



GMPI and EPI Manual Codes

Derwent World Patents Index | Edition 28



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GMPI and EPI Manual Codes

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GMPI and EPI MANUAL CODES

Introduction

This User Manual is intended to assist users of the General and Mechanical Patents Index (GMPI) and Electrical Patents Index (EPI) Service in making the best use of the classification and indexing (Manual Coding) scheme which Clarivate applies to all patents covered.

Background

Clarivate coverage of Engineering patents is divided into two main areas: the Electrical Patents Index (EPI) and the General and Mechanical Patents Index (GMPI).

EPI was introduced in 1980 (Update 198018), to provide an improved patent information alerting service for users whose interests lie in the electrical field. Coverage is arranged in six sections (S-X), each dealing with a fairly broad range of subject matter. Within these sections are the EPI classes, 50 in total, which provide a more precise breakdown of material (see Appendix 4 for details). Associated with each class is a set of Manual Codes applied by Clarivate technical staff to allow detailed retrieval.

More recently, GMPI has also been developed from its original structure of two sections (P and Q) incorporating 103 classes, to improve its focus on mechanical engineering patents and those of general interest. This involved the introduction of Manual Codes for the mechanical transportation field in 2006, for mechanical packaging in 2012, and for the remaining classes in 2015.

For both EPI and GMPI the codes form a hierarchical indexing system, mainly intended as an online retrieval tool, that is reviewed annually. For example, the EPI manual codes, which were originally based, in part, on the International Patent Classification (IPC), numbered approximately 1,900 when introduced and have been revised yearly with the latest revision (2023) now including over 14,200 active EPI Manual Codes. There are also now over 3,200 active GMPI Manual Codes, with 1,900 of those introduced in the 2015 manual code revision.

The annual Manual Code Revision (MCR) process, carried out in consultation with our customers, is designed to update the coding hierarchy in order to reflect changes in technology, provide finer subject matter breakdown to enable customers to find the information they need with precision and accuracy, and continue to develop an alternative technical viewpoint to that of the IPC.

Format of Manual Codes

Manual Codes are structured so that an increase in the number of characters represents a finer subject matter breakdown. For the 1992 revision, the permissible maximum length of manual codes was increased to ten characters (including the hyphen), the possible formats being shown below:

ANN	<i>Class</i>
ANN-A	<i>Generic Manual Code</i>
ANN-ANN	<i>Sub-group</i>

ANN-ANNA *Sub-group division*
ANN-ANNAN *Full Manual Code*
ANN-ANNANA *(9 or 10 digits)*

The class to which a Manual Code belongs is indicated by the characters preceding the hyphen, thus the codes are always sub-divisions of their related Class. It should be noted that leading zeros are used to preserve the correct hierarchy. The shortest possible Manual Code is thus of five characters length (e.g. S01-A).

Criteria for Assigning Manual Codes

Manual Codes are intended to highlight the novel aspects of an invention and are therefore normally assigned according to the claimed novelty. In addition, depending on either the electrical content of the invention itself, or its intended use, codes are applied to indicate the application of an invention. (For a fuller explanation of these criteria see Appendix 2).

It should be noted that Manual Codes are frequently used in combination to represent a particular topic, so that some subjects may be routinely assigned two or three Manual Codes.

Documents Assigned Manual Codes

Manual Codes are currently assigned to all Basic patents in EPI. Prior to Update 199510, EPI classes were assigned to title-only entries, except those for Chinese and Japanese patents, which were fully coded.

Transportation Codes

Mechanical transportation Q11-Q25 codes are applied to all patent documents from 200601 and are applied to highlight mechanical application or patents with mechanical novelty.

The Q codes are designed to be used in conjunction with one another in the same way as the electrical manual codes are assigned, and they may also be applied in conjunction with the electrical manual codes when appropriate.

Q11-Q25 codes are applied to cover the core transportation areas such as vehicles in general, trains, ships and aircraft.

From 200601-201582 mechanical Q codes are applied in two other areas: namely, Q5 (Engines; pumps; compressors, fluid pressure actuators) and Q6 (Engineering elements), either when:

- (i) The patent is in a transportation technology (indicated by the presence of the Q11-Q25 class) and the Q5 and Q6 code provides a more detailed breakdown of the patent novelty than any of the Q11-Q25 codes applied; or
- (ii) The patent has an unspecified application, though one that could be of use in the transportation field, e.g. a novel piston for an internal combustion engine of unspecified application.

Packaging Codes

Mechanical packaging Q3* codes are applied to all patent documents from 201201 and are applied to highlight mechanical application or patents with mechanical novelty. The Q3* codes are designed to be used in conjunction with one another in the same way as the electrical manual codes are assigned, and they may also be applied in conjunction with the electrical manual codes when appropriate.

General and Mechanical Codes

From 201501 DWPI Manual Codes are applied to all P* classes and to Q41-Q49, Q71-Q79 classes.

From 201601 DWPI Manual Codes are assigned to all P* and Q* classes including Q5* and Q6* classes irrespective of technology area, so that from 201601 all Engineering P-X classes must have corresponding manual codes.

Layout of the Manual

The manual is arranged in two sections:

Part 1

Codes in the eight sections P, Q, S-X are listed in alphanumeric order with details including the code definition, scope notes and associated search terms. For codes introduced post-1980 the year of introduction is indicated.

An annotated example of a typical entry in the manual is shown below:

<i>Manual Code</i>	X25-A08	[2006]	<i>Year of code introduction</i>
	3D printing / additive manufacturing		
	Details of 3D scanners are coded under T04-M05. See also X25-A06 for electrical aspects of working plastics.		
<i>Additional search terms</i>	<i>3D replicator, rapid prototyping, solid freeform fabrication, SFF, 3D modelling</i>		
	X25-A08A	[2016]	
<i>Code Title</i>	3D printing / additive manufacturing methods		
	X25-A08B	[2016]	
	3D printing / additive manufacturing apparatus		
<i>Expanded details and scope notes</i>	Computer control details of 3D printing / additive manufacturing machines are coded under T01-J07B3. For details of 3D scanners see T04-M05. For ink-jet printhead details see S06-G03.		
	<i>Extruder</i>		

Part 2

This comprises an overall keyword index to Part 1 of the manual, with 8 appendices as follows:

- 1 Brief Summary of EPI Subject Matter Coverage
- 2 Subject Index highlighting EPI Manual Coding Criteria
- 3 IPC - EPI Manual Code Approximate Concordance
- 4 Concise Guide to EPI and Mechanical Transportation Classification
- 5 Nanotechnology: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Nanotechnology industries
- 6 Green Technology: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Green technology
- 7 Internet-of-Things: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Internet-of-Things (IoT) technology
- 8 Digital Health: Quick reference guide listing all CPI, GMPI and EPI manual codes relating to Digital Health

Code Heading and Definition

In this new edition, many of the code descriptors have been re-worded and expanded to include details on how the code is applied and to provide references to other Manual Codes which might be of interest to the searcher for retrieval purposes.

Additional Search Terms

Additional terms immediately follow most code definitions. These comprise individual terms or groups of terms which might assist users in devising search strategies. The terms have been derived intellectually by Clarivate coders aided by online searches to determine the most frequently occurring terms in titles of records to which the code has been assigned.

In order to enhance retrieval, the searcher may also wish to use terms of interest in the code title definition itself and in the accompanying scope notes. In addition, terms appearing against higher level codes in the hierarchy may be employed, e.g.

P81-A	[2015]
Types of optical element, system or apparatus	
P81-A01	[2015]
Lens and lens systems	
Includes single lenses, multiple lenses/lens groups and variable refractive power lens/lens group.	
<i>Biconcave, biconvex, concave, convex, fluid-filled, glass lens, negative meniscus, plano-concave, plano-convex, plastic lens, positive meniscus,</i>	
P81-A01A	[2017]
Single lens	
This code covers individual lenses. Single lenses having variable refractive power are also assigned P81-A01V1.	

In this example, users interested in stators for optical lenses (P81-A01A) should consider terms of interest (e.g. plano-convex) under the broader code P81-A01, where terms equally applicable to both sub-divisions are listed.

It should be stressed that the lists of search terms are not comprehensive and users may find it necessary to use additional terms.

Year of Introduction

The year of implementation of codes added after the initial introduction of EPI in 1980 is indicated in parentheses immediately alongside the code, e.g. [1987], indicates the code was introduced from the start of 1987. If such a code is not a subdivision of an existing code, then the code to be searched in order to retrieve earlier records is given in parentheses following the code heading. If no year is shown alongside a code, this indicates the code was applied from the start of EPI, i.e. Update 198018.

In a few cases, revision of the Manual Codes has resulted in a particular code or code group being discontinued. These codes, which are indicated in the manual by an asterisk (*) following the code, remain valid for records prior to the year of revision.

Keyword Index

Part 2 of the GMPI & EPI Manual comprises an alphabetical index of the key terms appearing in the definition and associated with each Manual Code, together with the corresponding code. This index is used to guide the user to the correct code(s) in Part 1 of the manual, where in order to ensure correct retrieval the user should always consult the full definition for the code including any scope notes. To avoid ambiguity, the terms appearing in the index are mainly derived from the code definition and only a few of the additional search terms are indexed.

IPC - Manual Code Relationship

An IPC-to-Manual Code concordance at generic Manual Code level is provided at the end of this manual under Appendix 3. It should be noted that the concordance cannot be guaranteed and since the codes are intellectually applied, other codes may be assigned as appropriate according to the technical content of the patent.

Online Searching of Manual Codes

All Manual Codes are searchable in the Derwent World Patents Index online files.

Retrieval may be enhanced, depending on the scope of a Manual Code and the desired search, by combining it with other search terms, such as title/abstract words, title terms, IPCs, patentee names etc. These terms may be used to restrict the Manual Code to items of particular interest or to ensure full retrieval by defining the subject matter by use of other terms in addition to the Manual Codes. For additional information on online searching, please consult the relevant Clarivate Online User Guides for each of the hosts.

PART 1: General and Mechanical Patents Index (GMPI) & Electrical Patents Index (EPI)

Section P: General

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P1: Agriculture, Food, Tobacco

P11: Soil Working; Planting

Electrical details are coded under X25-N01. From 2015, manual codes have been assigned for all mechanical details of soil working and planting.

P11-A [2015]

Soil working (mechanical)

P11-A01 [2015]

Soil working using hand tools

Covers spades, shovels, hoes, rakes, etc.

Rake

P11-A02 [2015]

Soil working using ploughs

Includes man-driven ploughs, animal-driven ploughs, tractor-driven ploughs and self-driven ploughs. Also includes ploughs with rotary driven tools.

P11-A03 [2015]

Soil working using harrows

For the use of harrows in all soil working.

P11-A04 [2015]

Raking

Gatherers for removing stones, undesirable roots or the like from the soil, e.g. tractor-drawn rakes.

P11-A05 [2015]

Tilling

Includes soil preparations such as stirring and overturning of soil.

Tillage

P11-A06 [2015]

Making, covering furrows

Includes the formation of furrows by digging or dragging soil or any other process. Also involves any process for covering furrows.

P11-A99 [2015]

Other types of soil working

Includes aerating, thinning, loosening soil, etc. Also covers soil working using rollers, drags, etc.

Crumble roller

P11-B [2015]

Treating and fertilizing soil

P11-B01 [2015]

Fertilizing soil

Includes application of fertilizers, manuring, using dung distributors, etc.

P11-B02 [2015]

Other fertilizer related topics

Includes other fertilizer related topics like dung storage, aerating etc.

P11-B03 [2015]

Treatment of soil with agricultural actives

Includes e.g. in-furrow treatment of fungicides, herbicides, insecticides, plant-growth-regulators, etc.

P11-B04 [2015]

Treatment of soil with other types of chemicals/gases/additives

Includes soil treatment with all other types of chemicals or additives, e.g. soil conditioning agents e.g. for increasing water retention of soils, or sterilizing soil by steam. Also includes stone powders.

P11-B05 [2015]

Covering soil

Includes covering soil by agricultural foils or mulch.

P11-B99 [2015]

Other types of agricultural processes for soil treatment

P11-C [2015]

Planting and sowing

P11-C01 [2015]

Treatment of seeds

Includes coating / dressing seed, immunizing seed prior to planting.

P11-C02 [2015]

Germination of seeds

Includes germination of seeds and all testing or monitoring aspects of seeds before or during germination.

P11-C03	[2015]
Sowing and handling of seeds	
Includes apparatus or methods for sowing/distribution of seeds and any other handling of seeds.	
<i>Seed sowing, seed handling</i>	
P11-C03A	[2016]
Sowing	
Includes sowing/distribution of seeds in earth or substrate.	
<i>Sowing</i>	
P11-C03B	[2016]
Seed handling	
Includes seed or seedling transfer apparatus or method.	
<i>Seed handling</i>	
P11-C04	[2015]
Planting	
Includes methods/tools for planting seedlings/plants (including trees).	
P11-C99	[2015]
Other types of agricultural processes around sowing/planting	
P11-E	[2015]
Types of crop produced	
Codes in this section are used only in combination with appropriate codes in P11-A to P11-C sections.	
P11-E01	[2015]
Fruits and nuts	
P11-E02	[2015]
Vegetables and pulse crops	
Including vegetables, legumes, beans, sugar beet, etc.	
P11-E03	[2015]
Cereals and grasses	
Includes sugar cane, bamboo, rice, turf, lawn, etc.	
P11-E04	[2015]
Oil seeds and oil fruits	
Including e.g. rape, sunflower, olives, palm fruits, etc.	

P11-E05	[2015]
Fiber plants	
Including e.g. cotton, flax, sisal, etc.	
P11-E06	[2015]
Tea, coffee and herbs	
Including also hops, spices.	
P11-E07	[2015]
Mushroom/Fungi	
P11-E08	[2015]
Flowers and trees	
P11-E09	[2023]
Latex, resin, sap, syrup	
<i>Natural rubber, maple syrup</i>	
P11-E99	[2015]
Other types of crops	
P11-G	[2015]
Cleaning, maintenance/repair of soil working and planting systems	
Includes sharpening of blades, etc.	
P11-T	[2015]
Constructional details of soil working machines, tools	
These codes can be used in conjunction with other P11 codes to highlight the tool, e.g. blades for harrows are coded under P11-A03 and P11-T01.	
P11-T01	[2015]
Blades, teeth, discs	
Sharpening of teeth and blades are also coded under P11-G.	
P11-T02	[2015]
Frame, beam, handle	
Frames, beams, handles of equipment or tools for soil treating are coded here.	
P11-T03	[2015]
Lifting or adjusting arrangements for agricultural machines or implements	

P11-T04 [2015]

**Tractor or other driven soil working
vehicle construction**

Include parts and accessories to tractors for the purpose of soil working, e.g. coupling devices between tractor and machine/tool device.

P11-T99 [2015]

**Other constructional details of soil
working machines or tools**

Includes devices specially adapted for connection between animals or tractors and agricultural machines or implements.

P12: Harvesting

Includes all stages of harvesting, instruments and machinery used, types of produce harvested.

From 2015, manual codes have been assigned for all mechanical details of harvesting.

P12-A [2015]

Types of instruments and machinery for harvesting

P12-A01 [2015]

Hand instruments for harvesting

Includes all hand-cutting tools, such as scythes, rakes, forks, etc.

Sickles, knives, taps, augers

P12-A02 [2015]

Machines for harvesting; mowing

Includes digging machines, topping machines, mowers, lifters, and harvesters or mowers combined with threshing devices, or with apparatus performing additional operations while cutting, e.g. with haymakers or dispensing apparatus for e.g. fertilisers, herbicides etc. Also includes equipment for binding, packing or storing harvested produce.

Potato ploughs, grain crop lifters, combine harvester/mower, packers, knotters, needles, discharge arms, containers, sheaf counters, outside dividers, lawn mowers

P12-E [2015]

Types of crop harvested

P12-E01 [2015]

Fruits and nuts

P12-E02 [2015]

Vegetables and pulse crops

Including vegetables, legumes, beans, sugar beet, etc.

P12-E03 [2015]

Cereals and grasses

Includes sugar cane, bamboo, rice, turf, lawn, etc.

P12-E04 [2015]

Oil seeds and oil fruits

Including e.g. rape, sunflower, olives, palm fruits, etc.

P12-E05 [2015]

Fiber plants

Including e.g. cotton, flax, sisal, etc.

P12-E06 [2015]

Tea, coffee and herbs

Including also hops, spices.

P12-E07 [2015]

Mushroom/Fungi

P12-E08 [2015]

Flowers and trees

P12-E09 [2023]

Saps and syrups

Includes tapping trunks of rubber, maple, birch, walnut, pine etc. trees for natural rubber, latex, resin, maple syrup or other syrup-like substances.

Sapping, resin

P12-E09A [2023]

Natural rubbers and latex

Rubber tree

P12-E09B [2023]

Syrups

Includes tapping of e.g. acer and birch trees for saps / syrups.

Birch syrup, maple syrup

P12-E99 [2015]

Other types of crops

P12-G [2015]

Cleaning, maintenance/repair of harvesting tools and machines

P12-T [2015]

Constructional details of harvesting tools and machines

P12-T01 [2015]

Conveyors and other delivering mechanisms for harvesting machines

Conveyors, bunchers, standers, reels

P12-T02 [2015]

Sieving and separating mechanisms for harvesting machines

For separating stones or foliage etc.

P12-T03 [2015]

Centrifugal wheels, drums, or spinners

Scoop wheels, scoop tines, screening wheels

P12-T04 [2020]

Cutting parts of harvesting machinery

Includes blades, teeth, knives, cutting and picking mechanism.

P12-T05 [2020]

Handles, frames

P12-T10 [2015]

Safety mechanisms

P12-T15 [2023]

Taps and collectors

Includes taps and collection buckets used to collect latex, resin and syrup.

Tapping, sapping

P12-T99 [2015]

Other constructional details of harvesting tools or machines

P13: Plant culture; Dairy products

Covers horticulture, agriculture, new plants and processes, dairy products, etc.

From 2015, manual codes have been assigned for all mechanical details of plant culture and dairy products.

P13-A [2015]

Horticulture; Agriculture

Apart from soil working / harvesting (P11/P12).

P13-A01 [2015]

Greenhouse cultivation, Cultivation rooms

P13-A01 is a general code for greenhouses or greenhouse cultivation, used when specific codes below are not applied. P13-A01 is also used when novel greenhouse is claimed as a whole. Electrical details of greenhouses are coded under X25-N01. Also includes cultivation rooms to grow e.g. mushrooms.

P13-A01A [2015]

Regulation of temperature in greenhouse

Includes heating and cooling of greenhouse.

Heating, cooling

P13-A01B [2015]

Regulation of light in greenhouse

Regulation of light intensity or wavelength, artificial lighting.

P13-A01C [2015]

Regulation of ventilation/gases in greenhouse

Ventilation and controlling gas supply to greenhouses (e.g. CO₂).

P13-A01D [2015]

Regulation of watering in greenhouse

Includes watering methods/installations in greenhouses.

P13-A01E [2015]

Monitoring, measuring, testing methods in greenhouses

Includes methods and apparatus for monitoring greenhouse atmosphere or plant parameters.

P13-A01F [2015]

Other equipment or methods used for green houses

Includes conveyors in greenhouses.

P13-A02 [2015]

Plant receptacles, supports and barriers

Includes all containers, supports and barriers for plants.

P13-A02A [2016]

Pots, tubs and trays

Includes all plant containers, including cultivation bags and cultivation bottles.

P13-A02B [2016]

Trellis, supports and barriers

Includes damage protection barriers, root barriers for containment or protection, tree supports, climbing/growth supports etc.

Tree support, root barrier, trellis

P13-A03 [2015]

Forestry

Includes planting, transplanting, uprooting, felling or delimbing trees. See also P11 class for planting of trees.

P13-A04 [2015]

Methods and apparatus for plant protection

Includes methods for treatment of plants for protection against diseases/insects (e.g. using sprayers) or other dangers; treating plants using gases; generating heat, smoke, or fog in gardens, orchards, or forests. Also includes apparatus e.g. sprayers.

P13-A05 [2015]

Methods and apparatus for plant feeding

Includes methods for feeding of plants as far as not covered in P11 e.g. methods for foliar treatments e.g. using sprayers. Also includes apparatus, e.g. spreaders or sprayers etc.

P13-A06 [2015]

Water supply and management

Includes watering gardens, fields, sports grounds, plant pots, etc. Also includes methods or systems for reducing water run-off, evaporation, etc. Includes means of preventing soil erosion due to water. See also Q42-A11 for prevention of soil erosion.

P13-A07 [2015]

Other methods and apparatus for modifying growth of plants

Includes chemical or mechanical methods for modifying growth of plants except for protecting or feeding of plants (covered in P13-A04 and P13-A05 codes). Includes pruning. Also includes any tools or apparatus used for modifying plant growth.

P13-A08 [2015]

Methods and apparatus for monitoring status of crops and fields

Monitoring e.g. disease activity, growth and health of plant, humidity, temperature etc. Also includes any equipment used to monitor growth activity or conditions.

P13-A09 [2023]

Latex, resin, sap, syrup

Natural rubber, maple syrup

P13-A10 [2016]

Flower handling

Includes apparatus or methods for flower arranging, binding bouquets or wreaths, all aspects of flower preserving etc.

Flower bouquet, floral wreath, flower preserve

P13-A99 [2015]

Other horticulture or agriculture aspects

Includes other types of agricultural or horticultural methods or equipment not covered elsewhere.

P13-B [2015]

Plant propagation and modification

This section includes plant propagation and processes for modifying genotypes, phenotypes or plant reproduction by tissue culture techniques etc.

P13-B01 [2015]

Propagation of vegetative material

Includes propagation from seeds, cuttings, bulbs, artificial or natural dispersal of plants. Also includes propagation by scions, tissue culture, grafting, extraction, germination of material from plant buds, creating "artificial seed material", preparation of culture medium, etc. For regular seed planting, see P11 class.

P13-B02 [2015]

New plants or plant breeds

Includes methods using selection, hybridization or genetic engineering to modify or produce new plants.

P13-E [2015]

Types of crop cultivated

P13-E01 [2015]

Fruits and nuts

P13-E02 [2015]

Vegetables and pulse crops

Including vegetables, legumes, beans, sugar beet, etc.

P13-E03 [2015]

Cereals and grasses

Includes sugar cane, bamboo, rice, turf, lawn, etc..

P13-E04 [2015]

Oil seeds and oil fruits

Including e.g. rape, sunflower, olives, palm fruits, etc.

P13-E05 [2015]

Fiber plants

Including e.g. cotton, flax, sisal, etc.

P13-E06 [2015]

Tea, coffee and herbs

Including also hops, spices.

P13-E07 [2015]

Mushroom/Fungi

P13-E08 [2015]

Flowers and trees

P13-E09 [2023]

Latex, resin, sap, syrup

Natural rubber, maple syrup

P13-E99 [2015]

Other types of crops

P13-F [2015]

Dairy products

P13-F01 [2015]

Milking and primary milk treatment

Includes machines for milking or hand milking devices. Also includes primary milk treatment, i.e. sterilizing/pasteurizing processes.

P13-F02	[2015]
Secondary milk treatment	
Includes cream, butter and cheese manufacture. Includes kneading machines or hand devices for butter, devices for shaping butter or cheese, tanks for treatment of cream, etc.	
<i>Cheese coating</i>	
P13-F50	[2015]
Characterized by dairy product	
P13-F50A	[2015]
Milk	
P13-F50B	[2015]
Cream	
P13-F50C	[2015]
Butter	
P13-F50D	[2015]
Cheese	
P13-F50X	[2015]
Other dairy products	
P13-F99	[2015]
Other dairy product processing	
Includes extraction of nutrients from dairy products, fat skimming, etc.	
P13-G	[2015]
Cleaning, maintenance/repair of equipment	
This code should be used in conjunction with other P13 codes.	

P14: Animal Management and Care

P14-A [2015]

Animal husbandry; Animal care

P14-A01 [2015]

Housing and fencing; Animal training

Includes items for taming animals, such as nose-rings or hobbles.

Wing clamps

P14-A01A [2015]

Housing and fencing

Includes pigsties, dog kennels, rabbit hutches, and the cleaning equipment. Also includes tethering poles, incubators, floor grids for preventing cattle from straying (details of electrical fencing are coded under X25-X11 and X25-N02C), etc. Incubators are also coded under P14-A05. Insect/vermin traps placed in animal shelters should be coded in both P14-A01A and P14-B01. Also includes animal transit boxes, such as dog cages and crates.

Pasture, bird cages, chicken coops, brooders, poultry runs, dove-cots, beehives, artificial honeycombs, rearing-boxes, aquaria, terraria, pens

P14-A01B [2015]

Animal training

Mazes, labyrinths, animal behaviour

P14-A02 [2015]

Feeding and drinking

Feed troughs, feed pails, licking stone holders

P14-A03 [2015]

Washing and grooming

Includes curry-combs, fetlock rings, tail-holders, protection against weather conditions or insects. Also includes tools, such as clippers and shavers, for removing fleece from sheep, etc.

Dehorers, horn trainers

P14-A04 [2015]

Animal wear, including horse tack

Includes horse blankets/covers, hoods, blinders/blinkers, saddles, etc. Also includes leads for pets and jackets for dogs and cats.

Muzzles, collars

P14-A05 [2015]

Animal breeding equipment

Includes rearing or breeding of animals, including new breeds of animals, and devices for assisting or preventing mating.

Incubators

P14-A06 [2015]

Shoeing

Covers shoeing of horses but also other animals such as oxen, etc. Includes horseshoes, horseshoe nails and tools used by a farrier, such as elastic inserts, calks, studs, etc.

Soles, ice-spurs, hoof care

P14-A07 [2015]

Milking

Electrical details of milking are covered by X25-N02B.

Milking station

P14-A99 [2015]

Other details of animal husbandry

Includes marking of animals, devices for sorting and cleaning eggs, tools for collecting honey, bee-smokers, bee-keepers' accessories, such as veils, etc. Also includes animal transport, such as safety harnesses, car guards, animal ramps, restraints, etc.

Manure pouch, urine pouch, honey strainers, carriers, ear tag

P14-B [2015]

Catching, hunting, trapping or scaring of animals; Fishing

P14-B01 [2015]

Scaring, catching or killing of animals; Insect repellent

Includes devices for attracting insects, devices for dispensing poison, bird-scarers, traps, etc. Also includes hunting appliances, such as shooting stands, beater rattles, decoys, etc. This code can be used with P14-E codes to highlight the type of animals scared, caught or killed. Insect/vermin traps placed in animal shelters should be coded in both P14-A01A and P14-B01.

Fly papers, fly-swatters, nets, fumigators, flame-throwers, scarecrow, mosquito repellent

P14-B02 [2015]

Fishing

Includes fishing nets, artificial baits, fishing rods, etc.

Landing-spoons, fish-spears, fishing lines

P14-E	[2015]
Types of animals	
P14-E01	[2015]
Classes of animals	
P14-E01A	[2015]
Mammals	
P14-E01B	[2015]
Birds	
<i>Aviculture</i>	
P14-E01C	[2015]
Fish	
P14-E01D	[2015]
Reptiles	
P14-E01E	[2015]
Amphibians	
P14-E01F	[2015]
Invertebrates	
Includes insects, millipedes, shrimps, crabs, spiders, scorpions, etc.	
<i>Crustaceans, apiculture, mussels</i>	
P14-E02	[2015]
Primary use of animals	
P14-E02A	[2015]
Livestock; Farming	
Includes cattle, pisciculture, aviculture, poultry, etc.	
<i>Horse, cows, sheep, pigs, fish-farming, bee-keeping</i>	
P14-E02B	[2015]
Domestic pets	
<i>Cats, dogs, ferrets, guinea pigs, mice, fish, chameleons</i>	
P14-E02C	[2015]
Laboratory animals	
P14-E02X	[2015]
Other specific uses of animals	
P14-G	[2015]
Cleaning, maintenance/repair of equipment for animal care	

P14-X	[2015]
Other details of animal care	

P15: Tobacco

From 2015, electronic cigarettes will not carry a P15 class anymore, but will solely be coded under X27-A02F.

P15-A [2015]

Types of tobacco

P15-A01 [2015]

Tobacco for pipes, cigars and cigarettes

Kretek, beedi, bidi

P15-A02 [2015]

Chewing tobacco; Snuff

Includes dipping tobacco.

Tobacco gum, snus

P15-A03 [2015]

Non-consumable tobacco

Includes tobacco water and topical tobacco paste.

P15-A09 [2015]

Other specific types of tobacco

P15-L [2015]

Tobacco harvesting and processing

P15-L01 [2015]

Planting, irrigation and harvesting of tobacco

Electric details of soil working and harvesting are coded under X25-N.

P15-L05 [2015]

Tobacco processing

Includes sifting, sorting, removing impurities from tobacco, blending, roasting, cooling, stripping and cutting tobacco. Also includes arrangements for feeding tobacco leaves in the cutting apparatus and other tools used during the tobacco processing. Includes chemical and bio-chemical treatment of tobacco, e.g. to form reconstituted tobacco. Electrical details of tobacco manufacturing are coded under X25-P03.

Cleaning, curing, flavouring, puffing, crimpling, tobacco-twisting

P15-M [2015]

Manufacture of cigars and cigarettes

Includes forming tobacco bunches followed rolling, curing and wrapping final cigars. Also includes forming paper tubes, filling tubes, conveying cigarettes, branding each cigarette and packaging finished products. Packing details are coded under Q31 to Q34 codes, and electrical details of packing are also coded under X25-F03A. Also includes hand-driven devices for making cigarettes, such as cigarette rolling machines, rolling boxes, etc.

Packaging, rolling mat, rolling tray

P15-T [2015]

Constructional details of tobacco products and related accessories

P15-T01 [2015]

Filter tips; Mouthpieces

P15-T02 [2015]

Cigarette paper and tubes

Includes dipping tobacco.

Tobacco gum, snus

P15-T03 [2015]

Tobacco smoking paraphernalia

Includes pipes, hookahs, argghilas, etc. Includes support and cleaning implements, and seasoning of tobacco pipes. Mouthpieces of pipes are also coded under P15-T01.

Bowl, pipe cleaner, pipe tamper

P15-T04 [2015]

Packaging of tobacco products

Includes bands for cigars or cigarettes, and boxes for cigarette and cigarette papers. Packaging details are also covered under Q32, Q33 and Q34.

Cigar case, tobacco pouch

P15-T99 [2015]

Other constructional details

Includes matchboxes, tobacco stoppers, cigar/cigarette holders, ashtrays, cigar cutters, device for producing smoke images/rings, lighters, etc. Electrical details of lighters are coded under X27-G01.

Cigar slitters/perforators, humidors

P15-X [2015]

Other tobacco aspects

P2: Personal, Domestic

P21: Wearing Apparel

From 2015, manual codes have been assigned for all mechanical details of clothes. Electrical details are covered by X27-A02B code.

P21-A [2015]

T-Shirts, shirts and vests

Includes blouses, jerseys, sweaters, etc.

Cardigan

P21-B [2015]

Trousers and shorts; Skirts and dresses

P21-B01 [2015]

Trousers and shorts

Includes dungarees.

Bermuda, leggings, jeggings, chinos

P21-B02 [2015]

Skirts and dresses

Minis, micros, kilts

P21-C [2015]

Coats and jackets

Includes overcoats, raincoats, capes, etc.

P21-D [2015]

Sportswear (excludes sport shoes)

Includes swimwear (including swimming aids), wristbands and headbands used during sporting activities. Swimming aids are also coded under P21-N. Sport shoes, e.g. running shoes, are coded under P22 only. Swimming gloves, boxing/golf gloves are also coded under P21-H. See also P36-A08A for sportswear.

Bathing suits, trunks

P21-E [2015]

Undergarments; Hosiery; Nightwear

Includes underwear, bathrobes, pyjamas, nightdresses, nursing bras (also coded under P21-K), legwarmers, etc. Socks are also coded under P22-C. Also includes absorbing material embedded in e.g. underwear. Diapers are also coded in P32-A60.

Corsets, brassieres, knickers, underpants, petticoat, panti-hose, tights, stay-ups, stockings, drawers, girdles

P21-F [2015]

Headwear

Includes hats, caps, helmets (including chin straps and visors), wigs, masks and dominoes, veils and fascinators. Also includes artificial eyelashes and eyebrows. Includes face coverings worn in public places (shops, banks, public transport, etc) to protect the public from against germs/viruses spread through coughing or sneezing. These protective masks are also coded under P35-A03C.

Toupee, hair extensions, hairpiece

P21-H [2015]

Gloves and scarves; Ties and bow-ties

Includes operating gloves, swimming gloves, baseball/boxing/golf gloves, etc. Sporting gloves are also coded under P21-D.

Snood, mittens, head-scarf, necktie

P21-K [2015]

Baby/children clothes and linen

Includes bodysuits, swaddling cloths, bibs, etc. Nursing bras are also coded under P21-E. Also includes maternity clothing.

P21-L [2015]

Belts, suspenders and other fasteners

Includes braces, suspenders for socks or stockings. Also includes trouser clips used by cyclists.

Shoulder strap

P21-M [2015]

Manufacture of clothes

Electrical details of clothes manufacturing are coded under X25-T codes. Includes tracing wheels, cloth holders, cushions or boxes for needles and pins, etc. Also includes patterns, dress forms and bust forms.

Tailor aids

P21-N [2015]

Protective clothing

Includes overalls, apron, knee protectors, etc. Also includes swimming aids. Safety shoes are coded under P22-F04 only.

Face masks, gaiters, surgeon gown, protective gloves, helmet

P21-T [2015]

Constructional details

This code should be used in conjunction with other P21 codes to highlight the garment.

P21-T01 [2015]

Collars, sleeves and pockets

Includes cuffs and lining.

Closures, collar-studs, stiffeners, armhole

P21-T50 [2015]

Novel constructional materials

Includes novel materials only. Can be used in conjunction with other P21 codes to indicate material application.

P21-T99 [2015]

Other specific constructional details

P21-X [2015]

Other wearing apparel

Includes handkerchiefs and artificial or natural feathers and flowers.

P22: Footwear

From 2015, manual codes have been assigned for all mechanical details of footwear. Electrical details are covered by X27-A02B1B.

P22-A [2015]

Shoes and sandals

Includes slippers and trainers. Sport shoes are also coded under P22-F03. Also includes over-shoes.

Brogues, court shoes, flats, loafers, pumps, wedges, clogs, mules, ballerina, slip-on, dockside, flip flops, shoe cover, overshoes

P22-B [2015]

Boots

Includes safety boots (see also P22-F04 for safety shoes).

Ankle boots, knee-length boots, rubber boots, booties, thigh-high, knee-high, cowboy boots

P22-C [2015]

Socks

Hosiery, e.g. tights and stockings, are coded under P21-E01. Includes arrangements for securing socks to shoes.

P22-F [2015]

Main types of footwear

P22-F01 [2015]

Shoes for babies and children

P22-F02 [2015]

Shoes for dolls and other toys

P22-F03 [2015]

Sport shoes

Includes shoes and boots for activities such as athletic events, ball games, cycling, climbing, skiing, skating and dancing.

Running shoes, climbing shoes, football shoes, ski boots, tennis shoes, dancing shoes, skating boots, ballet

P22-F04 [2015]

Safety shoes, e.g. hospital footwear

Sport shoes e.g. football boots, are coded in P22-F03.

Nursing clogs, theatre mules, surgical clogs, safety boots

P22-F05 [2015]

Orthopaedic shoes

Includes ventilated shoes, shoes with specific foot-supporting parts or shock absorbers, etc.

Insert, in-step support, toe spacer, toe spreader

P22-M [2015]

Manufacture of footwear

Electrical details of clothes manufacturing are coded under X25-T codes. Includes machines for making laces.

Goodyear welt, lasts, shoemaking, presses, flexing, shoe gluing, heel cutter

P22-T [2015]

Constructional details of footwear

P22-T01 [2015]

Soles, insoles and heels

Includes details of separate inserts and detachable wheels attached on reverse of soles.

Stiffener

P22-T03 [2015]

Uppers, boot legs and tongues

Includes sandal straps (also coded under P22-T05).

P22-T04 [2015]

Welt and lining

P22-T05 [2015]

Laces and other fastenings

Includes hooks and eyelets for laces, zips, snap buttons, buckles, fasteners with toggle levers, etc.

Hook and loop fastener, slide/glide fastener

P22-T06 [2015]

Wear-resisting and safety arrangements

Includes non-skid attachments e.g. ice-spikes, spurs, studs

Steel toe cap, metal plate, skid-proof

P22-T50 [2015]

Novel footwear materials

Includes novel materials used to form footwear.

Can be used in conjunction with other P22-T codes to indicate material applications.

P22-T99 [2015]

Other constructional details

Includes decorative buckles.

Ornamental

P23: Haberdashery and Jewellery

From 2015, manual codes have been assigned for all mechanical details of haberdashery and jewellery. Electrical details of jewellery are covered by X27-A02B2.

P23-A [2015]

Haberdashery

Includes all types of closures. Tools used to manufacture clothes, such as tracing wheels, cloth holders, cushions or boxes for needles and pins, etc are coded under P21-M.

P23-A01 [2015]

Buttons

Includes press-buttons, and collar studs.
Press-studs, snap fasteners

P23-A03 [2015]

Cuff-links

Sleeve-links

P23-A04 [2015]

Retainers for ties and cravats

Includes retainers for neckties, cravats, neckerchiefs, such as tie-clips, spring clips, etc.
Tie pin

P23-A05 [2015]

Pins

Includes hat pins, scarf pins and safety pins. Tie pins are also coded under P23-A04.
Brooches

P23-A06 [2015]

Buckles, Lanyards

Includes buckles for safety belts. Safety belts are also coded under Q14-C01.
Seat belts

P23-A07 [2015]

Zippers and other slide fasteners

Fly

P23-A08 [2015]

Hook and eye fasteners; hook and loop fasteners

Includes touch-and-close fasteners.

P23-A50 [2015]

Novel constructional materials for haberdashery

This code should be used in conjunction with other P23-A codes.

P23-A99 [2015]

Other types of haberdashery

Includes key-rings, and cards for buttons, collar-studs or sleeve-links.

P23-C [2015]

Jewellery and coins

P23-C01 [2015]

Brooches, clips, medals and badges

Brooches are also coded under P23-A05.

P23-C02 [2015]

Bracelets, necklaces, pendant and charms

Includes fastening arrangements for bracelets and wrist-watch straps. Pendants are coded under P23-C04 only. Constructional details of watches are coded under S04-A.

Rosaries, chains, watch-chains, wristband

P23-C03 [2015]

Rings, earrings and body piercing

Includes rings worn around the finger or toe. Also includes equipment for piercing the ear-lobes.

Finger rings, toe rings, signet ring, piercing rings, piercing bar

P23-C15 [2015]

Safety arrangements

Includes arrangements for securing the item of jewellery, e.g. bracelet, to the wearer to prevent loss or theft.

Safety chains

P23-C20 [2020]

Gem settings

Includes arrangements for securing the gem to the piece of jewellery. This code should be searched in conjunction with other P23-C codes. Also includes setting tools. Manufacturing details are coded under P23-M.

Bezel, channel, claw, prong, rose head, buttercup setting, illusion setting

P23-C30 [2015]

Coins

Includes gambling coins, slot machine tokens, cart tokens.

P23-C50 [2015]

Novel constructional materials for jewellery and coins

This code should be used in conjunction with other P23-C codes.

P23-C99 [2015]

Other types of jewellery

Includes connectible jewellery, and fancy wear such as crosses and crucifixes.

P23-M [2015]

Manufacture of haberdashery and jewellery

This code should be used in conjunction with P23-A or P23-C codes. Arrangements for securing the gem to the piece of jewellery are coded under P23-C20.

P24: Hand and Travelling Articles; Brushes

From 2015, manual codes have been assigned for all mechanical details of clothes. Electrical details are covered by X27 codes.

P24-A [2015]

Walking sticks, umbrellas and handheld fans

P24-A01 [2015]

Walking sticks

Includes walking aids for blind persons, and walking sticks convertible into seats. Walking sticks convertible into umbrellas are also coded under P24-A02. Electric details of walking sticks are coded under X27-A02E.

Hunting sticks

P24-A02 [2015]

Umbrellas

Walking sticks convertible into umbrellas are also coded under P24-A01. Electrical details of umbrellas are coded under X27-A02.

Parasol

P24-A03 [2015]

Handheld fans

P24-B [2015]

Purses, luggage, handheld bags and cases

Includes shopping bags, handbags, beach bags, bags for shoes, rigid and semi-rigid luggage, such as suitcases, trunks, travelling baskets, sleeves or socks for mobile phones, etc. Also includes sacks that can be transformed into a different article, such as a rucksack turning into a tent, a mattress, a coat, a sleeping bag, etc. This type of bag is also coded under P24-D (camping equipment). Also includes boxes or cases for specific items, such as hat boxes, cases for telescopes, pocket holders for stamps or coins, jewel boxes, water-tight boxes used during swimming, key wallet, camera cases, etc. Make-up boxes and lipstick cases are coded under P24-C04.

Backpack, money-bag, wallet, guitar case, spectacle case, watch case, picnic box, protective shell, storage box, nursing bag, trauma bag

P24-C [2015]

Hairdressing and shaving equipment; beauty and cosmetic treatment

P24-C01 [2015]

Hairdressing equipment

Includes equipment for hair-curling or hair-waving, hair pins, hair grips, hair combs, and equipment for hair salons, such as backward lavabos, hair-colouring caps, spray heads, hairdressers' chairs or portable wash stands. Also includes processes for waving, straightening or curling hair, such as chemical processes, and equipment used for attaching/removing hair extensions. Hairbrushes are also coded under P24-E.

Hair clamps, hair clasps, hair nets, hair protecting caps, hair extensions, eyelash curler

P24-C02 [2015]

Shaving equipment

Includes gloves or brush used for lathering, shaving mugs, containers for storing shaving paraphernalia. Also includes tweezers. Details of electric razors are coded under X27-A02A3B.

Shaving mirrors, skin stretchers, shaving brush

P24-C03 [2015]

Manicure and pedicure equipment

Includes nail clippers and nail files, cuticle sticks, finger-supports, and boxes for storing manicure/pedicure equipment. Also include artificial nails.

Nail cutters, nail-tip shapers

P24-C04 [2015]

Accessories/container for toilet/cosmetic products

Includes accessories such as powder puffs, masks for marking lips or eyelashes, etc. Also includes containers such as perfume bottles, make-up boxes, lipstick, boxes for shaving soap, container for artificial teeth, etc. Details of packaging for cosmetic products are coded under Q32 to Q34 codes.

Cosmetic box

P24-C99 [2015]

Other toilet/cosmetic equipment

Includes pocket mirrors (shaving mirrors are also coded under P24-C02).

Hand mirror

P24-D [2015]

Camping equipment

Includes tents, water bottles, hammocks, hanging seats, mosquito nets, mini camping stoves, metal plates and mugs, etc. Bags, such as rucksacks convertible into e.g. a tent, a mattress, etc, are also coded under P24-B. Also includes attachments for fastening e.g. books, hats, etc to the tent, or hammocks, etc.

Tent spikes

P24-E [2015]

Brushes

Includes details of bristles, handles, integrated reservoir for e.g. paint, paste, water. Also includes paint rollers and accessories for brushes, such as protective covers and special devices for cleaning brushes after use.

Details of electric toothbrushes are coded under X27-A02A3A.

Toothbrush, paint brush, hair brush, comb

P24-M [2015]

Manufacture details

This code should be used in conjunction with other P24 codes.

P25: Office and Home Furniture

From 2015, manual codes have been assigned for all mechanical details of office and home furniture. Electrical details are covered by X27-A03.

Does not include chairs, beds, sofas and mattresses; these are coded under P26 codes only. P25 codes cover tables, wardrobes and cabinets.

P25-A [2015]

Tables

Includes benches combined with such as school desks.

Nesting table, wall table

P25-A01 [2015]

Types of tables

P25-A01A [2015]

Desks

Includes school desks, writing tables, drawing desks, pulpits and lecterns. Desks for computers are also coded under T04-L codes.

School bench, workstation, conference table, computer desk

P25-A01B [2015]

Bedside tables

Dressing tables are also coded under P25-C01C.

P25-A01C [2015]

Garden tables

P25-A01D [2015]

Dining/breakfast tables

Includes tables for restaurants and dining rooms. Also includes food trays.

Kitchen table, breakfast bar, coffee table

P25-A01X [2015]

Other specific type of tables

Includes sewing tables, tea trolleys and game tables. Also includes operating tables.

Card table, ironing table, billiard table, table tennis table

P25-A02 [2015]

Components of tables

P25-A02A [2015]

Table tops

P25-A02B [2015]

Legs and underframe

Feet

P25-A02C [2015]

Drawers

Includes sliding arrangements and handles of drawers.

Sliding tray

P25-A02D [2015]

Arrangements for modifying the size of the table

Includes folding and extending arrangements.

Stowable table, extensible table, drop-leaves, telescopic table

P25-A02X [2015]

Other components of tables

P25-B [2015]

Wardrobes

Includes details of doors, hanging arrangements, interior drawers and wardrobe fixings such as hinges and handles. Also includes mirror attached to the doors.

P25-C [2015]

Cabinets

Includes racks and shelf units.

Cupboard

P25-C01 [2015]

Types of cabinets

P25-C01A [2015]

Bookshelves and office cabinets

Bookcase, filing cabinet

P25-C01B [2015]

Kitchen and bathroom cabinets

Includes cocktail cabinets, cabinet for perishable items, such as meat safes, bottle racks, and fruit or vegetable storage cabinets.

Welsh dresser, medicine cabinet

P25-C01C [2015]

Bedroom and dining room cabinets

Includes chests of drawers, dressing tables (also coded under P25-A01B) and bedside cabinets.

Also includes television stands (see also W03-A09C), radio stands, record cabinets.

P25-C01X [2015]

Other specific types of cabinets

Includes shoe cabinets and racks for skis or guns.

P25-C02 [2015]

Components of cabinets

Includes systems for modifying the size of the cabinet.

P25-C02A [2015]

Feet and casing

Carcass, partition wall, upright, strut, wheel

P25-C02B [2015]

Shelves arrangements

Includes book-ends. Shelving systems for e.g. supermarkets are also coded under P27-A01.

Book trough

P25-C02C [2015]

Drawers and doors

Includes sliding arrangements.

P25-C02D [2015]

Handles and other fittings

Knobs, key plate, ornaments

P25-C02X [2015]

Other components of cabinets

P25-L [2015]

Convertible/stackable furniture; multi-purpose furniture

Includes furniture that can be converted into other types of furniture. This code can be used in conjunction with other P25 codes to highlight the different functions. Also includes dual-purpose furniture, e.g. a table combined with a seat. Reconfigurable furniture for vehicle cabins are coded under Q14-T only.

Combination

P25-M [2015]

Manufacture of office and domestic tables, wardrobes and cabinets

This code should be used in conjunction with other P25 codes.

P25-X [2015]

Other home and office furniture

Does not include chairs, beds, sofas and mattresses; these are coded under P26 codes only. Includes easels or stands for maps, blackboards, etc.

Umbrella stand

P26: Chairs, Sofas and Beds

From 2015, manual codes have been assigned for all mechanical details of chairs, sofa and beds. Electrical details are covered by X27-A03.

Does not include tables, wardrobes and cabinets; these are coded under P25 codes only. P26 codes cover chairs, beds, sofas, mattresses and all furniture for babies and children.

Prior to 2012, details of upholstery were coded under Q39.

Upholstery

P26-A [2015]

Chairs and benches

Stool, hassock, rocking chair, seat

P26-A01 [2015]

Types of chairs and benches

Children chairs are also coded under P26-E.

P26-A01A [2015]

Home or office chairs

Includes armchairs and garden chairs. Armchairs are also coded under P26-B01.

Workshop, high chair, gaming chair

P26-A01B [2015]

Hairdressers, barbers or dentist chairs

Includes disabled chairs. Electrical details of disabled chairs and dentist chairs are coded under S05-K and S05-E01, respectively.

Operating chair

P26-A01C [2015]

Theatre/cinema/church benches and chairs

Includes chairs/stools for restaurants.

Stadium chair, tipping-up chair, confessional bench, prayer stool, kneeling stool, public bench

P26-A01D [2015]

Folding/collapsible/stackable chairs

Includes dismountable chairs and booster seats attached to e.g. dining chairs.

Camping chair, garden chair, beach chair, trunk chair, inflatable chair, nesting chairs

P26-A01F [2015]

Vehicle seats

Includes seats for cars, bikes, scooters, etc. See also Q14-A.

P26-A01X [2015]

Other types of chairs

Milking stool, music stool, bean bag, rocking chair

P26-A10 [2015]

Constructional details of chairs and benches

P26-A10A [2015]

Seats, armrests, headrests and backrests

Includes details of folding and reclining arrangements, and seat padding. Footrests are coded under P26-A10B only.

Frame, cushion, back support

P26-A10B [2015]

Legs and feet

Includes footrests.

Caster wheel

P26-A10X [2015]

Other constructional details of chairs and benches

Includes hooks to attach bag or coat, such as on theatre chairs. Also includes protective covers, e.g. to protect against rain.

Cup holder

P26-B [2015]

Sofas, armchairs and beds

Divan

P26-B01 [2015]

Sofas and armchairs

Includes armrests, footrests, hidden storage, feet and legs. Armchairs are also coded under P26-A01A.

Couch, settee

P26-B02 [2015]

Beds

Includes bedsteads and headboards. Beds installed in vehicles are also coded under Q14-B.

Cots, day-bed, wall bed, hammock, suspended bed

P26-B03 [2015]

Sofa-beds, chair-beds and wardrobe-beds

Includes folding arrangements.

Futon, cabinet bed, table bed, trunk bed

P26-C [2015]

Mattresses and cushions

Includes spring, foam or fluid mattresses. Pillows are coded under P27-B02. Seat cushions of chairs are also coded under P26-A10A.

P26-E [2015]

Furniture for children; Child-proofing arrangements

This code can be used in conjunction with P25 or other P26 codes to highlight the piece of furniture, e.g. chair, bed, etc. Includes high chairs, cradles, cots, but also other nursery accessories such as baby carriers, playpens, safety harnesses, etc. Electrical details of baby equipment are coded under X27-X01. Includes general child-proofing arrangements, such as corner protectors, window restrictors, anti-tip straps for heavy furniture, etc. This code is to be used in conjunction with other P codes to specify the type of furniture the child-proofing item is connected to, e.g. P25-C01B for kitchen and bathroom cabinets, X27-F01 for fridges, etc.

Dressing table, changing table, rocking chair, carrycot, baby gate, baby proofing kit

P26-F [2015]

Accessories for chairs, benches, sofas, beds and mattresses

This code is used in conjunction with P26-A or P26-B codes. Includes loose furniture covers and insect nets (see also P27-C). Bedspreads are also covered under P27-B02.

Throw

P26-M [2015]

Manufacture of chairs, sofas and beds

This code should be used in conjunction with other P26 codes.

P27: Shops and Household Furnishing

From 2015, manual codes have been assigned for all mechanical details of shop and household furnishing. Electric details are coded under X27.

P27-A [2015]

Furniture and fittings for shops, restaurants and warehouses

Tables and chairs are coded under P25-A and P26-A, respectively.

P27-A01 [2015]

Racks and cabinets for displaying/storing merchandise

Includes dispensers for granulated materials, vending jars, display stands, dummies, etc. Refrigerated cabinets are also coded under X27-F. Also includes shelving units in warehouses or storage facilities.

Showcase, bust, wire figure, shop window display

P27-A02 [2015]

Shop, bar or bank counters

Includes paying counters.

Check-out counter

P27-A99 [2015]

Other furniture and fittings for shops, restaurants and warehouses

Includes plastic protective screens used in e.g. checkout areas or bank counters to protect staff and customers against germs and viruses spread through coughing or sneezing.

Changing rooms, sneeze guards, protective counter screens

P27-B [2015]

Household and table equipment

Cookware, such as pots and pans, are coded under P28-A02 only. Details of tables per se are coded under P25-A.

P27-B01 [2015]

Mirrors and picture frames

Shaving mirrors are coded under P24-C02.

P27-B02 [2015]

Bed linen and towels

Includes bedspreads, sleeping bags, blankets, pillows and travelling rugs. Cushions are coded under P26-C02. Paper towels are coded under P28-B03.

Throw

P27-B03 [2015]

Tableware, glassware, cutlery and table linen

Includes plates, bowls, serving dishes, glasses, jugs, cups, etc. Also includes table linen, such as napkins and tablecloths, and tea/coffee pot cosies.

Knives, forks, spoons, wine decanter, crockery, tea pot, egg cup, sugar tongs, serving tray, drinking straw

P27-B04 [2015]

Carpets and rugs

Includes stair runners and stair rods.

P27-B05 [2015]

Clothes hangers and racks

Includes clothes racks, hat rack, coat hangers, umbrella stands, shoe horns, etc.

Hat holder, necktie holder

P27-B06 [2015]

Religious decorations

Includes altars, Christmas trees, Christmas decorations, religious shrines, fonts, etc.

Christmas tree stand

P27-B99 [2015]

Other household and table equipment

Includes screens such as fire screens, flower vases, wall boards, paper baskets, key holders, letter boxes, incense burners, etc. Incense burners used during religious celebrations are also coded under P27-B06 and incense burners used as mosquito repellent are also coded under P14-B01.

P27-C [2015]

Curtains and blinds

Includes curtain rods/rails, pelmets, runners, gliders, and arrangements for opening/closing blinds and curtains. Electrical details are coded under X27-T. Also includes mosquito nets (see also P26-F when the net is attached to e.g. a bed).

Pleat curtain tape, net curtain

P27-M [2015]

Manufacture of shops and household furnishing

This code should be used in conjunction with other P27 codes.

P28: Kitchen and Sanitary Equipment

From 2015, manual codes have been assigned for all mechanical details of kitchen and sanitary equipment. Electrical details are covered by X27 codes.

P28-A [2015]

Kitchen equipment

Electrical kitchen appliances, such as toaster or coffee machines, are coded under X27-B. Cooking appliances are coded under X27-C. All details of refrigerators are coded under X27-F. Tableware, such as crockery, cutlery and glassware, are coded under P27-B03 only.

P28-A01 [2015]

Food and beverages preparation

Includes kitchen gadgets and utensils such as vegetable slicers, juicers, garlic presses, zesters, egg slicers, ladles, mechanical timers and scales, etc. Also includes cafetieres and espresso makers.
Citrus peeler, tin/can opener, coffee grinder, salt and pepper grinder, egg whisk, nutcracker, sifter, coffee mill

P28-A02 [2015]

Cookware and ovenware

Includes saucepans, woks, oven trays, casserole dishes, poachers, fish tins, etc. Also includes dish warmers and barbecues.
Frying pan

P28-A03 [2015]

Kitchen storage

Includes bread bins, spice racks, plastic containers for food, etc.
Bread box

P28-A99 [2015]

Other kitchen equipment

Includes holders for cooking books, oven gloves, aprons, vacuum flasks, splashguard for sink, etc.
Cutting board

P28-B [2015]

Sanitary equipment and toilet accessories

Bathroom cabinets are coded under P25-C only.

P28-B01 [2015]

Wash-stands and sinks

Also includes stoppers for sinks and baths, and bathroom cabinets placed underneath sinks.
Wash-basins

P28-B02 [2015]

Baths and showers

Includes bidets, shower screens, shower curtains, and anti-slip mats, etc. Bath stoppers are included in P28-B01. Electric details of baths and showers are coded under X27-A02A4.

Bath feet

P28-B03 [2015]

Bathroom accessories and linen

Includes soap and toothpaste dispensers, soap holders and dishes, towels, toilet roll and towel holders/racks. Also includes washing accessories such as bathing sponges. Towels and anti-slip mats placed in the bath are also coded under P27-B02.

Loofah, shower cap, toothbrush holder, bath mats, bathroom storage, bathroom bin, towel rail, bathroom caddy

P28-B04 [2015]

Toilets

Includes flush-less toilets, such as chamber pots or urinals, hand tools for cleaning the toilet bowl, cover for toilet seat, and toilet seat specially adapted for children. Electrical details of toilets are coded under X27-L.

Hinge, toilet brush, toilet seat

P28-B99 [2015]

Other sanitary equipment

P28-C [2015]

Domestic cleaning and washing

Electrical cleaning and washing appliances are coded under X27-D. All details of washing machines, dishwashers, tumble dryers, and vacuum cleaners are coded by X27-D01A, X27-D01B, X27-D02 and X27-D03, respectively.

Cleaning caddy

P28-C01 [2015]

Equipment for cleaning windows

Includes cloths, sponges, pads, and equipment for cleaning blinds.

Squeegee, wiper

P28-C02 [2015]

Equipment for cleaning floors, walls, carpets, and upholstery

Includes brooms and brushes, buckets, dustpans, and mops. Brushes for cleaning shoes are coded under P28-C04 only.

Upholstery/carpet beater

P28-C03 [2015]

Equipment for cleaning/drying crockery

Includes basins, draining boards, and equipment for polishing cutlery.

Sponge

P28-C04 [2015]

Equipment for cleaning/polishing footwear

Shoe brush

P28-C05 [2017]

Equipment for cleaning/drying/ironing clothes

Includes mechanical details only of clothes lines and ironing boards. Electrical details are coded under X27-L and X27-D09, respectively.

Clothes pegs, pedal washing machine

P28-C99 [2015]

Other specific cleaning or washing equipment

Sink plunger

P28-M [2015]

Manufacture of kitchen and sanitary equipment

This code should be used in conjunction with other P28 codes.

P3: Health, Amusement

P31: Diagnosis, surgery

From 2015, manual codes have been assigned for all mechanical details of diagnostic and surgical apparatus. Electrical details are covered by S05 class.

P31-A [2015]

Diagnosis or surgery apparatus

P31-A01 [2015]

Surgical tools and instruments

Includes cutters e.g. scalpels; clamps and retractors; distractors and positioners; sealing and stapling devices; dilators, specula.

P31-A05 [2015]

Diagnostic devices

Includes measurement devices e.g. rulers, calipers; percussion instruments for tapping on a surface to determine the underlying structure; Auscultation devices e.g. stethoscopes.

Pleximeter

P31-A99 [2015]

Other types of diagnosis or surgery apparatus and systems

For operating theatre and dental surgery equipment see P33-A10.

P31-B [2015]

Storage and transport of diagnosis or surgery apparatus

Includes containers for storing and transporting surgical tools and equipment. See also Q31-Q34 codes.

P31-G [2015]

Cleaning, maintenance/repair of diagnosis or surgery apparatus

P31-M [2015]

Manufacture/Pre-use treatment of diagnosis or surgery components

P31-R [2015]

Recycling of diagnosis or surgery components

P32: Dentistry, bandages, veterinary, prosthesis

From 2015, manual codes have been assigned for all mechanical details of dentistry, bandages, veterinary, and prosthesis apparatus. Electrical details are covered by S05 class

P32-A [2015]

Dentistry, veterinary, prosthesis apparatus and dressings

P32-A01 [2015]

Dentistry

Includes mechanical aspects of dental tools and instruments, orthodontics, impressions. For dental chairs and accessories see P33-A10.

P32-A20 [2015]

Veterinary

Surgical tools and instruments; supports, restraints and other auxiliary devices used during examination and surgery e.g. for holding animal's mouth open; treatment; reproduction or fertilization devices.

P32-A40 [2015]

Prostheses

Includes dental prostheses. Also includes instruments used for placement or removal of prosthesis. Electrical details of prostheses are coded under S05-F codes.

P32-A40A [2015]

Implantable

Including stents for insertion in blood vessels and joint replacement implants, spine stabilisation implants, etc.

P32-A40B [2015]

Non-implantable

Includes artificial limbs.

P32-A50 [2015]

Eye and ear protection and/or treatment

Eye mask, eye washing

P32-A60 [2015]

Bandages, dressings and first aid kits

Includes dispensers and auxiliary items. Also includes absorbent/antiseptic pads and swabs such as nappies, sanitary towels, diapers and tampons. Disposal of used dressings and bandages is coded by a combination of P34-W (medical waste disposal) and P32-A60.

Arm sling

P32-A99 [2015]

Other apparatus and methods for dentistry, veterinary, prostheses

Includes dental auxiliary appliances (for dental chairs and work-stands see P33-A10), therapeutic heating devices, orthopaedic devices, contraceptive devices, devices for preventing snoring, finger-sucking, for correcting stammering or stuttering or for preventing bed-wetting.

Hot-water bottle, colostomy bag, condom, corset, traction splint, neck brace

P32-M [2015]

Manufacture/Pre-use treatment of dentistry, bandages, veterinary, prosthesis components

Includes coating of e.g. stents.

P32-R [2015]

Recycling of dentistry, bandages, veterinary, prosthesis components

P33: Medical aids, oral administration

From 2015, manual codes have been assigned for all mechanical details of medical aids and oral administration apparatus. Electrical details are covered by S05 class.

P33-A [2015]

Medical aids

P33-A01 [2015]

Patient transport

Trolleys, wheelchairs, stretchers and other lifting devices, including those aspects as applied to vehicles such as ambulances.

P33-A02 [2015]

Beds

P33-A03 [2015]

Hygiene and sanitary devices

Bed-pans

P33-A10 [2015]

Other hospital and dental surgery equipment

Includes operating tables and dental chairs. Also includes trolleys for transporting medicines, food and other items.

P33-A20 [2015]

Therapy

Includes devices for massage, bathing and passive exercise.

Acupuncture

P33-A40 [2015]

Funeral apparatus and accessories

P33-A50 [2015]

Oral administration of medicines; Feeding devices

Includes feeding tubes, baby teething apparatus e.g. rings, feeding bottles. For syringes and subcutaneous, intra-vascular or intra-muscular devices see P34-A02.

P33-A99 [2015]

Other types of medical aids and oral administration methods

Includes walking aids and crutches.

Wrist band

P33-B [2015]

Storage and transport

Includes containers for storing and transporting medical aids. See also Q31-Q34 codes. Also includes nurse medical bags (see also P24-B).

Nursing bag, trauma bag

P33-G [2015]

Cleaning, maintenance/repair of medical aids

P33-M [2015]

Manufacture/Pre-use treatment of medical aids

Includes devices and methods for processing pharmaceutical products into physical forms suitable for oral administration.

P33-R [2015]

Recycling of medical aids

P34: Sterilizing, syringes

From 2015, manual codes have been assigned for all mechanical details of sterilizing apparatus and syringes. Electrical details are covered by S05 class.

P34-A [2015]

Sterilization equipment, syringes

P34-A01 [2015]

Sterilization and disinfection devices

For sterilization, disinfection, sanitizing and deodorizing of substances and materials including air, refuse, bandages and dressings (See P32-A60 for bandages per se), and contact lenses. Also includes sanitizing stations placed in public spaces to dispense e.g. antibacterial gel/wipes.

P34-A02 [2015]

Syringes and other devices for introduction and removal of media from body

Syringes, needles, and irrigation devices; Inhalers; sprayers, atomizers and insufflators; subcutaneous, intra-vascular or intra-muscular devices; catheters and other drainage apparatus; applicators. Includes blood transfusion equipment. For oral administration devices and methods, see P33-A50.
Eye drop dispenser

P34-A10 [2015]

Anesthesia; relaxation

P34-A99 [2015]

Other types of sterilization equipment, syringes and introduction/removal devices

P34-G [2015]

Cleaning, maintenance/repair of sterilization equipment, syringes

P34-M [2015]

Manufacture/Pre-use treatment of sterilization equipment, syringes

P34-R [2015]

Recycling of sterilization equipment, syringes

P34-W [2024]

Medical waste disposal

Includes receptacles for clinical waste, such as used dressings, bandages, needles, sharps, etc. This code is to be used in conjunction with other P34 codes or P32 codes to specify the items to be disposed of, e.g. P34-A02 for needles, or P32-A60 for bandages. Constructional details of refuse receptacles are also coded under Q35-A01.

Needle disposing box

P35: Life-saving, safety, firefighting, fire extinguishing and fire prevention

This class covers apparatus and methods for life saving and safety in a general sense and also for firefighting and fire extinguishing. For life saving and safety systems for specific purposes see the relevant class, for example water-based life-saving equipment such as lifebuoys is covered in Q24. From 2015 P35 manual codes have been assigned for all mechanical details of life saving, safety, firefighting and fire extinguishing. Electrical aspects are also covered in class X25. Fire alarms are not included and are covered by W05-B02 codes. Significant applications are indicated by assignment of P35-U codes in conjunction with other P35 codes as necessary.

P35-A [2015]

Type of life saving and safety systems

These codes are assigned to indicate the general type of life saving and safety system involved.

P35-A01 [2015]

Rescue equipment and methods

Covers equipment, and methods for using it, for rescuing people or animals from a dangerous situation such as a building during a fire, earthquake, etc. Water-based life-saving equipment such as lifebuoys and the like is covered by Q24-X01 codes and equipment installed onboard an aircraft is covered by Q25-B09 codes.

P35-A01A [2015]

Hoists, winches, lifting equipment

Novel aspects of harnesses for supporting a person being rescued are also assigned P35-A03A.

Lowering, raising, winching, winding

P35-A01E [2015]

Slides, chutes

Escape slides and similar emergency exit arrangements for aircraft are not included and are covered by Q25-B09E.

P35-A01G [2015]

Cushioning devices

Includes use of devices providing a 'soft landing', e.g. for persons falling or jumping from a high point.

Cushion, inflatable, mat, pad

P35-A01X [2015]

Other types of rescue equipment or method

P35-A03 [2015]

Safety systems in general

These codes cover systems, protective clothing and other equipment for general safety purposes.

P35-A03A [2015]

Safety harnesses and belts

Includes harnesses for supporting workers, e.g. by anchoring to a building or other structure. Harnesses forming part of rescue equipment, e.g. to lift a person for escape purposes, are also assigned P35-A01A.

Builder, carabiner, construction worker, lineman, window cleaner

P35-A03C [2015]

Protective clothing

Includes helmets, masks, and the like to provide protection for humans and animals from adverse environments. Includes face coverings worn in public places (shops, banks, public transport, etc.) to protect the public against germs and viruses spread through coughing or sneezing. Face coverings are also coded under P21-F. Fireproof clothing is also assigned P35-C05. Arrangements for facilitating or enabling breathing are covered by P35-A05E which is also assigned as necessary. Systems and equipment for treating hazardous chemicals or biological agents to make them safe or to contain them are covered by P35-A03G.

Environmental suit, hazmat suit, NBC suit

P35-A03E [2015]

Breathing equipment and protection against harmful gases

Includes equipment for filtering gases hazardous to health of humans or animals and breathable gas supply systems providing e.g. oxygen or gas mixtures. Breathable gas supplies for medical purposes are not included and are covered by P34 codes. Covers equipment, and methods for removing or neutralizing the effects of hazardous gases in the air within a building, room, or other enclosed area. Electrical alarm systems warning of the presence of toxic gases are covered by W05-B07L codes and those warning of flammable or explosive gases by W05-B02A codes.

Chemical plant, filter, firefighter, mine, poisonous gas, rescue

P35-A03E1 [2015]

Breathing masks

Covers masks in the form of equipment carried by an individual and also those used in multiple-mask systems, e.g. on board an aircraft. From 2016 all other aspects of breathing equipment, installations and systems are covered by P35-A03E5. Includes masks and similar devices forming part of equipment protecting against harmful chemicals, e.g. protective clothing, which is also covered by P35-A03C. Masks with electrical communications equipment such as intercoms or portable transceivers are also assigned W01-C04A or W02-G02A1 respectively. Details of microphones, earphones and the like incorporated in masks are also assigned V06-V codes as appropriate.

Cartridge, crew radio, filter, interphone, walkie-talkie

P35-A03E5 [2016]

Breathing equipment, installations and systems

This code covers all aspects of breathing equipment and installations, e.g. oxygen generators, gas cylinders, hoses and pipes, except for masks and other devices fitting around the mouth and/or nose of the user which are covered by P35-A03E1. Includes equipment carried in backpack or other portable form and also installations in e.g. buildings, tunnels or vehicles, including those on-board an aircraft. Prior to 2016 these details were covered by P35-A03E or P35-A03E1 depending on novel aspects.

P35-A03G [2015]

Protection against harmful chemicals

Includes arrangements for making safe hazardous industrial chemicals and also chemical or biological warfare agents. Protective clothing and breathing equipment are not included and are respectively covered by P35-A03C and P35-A03E codes.

Biohazard, spillage, tanker, toxic waste

P35-A99 [2015]

Other types of life saving and safety systems

P35-C [2015]

Type of firefighting, fire extinguishing or fire prevention equipment or method

The codes are assigned to indicate the general type of firefighting, fire extinguishing or fire prevention equipment or system involved.

P35-C01 [2015]

Fire extinguishing equipment and methods

P35-C01A [2015]

Type of fire extinguishing material

P35-C01A codes are assigned to indicate in a general sense the type of fire extinguishing material used. When the material itself is novel P35-C01A8 is also applied, e.g. a novel chemical composition for extinguishing fires would be coded as P35-C01A2 and P35-C01A8.

P35-C01A1 [2015]

Carbon dioxide-based fire extinguishing

CO₂

P35-C01A2 [2015]

Chemical-based fire extinguishing

Covers use of wet chemical-based extinguishing agents.

P35-C01A3 [2015]

Foam-based fire extinguishing

P35-C01A4 [2015]

Powder-based fire extinguishing

P35-C01A5 [2015]

Water-based fire extinguishing

Includes water mist-based fire extinguishing systems.

P35-C01A8 [2015]

Novel materials for extinguishing fires

This code is assigned in conjunction with a P35-C01A code to indicate the type of extinguishing material used. See also K01-A for novel materials and compositions for fire extinguishing.

P35-C01A9 [2015]

Other type of fire extinguishing material

Sand

P35-C01C [2015]

Fire extinguishing equipment type

P35-C01C1 [2015]

Portable/hand-held extinguisher

P35-C01C3 [2015]

Fixed installations and building-type extinguishing system

Covers permanently installed systems such as indoor sprinklers and outdoor installations such as fire hydrants. Fire alarms are not included and are covered by W05-B02 codes.

Bulb, fusible alloy, green bulb, red bulb, Wood's metal

P35-C01C5 [2015]

Mobile fire extinguisher

Covers fire extinguishing equipment or systems capable of being transported to the location of a fire, including extinguishers mounted on trolleys, aircraft, ships, trains, or land vehicles such as fire engines which are also covered in Q19-H02 or in X22-P10 if electrical aspects are involved. Fire extinguishing systems for putting out fires on-board vehicles themselves are covered by P35-C01C7 codes.

Air tanker, crash tender, fire hose, fire train, fire truck, fireboat, forest fire, ladder, pump, turntable, waterbomber, wildfire

P35-C01C7 [2015]

Vehicle-type fire extinguishing system

Covers extinguishing equipment and systems for putting out fires in a vehicle itself. Vehicles used to transport extinguishing equipment to the location of a fire are covered by P35-C01C5.

On-board

P35-C01C7A [2015]

Aircraft and aerospace-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on an aircraft or space vehicle, for which Q25-B09A and Q25-S06 are also respectively assigned, but does not include aerial firefighting aircraft, which are covered by P35-C01C5.

P35-C01C7C [2015]

Land vehicle-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on land vehicles and does not include fire engines, which are covered by P35-C01C5.

P35-C01C7E [2015]

Ship-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on ships, for which Q24-B09A is also assigned, but does not include fireboats, which are covered by P35-C01C5.

P35-C01C7F [2015]

Rail vehicle-type fire extinguishing system

This code covers on-board equipment, methods and systems for putting out fires on trains, for which Q21-J09 is also assigned, but does not include fire trains, which are covered by P35-C01C5.

P35-C01C9 [2015]

Other fire extinguishing equipment type

Beater, fire blanket, fire bucket

P35-C03 [2016]

Nozzles, hoses, pumps and delivery systems

Covers novel aspects of equipment for delivering or dispensing a fire-extinguishing agent.

P35-C05 [2015]

Fire prevention equipment and methods

Includes arrangements for containing or limiting the spread of fires, such as physical barriers, flame traps and the like, firefighting equipment other than extinguishers and also control of firefighting systems, electrical aspects of which are covered by X25-X05.

Axe, fire doors

P35-C99 [2015]

Other types of firefighting, fire extinguishing or fire prevention equipment or method

P35-G [2015]

Cleaning, maintenance/repair of life saving, safety, firefighting and fire extinguishing systems

This code is assigned with P35-A or P35-C codes as appropriate.

P35-M [2015]

Manufacture/pre-use treatment of life saving, safety, and firefighting/extinguishing components

Includes testing. This code is assigned with P35-A or P35-C codes as appropriate.

P35-U [2015]

Applications

These codes are assigned with P35-A or P35-C codes as appropriate to denote significant applications.

P35-U01 [2015]

Domestic

Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room

P35-U02 [2015]

Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom

P35-U03	[2015]
Vehicles	
Includes all vehicles.	
P35-U05	[2015]
Agriculture; Farming	
<i>Arable, chickens, cows, crops, dairy, ducks, eggs, field, goats, greenhouse, harvest, irrigation, lambs, pigs, pigsty, planting, plantation, poultry, sheep</i>	
P35-U06	[2015]
Manufacturing plants	
<i>Factory, production line</i>	
P35-U07	[2015]
Food industry	
P35-U17	[2015]
Civil Engineering; Construction; Buildings	
P35-U18	[2015]
Mining	
<i>Coal, coalface, gallery, methane, seam, ventilation</i>	
P35-U20	[2015]
Waste disposal, waste treatment, pollution control and recycling	
P35-U40	[2015]
Industrial	
This code is assigned for general industrial applications of life saving, safety, firefighting, fire extinguishing and fire prevention systems not covered elsewhere.	
P35-U99	[2015]
Other specific applications	
P35-X	[2015]
Other aspects of life saving, safety, firefighting, fire extinguishing and fire prevention	

P36: Sports, games, toys, amusements

Covers saddlery from 201201, prior to 2012 this was classified as Q39.

P36-A [2015]

Type of sport and leisure activity

P36-A codes cover organized competitive sports and also analogous activities performed as a leisure pursuit or pastime. Electrical aspects of sports and leisure activities are covered by W04-X01 codes. Games which in general do not involve significant physical activity, e.g. indoor games, are covered by P36-C codes. Games involving throwing or hitting a ball with an implement such as a cue, e.g. billiards, are regarded as a sport.

P36-A01 [2015]

Sports using ball, puck, or shuttlecock

Badminton, baseball, basketball, billiards, bowling, bowls, cricket, croquet, curling, football, golf, hockey, petanque, pool, snooker, soccer, squash, rugby, table tennis, tennis, volleyball

P36-A03 [2015]

Athletics, cycling, racing, air and water based sports

Includes running on track, cross-country, or marathons, and sports based on jumping and throwing, e.g. high jump, javelin, shot-put etc.

Heptathlon, horse riding, horseracing, marathon, motor racing, pentathlon, swimming, water skiing, snowboarding, skiing

P36-A04 [2015]

Combat-based sports

Laser-simulated shooting is covered by W04-X01K4E.

Boxing, martial arts, fencing, paintball, wrestling

P36-A05 [2015]

Archery, darts, shooting

This code covers archery in the sense of shooting at targets using longbow, crossbow, etc. Shooting animals while hunting is covered by P36-A07.

Bow, dart, dartboard, pistol, rifle, target

P36-A06 [2015]

Gymnastics, climbing and weightlifting

Covers rock climbing and mountaineering on natural features, and climbing walls and the like in indoor and outdoor sports facilities. Lifting of weights as part of general fitness training, i.e. 'weight training' is covered by P36-A08E.

Bar, dumbbell, lift, abseiling, crampons, harness, rope, alpine

P36-A07 [2015]

Fishing, hunting

This code covers fishing as a recreational or sporting activity only. Commercial fishing is not included and is covered by P14 in general and X25-N02 when electrical aspects are involved.

Angling, bait, bow, crossbow, decoy, float, line, rifle, rod, tracking

P36-A08 [2015]

Sports equipment, sports facilities and sports training

These codes are assigned with other P36-A codes as appropriate.

P36-A08A [2015]

Sports equipment and clothing

Includes items used by a player of a sport, e.g. horse racing, or a participant in leisure activities such as horse riding. See also P21-D for sportswear. Electrical details of sports equipment are coded under W04-X01E, and electrical details of clothing are coded under X27-A02B1.

Ball, bat, boots, bow, bowls, crampons, crossbow, cue, fishing rod, goggles, golf clubs, harness, kit, racquet, riding boots, running shoes, saddle, skateboard, skates, ski binding, skis, surfboard, training shoes, trampolines, wetsuit, whip

P36-A08C [2015]

Sports facilities

Covers buildings, sports halls, pitches, sports grounds etc. Electrical details of sport facilities are coded under W04-X01F. Details of ice manufacture for e.g. ice rinks are coded under X27-F04.

AstroTurf®, arena, changing rooms, club, clubhouse, court, field, floodlights, goals, grass, gymnasium, ice rink, lockers, race course, race track, swimming pool, track

P36-A08E [2015]

Sports training and fitness training

This code is assigned with other P36-A codes as necessary i.e. training for specific sports is covered by P36-A08E together with the code for the particular sport. Inventions involving teaching of sports are covered by P85-A01N which is assigned with this code when both aspects are involved. Electrical aspects of sports training are covered by W04-X01A codes. Table tennis tables are also coded under P25-A01X.

Exercise bike, treadmill, table tennis

P36-A99 [2015]

Other aspects of sport and leisure

P36-C [2015]

Type of game

Electrical aspects of games are covered by W04-X02 codes, e.g. coin-operated games are covered by W04-X02A codes and video games by W04-X02C. Coin-operated games are also assigned T05-H05E.

P36-C01 [2015]

Board games

Includes chess, checkers, draughts etc.

P36-C03 [2015]

Games involving tokens or pieces to be placed on a table or other flat surface

Includes dominoes and Mahjong.

P36-C05 [2015]

Card games

Inventions relating to card games played in a casino are also assigned P36-C09.

Bezique, blackjack, chemin-de-fer, clubs, deal, deck, diamonds, gin rummy, hearts, joker, Napoleon, pinochle, poker, rummy, shuffle, solitaire, spades, suit, trick, whist

P36-C07 [2015]

Dice games

Board or card games are covered by P36-C01 and P36-C05 respectively and this code is only assigned as well as those codes when the dice aspect is novel.

Die, face, marking, pips

P36-C09 [2015]

Casino games

Includes roulette. This code can be assigned with P36-C05 and P36-C07 respectively for casino games where the use of playing cards or dice is significant. P36-C09 also covers non-electrical aspects of coin- or token-operated 'amusement with prizes' ('AWP') games with spinning reels and the like. Coin-freed aspects of such games are covered by T05-H codes and electrical aspects by W04-X02A3.

Blackjack, chemin-de-fer, croupier, dealing shoe, deck, poker, roulette

P36-C13 [2015]

Games involving ball or balls confined by e.g. table.

This code includes pinball, bagatelle, ninepins etc. but not billiards, pool, snooker or table tennis, which are regarded as sports and covered by P36-A01.

Pachinko, table football, table hockey

P36-C99 [2015]

Other types of games

P36-E [2015]

Toys, playing equipment and novelty items

Electrical aspects of toys, playing equipment and novelty items are covered by W04-X03E codes.

P36-E01 [2015]

Model vehicles

Includes model aircraft, boat, wheeled vehicle such as car or truck, racing track, train and train set, etc.

Model railway, model roadway

P36-E03 [2015]

Construction toys and kits

Includes toys comprising miniature bricks or basic mechanical elements which may be used to assemble model buildings, machines etc. and also kits of parts to assemble a specific model. Kits which can be made up into model vehicles are also assigned P36-E01.

Building set, construction set, self-assembly

P36-E05 [2015]

Dolls, stuffed toys, figures

Includes animated figures and puppets.

Character figure, knitted toy, marionette, plush toy, teddy bear, toy soldier

P36-E07 [2015]

Outdoor toys and playing equipment

Includes skateboards, scooters and other ride-on vehicles for children, balls, slides, swings, for home/garden use and as playground equipment. Tree houses are also covered under Q46-B99.

Kite, merry-go-round, roller skates, roundabout, see-saw, tree house

P36-E15 [2015]

Novelty items

Includes tricks, humorous items such as jokes, collectible items etc. and complementary toys offered with fast-food meals or other products.

Cracker, favor, pennant, puzzle

P36-E99 [2015]

Other aspects of toys, playing equipment and novelty items

P36-F [2015]

Entertainment and other venue-related equipment and systems

This code covers equipment and systems for use in venues for entertainment and similar purposes. Electrical aspects are covered by W04-X03G codes.
Auditorium, cinema, concert hall, fairground, show ground, stage, theater, theme park

P36-G [2015]

Cleaning, maintenance/repair of sports, games, toys

This code is assigned with P36-A, P36-C, P36-E or P36-F codes as necessary.

P36-M [2015]

Manufacture/Pre-use treatment of sports, games, toys

This code is assigned with P36-A, P36-C, P36-E or P36-F codes as necessary.

P36-X [2015]

Other aspects of sports, games, toys, amusements

P4: Separating, Mixing

P41: Crushing, centrifuging, separating solids, sorting

From 2015 manual codes have been assigned for all mechanical details of crushing, centrifuging, separating solids, and sorting. In this class the group codes P41-A, P41-E, P41-J and P41-K respectively refer to apparatus and methods for:

- (i) crushing, pulverizing, disintegrating, and milling;
- (ii) separating solids (covered by P43 before 2015);
- (iii) centrifuging; and;
- (iv) sorting objects (covered by P43 before 2015).

To indicate novel constructional details suitable P41-T codes are also assigned and novel materials used in construction of apparatus are indicated by also assigning P41-T50. Materials processed or handled are indicated where possible in the respective code groups, otherwise by assigning P41-V codes with the code describing the equipment or process involved in the invention. Significant applications are indicated by assignment of P41-U codes.

P41-A [2015]

Crushing, pulverizing, disintegrating, milling

Although based on the use of similar processes the terms 'crushing' and 'milling' are used here as generally understood, e.g. 'milling' usually referring to production of smaller particles or powders and with regard to producing an output product with specific size or properties. For specific materials processed or handled search with P41-V codes. Milling of metals in the sense of surface cutting is not included and is covered in class P54. Crushing, pulverizing and disintegrating as part of a chemical engineering process is covered by class J02.

P41-A01 [2015]

Type of crushing equipment or process used

P41-A01A [2015]

Jaw crusher

Blake, Dodge, toggle, universal

P41-A01C [2015]

Cone crusher

Compound, multi-cylinder, Symons, single cylinder

P41-A01E [2015]

Roll crusher

P41-A01G [2015]

Gyratory crusher

Eccentric

P41-A01J [2015]

Hammer and impact crusher

Excludes mills such as hammer mills which are covered by P41-A03G.

Horizontal, vertical shaft impactor

P41-A01X [2015]

Other type of crushing equipment or process

P41-A03 [2015]

Type of milling equipment or process used

P41-A03A [2015]

Roller mill

P41-A03C [2015]

Disc mill

Buhrstone, flour mill, grist mill

P41-A03E [2015]

Ball mill/Tumbler mill

Cylinder, grinder, planetary, powder

P41-A03G [2015]

Hammer mill

P41-A03J [2015]

Drum mill

P41-A03L [2015]

Stamp mill

P41-A03X [2015]

Other type of milling equipment or process

Includes jet mills.

P41-A04 [2015]

Disintegrating based on cutting or tearing

Includes disintegrating using rotating or reciprocating knives, including shredders.

Cross-cut, paper shredder

P41-A05 [2015]

External energy input for crushing, pulverizing, disintegrating, or milling

Includes driving of equipment using motors, engines, water or wind power and also secondary energy input using additional energy sources to facilitate the process, e.g. use of heating or ultrasonic energy to assist in breaking-up material. Novel electrical aspects are covered by X25-J.

Belt, chain, drive, gear, shaft

P41-A07 [2015]
Pre-treatment of substances or materials
Novel arrangements for removing foreign bodies or unwanted materials from substances to be processed are covered by P41-T01C.

Tempering

P41-A07A [2015]
Removing husks from e.g. grain

Hulling

P41-A07X [2015]
Other pre-treatment of substances or materials

P41-A99 [2015]
Other aspects of crushing, pulverizing, disintegrating, milling

P41-E [2015]
Separating solids
P41-E codes cover the separation, e.g. in a stream, of solids from other solids and also from gases or liquids. Codes in this group are assigned together as necessary, e.g. dry separation of solid materials by means of screens or sieves is represented by P41-E01 and P41-E06; wet separation of solids involving pneumatic tables by P41-E03 and P41-E05. Novel details of apparatus for solid separation are indicated by assignment of an appropriate P41-T03 code with P41-E codes. Separation with the emphasis on sorting or grading is covered by P41-K codes. Separation as part of a chemical process such as evaporation, crystallization, solvent extraction, chromatography etc. is covered by class J01. Electrical aspects of separation are covered by X25-H codes.

P41-E01 [2015]
Dry separation of solids
Covers separation of two kinds or sizes of solid material in a dry medium.

P41-E03 [2015]
Wet separation of solids and separation from gases
Covers separation of two kinds or sizes of solid material in a liquid medium and also separation of solids from liquids and from gases. Includes use of techniques such as filtering and (differential) sedimentation. Electrostatic precipitation of solid particles from a gas stream or cloud involving voltages applied from power supplies and the like is covered by X25-H02 codes.

P41-E05 [2015]
Separating of solids using mechanical agitation
Includes use of pneumatic tables. This code is assigned with P41-E01 or P41-E03 codes as appropriate. Novel details of the agitating arrangement are also assigned P41-T03E.

P41-E06 [2015]
Separating solids based on size or weight
This code covers separation of solids based on size and weight where the solid materials are mixed together, including mixtures with liquids or gases. Sorting and grading of discrete objects, e.g. to separate them into distinct categories or in a 'pass/fail' test, is not included and is covered by P41-K codes.

P41-E07 [2015]
Separating solids using magnetic effects
Includes separation by magnetic/non-magnetic or paramagnetic/diamagnetic properties based on use of permanent magnets only. Magnetic separation using electromagnetism is covered by X25-H01.

P41-E99 [2015]
Other aspects of separating solids

P41-G [2015]
Cleaning, maintenance or repair of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus
This code covers novel aspects of cleaning, maintenance or repair of apparatus covered by P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate.

P41-J [2015]
Centrifuges and centrifuging; cyclone apparatus
This code covers novel centrifuges and their use in separating, mixing, or other processes and also cyclones and similar devices based on vortex flow. Novel electrical aspects of centrifuges are covered by X25-J. Centrifuges and processes involving centrifuging for chemical engineering are covered in class J01.
Cyclonic separation, dust, hydrocyclone, particle, rotor, vessel

P41-K	[2015]
Sorting and grading objects	
These codes cover the sorting and grading of discrete objects, e.g. to separate them into distinct categories or in a 'pass/fail' test, as opposed to separating continuous streams of material as covered by P41-E06 codes. Electrical aspects of sorting are covered by T05-K codes and X25-F06.	
P41-K01	[2015]
Sorting and grading objects based on specific property	
Novel aspects of measurement of properties such as dimensions or weight are covered by S02 codes.	
P41-K01A	[2015]
Sorting and grading objects based on dimensions	
<i>Area, circumference, diameter, length, size, thickness, volume, width</i>	
P41-K01C	[2015]
Sorting and grading objects based on weight	
<i>Mass</i>	
P41-K01E	[2015]
Sorting and grading objects based on density	
<i>Buoyancy, floating, sinking</i>	
P41-K01X	[2015]
Sorting and grading objects based on other specific property	
P41-K05	[2015]
Sorting mail	
Electrical aspects of mail sorting are covered by T05-K02.	
P41-K99	[2015]
Other sorting and grading of objects	
P41-M	[2015]
Manufacture and testing of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus	
This code covers novel aspects of manufacturing and testing of apparatus covered by P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate.	

P41-T	[2015]
Constructional details of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus	
These codes are assigned with P41-A, P41-E, P41-J and P41-K codes which are also assigned as appropriate to denote the type of apparatus or process in which they are used. For example P41-A01A is assigned with P41-T01A for novel details of hoppers for jaw crushers.	
P41-T01	[2015]
Constructional details of crushing, pulverizing, disintegrating, or milling apparatus	
This code and its subdivisions are assigned to highlight novel aspects of the construction of crushing, pulverizing, disintegrating, or milling apparatus and are assigned with P41-A codes as appropriate.	
P41-T01A	[2015]
Feeding arrangements, hoppers	
Covers novel details of apparatus for introducing material to be processed to a crusher, mill, etc.	
P41-T01C	[2015]
Removing foreign bodies or unwanted materials	
Includes arrangements to remove metal objects from e.g. crushers or mills and safety measures. <i>Hydraulic relief system</i>	
P41-T01E	[2015]
Casings, frameworks	
This code covers the main structural aspects of crushing, milling and similar machines as specified by P41-A codes, rather than the parts performing the crushing, milling, etc. <i>Case, enclosure, housing</i>	
P41-T01F	[2015]
Crushing elements	
Covers details of the part of a crusher that performs the actual crushing process, such as jaws (with P41-A01A). <i>Cone, hammer, impactor, roller</i>	
P41-T01H	[2015]
Milling elements	
Covers details of the part of a mill that performs the actual milling process, such as a millstone (with P41-A03C). <i>Ball, bedstone, buhrstone, burrstone, cylinder, roller, runner stone</i>	

P41-T01J	[2015]
Sizing elements	
Covers elements used in crushers or mills to control the size of material produced, e.g. by adjustment of crusher or mill components or the use of sieves or screens for which P41-E06 is also assigned.	
P41-T01X	[2015]
Other constructional details of crushing, pulverizing, disintegrating, or milling apparatus	
P41-T03	[2015]
Constructional details of apparatus for separating solids	
These codes are assigned with P41-E codes as appropriate to denote the type of apparatus in which they are used. For example P41-T03E is assigned with P41-E05 for novel details of vibrating or agitating devices used in separation.	
P41-T03A	[2015]
Feeding arrangements, hoppers	
Covers novel details of apparatus for introducing material to be processed to a solid material separator.	
P41-T03C	[2015]
Filters, screens, sieves	
Covers novel details of filters, screens, or sieves. The general code for apparatus and processes using this technique, P41-E06, is also assigned.	
P41-T03E	[2015]
Mechanical agitators or shakers	
Includes pneumatic tables and similar devices.	
P41-T03G	[2015]
Magnetic elements	
This code covers novel details of permanent magnets only and is assigned with the general 'magnetic separation' code. Magnetic separation using electromagnets is covered by X25-H01.	
P41-T03X	[2015]
Other constructional details of solid separation apparatus	
P41-T05	[2015]
Constructional details of centrifuge and cyclone apparatus	
This code and its subdivisions are assigned with P41-J to denote novel details of apparatus based on centrifuging or cyclones.	
P41-T05A	[2015]
Feeding arrangements	
Covers novel details of apparatus for introducing material to be processed to a centrifuge.	
<i>Inlet, outlet, stream</i>	

P41-T05C	[2015]
Housing, casing	
<i>Lid, vessel</i>	
P41-T05E	[2015]
Rotor, sample or substance holder	
P41-T05G	[2015]
Drive mechanism	
Novel electrical details are covered by X25-J.	
<i>Belt drive, gear, planetary</i>	
P41-T05X	[2015]
Other constructional details of centrifuge apparatus	
P41-T07	[2015]
Constructional details of sorting apparatus	
This code and its subdivisions are assigned with P41-K codes to denote novel details of apparatus based on sorting and grading objects.	
P41-T07A	[2015]
Feeding arrangements	
Covers novel details of apparatus for introducing objects to be sorted.	
P41-T07C	[2015]
Housing, casing	
P41-T07E	[2015]
Discriminating arrangements	
Covers novel details of apparatus for distinguishing objects to be sorted, e.g. weighing apparatus for which P41-K01C and S02-D codes are also assigned.	
P41-T07G	[2015]
Output arrangements	
Includes bins or other receptacles receiving sorted articles and packing arrangements.	
P41-T07X	[2015]
Other constructional details of sorting apparatus	
P41-T50	[2015]
Novel constructional material	
This code is used in conjunction with other P41-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P41, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.	
P41-T99	[2015]
Other constructional details of crushing, pulverizing, disintegrating, milling, solid separation, centrifuging or sorting apparatus	

P41-U	[2015]
Applications of crushing, pulverizing, disintegrating, milling, centrifuging or sorting apparatus	
These codes are assigned as necessary to indicate significant applications of crushing, pulverizing, disintegrating, milling, centrifuging or sorting apparatus.	
P41-U01	[2015]
Domestic	
Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.	
<i>Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room</i>	
P41-U02	[2015]
Commercial	
Includes general commercial applications. Can be used alone or in conjunction with other specific applications.	
<i>Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom</i>	
P41-U03	[2015]
Vehicles	
Includes land, air and space vehicles and watercraft.	
P41-U05	[2015]
Agriculture; Farming	
<i>Arable, chickens, cows, crops, dairy, ducks, eggs, field, goats, greenhouse, harvest, irrigation, lambs, pigs, pigsty, planting, plantation, poultry, sheep</i>	
P41-U06	[2015]
Manufacturing plants	
<i>Factory, production line</i>	
P41-U07	[2015]
Food	
Includes meat, fish, milk, dairy products and food processing in general as well as alcoholic and non-alcoholic beverages.	
<i>Baked goods, bakery, beer, biscuits, blast chill, bottling plant, brewery, butter, canned drinks, canned food, cheese, cider, corned beef, conveyor freezer, conveyor oven, cream, curing, distillery, dough, eggs, flash freezing, juice production, margarine, meat processing, mechanical recovery, pasteurizing, poultry, pressing, sterilizing, tinned food</i>	
P41-U08	[2015]
Tobacco	
<i>Cigar, cigarette, curing, drying, harvesting, planting</i>	

P41-U09	[2015]
Packaging; Canning; Tinning; Bottling	
Novel aspects of packaging are covered by codes in classes Q31 to Q34.	
P41-U13	[2015]
Pharmaceutical; Medical	
P41-U14	[2015]
Laboratory	
P41-U17	[2015]
Civil Engineering; Construction; Buildings	
P41-U18	[2015]
Mining	
P41-U20	[2015]
Waste disposal, waste treatment, pollution control and recycling	
Can be assigned with other specific codes as appropriate, e.g. P41-U03 for scrapping/crushing motor cars. Includes incineration of waste.	
P41-U99	[2015]
Other specific applications	
P41-V	[2015]
Materials processed or sorted	
These codes are assigned to indicate that an invention is intended to process or handle specific materials. For materials used in the construction of apparatus covered in this class see P41-T50.	
P41-V01	[2015]
Metals	
P41-V01A	[2015]
Iron	
P41-V01A1	[2015]
Cast Iron	
P41-V01B	[2015]
Aluminum	
P41-V01C	[2015]
Copper	
P41-V01D	[2015]
Lead	
P41-V01E	[2015]
Magnesium	
P41-V01F	[2015]
Zinc	
P41-V01G	[2015]
Titanium	

P41-V01H	[2015]
Tin	
P41-V01P	[2015]
Alloys	
P41-V01P1	[2015]
Steel	
P41-V01P2	[2015]
Brass	
P41-V01X	[2015]
Other types of metal	
P41-V11	[2015]
Wood	
Includes wood shavings or saw dust.	
<i>Timber</i>	
P41-V11A	[2015]
Fiberboards	
P41-V12	[2015]
Paper	
P41-V13	[2015]
Plastics	
Covers processing or sorting of synthetic polymer materials. Novel aspects of such materials are represented by codes in section A.	
P41-V14	[2015]
Glass	
P41-V15	[2015]
Ceramic	
P41-V20	[2015]
Concrete	
P41-V22	[2015]
Stones; Rocks; Slate	
Prior to 2016 crushing or milling of coal was covered by this code. From 2016 this topic is covered by P41-V28.	
<i>Boulder, ore</i>	
P41-V23	[2015]
Bricks	
P41-V28	[2016]
Coal, graphite	
Prior to 2016 crushing of coal was covered by P41-V22.	
P41-V50	[2015]
Composite materials	
This code can be used in combination with other P41-V codes to highlight the different components of the composite material.	

P41-V60	[2015]
Agricultural produce	
<i>Arable, crops, field, greenhouse, harvest, irrigation, plant, plantation</i>	
P41-V60A	[2015]
Grain	
P41-V60C	[2015]
Fruit or vegetables	
<i>Apples, bananas, beans, bilberries, blackberries, blueberries, cabbages, cauliflowers, courgette, gourds, grapes, legumes, lettuces, mangoes, marrows, nuts, parsnips, pears, peas, potatoes, raspberries, root-crops, strawberries, swedes, tomatoes, turnips, vegetables, yams</i>	
P41-V60X	[2015]
Other agricultural produce	
P41-V65	[2015]
Manufactured or processed foodstuffs	
P41-V99	[2015]
Other materials processed	

P41-X	[2015]
Other aspects of crushing, centrifuging, separating solids, and sorting	

P42: Spraying, atomizing, coating, surface treatment and liquid application

From 2015 manual codes have been applied for mechanical aspects of apparatus and processes involving the handling of liquids and other flowing substances, e.g. for coating, surface treatment or other purposes.

P42-A [2015]

Type of spraying or atomizing apparatus

P42-A codes cover the type of apparatus for producing a spray, mist, jet etc. irrespective of its purpose and should be searched with P42-T for constructional details, and P42-U codes to link them to a specific application. Manufacture of apparatus for producing a spray, mist, jet etc. is covered by P42-M which is assigned with P42-A codes as appropriate. Liquid application arrangements involving direct contact between a surface to be coated and a liquid-carrying vessel or liquid-bearing element such as a roller are covered by P42-B codes. Details of spraying equipment for electrostatic coating are included as appropriate but electrical details are covered by X25-K01.

P42-A01 [2015]

Single nozzle or jet arrangements

Covers arrangements with a single aperture through which the flowing material passes.

P42-A03 [2015]

Multiple nozzles or jet arrangements

Includes multiple nozzles or multiple apertures.

P42-A03A [2015]

Spray nozzles or jets arranged in circular, spiral, rectangular or square pattern

Includes shower heads.

P42-A03C [2015]

Spray nozzles or jets arranged in linear pattern

Includes spray booms

Crop spray

P42-A05 [2015]

Spray, jet or atomizing arrangements with variable characteristics

Covers arrangements involving variable characteristics of the nozzle, jet or other application arrangement itself and also variation in operation produced externally, e.g. by moving the whole apparatus, deflecting a jet, etc.

P42-A99 [2015]

Other aspects of spraying or atomizing

P42-B [2015]

Contact-based liquid application arrangements

Arrangements for applying liquids by means of spraying are covered by P42-A codes.

P42-B01 [2015]

Involving immersion or passage through liquid bath

P42-B03 [2015]

Involving pouring or flowing of liquid over surface

Includes spin coating.

Spinner

P42-B05 [2015]

Involving use of roller, brush or other liquid-bearing element

Includes use of spreaders.

P42-B99 [2015]

Other contact-based liquid application arrangements

P42-E [2016]

Novel aspects of coating processes and related processes

P42-E codes are intended to focus on novelty in processes associated with applying coatings, whether equipment involved is novel or not.

P42-E01 [2016]

Novel coating processes

All aspects of flocking are covered by P42-E05A which is assigned with P42-E01 as necessary.

P42-E03 [2016]

Pre-treatment of surfaces to be coated and treatment of applied coatings

This code covers processes and methods for treating surfaces prior to coating and also processes and methods for treating a coating after it has been applied.

Baking, cleaning, degreasing, heating, smoothing

P42-E05 [2016]

Processes for creating special textures or effects

This code covers processes and methods for creating a surface coating having specific properties.

Anti-adhesive, anti-corrosion, anti-friction, anti-slip, corrosion-proof, corrosion-resist, fine-textured, low-friction, lubricating, matt, matte, non-corrosive, rough-textured, rust-proof, rust-resist, texture

P42-E05A [2016]

Flocking

This code is assigned with P42-E01 to denote novel flocking processes.

Charge, electrostatic, fabric, fiber, particle, particulate, wallpaper

P42-E99 [2016]

Other aspects of coating and related processes

P42-G [2015]

Cleaning, maintenance/repair of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers novel aspects of cleaning, maintenance and repair of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

P42-M [2015]

Manufacture and testing of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers manufacture and testing of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

P42-T [2015]

Constructional details of spraying, atomizing, coating, surface treatment and liquid application apparatus

This code covers novel constructional aspects of apparatus covered by P42-A and P42-B codes which are also assigned as appropriate.

P42-T01 [2015]

Constructional details of arrangements for spraying, atomizing and directly applying fluids

These codes cover constructional details associated with the fluid atomizing, spraying, or liquid application apparatus itself. Arrangements for moving or modifying operation of spraying devices are covered by P42-T05 codes and details of housings and the like are covered by P42-T20.

P42-T01A [2015]

Constructional details of nozzles and spray heads

Includes shape, layout of spray head orifices, etc. as covered by P42-A codes. Arrangements for modifying the shape, form or direction of liquid spray or jet, whether by moving the whole spraying assembly or by the use of variable jets, are also assigned P42-T05A.

Aperture, shower head

P42-T01C [2015]

Constructional details of direct liquid application apparatus

Includes arrangements for pouring or otherwise transferring liquid to the surface being coated or treated, as covered by P42-B codes.

Brush, pad, roller, spout

P42-T01X [2015]

Other constructional details of arrangements for spraying, atomizing and directly applying fluids

P42-T03 [2015]

Constructional details of baths or tanks for fluids

Includes containers for storing fluids and also for immersing surfaces to be treated or coated.

Bottle, reservoir, vat, vessel

P42-T05 [2015]

Driving arrangements of spraying, atomizing, coating, surface treatment and liquid application apparatus

Covers constructional aspects of arrangements for moving or modifying operation of spraying, atomizing or direct liquid application devices, moving or agitating fluids, and moving surfaces to be coated or treated.

P42-T05A [2015]

Driving or modifying operation of spraying, atomizing, and liquid application apparatus

Includes arrangements for varying operation by moving the spraying or atomizing head or the equipment as a whole, and also for changing part of the spraying or atomizing head e.g. to modify jet characteristics.

Angle, controllable, cross-section, deflect, variable

P42-T05C [2015]

Driving fluids

Includes pumps, compressors, etc., e.g. for pressurizing liquids and also arrangements for agitating or heating. Electrical aspects of spraying apparatus for electrostatic coating are covered by X25-K01.

Agitator, color changer, delivery control, gas, mixer, piston, pump, pressure, vibrate

P42-T05E [2015]

Driving and holding workpieces

Includes arrangements for moving the surface being coated or treated through the equipment or system.

Chain, conveyor, immersing, paint hanger, plunging

P42-T05X [2015]

Other driving arrangements for spraying, atomizing, and liquid application apparatus

P42-T20 [2015]

Casings, frameworks and housings

Includes constructional details of enclosures and equipment as a whole.

Brace, bracket, drying booth, mounting, spray booth

P42-T50 [2015]

Novel constructional material

This code is used in conjunction with other P42-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P42, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.

P42-T99 [2015]

Other constructional details of spraying, atomizing, coating, surface treatment and liquid application apparatus

P42-U [2015]

Applications of spraying, atomizing, coating, surface treatment and liquid application apparatus

These codes are assigned as necessary to indicate specific applications in conjunction with other P42 codes. In 'multiple use' cases the codes are not applied, or are only applied at a general level.

P42-U01 [2015]

Domestic

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

Bathroom, bedroom, domestic appliance, fitted kitchen, home furnishings, household appliance, household product, living room

P42-U02 [2015]

Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

Bar, business, café, commerce, commercial, department store, enterprise, hotel, office, restaurant, rest-room, washroom

P42-U03 [2015]

Vehicles

Includes all land, air and space vehicles and also watercraft.

P42-U05 [2015]

Agriculture; Farming

Arable, chickens, cows, crops, dairy, ducks, eggs, field, forestry, goats, greenhouse, harvest, irrigation, lambs, logging, pigs, pigsty, planting, plantation, poultry, sheep

P42-U06 [2015]

Manufacturing plants

Factory, production line

P42-U07 [2015]

Food

Includes production of beverages such as soft and alcoholic drinks, as well as tea/coffee, processing of milk and dairy products, fish, meat and processed foods in general.

P42-U08 [2015]

Tobacco

Cigar, cigarette, curing, drying, harvesting, planting

P42-U09 [2015]

Packaging; Canning; Tinning; Bottling

Novel aspects of packaging are covered by codes in classes Q31 to Q34.

P42-U13 [2015]

Pharmaceutical; Medical

P42-U14 [2015]

Laboratory

P42-U17 [2015]

Civil Engineering; Construction; Buildings

P42-U19	[2015]
Furniture	
P42-U30	[2015]
Sports, toys, entertainment and leisure	
Includes sports equipment, sports stadiums, ice rinks, ski slopes, entertainment venues, leisure pursuits, games and toys. Specific details of inventions in these fields are covered by P36 codes in general and W04-X codes in the case of electrical aspects.	
P42-U37	[2015]
Scented/therapeutic/insect repellent	
P42-U40	[2015]
Industrial	
Covers general or non-specific industrial applications not covered by other application codes.	
P42-U41	[2015]
General functional applications	
P42-U41E	[2015]
Insulating	
P42-U41F	[2015]
Waterproofing	
P42-U41H	[2015]
Coating	
P42-U41H1	[2015]
Painting, lacquering, applying protective coatings	
P42-U50	[2015]
Personal	
P42-U99	[2015]
Other specific applications	
P42-X	[2015]
Other aspects of spraying, atomizing, coating, surface treatment and liquid application	

P43: Generating and using mechanical vibrations, cleaning, waste disposal

From 2015 manual codes have been applied for mechanical aspects of generation and use of mechanical vibrations, cleaning, and waste disposal. Prior to 2015 this class included separation of solids and sorting, now respectively covered by P41-E and P41-K codes.

P43-A [2015]

Generating and using mechanical vibrations

These codes cover the generation and use of mechanical vibrations for performing mechanical work and not for the purpose of generating audible sound. Audio transducers are covered by V06-V codes and sound production in general by P86 codes.

P43-A01 [2015]

Vibration generators

Electrical aspects of small-scale vibration generators are covered by V06-V04C and other V06 codes as appropriate. Large-scale (i.e. industrial) vibration generators with electrical aspects are covered by X25-L05.

P43-A05 [2015]

Coupling or transmitting mechanical vibrations

P43-A99 [2015]

Other aspects of generating and using mechanical vibrations

P43-B [2015]

Cleaning in general

See also under the specific item or substance being cleaned. P43-B01 codes and P43-B05 are assigned according to the form of the substance performing the actual cleaning. For example, a water tank for steam cleaning equipment is coded as P43-B01C and not P43-B01A. Dry cleaning (of textiles and garments) is not included and is covered by F03-J04 with electrical aspects also covered by X25-H09 (industrial scale) or X27-D09 (domestic scale).

P43-B01 [2015]

Cleaning involving liquids, vapors or steam

P43-B01A [2015]

Cleaning involving liquids

Covers cleaning using liquid-phase materials only. The use of vapors, mists or aerosols of condensed fluid droplets is covered by P43-B01C.

Fluid, solution, solvent

P43-B01C [2015]

Cleaning involving vapors or steam

Includes steam cleaning and suspensions of e.g. fluid droplets in air.

Aerosol, droplet, mist, vapor

P43-B05 [2015]

Cleaning involving air or gas flow

Includes use of gases or gas mixtures made up of substances normally existing in a gaseous state and also suction-based cleaning excluding domestic suction cleaners which are covered by X27-D04 codes. Cleaning using vaporized substances is covered by P43-B01C.

Air line, blast, canned air, compressed air

P43-B07 [2015]

Cleaning involving external energy

Covers application of energy to the item or substance being cleaned to perform or expedite cleaning.

P43-B07A [2015]

Cleaning involving large-scale mechanical agitation

Agitate, shake, stir

P43-B07C [2015]

Cleaning involving sonic or ultrasonic energy

Electrical aspects of ultrasonic cleaning are covered by X25-H09A.

P43-B07X [2015]

Cleaning involving other types of energy

Involves application of mechanical energy, e.g. in the form of impacts.

P43-B08 [2015]

Measures to avoid the need for cleaning

Covers arrangements for confining dirt, dust, contaminants, etc. and also selection of surface characteristics to reduce adhesion of unwanted substances.

Contamination, contour, deposition, form, fouling, fumes, shape

P43-B99 [2015]

Other general cleaning

P43-E [2015]

General solid waste disposal

Dump, garbage, MSW, municipal solid waste, refuse, rubbish, tip, trash

P43-E01	[2015]
Solid waste disposal by burning	
Novel aspects of apparatus for combustion are covered by Q73 codes.	
<i>Furnace, incinerator</i>	
P43-E03	[2015]
Solid waste disposal by burying or dumping	
Includes landfill disposal.	
<i>Bury, cover, compact</i>	
P43-E05	[2015]
Solid waste disposal by treating or converting	
Covers treatment of waste to reduce e.g. odor and conversion into useful product.	
<i>Deodorize, detoxify, make safe, recycle</i>	
P43-E99	[2015]
Other aspects of general solid waste disposal	
P43-G	[2015]
Cleaning, maintenance/repair of apparatus for generating and using mechanical vibrations, cleaning or waste disposal	
This code covers cleaning, maintenance or repair of apparatus or systems covered by P43-A, P43-B, P43-E, and P43-J codes which are also assigned as appropriate.	
<i>Maintain, service, schedule</i>	
P43-J	[2015]
Contaminated soil or ground treatment	
Includes treatment of ground contamination to remove biohazards, toxins, and the like following chemical accidents or spillages or to reduce the effects of industrial pollution.	
<i>Reclamation</i>	
P43-M	[2015]
Manufacture and testing of apparatus for generating and using mechanical vibrations, cleaning or waste disposal	
This code covers manufacture of apparatus or systems covered by P43-A, P43-B, P43-E, and P43-J codes which are also assigned as appropriate.	
<i>Build, evaluate, production line, QA, quality assurance</i>	

P43-T	[2015]
Constructional details of mechanical vibration generators, cleaning and solid waste disposal apparatus	
These codes are assigned with P43-A, P43-B, P43-E, and P43-J codes which are also assigned as appropriate to denote the type of apparatus or process in which they are used. For example P43-A01 is assigned with P43-T01A for novel constructional details of driving arrangements for vibration generators. When novelty involves materials used in e.g. part of a machine, P43-T50 is also assigned.	
P43-T01	[2015]
Casings, housings and frames of mechanical vibration generators, cleaning and solid waste disposal apparatus	
<i>Case, enclosure, framework</i>	
P43-T05	[2015]
Driving arrangements of mechanical vibration generators, cleaning and solid waste disposal apparatus	
This code covers gearing and other mechanical aspects of equipment and machines. Novel electrical aspects are not specifically included and are covered by X25 codes and V06 or X11 codes for electric machine details.	
<i>Ball-race, bearing, clutch, crown-gear, drive-belt, gearbox, idler, lever, linkage, mechanical, mechanism, motor, pinion, pivot, pulley, rack-and-pinion, reciprocating, rotating, shaft, v-belt, worm-gear</i>	
P43-T50	[2015]
Novel constructional material	
This code is used in conjunction with other P43-T codes to indicate the use of a novel material in a machine or similar. Specific details of novel materials are represented by codes outside P43, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.	
P43-T99	[2015]
Other constructional details of mechanical vibration generators, cleaning and solid waste disposal apparatus	
P43-U	[2015]
Applications of mechanical vibration generators, cleaning and solid waste disposal apparatus	
These codes are assigned as necessary to indicate significant applications of apparatus for generating and using mechanical vibrations, cleaning, or waste disposal.	

P43-U01	[2015]
Domestic	
Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.	
P43-U02	[2015]
Commercial	
Includes general commercial applications. Can be used alone or in conjunction with other specific applications.	
P43-U03	[2015]
Vehicles	
Includes all land, air and space vehicles and also watercraft.	
P43-U05	[2015]
Agriculture; Farming	
P43-U06	[2015]
Manufacturing plants	
P43-U07	[2015]
Food	
P43-U08	[2015]
Tobacco industry	
P43-U09	[2015]
Packaging; Canning; Tinning; Bottling	
Novel aspects of packaging are covered by codes in classes Q31 to Q34.	
P43-U10	[2015]
Cooking and baking	
P43-U13	[2015]
Pharmaceutical; Medical	
P43-U14	[2015]
Laboratory	
P43-U17	[2015]
Civil Engineering; Construction; Buildings	
P43-U18	[2015]
Mining	
P43-U25	[2015]
Chemical engineering; Refinery/chemical plant	
P43-U26	[2015]
Metallurgy	

P43-U30	[2015]
Sports, toys, entertainment and leisure	
Includes sports equipment, sports stadiums, ice rinks, ski slopes, entertainment venues, leisure pursuits, games and toys. Specific details of inventions in these fields are covered by P36 codes in general and W04-X codes in the case of electrical aspects.	
P43-U99	[2015]
Other specific applications	
P43-X	[2015]
Other generation and use of mechanical vibrations, cleaning, or waste disposal	

P5: Shaping metals

P51: Metal Rolling, Drawing, Extruding

Electrical details of metal rolling, drawing and extruding are coded under X25-A02B and T06-D05A1 (control details).

General metal working where the technique is not specified is coded under P56-X.

P51-A [2015]

Metal rolling

Includes hot rolling, cold rolling, roll bending, roll forming, flat rolling, ring rolling, structural shape rolling and tube rolling.

Foil rolling

P51-B [2015]

Metal drawing

Includes sheet metal drawing and bar, tube and wire drawing. Electrical details of wire drawing are coded under X25-A02E.

Deep drawing

P51-C [2015]

Metal extruding

Includes hot, cold and warm extrusion.

Metal extrusion

P51-G [2015]

Maintenance and repair of rolling, drawing, extruding systems

Roll maintenance, de-scaling

P51-R [2015]

Recycling of rolling, drawing, extruding components

Electrical details of recycling systems are coded under X25-W04.

P51-T [2015]

Constructional details of rolling, drawing, extruding systems

P51-T01 [2015]

Rolls; Rolling balance system

Includes backup rolls, work rolls, etc. Also includes roll mountings, arrangements to maintain correct position of rolls and roll changing devices.

Roller, rolling stand frame, interchanging rolls, overhead crane

P51-T02 [2015]

Drive motors; Pinions; Gearing

In-depth details of motors are covered by X11 codes.

Spindle

P51-T03 [2015]

Drums

Capstan

P51-T04 [2015]

Grippers

P51-T05 [2015]

Dies; Mandrels; Presses; Stocks

Includes draw bench. Also includes guides and supports of mandrels.

Die holder, extrusion press

P51-T20 [2015]

Control and safety arrangements

Includes arrangements for freeing jammed rolls, preventing fracture of rolls or removing fumes. Electrical details are covered under T06-D05A1.

Breaker blocks, protection

P51-T22 [2015]

Cooling and lubrication arrangements

This code can be used in conjunction with other P51-T codes, i.e. cooling arrangements of mandrels are coded under P51-T22 together with P51-T13. Includes cooling of finished workpieces.

Phosphate coating, cooling beds

P51-T25 [2015]

Work feeding/guiding arrangements; Coiling

Includes arrangements for moving work between different stations/steps, turning over sheets, etc, arrangements for dealing with multi-layer sheets of metal, e.g. for separating the different sheets of metal after the rolling process, and for separating the work from the mandrel. Also includes arrangements for coiling metal wire or band.

Carriage, drive

P51-T99 [2015]

Other constructional details of rolling, drawing, extruding systems

Includes arrangements for removing machining waste from the machine and storage of finished items.

Debris disposal, coilers, uncoilers, rams, plungers

P51-U	[2015]
Applications	
P51-U03	[2015]
Vehicles	
<i>Planes, cars, ships</i>	
P51-U40	[2015]
Industrial	
This code is applied for manufacture of industrial parts, such as blades, etc. Manufacture of vehicle parts are coded under P51-U03 only.	
P51-U99	[2015]
Other specific applications	

P52: Metal Punching, Working and Forging

With the exception of metal punching, P52 codes cover metalworking processes where the workpiece is reshaped without adding or removing material.

Electrical details of metal forging are coded under X25-A02C and T06-D05A (control details), and electrical details of metal hammering, bending and punching are coded under X25-A02D and T06-D05A (control details).

P52-A [2015]

Preliminary treatment

Includes preparation of metal stock. This code can be used in conjunction with P52-B, P52-C, or P52-D codes.

P52-B [2015]

Metal punching

Perforating, stabbing, piercing

P52-C [2015]

Metal forging/hammering/pressing/riveting

Forge furnace

P52-D [2015]

Metal working (excluding metal punching or forging)

P52-D01 [2015]

Metal straightening/stretching

P52-D02 [2015]

Metal bending

Includes metal corrugating, metal coiling, flanging and edge-curling.

Twisting

P52-D03 [2015]

Stamping

P52-D04 [2015]

Spinning

P52-D05 [2015]

Metal drawing

Cold drawing, deep drawing

P52-D06 [2015]

Wire working

Includes wire coiling, bending, twisting, cutting, splitting, straining, etc.

P52-D99 [2015]

Other metal working processes

Includes flanging, etc. Also includes finishing details such as attaching head to a drawing-pin, and metal shaping using fluid pressure, shock waves, etc.

Chemical explosives, edge-curling, edge-strengthening, edge armoring

P52-G [2015]

Maintenance and repair of punching, working and forging systems

P52-R [2015]

Recycling of punching, working and forging components

Electrical details of recycling systems are coded under X25-W04.

P52-T [2015]

Constructional details of punching, working and forging systems

Constructional details of presses are also covered under P71, and constructional details of furnaces are also covered under Q77.

P52-T01 [2015]

Bolster plates

P52-T02 [2015]

Dies; Die cushions

Die holder, die mounting

P52-T03 [2015]

Rams; Anvils; Hammers

P52-T04 [2015]

Blank holders

Mounting

P52-T05 [2015]

Frames; Casing

Supports, feet

P52-T08 [2015]

Mandrels

P52-T10 [2015]

Burr prevention/removal arrangements

Shoulder prevention

P52-T20 [2015]

Control and safety arrangements

Barrier guards, protection

P52-T22	[2015]
Cooling and lubrication arrangements	
Includes cooling arrangements of finished workpieces.	
<i>Cooling beds</i>	
P52-T25	[2015]
Workpiece feeding/guiding arrangements	
Includes feeding of wire.	
P52-T99	[2015]
Other constructional details of punching, working and forging systems	
Includes storage of finished items.	
<i>Debris disposal</i>	
P52-U	[2015]
Applications	
P52-U03	[2015]
Vehicles	
P52-U40	[2015]
Industrial	
Manufacture of vehicle parts is coded in P52-U03 only. Also covers manufacture of tools, including garden tools, and locksmith items.	
<i>Propeller blade, turbine blade, nails, blacksmith, chain, key</i>	
P52-U50	[2015]
Personal	
<i>Hair pins</i>	
P52-U50A	[2015]
Jewellery	
P52-U50B	[2015]
Haberdashery	
P52-U99	[2015]
Other specific applications	
Includes manufacture of cutlery.	

P53: Metal Casting and Powder Metallurgy

P53-A [2015]

Foundry Moulding

Includes manufacture of moulds, cores and patterns. Details of cores/moulds per se are coded under P53-T02. Includes details for coating surfaces of mould / core / pattern and other finishing processes.

P53-B [2015]

Metal Casting

P53-B01 [2015]

Types of metal casting

P53-B01A [2015]

Continuous casting

P53-B01B [2015]

Expendable mould casting

P53-B01B1 [2015]

Sand casting

P53-B01B2 [2015]

Investment casting

Lost wax

P53-B01B9 [2015]

Other types of expendable mould casting

P53-B01C [2015]

Non-expendable mould casting

P53-B01C1 [2015]

Permanent mould casting

P53-B01C2 [2015]

Die casting

P53-B01C9 [2015]

Other types of non-expendable mould casting

Centrifugal casting

P53-B01X [2015]

Other types of mould casting

P53-B04 [2015]

Pre-casting treatment

P53-B05 [2015]

Post-casting treatment

Includes removing castings from moulds, cooling castings (see also P53-T25) and cutting-off surplus material.

P53-C [2015]

Powder Metallurgy

Fiber reinforcement is coded in M22-H03D. Post treatment/impregnation is coded in M22-H03E. Composite layers and materials are coded in M22-H03F. Metal matrix composites are coded in M22-H03F1. Ceramic matrix composites are coded in M22-H03F2.

P53-C01 [2015]

Powder manufacture

Powder manufacture is also coded in M22-H01.

P53-C02 [2015]

Powder blending

P53-C03 [2015]

Compacting and/or sintering

Compacting only is also coded in M22-H03A, sintering only is also coded in M22-H03B, and compacting and sintering is also coded in M22-H03C. Selective laser sintering is coded under X25-A08C3.

P53-C99 [2015]

Other powder metallurgy details

P53-G [2015]

Maintenance and repair of foundry moulding, metal casting and powder metallurgy systems

Includes removal of tundish skulls.

Skimming

P53-R [2015]

Recycling of foundry moulding, metal casting and powder metallurgy components

Electrical details of recycling systems are coded under X25-W04.

P53-T [2015]

Constructional details of foundry moulding, metal casting and powder metallurgy systems

P53-T01	[2015]
Constructional details of moulding machines	
Includes details of the system conveying liquid material to the mould such as gating system, riser and riser aids, ladles and tundishes.	
<i>Mould table, flask, sprue, pouring cup, gates, runners</i>	
P53-T02	[2015]
Moulds, cores or patterns	
Includes additives for e.g. separating the casting from the mould, protecting the casting, etc.	
Machines used to make the moulds, cores or patterns are coded under P53-T01.	
<i>Binding agents, grain structure</i>	
P53-T05	[2015]
Lubrication details	
P53-T20	[2015]
Control and safety arrangements	
<i>Barrier guards, supervision</i>	
P53-T25	[2015]
Cooling arrangements of finished workpieces	
Cooling of cast workpieces are also coded under P53-B05.	
<i>Cooling beds</i>	
P53-T99	[2015]
Other constructional details of metal casting and powder metallurgy systems	
Includes storage of finished items.	
<i>Debris disposal</i>	
P53-U	[2015]
Applications	
P53-U03	[2015]
Vehicles	
P53-U40	[2015]
Industrial	
<i>Turbine blade, engine valves, machine components</i>	
P53-U99	[2015]
Other specific applications	

P53-V	[2015]
Types of materials processed	
P53-V02	[2015]
Ferrous metals	
P53-V02A	[2015]
Cast iron	
P53-V02B	[2015]
Steels	
P53-V02F	[2015]
Nickel-free special alloys	
Additional code for special alloys, e.g. for medicinal devices.	
P53-V02X	[2015]
Other iron alloys	
P53-V03	[2015]
Light metals	
P53-V03A	[2015]
Aluminum (alloys)	
P53-V03B	[2015]
Magnesium (alloys)	
P53-V03C	[2015]
Titanium (alloys)	
P53-V03X	[2015]
Other lightweight alloys	
P53-V04	[2015]
Group 11 elements; Coinage metals	
P53-V04A	[2015]
Copper	
P53-V04A1	[2015]
Brass (Cu/Zn alloys)	
P53-V04A2	[2015]
Bronze (Cu/Sn alloys)	
P53-V04A9	[2015]
Other copper alloys	
P53-V04E	[2015]
Silver (alloys)	
<i>Ag</i>	

P53-V04F	[2015]
Gold (alloys)	
<i>Au</i>	
P53-V04X	[2015]
Other precious metals/alloys	
P53-V05	[2015]
Refractory metals	
P53-V05A	[2015]
Chromium (alloys)	
P53-V05B	[2015]
Molybdenum (alloys)	
P53-V05C	[2015]
Tungsten (alloys)	
P53-V05E	[2015]
Manganese	
This code is always applied even when a minor component.	
P53-V05X	[2015]
Other refractory metals and their alloys	
P53-V06	[2015]
Soft metals	
P53-V06A	[2015]
Lead (alloys)	
P53-V06B	[2015]
Tin (alloys)	
P53-V06C	[2015]
Zinc (alloys)	
P53-V06X	[2015]
Other soft metals and their alloys	
P53-V07	[2015]
Nickel (alloys)	
P53-V08	[2015]
Cobalt (alloys)	
P53-V09	[2015]
Rare earth metals	
This code is always applied even when a minor component.	

P53-V10	[2015]
Composites with non-metallic inorganic materials	
Non-metallic components are always coded even when a minor component.	
P53-V10A	[2015]
Silicon, silicides	
P53-V10B	[2015]
Boron, borides	
P53-V10C	[2015]
Carbon, carbides	
P53-V10D	[2015]
Oxygen, metal oxides	
P53-V10E	[2015]
Chalcogens (S, Se, Te)	
P53-V10F	[2015]
Silicates, glass, ceramics	
P53-V10X	[2015]
Other inorganic materials	
P53-V11	[2015]
Composites with organic components, polymers	
Includes metal/polymer composite materials, but not binders, lubricants or other auxiliaries.	

P54: Metal milling and other machining

P54 codes cover metal machining involving removal of material.

From 2015, electroworking details have been removed from P54 and are coded by X25 and X24-F (electric discharge machining). P54 remains searchable for electroworking for records prior to 2015.

General metal working where the technique is not specified is coded under P56-X.

P54-A	[2015]
Turning	
P54-B	[2015]
Boring and drilling	
P54-C	[2015]
Milling	
P54-D	[2015]
Metal working involving removal of material (excluding turning, boring and milling)	
P54-D01	[2015]
Planing; Slotting	
P54-D02	[2015]
Shearing	
P54-D03	[2015]
Broaching	
P54-D04	[2015]
Sawing	
P54-D05	[2015]
Filing; Rasping; Grinding	
Also includes abrading, honing, lapping and sharpening of e.g. metal blades, razors or engine cylinders. Prior to 2021, grinding, filing and rasping of metal elements were coded by the combination of P61-A01 codes and P61-V26.	
P54-D06	[2021]
Polishing; Burnishing	
Prior to 2021, polishing and burnishing of metal elements were coded by the combination of P61-A03 and P61-V26.	
<i>Stropping, buffing</i>	

P54-D99 [2015]

Other metal working involving removal of material (excluding turning, boring and milling)

Includes reaming bored holes.

P54-E [2015]

Making gears or toothed racks

This code can be used in conjunction with other P51 to P54 codes to highlight the method used.

P54-F [2015]

Thread cutting

This code can be used in conjunction with other P51 to P54 codes to highlight the method used. Includes cutting threads in screws, bolt heads and nuts.

P54-G [2015]

Maintenance and repair of milling and machining systems

Includes sharpening of saw teeth.

P54-H [2015]

Small-scale/handheld machines

This code should be used in conjunction with P54-A, P54-B, P54-C or P54-D.

Watchmaker, portable

P54-R [2015]

Recycling of milling and machining components

Electrical details of recycling systems are coded under X25-W04.

P54-T [2015]

Constructional details of milling and machining systems

P54-T01 [2015]

Lathes

Includes lathes beds, headstocks and tailstocks.

P54-T02 [2015]

Drives; Gears

If part of a lathe, P54-T02 should be used together with P54-T01.

P54-T03	[2015]
Tools; Tool holders; Chucks; Mandrels	
If part of a lathe, P54-T03 should be used together with P54-T01. Includes saw blades and arrangements for securing the tool in place.	
<i>Reamer, hacksaw, saw blade</i>	
P54-T05	[2015]
Frames; Casing	
<i>Supports, feet</i>	
P54-T20	[2015]
Control and safety arrangements	
<i>Barrier guard, safety guard, protection</i>	
P54-T22	[2015]
Cooling and lubrication arrangements	
P54-T25	[2015]
Workpiece feeding/guiding arrangements	
Also includes arrangements for ejecting finished workpiece.	
P54-T99	[2015]
Other constructional details of milling and machining systems	
<i>Debris disposal, scraping</i>	
P54-U	[2015]
Applications	
P54-U03	[2015]
Vehicles	
P54-U17	[2015]
Building, construction industry	
P54-U31	[2015]
Weapons	
P54-U40	[2015]
Industrial	
P54-U50	[2015]
Personal items	
P54-U50A	[2015]
Jewellery	
P54-U99	[2015]
Other specific applications	

P55: Welding and Soldering

From 2015, P55 manual codes have been assigned for mechanical details of soldering and non-electric welding. X24 codes should be used for electric welding, e.g. laser welding, arc welding, etc.

P55-A [2015]

Pre-treatment

This code should be used in conjunction with P55-B or P55-C for soldering/brazing or welding, respectively.

Preparation of surfaces, degreasing, oxides removal

P55-B [2015]

Soldering and brazing

See also X24-A codes.

P55-B01 [2015]

Soldering

P55-B02 [2015]

Brazing

P55-B03 [2015]

Desoldering

Unsoldering

P55-C [2015]

Welding

Welding systems using electricity, such as arc welding, laser welding, ultrasonic welding, etc, are only coded under X24. Also includes details of scarfing two surfaces using flames.

P55-C01 [2015]

Gas welding/cutting

Includes gas cutting torches.

Gas flame welding, butane, propane

P55-C02 [2015]

Solid state welding

Includes cold pressure welding, diffusion welding, explosion welding, forge welding, friction welding, hot pressure welding and roll welding.

P55-C99 [2015]

Other types of welding

Includes exothermic welding.

P55-D [2015]

Soldering and welding media

P55-D01 [2015]

Solder, flux

Includes details of solder manufacture. See also X24-A01A.

P55-D03 [2015]

Welding rods and electrodes

Welding rods and electrodes feeders are coded under P55-T02B.

Wire

P55-D99 [2015]

Other soldering and welding media

P55-G [2015]

Repair and maintenance of soldering and welding systems

P55-R [2015]

Recycling of soldering and welding components

P55-T [2015]

Tools; Protective equipment; Control; Feeder and Dispensers

Includes soldering/brazing and welding tools. (De)soldering irons are also coded under X24-A02A.

P55-T01 [2015]

Soldering torches; (De)soldering irons

Includes arrangements for guiding or supporting torches.

Propane torch, soldering bit

P55-T02 [2015]

Feeders, dispensers and conveying systems

P55-T02A [2015]

Solder dispensers

Solder melting pan

P55-T02B [2015]

Welding rods and electrodes feeders

Details of welding rods and electrodes per se are coded under P55-D03.

P55-T02C [2015]
**Work conveying/supporting systems ;
Automatic welding systems**
Includes arrangement for conveying work to be
soldered/welded.
Driving mechanism, clamp

P55-T20 [2015]
**Control and safety arrangements;
Protective equipment**
Includes protective masks, goggles, etc. Includes
details of fire protection (see also P35). From 2017,
details of cooling and lubrication arrangements are
coded under P55-T20 (previously coded under
P55-T99).
Barrier guard, safety guard

P55-T99 [2015]
Other welding/soldering/brazing tools
Includes crocodile clips used as heat sinks, guides,
cables and connectors. From 2017, details of
cooling and lubrication arrangements are coded
under P55-T20.

P55-U [2015]	
Applications	
P55-U03 [2015]	
Vehicles	
P55-U13 [2026]	
Medical	
P55-U17 [2015]	
Building, construction industry	
P55-U40 [2016]	
Industrial	
Includes welding/brazing of pipes in air conditioning systems, in factory units, etc.	
P55-U42 [2017]	
Electronics	
<i>Printed circuits</i>	
P55-U50 [2015]	
Personal items	
P55-U50A [2015]	
Jewellery	

P55-U99 [2015]
Other specific applications
Includes details of specific structures made by
soldering, welding or cutting, e.g. honeycomb
structures.

P56: Machine Tools; Post-treatment for metal working

Metal rolling, drawing and extruding are coded under P51. Metal punching, working and working are coded under P52. Metal casting and powder metallurgy are coded under P53. Metal milling and machining are coded under P54. Soldering and welding metal are coded under P55.

P56-A [2015]

Post-treatment for metal working

Includes treatment of finished surfaces/workpieces to improve resistance to wear or impact, etc.

Knurling

P56-B [2015]

Arrangements for setting precious stones to metal surfaces

Diamond, gemstone

P56-C [2015]

Copying

Includes methods and systems for copying directly from a master model.

P56-G [2015]

General cleaning, maintenance/repair of machine tools

Includes restoring or reconditioning objects, such as repairing fractures or cracked metal parts.

P56-T [2015]

Constructional details of machine tools

Includes general details of machine tools. For specific applications, e.g. metal milling, metal rolling, etc, see P51 to P55 codes. Electrical details are coded under X25. Details of motors are coded under X11 and V06 for high power and low power, respectively.

P56-T01 [2015]

Frames; Beds; Tool supports

Feet, casing, springs, tool holder

P56-T20 [2015]

Control, safety and cleaning arrangements

Includes protective covers, arrangements for preventing overload of tools, etc. Electric details are coded under X25 and T06 codes. Also includes cooling and lubrication arrangements, and cleaning arrangements for removing scrap from e.g. teeth of circular cutters, etc.

Control knobs, compensation, dust protection, splash guard

P56-T25 [2015]

Workpiece holding/feeding/supporting arrangements

Includes arrangements for securing the workpiece in any desired position.

Clamps, index, guide

P56-T99 [2015]

Other details of machine tools

Includes equipment for storing tools when not in operation and combination of multiple metal-working machines.

P56-U [2015]

Applications

P56-U03 [2015]

Vehicles

P56-U17 [2015]

Building, construction industry

P56-U31 [2015]

Weapons

P56-U40 [2015]

Industrial

Tools

P56-U50 [2015]

Personal items

P56-U50A [2015]

Jewellery

P56-U99 [2015]

Other specific applications

P56-X	[2015]
Unspecified metal working processes and systems	
Includes general metal working where the technique is not specified.	

P6: Shaping non-metals

P61: Grinding and polishing of non-metals

From 2015, P61 has been subdivided to cover mechanical details of grinding and polishing equipment and processes. See also X25-A03C codes for electrical details. Shaping and working of metals are coded by P51 to P56 codes.

P61-A [2015]

Types of grinding and polishing systems

These codes are applied to highlight the general type of grinding/polishing machine/mechanism. Use with other P61 codes as appropriate.

P61-A01 [2015]

Grinding, abrading, honing, lapping, sharpening

Prior to 2021, grinding, filing and rasping of metal elements were coded by the combination of P61-A01 codes and P61-V26. From 2021, these are now coded under P54-D05 only.

Sanding

P61-A01A [2015]

Sharpening

P61-A01B [2015]

Honing

Includes honing of engine cylinders. See also Q51-A codes for IC engine details.

P61-A01C [2015]

Lapping

P61-A03 [2015]

Polishing, burnishing

Prior to 2021, polishing and burnishing of metal elements were coded by the combination of P61-A03 and P61-V26. From 2021, these are now coded under P54-D03 only.

Stropping, buffing

P61-A20 [2015]

Grinding/polishing mechanism

Use with P61-A01 codes as appropriate.

P61-A20A [2015]

Rotary, e.g. using grinding/polishing discs

Angle grinder, rotary polisher

P61-A20B [2015]

Linear/reciprocating, e.g. using grinding/polishing belts

Belt sander

P61-A20C [2015]

Blasting with particulate material

P61-A20G [2015]

Portable grinding

P61-A99 [2015]

Other types of grinding and polishing systems

P61-F [2015]

Measuring, indicating, controlling grinding/polishing equipment

Includes all control and monitoring details. Use with e.g. X25, T06 and S02 codes as appropriate.

P61-G [2015]

Cleaning, dressing, maintenance/repair of grinding equipment

Includes cleaning of grinding/polishing equipment, dressing/conditioning of grinding surfaces, etc.

P61-M [2015]

Manufacture of grinding and polishing apparatus/media

Includes manufacture of grinding/polishing machines and their parts.

P61-R [2015]

Recycling of grinding and polishing components/media

Includes recovery and re-use or recycling of blast media, e.g. grit, soda.

P61-T [2015]

Constructional details of grinding and polishing systems

P61-T01 [2015]

Frames, beds, casings

Also see Q68 class.

P61-T02 [2015]

Headstocks; working spindles

P61-T03	[2015]
Work support, table, conveyor belts	
Also see Q35-B for mechanical conveyors per se, and X25-F01 for electrical details.	
<i>Jigs</i>	
P61-T04	[2015]
Drive devices	
Includes drive shafts, gearing, 90-degree drive adapters etc.	
P61-T08	[2015]
Abrasion devices and media	
Includes grinding/polishing discs, wheels and drums, grinding/polishing bands, and abrasion material blast devices and their media	
<i>Grinding pads, sanding belt, nozzle, impeller</i>	
P61-T10	[2015]
Safety devices	
Includes protective guards.	
P61-T12	[2015]
Dust extraction and suppression; Debris collection	
Includes devices for collecting/recovering materials resulting from grinding or polishing. Recycling of grinding and polishing media is covered by P61-R.	
<i>Dust cover</i>	
P61-T13	[2015]
Cooling and lubricating equipment	
Includes cooling slots in grinding wheels as well as coolant/lubricant supply arrangements.	
P61-T99	[2015]
Other constructional details of grinding and polishing systems	
P61-U	[2015]
Applications	
See other P and Q classes for mechanical applications and S-X codes for electrical applications.	
P61-U01	[2015]
Domestic	
Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.	
P61-U03	[2015]
Vehicles	
Includes motor vehicles, trains, boats and aircraft.	

P61-U05	[2015]
Agriculture; Farming; Logging	
P61-U07	[2015]
Food	
See D11-D14 codes for further details of foodstuffs.	
P61-U08	[2015]
Tobacco	
See P15 codes for details of tobacco per se.	
P61-U13	[2015]
Pharmaceutical; Medical	
See P3 codes for mechanical details of medical equipment.	
P61-U17	[2015]
Civil Engineering; Construction; Buildings	
Includes grinding of materials used in roads, railroads, waterways, canals, buildings. See Q4 codes for further details of civil engineering and construction.	
<i>Railway</i>	
P61-U18	[2015]
Mining; Drilling	
See P61-V22 for grinding of ores, coal etc. See P61-A01A also for sharpening of drill bits.	
P61-U19	[2015]
Furniture	
Includes grinding and polishing of wood during cabinet making and furniture construction.	
<i>Chair, sofa, table, bed</i>	
P61-U20	[2015]
Waste disposal, waste treatment, recycling	
Includes grinding materials for recycling. Can be assigned with other specific codes as appropriate, e.g. P61-U03 for scrapping/crushing motor cars.	
P61-U99	[2015]
Other specific applications	
P61-V	[2015]
Materials ground or polished	
P61-V11	[2015]
Wood	
See X25-A10 for electrical details of wood working.	
P61-V13	[2015]
Plastic; Composite; Rubber; Resin	
See section A codes for polymers per se.	

P61-V15 [2015]
Glass

See L01 codes for glass per se.

P61-V20 [2015]
Ceramic; Porcelain; Concrete

Includes grinding of tiles and bricks. See L02 codes for ceramics/cement per se.

P61-V22 [2015]
Stone; Rock; Ores; Slate, Minerals

Includes grinding of all rocks, stones, ores/minerals.

Granite, sandstone, coal, chalk, diamonds, sapphires, gemstones

P61-V26* [2015-2020]
Metals

*This code is now discontinued and transferred to P54-D05 for grinding, honing and sharpening of metal elements, and P54-D06 for polishing and burnishing of metal elements. It remains searchable for records prior to 2021.

P61-V99 [2015]
Other materials processed

P62: Hand tools, cutting

P62-A	[2015]
Types of hand/portable power tools	
P62-A01	[2015]
Pliers; tweezers	
P62-A02	[2015]
Spanners; wrenches	
Includes ring, open ended, ratchet wrenches and socket sets.	
<i>Torque wrench, spanner</i>	
P62-A03	[2015]
Screwdrivers	
Includes impact driver.	
P62-A04	[2015]
Wire/strip fastening, connecting and tensioning tools	
P62-A05	[2015]
Fastening/separating tools	
Includes tools for fastening or connecting two or more parts together with or without deformation and for unfastening parts. For application of nails/staples see Q61-A06. Includes tools for inserting bearing races, cotter pins, bushes etc. and removing broken drill bits.	
P62-A06	[2015]
Nailing and stapling tools	
Includes hand-held stapling tools, and nail/staple punching, extracting and straightening tools. Includes tools for applying other fastening elements.	
<i>Nail gun, staple gun, stapler</i>	
P62-A07	[2015]
Hammers	
Includes all types of hammer.	
<i>Club hammer</i>	
P62-A08	[2015]
Chisels	
P62-A75	[2015]
Combination or multipurpose hand/portable tools	
Includes tools with multiple functions. Can be applied in conjunction with other individual tool types as required.	

P62-A99 [2015] **Other hand/portable tools (except cutting)**

P62-B	[2015]
Hand cutting/perforating/punching tools	
Includes tools for cutting, bevelling, grooving, slitting, punching, perforating, cutting-out, shaving.	
P62-B01	[2015]
Punching; punches	
Includes centre punches and other punching tools.	
P62-B02	[2015]
Perforating	
P62-B04	[2015]
Cutting-out; Stamping-out	
Includes press-type tools.	
P62-B05	[2015]
Knives	
P62-B07	[2015]
Scissors; shears	
<i>Garden shears, pinking shears</i>	
P62-B08	[2015]
Clippers; shavers	
P62-B09	[2015]
Razors	
P62-B10	[2015]
Axes; hatchets	
P62-B50	[2015]
Severing/tearing devices	
Includes arrangement for severing workpiece/material without cutting, e.g. by heating or squeezing.	
P62-B99	[2015]
Other hand/portable cutting tools	
P62-D	[2015]
Workshop equipment; work holders; vices; clamps	
P62-D01	[2015]
Work benches; stands; trestles; supports	
Includes benches, tables, supports, jigs etc. on which workpiece is being machined/worked.	

P62-D02 [2015]

Vices; clamps; gripping heads

Includes arrangements for gripping tools or workpieces. Includes magnetic and vacuum work holders.

Sash clamp, G-clamp, workpiece holder

P62-D03 [2015]

Workpiece/material feeding

Includes arrangements for feeding workpiece being machined.

P62-D05 [2015]

Tool storage

Includes tool storage boxes, racks, trays.

P62-D08 [2015]

Marking out or setting out work

Includes scribes.

P62-D99 [2015]

Other workshop equipment

P62-E [2015]

Manipulators

Includes mechanical details of manipulators. See also Q35-B. See X25-A03E for electrical details of manipulators.

P62-F [2015]

Measuring, indicating, sensing, controlling hand/portable tools

Includes mechanical control elements and program control. See T06 for general electrical control and T01 for computer control as appropriate.

P62-G [2015]

Cleaning, maintenance/repair of hand and cutting tools

Includes arrangements for cleaning, lubricating and sharpening tools. See P61-A01A for sharpening per se.

Refurbishment

P62-M [2015]

Manufacture/Pre-use treatment of hand and cutting tools

Includes equipment and methods of manufacturing the hand/cutting tool per se.

P62-T [2015]

Constructional details of hand and cutting tools

P62-T01 [2015]

Handles and handle attachment arrangements

P62-T02 [2015]

Tool bits

Includes screwdriver bits, wrench bits/sockets, and bit holders/chucks.

P62-T03 [2015]

Hammer heads

P62-T04 [2015]

Drive arrangements

Includes percussion arrangements, such as electromotors, electromagnetic drives, centrifugal and rotary drive arrangements, fluid pressure drives, e.g. using compressed air, IC engines or detonation of cartridge, and mechanical drives, such as ratchet mechanisms, cams, cranks, worms, gearing etc. Also includes joints, wrists and arms used in manipulators. See X25-A03 codes for electrical aspects of hand tools.

Drive mechanism

P62-T05 [2015]

Noise/vibration dampers

Includes vibration absorbing.

P62-T06 [2015]

Dust/waste extraction

Includes removal of waste material and dust.

P62-T07 [2015]

Safety devices

Includes guards and sheaths.

P62-T08 [2015]

Chambers

Includes chambers provided with manipulator devices or holes to allow working by hand.

P62-T10 [2015]

Heating and cooling arrangements

P62-T12 [2016]

Cutting elements/blades

Includes cutting surfaces and blades. Also see P62-B codes for type of cutting device.

Razor blade, cutter, knife

P62-T50	[2015]
Novel constructional materials	
Novel materials only. Should be used in conjunction with other P62-T codes.	
P62-T99	[2015]
Other constructional details	
P62-U	[2015]
Applications	
See S-X codes for electrical applications.	
P62-U01	[2015]
Domestic	
Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.	
P62-U02	[2015]
Commercial	
Includes general commercial applications. Can be used alone or in conjunction with other specific applications.	
P62-U03	[2015]
Vehicles	
Includes hand tools for assembling vehicles (see Q16-D codes also) or parts of vehicles.	
P62-U05	[2015]
Agriculture; Farming; Logging	
Includes shears for shearing sheep and well as shears for cutting grass.	
P62-U07	[2015]
Food	
P62-U08	[2015]
Tobacco	
P62-U13	[2015]
Pharmaceutical; Medical	
Includes fastening of wires/rods/bolts used in surgical applications.	
P62-U17	[2015]
Civil Engineering; Construction; Buildings	
P62-U18	[2015]
Mining; Drilling	
P62-U99	[2015]
Other specific applications	

P62-V	[2015]
Materials machined/cut	
P62-V11	[2015]
Wood	
See X25-A10 for electrical details of wood working/cutting.	
P62-V12	[2015]
Paper	
P62-V13	[2015]
Plastic; Composite; Rubber; Resin	
See section A codes for polymers per se.	
P62-V15	[2015]
Glass	
P62-V20	[2015]
Ceramic; Pottery; Porcelain; Concrete	
P62-V22	[2015]
Stone; Rock; Ores; Slate, Minerals	
Includes grinding of all rocks, stones, ores/minerals.	
<i>Sandstone, chalk, diamonds, sapphires, gemstones</i>	
P62-V31	[2015]
Fabric; Leather	
P62-V99	[2015]
Other materials processed	

P63: Working, preserving wood

P63-A [2015]

Types of wood working/preserving systems

Includes working and treating of bark, cane, cork, straw, reeds etc.

P63-A01 [2015]

De-barking; removing branches/twigs

Includes peeling of osier rods and stripping bark from tree trunks.

P63-A02 [2015]

Splitting

P63-A03 [2015]

Cutting; sawing

Includes circular saws, gang saws, reciprocating saws, band saws, strap saws, chain saws, etc.

Saw wires, twisted saw strips, cylinder saws

P63-A05 [2015]

Planing; milling; sanding

See P61-A01 for grinding/sanding in general.

Grinding

P63-A08 [2015]

Drilling

P63-A09 [2015]

Routing

P63-A10 [2015]

Turning

Includes lathe to turn wood.

P63-A15 [2015]

Joining

Includes jointing, nailing, stapling, gluing and pressing.

Dovetails, mortises, tenons, dowels, biscuit

P63-A18 [2015]

Bending

Includes bending wood e.g. by steam or pressure.

P63-A30 [2015]

Wood treating/preserving

Includes staining, impregnating, dyeing, bleaching and dampening wood, reeds, cork etc.

P63-A99 [2015]

Other types of wood working/preserving systems

P63-G [2015]

Cleaning, maintenance/repair of wood working/preserving systems

Includes arrangements for clearing sawdust and shavings from wood working tools. Includes sharpening of cutting blades and lubrication of tool drives. Includes cleaning of implements used to dye, varnish or stain workpieces.

P63-M [2015]

Manufacture of wood working tools/workpieces

Includes methods of manufacturing wood working tools

P63-R [2015]

Recycling/recovery of wood/timber; Use of waste material

Includes all processes for manufacturing wood wool, wood shaving/chips, wood fibers and wood powder / sawdust whether from waste wood/timber or not.

P63-T [2015]

Constructional details of wood working and preserving systems

P63-T01 [2015]

Wood splitting tools

Includes wedges, knives, spreaders, chopping blocks etc. For splitting wood.

P63-T02 [2015]

Saw blades/cutting elements

Includes saw blades, chains, wires and toothed cylinders for all types of power and hand saws. Also includes saw blade tensioning arrangements.

Cutter blocks

P63-T03 [2015]

Planes/Spokeshaves blades/blade adjusters

P63-T04 [2015]

Sanding elements

Includes wood sanding blocks.

P63-T05 [2015]

Drive arrangements

Includes drive shafts, gearings, worms.

P63-T06	[2015]
Braking arrangements	
P63-T07	[2016]
Drilling/honing/routing elements	
Includes auger/router bit and drill bits per se.	
P63-T13	[2015]
Heating and cooling arrangements	
Includes hot tables for warming veneers.	
P63-T14	[2015]
Lubricating arrangements	
P63-T19	[2015]
Fastener feeding, driving, bending arrangements	
Includes feeding and inserting nails and staples.	
P63-T20	[2015]
Work benches; frames; pillars, workpiece guides; clamps	
Includes guide fences and stops for saw mills or sawing machines, static and portable clamps, presses e.g. used to adhere veneer or form plywood, arrangements for feeding, loading, turning and conveying timber/wood and feed chains/rollers.	
<i>Work tables, stops, presses, workpiece feeders, G-clamp, sash clamp</i>	
P63-T99	[2015]
Other constructional details of wood working/preserving systems	
P63-U	[2015]
Applications	
P63-U03	[2015]
Vehicles	
Includes wooden dashboards and other vehicle parts.	
P63-U05	[2015]
Trees; Logging; Timber	
Includes sustainable forest management.	
P63-U08	[2015]
Tobacco	
Includes wooden pipes.	

P63-U17	[2015]
Civil Engineering; Construction; Buildings	
Includes recovery and reconditioning of railway sleepers. Also includes manufacture of wooden stairs, handrails. See Q4 codes for further details.	
P63-U18	[2015]
Mining; Drilling	
Includes wooden mine props/supports.	
P63-U19	[2015]
Furniture	
Includes manufacture of wooden chairs, tables, cupboards etc.	
<i>Sofa, bed</i>	
P63-U30	[2015]
Sports, toys, entertainment and leisure	
Includes wooden bats and racquets, bowling pins etc. See P36 for sports equipment per se.	
P63-U50	[2015]
Personal	
Includes manufacture of wooden walking sticks and jewellery.	
P63-U99	[2015]
Other specific applications	

P64: Working cement, clay, stone

P64-A [2015] **Clay/Clay mixture production/processing**

P64-A01 [2015]
Producing/processing clay suspensions
Includes production and processing of clay slurries and fluidic clay compositions, e.g. by blunging.

P64-A02 [2015]
Producing/processing clay non-fluidic compositions
Includes homogenizing, comminuting and conditioning clay in non-fluidic condition.

P64-A99 [2015]
Other types of cement, clay, stone working systems

P64-C [2015] **Shaping clay/clay mixtures**

P64-C01 [2015]
Casting
Includes centrifugal/rotational casting and slip casting.

P64-C02 [2015]
Moulding
Includes all types of moulding.

P64-C03 [2015]
Working shaped/moulded articles
Includes attaching handles and spouts as well as refinishing (corrugating, smoothing), removing burrs etc.

P64-C04 [2015]
Finishing shaped/moulded articles
Includes coating, glazing, curing, setting and hardening of moulded articles.

P64-C99 [2015]
Other cement/clay shaping

P64-E [2015] **Working stone/stone-like materials**

P64-E01 [2015]
Cutting; splitting
Includes cutting stone into slabs, splitting slates etc.

P64-E03 [2015]
Boring; drilling

P64-E05 [2015]
Turning; milling; planing

P64-E50 [2015]
Working specific materials

P64-E50A [2015]
Stones; Rocks; Bricks; Concrete; Tiles
Includes working of granite, limestone, sandstone, chalk, bricks, tiles, concrete, pottery, mica, slate, schist etc.

P64-E50E [2015]
Gems; jewels; crystals
Includes precious stones.

P64-E50Z [2015]
Other specific materials

P64-E99 [2015]
Other stone working arrangements

P64-G [2015]
Cleaning, maintenance/repair of cement, clay, stone working systems
Includes dressing milling discs and rollers. Also includes cleaning of clay/stone/cement machinery and produced articles.

P64-R [2015]
Recycling/recovery of cement, clay, stone working components
Includes recycling of used clay/slip.

P64-T [2015]
Constructional details of cement, clay, pottery, stone working systems

P64-T01 [2015]
Moulds; cores; mandrels
Includes novel aspects of all types of mould, core or mandrels.

P64-T02 [2015]
Work/material support/conveying/feeding/discharging
Includes feeding/discharging material as well as moving moulds on conveyor.

P64-T03 [2015]

Cutting devices

Includes saws and chisels.

P64-T04 [2015]

Drills; boring devices

Drill

P64-T05 [2015]

**Turning/milling/grinding
machines/devices**

See also P61 for specific grinding/milling
equipment in general.

P64-T10 [2015]

Safety devices

Includes protective guards.

P64-T12 [2015]

Dust extraction/suppression

P64-T13 [2015]

**Heating; cooling; (de)humidifying
equipment**

Includes means for heating or cooling material in
mould.

P64-T99 [2015]

Other constructional details

P7: Pressing, Printing

P71: Presses

Details of all types of presses and their operation and structure etc.

P71-A	[2015]
Press Type/Function	
P71-A01	[2015]
Types of presses	
P71-A01A	[2015]
Press brake; frame-type press	
Includes C-frame presses, open-frame presses, open back inclinable presses and press brakes.	
P71-A01B	[2015]
Horn press	
P71-A01C	[2015]
Arch press	
P71-A01D	[2015]
Straight-side press	
P71-A01E	[2015]
Turret press	
<i>Turret punch</i>	
P71-A01X	[2015]
Other specific types of presses	
Includes non defined press types and presses other than defined in A01A to A01F codes.	
P71-A10	[2015]
Main press function	
P71-A10A	[2015]
Forming/Shaping	
Includes using presses for bending, forming, drawing, cold-working, hot-working, seaming, stamping.	
P71-A10C	[2015]
Punching; blanking; broaching	
Includes cutting shapes out of material, e.g. using blanking tool.	
<i>Broaching</i>	
P71-A10E	[2015]
Baling	
Includes using baling press for e.g. waste paper.	

P71-A10F	[2015]
Compacting/consolidating material, e.g. scrap material	
Includes crushing for e.g. cars. Compacting press.	
<i>Car crusher</i>	

P71-A10H	[2015]
Squeezing out liquids from materials	
Squeezing-out liquid from liquid-containing material, e.g. juice from fruits, oil from oil-containing material, filtering, e.g. straining solids from liquids, using presses in combination with filtering elements expelling water from textile fabrics or laundry.	
<i>Fluid expel, oil expel, water expel</i>	

P71-A10X	[2015]
Other specific press functions	

P71-B	[2015]
Press action	
Electrical details of presses are coded under X25.	

P71-B01	[2015]
Using press ram/platen	
Includes presses using hydraulic/pneumatic drive, mechanical drive, levers, toggle mechanisms, screws, rack and pinion, and eccentric shafts, cams, cranks and knuckle joints.	
<i>Bramah press, chains, ropes</i>	

P71-B03	[2015]
Using rotary press members	
Includes presses using rotary worms and screws, rotary rollers, rings and discs.	
<i>Rotary press, screw press</i>	

P71-B99	[2015]
Using other press types/actions	
Includes presses using deformable member, e.g. diaphragm, or endless steel bands used e.g. for producing chipboard.	
<i>Diaphragm press, filter press</i>	

P71-T	[2015]
Press construction	
P71-T01	[2015]
Frames; Beds	
Includes beds e.g. for solid-bed, open-bed and adjustable bed presses. Also includes supports and feet.	
P71-T02	[2015]
Bolster plates	

P71-T03	[2015]
Platens; Rams; Anvils	
P71-T05	[2015]
Drive arrangements	
Includes gears, brakes, clutches and flywheels.	
P71-T07	[2015]
Dies; Die sets; Die shoes	
<i>Die cushions</i>	
P71-T08	[2015]
Rollers; Screws	
Includes pocketed rollers e.g. used to form tablets.	
P71-T15	[2015]
Hydraulic and pneumatic systems	
Includes press cylinders, pistons.	
<i>Cylinder</i>	
P71-T20	[2015]
Control and safety arrangements	
Includes measuring, indicating and controlling systems (mechanical details only).	
<i>Monitoring, safety</i>	
P71-T22	[2015]
Heating, cooling and lubrication arrangements	
P71-T25	[2015]
Material feed/discharge/conveying	
Includes blank holders.	
P71-T50	[2015]
Novel material details	
Novel materials used for the press constructions only. Should be used in conjunction with other P71 codes as appropriate.	
P71-T99	[2015]
Other constructional details	
Includes press accessories such as knives, knife mountings, etc.	
P71-U	[2015]
Application of Presses	
Characterized by what the press is used for.	
P71-U03	[2015]
Vehicles	
For scrapping/crushing motor cars, and other vehicles.	

P71-U05	[2015]
Agriculture; Farming	
Includes arable farming, sowing and harvesting. See P71-A10E for baling.	
<i>Baler</i>	
P71-U06	[2015]
Manufacturing plants	
Includes application of presses used in manufacturing plants.	
P71-U07	[2015]
Food industry	
Includes food shaping, e.g. for shaping dough, and oil pressing.	
<i>Olive oil</i>	
P71-U11	[2015]
Printing industry	
Electrical details of printing presses are covered by S06-C codes.	
P71-U13	[2015]
Pharmaceutical; Medical	
P71-U13A	[2015]
Pharmaceutical	
For tableting pressing.	
P71-U13B	[2015]
Medical	
Includes the use of presses for the medical industry.	
P71-U20	[2015]
Waste disposal and recycling	
Can be assigned with other specific codes as appropriate, e.g. P71-U03 for scrapping/crushing motor cars.	
<i>Biomass waste briquetting, wood waste for making fuel logs</i>	
P71-U99	[2015]
Other specific applications	
Applications of presses for uses not mentioned above.	
P71-V	[2015]
Types of materials pressed	
Characterized by the types of materials being pressed.	
P71-V01	[2015]
Metals	

P71-V11 [2015]

Wood

E.g. for wood shaving or saw dust, forming chipboard.

Chipboard press

P71-V12 [2015]

Paper

P71-V13 [2015]

Plastic

P71-V99 [2015]

Other specific materials pressed

P72: Working Paper

Covers all paper working aspects, including the types of processing involved, apparatus used and types of paper articles worked.

P72-A [2015]

Paper working process and apparatus

This section covers all aspects of paper processing and apparatus.

P72-A01 [2015]

Folding or creasing

Covers all methods of folding or creasing paper for various paper processes.

Fold, crease

P72-A02 [2015]

Shaping

General shaping of paper or card.

P72-A03 [2015]

Cutting or punching

Any cutting aspects to do with working paper article. Includes perforating,

Slitting, trimming

P72-A04 [2015]

Applying pressure

Includes pressing or flattening of paper.

P72-A05 [2015]

Applying heat or moisture

Any heating process to form paper or card product. Moistening/drying.

Heat process, heat treatment, moisten

P72-A06 [2015]

Bonding or attaching paper together

Using adhesives, taping, crimping etc.

Adhesive, crimping, bonding

P72-A07 [2015]

Deformation of paper or card

Covers methods for corrugating or embossing paper or card.

P72-A08 [2015]

Winding

E.g. for wound tubes or cones. See P72-B04.

Winding, tube, cone

P72-A09 [2015]

Crêping paper

Includes forming Crêpe paper.

P72-A10 [2015]

Recycling

Includes adding products to the pulp, defibrating, or any other treatments for recycling.

Recycle

P72-A15 [2015]

Manufacturing equipment

Includes hand tools or machinery to produce paper articles.

P72-B [2015]

Types of paper articles and shapes

This section is characterized by types of the paper articles or structures produced.

P72-B01 [2015]

Boxes

Includes cardboard boxes.

P72-B02 [2015]

Cartons

Includes paper cartons.

P72-B03 [2015]

Cups

Includes paper cups.

P72-B04 [2015]

Tubes or cones

Includes making tubes or cones or other wound shapes or cylinders from paper or card.

Paper tube, conical paper, paper cylinder

P72-B05 [2015]

Envelopes

Paper envelopes

P72-B06 [2015]

Bags

Paper bag

P72-B07 [2015]

Corrugated

Includes corrugated card.

[2015]

Includes light shades, Chinese lanterns, labels or tags, honeycombed structures, cellular packaging articles etc.

Honeycombed

P73: Layered Products

Covers details of layered products including methods, apparatus used, application of producing layered products, and structure of layered products.

P73-A [2015]

Structure of layered product

P73-A01 [2015]

Characterized by shape

Includes tubular layered products

P73-A02 [2015]

Characterized by structure

Includes flat, solid, ribbed, fibrous, cellular e.g. honeycombed, corrugated, etc.

P73-A03 [2015]

Relationship between layers

Connections between each layer and separability. Joining similar or dissimilar materials.

P73-N [2015]

Methods and apparatus for producing layered products

P73-N01 [2015]

Methods for producing layered products

P73-N02 [2015]

Apparatus for producing layered products

P73-V [2015]

Layer materials

Characterized by type of material used in layered product.

P73-V01 [2015]

Metals

P73-V11 [2015]

Wood

P73-V12 [2015]

Paper; cardboard

P73-V13 [2015]

Plastic; cellulosic plastic substances

P73-V14 [2015]

Glass; glass fibers

P73-V15 [2015]

Ceramic; cement; plaster

P73-V16 [2015]

Rubber; Resin

P73-V19 [2015]

Bituminous

P73-V30 [2015]

Mineral fiber

Rock wool

P73-V99 [2015]

Other specific materials

P74: Printing and lining machines

Covers all non-electrical aspects for printing and lining.

P74-A [2015]

Methods of printing characterized by type

These codes are for the methods of mechanical printing. The apparatus for printing is coded in P74-C. Electrical details of printing systems or electrical printing processes are coded under S06 class.

P74-A01 [2015]

Press printing

Includes letterpress printing, rotary press printing, offset press printing etc.

P74-A02 [2015]

Lithography

Covers all techniques using lithography.
Offset lithography, offset printing

P74-A03 [2015]

Intaglio

Covers all intaglio printing.

P74-A04 [2015]

Screen printing

Covers stencilling techniques.
Stencil, etymology, silkscreen, serigraphy, serigraph printing

P74-A10 [2015]

Other types of printing

Covers any types of mechanical printing not mentioned in P74-A01 to P74-A04.

P74-B [2015]

Printing processes

Covers specific or individual processes involved in various stages of printing.

P74-B01 [2015]

Composition or typesetting

Composing stick, typesetting

P74-B02 [2015]

Imposition

Includes forme preparation.
Forme

P74-B03 [2015]

Printing surface preparation

Covers all preparation for printing surface.

P74-B05 [2015]

Control aspects of printing

Covers all control aspects of all printing operations. Also covers safety aspects.

P74-C [2015]

Printing machinery and equipment

P74-C01 [2015]

Apparatus used for composition

Includes details of, or accessories for, machines for mechanical composition. Includes all hand apparatus for composition e.g. chases, quoins, or galleys. Also covers machinery or mechanical apparatus for composing, e.g. moulding or casting apparatus, matrices etc. Does not include photographic or photo-electronic composing machines, these are covered in S06 class. Printing for record carriers is covered in T03 class.

Chases, quoins, galleys, matrice

P74-C02 [2015]

Printing machines or Presses

Includes platen presses and cylinder presses. Details of presses are covered by P71 codes.

P74-C03 [2015]

Rotary printing machines

Includes rotary lithography, rotary intaglio or rotary press printing machines.

P74-C04 [2015]

Screen printers

Screen printing

P74-C08 [2015]

Inking arrangements or devices

Includes, inking units, ribbons, rollers, flat inking elements, troughs, reservoirs, pads, ducts etc.

P74-C09 [2015]

Media conveying/feeding arrangements

Covers all conveying or feeding apparatus for sheets through printing apparatus or machines. Includes grippers, pins, transfer drums etc.

Paper feeding

P74-C10 [2015]

Bronze printing machines

Includes apparatus for bronze printing or for like operations.

P74-C11 [2015]

Line printing machines

P74-C99 [2015]

Other apparatus for printing

Includes cleaning arrangements, safety arrangements, smudging prevention devices etc.

P75: Typewriters, stamps, duplicators

P75-A [2015] **Typewriters**

P75-A01 [2015] **Casing; Framework**

Includes supports, feet, dust excluders, etc.

P75-A02 [2015] **Keyboard arrangements; Hammers**

Includes locks, shift keys, key levers, key buttons, etc.

Tabulating, line spacing, character spacing, keys

P75-A03 [2015] **Media conveying**

Includes sheet or web feeding. Details of ink ribbons feeding are coded under P75-A04 only.

Rollers, holders, guides

P75-A04 [2015] **Inking arrangements**

Includes ink ribbon feeding, correction bands and fluid.

Ribbon, ink rollers, ink discs, ink cartridges

P75-A05 [2015] **Drive arrangements**

Includes gears, levers, sliding mechanisms, etc.

Mechanical power drives, fluid-pressure power drives

P75-A06 [2015] **Cooling arrangements**

P75-A99 [2015] **Other typewriter details**

Includes line counters, alarms when approaching end of line or end of sheet, etc.

P75-B [2015] **Stamps**

P75-B01 [2015] **Handheld stamps**

Includes changeable characters, handles, details of stamping surfaces, stands, numbering devices, etc. Ink pads are coded under P75-B03 only. Also includes plier-like tools used for stamping e.g. train or cinema tickets, etc.

P75-B02 [2015] **Stamping machines**

This code covers larger-size stamping machines where the media is held in place on/fed through the stamping machine. Includes details of sheet feeding, rollers, holders, guides, etc. Includes selection mechanism for successive stamping and numbering devices.

Ticket stamping machines

P75-B03 [2015] **Ink for stamps**

Includes ink wells or reservoirs, ink ribbons or tapes, inking pads, etc.

P75-B99 [2015] **Other types of stamps**

Includes stamping using rollers with integral ink-supply devices.

P75-D [2015] **Duplicating or manifolding**

P75-D01 [2015] **Using pressure-sensitive layers or intermediaries**

Hectographic printing, carbon copying etc.

P75-D10 [2015] **Other types of duplicating**

P76: Books, special printed matter

Includes aspects of book making and details of book structure or book features etc.

P76-A [2015]

Book binding

P76-A01 [2015]

Book binding methods

Includes stitching, using clips, laces or ribbons, eyelets, applying glue or adhesive, collating or gathering of sheets, or binding using fingers, claws or ring-like elements. Also includes manufacturing bookbinding cases or covers.

Jacketing, casing, covering

P76-A02 [2015]

Book binding tools or apparatus

Includes hand tools or machinery.

P76-B [2015]

Book covers and page features

P76-B01 [2015]

Book cover features

Includes details of loose covers, hinges, locks or closures, ornamented covers, covers with column, line or heading marks or indicators, with means for holding books open, etc.

P76-B01A [2015]

Characterized by material

Characterized by material used for book covers.

P76-B02 [2015]

Page features and accessories

Includes book markers, leaf turners, form sets and calendar blocks.

P76-C [2015]

Special printed matter

P76-C01 [2015]

Newspapers or the like

Includes all printed new paper or the like matter.

P76-C02 [2015]

Post cards or the like

Includes greeting, menu, business or like cards; letter cards or letter-sheets.

P76-C09 [2015]

Characterized by application

P76-C09A [2015]

Information and security-bearing printed matter

Identity cards, passports, public transport or admission tickets, using data chips, bank notes, fingerprints, signatures, photographs, security threads, magnetic strips, diffraction gratings, watermarks, lottery tickets

P76-C09B [2015]

Guilloche patterns

Includes Guilloche patterns and other decorative printed matter of the like.

P76-C09C [2015]

Moiré effects

P76-C09D [2015]

For use in medical treatment or therapy

Includes sterile or impregnated printed matter.

P76-C09E [2015]

Perforations

P76-C09F [2015]

Translucent or partly translucent parts

Windows

P76-C09M [2015]

Comprising special materials

P76-C09M1 [2015]

Liquid crystals

Printed matter that use liquid crystals.

P76-C09M2 [2015]

Metallic materials

P76-C09M3 [2015]

Special inks

P76-C09M4 [2015]

Absorbing or reflecting radiation

For absorbing or reflecting infra-red light, ultra-violet light, polarized light etc.

P76-C09X [2015]

Other specific applications

P76-F

[2023]

Filing and Folders

Includes filing devices such as folders, portfolios, plastic pockets/wallets, document holders/wallets, magazine binders, collapsible file carry boxes, file dividers, etc. Filing cabinets are coded with office furniture under P25-C01A only.

P77: Writing, drawing appliances; Bureau /desk accessories

Covers all aspects of writing or drawing appliances. Includes inventions characterized by type, core material, constructional details and manufacture for writing or drawing appliances. From 2021, P77 also covers bureau / desk accessories.

P77-A [2015]
Writing and drawing instruments

P77-A01 [2015]

Fountain pens

Includes nibs

Nib

P77-A02 [2015]

Ballpoint pens

Rollerball pen

P77-A03 [2015]

Felt-tip pens

Markers

P77-A04 [2015]

Pencils

Includes propelling pencils and grease pencils.

Pop-a-Point pencil, wax pencil, crayons

P77-A05 [2015]

Stylus

For use with e.g. touch screens.

P77-A99 [2015]

Writing instruments using other writing-points

Using coreless tubular writing-points, magnetically active writing-points etc.

Ink brush, quill, reed pen

P77-B [2015]

Core materials for writing or drawing instruments

P77-B01 [2015]

Graphite

Includes leads for propelling pencils.

P77-B02 [2015]

Metallic writing-core

Can be used in combination with other core material type, e.g. metallic ink, metallic graphite etc.

P77-B03 [2015]

Wax

Crayons

P77-B04 [2015]

Slate

P77-B05 [2015]

Chalk

P77-B06 [2015]

Ink

P77-D [2021]

Bureau / desk accessories

Includes devices for opening or closing envelopes, paperweights, drawing pins, pen holders, etc. Desk furniture per se is not covered by this code, see P25-A01A instead.

P77-M [2015]

Manufacture of pens and pencils

Includes manufacturing method and apparatus.

P77-T [2015]

Constructional details of writing or drawing instruments

These codes can be used in conjunction with other P77 codes.

P77-T01 [2015]

Propelling and retracting mechanisms

Includes springs, sliders, buttons, twisting mechanisms etc. for pens or pencils.

P77-T02 [2015]

Nibs

Includes nib holders.

P77-T03 [2015]

Sheathings; Casing; Cap

Sheathing, casing or caps for all types of writing or drawing implements. Includes rubber placed at end of pencil, the wooden sheathing of a pencil, or plastic sheathing of pen media etc. Pen/pencil casings, or pen/pencil caps etc.

Clip

P77-T04 [2015]

Ink supply/storage; Pencil leads

Includes details of ink reservoirs, ink cartridges and ink pads. Also covers pencil lead storage or supply containers etc. Novel ink and pencil leads are also coded by P77-B06 and P77-B01, respectively.

Ink well

P77-T99 [2015]

Other constructional details of writing or drawing instruments

Includes writing or drawing implements in combination with other items or devices, e.g. with torches, lighters, toys etc.

Ink blotter

P78: Decorative art

Covers all aspects of decorative art, including types of, and methods of producing decorative art, designs, materials used etc.

P78-A [2015]

Types of artistic processes

P78-A01 [2015]

Sculpturing or modeling

P78-A02 [2015]

Guilloching

P78-A03 [2015]

Carving

P78-A04 [2015]

Branding

P78-A05 [2015]

Inlaying

P78-A06 [2015]

Embossing

P78-A07 [2015]

Painting or drawing

Includes techniques in artistic painting or drawing e.g. oil painting, water painting, pastel painting, relief painting etc.

P78-C [2015]

Methods for producing decorative effects

Includes: sculpturing, stamping, modeling or bending etc., applying different materials of different shapes and sizes, applying transfer pictures etc., engraving or etching methods, stamping or pressing or inlaying ornamental designs onto/into or inlaying surfaces, or any other methods for decorative or ornamental production.

P78-C01 [2015]

Paper hanging

Machines, apparatus, tools, or accessories therefore for applying adhesive, for applying the paper to the surface to be covered or finishing operations.

P78-M [2015]

Machines, apparatus or tools for artistic work

Includes all machinery or tools for producing all artwork or decorative work. Including tools and apparatus or equipment used for: painting, sculpturing, carving, inlaying etc., surface treatment equipment, holders or containers etc.

P78-P [2015]

Materials for artistic work

P78-P01 [2015]

Paints and other colored materials

Includes any paint or other substance that is used to create artwork.

P78-P02 [2015]

Wood or wood composites

Includes any wood structure or material used for artwork.

P78-P03 [2015]

Paper

Includes paper to create artwork, but does not include paper canvass (see P78-P06).

P78-P04 [2015]

Metals

Includes metals used for artwork.

P78-P05 [2015]

Plastic

Includes any plastic materials used in artwork.

P78-P06 [2015]

Canvas or other base sheet material

Includes materials for any base for applying artwork to.

P78-P15 [2015]

Other materials used for artwork

P78-S [2015]

Special designs

P78-S01 [2015]

Imitations

Covers imitation of pictures, e.g. oil paintings, mosaic or tarsia-work patterns, ceramic patterns, imitating three-dimensional effects, pearl effects, or mother-of-pearl effects.

P78-S01A [2015]

Metallic or oxidized metallic surfaces

P78-S01B [2015]

Crystalline structures

P78-S01C [2015]

Stone surfaces

Marble

P78-S01D [2015]

Wood grain effects

P78-S01E [2015]

Horn, ivory, or meerschaum surfaces

P78-S01F [2015]

Leather or fur

Includes real or imitation leather designs or effects.

Faux leather, faux fur

P78-S02 [2015]

Characterized by irregular areas

Mottled patterns

P78-S03 [2015]

Light effects

Including color effects.

P8: Optics, Photography, General

P81: Optics

From 2015 P81 manual codes have been applied for details of optical elements. The optical elements covered in this class may form part of optical equipment or systems covered by other classes such as :

- (i) P82 for photographic apparatus;
- (ii) P84 for other photographic aspects, including apparatus for photographic processing, holography and lithography;
- (iii) S06 for electrical aspects of photography; and
- (iv) W04 for digital and video cameras and electronic image projectors.

P81-A [2015] Types of optical element, system or apparatus

P81-A01 [2015] Lens and lens systems

Includes single lenses, multiple lenses/lens groups and variable refractive power lens/lens group.
Biconcave, biconvex, concave, convex, fluid-filled, glass lens, negative meniscus, plano-concave, plano-convex, plastic lens, positive meniscus

P81-A01A [2017] Single lens

This code covers individual lenses. Single lenses having variable refractive power are also assigned P81-A01V1.

P81-A01C [2017] Multiple lens systems

This code covers two or more lenses used together. Where the ability to vary overall refractive power by movement is important, P81-A01V5 is also assigned.
Eyepiece, lens group, telephoto lens, zoom lens

P81-A01V [2017] Variable power lenses

This code and its subdivisions are assigned with P81-A01A or P81-A01C as necessary.
Focus, variable magnification

P81-A01V1 [2017] Individual lens with variable refractive power

This code, normally assigned with P81-A01A, covers lenses whose refractive power can be varied electrically or by physical deformation, i.e. changing shape. Lenses of this type for use in digital or video cameras are also assigned W04-M01C1E.

Fluid-filled lens, liquid crystal lens, ring electrodes

P81-A01V5 [2017] Variable power lens groups

This code, normally assigned with P81-A01C, covers two or more conventional lenses used together and having the ability to vary overall refractive power by physical movement, e.g. varying separation.

Gearing, slide, varifocal lens

P81-A03 [2015] Mirrors

Includes mirrors with multiple surfaces.
Plane mirror, polygonal mirror, reflex reflector

P81-A05 [2015] Filters

P81-A07 [2015] Gratings

P81-A09 [2015] Light guides

For details of light guides and optical fibers see V07-F codes.

P81-A11 [2015] Prisms

P81-A13 [2015] Condensers

P81-A15 [2015] Polarizers

Polarization gratings are also assigned P81-A07. Polarizers for optical fiber technology are also assigned V07-F02B. Polarized eyeglasses for 3D film or video projection viewing are also assigned P81-A50E1. The use of polarized eyeglasses for 3D TV viewing is covered by W03-A08E7E.
Circular, elliptical, left, right

P81-A50 [2015]

Optical system function

These codes are intended to indicate in a broad sense the main function of the novel optical element specified by other P81-A codes. In general more detail will be provided in the class referred to for the process or equipment in which the element is used. Application in a wider sense is indicated by assignment of P81-U codes.

P81-A50A [2015]

For viewing distant objects

Includes optical elements used in telescopes, sights and sighting tubes and binoculars.

Cassegrainian, catadioptric, Gregorian, Keplerian, monocular, Newtonian, opera glasses, reflecting, refracting

P81-A50C [2015]

For viewing nearby or close-up objects

Includes optical elements used in magnifiers and microscopes.

Magnifying glass

P81-A50E [2015]

For projection and recording of images or patterns

P81-A50E1 [2015]

For displaying images or patterns

Includes optical elements used in projectors showing images or patterns on a screen or other surface. Electrical aspects of photographic projectors for slides or cine film are covered by S06-B06A and electronic display projectors based on the use of light valves, deformable mirror arrays or lasers are covered by W04-Q01 codes.

P81-A50E3 [2015]

For lithography

Covers the use of optical elements in projection of images or patterns onto light-sensitive materials, e.g. for decorative design purposes or exposure of photoresist on a semiconductor wafer prior to etching. See U11-C04E codes for full details of photolithography for semiconductor device manufacture, and especially U11-C04E1A for optical elements and systems. Optical elements for recording images in photography are covered by P81-A50E5.

P81-A50E5 [2015]

For recording images in photography

Includes optical elements used in the recording of images in a camera and also projection printing onto photographic paper. Electrical aspects of film-based cameras and projection printing apparatus are covered by S06-B codes and optical elements for video and digital cameras by W04-M01C codes.

P81-A50E9 [2015]

For other projection and recording of images or patterns

P81-A50G [2015]

Eyesight correction and protection

Includes optical elements used in spectacles, sunglasses and contact lenses and also implantable lenses.

P81-A50J [2015]

Light control

Includes control of light intensity, and also phase, polarization, color and direction, e.g. in optical scanning equipment. The 'light control' here is intended to be independent from the source of light itself and based on the use of filters, diffusers, and the like. Electro-optical control of these properties is covered by V07-K codes. Direct control of the intensity of light emitted by electrical light sources themselves, e.g. by varying voltage or current, is not included and is covered by X26-C codes in general and X26-H03C in the case of LED light sources.

P81-A50X [2015]

Other optical system function and optical apparatus

P81-A99 [2015]

Other type of optical element or system

P81-G [2015]

Cleaning and maintenance of optical elements, systems or apparatus

This code covers novel aspects of cleaning and maintenance of apparatus covered by P81-A codes which are also assigned as appropriate.

Lens cleaner, polish, recondition, repair, service

P81-M [2015]

Manufacture of optical elements, systems or apparatus

This code covers novel aspects of manufacturing and testing of apparatus covered by P81-A codes which are also assigned as appropriate.

Moulding, mounting, polishing

P81-T [2015]
Constructional details of optical elements, systems or apparatus

These codes are assigned with P81-A codes to indicate the novel aspects of optical elements, systems or apparatus.

P81-T01 [2015]
Housing, casing, frame, support

Includes mounting of lens, mirror, etc.
Aperture stop, internal construction

P81-T02 [2015]
Lens positioning systems

Includes arrangements for moving lenses, e.g. for changing focus or magnification, including control aspects.
Bearing, focus ring, slide

P81-T03 [2015]
Protective coating

Includes coatings to prevent unwanted effects such as reflection and also to protect from scratches and the like.
Anti-reflective, bloom, magnesium fluoride

P81-T50 [2015]
Novel constructional material

This code is used in conjunction with other P81-T codes to indicate the use of a novel material in an optical element or system. Specific details of novel materials are represented by codes outside P81, such as L01 codes for glass compositions or section A codes for plastics materials, which are also applied as appropriate.

P81-T99 [2015]
Other aspects of optical element, system or apparatus construction

P81-U [2015]
Applications

These codes are intended to indicate in a broad sense the field of application of the novel optical element specified by P81-A codes and optical equipment using it as specified by P81-A50 codes.

P81-U01 [2015]
Domestic

Includes general or non-specific domestic applications. Can be used in conjunction with other specific codes as required.

P81-U02 [2015]
Commercial

Includes general commercial applications. Can be used alone or in conjunction with other specific applications.

P81-U03 [2015]
Vehicles

Includes land, sea, air and space vehicles.

P81-U13 [2015]
Pharmaceutical; Medical

P81-U14 [2015]
Laboratory

P81-U30 [2015]
Sports, toys, entertainment and leisure

Includes sports equipment, sports stadiums, entertainment venues, leisure applications, toys and games.

P81-U40 [2015]
Industrial

Covers general or non-specific industrial applications not covered by other application codes.

P81-U41 [2015]
General functional applications

P81-U41D [2015]
Illuminating; Lighting

For specific details of optical elements for use in lighting applications see Q71-T codes and X26-D01 codes.

P81-U99 [2015]
Other specific applications

P81-X [2015]
Other aspects of optics

P82: Photographic apparatus

P82-A [2015]

Types of systems for taking or projecting photographic images

These codes can be used with other P82 codes as required.

P82-A01 [2015]

Photographic camera

Includes mechanical details of cameras. For video cameras see W04-M codes.

P82-A01A [2015]

Still camera

P82-A01C [2015]

Motion picture camera

Cine camera

P82-A02 [2015]

Photographic projection; photograph viewers

Includes mechanical details of photograph projectors or viewers.

Projector

P82-A03 [2015]

Photographic printing

See G05 CPI manual codes for further details.

P82-A15 [2015]

Auxiliary photographic systems/operations

P82-A15A [2015]

Illuminating scene

Includes techniques for lighting the scene/object such as backlighting, forelighting, using diffusers/reflectors etc. See X26 codes for novel electric lighting per se.

Reflector, diffuser, floodlight

P82-A15C [2015]

Sound recording/reproduction

Includes adding of sound to film. See W04 codes for audio recording/reproduction per se.

Audio

P82-A99 [2015]

Other photographic systems

P82-B [2015]

Special Photographic techniques

P82-B02 [2015]

Color photography

Includes color photographic techniques other than exposing a color film, such as by two, four or more color separation records or sequential/simultaneous recording/reproduction.

P82-B04 [2015]

Panoramic/wide screen/extended surface photography

P82-B06 [2015]

High speed photography

Includes equipment for capturing images at high speed.

P82-B08 [2015]

Using non-optical waves

Includes visual representation of images captured by other medium such as X-rays or ultrasonic waves.

P82-B99 [2015]

Other photographic techniques

Includes trick photography.

P82-F [2015]

Measuring, indicating, sensing, controlling, testing of photographic apparatus

Includes focus and exposure control. See P82-T for novel exposure controlling diaphragms, filters and shutters and focus controlling drive components. Also includes testing of photographic equipment.

P82-G [2015]

Cleaning, maintenance/repair of photographic apparatus

Includes cleaning of cameras and projectors.

P82-M [2015]

Manufacture of camera and projection apparatus/components

P82-R [2015]

Recycling of photographic apparatus/components

Includes recycling of all photographic equipment and materials.

P82-T	[2015]
Constructional details of photographic image taking/projecting/printing apparatus	
Includes camera bodies, lenses, viewfinders, film winders, projectors, printing apparatus, projection apparatus etc. See S06 for electrical details of still picture cameras and projectors and W04-M codes for video cameras.	
P82-T01	[2015]
Exposing; Exposure making shutters; Diaphragms	
Includes color photographic techniques other than exposing a color film, such as by two, four or more color separation records or sequential/simultaneous recording/reproduction.	
P82-T03	[2015]
Viewfinders; Focusing	
Includes focusing aids, optics, lenses and their adjustment.	
P82-T05	[2015]
Bodies; Housings	
P82-T07	[2015]
Film handling	
P82-T15	[2015]
Printers; Printing	
See S06 codes for further details of printers.	
P82-T99	[2015]
Other constructional details of photographic image taking/projection/printing apparatus	

P83: Photographic processes/compositions

P83-A [2015]

Photographic photosensitive materials and compositions

See G06 CPI manual codes for further details of novel photographic compositions, agents and materials.

P83-B [2015]

Film packages; Wrapping materials for light-sensitive plates, films, or papers

Includes roll films.

P83-D [2015]

Photographic processes

See G06 CPI manual codes for further details.

P83-D01 [2015]

Multicolor processes

Includes direct bleach-out processes, additive processes using color or lenticular screens, subtractive color and cinematographic processes and dye-inhibition processes. Also includes color processes using color-coupling substances.

P83-D03 [2015]

Diffusion transfer processes

Includes processes using substances transferred by diffusion consisting of inorganic compounds or of organo-metallic compounds derived from photosensitive noble metals.

P83-D05 [2015]

Stereo-photographic processes

Includes producing 3-D images, parallax-stereograms, vectographic images and anaglyphs.

P83-D99 [2015]

Other photographic processes

Includes retouching, varnishing, pasting, mounting, drying etc.

P83-R [2015]

Recycling, regeneration or replenishment of photographic processing agents

Includes regeneration or replenishment of photosensitive material and removing emulsion from waste photographic material.

P84: Other photographic

P84-A [2015] **Types of photographic system/process**

P84-A01 [2015]
Photomechanical
Photomechanical production of textured or patterned surfaces.

P84-A02 [2015]
Electrographic/electrophotographic

P84-A03 [2015]
Magnetographic

P84-A05 [2015]
Holography
Includes holographic processes and apparatus for producing holographs. See V07 for further holographic details.

P84-A05A [2015]
Using light, IR or UV waves
Includes production of holograms using optical waves.

P84-A05C [2015]
Using ultrasonic, sonic or infrasonic waves
Includes production of holograms using sound waves.

P84-A05E [2015]
Using other waves
Includes production of holograms using other waves while producing an optical image from them.

P84-A99 [2015]
Other photographic systems

P84-G [2015]
Cleaning, maintenance/repair of photographic systems
Includes use of modular parts to enable maintenance of photographic apparatus.

P84-M [2015]
Manufacture of photomechanical, electrographic/electrophotographic, magnetographic etc. components and materials

P84-R [2015]
Recycling of photographic materials components
Includes collection and recycling of waste toner.

P84-T [2015]
Photographic system construction/materials

P84-T01 [2015]
Exposed photographic material processing apparatus
Includes containers, trays, clips, frames and darkroom equipment for treating exposed photographic material. Includes liquid and gas processing apparatus, diffusion development equipment and reversal processing apparatus.

P84-T02 [2015]
Photomechanical production apparatus
Includes screens and exposure apparatus, color separation. Also includes originals for photomechanical production of textured or patterned surfaces. Includes masks, reticles, pellicles and mask positioning/registration.
Mask blanks

P84-T50 [2015]
Novel materials
See E codes for further chemical aspects.

P84-T50A [2015]
Image receiving materials; Photosensitive materials for photomechanical production
Includes photosensitive materials for photomechanical production.

P84-T50D [2015]
Developers

P84-T50E [2015]
Fixing agents

P84-T99 [2015]
Other photographic system details

P85: Educational, cryptographic or advertising apparatus or systems

From 2015 manual codes have been applied for general details of educational, cryptographic or advertising apparatus and systems. Where use of electrical or electronic technologies is significant please refer to the following :

- (i) W04-W codes for educational equipment and systems.
- (ii) T01, W01, W02 and W04 codes for encryption, scrambling and concealment;
- (iii) W05-E codes for advertising.

P85-A [2015]

Types of educational apparatus or system, timetables and perpetual calendars

When teaching aids involve the use of models P85-A05 is also assigned. Electrical aspects of educational apparatus and systems are covered by W04-W codes. General information systems such as maps, timetables and perpetual calendars are covered by P85-A50 codes.

P85-A01 [2015]

Educational apparatus or systems for specific purposes

Models for demonstration and illustration are covered by P85-A05.

Cards, charts

P85-A01A [2015]

Teaching shapes and spatial awareness

Includes blocks, construction toys with educational aspects. Construction toys are also assigned P36-E03.

Bricks, shape sorter

P85-A01C [2015]

Teaching reading or writing

Includes aids for learning the alphabet, recognizing letters and words, and for handwriting.

Braille, lipreading

P85-A01E [2015]

Teaching counting, arithmetic, mathematics

Abacus, blocks, counters

P85-A01G [2015]

Teaching science, medicine and dentistry

Includes aids for teaching botany, biology, chemistry, physics etc. and also veterinary medicine.

Atom, core, electron, neutron, nucleus, planetarium, proton, astronomy

P85-A01J [2015]

Teaching music

Metronome, practice

P85-A01L [2015]

Teaching languages

P85-A01N [2015]

Teaching sports, physical education

Covers games involving physical activity. Teaching of board games, card games and the like is covered by P85-A01P. Training for sports is covered by P36-A08E which may also be assigned as necessary. Electrical aspects of sports training are covered by W04-X01A codes.

PE, swimming

P85-A01P [2015]

Teaching game playing

Covers teaching of board games, card games and the like. Teaching of games involving physical activity, e.g. team sports, is covered by P85-A01N.

P85-A01X [2015]

Other educational apparatus or systems for specific purposes

Needlework, modelling

P85-A05 [2015]

Models for demonstration and illustration; simulations

Includes models of buildings, towns, geographical or geological features, living creatures, machines, vehicles, etc. See P85-A01 codes also to differentiate the specific field of teaching.

Cut-away view, engine, organ

P85-A05A [2015]

Simulations

Covers simulations for demonstrating a process or effect and also training simulators. Electrical aspects of training simulators are covered by W04-W07A and simulations for demonstration purposes by W04-W07C.

P85-A07 [2015]

Question and answer apparatus and systems

Electrical aspects of question and answer-type educational systems are covered by W04-W01.

P85-A50 [2015]

General information presenting systems

Covers timetables, perpetual calendars, town plans etc.

P85-A50A [2015]

Timetables

Covers timetables in e.g. printed form, for use on railways or other public transport systems and the like.

P85-A50C [2015]

Perpetual calendars

Covers calendars with movable discs, wheels, and the like for indicating the current date. Clocks and time-indicating devices in general are not included and are covered by S04 codes. Calendars involving tear-off sheets are covered in P76.

P85-A50E [2015]

Maps, guide, town plans and public information panels

The title of this code has been changed (2018) to indicate that public information boards and panels are included in addition to maps in general, maps of an immediate area such as town plans, and guides to places of interest. Timetables, e.g. for public transport, are covered by P85-A50A. Electrical aspects of these information-presenting items are covered by W04-W09. Displays and signs for advertising and commercial purposes are covered by P85-E01 codes and by W05-E03 codes if electrical.

P85-A99 [2015]

Other types of educational apparatus or system

P85-C [2015]

Types of cryptographic system

This code is intended for general arrangements for making a sequence of symbols (such as text characters) unintelligible, including the use of mechanical or electrical means. For specific information encryption, scrambling or concealment systems based on the use of electronics and computing techniques see the following :

- (i) T01-D01 for data encryption and decryption using computing techniques;
- (ii) W01-A05 codes for secret data communication;

- (iii) W02-F05A1 and W02-F10N1 codes for scrambling and encryption of video and TV signals;
- (iv) W02-L05 for general signal scrambling, including analogue signal scrambling;
- (iv) W04-F01L codes for encryption and scrambling in video recording;
- (v) W04-G01L codes for encryption and scrambling in audio recording.

P85-E [2015]

Types of advertising and displaying system

Electrical aspects of advertising and displays are covered by W05-E codes. Novel electronic displays are covered by U14 codes or W05-E codes, depending on technology. P85-E codes cover advertising with some visual element and also signs and labels in general. Use of electrical displays with computing equipment is covered by T04-H codes.

P85-E01 [2015]

Advertising and commercial signs, price labels

P85-E01A [2015]

Advertising signs and displays

Includes hoardings, billboards and the like.

P85-E01C [2015]

General commercial signs

Covers signs for shops or other businesses, including information on awnings, windows, etc.

P85-E01E [2015]

Signs involving movement

Includes signs moved by e.g. action of the wind. Electrically-moved advertising signs are covered by W05-E03A3.

P85-E01G [2015]

Advertising on other articles or items

Covers advertising on items used in e.g., restaurant or bar, such as glasses, napkins, ashtrays, promotional items, etc. And also advertising information on vehicles.

P85-E01J [2015]

Advertising in printed products

Covers advertisements in newspapers, magazines or other publications.

P85-E01L [2015]

Price tags and labels

Covers labels attached to goods and also shelf labels and the like used in stores. Labels in general are covered by P85-E05. Electrical aspects such as antitheft tags are covered by W05-B01A2 codes

and novel digital marking such as bar codes or RFID tags by T04 codes.

P85-E01X [2015]
Other aspects of advertising and commercial signs

P85-E03 [2015]
Display cases and stands

Covers display equipment for advertising but also for general use in e.g. museums, etc.

P85-E05 [2015]
Labels in general

Covers labels and identifying tags in general, but not price tags or labels which are covered by P85-E01L.

P85-E99 [2015]
Other types of advertising or displaying system

P85-G [2015]
Cleaning, maintenance/repair of educational, cryptographic or advertising apparatus or systems

This code is assigned with P85-A, P85-C or P85-E codes as appropriate.

P85-M [2015]
Manufacture of educational, cryptographic or advertising apparatus or systems

This code is assigned with P85-A, P85-C or P85-E codes as appropriate.

P85-T [2015]
Constructional details of educational, cryptographic or advertising apparatus or systems

These codes are assigned with P85-A, P85-C or P85-E codes as appropriate.

P85-T01 [2015]
Housing, casing

P85-T05 [2015]
Internal constructional details

P85-T50 [2015]
Novel constructional material

P85-T99 [2015]
Other constructional details of educational, cryptographic or advertising apparatus or systems

P85-X [2015]
Other aspects of educational, cryptographic or advertising apparatus or systems

P86: Musical instruments, acoustics

From 2015 P86 manual codes have been applied for general and mechanical details of musical instruments and acoustic systems. Analysis and synthesis of speech and other sounds by electronic or computing devices is not included and is covered by W04-V codes. Electronic musical instruments and electrical aspects of musical instruments in general are covered by W04-U codes but common features or mechanical aspects are also covered by appropriate P86 codes. Music teaching is covered by P85-A01J and when specific to a particular type of instrument an appropriate P86-A code is also assigned.

P86-A [2015]

Types of musical instruments or musical accessory

P86-A01 [2015]

Musical instruments based on air or gas flow

Includes instruments operated by gases, gas mixtures such as air, or steam.

Aerophone

P86-A01A [2015]

Wind instruments

Covers instruments operated by a musician blowing into them. Instruments operated by flow of air or similar from a machine or hand-operated mechanism are covered by P86-A01C codes.

P86-A01A1 [2015]

Reed instruments

Covers instruments employing a reed in a mouthpiece that vibrates when the player blows into or across it.

Bagpipes, bassoon, clarinet, harmonica, mouth organ, oboe, saxophone

P86-A01A3 [2015]

Lip vibration instruments

Covers instruments in which the player's lips vibrate in a way analogous to a reed, such as trumpets or trombones.

Cornet, euphonium, French horn, horn, labrosone, tuba

P86-A01A5 [2015]

Air-reed instruments

Covers instruments in which sound is produced by a player blowing across an opening, such as flutes. Mechanical reed instruments are covered by P86-A01A1.

Ocarina, panpipes, recorder

P86-A01A9 [2015]

Other wind instruments

Whistles are coded under P86-E01C5 only.

P86-A01C [2015]

Organs

Electronic organs are covered by W04-U codes. These codes cover instruments operated by flow of e.g. air produced mechanically, such as by blowers, bellows, pumps and the like. Instruments operated by air flow directly produced by the player blowing into them are regarded as 'wind instruments' and are covered by P86-A01A codes.

P86-A01C1 [2015]

Reed organs

Includes harmoniums, accordions, and concertinas. Bagpipes are regarded as being operated by the player's exhaled air and so are covered by P86-A01A1.

P86-A01C3 [2015]

Pipe organs

Church organ, steam organ

P86-A01X [2015]

Other musical instruments based on air or gas flow

P86-A03 [2015]

String instruments

Covers instruments based on vibration of a resonant string, whether struck, plucked or excited by other means, such as a bow.

Chordophone

P86-A03A [2015]

String instruments with keyboards

Covers instruments where depression of a key actuates a mechanism that strikes or plucks strings mounted on a soundboard or similar.

P86-A03A1 [2015]

Pianos

Pianoforte

P86-A03A9 [2015]

Other string instruments with keyboards

Includes harpsichords. Harps are regarded as instruments in which strings are plucked directly by the player and are thus covered by P86-A03E.

P86-A03C [2015]
String instruments normally played using a bow

Covers cello, violin etc.
Bass, double bass, viola

P86-A03E [2015]
String instruments played by manually strumming, plucking or hitting strings

Includes instruments carried or supported by the player and those mounted on a support or stand, the strings being plucked or strummed by a player directly, using fingers, a plectrum or a hammer.
Banjo, guitar, harp, pedal steel guitar, zither

P86-A05 [2015]
Percussion-based musical instruments

Brushes, castanets, cow bell, cymbal, drum, drumsticks, hand bell, shaker, tambourine, timpani, triangle, xylophone

P86-A30 [2015]
Accessories for musical instruments and musical instrument playing

Case, music stand, tuning aid, tuning fork

P86-A99 [2015]
Other types of musical instruments

P86-E [2015]
Acoustic systems and sound-producing devices

P86-E01 [2015]
Sound-producing devices
Covers devices intended to produce sounds other than for musical purposes, e.g. for attracting attention or warning. Novel electrical aspects of such devices are covered by W05-A02A and electroacoustic transducers in general are covered by V06-V codes.

P86-E01A [2015]
Sound production by physical contact or impact

Includes percussion-based sound generation.

P86-E01A1 [2015]
Bells, gongs, other resonating bodies

P86-E01A5 [2015]
Sound production by non-resonant bodies in contact

Includes rattles.

P86-E01A9 [2015]
Other sound production by physical contact or impact

P86-E01C [2015]
Sound production by air or gas flow

P86-E01C1 [2015]
Sirens
Includes drive by motive device and also gas flow.

P86-E01C3 [2015]
Horns, klaxons
Covers sound generation using a vibrating diaphragm. Mechanical aspects of vehicle horns are covered by Q14-C04 and electrical aspects by X22-B03H.

P86-E01C5 [2015]
Whistles
Includes whistles producing sound beyond human audible range.
Dog whistle

P86-E01C9 [2015]
Other sound production by air or gas flow

P86-E01X [2015]
Other sound-producing devices

P86-E05 [2015]
Sound transmission, modification, and damping
These codes are intended to represent transmission, modification or damping of sound in a general sense. Codes elsewhere relating to specific equipment or applications should also be considered.

P86-E05A [2015]
Sound transmission
Includes acoustic coupling arrangements.

P86-E05C [2015]
Sound modification
Covers use of passive resonators, acoustic lenses and reflectors and the like, e.g. to re-direct sound.

P86-E05E [2015]
Sound damping and masking
Covers passive systems, such as acoustic damping, use of absorbing materials, etc. Electronic systems for sound damping and masking, e.g. using interference effects and anti-phase sound, are covered by W04-V07 codes.

P86-E05X	[2015]
Other aspects of sound transmission, modification, and damping	
Includes acoustic impedance matching. For electrical impedance matching in general see U25-D05.	
P86-E99	[2015]
Other aspects of acoustic systems and sound-producing devices	
P86-G	[2015]
Cleaning, maintenance/repair of musical instruments or acoustic systems	
This code is assigned with P86-A or P86-E codes as appropriate.	
P86-M	[2015]
Manufacture/Pre-use treatment of musical instruments or acoustic systems	
This code is assigned with P86-A or P86-E codes as appropriate.	
P86-T	[2015]
Constructional details	
These codes are assigned with P86-A or P86-E codes as appropriate and are intended to highlight specific novel aspects of musical instruments or acoustic systems and sound-producing devices.	
P86-T01	[2015]
Constructional details of musical instruments, acoustic systems and sound-producing devices	
P86-T01A	[2015]
Constructional details of devices generating sound	
Covers devices producing the actual sound, such as reeds, strings, drum skins, etc. for musical instruments and e.g. a perforated disk in the case of a pneumatic siren.	
<i>Bridge, cavity, chamber</i>	
P86-T01C	[2015]
Constructional details of devices controlling or modifying sound	
Covers novel aspects of devices and systems for controlling sound, such as keyboards, string-tensioning devices, pedals etc. and automatic playing systems in the case of instruments and e.g. sound damping or directing devices in the case of acoustic systems and sound producing devices.	

P86-T01E	[2015]
Constructional details of musical instrument bodies and acoustic device housings	
Covers construction of musical instruments, acoustic systems and sound producing devices as a whole, e.g. frames, outer casing, etc.	
<i>Lid, neck, soundbox</i>	
P86-T01X	[2015]
Other constructional details of musical instruments, acoustic systems and sound-producing devices	
P86-T50	[2015]
Novel constructional material	
This code is assigned in conjunction with other P86-T codes to indicate the specific aspect to which the material relates. Specific details of novel materials are represented by codes outside P86, such as M27 codes for steels or section A codes for plastics materials which are also applied as appropriate.	
P86-T99	[2015]
Other constructional details of musical instruments and acoustic systems or devices	
Includes constructional details of accessories for musical instruments and musical instrument playing, for which P86-A30 is also assigned.	
P86-X	[2015]
Other aspects of musical instruments or acoustic systems	

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Q1 Vehicles in General

Q11: Wheels, Tyres, Connections

From 2006, manual codes have been assigned for all mechanical details of vehicle wheels, tyres and connections.

Q11-A

Wheels; Wheel assemblies

Includes novel aspects of vehicle wheels, including emergency space saver and spare wheels. This code can also be applied when the wheel assembly as a whole is being claimed and when no specific components of the wheel assembly are novel.

Wheelend assembly

Q11-A01

Spoked wheels

Includes wheels with separable/replaceable spokes, nipples etc, such as bicycle wheels.

Q11-A02

Disc wheels

Includes wheels with single disc body, e.g. cast alloy wheels (with or without cut-outs to simulate spokes), and pressed steel disc wheels.

Q11-A03

Rims

Q11-A04

Hubs

Includes hub bearing assemblies - see also Q62-G for more detail.

Q11-A05

Axles

Includes all axle details including quick release bicycle wheel axles.

Q11-A06

Wheel bearings

Also see Q62-G for specific bearing types.

Tapered roller bearings

Q11-A07

Wheel covers

Includes covers for decorative or aerodynamic purposes.

Hub cap

Q11-A08

Castors

Q11-A15

Traction increasing equipment

Includes mechanical devices for increasing friction between wheel and the ground.

Q11-A15A

Lugs, spikes, snow chains etc.

Includes tyres with built-in or attachable spikes or chains removably fastenable to tyres.

Q11-A15B

Applying traction increasing material, e.g. sand

Includes dispensing particulate material, such as sand, in front of tyre path.

Q11-A17

Rail engaging arrangements

Includes wheels with flanged edges for engaging rails. See Q19-R02 for vehicles usable on road/rail, and possibly Q21 for railway vehicles per se.

Q11-A19

Wheel-axle combinations, e.g. wheel sets

Includes overall novel wheel/axle combination, e.g. the whole rear axle/wheel assembly used on a commercial lorry (also see Q19-C02).

Q11-A20

Wheel nuts/fastening elements

Includes wheel nuts and bolts and anti-theft locking wheel nuts (see also Q61-A codes). Also includes quick release wheel fastening elements.

Spinner, skewer

Q11-A28

Wheel manufacture/ assembly/disassembly apparatus

Includes equipment for manufacturing and assembling/dismantling wheels, such as metal presses and casting equipment or jigs for enabling manual building of spoked wheels. For apparatus for (de)mounting wheel onto vehicle also see Q16-A02.

Q11-A30

Other wheel details

Q11-B

Tyres

See X22-E02B for electrical aspects such as tyre pressure sensing (also see S02-F04C1A) or X22-X for other electrical tyre details such as heaters (also see X25-B codes).

Q11-B01

Tyre type

Q11-B01A

Inflatable tyres

Can be used to highlight the fact that the tyre construction is applicable to a pneumatic tyre.

Q11-B01A1

Inner tubes

Q11-B01A3

Emergency or restricted use tyres

Includes tyres that can be temporarily used in a damaged or deflated condition, e.g. using additional inflatable or non-inflatable supporting elements.

Q11-B01A3A

Run-flat tyres

Includes run-flat arrangements, e.g. by enabling folding of tyre side wall (see also Q11-B05).

Q11-B01A5

Folding tyres

See Q19-A01 for folding bicycle tyres, and e.g. Q11-B03 for Kevlar® beads per se.

Q11-B01H

Heavy duty tyres

Includes tyres used in general heavy duty applications. Can be used in conjunction with Q19 codes to further specify the type of heavy duty vehicle involved.

Q11-B01S

Solid tyres

Includes solid rubber tyres and tyres with a solid, e.g. foam material, insert.

Q11-B01X

Other tyre types

Q11-B02

Valves

See also Q66 codes for valves per se.

Q11-B03

Beads

Includes beads and other similar ply overlap arrangements for enabling tyre to seat on and be retained in wheel rim.

Q11-B04

Reinforcements or ply arrangements

Includes cross ply, reinforcing cords, layers, inlays etc.

Q11-B05

Tyre sidewalls

Includes grooves and rib markings or coloured inlays, e.g. white walls.

Q11-B06

Tread bands, patterns and anti-skid inserts

Includes tread patterns, anti-skid inserts vulcanised into tyre and wear indicators.

Q11-B15

Emergency/puncture repair arrangements

Includes emergency use accessories such as tyre sealant sprays to temporarily repair tyre until it can be properly fixed/changed.

Q11-B20

Tyre manufacture, mounting and inspection

Includes all mechanical aspects of tyre manufacture such as vulcanising, or equipment for mounting of tyres on wheels (also see Q16-A02) or inspecting tyres. Also includes equipment for balancing wheels and associated balance weights (see also S02-J05 for static or dynamic balance testing per se).

Q11-B30

Other tyre details

Includes wheel tape used to cover spoke nipples to protect inner tube (see also Q19-A for bicycles). Also includes novel tyre materials and rubber compositions (see also relevant polymer section A indexing).

Q11-C

Connections

Includes assemblies between e.g. towing and towed vehicles.

Q11-C01

Traction couplings or hitches

Includes ball and socket hitches or bolt/shackle type hitches mounted on **towing** vehicle. For power take offs (PTOs) per se, e.g. used on agricultural tractors, see also Q19-G and Q13-C instead. Also includes fifth wheel traction couplings used on articulated lorries (see also Q19-C02). For electrical aspects such as 7pin electrics, see X22-X01A and V04-D codes instead.

Tractor-trailer

Q11-C02

Draw gear or towing devices

Includes e.g. V or Y shaped tubular frameworks and hitch arrangements forming part of **towed** vehicle. Also includes towing chains or ropes, and safety arrangements such as stabiliser bars fixed to towed vehicle for limiting sway of e.g. towed trailer/caravan.

Q11-C05

Fittings to facilitate pushing

Q11-C07

Gangways for coupled vehicles

Includes removable walkways between vehicles, e.g. between lorry cab and trailer.

Q11-C09

Other connection details

Includes damping arrangements for limiting vibration etc. between towing vehicle and towed assembly/trailer.

Q12: Suspension

From 2006 Q12 covers all mechanical details of vehicle suspension systems. Prior to the introduction of Q12 manual codes in 2006, the Q12 class covered vehicle suspensions, heating, doors and screens.

Q12-A

Rigid suspensions; Rigid connection between axle and frame

Q12-B

Resilient suspensions

Includes independent resilient suspension for single wheels and resilient suspension for wheel sets or axles with inter-related movement, e.g. live axles.

Q12-B01

Spring arrangements

Q12-B01A

Leaf

Q12-B01B

Coil

Q12-B01C

Torsion bar springs

Q12-B01D

Rubber springs

Includes elastomers.

Q12-B01E

Fluid springs

Includes hydraulic and air springs.

Q12-B01F

Combination of different spring types

Includes suspensions e.g. employing both coil springs and air springs.

Q12-B02

Vibration dampers; Shock absorbers

Damper

Q12-B02A

Mechanical damper

Includes coil springs used to provide a damping function.

Q12-B02B

Fluid damper

Includes hydraulic, pneumatic and quasi-fluid, i.e. having powdered medium, dampers.

Q12-B02C

[2008]

Torsion damper

Includes torsional damping arrangements.

Q12-B02D

[2008]

Rubber damper

Includes elastic material, e.g. rubber or elastomer dampers.

Q12-B03

Spring/damper combinations

Includes coil-over dampers. This code can be used in conjunction with other Q12-B codes to highlight the type of springs and dampers being used.

Racing car, sports car

Q12-B04

Spring/damper characteristic adjustment; Vehicle ride height control

Includes control of air pressure within air springs. Also includes arrangements for adjusting caster/camber and toe-in/toe-out of vehicle wheels (see also Q12-B07 for suspension adjustment linkages per se).

Height control

Q12-B06

Mountings; Brackets

Includes suspension mounting arrangements such as bushes and brackets.

Nylon, poly, bush

Q12-B07

Suspension connections/linkages

Includes Panhard rods, Watt linkages, trailing arms, wishbones etc. Also includes upper and lower ball joints.

Double wishbones, outboard, inboard

Q12-B09

Roll/stability control arrangements

Includes mechanical anti-roll bars per se.

Stabiliser

Q12-B15

Lubrication arrangements

Oil, grease, nipple

Q12-B16 **[2022]**

**Covers and protection for springs, dampers
and suspension parts**

Includes spring or shock covers for dust or weather
protection.

Q12-X

Other suspension details

Q13: Powertrain/transmission, systems and their control

From 2006 Q13 covers all mechanical details of vehicle powertrains, transmission systems and their control. Prior to the introduction of Q13 manual codes in 2006, the Q13 class covered vehicle transmissions and controls, including propulsion unit mounting arrangements and fuel tanks.

Q13-A

Powertrain/Transmission systems and their control

For electrical aspects of transmission systems used in electric vehicles or motor vehicles, respectively see X21-A02A and X22-G codes only.

Q13-A01

Transmission type

Q13-A01A

Automatic transmission

Includes transmissions where gears are changed under load, so that power continues to be transmitted to drive wheels while shifting. Includes sun and planet gears, planet carriers etc.

Q13-A01A1

Double clutch transmission

Includes transmissions using two multiplate clutches arranged on drive side with next gear being preselected in transmission unit not currently transmitting power.

Q13-A01C

Continuously variable transmission (CVT)

Includes e.g. mechanical belt wrap transmissions.
Toroidal transmission

Q13-A01E

Semi-automatic

Includes manual transmissions where clutch is electronically disengaged during gear shifting, avoiding the need for a driver's clutch pedal.

Paddleshift, clutchless

Q13-A01M

Manual transmission

Includes gearing and synchronisers, e.g. used to allow collar and gear to make frictional contact before dog teeth make contact to avoid the need for double declutching.

Synchromesh

Q13-A01X

Other transmission types

Includes derailleur type transmission assemblies used on bicycles (see also Q19-A). Also includes general hydrostatic transmission system (see Q13-A02 instead for hydraulic torque converters).

Q13-A02

Torque converter

Includes fluid coupling type torque converters used in multi-speed and automatic transmissions and lockup clutches used to lock the two halves of the converter together to eliminate slippage when the converter is up to speed. Also see Q13-A01A for automatic transmissions per se.

Hydrodynamic torque converter

Q13-A03

Clutch

Includes both wet and dry plate friction clutches. Also includes mechanical lock-up clutches used in e.g. torque converters (see also Q13-A02). Also includes clutch release bearings (see also Q62-G codes) and clutch pressure plates. Also includes flywheels (see also Q63-E02B) including dual mass flywheels prior to 2012. From 2012 flywheels are transferred to Q13-A04. Also see Q17-N for vibration reduction per se.

Q13-A04

[2012]

Flywheels

Includes mechanical details of all flywheels including dual mass flywheels (see also Q63-E02B). For vibration reduction per se see Q17-N.

Q13-A05

Retarder

Includes hydrodynamic retarders, including primary retarders fitted on drive input side, e.g. for low speed braking of buses, and secondary retarders fitted on drive output side, e.g. for higher speed or downhill braking of trucks.

Q13-A07

Drive shafts

Includes prop shafts and half shafts. Also includes constant velocity joints and other connections (see also Q63-A codes).

CV joint, universal joint

Q13-A09

Differentials

Includes open and limited slip differentials (See Q13-A11 for 4WD diff locks). See also Q13-A11 for mechanical Torsen® differentials or viscous couplings used in all wheel drive off-road vehicles.

LSD, open, diff, plate, Torsen®, viscous coupling, final drive unit, bevel gears

Q13-A11

All wheel drive

Includes both permanent and disengageable all wheel drive and four wheel drive systems. Includes viscous couplings, transfer cases and lockable differentials (see also Q13-A09). For electrical aspects of four or all wheel drive systems see X22-G05 instead, and for systems using intelligent brake application see X22-C02 codes.

AWD, 4WD, four-wheel drive, all-terrain, transfer case, Torsen (RTM) lock, viscous coupling, high-low range

Q13-A15

Cranks

Pedal arm

Q13-A16

Pedals

SPD, clipless

Q13-A17 [2008]

Chainrings and sprockets

Includes toothed chainrings and sprockets e.g. for bicycle (see also Q19-A).

Q13-A18

Chains/belts

Includes endless chains and belts.

Q13-A20

Lubrication arrangements

Includes oil seals and drain plugs e.g. for gearboxes or differentials.

Q13-A22

Cooling arrangements

Includes transmission oil coolers.

Q13-A24 [2007]

Gearing

Includes mechanical aspects of transmission gearing and gearboxes. Also covers gear locking or disabling mechanisms, e.g. for parking (also see Q18-A01P for parking brakes). See Q64-C for details of gearing in general.

Parking gear arrangements

Q13-A26 [2008]

Mountings

Includes gearbox, differential, drive train mounting arrangements and transmission noise control arrangements (see also Q17-N for noise reduction in general).

Bracket, rubber, bush

Q13-A30

Other transmission hardware

Q13-B

Powertrain/Transmission control arrangements

Includes gear levers per se and gear knobs. Also includes clutch control levers e.g. used on motorcycle (see also Q19-B) and mechanical/hydraulic clutch activation arrangements and clutch pedals.

Control

Q13-C

Auxiliary drives, e.g. from PTO, driven wheel

Includes power take-offs used on e.g. agricultural tractors (see also Q19-G). For mechanical aspects of hitches per se, see Q11-C01.

Q13-X

Other transmission details

Includes transaxles, i.e. where gearbox and differential etc. are combined into one unit.

Q14: Vehicle Accessories

From 2006 Q14 covers all mechanical vehicle accessories. See X22-J instead for electrical vehicle accessories. Prior to the introduction of Q14 manual codes in 2006, the Q14 class covered electric propulsion and seating.

Q14-A

Seats; Saddles

Includes headrest, armrest, height adjustment, etc.
Seat cover, cushion

Q14-A01 [2007]

Child seats

Includes removable child seats, and child seats and booster cushions that are integral with vehicle seats.
ISOFIX

Q14-B

Beds

Q14-C

Safety devices

For electrical aspects, see X22-J11 for general passenger safety devices.

Q14-C01

Safety belts; Body harnesses

See X22-J03B codes only for electrical aspects of seat belts.
Seatbelt

Q14-C02

Inflatable occupant restraints

Includes inflatable airbags, knee bolsters and side/curtain airbags. See X22-J07 only for electrical aspects of airbags.
SRS

Q14-C02A [2008]

For protecting specific occupant

The codes below are used to highlight whether a specific occupant is being protected. For e.g. curtain airbags designed to protect all vehicle occupants then no Q14-C02A codes need be applied.

Q14-C02A1 [2008]

For protecting driver

Q14-C02A2 [2008]

For protecting front seat passenger

sQ14-C02A3 [2008]

For protecting rear seat passenger

Q14-C02C [2008]

Specific inflatable restraint types

These codes can be applied to highlight specific types of inflatable occupant restraint.

Q14-C02C1 [2008]

Inflatable knee bolster

Q14-C02C2 [2008]

Side/curtain airbag

Q14-C02C3 [2008]

Dashboard/steering wheel mounted airbag

Q14-C02C4 [2008]

Roof mounted airbag

Q14-C03

Visual signalling, e.g. reflectors

Includes optical signalling devices such as reflectors and e.g. posts mounted on bumper to highlight corner of vehicle for assisting parking or collision prevention. For reflectors built into vehicle light see X22-B and X26-D01A codes only.

Q14-C04

Audible signalling, e.g. horns

Includes mechanical devices only. See X22-B03H and W05 codes for electrical aspects of vehicle horns.

Q14-C05

Portable emergency signal devices

For portable illuminated signalling devices see X22-B03E and T07-X and possibly X26 or W05 codes only.
Warning triangle

Q14-C06

Crash bars, crash pads

See also Q19-A or Q19-B for bicycles and motorcycles respectively. Also includes side impact protection bars (also see Q17-A06 for doors). Includes flip-up rollover bars used in cabriolet vehicles (also see Q19-S).

Q14-C07

Stabilisers

Includes stabilisers used when learning to ride a bicycle (see also Q19-A). Also includes stabilisers and grounding members for construction vehicles (see also Q19-E). For suspension system stabiliser/anti-roll bars see Q12-B09 instead.

Q14-C15

Pedestrian safety systems

includes passive systems such as pedestrian friendly bonnets or deformable bumpers (see also Q17-A12).

Q14-C16 [2008]

Vehicle specific clothing

Can be used for all mechanical aspects of vehicle specific clothing, including bicycle and motorcycle helmets, safety shoes and jackets with protective inserts.

Q14-C20

Other safety devices

Includes collision responsive collapsible steering columns (see also Q18-B01D5).

Q14-D

Anti-glare equipment; Sun shades; Visors; Curtains; Screens

For electrical aspects such as electrochromic window glass, see X22-X05.

Q14-E

Mirrors

See X22-J04 only for electrical aspects of vehicle mirrors.

Rear-view

Q14-F

Luggage/item storage arrangements

Q14-F01

Interior compartments/fittings

Includes door pockets, cubby holes, cup holders etc. For kitchen cabinets etc, see Q14-X instead.

AC Vent cup holder, fold-down tray

Q14-F02

Exterior fittings/racks e.g. for luggage/sports equipment

Includes panniers and cycle carriers. Also includes removable racks for carrying other equipment such as canoes. See Q15 codes for vehicles specifically designed to carry specific loads.

Q14-G

Sidecars; Forecars

Also see Q19-B for motorcycles per se.

Motorcycle

Q14-H

Anti-theft arrangements

Includes steering column lock, steering wheel lock, locking wheel nuts (see also Q11-A15) and other mechanical anti-theft assemblies.

Q14-H01

Locks

Includes vehicle door lock assemblies. For electrical aspects of vehicle door locks see X22-D01 codes.

Q14-I

Steps, e.g. running boards

Includes lift arrangements, e.g. for disabled person. For disabled person aids used on disabled person-specific vehicles such as invalid carriages, see Q15-B13 also.

Q14-J

Stands

Includes on and off-board supports and holders and parking cycles (see also Q19-A). See X22-J20 for electrical details of cycle stands and supports for parking purposes, as well as T05 codes for parking fee charging details.

Q14-K

Mudguards; Chain guards; Weather guards

Includes bicycle mudguards (see also Q19-A) and waterproof car covers used when vehicle is parked to protect the whole vehicle or e.g. windscreen from frost.

Q14-L

Sanitation devices

Includes toilets and washing facilities. Also includes sewage and waste storage.

Q14-M**Heating/ventilating/air-conditioning systems**

Includes mechanical aspects such as ducting and air directing nozzles. For electrical aspects see X22-J02 codes.

Q14-N**Windscreen wipers/washers**

Includes all aspects of windscreen/window cleaning such as windscreen wiper blades, screen washers, windscreen scraper/sponge etc. For electrical aspects of vehicle windscreen wipers/washers see X22-J01.

Q14-P [2012]**Footrests**

Includes foot rest for supporting passenger's/driver's feet.

Q14-R [2013]**Vehicle license plates**

Includes mechanical details of vehicle number plates. See Q14-C03 also for novel reflectors and X22-B05 for illuminated number plates.

Q14-T [2024]**Vehicle cabin equipment/furniture**

Includes furniture such as desks, tables, stands etc. See Q14-A and Q14-B respectively for chairs and beds. Includes furniture that is reconfigurable for different uses such as office work or entertainment. See X22-J12 and X22-J13 for electrical office and entertainment devices per se. For kitchen and sanitation equipment see Q14-X.
Laptop stand

Q14-X**Other vehicle accessories**

Includes removable aftermarket car mats. See Q17-A10 instead for permanent fixings and fixed interior trim/carpets. Also includes kitchen equipment used in caravan or camper van (see also Q19-F01 and Q19-F02 respectively).
Kitchen; kitchen sinks/worktops/equipment storage; cooker

Q15: Transporting Special Loads

From 2006 manual codes have been applied to cover all mechanical arrangements for transporting special loads. Prior to 2006, the Q15 class covered these aspects.

Q15-A

Vehicles for transporting special loads and modified to facilitate loading/unloading/consolidating

Q15-A01

Using tipping movement of load supporting surface

Includes dump trucks and tipper lorries (see also Q19-E for construction vehicles per se).

Q15-A02

Using endless chains and belts

Includes use of cargo (un)loading conveyor belts.

Q15-A03

Using screw conveyors

Includes used of screw conveyors e.g. to unload particulate material.

Q15-A04

Using loading ramp

Includes use of cargo bed that can be raised to an inclined position to assist unloading.

Q15-A05

Using loading platform

Q15-A06

Using cranes

Q15-A07

Using rollers

Q15-A08

Using vibrators or fluid in direct contact with load

See also V06-D for vibration generators, and X22 for electrical aspects of cargo handling arrangements.

Q15-A15

Other loading/unloading arrangements

Q15-B

Vehicle adapted to transport special loads

Also see Q19-C codes for further vehicle applications, e.g. Q19-C for commercial vehicles per se.

Q15-B01

For transporting prefabricated buildings

Includes vehicles or trailers specifically for transporting mobile homes.

Q15-B02

For transporting money or other valuables

Includes armoured cars.

Q15-B03

For transporting reels

Includes vehicle for transporting large cable or wire drums.

Q15-B04

For transporting animals/meat

Includes lorries or trailers for transporting live animals such as pigs, sheep or cows, or processed meat.

Q15-B05

For transporting refrigerated goods

Includes refrigerated lorries (see also Q19-C02). See also X27 for refrigeration systems per se.

Q15-B06

For transporting bottles

Q15-B07

Vehicle/crane transporter

Includes car transporter lorries.

Q15-B08

Tanker vehicles

Includes tanker lorries carrying fluids such as petrol, milk or chemicals.

Q15-B09

Spraying vehicles

Q15-B10

Vehicles with living accommodation

For caravans and mobile homes or camper vans per se, see Q19-F01 and Q19-F02 codes respectively.

Q15-B11

For transporting mixed concrete

Also see Q19-E for construction vehicles per se.

Concrete mixer

Q15-B12

For carrying long loads

Includes transportation of wind turbine blades (see also X15-B09).

Q15-B13

For transporting persons

Includes wheelchair lifting arrangements and other vehicle fittings specifically designed to adapt vehicle for solely transporting disabled persons, e.g. invalid carriages. For disabled person aids/accessories such as wheelchair lifts used on conventional vehicles see Q14-I instead. See Q19-H03 for ambulances per se. Electrical aspects of e.g. disabled person aids can be coded in X22-X and S05-K codes.

Q15-B30

Other vehicle adaptations/modifications

Includes vehicles specifically designed to carry other loads such as gas tanks/cylinders.

Q15-C

On-board weighing arrangements

Also see S02-D codes for weighing per se, and X22-X06K for electrical on-board vehicle weighing arrangements.

Q15-D

Securing of loads

Includes novel straps and tie-down assemblies for specific loads. Includes tarpaulins for covering lorry trailers (see also Q19-C02 and Q19-J) to prevent load from spilling.

Q15-X

Other vehicles predominantly for carrying specific loads

Q16: Vehicle servicing, maintenance, cleaning equipment, Vehicle design and manufacture

From 2006 Q16 covers all mechanical details of vehicle servicing, maintenance and cleaning equipment as well as vehicle design and manufacture. Prior to the introduction of Q16 manual codes in 2006, the Q16 class covered vehicle lighting and signalling. See X22-B codes for electrical details of lighting and signalling, and Q14-C03 and Q14-C04 codes for mechanical details of vehicle signalling. When a more specific code exists elsewhere, then Q16 codes are not required. For example, a wheel manufacturing apparatus can be adequately covered in Q11-A28 and does not require the application of a Q16-D code.

Q16-A

Vehicle servicing/maintenance/cleaning equipment

Q16-A01

Vehicle cleaning apparatus

See X25-H09C for electrical aspects of car washers.

Q16-A02

Servicing/repairing equipment

Includes all equipment/methods for servicing, maintaining and repairing vehicles. For electrical aspects of vehicle servicing equipment, see X22-X16. For off-board wheel balancer see S02-J codes and Q11-B20. Includes mechanical aspects of oil change/reconditioning apparatus and on-board systems that burn dirty oil in combustion chamber and replenish engine with clean oil. For electrical aspects see X22-A16.

Q16-A03

Vehicle supporting/lifting/manoeuvring apparatus

See X25-F05 codes for electrical aspects of e.g. vehicle engine hoists or drive-on ramps.

Axle stands, jack

Q16-D

Vehicle design/manufacture/assembly

This code is used to highlight a vehicle manufacturing aspect that cannot be covered elsewhere. For vehicle tyre manufacture see Q11-B20 instead. See T01 codes for electrical CAD/CAM systems.

Q16-D01 [2007]

Vehicle manufacture/assembly

See X25-X14 only for electrical aspects of industrial manufacturing/assembly equipment, and X25-F01 codes for e.g. conveyors per se.

Q16-D01A [2007]

Production line assembly equipment

Q16-D09 [2007]

Vehicle design

See T01 codes for electrical CAD/CAM systems.

Q16-R

Vehicle salvaging; recycling

See X25-W04 for electrical aspects of vehicle/material recycling.

Q16-X

Other vehicle servicing/manufacturing equipment not provided for

Q17: Vehicle construction, Fittings, Propulsion arrangements

From 2006 Q17 covers all mechanical details of vehicle construction, fittings and propulsion arrangements. Prior to the introduction of Q17 manual codes in 2006, the Q17 class covered vehicle parts and fittings as well as servicing. See Q16-A02 instead of mechanical aspects of vehicle servicing or X22-X16 and X22-A16 for electrical aspects of vehicle/engine servicing. For mechanical details of vehicle engines also see Q51 codes.

Q17-A

Vehicle construction

Q17-A01

Under structures; Chassis; Subframe; Connections

Includes tubular spaceframe constructions. Also includes passenger protection arrangements such as crumple zones built into the chassis.

Q17-A02

Superstructures; Superstructure sub units and connections

Includes side panels, door pillars, fixed roofs, floors etc.

Q17-A03

Combined superstructure and frame; Monocoque

Includes monocoques used in racing cars (see also Q19-F03).

Q17-A04

Cycle frames

Includes frames and forks used in cycles and motorcycles. Also See Q19-A for cycles, Q19-B for motorcycles and Q12 codes for novel details of suspension forks or rear suspension units. Also includes foldable bicycle frames.

Electric bike

Q17-A05

Streamlining arrangements

Includes spoilers and other valances or wind deflectors. For electrical aspects of exterior fittings such as speed responsive spoilers, see X22-X05 only.

Q17-A06

Doors; bonnets; tailgates

Includes mechanical aspects of openings such as doors, boots and bonnets. Gas struts are also coded in Q63-E01D for fluid springs. For electrical aspects such as electric sliding doors or electric door locks, instead see X22-X05 and X22-D01 codes respectively. Also includes side impact beams (see also Q14-C06 for crash bars per se).

Q17-A07

Windows

Includes window glass per se and mechanical winders for raising and lowering windows. See X22-H codes only for electrical aspects of power windows.

Windshield, windscreen

Q17-A08

Sunroof; Removable roof panels; Convertible soft top roof

For electrical aspects see X22-J08 only.

Targa top, roadster

Q17-A09

Sealing arrangements

Includes rubber seals and other water-proofing arrangements.

Drainage channel, sealing strip

Q17-A10

Body finishing arrangements

Includes decorative trim elements such as external rubbing strips, all interior trim, and liners and covers for load compartments such as pick-up truck load beds. Also includes covers/flaps for vehicle charging sockets (see X21-B01A1C for electric vehicle charging per se) or fuel filler flaps (see Q17-E04 for fuel supply per se). For car weatherproof covers used when vehicle is parked see Q14-K instead.

Q17-A11

Dashboard; Instrumentation

Includes plastic dashboard mouldings, mountings and clips. See X22-E only for electrical aspects of vehicle dashboards/instrumentation, and S02 codes for dials/displays.

Q17-A12

Exterior fittings; Bumpers

Includes bullbars and A-frames mounted on front of off-road vehicle.

Q17-A13

Spare wheel stowing, holding or mounting arrangements

Q17-A14

Endless track arrangements

Includes e.g. tank and bulldozer Caterpillar (RTM) tracks (see also Q19-D and Q19-E codes for military and construction vehicles per se). Also see Q19-X for unspecified type tracked vehicles.

Q17-A15

Air cushion vehicle equipment

See also Q19-R01 for air cushion vehicles per se. Includes inflatable skirts. Also see Q24 codes for hovercraft per se.

Hovercraft

Q17-A20

Other vehicle constructions/fittings

Q17-E

Propulsion arrangements

This code can be applied to highlight motor vehicle engine/motor application, especially novel internal details of internal combustion engines such as pistons (Q51-A03B), crankshafts (Q51-A03E) etc., though Q51 codes are the primary codes used to highlight novel internal combustion engines details per se. For novel engine parts that bolt onto the engine such as exhaust systems and intake manifolds see Q17-E15 instead. For electrical aspects of vehicle engines see X22-A codes only. For mechanical details of electric vehicles also see Q19-P and for electric motors used to propel electric/hybrid vehicles see X21-A07.

Q17-E01

Engine/motor mounting arrangements

Includes mechanical engine mountings (see also Q51-X) or motor mountings (see also X11-J07*). Mechanical vibration reduction mountings can also be coded in Q17-N. For electrically controlled vibration reducing engine mountings see X22-A12 only.

Bush

Q17-E02

Engine/motor cooling arrangements

Includes radiators per se. For electrical aspects of engine cooling, such as electric water pumps, see X22-A10 only. For electric motor cooling see X11-J06* as well as X21-A07 for electric vehicle motors per se.

Water, cooling, antifreeze

Q17-E03

Engine/motor lubricating arrangements

Includes e.g. sumps and oil pick up pipes. See X22-A09 for electrical IC engine oil pumps etc. See X11-J07A for lubricating motor bearings.

Oil

Q17-E04

Fuel supply arrangements; Fuel tanks

Includes tanks for storing petrol, diesel, hydrogen etc. For electrical fuel supply arrangements see X22-A02 codes and X22-A03A codes for corresponding control details.

Fuel, tank, carburettor

Q17-E05

Propulsion unit control arrangements

Includes e.g. throttle cables, accelerator pedals, hand controls etc. For electrical aspects such as electronic throttle controls and electric pedal details see X22-A03B and X22-X12 codes instead.

Control

Q17-E09

[2009]

Exhaust systems

Includes novel primaries, collectors and silencers of motor vehicle exhaust systems. See also Q51-J codes for IC engine exhausts per se. See X22-A07 for electrical aspects of vehicle exhaust systems.

Q17-E15

Other propulsion details

Includes engine heating/warming arrangements (see also Q51-L), e.g. using diverted exhaust gas. From 2009 novel mechanical aspects of vehicle exhaust systems have been transferred to Q51-E09.

Q17-N

Noise/Vibration/Harshness reduction arrangements

Includes all mechanical aspects associated with reducing noise, vibration and harshness within vehicle, such as use of sound deadening materials. This can be used in conjunction with other Q codes as appropriate, e.g. with Q12 for suspension based NVH reduction. For electrical NVH aspects see the relevant X22 codes such as X22-G03N for transmission based NVH reduction, X22-X08 for general passenger compartment noise reduction and X22-A12 for engine noise/vibration reduction. See Q51-J01 instead for vehicle exhaust silencers.

NVH

Q17-X

**Other vehicle construction; fittings,
Propulsion arrangements not provided for**

Includes mechanical aspects of agricultural
implements and their control.

Q18: Brake systems; Steering systems; Control

From 2006 Q18 covers all mechanical details of vehicle brake and steering systems and their control. Prior to the introduction of Q18 manual codes in 2006, the Q18 class only covered brake control systems. See X22-C02/X22-C05 codes for electrical details of vehicle braking and steering systems.

Q18-A

Braking systems; Control

For electrical aspects of braking systems, see X22-C02 codes only.

Q18-A01

Braking system components

These codes are applied to highlight specific novel components of the braking system, such as novel brake discs per se (Q18-A01A). If the braking system as a whole is novel, rather than a specific individual part of it, then apply Q18-A03 codes instead, e.g. Q18-A03A for novel disc brake assemblies.

Q18-A01A

Discs

Includes novel brake discs per se.

Q18-A01B

Drums

Includes novel brake drums per se.

Q18-A01C

Pads and shoes

Includes novel brake pads and shoes and their materials.

Q18-A01D

Callipers

Includes novel hydraulic brake callipers and mechanical cable operated callipers.

4-pot, V, side-pull, cantilever

Q18-A01E

Cylinders/reservoirs, e.g. master cylinder

Q18-A01F

Valves

Q18-A01G

Brake force control

Includes brake bias valves (also see Q18-A01E). Includes all systems and methods for adjusting braking force. See X22-C02C for electrical brake pressure control systems.

Q18-A01H [2013]

General brake hydraulics

Includes general hydraulic aspects of vehicle brakes such as brake pipes, hoses, hydraulic lines, clips etc.

Q18-A01J [2007]

Air brakes

Includes e.g. air compressor arrangements for compressing air used in brakes of heavy vehicle such as truck (see also Q19-C02). For novel reciprocating air compressors see also Q55-A.

Q18-A01P [2007]

Parking brakes

Includes mechanical details of hand brakes or foot actuated parking brakes. See also Q18-A07 codes for novel details of the parking brake actuating arrangement per se. Also includes parking brakes acting by locking vehicle transmission/drive (see also Q13-A24).

Q18-A01X

Other brake system components

Q18-A03

Brake assemblies

These codes are only applied when the brake system as a whole is novel. For individual novel brake system components such as discs or callipers see the relevant Q18-A01 codes only.

Q18-A03A

Disc brake assemblies

Q18-A03B

Drum brake assemblies

Q18-A03C

Brake assemblies with braking member acting on periphery of drum or wheel rim etc.

Includes bicycle cantilever brakes (see also Q19-A).

Q18-A03P

Brake systems controlled by back-peddalling

Includes hub brakes and brakes built into bicycle (see also Q19-A) transmission utilising e.g. disks, drums, contacting coaxial cones, or expanding brake bushings, that are actuated upon back-peddalling, See Q63-B05 for freewheels and free-wheel clutches.

Q18-A03X

Other brake assemblies

Q18-A05

Brake cooling arrangements

Q18-A07

Brake action initiating devices

Includes mechanical driver actuated devices. For electrical aspects of brake actuation devices see X22-X12 and X22-C02 codes.

Q18-A07A

Foot control

Includes brake pedal per se and after-market alloy drilled pedal pads or rubber covers. See X22-X12 only for electrical aspects of brake pedals.

Foot pedal

Q18-A07B

Hand control (e.g. brake lever)

Includes brake levers (also see Q19-A for bicycles and Q19-B for motorcycles).

Q18-A07C

Automatic brake initiation

For electrical aspects of automatic brake initiation see X22-C02D codes only.

Q18-A10

Portable wheel chocks

Includes portable chocks e.g. for preventing vehicle from moving during servicing or wheel changing.

Q18-A15

Brake safety devices; Monitoring

Includes mechanical aspects of e.g. brake safety such as brake pad wear indicators (see also Q18-A01C).

Q18-A30

Other brake systems

Includes deployable braking parachutes. Also includes exhaust braking, e.g. used on diesel-engined trucks (see also Q19-C02 and Q51-D03) for sustained slowing down long hills, to prevent overheating of mechanical friction brakes (also see Q51-J07 for exhaust systems per se).

Q18-B

Steering systems; Control

For electrical aspects of steering systems, see X22-C05 codes only.

Q18-B01

Steering controls

For electrical aspects of steering wheels, see X22-C05C codes only.

Q18-B01A

Hand wheels; Steering wheel

Includes steering wheels per se and covering elements. See Also Q14-C02 for steering wheel mounted airbags.

Q18-B01B

Hand levers

Q18-B01C

Handlebars; Grips; Stems

Includes handlebars, grips, stems, bar-ends etc. (also see Q19-A for bicycles and Q19-B for motorcycles per se).

Q18-B01D

Steering column

Includes column per se.

Q18-B01D1

Rake/reach adjustment mechanisms

Includes telescopic and tiltable steering columns to enable adjustment of driving position.

Q18-B01D3

Clamps

Includes steering column mounting clamps.

Q18-B01D5 [2008]

Collapsible steering column

Includes steering columns designed to collapse during vehicle collision for safety purposes (see also Q14-C20 for driver safety).

Q18-B01X

Other steering controls

Q18-B02

Steering gears/racks

Includes steering racks and associated pinion gears.

Q18-B02A

Mechanical type

Includes steering arrangements utilising a mechanical rack/gear arrangement. If hydraulic power assistance is also used see Q18-B06C as well.

Q18-B02B

Hydraulic type

Includes systems using hydraulic piston/cylinder assemblies instead of a mechanical rack arrangement to displace steering arms. Also see Q18-B06C for hydraulic power steering.

Q18-B03

Steering linkages; Stub axles or their mounting

Includes universal joints, e.g. for interconnecting upper and lower steering columns, and tie rod ends.

Q18-B06

Power assisted steering systems

For electrical power assisted steering systems see X22-C05A codes only.

Q18-B06A

Mechanical, e.g. using power take-off

Q18-B06C

Fluid

Includes hydraulic power assistance.

Q18-B07

Automatic steering control arrangements

For electrical automatic steering systems see X22-C05B only.

Q18-B09

Other deflectable wheel steering apparatus

Includes passive four wheel steering (4WS) systems (see X22-C05A1 only for electrical 4WS systems).

Q18-B12

Steering non-deflectable wheels, i.e. endless tracks

Includes steering of tracked vehicles. (also see Q19-D for military tanks and Q19-E for bulldozers).

Q18-B15

Other steering arrangements not provided for

Includes other steering devices such as steerable skis for snow mobiles (see also Q19-F04).

Q19: Vehicle applications

From 2006 Q19 covers vehicle applications. Prior to the introduction of Q19 manual codes in 2006, the Q19 class only covered air-cushion vehicles. From 2006, see Q19-R01 and Q24-P10 for air-cushion vehicles such as hovercraft.

Q19-A

Cycles

Includes bicycles, unicycles, tricycles, tandems, recumbent cycles. For electrical aspects or accessories for bicycles, see X22-P01 only.

Q19-B

Motorcycles; Scooters; Mopeds

See X22-P02 only for electrical aspects of motorcycles.

Q19-C

Commercial vehicles

See X22-P05 codes only for electrical aspects of commercial vehicles.

Q19-C01

Bus/Coach

See X22-P05A for electrical aspects of buses and coaches.

Q19-C02

Lorry/Truck

Includes tractor-trailer over-the-highway vehicles. See X22-P05B for electrical aspects of lorries.
Articulated lorry, HGV

Q19-C03

Taxi

See X22-P05C for electrical aspects of taxis.

Q19-C04

Refuse collecting vehicle

See X22-P05X for electrical aspects of dust carts.

Q19-C05

Snow removing vehicle; Snow plough; Road cleaning vehicles

See X25-U05 for electrical aspects of road cleaning and X22-P05X e.g. for snow ploughs.
Road sweeper

Q19-C06

Forklift truck

See X25-F05A and X21-A01B or X22-P05F for electrical aspects of forklift trucks.

Q19-C07

Hearse

Q19-C09

Other commercial vehicles

Includes milk floats, pick-up trucks and commercial vans.

Q19-D

Military vehicles

Includes tanks, armoured personnel carriers etc. See W07 and possibly X22-P06 for electrical aspects of military vehicles.

Q19-E

Construction vehicles

Includes bulldozers, excavators and cranes. See X25-U (construction), X25-D01 (earth mover) and X22-P07 for electrical aspects. For unspecified use tracked vehicles see Q19-X instead.

Q19-F

Recreational vehicles

Includes MPVs (multipurpose vehicles), SUVs (sports utility vehicles) and people carriers. See X22-P08 for electrical aspects of recreational vehicles.
RV

Q19-F01

Caravan; Trailer tent

Q19-F02

Camper van; Motorhome

For equipment adapting vehicle to provide living or sleeping accommodation see Q15-B10.

Q19-F03

Racing/sports cars; Go-karts

Includes cars used in competition such as racing and rally cars. Q22-C instead for children's push-along go-karts.

Q19-F04

Snow mobile

For sledges see Q22-C01 instead.

Q19-F05 [2025]

All-terrain vehicles

Includes all-terrain vehicles, off-road buggies, quad-bikes etc. See Q13-A11 for novel AWD/4WD systems per se.

Q19-G

Agricultural vehicles

Includes tractors, combine harvesters and agricultural implements. See X22-P09/X22-X11 and X25-N codes for electrical aspects of agricultural vehicles per se.

Q19-H

Emergency vehicles

See X22-P10 only for electrical aspects of emergency vehicles.

Q19-H01

Police car

Q19-H02

Fire engine

Q19-H03

Ambulance

Q19-J

Trailers

See also Q19-C02 for articulated lorry trailers. For electrical aspects of trailers see X22-P11 only.

Q19-L

Driverless/autonomous vehicles

Includes mechanical details of vehicles that can drive themselves, such as novel interior design/seating/function that takes advantage of reduced need for conventional driver controls. See X22-P15 and X21-A01L for electrical details of autonomous motor vehicles and electric vehicles respectively.

Q19-P

Electric vehicles; fuel cell vehicles

Only mechanical aspects of electric vehicles are coded here. See the electrical X21 codes only, when the novelty is electrical in nature.

FCV

Q19-Q

Hybrid vehicles

Only includes mechanical aspects of hybrid vehicles.

Q19-Q01

Hybrid-electric

Includes series/parallel/mixed hybrid-electric and hybrid-fuel cell vehicles. See X22-P04 and X21-A01D codes only for hybrid electric vehicles where the novelty is electrical in nature.

Q19-Q05

Hybrid-mechanical

Includes hybrid-flywheel and hybrid-pneumatic vehicles.

Q19-R

Convertible vehicles (usable on/in different terrain)

Q19-R01

Amphibious vehicles; Air cushion vehicles, e.g. for transporting heavy loads over small distances

Includes hovercraft type vehicles. Also see Q24-P10 and Q24-P30 for mechanical aspects for marine hovercraft and amphibious vessels respectively, or W06-C codes for electrical aspects.

Q19-R02

Vehicles usable on road/rail

Includes motor vehicles with outriggers to allow travel on railway track. Also see Q21 for mechanical railway details, or X22-X and X23-A codes for electrical aspects.

Q19-R03

Vehicles convertible into aircraft

Also see Q25 for mechanical aspects of aircraft, or W06-B codes for electrical aspects.

Q19-R09

Other convertible vehicles usable in or on different media

Q19-S [2007]

Soft top/cabriolet vehicles

Includes vehicles that have a soft-top roof or a foldable hard roof, e.g. on coupe/convertible cars. See also Q17-A08 for novel convertible roofs per se. See Q14-C06 for flip-up rollover bars used cabriolet vehicles.

Q19-X

Other vehicle types

Includes unspecified use tracked vehicles (see Q17-A14 for endless track arrangements per se).

Q2 Special Vehicles

Q21: Railways

From 2006 manual codes have been assigned for all mechanical railway details. For electrical aspects of railways see X23 codes instead.

Q21-A

Railway track arrangements/construction

Q21-A01

Track construction per se

Includes mechanical aspects such as track rails and sleepers per se. Also includes track maintenance assemblies and maintenance vehicles. For track inspection, see Q21-C03I instead. Further includes mechanical details of track changing arrangements, track switches and crossings.

Q21-A02

Railway stops fixed to permanent way; Track brakes; Sand tracks; Buffers

Q21-A03

Stations; Station equipment

Includes platform doors, turnstiles etc. See X23-A09A for electrical offboard/station aspects.

Q21-A04

Track/station based equipment for transferring passengers, articles or freight to or from train

Includes gangplank and ramp assemblies. For train mounted aspects, see Q21-J06 and Q21-J07 codes instead.

Q21-A05

Track based rail or wheel flange lubrication devices

Q21-A06

Turntables; Traversers

Q21-A07

Shunting or short distance haulage devices

Q21-A08

Track mounted derailleurs; Apparatus for placing vehicles on track

Includes portable or fixed track mounted jacks and hoists for lifting rail cars. For train mounted lifting apparatus see Q21-M03 instead.

Q21-A12

[2010]

Bridges and tunnels

(Q21-A15)

Includes constructional details of railway bridges and tunnels.

Viaduct

Q21-A15

Other railway track arrangements

Q21-B

Railway type

Q21-B01

Elevated railways

See also Q21-B02 for monorail systems.

Q21-B01A

With suspended vehicles

Q21-B01B

Without suspended vehicles

Q21-B02

Monorails

See also Q21-B01 for elevated monorail systems.

Q21-B03

Rope/cable railways

Includes aerial runways. See also Q21-C01D1 for novel traction arrangements utilising cables, ropes or chains.

Q21-B03A

Tramway or funicular systems

Includes tramways or funiculars using rigid tracks and cable or chain traction. For trams per se see Q21-C03G instead. For novel cable/chain traction assemblies see Q21-C01D1 also.

Q21-B03B

Power-and-free systems

Includes overhead systems with suspended vehicles that can be engaged with drive train when powered or disengaged when in free unpowered or stopped mode. For power and free conveyors see Q35 class or X25-F codes if electrical.

Q21-B03C

Ski lift, sleigh lift or trackless systems with guided towing cables only

Q21-B04

Rack railways

Q21-B05

Sliding or levitation systems

Q21-B05A

Magnetic suspension arrangements

See X23-A01A4 and X12-C codes for electrical aspects of magnetic levitation systems and electro- and super-conducting magnets per se.

Q21-B06

Underground railways

Also see Q21-A codes for constructional details of underground railway tunnels, platforms, stations etc.

Subway, metro

Q21-B09

Other railway types

Includes tunnel systems. Also see Q35 class for e.g. pneumatic tube conveying arrangements or X25-F codes for electrical conveying systems.

Q21-C

Locomotive/motor railcar type

These codes are applied to classify the locomotive type when the novelty being coded is mechanical. If the novelty is electrical in nature then see X23 and other EPI codes instead.

Q21-C01

Type of propulsion for locomotive or railcar

Q21-C01A

Steam locomotives or railcars

Q21-C01B

Electric locomotives or railcars

Q21-C01C

IC engined or gas turbine engined locomotives or motor railcars

See also Q21-C01B for diesel-electric locomotives.

Q21-C01D

Other propulsion systems for locomotives or motor railcars (e.g. with propulsion devices between or alongside rails, e.g. pneumatic systems)

Q21-C01D1

Tractive effort applied to cables or chains

See also Q21-B03 codes for e.g. funiculars.

Q21-C01D2

Tractive effort applied to racks

Q21-C01D3

Tractive effort applied or supplied by aerodynamic force or fluid reaction

Q21-C03

Type of carriage or wagon

These codes are intended to highlight specific types of carriage or wagon construction.

Q21-C03A

Passenger carriages

This code is mainly applied when the novelty relates to the carriage superstructure itself or fittings such as windows, doors or bulkheads etc. permanently mounted to/inside the carriage. Novel accessories such as seats used in a passenger carriage are not normally included here (see Q21-J03).

Q21-C03B

Wagons or vans

Includes freight wagons.

Q21-C03C

Tank wagons or carrying fluent materials

Includes tankers for carrying liquids.

Q21-C03D

Hopper cars

Includes e.g. wagons for carrying particulate material with dispensing openings at bottom of wagon.

Q21-C03E

Tipping wagons

Q21-C03F

Mine cars

See X25-D02 for electrical aspects of mining vehicles.

Q21-C03G

Tramway vehicles

The code is applied for novel trams per se. For cable/rope driven tram or funicular railways in general see Q21-B03A instead.

Q21-C03H

Buffer cars

Q21-C03I

Railway inspection trolleys

Includes all types of railway inspection vehicles. For novel track maintenance vehicles, also see Q21-A01.

Q21-C03X

Other railway vehicles

Includes rail vehicles convertible for use on road (see also Q19-R02).

Q21-D

Rail vehicle construction; fittings; Underframes; Suspension; Transmissions

Q21-D01

Superstructures

Includes wall panels, floors, bulkheads and roofs etc. For movable roof assemblies see Q21-D17 instead.

Q21-D02

Underframes; Chassis

Q21-D03

Bogies

Includes wheel/axle assemblies fastened to chassis.

Q21-D04

Connections between underframes and bogies, e.g. to allow relative movement

Includes suspension arrangements. See X23-A01C for electrical aspects of railway suspension systems.

Q21-D05

Adjustment of wheel axles or bogies when rounding curves

Includes e.g. passive carriage tilt control. See X23-A01C for railway train active suspension/carriage tilt control. Also includes arrangements for adjusting orientation/steering of wheels e.g. when rounding bend to reduce wheel flange and rail head wear.

Q21-D06

Axle boxes and their mounting

Includes wheel bearing arrangements inside axle box.

Q21-D07

Lubrication assembly for axle box

Includes lubrication arrangements and oil sumps for axle box wheel bearings.

Q21-D08

Arrangements to allow use on tracks of different width

Includes systems for adjusting wheel spacing to allow train to run on different gauge tracks.

Q21-D09

Derailment preventing equipment

Q21-D10

Rail engaging elements, e.g. wheels or balls

Includes wheels and other assemblies for engaging tracks, overhead rails etc.

Q21-D10A [2007]

Traction increasing equipment

Includes dispensing of particulate material such as sand under train wheels on railway track to increase grip. See Q21-F09 also, if sand is dispensed specifically to improve braking.

Q21-D11

Wheel guards; Bumpers; Obstruction removers

Q21-D12

Couplings; Draught or buffering appliances

Q21-D12A

Couplings

Includes couplings between carriages.

Q21-D12B

Draw gears

Q21-D12C

Buffers

Q21-D13

Transmission systems

Includes power transmission arrangements.
Drive shaft, gearing

Q21-D14

Aerodynamic modifications to reduce air resistance

Includes spoilers and other wind deflectors, especially for high speed trains.

Q21-D15

Doors

Q21-D16

Windows

Q21-D17

Movable roofs; Covers; Tarpaulins

For fixed roofs see Q21-D01 for novel train superstructures.

Q21-D25

Other rail vehicle constructions, fittings

Includes constructions/fittings designed for safety purposes, such as fire resistant bulkheads (see also Q21-D01). Accessories such as fire extinguishers are included in Q21-J09 only.

Q21-F

Brake systems

See X23-A01B for electrical braking systems. Q18-A codes may also need to be applied when they provide a more detailed breakdown of the brake system.

Q21-F01

Braking arrangements acting on wheels

Q21-F02

Brakes with braking members co-operating with track

Q21-F03

Hydrostatic, hydrodynamic or aerodynamic brakes

Includes air brakes.

Q21-F04

Brake wear compensating mechanisms

Includes mechanical adjusters to compensate for brake pad wear.

Q21-F05

Brake actuation mechanisms

Includes brake actuating levers.

Q21-F09

Other braking arrangements

Includes other braking systems and brake system components

Brake pipes, clamps, clips, hoses

Q21-J

Rail vehicle accessories

See X23-A13 for electrical train accessories. Other Q14 codes may also need to be applied when a more detailed breakdown exists.

Q21-J01

Sleeping accommodation; Beds

See X27-A03 for electrical aspects of furniture per se.

Q21-J02

Heating; cooling; ventilating; air-conditioning

Includes mechanical ducting and vents.

Q21-J03

Seats

Q21-J04

Sanitation arrangements

Includes toilets and washing facilities.

Q21-J05

Steps

Includes all train mounted arrangements for assisting boarding of passengers such as fixed or movable steps, or wheelchair lifting or ramp assemblies etc.

Q21-J06

Cargo/luggage loading and unloading arrangements

Includes cargo loading ramps and hoists. For platform based cargo/passenger handling, see Q21-A04 instead.

Q21-J07

Cargo/luggage storing/securing arrangements

Includes cargo storage compartments and restraining devices such as luggage nets or straps.

Q21-J08

[2007]

Railway safety systems

Includes systems for evacuating passengers from train during emergency and e.g. glass hammers mounted inside train. Also includes fire fighting equipment such as fire extinguishers. See Q21-D05 for train constructional features designed specifically for safety purposes such as fire-resistant bulkheads.

Fire-extinguisher, emergency, safety, escape slide, escape hatch

Q21-J09

Other rail vehicle accessories

Includes any other rail vehicle accessories that can not be coded elsewhere.

Q21-M

Locomotive servicing/maintenance; Cleaning; Train/track design and manufacture

For track maintenance equipment see Q21-A01 instead. Track inspection vehicles are coded in Q21-C03I only.

Q21-M01

Train cleaning apparatus

Includes equipment for washing the exterior of the train or train specific equipment for cleaning the inside of the train.

Q21-M02

Locomotive servicing equipment, e.g. filling locomotive with water or sand

Includes water columns and coal bunkers (see also Q21-C01A for steam locomotives). Also includes tools used during servicing and maintenance operations.

Q21-M03

Rail vehicle mounted locomotive supporting/lifting/manoeuvring apparatus (e.g. breakdown recovery train)

Includes train mounted cranes for manoeuvring train after derailment or accident. For track mounted equipment such as cranes and jack assemblies, see Q21-A08 instead.

Q21-M05

Train design/manufacture/ assembly/refurbishment

See e.g. T01 codes for computer/CAD/CAM systems for train design and manufacture.

Q21-M09

Other locomotive servicing/manufacturing equipment not provided for

Includes track maintenance, repair, servicing tools and equipment.

Q21-N

[2007]

Noise/Vibration/Harshness reduction arrangements

Includes all aspects of reducing noise, vibration or harshness on-board railway train, and also offboard aspects such as track mounted arrangements for reducing noise from passing train (see also Q21-A15).

Q21-S

Safety and signalling equipment

For electrical aspects of railway safety or signalling see X23-B codes.

Q21-S01

Points and signalling

See X23-B03 for electrical aspects of points and signals and their operation.

Q21-S01A

Points and scotch blocks and their operating devices

Includes locking mechanisms for points.

Q21-S01C

Signals and their operating devices

For warning signals used at level crossing to warn motorists, see Q21-S07C.

Q21-S01C1

Visible signals

Includes flags, semaphores and reflectors. See X23-B03 for electrical/illuminated signals.

Q21-S01C2

Audible signals

Includes pneumatic horns.

Q21-S01C3

Signalling indicators on train

Q21-S01E

Arrangement for interlocking between points and signals

See X23-B04A codes for electrical interlocking between points and signals.

Q21-S05

Train traffic control; Track/station blocking

Includes arrangements for dividing track into block sections so that multiple trains are not present in a signal block, to reduce the risk of collisions. See X23-B04C for electrical aspects of track/station blocking.

Anticollision

Q21-S05A

For controlling traffic in one direction only

One-way

Q21-S05C

For controlling traffic in two directions over same pair of rails

Includes e.g. using token system, tablets, staffs etc.

Q21-S07

Safety systems for rail/road crossing traffic

See X23-B05A and maybe T07-B05A for electrical aspects of railway crossing systems.

Q21-S07A

Guards; Gates

Includes mechanical gates and barriers per se.

Q21-S07B

Operation of gates

Includes actuating arrangements for opening and closing gates/barriers.

Q21-S07C

Warning devices for road traffic

See T07-A05A for electrical aspects of railway crossing road traffic warning systems.

Q21-X

Other locomotive aspects

Includes locomotive aspects that are not covered elsewhere.

Q22: Hand/Foot/Animal Drawn Vehicles

From 2006 Q22 covers all mechanical details of hand/foot and animal drawn vehicles such as carts, wheelchairs, sledges and horse-drawn carriages. Prior to the introduction of Q22 manual codes in 2006, the Q22 class covered hand and motor vehicles which included carts, sledges, steering systems/controls, vehicle under/super structures, trailers and vehicle design, manufacture and (dis)assembly.

Q22-A

Hand carts

Q22-A01

With single axis carrying transport wheels

Includes wheelbarrows.

Q22-A02

With more than one axis carrying transport wheels

Includes four-wheeled barrows and mechanical aspects of shopping trolleys (see X25-F05A for electrical aspects of shopping trolleys).

Q22-A03

Accessories for hand carts

Includes handle grips and brakes.

Q22-B

Carriages for children; Perambulators

Pram, pushchair

Q22-B01

With single wheel axis

Q22-B02

With more than one wheel axis

Includes three and four wheeled, twin axle pushchairs.

Q22-B03

Accessories for children's carriages/perambulators

Includes luggage racks, bottle holders etc.

Q22-C

Other hand propelled vehicles

Includes unpowered children's go-karts and agricultural hand propelled machines. Lawnmowers are only coded under P12-A02 (non-electrical) and X27-A01A (electrical details)..

Q22-C01

Sledges/ice boats

Toboggan

Q22-C02

Wheelchairs

See S05-G02A for electrical aspects of wheelchairs, and X21-A01A and S05-K01 for electrical aspects of mobility vehicles.

Q22-C03

[2007]

Accessories for other hand propelled vehicles

Includes seats, handles, foot rests, etc.

Q22-D

Land vehicles drawn by animals

Includes e.g. horse-drawn carts.

Sulky

Q22-M

[2007]

Foot propelled vehicles

Includes stand on scooters and skateboard type devices propelled by user's feet. See W04-X codes for electrical aspects of toy skateboards. See Q19-A instead for bicycles and P36 for novel roller skates or ice skates.

Q22-X

[2007]

Other carts/carriages/vehicles

Q24: Ship; Waterborne Vessels; Related Equipment

From 2006 manual codes have been assigned for all mechanical ship, waterborne vessel and port details. For electrical aspects of ships see W06-C codes instead.

Q24-A

Ship construction; Fittings

Q24-A01

Hulls

Includes surfboard constructions.

Q24-A01A

Hydrodynamic or hydrostatic features

Includes e.g. hydrofoils and hydroplanes. Also includes shock-wave/drag reducing bow assembly.

Q24-A01B

Hull shells

Q24-A01C

Frames

Q24-A01D

Keels

Includes permanently fixed, non-movable keels.

Q24-A01D1

Movable/drop keels/centre boards

See Q24-E05A instead for movable rudders.

Q24-A01E

Stern posts

Q24-A01G

Stems

Q24-A01H

Decks

Includes flooring.

Q24-A01I

Bulkheads

Also see Q24-B09H for watertight arrangements for bulkheads.

Q24-A01J

Gratings

Q24-A01K

Panellings; Linings

Q24-A01L

Reinforcements for carrying localised loads

Q24-A01M

Collapsible; foldable; inflatable hulls

Includes inflatable dinghy hull assemblies and cushions for hovercraft (see also Q24-P10).

Q24-A01N

Ballasting; Self-bailing equipment; Scuppers

Includes bilge pumps.

Q24-A01P

Multiple hull arrangements

Includes catamaran twin hull and trimaran triple hull arrangements.

Q24-A01X

[2007]

Other hull details

Q24-A03

Windows; Doors; Ports

Q24-A03A

Windows; Port holes

Q24-A03B

Doors

Q24-A03C

Ports; Hatches

Q24-A05

Superstructures; Masts

Includes conning towers. See W06-A codes for radar installations and W02 codes for radio masts etc.

Q24-A15

Other ship construction; fittings

Q24-B

Ship accessories

Includes mechanical aspects of shipboard lighting and signalling (see also X26 for lighting per se).

Q24-B01

Passenger/crew accommodating arrangements; Cabins; Galleys

Q24-B01A

Furniture - vessel specific

Includes furniture specifically designed for marine/ship application, such as seats and beds etc.

Q24-B01C

Sanitation arrangements

Q24-B01C1

Toilets

Q24-B01C2

Washing facilities; Showers

See X27-A02A4 for electrical aspects of showers and wash basins, and X27-E03A for electrical aspects of water heating.

Q24-B02

Load accommodating arrangements

Q24-B02A

Load accommodating compartments

Includes e.g. movable/detachable decks, and storage tanks.

Q24-B02C

Ship-board load handling arrangements

Includes e.g. derricks, cranes, winches, chutes, cableways, conveyors for loading/unloading.

Q24-B02E [2007]

Ship-board passenger handling arrangements

Includes ship-mounted extendable gang planks or platforms lowerable into the water or onto dry land to aid boarding or alighting of vessel. For shore mounted passenger handling arrangements see Q24-R03 instead.

Q24-B03

Heating; Ventilating; Air-conditioning

Includes mechanical aspects only. See W06-C01C5 for electrical aspects of HVAC systems.

Duct, vent

Q24-B05

Instrumentation

Includes e.g. mechanical gauges, periscopes. See S02 codes for further details of instrumentation per se, and W06-B01B codes for electrical instrumentation details.

Q24-B07

Desalination plants - fresh water production

Q24-B09

Emergency/safety equipment

Includes shipboard safety devices. For personal equipment such as life jackets and life rings, see Q24-X01A.

Q24-B09A

Fire fighting equipment

Q24-B09C

Life boat equipment

Q24-B09C1

Fastening or storage on deck

Q24-B09C2

Deployment devices

Includes e.g. hoists, davits, winches.

Q24-B09E

Apparatus to control vessel attitude

Includes equipment to decrease roll, pitch or like unwanted vessel movement. Includes arrangements to reduce the risk of capsizing or sinking.

Q24-B09E1

By improving stability

Includes use of e.g. ballast tanks.

Q24-B09E3

By improving buoyancy

Includes use of e.g. buoyancy chambers.

Q24-B09G

Anti-collision arrangements, e.g. feelers

Q24-B09H

Watertight arrangements

Includes e.g. watertight doors/bulkheads (see also Q24-A03B and Q24-A01I respectively).

Q24-B09X [2007]

Other safety/emergency equipment/systems

Includes emergency escape equipment such as escape shaft in vessel, e.g. between sunken vessel and rescue vessel.

Q24-B10

Waste water/Sewage treatment plants

See Q24-B01C for sanitation and toilet systems per se.

Q24-B99 [2010]

Other ship accessories

Q24-C

Tying-up; anchoring, towing/pushing equipment

Q24-C01

Mooring equipment

For mooring against jetty, pier or other vessel.

Q24-C02

Anchoring arrangements

E.g. when using ground-engaging anchor.

Q24-C02A

Anchors

Q24-C03

Boat hooks

Q24-C04

Towing/pushing equipment

Q24-C05

Ancillaries, e.g. chains; ropes; clamps; bollards; fairleads; hawsers

Includes ancillaries used for e.g. mooring, anchoring or tying up. Includes fenders used to protect side of ship's hull.

Q24-E

Marine propulsion and steering

Q24-E01

Propulsive elements

These codes describe the type of propulsion used on the ship and are only applied when the type of propulsion system has some bearing on the novelty.

Q24-E01A

Directly acting on water

Includes water jet propulsion (see Q24-P21 for jet-skis).

Q24-E01A1

Of rotary type

Q24-E01A1A

Propellers

Includes propellers per se and propeller driven vessels when the propulsion aspect is important.

Q24-E01A1C

Paddle wheels

Paddle steamer

Q24-E01A3

Of non-rotary type, e.g. flaps

Includes oars (see also Q24-E01G for muscle power).

Q24-E01C

Directly acting on air (e.g. for hovercraft)

Also see Q24-P10 for hovercraft per se, and Q24-P30 for swamp boats having large propeller acting on air.

Q24-E01E

Directly acted on by wind (e.g. sails, Magnus effect)

Includes sails per se. See Q24-A05 for masts per se.

Q24-E01G

Using muscle power

Includes use of e.g. oars, movable thwarts, foot rests, sculls.

Q24-E01X

Using other means

Includes e.g. using water currents, e.g. tidal flow, or direct engagement with water bed.

Q24-E02

Propulsion power plant

The codes in this section describe the type of propulsion used on the ship and are generally only applied when the type of propulsion has some bearing on the novelty.

Q24-E02A

Using internal combustion engines

Q24-E02A1

Outboard motors

Q24-E02A3

Inboard motors

Q24-E02B

Using external combustion engine, e.g. gas turbine

For gas turbine engines per se, see also Q52 codes.

Q24-E02C

Using steam

Q24-E02C1

Using steam turbine

Q24-E02C3

Using positive displacement steam engine

Q24-E02D

Using hydraulic fluid motor

Q24-E02E

Using nuclear energy

Q24-E02F

Using land vehicle supported on vessel

Q24-E02G

Using land based animal/vehicle, e.g. horse

Q24-E02M [2008]

Fuel supply arrangements

Includes fuel tanks and associated pipework. For IC engine and gas turbine engine fuel supply aspects see Q51-H01 and Q52-C codes respectively.

Q24-E02X [2007]

Other propulsion power plant

Q24-E03

Transmission systems

Includes novel drive trains.

Q24-E03A

Gearing

Q24-E03C

Clutch

Q24-E03E

Drive shafts; propeller shafts; shaft tubes; seals etc.

Q24-E05

Steering arrangements

Q24-E05A

Steering by rudders

Includes rudder and tiller assemblies per se.

Q24-E05C

Steering by propulsive elements

Includes systems changing direction of propeller shaft.

Q24-E05E

Steering/slowing by extensible flaps

Q24-E05G

Steering by deflecting propeller slipstream

Includes rudder type elements in propeller slipstream.

Q24-E05X

Other steering arrangements

Q24-M

Military equipment

See W07 codes for electrical aspects of military equipment and W06-C codes for electrical aspects of ships. See Q24-P30 for military vessel application.

Q24-M01

Offensive equipment

Q24-M01A

Guns and missile launchers

See W07-E05 for electrical aspects of weapons launching systems. Also includes torpedo launchers.

Q24-M01B

Mine and depth charge launchers

Q24-M01E

Ammunition stores and handlers

Q24-M03

Defensive equipment

Includes e.g. camouflage. For electrical aspects of active camouflage see W07-F03 instead.

Q24-M03A

Mine sweeping/clearing

E.g. using towed mechanical cables. For electrical aspects of mine detection/sweeping/clearing see e.g. W07-F05 and W06-C codes instead.

Q24-N [2007]

Noise/Vibration /Harshness reduction arrangements

Includes all ship-board arrangements for reducing noise, vibration or harshness, e.g. use of sound-deadening material.

Q24-P

Vessels or floating structures adapted for special purposes

Q24-P01

Pipe laying vessels

Q24-P02

Cable laying vessels

Q24-P03

Ice breakers

Q24-P04

Fishing vessels

Includes small fishing boats and large commercial trawlers.

Q24-P05

Barges or lighters

Q24-P06

Environmental vessels, e.g. for collecting pollution from open water

Includes vessels adapted to clear up or contain environmental disasters such as oil spillages.

Q24-P07

For transporting marine vessels

Q24-P08

Floating buildings, drilling platforms, workshops

Includes floating vessels normally designed to be static at a fixed location.

Q24-P09

Canal boat

Q24-P10

Waterborne air cushion vehicle

Includes hovercraft.

Q24-P11

Submarines; submersible craft

Semi-submersible

Q24-P12

Flying vessels

Includes airfoil boats and ground effect craft. See Q25-P04 for flying boats and sea planes.

Q24-P13

Military vessels

Includes e.g. aircraft carriers, destroyers, frigates. For electrical aspects of military ships see W06-C and W07 codes respectively.

Q24-P14

Ferries

Q24-P15

Tugs

Q24-P16

Light ships

Q24-P17

Pontoons

See Q24-R15 instead for ground-engaging piers/jetties.

Inflatable

Q24-P18

Buoys

See W06-C07C for electrical aspects of buoys.

Q24-P19

Rafts

Q24-P20

Canoes; Kayaks

Q24-P21

Sports/pleasure equipment, e.g. surfboards, sailboards, water skis

Includes all recreational vessels such as small recreational boats (see also Q24-P22 for sailing boats), personal watercraft, jet-skis, surfboards etc.

Boogie board, kite surfing, sail board

Q24-P22 [2010]

Sailing boats

Includes all sail powered vessels such as sailing boats and yachts. See Q24-E01E for sail arrangements per se.

Q24-P24 [2008]

Tanker vessels

(Q24-P30)

Includes marine vessels that transport fluids such as crude oil, water, fuels etc.

Q24-P25 [2007]

Commercial vessels

(Q24-P30)

Includes general non-specific commercial ships. Use other Q25-P codes instead when a more specific commercial vessel is specified.

Q24-P28 [2007]

Emergency services vessels

(Q24-P30)

Includes coastguard vessels, police boats, fire tenders etc. For lifeboats and lifeboat equipment on-board e.g. ferry, see Q24-B09C (and Q24-P14 for ferry) also.

Q24-P30

Other special purpose vessels

Includes swamp boats and amphibious vessels (see also Q19-R01).

Q24-R

Port, harbour, marina equipment

Q24-R01

Dry-docks

Q24-R02

Vessel launching/hauling-out

Includes slipways and boat hoists.

Q24-R03

Passenger handling equipment

Includes steps and other dockside passenger handling equipment.

Q24-R05

Load/vehicle handling equipment

Includes vehicle loading ramps.

Q24-R09

Marine craft servicing and maintenance equipment

See W06-C07 for electrical aspects of ship maintenance.

Q24-R10

Cleaning equipment

Includes hull scrapers.

Q24-R15

Other ground/port based equipment

Includes piers and jetties (see also Q21-P17 for inflatable jetties/pontoons).

Q24-X

Other waterborne vessel details and related equipment

Q24-X01

Life saving in the water

Q24-X01A

Life jackets; Vests; Buoyancy aids; Rings

Q24-X01B

Shark screens; Nets

Q24-X04

Diving equipment

Q24-X05

Ship/boat manufacture

See W06-C08 for electrical aspects of ship manufacture. See Q51-M or Q52-M respectively for manufacture of IC and gas turbine engines used in ships.

Q24-X06

Salvaging equipment

Q24-X07

Ship design and testing

Includes e.g. using towing tanks or model basins for designing. See T01 codes for computerised (CAD) ship design.

Q24-X11

Boat trailers; other over-land boat transportation devices

See also Q19-J for trailers per se. For vehicles specifically designed to carry specific loads such as vehicles or boats, see Q15-B07.

Q25: Aircraft; Aviation; Cosmonautics

From 2006 manual codes have been assigned for all mechanical aircraft, aviation and cosmonautic details. See Q25-S for cosmonautics per se and Q25-X for non-specific aircraft/spacecraft systems such as aircraft/spacecraft manufacture (Q25-X05). For electrical aspects of aircraft and space vehicles see W06-B codes instead.

Q25-A

Aircraft construction; Fittings

Q25-A01

Fuselages

Includes aircraft body construction and interior trim.
Includes nose cones.

Q25-A01A

Air frames

Includes fuselage subframes/chassis.

Q25-A01C

Decks

Includes flooring.

Q25-A01E

Bulkheads

Q25-A01G

Skins; panels; linings; insulation

Q25-A02

Wings

Q25-A02A

Ribs; spars; stringers

Q25-A02C

Skins; panels

Q25-A03

Windows; doors; hatches

Q25-A03A

Windows

Q25-A03A1

Blinds

Q25-A03C

Doors

Q25-A03E

Hatches

Q25-A04

Stabilising/aerodynamic surfaces

Includes tail planes; nose planes; fins; nacelles. For control surfaces per se, such as moveable flaps and rudders, see Q25-C05 codes instead. For nose cones per se, see Q25-A01 instead.

Q25-A05

Undercarriages; alighting gear

Landing gear

Q25-A05A

Wheels assemblies

Includes aircraft wheels and tyres. For novel tyres etc. see also Q11 codes for a more detailed breakdown.

Q25-A05B

Skis; runners

Q25-A05C

Float assemblies

Includes buoyant floats for landing on water. See also Q25-P04 for sea planes per se.

Q25-A05F

Air cushion alighting gear

Q25-A05G* [2006-2007]

Arrestor hooks, e.g. for use on aircraft carrier

*This code is now discontinued and transferred to Q25-A07G. Q25-A05G remains searchable for patents from 200601-200682. Includes all arrangements for slowing or stopping aircraft, including air brake parachutes.

Q25-A07 [2007]

Brake systems

Includes mechanical brake system components such as novel brake pad friction materials.

Q25-A07A [2007]

Air brakes

Includes deployable air-brake parachutes.

Q25-A07G [2007]

Arrestor gear/hooks, e.g. for use on aircraft carrier

Includes hydraulic arrestor gear cooperating with arrestor hook for stopping military aircraft (see also Q25-P13) on board aircraft carrier. See Q25-A05G prior to 200701.

Q25-A07X [2007]

Other braking systems

Q25-B

Aircraft accessories

Includes aircraft lighting/signalling.

Q25-B01

Passenger/crew accommodating arrangements; Cabins; Galleys

Includes mechanical aspects of kitchen equipment, e.g. food carts. Also includes retractable steps to assist boarding of crew/passengers.

Q25-B01A

Furniture – aircraft specific

Includes e.g. aircraft specific tables, trays and seats, including ejector seats (see also Q25-M for military aircraft).

Q25-B01C

Sanitation arrangements

Includes waste water and sewage processing systems.

Q25-B01C1

Toilets

Q25-B01C2

Washing facilities; Showers

Q25-B02

Load accommodating arrangements

Q25-B02A

Load accommodating compartments/decks

Includes luggage and cargo holds and passenger compartment overhead storage compartments.

Q25-B02C

Aircraft-board load handling arrangements

Includes e.g. derricks, cranes, winches, chutes, cableways and conveyors for loading/unloading. See Q25-R05 for airport based load handling equipment.

Q25-B03

Heating; Ventilating; Air-conditioning

Includes ducting etc. For electrical aspects of HVAC systems used in aircraft, see W06-B01C5 instead.

Q25-B04

De-icing arrangements

Includes e.g. using ducted hot gas. For electrical de-icing arrangements see W06-B01C4 and X25-B codes for electrical heating per se.

Q25-B05

Instrumentation (mechanical aspects)

For electrical aspects of aircraft instrumentation see W06-B01B and S02 codes.

Q25-B09

On-board safety/emergency equipment

See W06-B01C8 for on-board electrical security systems e.g. to prevent hi-jacking.

Q25-B09A

Fire fighting equipment

Includes fire blankets and extinguishers used on-board aircraft.

Q25-B09C

Emergency oxygen supplies

See W06-B01C9 for electrical aspects of emergency oxygen supply systems.

Q25-B09E

Escape slides (and other emergency exit arrangements)

Includes inflatable emergency slides. See also Q25-B01A for ejector seats.

Q25-B09G

Parachutes

Q25-B15

Other aircraft accessories

E.g. includes dropping, releasing articles and liquids, e.g. to fight forest fire or for crop spraying (see X25-X05 and X25-N01B respectively for electrical aspects of fire-fighting and crop spraying).

Q25-C

Aircraft propulsion and steering; attitude/altitude control

Q25-C01

Propulsive elements

These codes describe the type of propulsive elements being used and are generally only applied when the type of propulsive elements has some bearing on novelty.

Q25-C01A

Directly acting on air

Q25-C01A1

Rotary propellers

See also Q25-C02B for turboprop external combustion engine propulsion. Also includes helicopter rotors (also see Q25-C05C if rotor control surface positioning/feathering is detailed).

Turboprop

Q25-C01A3

Of non-rotary type, e.g. flappable wings

Also see Q25-P03 for ornithopters per se.

Q25-C01E

Directly acted on by wind

Includes e.g. hang glider canopy.

Q25-C01G

Using muscle power

Includes use of pedal power.

Q25-C01X

Using other means

Q25-C02

Propulsion power plant

These codes describe the type of propulsion used on the aircraft and are generally only applied when the type of aircraft propulsion has some bearing on the novelty.

Q25-C02A

Using internal combustion engines

Q25-C02B

Using external combustion engine

For gas turbine engines per se, see also Q52 codes.

Gas turbine, RAMJET, SCRAMJET, turbojet, turboprop

Q25-C02G

Using land based animal/vehicle

Includes e.g. using vehicle to tow glider during take-off.

Q25-C02M

[2007]

Fuel supply arrangements

Includes fuel tanks and associated pipework. For gas turbine engine fuel supply aspects see Q52-C codes. Also includes mechanical aspects associated with in-flight refuelling.

Q25-C02X

[2007]

Other propulsion power plant

Q25-C03

Transmission systems

Q25-C03A

Gearing

Q25-C03C

Clutch

Includes novel drive trains.

Q25-C03E

Drive shafts; propeller shafts etc.

Q25-C05

Steering/attitude/altitude control arrangements; stabilisation

Q25-C05A

By rudders

Q25-C05C

By flaps/control surfaces

Includes aerodynamic control surfaces and their control, e.g. flaps in aircraft wings.

Q25-C05E

By propulsion plant

Includes use of e.g. tiltable turbine engines to achieve steering/attitude control.

Q25-C05G

Aircraft stabilisation

Includes e.g. transferring fuel to adjust trim, or ballast supply/discharge.

Q25-C05H

Influencing air flow over aircraft surfaces

Includes boundary-layer flow control, and e.g. use of slots, ducts, porous or rough surfaces, magnus effect of shock wave generators to adjust air flow over aircraft surfaces. For use of flaps and other movable control surfaces to adjust air flow, see Q25-C05C instead, and for fixed aerodynamic assemblies such as tail or nose planes, see Q25-A04 instead.

Q25-M

Military equipment

Respectively see W07 and W06-B codes for electrical aspects of military equipment and aircraft per se. Includes both offensive and defensive equipment. See Q25-P30 instead for military aircraft applications per se.

Q25-N [2007]

Noise/Vibration /Harshness reduction arrangements

Includes all aircraft-board arrangements for reducing noise, vibration or harshness, including use of sound deadening material.

Q25-P

Aircraft adapted for special purposes

Q25-P01

Lighter-than-air aircraft

Q25-P01A

Airship

Q25-P01B

Balloon

Q25-P02

Rotorcraft; Helicopter

Q25-P03

Ornithopter

Includes aircraft utilising a wing flapping motion.

Q25-P04

Sea plane

Includes amphibious aircraft and flying boats. Flying ground effect aircraft are coded in Q24-P12 only.

Q25-P05

Glider

Q25-P06

Microlight

Q25-P07

Hang-gliders and para-gliders

Q25-P08

VTOL (Vertical-take-off and landing) aircraft

Q25-P09

Kites

Q25-P10

Convertible aircraft

Includes e.g. motor vehicle convertible into aircraft (see also Q19-R03).

Q25-P13 [2007]

Military aircraft

For mechanical military equipment used onboard aircraft, see Q25-M. See W07 and W06-B codes for electrical aspects of military aircraft.

Q25-P15 [2007]

Unmanned aerial vehicles

Includes mechanical aspects of UAVs and micro UAVs used for geophysical surveying or military reconnaissance, imaging etc.

Q25-P25 [2007]

Commercial aircraft

(Q25-P30)

Includes general non-specific commercial aircraft.

Q25-P30

Other special purpose aircraft

Q25-R

Airport, ground or aircraft carrier equipment

Q25-R01

Aircraft storage; Hangars

Includes moorings for airships.

Q25-R02

Airfield/runway construction

Includes airfield construction methods and e.g. mechanical aspects of runway lighting. Helipad/landing pad. (also see W06-B02E and X26).

Q25-R03

Passenger handling equipment

Includes steps and aircraft stands.

Q25-R05

Load handling equipment

See Q25-B02 codes for aircraft mounted load handling equipment.

Q25-R07

Aircraft launching/towing gear; Arresting gear

Q25-R09

Aircraft servicing and maintenance equipment

Q25-R10

Cleaning equipment

Q25-R15

Other ground/aircraft carrier based equipment

Q25-S

Space/cosmonautic vehicles/equipment

See W06-B03 instead for electrical aspects of space/cosmonautic vehicles. These codes are used in isolation and are not intended to be used in conjunction with other Q25 codes, except Q25-X codes for non-specific aircraft/spacecraft systems and equipment.

Q25-S01

Cosmonautic vehicle type

Q25-S01A

Artificial satellites; Space stations

For satellite communication systems per se, see W02-C03B1 codes only.

Q25-S01B

Space shuttles

Q25-S01C

Space rockets

Q25-S01D

Extra-terrestrial vehicles

Moon buggy

Q25-S02

Navigation and position control

Includes e.g. using jets, gyros, inertia, Earth's magnetic field, gravity gradient.

Q25-S03

Instrumentation

Includes mechanical aspects. See S02 for instrumentation in general and W06-B03J for electrical aspects of spacecraft instrumentation.

Q25-S04

Propulsion systems

Includes solid rocket boosters (see also Q52-B03 for rocket engines per se).

Q25-S05

Life support equipment

Includes mechanical aspects of heating and air-conditioning equipment.

Q25-S06

Protection/safety/emergency devices

Includes systems for protecting the space craft per se. For astronaut protecting space suits see Q25-X01 only.

Q25-S06A

Protection against radiation

Q25-S06B

Protection against meteorites/foreign bodies

Q25-S06C

Thermal protection

Includes mechanical heat shields and tiles. Also includes thermal insulation on spacecraft to protect astronauts from extreme temperatures.

Q25-S07

Crew/passenger accommodation

Q25-S07A

Sanitation arrangements

Q25-S08

Systems for re-entry into Earth's atmosphere; retarding/landing devices

Includes parachutes, space capsules.

Q25-S09

Coupling/separating equipment

Includes docking equipment. Also includes couplings between vehicles or parts of them, e.g. between separable rocket stages or between solid rocket booster and space shuttle.

Q25-S10

Ground equipment

Includes rocket launching tower.

Q25-S11

[2007]

Load accommodating arrangements

Includes cargo bays and storage compartments, as well as load handling arrangements such as arms used to launch satellites. See W06-B03 and X25-F or X25-A03E codes for electrical aspects of load handling/manipulating equipment.

Q25-S15

Other space/cosmonautic equipment

Q25-X

Other aircraft/cosmonautic details and related equipment

Q25-X01

Flying suits; Space suits

Q25-X03

Parachute training equipment

Q25-X04

Astronaut training equipment; Simulators

Q25-X05

Aircraft/spacecraft manufacture

Includes both aircraft and spacecraft manufacturing systems, and (dis)assembly equipment and methods. See W06-B08 for electrical aspects of aircraft or spacecraft manufacture. See Q51-M or Q52-M respectively for manufacture of IC and gas turbine engines used in aircraft.

Q25-X07

Aircraft design and testing

E.g. using wind tunnels.

Q3 Conveying, Packaging, Storing

Q3 manual codes have been applied from 2012 to primarily allow mechanical details of packages and packaging equipment to be highlighted.

Q31: Packaging processes and equipment

From 2012 Q31 has been redefined to cover codes that are intended to highlight the equipment/methods etc. used for packaging/labelling material/goods during primary and secondary packaging. The type of container/bottle being filled/labelled/closed etc., as well as the container material can be specified by assigning Q32 and Q33 codes, respectively. The type of product being packaged/bottled can also be highlighted by the assignment of Q34 codes. For novel details of the actual container/bottle or its closure see Q32 codes instead. Details of transit packaging are coded under Q32-T. Prior to 2012 Q31 remains searchable for packaging and labelling in general.

Q31-A

Packaging, Liquid Handling

Packaging/packing/bottling details with electrical content are coded under X25-F03A codes.

Q31-A01

Packaging equipment, methods and control

Q31-A01A

Filling, bottling

Includes filling by gravity flow, rotary feeders (screw and centrifugal type feeders), vibratory feeders, pressure, pneumatic means, e.g. suction, etc. Also includes equipment for assisting filling, such as funnels or nozzles for introducing the articles or materials into containers. Also includes details for feeding blanks to the filling machine, for opening container, e.g. box or bag, and maintaining it in position during filling. Electrical details of Filling/bottling plant and processes are coded in X25-F03A1

Canning, tinning

Q31-A01A1

Filling, bottling equipment and apparatus

Q31-A01A3

Filling, bottling methods, processes and control

Q31-A01B

Closing and sealing packages or bottles

Details of Modified-Atmosphere Packaging (MAP) equipment and processes, such as gas flushing and compensated vacuum that re-balance gases inside the package to e.g. reduce levels of oxygen and to replace gases with Nitrogen or CO₂, are coded under Q31-A01B1A and Q31-A01B3A, respectively.

MAP, vacuum packaging

Q31-A01B1

Closing and sealing equipment and apparatus

Q31-A01B1A

MAP and Vacuum equipment and apparatus

Q31-A01B3

Closing and sealing methods, processes and control

Q31-A01B3A

MAP and Vacuum methods, processes and control

Q31-A01C

Opening packages/bottles

Q31-A01C1

Opening equipment and apparatus

Includes manual and powered opening devices, such as can openers and slotted keys. Bottle and can openers with electrical content are also coded under X27-B04.

Corkscrew, bottle opener, can/tin opener, churchkey

Q31-A01C3

Opening methods, processes and control

Q31-A01E

Wrapping/bundling

Includes details for orientating the articles, e.g. cigarettes, filled bottles, biscuits, before being placed in crates, boxes, etc.

Q31-A01E1

Wrapping

Q31-A01E1A

Wrapping equipment and apparatus

Q31-A01E1B

Wrapping methods, processes and control

Q31-A01E2

Bundling

Includes details for placing bottles in crates.

Banding, strapping, bale

Q31-A01E2A

Bundling equipment and apparatus

Q31-A01E2B

Bundling methods, processes and control

Q31-A02

Unpacking/emptying equipment, methods and control

For dispensing measured amounts of liquid, see Q31-A03 instead.

Q31-A02A

Unpacking/emptying equipment and apparatus

Q31-A02B

Unpacking/emptying methods, processes and control

Q31-A03

Dispensing equipment, methods and control

Includes details for dispensing a liquid into a recipient, such as a spirit measure attached to a bottle of spirit, device for dispensing beverages on draught or for dispensing beverages in bottles. Details of containers with removable pouring or dispensing arrangements, such as spout, spray pump, are coded under Q32-D06C only, and details of packaging with integral dispensing arrangements are coded under Q32-D06B only. Dispensing equipment, method and control details with electrical content is coded under X25-F03B. Dispensers for domestic alcoholic beverages with electrical content are coded under X27-X02. Bottling in general is coded in Q31-A0A codes only.

Spirit measure, bar optic

Q31-A03A

Liquid/semi-liquid transfer equipment, methods and control

Includes transfer of liquids from storage containers or reservoirs into vehicles or portable containers.

Q31-A03B

Solid/particulates/powder transfer equipment, methods and control

Includes transfer of particulates from storage containers or reservoirs into vehicles or portable containers.

Q31-A05

Cleaning/sterilising equipment, methods and control

Includes devices and methods for cleaning or sterilising cans/tins, bottles, etc., including concurrent cleaning and filling of cans/tins, bottles, etc.

Autoclave, pasteurisation

Q31-A99

Other packaging equipment, methods and control

Q31-B

Labelling; Tagging

Labelling/tagging equipment and methods with electrical content, including labels and tags per se, are coded under X25-F03A3C.

Q31-B01

Labelling equipment and methods

Q31-B01A

Labelling equipment and apparatus

Q31-B01B

Labelling methods, processes and control

Q31-B02

Labels

Includes labels directly glued on a container, such as adhesive labels, wraparound labels, etc. Also includes labels attached to a container using e.g. a string, ribbon or elastic, such as swing tag labels. Also includes cardboard sleeves. Details of labels for tracking/tracing the packaging are also coded under Q32-D03A.

Q31-B02A

Food labelling regulations and standards

Q31-C**Manufacturing details**

Includes manufacturing details of packaging plant as well as manufacture of packaging containers/bottles themselves. Q31-C should be used in conjunction with other Q32 codes to highlight the type of container or closure being manufactured, e.g. bottle, jar, lid, etc. Also see section A for novel polymer details such as A12-P for packaging applications and A11-B/C for details of forming, moulding and heat sealing of polymers. Also see section L01 for manufacture of glass items such as L01-L06 for packaging applications as well as e.g. L01-E for manufacturing hollow containers. Includes manufacturing details of external and internal packaging elements.

Q31-R**Recycling details**

Includes recycling details of containers, lids/caps and transit packaging. Electrical details of recycling are coded under X25-W04.

Q32: Container/Closure Types, Special packaging features and Transit packaging

From 2012 Q32 has been redefined to cover container and closure types and special features of containers/packaging. Q32 codes should be used in conjunction with Q31, Q33 and Q34 codes as appropriate. Manufacturing and recycling details are covered by Q31-C and Q31-R, respectively. Prior to 2012 Q32 remains searchable for containers in general.

Q32-A

Container Type

These codes are used to highlight the type of container that is either novel per se or used in the packaging/bottling system/method.

Q32-A01

Bottles

Q32-A02

Ampoules

Q32-A03

Cartons

Includes containers made from liquid packaging board such as juice boxes, milk cartons, etc.

Q32-A04

Jars

Q32-A05

Cans; Casks; Barrels; Drums

Q32-A05A

Aerosol containers

Q32-A05B

Drums; Tanks

Tank containers are coded under Q32-A30 only.

Q32-A05C

Casks; Barrels

Q32-A06 [2018]

Capsules; Cartridges

Includes coffee capsules, and ink cartridges. Ink cartridges for printers are also coded under S06-G06A.

Beverage pods

Q32-A08

Boxes; Crates

Q32-A09

Trays; Racks

Includes drawer-and-shell containers.

Q32-A10

Baskets

Q32-A15

Sacks; Bags; Pouches; Envelopes

Includes plastic compost bags and paper bags.

Q32-A15A

Reclosable/resealable

Includes resealable freezer bags and other airtight bags.

Re-sealable, air-tight, zip (RTM)

Q32-A16

Collapsible tubes

Includes tubes for toothpaste or ointment.

Q32-A17

Blister packaging; Skin packaging

Q32-A18

Wrapping films; Film laminates; Shrink packaging

Q32-A18A

Shrink packaging; Shrink wraps/films

For shrink wrapping of multiple packages, e.g. for transportation see Q32-T01C instead.

Q32-A20 [2014]

Cups

Q32-A30 [2021]

Large containers

Includes tank containers, cargo containers, bulk storage containers and shipping containers.

Tanktainer, silo

Q32-A99

Other container types

Bucket

Q32-B

Container or bottle construction

Details of transit packaging elements, such as corner protectors, air pillows or polystyrene peanuts, are coded under Q32-T codes only.

Q32-B01

Walls

Includes lines of weakness to facilitate the opening of the container.

Q32-B02

Partitions/dividers

Q32-B03

Reinforcements; strengthening arrangements

Q32-B04

Foldable; erectable containers

Includes containers formed from blanks such as cardboard boxes (see also Q32-A08 and Q33-C).

Q32-B05

Collapsible containers

Includes containers that can be collapsed when not storing product.

Q32-B06

Handles; carrying aids

Q32-B99

Other constructional details

Includes linings, drip catchers, internal/external coatings, inspection windows, spacers between containers, label holders. Details of handles are coded under Q32-B06 only.

Label/coupon holders, legs

Q32-C

Closure details, e.g. lids/caps

Q32-C codes are intended to highlight the type/construction of the actual closure/lid etc. for the package itself.

Q32-C01

Removable lids/caps

Q32-C01A

Threaded

Screw cap, pushdown and turn cap

Q32-C01B

Snap-action

Includes push-on caps.

Q32-C01D

Deformable/breakable

Includes deformable ring pulls as well as lids with integrated pull tabs for food cans/tins that do not require a can opener. Also includes crown caps used on beer bottles and closures with lines of weakness designed to be broken. Stay tabs for beverage cans are coded under Q32-C02 only.

Crown cap, crown seal, pull-off bottle cap, ring-pull, tape tab, tear strip, tearable wire

Q32-C01G

Bungs and corks

Includes rubber or plastic stoppers and corks for wine bottles. Wine bottle foils or capsules are coded under Q32-D11 instead. Includes closures arranged within necks or pouring openings or in discharge apertures.

Q32-C01H

Films and seals

Includes lidding films used to form a sealed layer on yogurts, margarine tubs, packs of delicatessen, etc. Also includes disc-like seals for bottle opening. For novel seals used in re-sealable bags also see Q32-A15A.

Aluminium foil liner/gasket

Q32-C01X

Other removable closures

Q32-C02

Non-removable closures/lids/caps

Includes lids that are hinged or slideable and remain attached to container whether open or closed, such as stay tabs for beverage cans. Also includes details of closing arrangements for bags and sacks, e.g. adhesive flaps, strings, etc.

Stay-on-tab, gable top

Q32-C99

Other closure details

Includes details to prevent idle rotation of the cap (to prevent gravity from rotating the cap downwards when contents are discharged from the container).

Anti-fogging lid

Q32-D

Special packaging features

Q32-D01

Packaging providing special environment

Includes packaging keeping goods at specific temperature, pressure, moisture level, or oxygen level, or using fungicides, antimicrobials and nanocomposites for longer shelf life, etc. Includes moisture absorbers, e.g. desiccants, oxygen scavengers/absorbers, and the use of thermochromic inks to indicate a change in temperature.

Insulation, sterile

Q32-D01A

Modified atmosphere packaging (MAP)

Includes "breathable" films used in equilibrium modified atmosphere packaging that passively control the atmosphere inside the package to prolong the life of the packaged goods.

Vacuum packaging, EMAP

Q32-D01C

Barriers

Includes gas barriers, e.g. oxygen barriers, moisture barriers and bacterial barriers.

Q32-D01X

Other packaging providing special environment

Includes corrosion inhibitors.

Q32-D02

Self-heating/self-cooling packaging

Includes active packaging to heat food without external heat source or power, typically using an exothermic chemical reaction, esp. for military ready-to-eat meals. Also includes cooling contents using endothermic reaction.

Q32-D03

Safety features

Q32-D03A

Trackable/traceable packaging

RFID details per se, including constructional details, are coded by T04-K codes only, and electrical details of goods tracking are coded by X25-F11. This code is used to cover attachment details of e.g. RFID chip to the packaging. Also includes codes used in the food industry e.g. 'family farm codes' on meat products so consumers can learn the location of the farm where e.g. chickens, cows, etc were raised, and in the medical industry to avoid drug

counterfeiting. If the codes are printed on/attached to the label, also include Q31-B02. Also includes special labels dedicated to barcodes. Details of barcodes per se, barcode writing and reading are coded under T04-C02, T04-A02B and T04-A03B1, respectively.

Trace code

Q32-D03B

Tamper resistant; preventing unauthorised removal/refilling; Anti-counterfeit features

Includes child resistant caps, and valves used for preventing refilling of containers.

Tamperproof

Q32-D03C

Tamper evident

Includes pop-up caps on jam jars and breakable seals across cap/lid.

Wax seal

Q32-D03X

Other safety features

Anti-explosion

Q32-D05

Containers storing two or more different products

Includes containers with internal partitions or multi-compartment containers for storing 2 or more samples of the same product or two or more different products. Also see Q32-B02 for novel partitions/dividers used in containers.

Q32-D06

Dispensing features

This code is used in conjunction with Q34-A and Q34-B to highlight the type of product dispensed, e.g. liquid/semi-liquid or solid/particulates. Equipment/method/control details for dispensing contents into a container, e.g. for dispensing beverages in bottles, are coded under Q31-A03 only.

Q32-D06A

Controlled/metered dose

Includes details for dispensing a controlled quantity, such as for nasal sprays or inhalers. This code can be used in conjunction with Q32-D06B or Q32-D06C to specify whether the dispenser is removable or integrated within the container.

Spirit measure, bar optic

Q32-D06B

Containers with integral dispensing arrangements

Includes containers with built-in dispensing arrangements. Spouts etc. that can be removably attached to the container, e.g. screwed on spouts, are coded under Q32-D06C only. Ring-pulls, stay tabs and ring pull type removable tin tops are coded in Q32-C instead.

Q32-D06C

Containers with removable pouring/dispensing arrangement

Includes lids with spouts, e.g. screw on spouts. If spout is integrated within the container, see Q32-D06B instead. Includes screw-on (see also Q32-C01A) sport caps for drinks bottles with lift/flip up top to allow drinking.

Spray pump

Q32-D06D

Preventing loss of cap/lid

Includes pull-off caps that are fixed to closure by tether.

Q32-D07

Closures/lids/caps with means for preventing re-filling

Includes containers with single-use closures such as one-way valves or closures that are destroyed upon opening.

Q32-D08

Closures/lids/caps with means for pressure application

Includes wire arrangement for applying pressure to cork used on champagne bottles.

Q32-D11

Decorative features

Includes wine bottle foils or capsules, as well as wax seals.

Q32-D12

Protective features; Secondary covers

Includes secondary covers used to protect main closure from e.g. dirt, such as plastic caps covering drinking spout (see also Q32-D06) or sports cap for bottle (see also Q32-A01).

Dust, dirt, contamination, protection

Q32-T

Transit Packaging

These codes are intended to highlight package accessories, e.g. straps, wrappers, cardboard edges to be fitted to outside of package to protect it during shipment etc.

Q32-T01

External packaging elements

Q32-T01A

Plugs, Sleeves, Caps for protecting/bundling of articles

Includes protectors for screw threads, corner protectors, and end caps.

Q32-T01B

Flexible elongated elements

Includes straps and cable ties. Use of cable ties in electronic equipment wiring or in cable installations in general is covered by V04-T01A and X12-G04A2 respectively.

Q32-T01C

Wrappers or flexible covers and wrapping machines

Q32-T01D

Pallets and palletizing equipment

Q32-T02

Internal packaging elements

Includes partitions and inner packaging pieces used to separate, cushion, suspend and fill irregular spaces within a container. Includes chips or peanuts made of polystyrene or recycled products, air pillows, foam packaging such as expanded polystyrene foam, polyethylene foam or polyurethane foam, and corrugated board.

Partitions or dividers placed inside a container for separating 2 or more products stored in the same container are coded under Q32-B02 and Q32-D05 only.

Air pouches, bubble wrap (RTM), encapsulated air plastic sheeting, EPS, foam-in-place, kraft paper, loose fill, PE, PU

Q33: Packaging container and closure materials

From 2012 Q33 has been redefined to highlight the material the container or closure is made of. Q33 codes should be used with Q31, Q32 and Q34 as appropriate. Prior to 2012 Q33 remains searchable for closures in general.

Q33-A

Glass

Q33-B

Plastic; Polymer; Polystyrene; Thermocol

Fiberglass, ABS, rubber, resin, acrylonitrile-butadiene-styrene, terpolymer

Q33-C

Paper; Card; Cardboard

Q33-C01

Treated paper, card and cardboard

Includes foil-lined containers for e.g. fruit juices.

Q33-D

Metal

Includes aluminium foil.

Q33-E

Wood

Q33-F

Ceramic; Earthenware

Q33-G

Microwaveable packaging

Includes food packaging specially made for use in a microwave. Includes metalized film (metalized polyethylene, polypropylene, PET) or metalized cardboard (so called crisping sleeve) used as a subset for cooking in a microwave oven, to help make food crisp and brown. See also X27-C01 for microwave cookware.

Q33-H

Cloth; Fabric

Includes details of packaging made from terry cloth, linen, cotton, fleece, microfibers, etc.

Q33-J

Green/sustainable packaging

Q33-J01

Biodegradable packaging

Includes compostable packaging.

Q33-J02

Made from renewable sources

Includes packaging made from renewable sources such as corn starch, sugarcane, and tapioca products including roots, chips or starch. Also includes packaging made from recycled materials. *PLA, Polylactide, Poly(lactic) acid, pea starch, bioplastic, PHB*

Q33-J03

Recyclable packaging; Reuseable packaging

This code includes packaging made from recyclable materials that can be used again after processing (e.g. made of glass, metal, card and paper). Also includes packaging that can be cleaned and reused, e.g. milk bottles. Packaging made from recycled materials is coded under Q33-J02 only. Details of edible packaging are coded under Q33-J04 only.

Q33-J04

Edible packaging

Q33-J05

Reduced/minimal packaging

This code includes packaging made using minimal materials, leading to reduced layers of packaging, lower mass (product to packaging ratio), lower volume, etc.

Q33-J06

Energy efficient packaging

Includes packaging with low carbon footprint and/or using renewable energy.

Q33-J99

Other environmental aspects of packaging

Q33-X

Other packaging container/closure material

Q34: Types of goods packaged, bottled, bound, labelled, unpacked

From 2012 Q34 has been redefined to highlight the type of product being packaged/bottled etc. and should be used in conjunction with other Q31-Q33 codes as appropriate. Prior to 2012 Q34 remains searchable for packaging elements/types in general (now covered in general by Q32).

Q34-A

Fluent solids; Powders; Dry particulates

This code is used in conjunction with other Q34 codes as appropriate.

Q34-B

Liquids; Semi-liquids; Gas

This code is used in conjunction with other Q34 codes as appropriate.

Paste

Q34-C

Food for human consumption

These codes can be used in conjunction with Q34-A and Q34-B to indicate whether the food product is a liquid or a solid.

Q34-C01

Meats; Poultry; Fish

Q34-C01A

Raw meats/poultry/fish

Includes packaging of meat mince, sausages, and marinated raw meats/poultry/fish.

Bacon

Q34-C01B

Processed meats/poultry/fish

Includes packaging of all smoked, cured and cooked meat products, including salamis, pates and hams. Ready meals made using meat, poultry and/or fish are also coded under Q34-C08A. Packaging of mince, sausages and marinated uncooked meats are coded under Q34-C01A only.

Delicatessen, fish pastes, sardines

Q34-C02

Vegetables; Fruits; Produce

Includes packaging of fresh and processed vegetables/fruits/etc, including pre-cut salads, diced carrots, peeled potatoes, tinned tomatoes, fruit compotes, etc.

Q34-C02A

Vegetables

Beans, soya, legumes, peanuts, garlic

Q34-C02B

Fruits

Includes packaging of dried fruits.

Raisins, fruit purees, fruit salads, olives

Q34-C02C

Nuts and seeds

Pecan, almond, cashew, sesame

Q34-C02X

Other vegetables/fruits/produce

Q34-C03

Cereals

Includes packaging of grains, rice, flour, breakfast cereals, etc.

Q34-C04

Dairy

Includes packaging of fresh and processed dairy products, such as milkshakes, powdered eggs, etc.

Q34-C04A

Milk; Yoghurt

Includes packaging of cream, ice cream, butter, milkshakes, etc. Also includes packaging of lactose-free milk.

Powdered milk, UHT milk, buttermilk, baby milk

Q34-C04B

Eggs

Dried eggs

Q34-C04C

Cheese

Q34-C04X

Other dairy products

Q34-C05

Bakery; Confectionery; Pasta

Includes packaging of breads, cakes, biscuits, pasta, crisps and sweets.

Cookies, spaghetti, macaroni, rice, candies, chewing gum

Q34-C06

Condiments; Sauces; Sugars; Oils

Salts

Q34-C06A

Herbs; Spices

Includes packaging of fresh, frozen and dried herbs. Herb pastes, such as basil or coriander pastes, are coded under both Q34-C06A and Q34-C06B. Packaging of mustard is coded under Q34-C06B only.

Q34-C06B

Sauces; Soups; Pastes

Includes packaging of pasta sauces, curry pastes, sauce pouches, mayonnaise, tomato sauce, etc. Herb pastes, such as basil or coriander pastes, are coded under both Q34-C06A and Q34-C06B. *Tomato puree, dry sauce mix, mustard, marinade*

Q34-C06C

Oils; Vinegars

Includes packaging of cooking oils, such as olive oil, sunflower oil. Also includes packaging of salad dressing. *Vinaigrette*

Q34-C06D

Sugar and sweeteners

Includes packaging of sugar cubes, loose sugar, syrups, but also sugar substitutes/artificial sweeteners. *Caramel, honey*

Q34-C07

Drinks and beverages

This code does not include milk packaging, which is coded under Q34-C04A only.

Q34-C07A

Water and soft drinks

Includes packaging of still/sparkling water, fruit juices, squashes and concentrates. *Cordial*

Q34-C07B

Tea and coffee

Includes packaging of ground and instant coffee, coffee beans, coffee machine pods, one-cup coffee filters, syrups (chicory), loose tea, tea bags and chocolate drinks. Also includes packaging of filter papers used in coffee makers.

Q34-C07C

Alcoholic drinks

Beer, wine, whisky

Q34-C08

Specialty foods and meals

Q34-C08A

Whole or partially prepared meals

Includes meal kits, and marinated uncooked meats. *Sushi, pizza, burger, ready-made sandwiches*

Q34-C08B

Baby foods

Includes packaging of powdered milk, long-life milk, food pouches, etc. Packaging of milk products is also coded under Q34-C04A.

Q34-C08C

Food supplements and vitamins

Includes packaging of slimming milkshakes.

Q34-C08D

Parenteral and enteral feeding

Q34-D

Food for animal consumption and supplements

Q34-D01

Animal food

Includes packaging of pet food or livestock feed. *Fodder, pet treats*

Q34-D02

Animal supplements/health products

Includes packaging of vitamins, cod liver oil, animal grooming products, etc. Also includes packaging of animal health products, such as flea products, ointments, etc. These are also coded under Q34-J01 for pharmaceuticals.

Q34-E

Textiles; Clothing; Garments; Shoes

Q34-F

Paper; Sheets; Magazines; Newspapers

Includes packaging details of toilet paper. Also coded under Q34-J03.

Q34-G

Building/construction materials

Includes packaging for tiles, bricks, windows, glass panels/sheets, etc. Also includes packaging for waste materials from building sites, such as rubbles. Packaging for asbestos is also coded under Q34-H99.

Q34-H

Hazardous and waste materials

Includes corrosive materials.

Q34-H01

Chemicals; Fertilizers

Insecticide, pesticide

Q34-H02

Fuels; Oils

Includes oil, such as machine or engine oil. Cooking oils are coded under Q34-C06C only.

Petroleum

Q34-H03

Hospital waste/Bio-hazards

Q34-H04

Nuclear materials/Radioactive waste

Rods

Q34-H05 [2015]

Household waste and garbage

Includes biodegradable and recyclable waste.

Q34-H99

Other hazardous materials

Asbestos, explosive materials, ammunitions, refrigerant, paint, poison, dead organisms/creatures, sewage effluents

Q34-J

Pharmaceuticals; Medical; Cosmetics; Cleaning products

Q34-J01

Pharmaceuticals

Includes packaging of pharmaceuticals for internal and external usage. Includes packaging of food supplements, such as vitamins. Packaging of meal replacements and diet products, such as slimming milkshakes or soups, are coded under Q34-C08C only.

Medicine, tablets, ointment, inhaler, flea products

Q34-J02

Medical

Includes packaging of medical instruments such as needles, dressings, etc. Special carriers for e.g. human organs with integrated cooling systems are also coded under Q32-D01. Packaging of tablets and medicines are coded under Q34-J01 only.

LifePort®, sterile bandages, blood, medical packs/kits, biological cell culture samples

Q34-J03

Cosmetics; Toiletries; Skincare

Packaging details of toilet paper is also coded under Q34-F.

Antibacterial hand gel, baby wipes, make-up, razor blades, shampoo, soap, sun lotion, toothpaste

Q34-J04

Cleaning products

Does not include packaging of toiletries; these are coded under Q34-J03 only.

Antibacterial wipes, antibacterial spray, cleaning foam, cleaning wipes, washing up liquid, clothes conditioner

Q34-K

Vehicle parts; Tyres; Machine parts; Tools

Q34-K01

Vehicle parts; Tyres

Includes packaging details of parts for cars, airplanes, boats, trains, bikes, etc.

Q34-K02

Machine parts; Tools

Includes packaging of gardening equipment, and welding electrodes. Also includes packaging of screws, nails, drill bits, etc.

Q34-L

Tobacco products

Includes packaging of cigarettes, cigars, pipes etc. Includes packaging of filters and cigarette papers. Packaging of electronic cigarettes are coded under Q34-M02 only.

Cigarillos, blunt, corona, kretek, tobacco pouch, cigarette holder

Q34-M

Electrical/electronic equipment/parts

Q34-M01

White goods and kitchen appliances

Washing machine, microwave, cooker, blender, coffee maker, toaster, fridge

Q34-M02

Electronic goods

Includes packaging of musical instruments, toys and sport equipment with electrical content e.g. keyboards, battery-operated toys, and electronic cigarettes. Packaging of musical instruments, toys and sport equipment are also coded under Q34-T.

LCD, television, display, game console

Q34-M99

Other electrical/electronic equipment/parts

Includes packaging of electrical beauty products (electric razors, massagers, etc.), batteries, solar/photovoltaic panels/cells, lightbulbs and tubes, gas/electricity/water meters, etc.

Smart meter

Q34-N

Household/domestic

Includes packaging of non-electrical items, such as crockery, furniture, cleaning accessories (e.g. cleaning mops, cloths, washing gloves, etc).

Packaging of kitchen appliances, white goods (washing machines, microwaves, etc) and electrical beauty products is coded under Q34-M codes only. Packaging of household waste/garbage is coded under Q34-H05 only.

Watch, jewellery, clock

Q34-T

Musical instruments; Toys; Sport

Packaging of musical instruments, toys and sport equipment with electrical content, e.g. keyboards, battery-operated toys, game consoles, are also coded under Q34-M02.

Q34-X

Other specific goods

Includes packaging for stationery, plants, flower bulbs and seeds.

Pencils, pen erasers, staplers

Q35: Refuse Collection; Conveyors

From 2012 manual codes have been assigned for all mechanical details of refuse collection and conveyors.

Q35-A

Refuse Collection

Q35-A01

Refuse receptacles

Includes cleaning/sterilizing equipment integrated with the refuse receptacle. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09. Receptacles for medical/clinical waste disposal, e.g. for used needles or bandages, are also coded under P34-W.

Bin bag, dustbin, wheelie bin, dumpster, needle disposal bin

Q35-A02

Vehicles to collect refuse

Details of e.g. vehicle gears, motors, etc, are also coded under Q19. Includes details of front loaders, rear loaders and compactors. Includes cleaning/sterilizing equipment integrated with the vehicle. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09.

Garbage truck, trash/dump truck, grapple truck, bin wagon, dustcart, dustbin lorry, garbage scow

Q35-A99

Other refuse collection details

Q35-B

Conveyors

Includes details of belts, gears, chutes, safety equipment, etc. Also includes lubricating and cleaning/sterilizing equipment. Details of cleaning/sterilizing equipment including electrical details are coded under X25-H09. Electrical details of conveyors, including control details, are coded under X25-F01 codes only. Details of elevators, escalators, lifts or moving walkways are coded under Q38-A only.

Roller conveyor

Q36: Handling Thin Materials

From 2012 manual codes have been assigned for all mechanical details of thin material handling.

Q36-A

Handling of piles

Includes supports and trays containing the piles of articles, device for feeding, separating, moving and orientating articles from piles, e.g. conveyor belts, grippers.

Feeder, gauge pin, feed table

Q36-B

Handling of webs

Continuous sheets of metal, paper

Q36-C

Handling of thin materials

Fabric

Q36-D

Handling of filamentary materials

Cable, string, wool

Q36-E

General handling

Includes details of delivering or advancing articles from a machine, collating articles, storing materials on e.g. reels, spindles, bobbins, etc, adjusting tension in material, driving gear, recirculation system, securing material to cores, etc. This code can be used in conjunction with other Q36 codes to specify the type of thin materials handled.

Q37: Container Traffic (Pre-1984 Only)

Q38: Hoisting; Lifting; Hauling; Trucks

From 2012 manual codes have been assigned for all mechanical details of hoisting, lifting, hauling and trucks.

Q38-A

Elevators, escalators, lifts, moving walkways

Details of conveyors are coded under Q35-B only. Electrical details of elevators, escalators, lifts and moving walkways, including control details, are coded under X25-F04 codes only.

Goods lift

Q38-B

Cranes, capstans, winches, tackles, trucks

Includes mechanical details of cranes, capstans, hoists, winches, tackles, trucks and factory/robotic vehicles. See X25-F05 codes for electrical details of cranes, winches, trucks etc. For mechanical details of forklift trucks see Q19-C06.

Hoist, block and tackle

Q39: Liquid handling, saddlery, upholstery

*This class is now discontinued. Liquid handling has been transferred to Q31, saddlery has been transferred to P36 and upholstery has been transferred to P26. Q39 remains searchable for records prior to 2012

Q4: Buildings; Construction

Q41: Road, rail, bridge construction

From 2015 manual codes have been assigned for all mechanical details of road, rail, and bridge construction.

Q41-A	[2015]
Bridges	
Q41-A01	[2015]
Types of bridges	
Q41-A01A	[2015]
Suspension or cable-stayed bridge	
Q41-A01B	[2015]
Arch-type bridge	
Q41-A01C	[2015]
Truss-type bridge	
Q41-A01D	[2015]
Movable, portable or floating bridges	
Q41-A01F	[2015]
Bascule	
<i>Swing or drawbridges</i>	
Q41-A01X	[2015]
Other specific types of bridges	
Q41-A05	[2015]
Constructional details of bridges	
Q41-A05A	[2015]
Structural components	
Q41-A05B	[2015]
Foundations	
Q41-A05G	[2015]
Novel constructional materials	
Q41-A10	[2015]
Safety equipment/components	
<i>Crash barriers</i>	

Q41-A20	[2015]
Applications of bridges	
<i>Details of the structure carried by the bridge.</i>	

Q41-A20A	[2015]

Road bridges

Q41-A20B	[2015]

Rail bridges

Q41-A20C	[2015]

Pedestrian bridges

Q41-A20D	[2015]

Waterway bridges

Bridges carrying rivers or canals.

Q41-A20H	[2015]

Aqueducts, pipelines bridges

Q41-A20X	[2015]

Other types of bridges and platforms

Includes helicopter landing stages and bridges carrying airport runways.

Q41-B	[2015]

Roads

Q41-B05	[2015]

Structural components

Includes pre-fabricated units.

Q41-B10	[2017]

Safety equipment

Includes barricade, crash barrier, reflectors.

Safety, indication, warning, road divider

Q41-B50	[2015]

Novel road materials

Includes novel materials for road surfaces and road foundations.

Asphalt, concrete, composite, bituminous, gravel, stone, brick, aggregate

Q41-E	[2015]

Railways

Q41-E01	[2015]

Types of railways

Q41-E01A	[2015]

Passenger

Q41-E01B	[2015]
Industrial/Freight	
Q41-E01C	[2015]
Monorail	
Q41-E01D	[2015]
Funicular	
<i>Cable-operated</i>	
Q41-E01E	[2015]
Underground/metro	
Q41-E01F	[2015]
Magnetic levitation	
<i>Maglev</i>	
Q41-E01X	[2015]
Other types of railways	
Q41-E02	[2015]
Constructional details of railways	
Includes constructional details of rails, sleepers, foundations and track ballasts.	
Q41-E10	[2015]
Safety equipment/components	
<i>Crash barriers, buffers</i>	
Q41-F	[2017]
Sound damping	
Includes sound damping or masking in roads, bridges and railways.	
<i>Noise barrier, vibration damping</i>	
Q41-G	[2015]
Cleaning, Maintenance and Repair	
Q41-M	[2015]
Manufacture	

Q42: Hydraulic engineering, soil shifting and sewerage

From 2015 manual codes have been assigned for all mechanical details of hydraulic engineering and sewerage systems. (See also X25-D).

Q42-A [2015]

Hydraulic engineering and soil shifting

Q42-A01 [2015]

Canals

For locks see Q42-A04.

Q42-A02 [2015]

Coastal defenses and control of watercourses

Q42-A02A [2015]

Barrages, Weirs

Q42-A02B [2015]

Dams

Q42-A02B2 [2015]

Water collection

Includes pipelines and aqueducts used to collect and divert water into reservoir.

Q42-A02C [2015]

Quays, docks

Q42-A02D [2015]

Embankments, levees and sea-walls

Q42-A03 [2015]

Water-power

Q42-A04 [2015]

Locks, ship-lifts

Includes locks and ship-lifts used in canals and docks. See also Q24 codes.

Q42-A05 [2015]

Irrigation and drainage

Q42-A10 [2015]

Dredging, soil shifting, excavations and foundations

Includes bulkheads, piles and caissons. For mining see Q49 codes.

Q42-A11 [2023]

Prevention of soil erosion

Includes means of preventing soil degradation due to water, wind, animal. See Q42-A02 codes for coastal defenses and control of watercourses, such as barrages, embankments, levees, etc. Means of preventing soil erosion due to water in e.g. fields are also coded under P13-A06.

Q42-B [2015]

Underground or underwater structures

Includes tunnels.

Q42-D [2015]

Water supply

Water supplies for human and animal consumption. For irrigation see Q42-A05.

Q42-D01 [2015]

Pipelines and aqueducts

Q42-D03 [2015]

Tanks

Q42-E [2015]

Sewerage

Q42-E01 [2015]

Pipelines, drains and sewers

Q42-E02 [2015]

Sewerage processing plants

Includes sewage processing/treatment. See X25-H03 and Chemistry codes such as D04 codes as required.

Q42-F [2015]

Sanitary equipment

See X27-L for electrical details of toilets.

WC

Q42-M [2015]

Manufacture

Includes manufacture of sewage treatment and sanitary equipment.

Q42-P [2021]

Pumping station

Includes fuel and water supply station arrangement.

Q42-S **[2021]**

Service/Cleaning/Maintenance

Includes water supply, sewage pipeline cleaning.

Q43: General building constructions

From 2015 manual codes have been assigned for all mechanical details of general building constructions.

Q43-A [2015]**Types of building structures**

General building structures. For details e.g. walls, see relevant code sections.

Q43-A01 [2015]**Walls and partitions**

Includes load-bearing and non-load-bearing walls and partitions within buildings.

Q43-A02 [2015]**Roofs**

Q43-A03 [2015]**Ceilings**

Includes fixed and removable e.g. false, ceilings.

Q43-A04 [2015]**Floors**

Q43-A05 [2015]**Doors**

Q43-A06 [2015]**Windows**

Q43-A07 [2015]**Service and access structures**

Structures associated with stairways, elevators, ducts, pipes.

Q43-A08 [2020]**Bearings and connections**

Other general purpose structures within buildings. Also includes bearing-type supports and anti-vibration / anti-shock elements.

Q43-A99 [2016]**General building insulation**

Pipe insulation

Q43-D [2015]**Light fittings**

Includes reflective natural light ducts/tubes. See also Q71 codes and X26 codes (for electrical details only).

Q43-E [2017]**Sound proofing**

Includes sound proofing in walls, floors etc.

Damping, masking, noise suppression

Q43-F [2020]**Protection (other)**

Includes protection against damp and pests by using e.g. impregnation of wood, ventilation.

Q43-H [2021]**Rain water harvesting systems**

Include apartments, home water conservation aspects.

Q43-M [2015]**Manufacture of building structures**

Q44: Structural elements

From 2015 manual codes have been assigned for all mechanical details of structural elements.

Q44-A [2015]

Structural components

Structural components of buildings.

Bricks

Q44-A01 [2015]

Load-supporting components

Includes joists, girders, trusses, lintels or transoms. For load-bearing walls see Q43-A01.

Q44-A01A [2015]

Girders

Q44-A01B [2015]

Pillars

Q44-A01C [2015]

Trusses

Q44-A01D [2015]

Mullions

Q44-A01G [2015]

Reinforcement components

Includes details of grouting sleeves.

Connector, joint

Q44-A01X [2015]

Other supporting structures

Includes underfloor supports, roof supports.

Q44-A10 [2015]

Sheets, panels

Q44-M [2015]

Manufacture of structural elements

Q45: Roofing, stairs, floors

From 2015 manual codes have been assigned for all mechanical details of roofing, stairs and floors.

Q45-A [2015]

Coverings

Includes covering materials and components for roofs, walls, ceilings and floors e.g. slates, tiles, mosaic, carpets, laminated flooring, wallpaper.

Q45-A01 [2015]

Roof covering

Q45-A01A [2015]

Slates, tiles, ceramics

Q45-A01B [2015]

Sheets

Includes roofing felt, polyethylene.

Q45-A01C [2015]

Sealants

Includes using bitumen on flat roofs.

Q45-A02 [2015]

Living roof; Thatched roof

Roofs which are partially or completely covered with living vegetation e.g. grass, sedum, planted in a growing medium on top of a waterproof membrane.

Q45-B [2015]

Drainage

Q45-D [2015]

Tools and equipment

Q45-E [2015]

Stairways and ramps

Q45-E02 [2015]

Balustrades and handrails

Banister

Q45-F [2015]

Flooring

Q45-F02 [2015]

False flooring

For use in offices to allow routing of e.g. computer-related cabling.

Q45-M [2015]

Manufacture

Q46: Building aids, special structures, ladders

From 2015 manual codes have been assigned for all mechanical details of building aids, special structures and ladders.

Q46-A	[2015]
Building aids	
Q46-A01	[2015]
Scaffolds	
Q46-A02	[2015]
Falsework, forming, shuttering	
Includes supports.	
Q46-A03	[2015]
Access	
Includes ladders.	
<i>Ramps</i>	
Q46-A03A	[2015]
Ladders	
Q46-A04	[2015]
Safety and protective arrangements	
Includes structures and equipment used to protect persons working on buildings and to protect the buildings from damage by e.g. weather, dust etc.	
Q46-A05	[2015]
Material handling and building repair	
Preparation of concrete, brick-laying equipment.	
Repair and cleaning of existing buildings.	
Q46-A05A	[2021]
Building demolition	
Q46-A05B	[2021]
Building relocation / moving	
For transportation and relocation of an entire building.	
Q46-B	[2015]
Special Structures	
Q46-B01	[2015]
Homes	
Q46-B02	[2015]
Offices	

Q46-B03 [2015]

Shelters, kiosks

Buildings and structures which provide protection against e.g. earthquakes, war, climatic conditions. Includes bus stops and railway platform roofs.

Q46-B04 [2015]

Garages, vehicle storage

Q46-B05 [2015]

Public buildings, institutions

Q46-B05B [2015]

Medical institutions

This code covers hospitals, infirmaries and other buildings used for medical applications e.g. doctor's or dental surgeries.

Q46-B05C [2015]

Educational, reference

This code covers schools, universities, libraries and museums.

Q46-B05D [2015]

Leisure and entertainment facilities

Includes sporting arenas, theatres, swimming pools, fitness centers.

Q46-B05F [2015]

Shops and Hotels

Q46-B07 [2015]

Industrial

Q46-B07A [2015]

Power generation

Q46-B07C [2015]

Manufacturing

Factories

Q46-B10 [2015]

Towers, chimneys

Q46-B11 [2015]

Monuments, statues

Q46-B12 [2015]

Enclosures, fences

For gates and other openings in fences and barriers, see Q48-N.

Q46-B15	[2015]
Tents, marquees	
Q46-B99	[2023]
Other special structures	
<i>Tree house</i>	
Q46-M	[2015]
Manufacture of building aids, special structures and ladders	

Q47: Locks, window and door fittings

From 2015 manual codes have been assigned for all mechanical details of locks, window and door fittings.

Q47-A [2015]

Locks

Q47-A01 [2015]

Pin and Tumbler

Q47-A02 [2015]

Cylinder

Q47-A05 [2015]

Permutation

Includes 'combination' padlocks.

Q47-B [2015]

Door and window fittings

Q47-B01 [2015]

Hinges, brakes

Sliding rail

Q47-B02 [2015]

Handles

Q47-B10 [2015]

Fasteners

See Q61 for general fasteners.

Bolt

Q47-M [2015]

Manufacture of locks, windows and door fittings

Q47-U [2015]

Applications

Q47-U01 [2015]

Domestic

Q47-U02 [2015]

Commercial

Q47-U03 [2015]

Vehicles

For automobile door locks see also Q14-H01.

Q47-U40 [2015]

Industrial

Q47-U55 [2015]

Safe deposit and security

Includes safes and other secure storage facilities for use in e.g. banks.

Q48: Blinds, shutters, doors and windows

From 2015 manual codes have been assigned for all mechanical details of blinds, shutters, doors and windows. Details of vehicle doors and windows are only coded under Q17-A07, and vehicle blinds, such as sun shades, are only coded under Q14-D.

Q48-A* [2015-2015]

Blinds and shutters

*This code is now retired. It remains searchable and valid for records produced in 2015. From 2016 see Q48-L.

Q48-B [2015]

Door and window frames

Q48-D [2015]

Door leaves, window sashes

Q48-J [2015]

Ventilation and sealing

Includes arrangements for draining-off condensed water, draught excluders, rain deflectors, thermal insulation, soundproofing, etc.

Grille, ventilation rose

Q48-K [2015]

Gates and turnstiles

For allowing access through and over structures such as fences and barriers.

Stile

Q48-L [2015]

Screens, blinds, shutters and other protective devices

Electrical details of blinds and shutters are coded under X27-L, and electrical details of doors and windows are coded under X25-U01.

Q48-M [2015]

Manufacture of blinds, shutters, doors and windows

Includes manufacturing methods and apparatus.

Q48-P [2015]

Primary function

Q48-P05 [2015]

Protection against specific conditions

Includes doors or windows designed for protection against specific conditions.

Q48-P05A [2015]

Security

Protection against theft, vandalism or military action.

Q48-P05C [2015]

Fire

Protection against fire, heat or explosions.

Q48-P05E [2015]

Gas

Protection against dangerous gases.

Q48-P05H [2015]

Radiation

Protection against harmful radiations.

Q49: Mining

From 2015 manual codes have been assigned for all mechanical details of mining and quarrying apparatus. Electrical details of mining are covered by X25-D02 codes.

Q49-A	[2015]
Mining and quarrying equipment	
Q49-A01	[2015]
Extraction equipment	
Includes details of conveyors for extracting mined materials, e.g. coal, from the mines. Non-electrical details of conveyors are coded under Q35-B, and electrical details of conveyors are covered by X25-F01 codes.	
<i>Hydraulic mining</i>	
Q49-A01A	[2015]
Drilling machines	
Q49-A01C	[2015]
Cutting machines	
Q49-A01H	[2015]
Support structures	
Q49-A10	[2015]
Tools	
Includes drill bits, drilling rods, pipes, casings and tubing.	
Q49-B	[2015]
Mining and quarrying methods	
Q49-B01	[2015]
Extraction methods	
Includes method for removing the mined materials out of the mines or quarries.	
<i>Hydraulic mining</i>	
Q49-B01A	[2015]
Percussion drilling	
Q49-B01B	[2015]
Rotary drilling	
Q49-B01C	[2015]
Cutting	

Q49-B01D	[2015]
Blasting	
Q49-C	[2015]
Mining and quarrying structures	
<i>Tunnel, gallery, lining</i>	
Q49-C01	[2015]
Ventilation	
Includes air filtering and dust removal.	
Q49-C03	[2015]
Drainage	
Q49-C05	[2015]
Safety and protective arrangements	
Includes structures and equipment used to protect persons working in mines and quarries. Includes fire prevention and extinguishing. Details of fire prevention and extinguishing systems are also coded under P35.	
Q49-C08	[2015]
Shafts	
Q49-C09	[2015]
Roofs and supports	
Q49-E	[2015]
Mining and quarrying locations	
Can be from either terrestrial or extraterrestrial sources.	
Q49-E01	[2015]
Surface, open-cast	
Q49-E03	[2015]
Underground	
Q49-E05	[2015]
Underwater	
Q49-H	[2015]
Maintenance equipment; equipment and methods for removing tools from mines, boreholes or wells	

Q49-V	[2015]
Material being mined or quarried	
Q49-V01	[2015]
Metals	
Q49-V01A	[2015]
Iron	
<i>Iron ore</i>	
Q49-V01B	[2015]
Aluminum	
<i>Bauxite</i>	
Q49-V01C	[2015]
Copper	
Q49-V01H	[2015]
Tin	
Q49-V01J	[2015]
Gold	
Q49-V22	[2015]
Stone	
<i>Granite, marble</i>	
Q49-V28	[2015]
Coal	
Q49-V31	[2015]
Precious stones	
<i>Diamond</i>	
Q49-V35	[2015]
Fluids; Slurry	
<i>Includes sand slurry.</i>	

Q5 Engines, Pumps, Compressors, Fluid Pressure Actuators

Q51: Internal Combustion Engines; Reciprocating Engines; Rotary Engines

From 2006 Q51 covers all mechanical details of positive displacement combustion engines. Prior to the introduction of Q51 manual codes in 2006, the Q51 class covered machines and engines in general including positive displacement engines, steam engines/turbines, engine valves, cooling, lubrication and silencing. Also see Q17-E for vehicle internal combustion engine propulsion arrangements. For electrical aspects of motor vehicle engines see X22-A codes only.

Q51-A

Reciprocating positive displacement engines

Q51-A01

Engine type

These codes are normally applied when the engine type has a direct bearing on the novelty.

Q51-A01A

With single cylinder

Q51-A01B

With multiple cylinders

This code is only applied when it is especially important to highlight the fact that an engine has multiple cylinders, or when the whole multi-cylinder engine is being claimed and further Q51 codes might not be applied. It is normally assumed that an engine will have multiple cylinders unless otherwise specified. Includes, in-line 4, V5, straight/V6, V8, W10, V12 etc. engines.

Q51-A01C

With multiple pistons in same cylinder

Q51-A01D

With movable cylinders

Q51-A01E

With precombustion chambers

Q51-A01G [2007]

With variable compression ratio

Includes engines with arrangements for varying the compression ratio in use.

Q51-A01J [2007]

Two-stroke

Includes IC engines operating in two-stroke cycle, e.g. for moped (see also Q19-B).

Q51-A01X [2014]

Other engine types

Includes variable cycle engines, e.g. capable of running in two-stroke mode at low speed and 4-stroke mode at higher speeds. IC engines operating in two-stroke cycle, e.g. for moped (see also Q19-B).

Variable-cycle

Q51-A03

Component parts

Q51-A03A

Cylinders; Cylinder heads

See Q51-D for valves. Includes precombustion chambers per se (see also Q51-A01E).

Q51-A03B

Pistons

Includes pistons with charge flow guides, i.e. scoops in piston head for swirl control.

Swirl control

Q51-A03C

Seals; Gaskets; Piston rings

Includes oil control rings.

Q51-A03D

Casings; Crankcases; Cam/rocker covers

Q51-A03E

Piston to output shaft connections; Connecting rods

Includes con rods connecting pistons to drive shaft. For connections from drive shaft to other transmission shafts or wheels, see Q62 codes. Includes crankshafts per se.

Q51-A03X [2007]

Other reciprocating engine components

Q51-B

Rotary or oscillating piston engines

Q51-B01

Rotary combustion engines

Includes four-stroke, Otto cycle Wankel engines.

Q51-B01A

With single rotor

Q51-B01B

With multiple rotors

Q51-B03

Component parts

Q51-B03C

Rotor seals

Q51-B03E

Connections between piston and casing

Includes drive arrangements for cooperating members, e.g. for rotary piston and casing.

Q51-B05

Oscillating/swing piston engines

See Q53-C for fluid driven oscillating piston engines.

Oscillating, swing, opposed piston

Q51-B05A [2014]

Free piston engines

Includes free-piston or "crankless" IC engines. See also Q51-A01J for two-cycle operation.

Dual piston, free piston, oscillating-piston

Q51-C

Gas-driven positive displacement engines

See Q53-A instead for positive displacement engines driven by liquid.

Q51-C01

Open cycle hot gas positive displacement engines; Steam engines

Includes reciprocating steam engines. See Q52 instead for non-positive displacement steam turbines. Can be used in conjunction with other Q51 codes as appropriate, e.g. Q51-A03B for steam engine pistons.

Q51-C02

Closed cycle hot gas positive displacement engines

I.e. positive displacement engines that are operated by expansion and contraction of a mass of working gas that is heated and cooled. See X25-X08 for electrical aspects of Stirling engines.

Closed cycle, heat, cool, Stirling engine

Q51-C05 [2007]

Air/gas driven positive displacement engines

Includes IC engines driven by compressed air supply and not involving combustion.

Q51-D

Engine/fuel type

See X22-A20 for electrical aspects of vehicle engine/fuel types.

Q51-D01

Petrol/gasoline

This code is not routinely assigned, since engines are assumed to be petrol unless otherwise stated.

Q51-D03

Diesel

Q51-D05

Mixed fuels

Includes engines running on dual fuels such as petrol/alcohol or diesel/LPG.

Q51-D07

Single unconventional fuel

Includes engines running on e.g. alcohol or bio-fuels.

Q51-D07A

Gaseous fuel

Using LPG, natural gas, hydrogen.

Q51-D07C

Bio-fuel; Alcohol

Includes engines running on free fatty acid methyl ester (bio-diesel) or alcohol such as methanol or ethanol.

Q51-E

Valve gear; Valve drive arrangements

Includes 4-valve drives for IC engines. For electrical aspects of vehicle engine intake/exhaust valve gear see X22-A11 and X22-A03G codes instead.

Q51-E01

Lift valves; Poppet valves

Includes valve guides.

Q51-E02

Gate or sliding valves

See also Q51-A01J for reed valves used in two-stroke internal combustion engines.

Q51-E03

Rotary or oscillating valve gear

Q51-E04

Steam engine valve gear

Q51-E05

Valve drive arrangements; Valve adjustment/control; Cam control

Includes mechanical valve clearance adjusters for motor vehicle engines, see also Q64-A for timing belt.

Hydraulic lash adjusters, timing belt

Q51-E05A

Camshafts; Cams; Eccentrics

Q51-E05B

Tappets; Pushrods; Rocking arms etc.

Includes hydraulic lash adjusters.

Hydraulic tappet

Q51-E09

Other valve gear

Q51-F

Lubrication

See X22-A10 for electrical aspects of vehicle engine lubrication, such as electric oil pumps. For oil pressure monitoring for motor vehicle engines, see X22-E01C.

Q51-F01

Pressure lubrication

Q51-F01A

[2014]

Dry sump systems

Includes dry sump lubrication systems and associated oil tanks and pipework.

Dry-sump

Q51-F02

Mixed with fuel and/or air

Two-stroke

Q51-F03

Breathing/ventilating

Includes crankcase breathing and cam cover breathing. Includes feeding of crankcase or cam cover air and any entrained oil back into induction system or to oil catch tank/filter.

Q51-F05

[2007]

Oil filters

Q51-G

Cooling

See Q51-H05A for turbocharger intercooling.

Q51-G01

Air cooling

Includes forced air feeding, i.e. fans.

Q51-G02

Liquid cooling

Q51-H

Charge feed i.e. fuel or air supply

For electrical fuel/air supply aspects of motor vehicle engines see X22-A02 and X22-A03 codes instead.

Q51-H01

Fuel feed

For electrical vehicle fuel pumps and fuel control see X22-A02D and X22-A03A codes respectively. See Q17-E04 for vehicle engine fuel supply.

Q51-H01A

Carburettion (carburettors)

See X22-A02C for electrical aspects of IC engine carburettors.

Q51-H01B

Fuel injection

Includes fuel systems using compressed air or mechanical control. Can also be applied to highlight novel mechanical aspects of EM fuel injection valves (also see X22-A02A codes for electrical fuel injection apparatus). See X22-A03A1 codes only for electric fuel injection control.

Q51-H01B1

Common rail arrangement

For electrical aspects of common rail injection systems see X22-A02A3.

Q51-H01C

Fuel pump

E.g. using compressed air or mechanically controlled fuel injection pump. See X22-A02D for electric fuel pumps and X22-A03A3 for electric fuel pump control. Includes gear pumps and rotary vane type pumps.

Q51-H01D

Fuel pressure regulator

Includes pressure relief valves.

Q51-H01F

Fuel filter

See X22-A02B for electrical aspects of fuel filters.

Q51-H01G

Fuel treatment

Includes e.g. fuel additive arrangements or water injection.

Q51-H01X

Other fuel systems

Includes fuel lines, hoses and pipework. Includes fuel heating arrangements. See X22-A02B for electrical fuel heaters. Also includes fuel cooling (see also Q51-G).

Q51-H02 [2010]

Fuel vapour recovery

(Q51-H01X)

Includes mechanical details of fuel vapour recovery systems. See X22-A02E instead for electrical details of fuel vapour recovery systems.

Q51-H05

Air intake systems

See X22-A03B for electrical aspects of air intake systems/throttles.

Q51-H05A

Supercharging; Turbocharging

Respectively see X22-A14 and X22-A03C for electrical aspects of motor vehicle super/turbo chargers and their control. Includes intercoolers.

Q51-H05C

Throttle valve

Intake air control valves.

Q51-H05E

Intake flow swirl/turbulisation control

Includes mechanical arrangements for promoting mixing of air and fuel, e.g. using scoops in piston head (see also Q51-A03B).

Q51-H05F [2007]

Air filters

Includes disposable paper air intake filters and reusable foam filters.

Q51-I

Ignition systems

Includes ignition systems using e.g. application of direct heat, incandescence, friction, pyrophoric or catalytic ignition. See X22-A01 codes for electrical ignition systems.

Q51-J

Exhaust systems; Pollution control

See X22-A07 and X22-A03J for electrical aspects of vehicle exhaust/emissions control systems. Also includes exhaust braking, e.g. for diesel engined truck (see also Q18-A30).

Q51-J01

Silencing systems

Includes use of resonance, sound absorbing materials or baffles. For electrical aspects of engine noise reduction see X22-A12 (including active noise suppression - possibly see W04-V07 also).

Q51-J02

Exhaust gas cleaning systems

See X22-A07 or X22-A03J for electrical aspects of motor vehicle engine exhaust gas cleaning and pollution control. See X22-A05 and S03-E codes for vehicle exhaust gas sensors per se.

Q51-J02A

Exhaust gas filters

Includes e.g. diesel particulate filters (see also Q51-D03).

Q51-J02B

Catalytic cleaning; Catalytic converters

Includes catalyst materials and catalytic converters, construction. For electrical aspects see X22-A07 only.

Q51-J02C

Inertial or centrifugal separators

Q51-J02D**Secondary air/fluid supply**

For electrical aspects of secondary air control used in motor vehicle exhausts, see X22-A03L.

Q51-J02E [2008]**Exhaust gas recirculation**

Includes mechanical aspects of exhaust gas recirculation arrangements. See X22-A07 for electrical aspects of EGR or X22-A03A2C for EGR control.

EGR

Q51-J02F [2010]**Exhaust heat recovery**

Includes recovery of heat of vehicle exhaust e.g. for passenger compartment heating. For electrical details of exhaust recovery systems see X22-A17.

Q51-J07 [2007]**Exhaust braking**

Includes exhaust brakes and exhaust brake control, e.g. used for slowing diesel-engined truck (see also Q19-C02 for trucks and Q51-D03 for diesel engines) when travelling down long hill, to avoid overheating mechanical friction brakes. Also see Q18-A30 for exhaust braking prior to 2007. See X22-A03B5 and/or X22-A09 instead for electrical aspects of vehicle exhaust/engine braking.

Q51-K**Starting systems**

For motor vehicle IC engine electrical starting see X22-A08, or X22-A04 for electric starter motors per se. Also see relevant X11 and X13 codes for motor hardware and control respectively.

Q51-K01**Using muscle power**

E.g. using hand cranks, pull cords and motorcycle kickstarts (see also Q19-B).

Q51-K02**Using mechanical power storage**

E.g. using springs or inertia.

Q51-K03**Using auxiliary engines****Q51-K09****Other starting arrangements**

Includes e.g. using explosive cartridges.

Q51-L [2007]**Engine heating/warming apparatus/method**

(Q51-X)

Includes use of exhaust gas heat to warm engine/coolant. See X22-A15 for electrical details of engine warming.

Q51-M [2007]**Engine manufacture/assembly/disassembly**

Includes manufacturing and assembly aspects of engine and engine components, not specifically for transportation applications such as motor vehicle, boat, aircraft - see relevant Q17 (with Q16-D), Q24 and Q25 codes respectively.

Q51-N [2010]**Noise, vibration and harshness reduction**

See also Q17-N and Q17-E codes for mechanical details of motor vehicle engine noise reduction. See X22-A12 for electrical details of vehicle engine noise and vibration reduction.

Q51-X**Other engine details**

Includes IC engine details not already covered, such as engine mountings (also see Q17-E01 for vehicle engine mountings).

Q52: Reaction Engines; External Combustion; Gas Turbines; Rockets

From 2006 Q52 covers all mechanical details of non-positive displacement combustion engines such as turbine and rocket engines. Prior to the introduction of Q52 manual codes in 2006, the Q52 class covered both positive displacement and non-positive displacement engines/turbines and their control. For power generation gas turbines see X11-C01, for aircraft gas turbines engines see W06-B01 codes and for electrical aspects of gas turbines used in land vehicle propulsion see X22-P03.

Q52-A

Gas/steam turbine engines

See Q25-C02B for aircraft gas turbine engines per se.

Q52-A01

Turbine engine type

Q52-A01A [2007]

Turbojet engines

Q52-A01C [2006]

Turbofan engines

Q52-A01E [2007]

Turboprop engines

Q52-A01S [2007]

Steam turbines

Includes non-positive displacement steam turbines. See X11 codes for power generation steam turbines, and see Q51-C01 instead for reciprocating piston steam engines.

Q52-A01X [2007]

Other turbine engines

Includes engines that are capable of running on variable cycles.
Variable-cycle

Q52-A02

Component parts

Q52-A02A

Rotor and stator

Includes manufacturing methods. Includes rotor and stator blades.

Q52-A02B

Combustion chamber

Includes charge flow guidance and cooling.

Q52-A02C

Nozzles, Nacelles

Also see Q25-A04 for aircraft engine nacelles per se.

Q52-A02D

Afterburner

Q52-A03

Intake/exhaust configuration; Intake heating/cooling

Includes air intake ducts and lips etc.

Q52-B

Non-turbine reaction engines

Q52-B01

Pulse jet

Includes pulse jet engine where gaseous fuel/air mixture is combusted in pulses to generate propulsive effort which is a reaction to the rearward flow of hot gases.

Pulsejet, deflagration

Q52-B01A [2007]

Pulse detonation engines

Includes pulse wave detonation engines that detonate fuel rather than deflagrate it.
PDE, PWDE, deflagration-to-detonation transition, DDT, high speed, high altitude, supersonic, hypersonic

Q52-B02

Ram jet

Q52-B03

Rocket engines

Includes solid fuel engine constructions. Also see Q25-S04 for spacecraft propulsion systems per se.

Q52-B04

Composite pulse, ram, rocket engine combinations

Includes composite pulse, ram, rocket engines. Also includes hybrid pulse detonation engines capable of operating in air-breathing and rocket modes.

Q52-C

Fuel supply systems

Also see Q25-C02B for aircraft jet engines and their fuel supply per se.

Q52-C01

Fuel heating

Q52-C02

Fuel supply control

See W06-B01A5 for aircraft engine electrical fuel supply.

Q52-C03

Fuel injection

Q52-C09 [2007]

Other fuel supply aspects

Q52-D

Starting systems

Includes fluid or mechanical drives e.g. using cartridges or starter turbines.

Q52-E

Ignition systems

See W06-B01C9 for electrical ignition systems for aircraft turbine engines.

Q52-F

Lubrication

Q52-G [2007]

Engine cooling

Includes overall cooling of gas turbine/external combustion engines. For gas turbine intake charge air cooling see Q52-A03 instead.

Q52-M [2007]

Engine manufacture/assembly/disassembly

Includes manufacturing/assembly/disassembly aspects of gas turbine engines. For manufacture of aircraft or ship gas turbine engines also see Q25-C02B and Q24-E02B respectively (and possibly Q25-X05 or Q24-X05 for aircraft and marine vessel manufacture per se).

Q52-X

Other engine details

Q53: Positive Displacement Fluid Engines (i.e. driven by fluid)

From 2006 Q53 covers all mechanical details of positive displacement fluid engines (i.e. driven by fluid). Prior to the introduction of Q53 manual codes in 2006, the Q53 class covered jet engines and fuel supply systems.

Q53-A

Reciprocating piston fluid engines

See Q51-A codes for positive displacement reciprocating engines driven by gas.

Q53-B

Rotary piston fluid engines

See Q51-B codes for positive displacement engines driven by gas.

Q53-C

Oscillating piston engines

See Q51-B05 for oscillating piston engines driven by gas.

Q53-G

Component parts

Includes valve gear, pistons, cylinders seals.

Q53-X

Other positive displacement fluid engines/machines

Q54: Non-positive Displacement Fluid Engines (i.e. driven by fluid); Miscellaneous Motors and Machines for Producing Mechanical Power/Thrust

From 2006 Q54 covers all mechanical details of non-positive displacement fluid engines (i.e. driven by fluid). Prior to the introduction of Q54 manual codes in 2006, the Q54 class covered starting and ignition systems. See Q51-K, Q51-I and Q52-D, Q52-E for starting and ignition systems for positive and non-positive displacement engines respectively.

Q54-A

Water turbines

Prior to 2007, this code was used for impulse engines having transportation interest. From 2007 this code has been expanded to cover all water turbines.

Q54-A01 [2007]

Impulse turbines

(Q54-A)

Includes turbines that use nozzles to change water's potential energy into kinetic energy, with resulting high velocity water jet made to impinge upon curved turbine blades which reverse the flow, with the resulting change of momentum or "impulse" causing a drive force on the blades. Mainly used in very high head applications.

Pelton, Turgo, Michell-Banki, crossflow, Ossberger turbine

Q54-A05 [2007]

Reaction turbines

(Q54-B)

Includes turbines that are encased or fully submerged and are acted upon by water which changes pressure as it moves through the turbine and gives up its energy. Mainly used in low and medium head applications.

Francis, Kaplan, propeller, bulb, tube, Straflo, Tyson, Water wheel

Q54-B* [2006-2007]

Reaction type engines

*This code is now discontinued and transferred to Q54-A05 from 200701. Includes e.g. Francis turbines, propeller turbines and Kaplan turbines. See Q51-C02 for closed cycle turbine engines driven by gaseous medium.

Q54-C

Friction type engines

Using non-bladed rotors, e.g. serrated.

Q54-D

Endless chain type engines/machines

Q54-E

Spring motors

Q54-F

Gravity and inertia motors

Includes flywheel energy storage.

Q54-G

Producing mechanical energy from wind, i.e. wind motors

For wind turbines used to generate electrical power, see X15-B instead.

Q54-H

Producing mechanical energy from geothermal or solar energy

Q54-I

Producing mechanical energy from muscle power

Includes treadmills or horse mills.

Q54-X

Other non-positive displacement fluid engines/machines; other mechanical energy systems

Includes perpetua mobilia using hydrostatic thrust, or using liquid flow, e.g. swinging flap type. Also includes ocean thermal energy conversion, using pressure or thermal differences, etc. Also see X15 codes for non-fossil fuel electricity generation.

Q55: Positive Displacement Fluid Machines/Pumps/Compressors (i.e. for driving fluid)

From 2006 Q55 covers all mechanical details of positive displacement fluid machines/pumps/compressors (i.e. for driving fluid). Prior to the introduction of Q55 manual codes in 2006, the Q55 class covered machines and engines for liquids.

Q55-A

Reciprocating piston fluid machines

Includes reciprocating piston positive displacement pumps and compressors.

Q55-B

Rotary piston fluid machines

Includes rotary piston positive displacement pumps and compressors.

Q55-C

Oscillating piston fluid machines

Includes oscillating piston positive displacement pumps and compressors.

Q55-D

Diaphragm operated fluid machines

Includes diaphragm operated positive displacement pumps and compressors.

Q55-E

[2007]

Scroll fluid machines

(Q55-X)

Includes positive displacement scroll compressors or scroll pumps using fixed and orbiting Archimedean spiral scrolls.

Q55-G

Component parts

Includes valves, seals, rotors, casings.

Q55-X

Other positive displacement fluid machines

Q56: Non-positive Displacement Fluid Machines/Pumps/Compression (i.e. for driving fluid)

From 2006 Q56 covers all mechanical details of non-positive displacement fluid machines/pumps/compressors (i.e. for driving fluid). Prior to the introduction of Q56 manual codes in 2006, the Q56 class covered pumps.

Q56-A

Radial flow fluid machines

Includes centrifugal pumps and helic-centrifugal pumps or compressors.

Q56-B

Axial flow machines

Includes e.g. non-positive displacement screw type pumps. For scroll pumps/compressors see Q54-E instead.

Q56-C

Fluid machines pumping fluid by direct contact of another fluid or using inertia of fluids to be pumped

Q56-C01

Jet pumps

Includes pumps in which fluid flow is induced by pressure drop caused by velocity of another fluid flow.

Q56-C02

Diffusion pumps

Q56-D

Siphons

Q56-G

Component parts

Includes shafts, bearings, rotors, casings, cooling strainers, cavitation reducers used in pumps or compressors.

Q56-X

Other non-positive displacement machines/pumps/compressors

Includes e.g. hydraulic rams.

**Q57: Fluid Pressure Actuators;
Hydraulic/Pneumatics in General**

From 2006 manual codes have been assigned for all mechanical details of fluid pressure actuators and hydraulics/pneumatics in general.

Q57-A

Telemotors; with movement proportional to pump output

Q57-B

Servomotors; with position of output conforming to input

Q57-C

Combined servo and telemotors

Q57-D

Pyrotechnic actuators

For motor vehicle safety systems such as vehicle airbags, see Q14-C02 only.

Q57-E

Component parts

Includes valve gear, guide vanes etc. used in fluid pressure actuators or hydraulics in general.

Q57-X

Other fluid pressure actuators and fluid dynamic control aspects

Includes general devices for influencing the flow of fluids and also manufacture and testing of devices covered in Q57.

Q6 Engineering Elements

Q61: Fastening Elements; Connections

E.g. for securing machine parts together. Includes both male (bolt) and female (nut) fastenings. These codes are normally only applied when the fastening itself is novel.

Q61-A

Threaded fasteners

Q61-A01

Nuts

For lock nuts see also Q61-A07A.
Female

Q61-A03

Bolts

For torque limiting break bolts see also Q61-A07C.
Male

Q61-A05

Screws

Q61-A07

Special purpose fastener action

Q61-A07A

Locking fasteners

Includes nylon insert locknuts (see also Q61-A01).

Q61-A07C

Torque limiting

Includes e.g. break bolts (see also Q61-A03).

Q61-A07E

Self-tapping

Includes self-tapping screws (see also Q61-A05).

Q61-B

Friction grip fasteners

Includes clamps, clips and shrinkage connections.

Q61-C

Key type connections

Includes bayonet connections.

Q61-D

Rivet connections

Includes peel type rivets and rivnuts (also see Q61-A01).

Q61-E

Nails, staples; Dowels

Includes dowel and plug type connections that are inserted or screwed into hole, with e.g. expanding bodies or tabs engaging hole or gripping reverse side of wall.

Wall plug, Rawlplug (RTM)

Q61-F

Anti-tamper connections

Includes snap off fastener head that snaps off when predetermined tightening torque is reached to leave behind shaped anti-tamper head.

Q61-G

Deformable connections

Includes e.g. split pins.

Q61-H

Washers; Lock washers; Spring washers

Q61-J

[2016]

Stuck or welded connections

Includes use of glue or welds to press or connect parts together. Also includes welding of nuts/bolts to part (also see Q61-A codes).

Cold pressure welding, adhesive

Q61-R

[2007]

Fastener installation tools

(Q61-X)

Includes tools used to install or remove fastening elements used in transportation applications such as mechanical compressed air driven rivet guns used in aircraft manufacture (see also Q25-X05). This code can be used in conjunction with other Q61 codes to specify the type of fastening being installed/removed.

Q61-X

Other fastening elements

Includes hooks and eyes, suction cups etc. Also includes tenons and male/female groove connections.

Q62: Shafts and Bearings

Q62-A

Flexible shafts

Q62-A01

For conveying rotary movement

Q62-A02

For conveying sliding movement

Q62-B

Rigid shafts

Q62-B01

Crankshafts

See Q19-A and Q13-A15 for cycle cranks.

Q62-B01A [2016]

Adjustable cranks

(Q62-B03)

Prior to 2016 this topic was covered by Q62-B03.

Q62-B02

Eccentric shafts (including camshafts)

See Q51-E05A for motor vehicle internal combustion engine camshafts.

Q62-B03* [2006-2015]

Adjustable cranks

(Q62-B01A)

*This code is now discontinued and has been transferred to Q62-B01A from 201601. It remains searchable for records prior to 2016.

Q62-C

Rigid connections, fixed joints

Q62-D

Pivots, pivotal connections

Includes ball joints, trunnions, crank pins.

Q62-G

Bearings

Q62-G codes include bearing elements and their races and also hydrodynamic bearings. From 2016 Q62-G08 is introduced for constructional details of bearings and also housings, caps, covers and mounting arrangements, and is assigned with other Q62-G codes to denote bearing type. Prior to 2016 these aspects were covered by other Q62-G codes or Q62-X as appropriate.

Q62-G01

Sliding contact bearings

Includes plain bearings e.g. used as crankshaft and connecting rod bearings in motor vehicle piston engines. See also Q51-A03E for crankshafts and connecting rods per se. Includes nylon self-lubricating bearings and fluid film bearings using a film of lubricant between sliding surfaces.

Bushing, babbitt, journal bearing

Q62-G02

Rolling contact bearings

Anti-friction bearings

Q62-G02A

Ball bearings

Includes bearings e.g. used to support a shaft or pulley. They can handle both axial and radial loads, though are usually used when the loading is fairly small.

Q62-G02A1

Ball thrust bearings

Includes ball bearings subjected to axial thrust loading, such as those used in bar stools or Lazy Susan (RTM) turntables. These cannot handle much radial load.

Q62-G02C

Roller bearings

Includes roller bearings used in conveyors where heavy radially loads need to be supported. Also includes needle roller bearings having small diameter cylinders designed to fit into tight spaces.

Q62-G02C1

Tapered roller bearings

Includes motor vehicle wheel bearings subject to axial (cornering force) and radial (vehicle weight) loads. They are usually mounted in pairs facing opposite directions so that they can handle thrust in both directions.

Q62-G02C3

Roller thrust bearings

Includes bearings used in gearsets such as those found in car transmissions between gears, and between the housing and the rotating shafts. These are suitable for handling large axial/thrust loads.

Q62-G02E

Giant bearings

Includes giant (1.5m diameter) ball bearings used under buildings to provide earthquake protection, or giant roller bearings used to move very heavy objects (also see Q62-G02A and Q62-G02C respectively).

Q62-G03

Magnetic bearings

Includes magnetic bearings used in high speed applications such as flywheel energy storage systems, where the flywheel rotating in excess of 50000 rpm can float on a magnetic field created by the bearing.

Q62-G04

Elastic bearings

Q62-G05

Combination bearings

Q62-G06 [2023]

Fluid bearings

Includes bearings where load is supported by a thin layer of rapidly moving pressurized liquid/gas between the bearing surfaces.

Hydrodynamic, hydrostatic, fluid dynamic bearings

Q62-G07

Bearing play adjustment

Q62-G08 [2016]

Constructional details of bearings

Includes constructional details such as balls, rollers, bushes, linings, ball cages, raceways, housings, caps, covers and mounting arrangements. Prior to 2016 these aspects of bearings were included in Q62-G codes or Q62-X as appropriate.

Q62-G09

Cooling and lubricating arrangements

Q62-G99

[2016]

Other bearing aspects

Includes load-reducing or equalizing arrangements. The use of magnetic force for load-reducing or equalizing is also covered by Q62-G03. Prior to 2016 constructional aspects of bearings were included in Q62-G or Q62-X as appropriate but from 2016 are covered by Q62-G08.

Q62-H

[2016]

Maintenance and servicing of shafts and bearings

Includes cleaning. Prior to 2016 maintenance, servicing and cleaning were covered by Q62-M and Q62-X as appropriate.

Q62-M

Manufacturing and testing arrangements for shaft or bearings

For electrical metal grinding operations see X25-A03C2.

Q62-X

Other shaft or bearing aspects not provided for

Includes arrangements to reduce the effects of centrifugal force. Prior to 2016 this code included mountings, housings, caps and covers for bearings which are now covered by Q62-G08.

Q63: Couplings; Clutches; Brakes; Springs; Dampers

Q63-A

Couplings for transmitting rotary motion

Q63-A01

For rigidly connecting shafts

Q63-A02* [2006-2015]

Controlled movement coupling e.g. elastic couplings

*This code is now discontinued. From 2016 all couplings allowing relative movement between the coupled members are coded in Q63-A03.

Q63-A03

Controlled movement couplings; Slip, yielding, impulse couplings

Includes couplings that permit relative rotational movement between the connected parts during drive; couplings that slip on overload and couplings that alternately accelerate/decelerate driven member. Includes universal joints and constant velocity joints.

Elastic coupling, UJ, CV joint

Q63-A04

Fluid couplings

Q63-A05

Quick acting/release couplings

Q63-B

Clutches

For motor vehicle clutches see Q13-A03, and for electrical aspects of vehicle powertrain hardware see X22-G01.

Q63-B01

Interengaging clutches

I.e. clutches with interengaging parts.

Q63-B02

Friction clutches

Includes wedge action clutches and wet and dry plate friction clutches.

Q63-B03

Fluid actuated clutches; Fluid transmission clutches

Includes hydraulically actuated clutches. See Q13-A03 for motor vehicle clutches.

Q63-B04

Mechanically operated clutches

Includes cable actuation arrangements.

Q63-B05

Freewheel clutches, freewheels

Q63-B06

Multiple/combination clutches

Q63-B09

Other clutch details

Q63-D

Brakes

For vehicle brakes see Q18-A codes only. For electrical aspects of brakes or brake wear indicators see X22-C02 and X22-E02A respectively.

Q63-D01

Drum brakes

See Q18-A01B for motor vehicle brake drums.

Q63-D01A

Fluid actuated drum brakes

Q63-D01B

Mechanically actuated drum brakes

Q63-D01E

Drum brake components

Includes drums, brake shoes.

Q63-D02

Disc brakes

See Q18-A01A for motor vehicle brake discs.

Q63-D02A

Fluid actuated disc brakes

Q63-D02B

Mechanically actuated disc brakes

For electrically actuated motor vehicle parking brake see X22-C02A.

Q63-D02E

Disc brake components

Includes discs, brake pads, callipers.

Q63-D03

Band brakes

Q63-D03A

Fluid actuated band brakes

Q63-D03B

Mechanically actuated band brakes

Q63-D03E

Band brake components

Includes wear surfaces and adjusters.

Q63-D09 [2007]

Other brake details

Q63-E

Springs; Shock absorbers; Dampers

See Q12-B codes for motor vehicle suspension spring/damper arrangements. See X22-M instead for electrical aspects of motor vehicle suspensions.

Q63-E01

Springs

See Q12-B01 for motor vehicle suspension spring arrangements.

Q63-E01A

Coil springs

Q63-E01B

Leaf springs

Q63-E01C

Cup springs

Q63-E01D

Fluid springs

Q63-E01E

Magnetic springs

Q63-E01F

Torsion springs

Q63-E01G

Elastic members e.g. elastomers

Q63-E01X

Other springs

Q63-E02

Shock absorbers; Dampers; Vibration suppression

See Q12-B02 for motor vehicle suspension dampers arrangements. For electrical aspects of vehicle dampers, including ride height control see X22-M codes.

Q63-E02A

Using damping fluid

Q63-E02B

Using damping mass/inertia

Includes flywheels, counterweights.

Q63-E02C

Using friction

Q63-E02D [2008]

Elastic dampers

Includes rubber and elastic material dampers.

Q63-E02E [2008]

Magnetic dampers

Includes magnetic fluid dampers.

Q63-E02G

Shock absorber/damper components

Includes seals, oil ports, split rings etc.

Q63-E02X

Other shock absorbers/dampers

Includes torsion dampers.

Q63-E05

Spring/damper combinations

Includes coil over dampers. Also see Q19-F03 for racing car independent coil over dampers.

Q64: Belts, Chains, Gearing

Q64-A

Driving belts

Includes IC engine timing belt (see also Q51-E05), and belt tensioning arrangements.

Cambelt, timing belt

Q64-A01

V-belts

Q64-A02

Ropes or cables

Q64-A03

Belt fastening and tensioning arrangements

Includes turnbuckles, clamps and belt tensioning arrangements (see Q51-E for IC engine timing belt tensioning arrangements).

Q64-A04

Pulleys

Q64-B

Chains

Q64-B01

Driving chains

Includes IC engine timing chain (see also Q51-E05).

Q64-B02

Hauling chains

Q64-B03

Chain fastening arrangements

Includes links, shackles, hooks.

Q64-B04

Sprockets

Q64-C

Gearing

Q64-C01

Mechanical gearing

Includes toothed gearing, helical gearing, ball or roller gearing.

Q64-C01A

Cams, cam followers

Q64-C01B

Toothed members; Worms

Q64-C01C

Friction members

Includes friction discs and pulleys.

Q64-C01L

Lubrication/cooling arrangements

Q64-C03

Fluid gearing

Q64-C05

Gearing control

Includes gear levers per se. For electrical aspects of motor vehicle transmission control see X22-G03 codes.

Q64-C09

[2007]

Other gearing details

Q64-D

Transmission linkages

Includes cam transmissions, wobble plate transmissions.

Q65: Pistons, Cylinders, Packing, Seals

These codes are not applied when other specific transportation related codes can be applied. For example, a novel cylinder used in an internal combustion engine can be coded in Q51-A03A, and does not require application of a Q65-B code.

Q65-A**Pistons; Plungers**

See Q51-A03B only for pistons used in internal combustion engines.

Q65-B**Cylinders**

Includes running faces and cylinder liners.

Q65-C***[2006-2007]****Pressure vessels**

*This code is now discontinued. From 200701 pressure vessels used for transportation purposes have been coded in Q69-B01 instead.

Q65-D**Seals; Packing**

Includes piston rings and sealing and packing arrangements in general.

Q65-X**Other piston, cylinder and seal details**

Q66: Valves; Taps; Cocks; Vents

For electrical aspects of mechanical valves see X25-L01 codes. See Q51-E only for valve gear used in internal combustion engine.

Q66-A

Lift valves

Includes cut-off apparatus with closure members having component of their opening/closing motion perpendicular to closing faces.

Q66-B

Gate or sliding valves

Includes cut-off apparatus with closure members having a sliding movement along the seat for opening and closing.

Reed valve

Q66-C

Diaphragm valves

Includes cut off apparatus with closure member deformed but not moved bodily.

Q66-D

Rotary valves

Q66-E

Multiway valves; Mixing valves and fittings incorporating them

Q66-F

Valve construction

Q66-F01

Valve members; Valve seats; Seals

Q66-F02

Valve housings; Casings

Q66-J

Valve actuation arrangements

Includes use of floats. See X25-L01A and V02-E02A1 for electromagnetically actuated solenoid valves.

Q66-P

Functional valve types

Q66-P01

Check valves

Q66-P02

Safety valves; Equalising valves

Q66-P03

Vent valves

Includes venting or aerating arrangements.

Q66-P04

Fluid delivery valves

Needle valve

Q66-X

Other valve/vent/tap details

Q67: Pipes; Joints; Fittings

For electrical aspects of large scale pipelines see X25-Y02.

Q67-A**Pipes; Hoses**

See Q18-A01X for vehicle brakes pipes/hoses per se.

Q67-A01**Rigid pipes**

Includes copper pipes.

Q67-A02**Flexible pipes**

Includes rubber hoses.

Q67-A03**Pipe laying and repair**

Includes pipe cleaning (See X25-H09 and X25-Y02 for electrical aspects).

Blockage removal

Q67-B**Pipe connections; Joints and Seals****Q67-B01****Pipe connectors/joints**

includes quick acting connectors, i.e. quick release/fastening, compression joints etc.

Hose nipple, end fitting, branching

Q67-B02**Seals**

Includes rubber seals and gaskets.

Q67-C**Pipe accessories**

Includes e.g. pipe supports and holders such as hose clips.

Clamps, cleats, brackets

Q67-D**[2016]****Pipe protection**

Includes protection against corrosion, incrustation, wear, fire, etc. Also includes heating or cooling details for preventing damage (e.g. freezing) of pipes.

Protective tubing, thermal insulation, vibration damping

Q67-X**Other pipeline details**

Q68: Other Engineering Elements

Q68-A

Frames; Casings; Beds; Supports

Q68-A01

Frames; Casings

From 2007 the scope of this code has been expanded to include all frames or casings e.g. for reciprocating or rotary engines, e.g. to facilitate engine assembly (see also Q51-M). From 2007 portable frames are specifically coded in Q68-A01A.

Q68-A01A [2007]

Portable frames

Includes wheeled frames. For trolley jacks etc., also see Q16-A03.

Q68-A02

Beds

Includes mounting of engines on foundations, e.g. for test purposes.

Q68-A03

Stands; Trestles; Supports

Includes movable stands and trestles for supporting various articles/equipment in various locations or orientations.

Brackets

Q68-B [2018]

Boards; Panels; Sheets

Layered products are covered under P73.

Q68-L [2007]

General lubrication systems

Includes generally applicable lubrication systems. For specific lubrication systems such as IC engine lubrication, vehicle transmission lubrication or vehicle suspension lubrication systems instead see Q51-F, Q13-A20 and Q12-B15 codes respectively. Also includes cleaning details of lubrication systems.

Q68-S [2007]

General safety devices

Includes generally applicable safety devices such as safety guards or screens or other systems e.g. requiring the use of both hands.

Q68-X [2018]

Other engineering elements

This code covers engineering elements not covered by any other Q61 to Q68 codes.

Q69: Storing/Distributing Gas/Liquid

Q69-A

Variable capacity gas holders

Q69-B

Fixed capacity gas holders

For motor vehicle hydrogen/natural gas etc. fuel tanks see Q17-E04 only.

Q69-B01

Pressure vessels

Includes pressurised vehicle fuel tanks, e.g. containing LPG. See also Q69-B for fixed capacity fuel tanks.

Q69-B02

Vessels not under pressure

Q69-C

Vessel filling method or apparatus

Q69-D

Vessel discharging method or apparatus

Q69-E

Pipeline systems

Q69-M [2016]

Gas/liquid holder/tank manufacture

Includes methods and equipment for manufacturing tanks and holders for gas/liquid.

Q69-T [2016]

Gas/liquid tank constructional details and accessories

Includes tanks details, reinforcing elements, stands etc.

Q69-X [2014]

Other gas/liquid handling systems

Includes steam traps.

Q7: Lighting, Heating

Q71: Lighting

All details of electric lighting or illumination obtained by unconventional sources like LED, EL devices are coded under X26.

Q71-A	[2015]
Type of light source	
Q71-A01	[2015]
Electric lighting	
All details of electric lighting are coded under X26.	
Q71-A02	[2015]
Non-electric lighting	
Q71-A02A	[2015]
Incandescence	
Q71-A02B	[2015]
Luminescence	
Includes crystalloluminescence, bioluminescence, chemoluminescence, thermoluminescence, phosphorescence or fluorescence.	
Q71-A02X	[2015]
Other type of non-electric light sources	
Q71-A50	[2015]
Combustible/Flammable material used	
Q71-A50A	[2015]
Oil	
Q71-A50B	[2015]
Gas	
Q71-A50C	[2015]
Kerosene	
<i>Paraffin lamp</i>	
Q71-A50D	[2015]
Wax	
<i>Candle, rushlight</i>	
Q71-A50X	[2015]
Other combustibles	

Q71-G	[2015]
Maintenance and repair of lighting devices	

Q71-M	[2015]
Manufacture/Pre-use treatment	
Includes pre-treatment of candle wicks.	
<i>Mordanting</i>	

Q71-R	[2015]
Recycling of components from lighting devices	
Electrical details of recycling systems are coded under X25-W04.	

Q71-T	[2015]
Constructional details	

Q71-T01	[2015]
Shades/globes/bowls/covers	

Q71-T02	[2015]
Refractors; Reflectors	
See also V07 codes.	
<i>Lens</i>	

Q71-T03	[2015]
Light filters; Light screens; Diffusers; Light guides; Polarizer	
See also V07 codes.	

Q71-T04	[2015]
Container for combustible material (e.g. oil)	

Q71-T06	[2015]
Ignition of combustible; Arrangement for controlling quantity of combustible used	
<i>Flint, permanent match, spark wheel, adjusting wheel</i>	

Q71-T07	[2015]
Protection from damage/draughts; Protection for user	
Includes shock-absorbers, thermal insulation, flame-retardant solutions. Also includes gas-tight, water-tight arrangements and draughts insulation.	
<i>Windproof, lightning protection</i>	

Q71-T99	[2015]
Other constructional details	
Includes modular construction, candle holders, wicks and stiffeners for candle wicks. Also includes fastenings and suspending/attaching arrangements (see X26-R for electric lighting), and cooling details.	

Q71-U	[2015]
Applications	
Q71-U03	[2015]
Vehicles	
Q71-U13	[2015]
Medical	
Q71-U32	[2015]
Torches/flares	
Q71-U33	[2015]
Lanterns	
<i>Hurricane lamp</i>	
Q71-U34	[2015]
Lighters	
Q71-U35	[2015]
Table lamps/floor lamps	
Q71-U36	[2015]
Wearable	
<i>Lightsticks, handlamp</i>	
Q71-U37	[2015]
Scented/therapeutic/insect repellent	
Q71-U45	[2015]
General area/location of use	
Q71-U45A	[2015]
Outdoors	
General outdoor use.	
<i>Gardens, waterways, camping, roads</i>	
Q71-U45C	[2015]
Indoors	
General indoor use.	
<i>Furniture, mirror, oven</i>	
Q71-U45E	[2015]
Underwater use	
Q71-U99	[2015]
Other specific applications	
<i>Christmas decorations</i>	

Q72: Steam generation

Electric steam boilers are coded under X25-W02.

Q72-A [2015]

Steam generation - Heating method

Q72-A01 [2015]

Using heat content from hot heat carriers

This code includes the use of hot slag, hot residues, molten metal, hot liquid or hot vapor, etc. as heat transfer medium.

Iron blocks

Q72-A02 [2015]

Using combustion

Details of combustion processes are covered by Q73 codes.

Q72-A03 [2015]

Pre-heating details (pre-heaters)

Includes water and air preheating systems, and combination of exhaust-steam and smoke-gas preheaters. Also includes details of thermal de-aeration of feed-water and accumulators arranged within combustion chambers, combined with steam accumulators or directly connected to boilers.

Smoke-gas preheaters, exhaust-steam preheaters, feed-water heaters, accumulator

Q72-A04 [2015]

Superheating of steam

Covers the use of hot flue gases from the furnace, radiations or heat generated by chemical reactions, etc, to superheat the steam.

Q72-A05 [2015]

Control and safety systems

Includes arrangements for regulating steam temperature and superheat temperature by regulating flue gas flow, by indirectly cooling or heating the superheated steam in auxiliary heat-exchangers, by using injected water sprays, etc. Also includes control details of water feed.

Water-level, regulator, vent

Q72-A99 [2015]

Using a different heating method

Q72-B [2015]

Types of boilers

Q72-B01 [2015]

Fire-tube boilers

Q72-B02 [2015]

Water-tube boilers

Flash boiler

Q72-B03 [2017]

Biomass boilers

See Q73 for combustion systems and Q74 for heating systems.

Q72-B04 [2015]

Fluidized bed combustion boilers

Includes atmospheric fluidized bed combustion boilers, pressurized fluidized bed combustion boilers and atmospheric circulating fluidized bed combustion boilers.

FBC, AFBC, CFBC

Q72-B05 [2015]

Stoker fired boilers

Includes boilers using spreader stokers and chair-grate or traveling-grate stokers.

Q72-B06 [2015]

Pulverized fuel boilers

Pulverized coal

Q72-B07 [2015]

Waste heat boilers

Heat recovery steam generator

Q72-B08 [2015]

Superheated steam boilers

Q72-B99 [2015]

Other types of boilers

Includes instantaneous boilers.

Q72-G [2015]

Maintenance and repair of steam generating apparatus

Self-cleaning, de-sludging

Q72-M [2017]

Manufacturing details of boilers

Q72-T [2015]

Constructional details of steam generating systems

Q72-T01 [2015]

Drums; Headers

Q72-T02	[2015]
Fireboxes	
Q72-T04	[2015]
Flues or fire tubes; Water tubes	
Includes details of linings, inserts, fittings for preventing burning-off of tube edges, attachments and supports.	
<i>Tube bundle</i>	
Q72-T05	[2015]
Boiler support, frame and casing	
<i>Stay-bolt connections</i>	
Q72-T07	[2015]
Arrangements for facilitating fluid circulation (air, water, etc.)	
Includes details of valves, pumps, compressors, nozzles, injectors and arrangements for inducing draughts.	
<i>Ventilating shafts, baffles, saddles, propellers</i>	
Q72-T09	[2015]
Heat exchangers	
See also Q78 codes for details of heat exchangers.	
Q72-T10	[2015]
Insulation details	
<i>Heat shield</i>	
Q72-T11	[2015]
Chimneys	
<i>Exhaust</i>	
Q72-T99	[2015]
Other constructional details of steam generating systems	
Includes steam traps, economizer, etc.	
Q72-U	[2015]
Applications	
Q72-U01	[2015]
Domestic	
<i>Facial steamer</i>	
Q72-U03	[2015]
Vehicles	
Q72-U16	[2015]
Power engineering; Power plants; Electrical power generation	
Q72-U40	[2018]
Industrial	

Q72-U41	[2015]
Cleaning	
Q72-U99	[2015]
Other specific applications	

Q73: Combustion apparatus and processes

Details of internal combustion engines are coded under Q51 only.

Electrical details of combustion are coded under X25-X13 (industrial combustion) and X27-G (domestic combustion).

Q73-A [2015]

Types of combustion apparatus and processes

Q73-A01 [2015]

Combustion systems using catalytic material

Includes details of catalytic material.

Q73-A02 [2015]

Burners

This code can be used in conjunction with Q73-A15 codes to highlight the type of fuel used.

Wick burner, radiant gas burner, cutting torch, vortex burner

Q73-A03 [2015]

Start-up details/techniques

Pre-treatment of fuel is coded under Q73-T05A.

Q73-A04 [2015]

Fluidized bed combustion

Includes stationary beds, circulating fluidized beds, vibratory fluidized beds, transport/flash reactors and annular fluidized beds. Details of fluidized beds are also covered under J04-E07A and J04-X03A.

FBC, bubbling bed, CFB, FR, AFB

Q73-A05 [2015]

Cremation furnaces

Details of furnaces are coded under Q77.

Incinerator

Q73-A15 [2015]

Fuel used

Q73-A15A [2015]

Solid fuel combustion

Includes details of pulverulent fuels.

Coal, charcoal, wood, powder

Q73-A15B [2015]

Liquid fuel combustion

Includes wick burners and blue-flame burners.

Oil, diesel, petrol, kerosene, biodiesel

Q73-A15C [2015]

Gaseous fuel combustion

Includes burners that use gas stored under pressure as a liquid. Includes pre-mix and non-pre-mix gas burners, radiant gas burners, inverter burners and welding/cutting torches.

Natural gas, propane, landfill gas

Q73-A15D [2015]

Biomass fuel

This code is to be used in conjunction with other Q73-A15 codes for solid biomass (together with Q73-A15A), biodiesel (together with Q73-15B), biogas (together with Q73-A15C) or on its own if the type is not specified.

Landfill gas, biofuel

Q73-A15X [2015]

Other fuels

Q73-A99 [2015]

Other types of combustion apparatus and processes

Includes systems for returning solid combustion residues or flue gasses to combustion chambers. Also includes explosive combustion chambers.

Q73-B [2015]

Combustion control/regulation

Electrical details of combustion control are coded under X25-X13 (industrial combustion) and X27-G02 (domestic combustion).

Q73-B01 [2015]

Control by regulating fuel supply

Q73-B02 [2015]

Control by regulating air supply or draught

Includes the use of bellows, diaphragms, etc.

Details of air inlet arrangements are coded under Q73-T02 codes.

Air flo, cyclone, vortex

Q73-B09 [2015]

Other arrangements for regulating or controlling combustion

Q73-G	[2015]
Maintenance and repair of combustion apparatus	
Includes method and apparatus for cleaning all surfaces contaminated by combustion products or combustion residues. This includes removing ash, clinker or slag from combustion chambers, and removing solid residues from passages or chambers beyond the fire, e.g. from flues by soot blowers.	
<i>Nozzle cleaning, grate cleaning, purging</i>	
Q73-R	[2015]
Recycling of components from combustion apparatus	
Electrical details of recycling systems are coded under X25-W04.	
Q73-T	[2015]
Constructional details of combustion systems	
Q73-T01	[2015]
Burner construction	
Details of air supply in burners are also coded under Q73-T02. Includes layout of burners to obtain a specific type of flames, e.g. pencil or sheet flames, loop flames, impacting flames or rotating flames.	
Q73-T01A	[2015]
Mounting/supports of burners	
Q73-T01C	[2015]
Nozzles for burners	
Cleaning of nozzles is also covered under Q73-G.	
Q73-T01X	[2015]
Other details of burners	
Includes evaporator, burner head, wick, flame spreader, etc.	
Q73-T02	[2015]
Details of air/gas supply/airflow	
Includes details for supplying air or other non-combustible liquids or gases (e.g. oxygen or steam) to the combustion apparatus. Also includes firebridges and arrangements for inducing draughts, such as ventilating shafts.	
<i>Mixing tube, air inlet, fan, blower, baffle, deflector, valve, damper</i>	

Q73-T02A	[2015]
Chimneys/flues	
Includes details of linings, jackets, casings, joints, inlet holes and doors.	
<i>Connection, mouths, cover, gas outlet</i>	
Q73-T03	[2015]
Combustion chamber	
Includes details of casings, doors, linings and walls. Also include supervision window for observation. Also includes details of multiple combustion chambers, such as details of separate secondary combustion chambers, where the combustion chambers are arranged in series or parallel to one another.	
<i>Crown, roof</i>	
Q73-T04	[2015]
Grates	
Cleaning of grates is also covered under Q73-G. Includes constructional details of grates with hollow or solid bars, double grates, inclined grates, revolving/rocking grates and travelling grates.	
<i>Basket grates, telescoping grates, dumping-grates, end fittings, bearer, frame, spacer, support, fire-bars</i>	
Q73-T05	[2015]
Fuel system	
Nozzles for burners are coded under Q73-T01C only.	
Q73-T05A	[2015]
Pre-treatment of fuel	
Includes pre-treatment details before feeding fuel to combustion apparatus. Includes mixing solid fuel with a liquid, mixing two or more liquid fuels, or pre-heating fuel.	
<i>Slurry, emulsion</i>	
Q73-T05B	[2015]
Fuel feed systems	
Includes feeding details by piston, screw, by gravity, or using spreader stokers with or without moving hoppers.	
<i>Air blast, pump, free fall</i>	
Q73-T05C	[2015]
Fuel nozzles	
Nozzles for burners are coded under Q73-T01C only.	
Q73-T06	[2015]
Filters	

Q73-T07	[2015]
Treatment and removal of combustion products	
Includes devices for treating smoke or fumes, e.g. for removing noxious materials from smoke or fumes using purifier or traps.	
Q73-T09	[2015]
Cooling arrangements	
Q73-T10	[2015]
Fluidized bed construction	
Includes details of air inlets, fuel feeders for fluidized beds. Also includes devices for removing material from bed.	
<i>Grids</i>	
Q73-T11	[2015]
Igniters/lighter construction	
Electrical igniters and cigarette lighters are included in X27-G01 only. Extinguishing devices are coded under Q73-T12 only. Includes details of casing, friction wheel, fuel container, wicks, flint, etc. Includes mechanical ignition (using friction or shock effects), lighters containing fuel and ignition by a pilot flame.	
Q73-T12	[2015]
Extinguishing devices	
Includes devices for blowing-out or snuffing candle flames. Igniters are coded under Q73-T11 codes only.	
Q73-T20	[2015]
Safety arrangements	
Includes protection from flashback and blowback, and safety systems e.g. in case of failure of gas supply. Cooling arrangements are coded under Q73-T09.	
Q73-T99	[2015]
Other constructional details of combustion apparatus	
Includes soot blower.	
Q73-U	[2015]
Applications	
Q73-U01	[2016]
Domestic	
Electric details of domestic combustion are coded under X27-G. Electrical details of gas cookers are coded under X27-C05.	
<i>Cooking stove, boiler</i>	

Q73-U07	[2015]
Food industry	
Q73-U20	[2015]
Waste disposal, waste treatment and recycling	
Includes cremation of human or animal carcasses.	
<i>Incineration</i>	
Q73-U26	[2015]
Metallurgy	
Q73-U27	[2015]
Boilers	
Includes steam boilers.	
Q73-U40	[2015]
Industrial	
Includes drying (see also Q76 for drying details). Also includes welding or cutting torches.	
Q73-U45	[2015]
Underwater use	
Q73-U99	[2015]
Other specific applications	

Q74: Heating, ranges and ventilating

Cooling and refrigerating details are coded under Q75. Electrical details of HVAC systems are coded by X27-E codes.

Q74-A [2015]

Types of heating, ranges and ventilating

Q74-A01 [2015]

Stoves and ranges

Includes closed stoves, stoves with open fires, free-standing stoves and ranges, integrated stoves and ranges and combined stoves and ranges.

Fireplaces, charcoal brazier, camping stove, back-to-back stoves

Q74-A02 [2015]

Space heating and ventilating; Water heating

Electrical details are coded under X27-E01.

HVAC, climate control system

Q74-A02A [2015]

Fluid heating systems

Includes water and/or air heating systems, fluid heating systems using heat pump and storage heating systems.

Combination boiler, combi

Q74-A02B [2015]

Air conditioning systems

Electrical details of air conditioning systems are coded under X27-E01B. Includes air conditioning systems with additional air treatment, such as combined with humidifiers or dehumidifiers. Electrical details of air humidifying systems are coded under X27-E01B2.

Q74-A02C [2015]

Air humidifying/de-humidifying systems

Electrical details of air humidifying systems are coded under X27-E01B2 only.

Includes details of air humidifying systems by evaporation of water using heated or unheated wet elements, by forming water dispersion in air or by injection of steam in air.

Q74-A02E [2015]

Ventilation systems

Includes natural ventilation systems, i.e. not using any mechanical systems, and ventilation systems using forced flow, e.g. using fans placed on doors/windows.

Q74-A02F [2015]

Air-cleaning and filtration systems

Air purifier

Q74-A02G [2015]

Air curtains

Includes air currents used for screening.

Q74-A02H [2015]

Portable HVAC units

This code is to be used in conjunction with other Q74-A02 codes.

Mobile, collapsible

Q74-A02J [2015]

Fixed HVAC units

This code is to be used in conjunction with other Q74-A02 code(s). Includes wall-mounted units, ceiling-mounted units, under-floor units and roof-mounted units.

Integrated

Q74-A25 [2015]

Fuel used

This code is used in conjunction with other Q74-A codes.

Q74-A25A [2015]

Solid fuel

Coal, charcoal, wood, wood pellets, powder

Q74-A25B [2015]

Liquid fuel

Oil, diesel, petrol, kerosene, biodiesel

Q74-A25C [2015]

Gaseous fuel

Natural gas, propane, landfill gas

Q74-A25D [2015]

Biomass fuel

This code is to be used in conjunction with other Q74-A25 codes for solid biomass (together with Q74-A25A), biodiesel (together with Q74-A25B), biogas (together with Q74-A25C) or on its own if the type is not specified.

Landfill gas, biofuel

Q74-A25E [2015]

Electrical power

Heating and air-conditioning devices powered by electricity are coded under X27 and X25.

Q74-A25F [2015]

Solar power

See also X15-A codes.

Q74-A25X [2015]

Other types of fuel

Geo-thermal power

Q74-G [2015]

Maintenance and repair of heating, ranges and ventilating systems/parts

Q74-H [2015]

Use of heat/steam recovery

See also X15-H codes.

Q74-R [2015]

Recycling of heating, ranges and ventilating systems/parts

Electric details of recycling systems are coded under X25-W04.

Q74-T [2015]

Constructional details of heating, ranges and ventilating systems

Details of heat exchangers are coded under Q78.

Q74-T01 [2015]

Air ducting/circulation systems

Includes diffusers, louvres, grilles, flaps, guide plates, vertical ducts, air handler, plenum, air outlet and intake vents, fan, blower, etc.

Ductwork, flue, turning vane, stac, flex, AH, plenum space

Q74-T02 [2015]

Pipes

Includes refrigerant pipings. Pipeline attachments (clamps, etc.) are coded under Q67-C.

Q74-T03 [2015]

Casings; Covers; Doors; Supports

Includes details of solar guards, snow guards and decorative panels. Also includes screens and fuel guards of stoves and ranges.

Camouflage, wall attachments, mountings, feet

Q74-T04 [2015]

Fireboxes; Fire grates; Fire irons; Hearth; Fuel containers

Includes details of frame, hood and heat deflectors. Also includes details of fuel containers, such as hods for coal storage, and tools for handling e.g. coal, such as tongs or shovel.

Fire surround, shaker grate, fire tools, shovel, tongs, poker, brush, hopper, hopper plate, coal box

Q74-T07 [2015]

Burners

Includes details of burner cap, burner ring, LPG conversion kit, cast iron pan supports, etc.

Bunsen burner, burner assembly

Q74-T08 [2015]

Compressors; Evaporators

Q74-T09 [2015]

Filters

Noise filters are coded under Q74-T15 only.

Includes air filters and water filters.

Q74-T10 [2015]

Radiators

This code can be used in conjunction with Q74-T03 to cover details of door, casing, mountings, etc.

Q74-T11 [2015]

Water tanks

Includes drip trays.

Water cylinder

Q74-T15 [2015]

Arrangements for vibration or noise suppression

Vibration isolator, noise filter, sound attenuator

Q74-T16 [2015]

Insulation; Seals

Noise insulation is coded under Q74-T15.

Draught shield

Q74-T20 [2015]

Control or safety systems

Electrical details are coded under X27-E01B.

Control knob, protective guard, fire resistant

Q74-T99 [2015]

Other constructional details

Includes arrangements for preventing condensation, tiles and tiles attachments.

Shim liner

Q74-U [2015]

Applications

Q74-U01 [2015]

Domestic

See also Q74-U10 for cooking and baking.

Barbeques, camping stove

Q74-U02 [2015]

Commercial

Includes shops, offices, sport halls, theatres, schools and universities.

Shops, offices, sports halls, theatre

Q74-U03 [2015]

Vehicles

Q74-U06 [2015]

Manufacturing plants

Q74-U07 [2015]

Food industry

Q74-U10 [2015]

Cooking and baking

This code can be used in conjunction with Q74-U01 or Q74-U40 for domestic and industrial cooking and baking, respectively.

Q74-U14 [2015]

Laboratories

Q74-U40 [2015]

Industrial

Covers industrial applications not covered by other application codes.

Q74-U99 [2015]

Other specific applications

Q75: Refrigeration and Liquefaction

From 2015, X27-F codes only cover refrigeration with substantial electrical content. All mechanical details are now covered under Q75. Details of air conditioning systems are coded under X27-E01B (electrical content) and Q74 (mechanical content).

Q75-A [2015]

Types of refrigeration systems

Electrical details of refrigeration systems are coded under X27-F02A. Refrigerant lubricants are coded under H08-D11 only.

Q75-A01 [2015]

Non-cyclic refrigeration systems

Includes ice boxes.

Cabinet

Q75-A02 [2015]

Cyclic refrigeration systems

Q75-A02A [2015]

Compression systems

Includes refrigeration systems with multi-stage compression, compression systems using Joule-Thompson effect, using multiple cooling stages, using Stirling cycle or using turbines. Also includes refrigeration systems using multiple evaporator circuits, multiple condenser circuits, with cascade operation, using 3He-4He dilution, etc.

Cryocooler

Q75-A02B [2015]

Sorption systems

Includes continuous and non-continuous sorption systems. Also includes refrigeration systems using endothermic solution of salt, using desorption of hydrogen from a hybrid, etc.

Q75-A02C [2015]

Heat pumps

Includes compression-type and sorption-type heat pumps. Electrical details of heat pumps are coded under X27-F02B.

Absorption heat pumps

Q75-A02H [2015]

Systems using combination of operation modes

Includes compression-sorption systems. Also includes combined heating and refrigeration systems.

Q75-A02X [2015]

Other types of cyclic-refrigeration systems

Includes refrigeration systems using evaporation of refrigerant without recovery of vapor, or using waste heat.

Q75-A03 [2018]

Defrosting and de-icing

Q75-A20 [2015]

Refrigerant used

Details of refrigerant are also coded under J07-A08. Refrigerant lubricants are coded under H08-D11 and J07-A10 only.

Q75-A20A [2015]

HFC

Q75-A20B [2015]

HCFC

Q75-A20C [2015]

CFC

Q75-A20X [2015]

Other refrigerants

Q75-A99 [2018]

Other refrigeration details

Q75-E [2015]

Production, storage and distribution of ice

From 2015, X27-F04 covers ice manufacture only with substantial electrical details. Includes production of ice with or without refrigeration. Also includes production of artificial snow (e.g. for winter sports), and specialized tools used during production of ice.

Harvesting tools, saw, ice shaving, ice presses

Q75-F [2015]

Liquefaction, solidification and separation of gases by pressure and cold treatment

Q75-G [2024]

Maintenance and repair of refrigeration and liquefaction components

Includes manufacturing methods and apparatus.

Q75-T	[2015]
Constructional details of refrigeration, liquefaction and solidification systems	
Constructional details of motors are coded under V06.	
Q75-T01	[2015]
Compressors	
Electrical details of compressors are coded under X27-F02C1.	
Q75-T02	[2015]
Absorbers; Adsorbers; Boilers	
Electrical details of absorbers and adsorbers are also coded under X27-F02C. Also includes analyzers and rectifiers.	
Q75-T03	[2015]
Evaporators; Condensers; Heat exchangers; Valves	
Includes cold exchangers, accumulators, sub-coolers, desuperheaters and superheaters. Details of heat exchangers are coded under Q78. Electrical details of evaporators and condensers are coded under X27-F02C.	
<i>Expansion valves</i>	
Q75-T06	[2015]
Housings; Walls; Handles; Shelves	
Includes cabinets, seals and feet. Also includes special inserts for doors (e.g. for bottles), ice trays and egg trays for domestic fridges and details of interior light. Fridge lights are also covered by X27-F02C2 and Q71.	
<i>Door, tray</i>	
Q75-T08	[2015]
Water and ice dispensers	
Details of ice generation are also covered by Q75-E codes. Electrical details of ice generation are coded under X27-F04.	
Q75-T09	[2015]
Arrangements for circulating cooling fluids	
Includes air intake filters.	
<i>Pipe</i>	
Q75-T20	[2015]
Control and safety systems	
Includes guards, protective plates, etc. Electrical details are coded under X27-F03.	
<i>Defrosting, frost prevention</i>	

Q75-T99	[2015]
Other constructional details of refrigeration systems	
Includes arrangements for preventing or removing deposits or corrosion, arrangements for transporting items to be cooled, etc.	
Q75-U	[2015]
Applications	
Q75-U01	[2015]
Domestic	
Includes free-standing and integrated appliances, and combined fridge-freezers.	
<i>Wine cooler</i>	
Q75-U03	[2015]
Vehicles	
Includes cars, trucks, airplanes, boats, etc.	
Q75-U07	[2015]
Food industry	
<i>Kimchi</i>	
Q75-U30	[2015]
Sports, toys, entertainment and leisure	
Includes ice rinks, ski slopes, etc.	
Q75-U40	[2015]
Industrial	
Includes cold rooms.	
Q75-U99	[2015]
Other specific applications	

Q76: Drying

Electrical details of drying methods and apparatus are coded under X25-G.

Q76-A [2015]

Pre-treatment (to facilitate drying)

Q76-B [2015]

Drying method

Q76-B01 [2015]

Drying using heat

Includes drying methods using heat convection, heat conduction, radiation (e.g. from the sun) or using heat created within the materials/objects to be dried (e.g. by friction).

Spray-drying, fluidised drying

Q76-B02 [2015]

Drying without using heat

Includes drying by evaporation/sublimation of moisture (e.g. in a vacuum), by centrifugal force or by pressure. Includes the use of a freezing step. Also includes drying by suction, or by contact with sorbent bodies.

Clothes press, mangle, wringer

Q76-B03 [2015]

Drying using a combination of heat and heat-free processes

Freeze-drying

Q76-G [2015]

Cleaning, maintenance and repair of drying machines

Includes testing, lubricating and oiling arrangements.

Q76-M [2015]

Manufacture of drying machines/Pre-use treatment

Pre-treatment of items to be dried (to facilitate drying) are coded under Q76-A only.

Q76-R [2015]

Recycling of drying parts/components

Q76-T [2015]

Constructional details of drying machines

Q76-T01 [2015]

Drums/Chambers

Q76-T03 [2015]

Arrangements for conveying materials/objects to dry

Includes fluidised beds, rollers and belts. Includes stirring devices.

Trays, racks

Q76-T04 [2015]

Arrangement and control of air/gas supply

Includes details of gas used during the drying process (if different than air). Includes mechanical control details only. Also includes filters.

Humidity, temperature, pressure, flow

Q76-T06 [2015]

Heating/refrigerating arrangements

Includes details of combustion heating (see also Q73 codes), and tubes containing heated fluids. Refrigeration details are also covered under Q75.

Freezing coil

Q76-T08 [2015]

Ventilation/cooling details of drying machine

Q76-T99 [2015]

Other constructional details

Safety system

Q76-U [2015]

Applications

Q76-U01 [2015]

Domestic

Airing cupboard, washing line

Q76-U13 [2015]

Pharmaceutical/Medical

Medicine, tablets, antibiotics, medical ingredients, additives, blood plasma

Q76-U21 [2015]

Characterized by specific type of materials to dry

Q76-U21A [2015]

For drying elongated/long materials

Fabrics, fibres, yarns

Q76-U21B [2015]

For drying loose materials

Granules, pellets, cubes

Q76-U21D [2015]

For drying gas

Natural gas

Q76-U21E [2015]

For drying food/plants

Q76-U21E1 [2015]

For drying food

Instant coffee, milk powder, coffee, tea, eggs, cereal, spices, flavorings

Q76-U21E2 [2015]

For drying plants

Tobacco, flowers

Q76-U40 [2015]

Industrial

Combine harvester, paint pigments, ceramic materials, catalyst supports, microalgae, paper pulp, sewage treatment, waste management

Q76-U99 [2015]

Other specific drying applications

Q77: Furnaces, kilns, ovens, retorts

Furnaces, kilns, ovens and retorts are also coded under J09. Details of combustion processes are also covered under Q73 codes.

Q77-A [2015] **Type of furnaces/kilns/ovens/etc**

Q77-A01 [2015] **Vertical furnaces**

Includes vertical furnaces with multiple shafts/chambers.
Blast furnace

Q77-A02 [2015] **Horizontal/slightly inclined furnaces**

Includes details of rotary furnaces. Includes externally and internally heated furnaces, tiltable furnaces or furnaces with multiple chambers/drums.

Q77-A03 [2015] **Hearth-type furnaces**

Includes details of reverberatory-type furnaces. Includes furnaces with single chamber/hearth, multiple chambers/hearths or with movable working chamber/hearth.

Q77-A04 [2015] **Muffle furnaces; Retort furnaces**

Includes furnaces muffle furnaces and retort furnaces with multiple chambers.

Q77-A07 [2015] **Fluidized-bed furnaces**

Q77-A99 [2015] **Other type of furnaces, kilns, ovens or retorts**

Includes bell-type furnaces, furnaces with stationary charge but moving kiln sections, open/uncovered sintering apparatus, crucible/pot furnaces and tank furnaces.

Vacuum furnace

Q77-B [2015] **Fuel used**

Q77-B01 [2015] **Coal**

Q77-B02 [2015] **Oil**

Q77-B03 [2015] **Gas**

Natural gas

Q77-B04 [2015] **Wood**

Q77-B99 [2015] **Other fuels**

Q77-D [2015] **Management of waste heat and exhaust gases**

Q77-G [2015] **Cleaning, maintenance and repair of furnaces, kilns, oven and retorts**

Q77-R [2015] **Recycling of furnaces, kilns, ovens and retorts parts**

Electric details of recycling systems are coded under X25-W04.

Q77-T [2015] **Constructional details of furnaces, kilns, ovens and retorts**

Q77-T01 [2015] **Drum; casing; lining; wall; roofs; dividers**

Includes details of refractory bricks, partitions and doors. Also includes sealing arrangements.
Blanket, muffle

Q77-T02 [2015] **Air blowers/tuyeres**

Includes details of blower motors (see also X11 codes), filters and blower chambers.

Q77-T03 [2015] **Burners**

Includes details of floor-mounted, wall-mounted or roof-mounted burners.

Q77-T04 [2015] **Radiant coils/tubes**

Q77-T05 [2015] **Arrangement for charging/discharging charge**

Feeders, hoppers, screw feeders

Q77-T06 [2015]

Heat exchangers

See Q78 codes for more details.

Q77-T07 [2015]

Flue-gas stack

Includes stack dampers. Also includes details to enhance stability in e.g. strong winds.

Damper blade

Q77-T08 [2015]

Dust collectors; Soot blowers

Q77-T10 [2015]

Cooling arrangements

Q77-T20 [2015]

Control and safety arrangements

See also J09-B04.

Q77-T99 [2015]

Other constructional details of furnaces, kilns, ovens and retorts

Includes details for corrosion protection, arrangement for forming or maintaining specific atmosphere within chamber, and tools for stirring molten materials.

Sightglass

Q77-U [2015]

Applications

Q77-U14 [2015]

Laboratory

Laboratory furnace

Q77-U20 [2015]

Waste disposal, waste treatment and recycling

Includes cremation of human and animal carcasses.

Incineration

Q77-U26 [2015]

Metallurgy

Q77-U40 [2023]

Industrial

Includes glass and ceramic manufacture.

Q77-U99 [2015]

Other specific applications

Q78: Heat exchange

Heat exchangers used in refrigeration systems are also coded under Q75.

Q78-A [2015]

Types of heat exchangers

Q78-A01 [2015]

Steam or vapor condensers

Q78-A02 [2015]

Characterized by the fluid direction

Q78-A02A [2015]

Parallel flow

Co-current

Q78-A02B [2015]

Cross-flow

Q78-A02C [2015]

Counter-current

Q78-A02D [2015]

Multi-pass arrangements

Includes combination of parallel and counter flows.

Q78-A03 [2015]

Indirect contact heat exchangers

Includes shell and tube heat exchangers, shell and tube heat exchangers, plate heat exchangers, compact heat exchangers, adiabatic wheel heat exchangers, dynamic scraped surface heat exchangers, regenerative heat exchangers and phase-change heat exchangers.

Surface condenser, U-tube heat exchanger, double pipe heat exchanger, plate tin heat exchanger, CHEs, plate and shell heat exchanger, intermediate flow

Q78-A04 [2015]

Direct-contact heat exchangers

Includes direct-contact trickle coolers, such as cooling towers.

Q78-A05 [2015]

Heat exchangers using a combination of indirect and direct heat exchanging methods

Q78-G [2015]

Cleaning, maintenance and repair of heat exchangers

Includes supports/frames for attaching cleaning appliances, masks delimiting areas to be cleaned, etc. Includes cleaning by distortion, by vibration, by flushing e.g. chemical solvents, by combustion processes.

Abrasive tools, cleaning brushers, scrapers, hammers, cutters, self-cleaning

Q78-M [2015]

Manufacture/Pre-use treatment of heat exchangers

Q78-R [2015]

Recycling of heat exchanger components

Electric details of recycling systems are coded under X25-W04.

Q78-T [2015]

Constructional details of heat exchangers

Q78-T01 [2015]

Tubular elements

Q78-T03 [2015]

Casings; Header boxes; Heat/flow reflectors

Includes plates and other arrangements for increasing/decreasing heat transfer, e.g. for promoting droplets formation, affecting the flow pattern, turbulent flow to reduce skin-effect, etc.

End plate, baffle plate, impeller

Q78-T04 [2015]

Sealing arrangements

Q78-T20 [2015]

Control and safety arrangements

Q78-T99 [2015]

Other constructional details of heat exchangers

Includes arrangements for preventing the formation of deposits/corrosion, for collecting and removing condensate, and for removing ice/water (to prevent clogging by frost). Also includes arrangement for suppressing noise.

Filters

Q78-U	[2015]
Applications	
Q78-U03	[2015]
Vehicles	
Q78-U07	[2015]
Food industry	
Includes dairy industry.	
Q78-U16	[2015]
Power engineering; Power plants; Electrical power generation	
Q78-U17	[2015]
Hydraulic engineering; Water management/treatment; Sewerage	
Q78-U25	[2015]
Chemical engineering; Refinery/chemical plant	
Q78-U40	[2015]
Other industrial applications (not covered by other Q78-U codes)	
Includes reboilers.	
Q78-U41	[2015]
Heating/Cooling	
Includes cooling of electronic devices (see also V04 codes).	
Q78-U41A	[2015]
Refrigeration/HVAC	
See also Q75 and X27 codes.	
Q78-U99	[2015]
Other specific applications	

Q79: Weapons, ammunition, blasting

See also K03.

Q79-A [2015]

Type of weapons

Q79-A01 [2015]

Cold weapons

This code is applied for weapons projecting missiles WITHOUT the use of explosive or combustible propellant charge.

Q79-A01A [2015]

Blow guns

Tube

Q79-A01B [2015]

Sling weapons

Catapults, slingshots

Q79-A01C [2015]

Bow/crossbows

Includes long bows and compound bows.

Darts

Q79-A01D [2015]

Thrusting or cutting weapons

Includes sabres, cutlasses, swords, epees, daggers, stiletos, lances, pikes and harpoons.

Q79-A01X [2015]

Other cold weapons

Includes batons, truncheons, sticks, shillelaghs, bolas, knuckledusters, spring guns, liquid ejecting guns, such as water pistols, and compressed gas guns, such as air guns or steam guns.

Friction-wheel operated launcher, speargun, toy gun

Q79-A02 [2015]

Firearms

Q79-A02A [2015]

Pistols

Non-lethal guns such as flare pistols are coded under Q79-A02F only.

Revolvers

Q79-A02B [2015]

Shoulder-fired firearms

Rifles, carbines, shotguns, gyrojets

Q79-A02C [2015]

Machine guns

Includes automatic and semi-automatic machine guns.

Q79-A02D [2015]

Artillery guns

Cannons, carronades, falconets, field guns, Howitzers

Q79-A02F [2015]

Non-lethal guns

Includes rescue equipment guns, riot control guns and alarm pistols. Also includes starting pistols, tranquiliser guns and paintball guns.

Flare guns, Lyle guns, Very pistol, Flash-ball

Q79-A02X [2015]

Other types of firearms

Harpoon guns

Q79-A03 [2015]

Flamethrowers

Q79-A04 [2015]

Launchers

Mechanical details of missile launchers attached to a vehicle are coded under Q24-M01A. Includes rocket/torpedoes launchers.

Q79-A05 [2015]

Mines, e.g. landmines

Includes anti-personnel mines and anti-vehicle mines. Also includes fragmentation mines, blast mines and naval mines.

Anti-tank mines

Q79-A06 [2015]

Missiles and hand grenades

Includes air-to-air missiles, air-to-surface missiles, surface-to-air missiles and surface-to-surface missiles. Also includes stun grenades, chemical and gas grenades, tear gas grenades, etc. Anti-missile systems are coded under Q79-H.

Molotov cocktails, warheads, rockets, torpedoes

Q79-A09 [2015]

Blasting

Includes controlled use of explosives for e.g. rock blasting, etc.

Q79-A99 [2015]

Other types of weapons

Includes fictional guns, such as ray-guns.

Q79-E	[2015]
Training/practice weapons and facilities	
Includes shooting/firing ranges and archery targets. Can be used with other Q79 codes to specify type of weapon, e.g. archery targets are also coded under Q79-A01C. Also see P36-A05 for archery/shooting target practice. <i>Bobbing targets, moving targets, clay-pigeon targets, bullet catcher</i>	
Q79-F	[2015]
Fireworks	
See also K04-C codes.	
Q79-F01	[2015]
Shell/container, includes wrapping	
Q79-F02	[2015]
Star pellets	
Includes arrangement of star pellets within the shell for specific display. <i>Palm, round shell, willow, chrysanthemum</i>	
Q79-F03	[2015]
Bursting charge; Mortar/launching arrangements	
Also includes details of fuse/time delay. <i>Compressed air, gunpowder</i>	
Q79-F99	[2015]
Other firework details	
Q79-G	[2015]
Cleaning, maintenance and repair of weapons	
Includes testing, lubricating and oiling arrangements. <i>Scrapers, cleaning rods</i>	
Q79-H	[2015]
Protection for weapons, personnel or equipment; Armoured vehicles	
<i>Anti-missile</i>	
Q79-H01	[2015]
Protection for personnel; Protective clothing	
Includes military specific clothing, eye/ear protection and head protection.	

Q79-H03	[2015]
Protection for weapons or equipment (not vehicle)	
Includes decoys.	
Q79-H04	[2015]
Armoured vehicles	
See also Q19-D.	
Q79-M	[2015]
Manufacture/Pre-use treatment of weapons	
Q79-S	[2015]
Recycling and decommissioning of weapons	
Decommissioning details of ammunitions are also covered by K03-A04. Alterations so that a gun can no longer be fired are also covered under Q79-T02X.	
Q79-T	[2015]
Constructional details of weapons and ammunitions	
Details of explosives are coded under K04. Constructional details of practice targets, such as archery targets, are coded under Q79-E codes only.	
Q79-T01	[2015]
Constructional details of weapons	
Protective clothing is covered under Q79-H01.	
Q79-T01A	[2015]
Bows; Bowstrings	
Includes details of bow-string drawing or releasing devices, bow stringers, bow wax, arrow rests, guides and bow stabilisers/dampers. Archery targets are also included under Q79-E. Arrows per se are coded under Q79-T02B. <i>Limbs, risers, tillers, bow sights, necking points, bracing height gauges, darts</i>	
Q79-T01B	[2015]
Handles; Crossguards	
Also includes butts and butt plates. <i>Stocks, recoil absorbing pads</i>	
Q79-T01C	[2015]
Blades; Folding blades	
Includes details of the folding mechanism. Also includes concealment details, such as for swordsticks and cane-swords.	

Q79-T01D [2015]

Holders, sheath or scabbards

Includes details of storage such as gun bags, gun cases, bow cases, quivers, etc.

Gun slip, gun holster

Q79-T01E [2015]

Barrels

Rifled bores, smoothbores

Q79-T01F [2015]

Magazines; Arrangements for feeding/loading projectiles

Includes details of pump-action mechanism or lever-action mechanism. Details of ammunitions are coded under Q79-T02.

Rocking lever

Q79-T01G [2015]

Triggers and other ignition mechanisms

Q79-T01H [2015]

Aiming mechanisms

Includes b-pods and shooting sticks. Also includes mounting arrangements, e.g. gun mountings on a vehicle.

Iron sights, turrets, monopod, target acquisition, trajectory compensation

Q79-T01X [2015]

Other constructional details of weapons

Includes high seats, recoil pads. Also includes details of gunshot sound and smoke simulation, such as shock-sensitive explosive compounds. Cartridges blanks are included under Q79-T02A. Details of gun decommissioning are coded under Q79-S.

Silencer

Q79-T02 [2015]

Constructional details of ammunitions

Tracer ammunition

Q79-T02A [2015]

Cartridges/shells

Includes details of cartridge blanks.

Rubber bullets

Q79-T02B [2015]

Bullets/projectiles

Includes arrows and arrowheads. Rubber bullets are coded under Q79-T02A.

Pellet

Q79-T02C [2015]

Propellants, primers (to ignite propellant) and detonators

Includes details of fuse mechanism, delay arrangement, booster and main charge.

Gunpowder

Q79-T02F [2015]

Storage of ammunitions

Includes details of ammunition belts or bags and ammunition boxes. Details of magazines are coded under Q79-T01F.

Q79-T02X [2015]

Other constructional details of ammunitions

Q79-T10 [2015]

Safety arrangements

Includes latch and double-trigger system for guns, device for absorbing or damping detonation-wave during explosions or protecting the user whilst firing the gun, etc.

Blasting mat

Q79-T50 [2015]

Novel constructional material (weapons and ammunitions)

Should be used in conjunction with other Q79-T codes to indicate material application.

Fiberglass, rubber, stone, thermoplastics, HMPE

Q79-T99 [2015]

Other accessories

Shooting mats

Q79-U [2015]

Applications

Q79-U03 [2015]

Vehicles

Q79-U17 [2015]

Civil Engineering; Construction; Buildings

Includes demolition of e.g. buildings, chimney stacks, using blasting.

Building implosion

Q79-U30 [2015]
Sports, toys, entertainment and leisure
Includes martial arts weapons, paintball, fireworks and fire performances.
Sparklers, Catherine Wheels, fire-breathing, fire-eating, hunting

Q79-U31 [2015]
Self-defence; military
Anti-riot

Q79-U31A [2015]
Military
Includes replica firearms for training.

Q79-U31C [2015]
Self-defence

Q79-U45 [2015]
Underwater use

Q79-U99 [2015]
Other specific applications

PART 1

Electrical Patents Index

(EPI)

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S01: Electrical Instruments

This section is restricted to measurements of electrical properties and values. It does not include other methods such as optical inspection of electrical and electronic apparatus, for which codes for the device under test, together with the appropriate code, in e.g. S03, should be used.

S01-A

Current and volt meters with pointer display

Does not include those used to display other measured variables e.g. on vehicle dashboard. For details of pointer displays in measurement, see S02-K06A. For vehicle dashboard instrumentation, see S02-K06X and X22-E codes.

Ammeter, coil, moving coil

S01-B

Integrating power or current meters

Includes meters with electromechanical and electronic integration, e.g. kilowatt-hour meter. See S01-D02 for instantaneous power measurement. See also X12-H04 codes.

Hour, watt, energy, utility, disc, security

S01-B01 [1992]

Remote meter reading

Includes monitoring of meter per se. See also S02-K08A. See also X12-H04A.

S01-B03 [1997]

Digital electricity meters

(S01-B)

S01-B05 [1992]

Protection against tampering

See also T05-H06 for coin, token, or card-freed systems. Includes local or remote indication of tampering.

Security, anti-fraud

S01-C

Instruments displaying waveforms or digital values

Transient

S01-C01

Cathode ray oscilloscopes

See V05-D codes for details of CRTs per se.

Oscillograph, CRO, vertical, trigger, horizontal, storage, vector

S01-C09

Other instruments displaying waveforms or digital values

Includes instruments with other display types.

S01-D

Measuring electric variables

S01-D01

Currents or voltages

S01-D01A

Functions of currents or voltages

Amplitude, average

S01-D01A1 [1983]

Effective values

Includes r.m.s values.

Root mean square

S01-D01A3 [1992]

Peak detection

Maximum, hold, sample and hold

S01-D01A9 [1992]

Other functions of currents or voltages

S01-D01B

Indicating presence or sign

Polarity, offset, comparator

S01-D01B1

Indicating presence

S01-D01B5

Thresholding

Includes indication of zero-crossing point of AC waveform.

Level reference, hysteresis

S01-D01C

Using AC/DC, current/pulse conversion, etc.

A-D and D-A converters per se are covered by U21-A codes.

S01-D01C1 [1983]

DC to AC, digital

S01-D01C1A	[1992]
DC to AC	
Includes chopper circuit. See U24-G01A1 and U24-G02E for instrumentation chopper amplification circuits.	
S01-D01C1B	[1992]
Digital	
S01-D01C5	[1983]
AC to DC	
<i>Rectifier, bridge, detector, full-wave rectifier</i>	
S01-D01D	[1992]
'Indirect' measurement techniques	
Includes non-contact measurement techniques and those involving transformation into non-electric quantity.	
S01-D01D1	[1992]
Using inductive or magnetic measurement	
<i>Clamp ammeter</i>	
S01-D01D1A	[1992]
Using current transformer	
See also V02-G01B and X12-C01, respectively for low and high power transformers per se.	
<i>Core, coil, primary, secondary, phase</i>	
S01-D01D3	[1992]
Using electrostatic effects	
Includes capacitive measurement, CVTs, etc.	
S01-D01D5	[1992]
Using optical transformation	
See also V07-K for light property such as polarisation varying in proportion to electric quantity.	
<i>Pockel's effect, Electrochromic, Faraday rotation</i>	
S01-D01D7	[1992]
Using particle beam	
Includes measurement using e.g. electron beam probing circuit, and also measurement by deflection of beam. See also V05-F01 codes and V05-F08B.	
S01-D01D9	[1992]
Other indirect current/voltage measurements	
S01-D01X	
Other current/voltage measurements	

S01-D02
Power, power factor or energy
Includes instantaneous power measurement. Integrating meters are covered by S01-B. Includes measurement of RF power (with S01-H05).
<i>Thermocouple, heating effect, remote indication</i>
S01-D03
Frequency; analysing frequency spectra
S01-D03A
By conversion to amplitude or phase shift
<i>Resonance, tuned circuit, integrator, frequency to voltage converter</i>
S01-D03B
By pulse counting
<i>Clock, gate, digital frequency meter, bit rate</i>
S01-D03C
Analysing frequency spectra
S01-D03C1 [1992]
Frequency sweeping apparatus.
Includes 'spectrum analyser' and panoramic receivers. Measurement receivers per se are covered by W02-G03 codes, monitoring of transmission systems in general by W02-C05 codes and band scanning by U25-J01 codes.
S01-D03C3 [1992]
Fourier analysis
See T01-J04B for implementation by data processing circuitry.
S01-D03C5 [1992]
Distortion and harmonic content measurement
<i>THD, total, distortion factor meter, nonlinear</i>
S01-D03C9 [1992]
Other frequency spectra analysis
S01-D03X
Other frequency aspects
S01-D04
Phase angle between voltages and currents
See U23-C for phase comparator per se.
<i>Lissajous figure</i>

S01-D05

LCR and impedance-based measurements

Codes in this section relate to the measurement of impedances per se (S01-D05B), resistance (S01-D05B1), impedance related measurements such as reflection coefficient (S01-D05B5), four terminal network characteristics (S01-D05C), and measurement of inductance, capacitance, quality factor etc (S01-D05A codes). For bridge measurements see S01-F01 also. For high-frequency measurement use S01-H05 also. For measurements on passive components, use S01-G12 codes also.

S01-D05A

Inductance, capacitance, Q factor, loss factor, dielectric constant

AC bridge

S01-D05A1 [1992]

Inductance measurement

Self, mutual

S01-D05A3 [1992]

Capacitance and dielectric constant measurement

Permittivity

S01-D05A5 [1992]

Quality/loss factor measurement

Tan delta, loss angle, Q-factor, dissipation factor

S01-D05B

Resistance and reflection-based measurements

Includes general measurement of impedance. Measurement of resistance, or predominantly resistive impedance, is covered by S02-D05B1.

S01-D05B1 [1992]

Resistance & conductivity measurements

Includes details of both resistivity and conductivity measurements.

Electrical resistivity, volume resistivity, specific electrical resistance

S01-D05B5 [1992]

Reflection-based measurements

For measurements on antenna feeder e.g. VSWR, gain etc, see W02-B08A1 also.

Reflectometer, time domain

S01-D05B5A [1992]

Characterising circuit

Includes e.g. scattering parameter measurements.

S-parameter

S01-D05B9 [1992]

Other 2-pole measurements

S01-D05C [1980]

4-pole characteristics

Includes measurement of 4-terminal network (i.e. 2-port network) characteristics such as attenuation, phase or amplitude as a function of frequency, Nyquist diagram, Bode plot, etc.

Gain, gain-bandwidth, insertion loss, roll-off, stability, transient response, transmission loss

S01-D06

Pulse characteristics (individual pulses)

Measurement and monitoring of pulse trains are covered by U22-D03.

Duration, rise-time, fall-time, overshoot

S01-D07 [1992]

Electric and electromagnetic fields

(S01-D09)

Measurement of magnetic field strength is covered by S01-E01 codes.

S01-D07A [1992]

Electrostatic fields

Includes measurement of point charges. See also S01-H02 for high voltage applications.

S01-D07A1 [1997]

Using optical techniques

S01-D07B [1992]

Electromagnetic fields

See also S01-H05 for RF field strength measurements.

S01-D07B1 [1992]

Antenna radiation diagram

See also S01-G08A5 and W02-B08A1.

S01-D07B3 [1997]

Using optical techniques

S01-D08 [1992]

Modulation and noise

(S01-D09)

S01-D08A [1992]

Modulation index or depth

See also S01-G08A1 and W02-G01 for transmitter testing. Modulators per se are coded in U23.

Cross-modulation, AM, FM, frequency, deviation, sideband

S01-D08B [1992]

Noise power; noise figure

See also S01-G08A3 and W02-G03 codes for receiver testing.

S-N, signal-to-noise, ratio

S01-D08B1 [1997]

For electronic amplifier

(S01-D08B)

See U24 codes

S01-D08B3 [1997]

For optical amplifier

(S01-D08B)

See also S02-J04A1C and V07-K01C.

S01-D09

Other electrical variable measurements

Includes measurement of turns ratio and number of turns. (See also V02/X12).

Piezoelectric

S01-E

Measuring magnetic variables

Resonance, free induction decay signal coil, NMR, field, nuclear, echo, spin echo, magnetometer, magnetise, Hall-effect, flow

S01-E01

Direction/ magnitude of magnetic field/ flux

Gradiometer, permanent

S01-E01A [1992]

Using superconductive quantum interferometer

See also U14-F02B.

S01-E01A1 [1997]

DC squid

(S01-E01A)

S01-E01A3 [1997]

RF squid

(S01-E01A)

S01-E01B [1992]

Using galvano-magnetic devices

Includes use of Hall-effect devices.

S01-E01B1 [1992]

Detector device per se

See also U12-B01A for Hall-effect devices.

S01-E01C [1992]

Using magneto-optical devices

Includes use of Faraday Effect devices. See also V07-K03.

S01-E01C1 [1992]

Detector device per se

S01-E01D [2005]

Using magnetoresistive devices

S01-E01D1 [2005]

Device per se

S01-E01X [1992]

Other magnetic variable measurement (including magnetostrictive)

S01-E02

Magnetic properties

S01-E02A [1992]

Quantised spin properties

See S03-C02F and S03-E07 codes. S01-J02 code is used for cooling arrangements.

S01-E02A1 [1997]

NMR

(S01-E02A)

S01-E02A1A [1997]

Sample handling

(S01-E02A)

Includes spinning mechanism.

S01-E02A2 [1997]

MRI

(S01-E02A)

S01-E02A2A [1997]

Image enhancement

(S01-E02A)

Includes artefact suppression. See S05-D02B2 for medical application. See S03-E09X for contrast agents.

S01-E02A3 [1997]

Nuclear Quadrupole Resonance
NQR

S01-E02A4 [1997]

ESR/EPR
(S01-E02A)
Spin, paramagnetic, resonance, electron

S01-E02A8 [1997]

Quantised spin measuring device details
(S01-E02A)
Refers to all devices within the scope of S01-E02A.

S01-E02A8A [1997]

Coils and waveguides
(S01-E02A)
Includes coils for RF excitation and detection. Does NOT include coils for generating magnetic fields, e.g. gradient coils. For coils generating magnetic fields, see S01-E02A8E. Also includes antennae. See also V02-F01G and X12-C codes.

S01-E02A8C [1997]

Signal and image processing
(S01-E02A)
See T01-J04B for use of Fast Fourier Transform.
Fourier Transform

S01-E02A8E [1997]

Magnets
(S01-E02A)
Includes coils for generating magnetic fields, e.g. gradient coils, electromagnets. See also V02-E codes.
Electromagnetic, superconducting

S01-E02A8P [2005]

Pulse sequences
Covers methods and apparatus which control the timing, shape and duration of the RF pulses.

S01-E02A8Q [2005]

Control and operation
Covers all systems for operation and control of NMR equipment other than RF pulses.

S01-E02A8X [1997]

Other quantised spin properties measuring device details
(S01-E02A)

S01-E02A9 [1997]

Other quantised spin properties
(S01-E02A)

S01-E02X [1997]

Other magnetic properties
(S01-E02)
See S03-E11 for investigation of materials using magnetic variables.
Ferromagnetic, eddy, susceptibility, coercivity, excitation, permeability

S01-F

Measurements involving comparison with a reference
Ratio, standard

S01-F01

AC or DC bridges
See S01-D05 also for appropriate measurement.
Resistance, capacitance, inductance, Wheatstone, transformer

S01-F01A [1992]

With transducer forming part of bridge
Includes Wheatstone bridge circuit with resistance strain gauge e.g. for force measurement (see also S02-F01C), or weighing (see also S02-D01B).

S01-F09

Other reference measurements
Polarity

S01-G

Testing electric properties; locating electric faults
See general scope note for S01 section. Includes power supply fault, energy quality, energy efficiency, etc.

S01-G01

Electronic circuits
Covers measurements at nodes of circuits which may be discrete or integrated.

S01-G01A

Digital circuits
Includes logic tester/analyser.
VLSI, integrated, IC, ROM, EEPROM

S01-G01A1 [1992]

Testing integrated circuits

Measurements on IC regarded as functional block are covered by S01-G02B. Includes use of electron beam probe techniques (see also S01-D01D7), and boundary scan testing (see also S01-G01A5). For on-chip test circuits, see U11-F01D2, U13-C07 also.

S01-G01A3 [1992]

Testing modules or cards

S01-G01A5 [1992]

Logic analyser

S01-G01A9 [1992]

Other digital circuit testing

S01-G01B

Printed circuit boards

See V04-R06 codes.

Contact, mount, probe, pin, PCB

S01-G01B1 [1987]

Bare PCB i.e. before component mounting

Tracks, continuity, short circuit

S01-G01B3 [1987]

Assembled PCB, including ATE

See S01-H03 codes for probe details.

Suction, board positioning, 'bed-of-nails', component

S01-G01C [1992]

Analogue circuits

S01-G01C1 [1992]

Analogue integrated circuits

See note for S01-G01A1.

S01-G01C3 [1992]

Analogue circuit modules

S01-G01C9 [1992]

Other analogue circuit testing

S01-G01D [2006]

Using external optical/ thermal/ other stimulation

Includes measurement where circuit is stimulated by external energy to induce voltage/current/ resistance change, which is then used for failure detection/ testing operation of circuit. For any subsequent non-contact measurement of voltages/currents, see also S01-D01D.

EBIC, OBIC, OBIRCH, voltage contrast

S01-G02

Tubes and semiconductor devices and display panels

Characteristic, curve, acceptance test

S01-G02A [1992]

Tubes

See also V05-L07E1 codes and X26-A03 for tube and discharge lamp testing respectively.

Valve, CRT

S01-G02B [1992]

Semiconductor devices

Codes in this section are used to denote testing of a semiconductor device as a "functional block" or "black box". See S01-G01A1 and S01-G01C1 for testing involving measurement of voltages and currents within the circuit itself.

Note, also includes unspecified electrical testing of semiconductor devices.

Bipolar, unipolar, FET, MOS, CMOS, integrated circuit, IC, transistor, thyristor, SCR, triac, diac, diode, rectifier, varactor

S01-G02B1 [1992]

At wafer or die level

See U11-F01D codes also.

Defect, fault, mark, identify

S01-G02B5 [1992]

Completed (encapsulated) device

See also U11-F01C codes.

IC, integrated circuit, transistor, SCR, triac, diac, diode, rectifier, varactor

S01-G02C [2006]

Display panels

Electrical measurements relating to display panels, e.g. LCD, PDP, FED, and associated circuitry. See also S02-J04A3A for LCD testing

S01-G03

Materials, for dielectric strength or breakdown voltage

Includes arc detection in general.

HV, discharge, withstand, tracking, arcing, insulator

S01-G04

Testing for short circuits, discontinuity and leakage

Cable core identifier, plug/socket connection tester, continuity tester

S01-G04A [1992]

Short circuit and leakage

S01-G04A1 [1992]

Short circuit

S01-G04A5 [1992]

Leakage

S01-G04A5A [1992]

With preset threshold

S01-G04C [1992]

Checking continuity

S01-G04C1 [1992]

Without resistance measurement

S01-G04C5 [1992]

With resistance measurement

S01-G04C5A [1992]

With pre-set threshold

S01-G05

Locating faults in cables or networks

Used for 'installed' cables and transmission lines.
See also X12-G01C for power cables W02-C01D for communication cables.

Telecommunication, break point, capacitance

S01-G06 [1983]

Batteries

See X16-H also which includes non-electric testing, e.g. of specific gravity, not coded in S01-G06.

Charge, terminal, accumulator, ampere-hour, capacity

S01-G06A [1992]

Measurement of remaining battery capacity

Reserve, residual, discharge

S01-G07 [1983]

Electrical machines

See V06-M11 and X11-J codes also.

Winding, coil, phase, rotating, rotor, stator, motor, generator, dynamo, alternator, dynamoelectric

S01-G08 [1992]

Radio equipment and related systems

(S01-G09)

See also W02-C05 and W02-G, and also relevant S01-D codes for specific electrical measurement aspect, e.g. from S01-D07 and S01-D08.

S01-G08A [1992]

Testing methods for equipment

The codes in this section are used when the method of testing is intended for a specific type of equipment.

S01-G08A1 [1992]

Transmitters, repeaters

S01-G08A3 [1992]

Receivers

S01-G08A5 [1992]

Antennae

S01-G08A9 [1992]

Other equipment testing

S01-G08B [1992]

Equipment for testing

The codes in this section are used when the novelty resides in the test equipment itself.

S01-G08B1 [1992]

Signal sources

Includes signal generators, noise generators, etc.

S01-G08B3 [1992]

Equipment with measuring facility

Includes e.g. RF power meter, noise-measuring receiver etc.

S01-G08B5 [1992]

Screening arrangements

Includes e.g. RF Faraday cage. See also S01-J02.

S01-G08B9 [1992]

Other radio test equipment

S01-G08C [1992]

Electromagnetic compatibility testing

See S01-D08B for noise figure measurements and S01-G08B5 for Faraday cage measurements. Covers tolerance of circuits to EM interference and output interference of device to other devices (e.g. effect of electric motor on TV).

EMC

S01-G09

Other electrical property tests

Includes non-specific aging testing.

S01-G10 [1992]

Switches and switchgear

(S01-G09)

Includes circuit breaker and relay testing. See also V03 and X13 codes.

Contact, contactor, breaker, relay, reed

S01-G12 [1992]

Passive components

Use with S01-D05 codes as appropriate, e.g. for measurement of resistance of an inductor, search S01-D05B1 and S01-G12E5.

S01-G12A [1992]

Resistors

See V01-A04H1 (or X12-A if power type) also.

S01-G12C [1992]

Capacitors

See also V01-B01G7C (electrolytic), V01-B04C (non-electrolytic), or X12-B (power capacitors).

S01-G12E [1992]

Inductive components

See also V02-H codes for low power components and X12-C01D3.

S01-G12E1 [1992]

Transformers

S01-G12E5 [1992]

Coils

S01-G13 [2011]

Insulators

Testing of all electrical insulators.

S01-G14 [2006]

Wires or cables

See also relevant X12-G codes.

S01-H

Electrical instrument details (general)

Non-electric, or non-specifically electric, instrument details are covered by S01-J codes.

S01-H01 [1983]

Testing, calibrating, monitoring and compensation

Also includes arrangements to prevent and/or indicate fraudulent use and for signalling faults.

Reference, standard, setting-up, compare, monitor, self-check

S01-H01A [1992]

Compensation

Includes compensation for e.g. noise effects, temperature variation etc. See also S02-K02 codes for compensation aspects of measurement systems in general.

S01-H01A1

Noise reduction

(S01-H01A)

S01-H01B [2005]

Testing

S01-H01C [2005]

Calibration

S01-H02 [1983]

For high voltage/current networks

HV, power line

S01-H03 [1983]

Probes, contacts

PCB, electronic circuits

S01-H03A [1992]

Multiple probe arrangement

Includes probe board, pin network, 'bed-of-nails' etc. See also S01-G01B for measurements on PCBs.

Integrated circuit, IC, wafer, circuit board, card, automatic test equipment, ATE

S01-H03B [1992]

Single probe

Includes probe for e.g. multimeter, or oscilloscope.

Test prod, clip, alligator, crocodile

S01-H04 [1997]

Multimeters

(S01-H09)

S01-H05 [1987]

For high-frequency measurements

Use with other codes where HF effects dictate measurement techniques. NMR and MRI are no longer coded in this section, see relevant S01-E02 codes.

Microwave, probe, RF, capacitance, inductance, skin effect, leakage

S01-H07 [1992]

Processor-controlled instrument

Includes computer control of operation. See also T01-J08A.

S01-H07A [1992]

Interfacing and remote control

Includes data transfer arrangement for multiple instrument systems. See T01-J08A and T01-C/T01-H codes also.

S01-H09 [1992]

Other electrical instrument details

From 2009 power supply for instrumentation are coded in S01-J04 instead.

S01-J

Instrument details (classes S01 to S03)

Codes in this section relate to non-electrical and electrical instruments.

S01-J01

Housing

Housings for electrical equipment in general are covered by V04-S codes.

Meter, lock, seal, case, wall, tamper, access, hinge, cover, enclosure

S01-J02

Indicating elements, cooling, screening

See S03-A04 for cooling arrangement for optical measuring instruments.

Shielding, set-up, adjustment, standard, reference

S01-J02A [1992]

Indicating elements

Scale, meter, printer, display, read-out

S01-J02C [2005]

Cooling, screening

S01-J03 [2006]

Instrument manufacture

Includes all manufacturing of instrumentation included in S01, S02 or S03 classes. Search with apparatus or method codes in addition to this code for specific instrumentation manufacturing details.

S01-J04 [2009]

Power supply

Includes power supply for all instrumentation devices in S01, S02 and S03.

Voltage source, current source

S01-J05 [2018]

Cables, terminals

Includes wires, cables, terminals, etc, for all instrumentation devices in S01, S02 and S03. See also V04 codes.

Switching box

S01-J09

Other instrument details (incl. vibration dampening)

Includes supports, arrangements adjusting position or attitude, compensating for effects of tilting.

Mount, vibration, insulation, installation, bracket

S02: Engineering Instrumentation

S02-A

Measuring, dimensions, angles, areas, contours, roughness

Codes in this section are applied in the hierarchy according to the primary method of measurement, e.g. a Vernier caliper using an electrical transducer to produce reading on a display would be coded under mechanical measurement.

S02-A01

Mechanical measurement

Slide, scale

S02-A01A

Rules, micrometers, wheels

Tape, mark, edge

S02-A01B

Gauges (e.g. feeler-pin or thread gauges)

Caliper, feeler, probe, dial, tool, vernier

S02-A01C*

Measuring arrangements (for)

*This code is now discontinued and transferred to S02-A10 together with S02-A01 from 201401. It remains searchable for records prior to 2014.

Position, configuration, curve, displacement, distance, dimension, height, shape

S02-A01C1*

Diameter

*This code is now discontinued and transferred to S02-A10A together with S02-A01 from 201401. It remains searchable for records prior to 2014.

Radius, circle

S02-A01C2*

Length, width, thickness

*This code is now discontinued and transferred to S02-A10B together with S02-A01 from 201401. It remains searchable for records prior to 2014.

S02-A01C3*

Spacing, depth, contour

*This code is now discontinued and transferred to S02-A10B together with S02-A01 for spacing and depth, and S02-A10C together with S02-A01 for contour, from 201401. It remains searchable for records prior to 2014.

S02-A01C4*

Angles, alignment, position, area

*This code is now discontinued and transferred to S02-A10D together with S02-A01 for angles, orientation and alignment, S02-A10C together with S02-A01 for area and S02-A10G2 together with S02-A01 for position from 201401. It remains searchable for records prior to 2014.

Includes measuring orientation.

S02-A01C5*

Roughness, deformation

*This code is now discontinued and transferred to S02-A10E together with S02-A01 for roughness, S02-A10F together with S02-A01 for deformation from 201401. It remains searchable for records prior to 2014.

Surface, flat, smooth

S02-A01X

Other mechanical measurements

S02-A02

Electrical or magnetic measuring arrangements

Transducer

S02-A02A*

Diameter, spacing

*This code is now discontinued and transferred to S02-A10A together with S02-A02 for diameter and S02-A10B together with S02-A02 for spacing from 201401. It remains searchable for records prior to 2014.

Distance, displacement, gap, radius

S02-A02B*

Thickness of sheet or coating

*This code is now discontinued and transferred to S02-A10B1 together with S02-A02 from 201401. It remains searchable for records prior to 2014.

Capacitance, magnetic, eddy current, film

S02-A02C*

Length, width or thickness

*This code is now discontinued and transferred to S02-A10B together with S02-A02 from 201401. It remains searchable for records prior to 2014.

S02-A02D*

Deformation

*This code is now discontinued and transferred to S02-A10F together with S02-A02 from 201401. It remains searchable for records prior to 2014.

Strain gauge, distortion

S02-A02E*

Depth, contour

*This code is now discontinued and transferred to S02-A10B together with S02-A02 for depth and S02-A10C together with S02-A02 for contour from 201401. It remains searchable for records prior to 2014.

Curve, profile

S02-A02F*

Angles, alignment, position

*This code is now discontinued and transferred to S02-A10D together with S02-A02 for angles and alignment and S02-A10G2 together with S02-A02 for position from 201401. It remains searchable for records prior to 2014.

Includes measuring orientation.

S02-A02G* [1997-2013]

Roughness

(S02-A02X)

*This code is now discontinued and transferred to S02-A10E together with S02-A02 from 201401. It remains searchable for records prior to 2014.

Smooth, surface

S02-A02X*

Other electrical or magnetic measuring arrangements

*This code is now discontinued and transferred to S02-A10 together with S02-A02 from 201401. From 201401, details of area measurements are coded under S02-A10C together with S02-A02. S02-A02X remains searchable for records prior to 2014.

Includes area.

Surface, cross-section

S02-A03

Optical measurement

Note - codes in this section cover disclosures where light is the primary means of measurement irrespective of subsequent treatment or processing, such as in CCTV system.

Beam, laser, reflect, grating

S02-A03A

Interferometers

Fabry-Perot

S02-A03B*

Measuring arrangements (for)

*This code is now discontinued and transferred to S02-A10 together with S02-A03 from 201401. It remains searchable for records prior to 2014.

S02-A03B1*

Thickness of sheet, diameter, coating

*This code is now discontinued and transferred to S02-A10B1 together with S02-A03 for thickness of sheet or coating, and S02-A10A together with S02-A03 for diameter from 201401. It remains searchable for records prior to 2014.

Radius, circle

S02-A03B2*

Length, width, thickness, spacing

*This code is now discontinued and transferred to S02-A10B together with S02-A03 from 201401. It remains searchable for records prior to 2014.

Distance, displacement

S02-A03B3*

Deformation, depth or contour

*This code is now discontinued and transferred to S02-A10B together with S02-A03 for depth, S02-A10F together with S02-A03 for deformation, and S02-A10C together with S02-A03 for contour from 201401. It remains searchable for records prior to 2014.

Profile, curve, strain, irregularity, undulation

S02-A03B4*

Angles, alignment, position

*This code is now discontinued and transferred to S02-A10D together with S02-A03 for angles and orientation, and S02-A10G2 together with S02-A03 for position from 201401. It remains searchable for records prior to 2014.

Includes measurement of orientation, tapers or optical axes alignment.

3D position

S02-A03B5*

Area, roughness

*This code is now discontinued and transferred to S02-A10C together with S02-A03 for area and S02-A10E together with S02-A03 for roughness from 201401. It remains searchable for records prior to 2014.

Flat, smooth, surface, cross-section

S02-A04

Measuring arrangements using fluids

Inclination, liquid, spirit-level, bubble, pneumatic, hydraulic, air, gas

S02-A05

Measuring using radiation, sound

S02-A05A [1983]

Radiation

Includes dimensional measurements using e.g. electron microscope.

S02-A05A1 [1997]

Using microwaves

(S02-A05A)

Includes use of terahertz radiation.

S02-A05A3 [1997]

Using atomic or nuclear radiation

(S02-A05A)

Includes electrons, X-rays, gamma radiation etc.

X-ray, gamma ray

S02-A05B [1983]

Sound

See W06-A05 for sonar systems, S03-E08 or S05-D03 for materials testing or medical systems respectively.

Ultrasonic, echo, propagation time, round-trip

S02-A05B1* [1997-2001]

Diameter

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C1 together with S02-A05A/B between 2002 and 2013, and to S02-A10A together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

S02-A05B2* [1997-2001]

Length, width, thickness

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C2 between 2002 and 2013, and to S02-A10B together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

S02-A05B3* [1997-2001]

Deformation, depth, contour

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C3 between 2002 and 2013. From 201401, deformation measurements are coded under S02-A10F together with S02-A05A/B, depth under S02-A10B together with S02-A05A/B and contour under S02-A10C together with S02-A05A/B. S02-A05B3 remains searchable and valid for records from 1997 to 2001.

S02-A05B4* [1997-2001]

Angles, alignment, position

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C4 between 2002 and 2013. From 201401, angle and alignment measurements are coded under S02-A10D together with S02-A05A/B, and position under S02-A10G2 together with S02-A05A/B. S02-A05B4 remains searchable and valid for records from 1997 to 2001.

S02-A05B5* [1997-2001]

Area, roughness

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C5 between 2002 and 2013. From 201401, area measurements are coded under S02-A10C together with S02-A05A/B, and roughness under S02-A10E together with S02-A05A/B. S02-A05B5 remains searchable and valid for records from 1997 to 2001.

S02-A05B9* [1997-2001]

Other dimensional measurement using sound

(S02-A05B)

*This code is now discontinued and transferred to S02-A05C1 between 2002 and 2013, and to S02-A10X together with S02-A05A/B from 201401, but remains searchable and valid for records from 1997 to 2001.

S02-A05C* [2002-2013]

Measuring arrangements, (for)

*This code is now discontinued and transferred to S02-A10 from 201401, but remains searchable and valid for records from 2002 to 2013.

Codes in this section are used with S02-A05A or S02-A05B codes to specify what is being measured.

S02-A05C1* [2002-2013]

Thickness of sheet, diameter, coating

*This code is now discontinued and transferred to S02-A10A for diameter, and S02-A10B1 for thickness of sheet or coating from 201401, but remains searchable and valid for records from 2002 to 2013.

Radius, circle

S02-A05C2* [2002-2013]

Length, width, thickness, gap, spacing

*This code is now discontinued and transferred to S02-A10B from 201401, but remains searchable and valid for records from 2002 to 2013.

S02-A05C3* [2002-2013]

Deformation, depth, contour

*This code is now discontinued and transferred to S02-A10F for deformation, S02-A10B for depth, and S02-A10C for contour from 201401 but remains searchable and valid for records from 2002 to 2013.

S02-A05C4* [2002-2013]

Angles, alignment, position

*This code is now discontinued and transferred to S02-A10D for angles and alignment, and S02-A10G2 for position from 201401 but remains searchable and valid for records from 2002 to 2013.

Includes measurements of orientation.

S02-A05C5* [2002-2013]

Area, roughness

*This code is now discontinued and transferred to S02-A10C for area, and S02-A10E for roughness from 201401 but remains searchable and valid for records from 2002 to 2013.

S02-A05C9* [2002-2013]

Other dimensional measurement using radiation, sound

*This code is now discontinued and transferred to S02-A10X together with S02-A05A/B from 201401, but remains searchable and valid for records from 2002 to 2013.

S02-A06* [1992-2013]

Coordinate and position measurement

*This code is now discontinued and transferred to S02-A10G from 201401, but remains searchable and valid for records from 1992 to 2013.

The emphasis is on relative measurement to any arbitrary coordinate system, e.g. Cartesian or Polar, rather than absolute measurement.

S02-A06A* [1992-2013]

Coordinates

*This code is now discontinued and transferred to S02-A10G1 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A06A1* [1992-2013]

Mechanical

*This code is now discontinued and transferred to S02-A10G1 together with S02-A01 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A06A2* [1992-2013]

Electrical/magnetic

*This code is now discontinued and transferred to S02-A10G1 together with S02-A02 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A06A3* [1992-2013]

Optical

*This code is now discontinued and transferred to S02-A10G1 together with S02-A03 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A06A9* [1992-2013]

Other coordinate type measurement

*This code is now discontinued and transferred to S02-A10G1 together with S02-A09 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A06C* [1992-2013]

Position

*This code is now discontinued and transferred to S02-A10G2 from 201401, but remains searchable and valid for records from 1992 to 2013. For determining location in space rather than orientation.

S02-A06X* [1992-2013]

Other relative measurement

*This code is now discontinued and transferred to S02-A10G9 from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A07 [1992]

Calibration, compensation and testing

S02-A08* [1992-2013]

Combination of measuring methods

*This code is now discontinued from 2014, but remains searchable and valid for records from 1992 to 2013. From 201401, a combination of S02-A01 to S02-A05 codes is used to highlight the use of more than one measuring method. When the measuring method is not specified, only S02-A10 codes are applied to highlight what is measured.

Codes in this section are used to indicate the use of one or more than one method from the preceding groups, e.g. electrical and optical measurement, or where the primary method of measurement is unclear.

S02-A08A* [1992-2013]

Thickness of sheet, diameter

*This code is now discontinued and transferred to S02-A10A for diameter and S02-A10B1 for thickness of sheet from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A08B* [1992-2013]

Length, width, spacing

*This code is now discontinued and transferred to S02-A10B from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A08C* [1992-2013]

Deformation, depth or contour

*This code is now discontinued and transferred to S02-A10F for deformation, S02-A10B for depth, and S02-A10C for contour from 201401 but remains searchable and valid for records from 2002 to 2013.

S02-A08D* [1992-2013]

Angles, alignment, position

*This code is now discontinued and transferred to S02-A10D for angles and alignment, and S02-A10G2 for position from 201401 but remains searchable and valid for records from 2002 to 2013. Includes measurements of axes, tapers, orientation, etc.

S02-A08E* [1992-2013]

Area, roughness

*This code is now discontinued and transferred to S02-A10C for area, and S02-A10E for roughness from 201401 but remains searchable and valid for records from 2002 to 2013.

S02-A08X* [1992-2013]

Other combined measuring

*This code is now discontinued and transferred to S02-A10X from 201401, but remains searchable and valid for records from 1992 to 2013.

S02-A09

Other measuring methods

This code is applied for measuring methods that cannot be coded under S02-A01 to S02-A05 codes. When the measuring method is not specified, only S02-A10 codes should be applied to highlight what is being measured.

S02-A10 [2014]

Measuring arrangements (for)

Codes in this section are used to indicate what is being measured, and should be applied together with other S02-A codes to indicate the method of measurement.

S02-A10A [2014]

Diameter

(S02-A01C1, S02-A02A, S02-A03B1, S02-A05C1, S02-A08A)

Radius, circle

S02-A10B [2014]

Length, Width, Thickness, Spacing, Depth

(S02-A01C2, S02-A01C3, S02-A02A, S02-A02C, S02-A03B2, S02-A05C2, S02-A05C3, S02-A08B, S02-A08C)

Gap, clearance, displacement

S02-A10B1 [2014]

Thickness of sheet or coating

(S02-A02B, S02-A03B1, S02-A05C1, S02-A08A)

S02-A10C [2014]

Contour, Area

(S02-A01C3, S02-A01C4, S02-A02E, S02-A02X, S02-A03B3, S02-A03B5, S02-A05C3, S02-A05C5, S02-A08C, S02-A08E)

Includes shape measurements.

Curvature, spherometer

S02-A10D [2014]

Angles, Orientation, Alignment

(S02-A01C4, S02-A02F, S02-A03B4, S02-A05C4, S02-A08D)

S02-A10D1 [2014]

Angles, Orientation

(S02-A01C4, S02-A02F, S02-A03B4, S02-A05C4, S02-A08D)

Inclination, taper

S02-A10D2 [2014]

Alignment

(S02-A01C4, S02-A02F, S02-A03B4, S02-A05C4, S02-A08D)

Perpendicularity

S02-A10E [2014]

Roughness

(S02-A01C5, S02-A02G, S02-A03B5, S02-A05C5, S02-A08E)

Flat, smooth

S02-A10F [2014]

Deformation

(S02-A01C5, S02-A02D, S02-A03B3, S02-A05C3, S02-A08C)

Mechanical strain gauge, resistance strain gauge, straightness

S02-A10G [2014]

Coordinates, Position

(S02-A06)

The emphasis is on relative measurement to any arbitrary coordinate system, e.g. Cartesian or Polar, rather than absolute measurement.

S02-A10G1 [2014]

Coordinates

(S02-A06A)

S02-A10G2 [2014]

Position

(S02-A06C)

For determining location in space rather than orientation.

S02-A10G9 [2014]

Other relative measurements

(S02-A06X)

S02-A10X [2014]

Other measuring arrangements

S02-B

Surveying and navigation

Position, scan, infrared, IR, laser optical

S02-B01

Measuring distances in line of sight; optical rangefinders

See W06-A06 for laser 'radar' systems. Rangefinders for photographic cameras are also coded in S06-B01A.

Range, light, beam, modulate, reflect, camera

S02-B01A [2005]

Large scale position and location measurement

Includes mining and pipeline machinery position location. Does not include RADAR, GPS systems (see W06).

Co-ordinate measurement, displacement

S02-B02

Measuring height; Leveling; Profile tracing

Includes leveling between separated points using e.g. direct/barometric/stradia/fly leveling. Also includes measuring distances transverse to line of sight and tracing profiles of land surfaces using e.g. a vehicle moving along the profile to be traced, or cavities (such as tunnels).

Surveyor's level, differential leveling

S02-B02A [2005]

Measuring altitude

(S02-B02)

S02-B03

Measuring inclination

Level, spirit, liquid, bubble, inclinometer, clinometer, angle, plumb, bob, slope, slant, gradient, grade

S02-B04

Photographic surveying; open-water surveying

Includes electronic imaging surveillance from e.g. orbiting space vehicle. Electrical aspects of photographic cameras are covered by S06-B codes, video cameras by W04-M01 codes.

Photogrammetric, aerial, aircraft, satellite, map, plane, sea

S02-B05

Measuring angles (incl. theodolites; sextants)

Angular, axis

S02-B05A [2005]

Measuring attitude and orientation

S02-B06

Compasses

Electrical aspects of compasses are also coded in W06-A09.

Magnetic, magnetometer, elevation, azimuth, pole, vehicle

S02-B07

Gyroscopes

See also W06-A07 for electric/electro-optical details.

Gyro, rotating, angular, rate, axis

S02-B07A [1992]

With electric transducer

Coriolis, vibration

S02-B07B [1992]

Using optical effects

Includes Ring Laser Gyroscopes and optical fiber gyroscopes. See V08-A01A1 for Ring Laser Gyroscopes and V08-A codes for laser details. See V07-N01 or optical fiber gyroscopes specifically and V07-K codes for light control aspects.

Fiber-optic, Sagnac effect, RLG, beam, relativistic, counter-propagating

S02-B08

Navigation techniques

See also W06-A codes. For systems specifically for aircraft, ships and land vehicles, see also W06-B01B1, W06-C01B and X22-E06 codes respectively.

Road, display, indicate, route, map, moving map, update, coordinate

S02-B08A [1997]

Using radio

(S02-B08)

S02-B08C [1997]

Satellite

(S02-B08)

See W06-A03A for Global positioning System. X22-E06B covers GPS as applied to vehicle navigation.

GPS, Global Positioning System, NAVSTAR

S02-B08E [1997]

Display and indication aspects

(S02-B08)

For novel visual display aspects see S02-K04C; for audio output, see S02-K04A and possibly also W04-V for speech synthesis; for haptic output, see S02-K04D.

S02-B08G [1997]

Computer/processor

(S02-B08)

Includes software. See also T01-J06B codes.

S02-B08X [2005]

Other navigation techniques

(S02-B08)

Includes inertial and dead reckoning techniques.

S02-B09

Other surveying/navigation

Includes electrical aspects of telescopes.

S02-B10 [1992]

Testing, calibration and monitoring of surveying/navigation equipment

(S02-B09)

S02-B11 [1992]

Instrument combinations

(S02-B09)

Includes measurement of two or more variables.

S02-B12 [1992]

Distance recording devices

(S02-B09)

S02-B12A [1992]

For vehicles

Includes odometers. For electrical aspects see also X22. (Tachographs are coded in T05-G01 and X22-E05).

Hodometer, tachometer

S02-B12B [1992]

Non-vehicle travel recorder

Includes pedometers.

S02-C

Measuring volume, volume flow, mass flow or liquid level; metering by volume.

Meter, water, air, gas, fluid

S02-C01

Continuous volume/mass flow meters

Pressure, valve, pipe, rate, fuel, transducers

S02-C01A

Mechanical

S02-C01A1

Using rotating vanes; using pressure/pressure difference measurement

Wheel, turbine, blade, Bernoulli, Venturi

S02-C01A9

Other mechanical flow measurement (incl. dynamic effects)

Vortex, float, swirl, Karman

S02-C01B

Using electric, magnetic, wave propagation or thermal effect

S02-C01B1 [1983]

Wave effects

Ultrasonic, Doppler, blood, velocity, acoustic, sonic, sound, medical

S02-C01B4 [1983]

Electric or magnetic effects

Electromagnet, coil

S02-C01B7 [1983]

Thermal effects

Engine, IC, intake, heat

S02-C01B7A [1997]

Device per se

(S02-C01B7)

S02-C01B7C [1997]

Circuitry

(S02-C01B7)

S02-C01F [1992]

Mass flow meters

(S02-C01X)

Includes Coriolis flow meters.

S02-C01F1 [1997]

Air mass flow sensors

(S02-C01F)

S02-C01X

Other flow meters

Includes using camera to image fluid to determine flowrate.

S02-C02

Discontinuous volume flow meters, water and gas meters

Chamber, piston

S02-C02A [1997]

Water meter

(S02-C02)

Includes water meters using continuous flow measurement techniques.

S02-C02A1 [1997]

Protection against tampering

(S02-C02)

S02-C02C [1997]

Gas meter

(S02-C02)

Includes gas meters using continuous flow measurement techniques.

S02-C02C1 [1997]

Protection against tampering

(S02-C02)

S02-C03

Other vol. flow measurement (incl. compound meters, measuring relative flow)

Fuel, engine, IC

S02-C04

Dispensers

Dose, pump, chamber, container, drink, supply

S02-C04A

With expanding or contracting measuring chambers

Piston, stroke

S02-C04B

With moving measuring chambers

S02-C04C

With stationary measuring chambers

Optic

S02-C04X

Other dispensers

S02-C05

Measuring volume, capacity; measuring-vessels

Cup

S02-C06

Level indicating

Tank, fuel, depth, gauge, height

S02-C06A

By floats

Switch, magnet, reed

S02-C06A1 [1992]

Operating electrical switch or transducer

S02-C06A1A	[1992]
Operating switch	
S02-C06A1B	[1992]
Operating transducer	
Covers arrangements with proportional output, e.g. resistance wiper blade.	
S02-C06A5	[1992]
Non-electric system	
S02-C06B	
By measuring weight or pressure	
S02-C06C	
By measuring variation of electrical properties of sensor	
This code and its subdivisions are used for cases in which the substance being monitored directly modifies the electrical property concerned. See S02-C06A codes for float-operated systems.	
<i>Probe, electrode, resonance, oscillator</i>	
S02-C06C1	[1992]
Resistive system	
S02-C06C1A	[1992]
Combined with heater	
S02-C06C3	[1992]
Capacitive system	
S02-C06C9	[1992]
Other sensor properties (e.g. inductive)	
<i>Inductance</i>	
S02-C06D	
Using wave propagation effects	
<i>Refraction, reflection, diffraction, interference</i>	
S02-C06D1	[1992]
Using optical frequencies (em)	
<i>Light, IR</i>	
S02-C06D3	[1992]
Using sonic or ultrasonic radiation	
<i>Echo</i>	
S02-C06D5	[1992]
Using radio frequencies (em)	
For radar-type systems search with W06-A04H8.	
<i>Microwave, RF</i>	

S02-C06D9	[1992]
Other wave propagation level sensing	
S02-C06X	
Other level indicating	
Includes dip-sticks and observable marks or scales on transparent vessel. Also includes level indicating using measurement of temperature.	
S02-C07	
Testing, calibrating and compensation aspects of S02-C equipment	
S02-D	
Weighing	
<i>Scale, load, platform</i>	
S02-D01	
Weighing apparatus	
S02-D01A	
Balances	
<i>Beam, pan</i>	
S02-D01B	
Using elastic materials	
<i>Strain, gauge, spring, extension</i>	
S02-D01X	
Other weighing appts. details	
Includes magnetic, electrostatic or fluid action balancing.	
<i>Liquid, hydraulic</i>	
S02-D02	
Weighing appts. for special purposes	
S02-D02A	
Weighing continuous stream of material	
Includes measurement of weight of material e.g. on conveyer belt.	
<i>Flow, grain, granular, powder, fluid</i>	
S02-D02B	
Weighing batches	
<i>Check, automatic discharge</i>	
S02-D02C	
Weighing sheets, wires, fluids, livestock, vehicles (e.g. aircraft), weighing during motion	
<i>Platform, weighbridge</i>	

S02-D02D [1992]

Price-indicating balance

Includes weighing at point-of-sale (see also T05-L01 codes).

S02-D02X

Other weighing appts. for special purposes.

Includes appts. for incorporation in vehicles and appts. for weighing people.

S02-D03

Indicating/recording weight

Display, calculate, label, printer

S02-D07 [2014]

Calibration, compensation and testing of weighing equipment

(S02-D09)

Includes monitoring details.

S02-D09

Other weighing aspects

Includes details of weighing apparatus, e.g. bearings, beams. Since 201401, calibration, compensation and testing details of weighing equipment are coded under S02-D07 only.

S02-E

Measurement of mechanical vibrations

Includes measurement of sound intensity.

S02-E01

Vibration measurement methods

Includes measuring reverberation time, propagation velocity, resonant frequency or sound impedance.

Acoustic, sound, transducer, speed

S02-E02

Vibration detectors

Includes detectors in fluids, radiation-sensitive detectors; detecting capacitance or reluctance change.

Piezoelectric, magnetostrictive, optical, fiber-optic

S02-E09

Other measurement of mechanical vibrations

S02-F

Measuring force, torque, work, mechanical power or efficiency, fluid pressure or vacuum

S02-F01

Measuring force

Load, thrust

S02-F01A

Hydraulically/pneumatically; by deformation of gauges; by counter-balancing

S02-F01B

Using variations in vibration freq., magnetic properties, capacitance or inductance

Magnetostrictive, resonance, oscillator

S02-F01C

Using electrical resistance strain gauges

Includes piezo-resistive devices.

Load cell

S02-F01E [1997]

Piezoelectric

(S02-F01X)

S02-F01G [1997]

Optical

(S02-F01X)

S02-F01X

Other force measurement (including stress measurement)

S02-F02

Measuring torque, work, mechanical power or efficiency

Includes moment and torque sensors.

Motor, engine, brake, dynamometer, generator

S02-F03

Applications and methods of measuring force

S02-F03A

Linear force, tension

Includes e.g. muscular force, ski binding release force, tension in ropes, belts etc.

S02-F03B

Torque, mechanical power, work

Includes, e.g. axial thrust in shaft, vehicle power, several components of force, torque on nut, testing brakes, force applied to control members, e.g. brake pedal, steering input etc.

Torque wrench, robot, manipulator, brake pedal force, steering input

S02-F03X

Testing, compensation and calibration; other

S02-F04

Measuring fluid pressure or vacuum

Gas, air, liquid

S02-F04A

Measuring pressure mechanically (using)

S02-F04A1

Flexible tube- or bellows type gauges

Bourdon

S02-F04A2

Flexible diaphragm- or capsule type gauges

Membrane, plate

S02-F04A9

Other mechanical fluid pressure measurement (incl. piston or liquid-column gauges)

Manometer

S02-F04B

Measuring pressure electrically or magnetically (incl. electrical or magnetic indication of mechanical sensor displacements) (using)

Transducer

S02-F04B1

Potentiometers, strain gauges, piezo-resistances

Resistor, extension

S02-F04B2

Piezoelectric devices; variations in inductance, capacitance, magnetic properties; movement of magnets; electro-kinetic cells

Electrode, resonance, plate

S02-F04B3

[1992]

Semiconductor transducer

See also U12-B03E.

S02-F04C

Measuring pressure differences, several pressures, inflation pressures

Includes measurement of tyre pressure. See S02-F04E for remote indication and X22-E02 for on-board electric systems.

Differential, vehicle, remote

S02-F04C1

[1997]

Pressure differences

(S02-F04C)

S02-F04C1A

[1997]

Inflation pressures

(S02-F04C)

S02-F04C2

[2005]

Blood pressure

(S02-F04C)

S02-F04C3

[1997]

Several pressures

(S02-F04C)

S02-F04C3A

[1997]

Partial pressures

(S02-F04C)

See also S03-E03 if achieved electrochemically.

S02-F04D

Vacuum gauges; measuring rapid changes in pressure; engine energy or work indicators

S02-F04D1

[1997]

Vacuum gauges

(S02-F04D)

See also V05-K03 for ionisation pressure gauges, e.g. Penning gauges.

Pirani, Penning

S02-F04D3

[1997]

Measuring rapid changes in pressure

(S02-F04D)

S02-F04D3A [1997]

Knock detection

(S02-F04D)

See also S02-J01A for IC engine testing and X22-A05A for IC engine pre-ignition detector. Includes knock detection by means other than using pressure measurement.

Misfire

S02-F04E

Protection against overload or environment; temperature compensation

S02-F04F* [1980-2013]

Testing, calibration and compensation

*This code is now discontinued and transferred to S02-F07 from 201401, but remains searchable and valid for records prior to 2014. Does not include temperature compensation, see S02-F04E.

S02-F04J [1992]

Optical techniques

Optical fiber, polarisation, birefringent

S02-F04X

Other pressure measurement

S02-F07 [2014]

Calibration, compensation and testing

(S02-F04F)

This code can be used together with other S02-F codes to highlight the type of equipment used, e.g. for measuring blood pressure (S02-F04C2). Details of temperature compensation of equipment measuring fluid pressure or vacuum are coded under S02-F04E only.

Monitoring

S02-G

Measuring speed, acceleration or shock

S02-G01

Linear or angular velocity

Rotating, wheel, vehicle, shaft, speedometer

S02-G01A

Optically

Includes angular velocity measurement using optical gyroscope.

Laser, light, gyro, beam, ring

S02-G01B

Electrically or magnetically

Generator, tachometer, pulse, frequency

S02-G01B1

Measuring angular velocity

Does **not** include measurement of angular velocity using electric gyroscope; see S02-G01X.

S02-G01B1A* [1992-2004]

With fixed sensor

*This code is now discontinued, but remains searchable and valid for records from 1992 to 2004.

S02-G01B1B* [1992-2004]

With moving sensor

*This code is now discontinued, but remains searchable and valid for records from 1992 to 2004.

S02-G01B2 [2005]

Measuring linear velocity

S02-G01B9

Other electrical or magnetic velocity measurement

S02-G01D [1997]

Doppler effect methods

(S02-G01)

See also W06-A04A2 (RF radar), W06-A05 (sonic/ultrasonic techniques) and W06-A06 (optical techniques). S02-G02X covers Doppler methods for measuring speed of fluids.

S02-G01X

Other (incl. mechanically)

Includes determination of time to travel fixed distance and measurement of angular velocity using electric gyroscope.

Gyroscope, vibration, Coriolis

S02-G02

Speed of fluids, or bodies relative to fluids (by)

Flow, gas, wind, anemometer, liquid

S02-G02A

Measuring electric or thermal variable affected by the flow

Heat, bridge, cooling, hot-wire

S02-G02B

Measuring fluid force or pressure differences

Pitot tube

S02-G02X

Other measurement of speed of fluids, or bodies relative to fluids (incl. swirl flowmeter)

Ultrasonic, Doppler, vortex, acoustic

S02-G03

Acceleration or shock

Inertia, force, accelerometer, impact, collision

S02-G07 [1992]

Calibration, compensation and testing

(S02-G09)

S02-G07A [1992]

Calibration

S02-G07C [1992]

Compensation aspects

S02-G07E [1992]

Testing and monitoring

S02-G09

Apparatus details and other speed-related measurement aspects

Includes constructional details of measuring devices.

S02-H

Indicating/recording movement or direction of movement

Includes analysis of trajectories.

Range, motion analysis, golf swing

S02-J

Testing machines, structures or appts.

Model, simulate, performance testing, testing during production

S02-J01

Engines

S02-J01A [1983]

IC engines

Fuel-consumption, cylinder, pressure, injection, Diesel, valve, speed, knock

S02-J01A1 [1997]

For aircraft

(S02-J01A)

Includes piston engines.

S02-J01C [1992]

Gas turbine engines

S02-J01C1 [1997]

For aircraft

(S02-J01C)

Includes turbo-prop engines and ram jets. See W06-B01B5 for onboard testing of aircraft engines.

Bypass ratio, turbofan, compressor, afterburn

S02-J01E [1992]

Steam turbines

See X11-A01X for steam turbine testing where steam turbine is specifically for electricity generation.

S02-J01F [2005]

Rocket motors and ion propulsion

(S02-J01X)

S02-J01X [1992]

Other engine types

S02-J02

Vehicles

Includes all vehicle types: aerospace, automotive and locomotive, etc.

Wheel, track, roll, balance, transmission

S02-J02A

Tyre performance, suspension, steering, wheels

Surface, road, tread, hold, grip, angle, toe-in, shock absorber

S02-J02B [1992]

Braking

S02-J02E [1992]

Electrical system

See also S01-G01 for electrical test appts. See X22 codes for tests on vehicle electrical systems.

S02-J02F [1992]

Crash/impact testing

S02-J02F1 [1992]

Crash dummy

Anthropomorphic

S02-J02X

Other vehicle tests (includes testing vehicle transmission)

Alignment, body, clutch, gearbox

S02-J03

Machine parts

Friction, drag

S02-J03A [1983]

Gearing, transmission, bearings

Shaft, tooth, torque, differential, ball race

S02-J03X [1992]

Other testing of machine parts

S02-J04

Optical appts. (also optical testing)

Beam, image, reflect, pattern, scan, objective, focal-length, mirror

S02-J04A [1992]

Testing of optical apparatus

S02-J04A1 [1992]

Testing optical fiber and other guide structures

S02-J04A1A [1997]

Testing optical fiber

(S02-J04A1)

See V07-J also.

S02-J04A1C [1997]

Testing optical amplifiers

(S02-J04A1)

Includes optical fiber amplifiers. See also S01-D08B3 and V07-K01C.

S02-J04A1X [1997]

Testing other guide structures

(S02-J04A1)

S02-J04A3 [1997]

Testing liquid crystals

(S02-J04A9)

See also U14-K01A8.

Nematic, cholesteric

S02-J04A3A [1997]

Testing LCDs

(S02-J04A9)

See also U11-F01F and/or U11-F01D and U14-K01A8.

S02-J04A5 [1992]

Testing and measuring lenses and lens systems

S02-J04A9 [1992]

Testing other optical appts.

Prism, grating

S02-J04B [1992]

Testing of specific optical apparatus

S02-J04B1 [1992]

Microscope

S02-J04B3 [1992]

Fiberscopes and endoscopes

See also V07 codes for novel fiber-optic aspects.

See also S05-D04 codes for medical applications, V07-N02 for optical fiber details and S06-B09 for photographic attachments. See W04-M01 for video camera equipment.

S02-J04B3A [1997]

Fiberscope

(S02-J04B3)

S02-J04B3C [1997]

Endoscope

(S02-J04B3)

S02-J04B9 [1992]

Other optical appts.

S02-J05

Investigating static or dynamic balance

Rotor, rotating, motor, weight, bearing, moment of inertia and dynamic balance/unbalance sensor

S02-J06

Investigating fluid-tightness

Leak, pipe, seal, pressure, air-tight, gas, hermetic, vacuum

S02-J06A

By detecting leakage fluid

S02-J06A1	[1992]
Electrically	
S02-J06A3	[1992]
Acoustic or ultrasonic detection	
S02-J06A5	[1992]
Using tracer substance	
<i>Radioactive, dye, fluorescent</i>	
S02-J06A7	[2006]
Optical detection	
Includes using camera, spectrometer. Prior to 2007, covered by S02-J06A9.	
S02-J06A9	[1992]
Other leakage fluid detection methods	
<i>Liquid, bubble, submerged, immersion testing</i>	
S02-J06B	
By measuring fluid loss/gain rate	
<i>Flow rate, pressure drop</i>	
S02-J06X	
Other fluid tightness investigation	
S02-J07	
Aerodynamic or hydrodynamic testing	
Electrical aspects of aircraft and ship testing are also coded in W06-B05 and W06-C05 respectively.	
<i>Flow, pressure, wind tunnel, aircraft, ship, tank, wave generator</i>	
S02-J08	
Vibration or shock testing of structures	
<i>Impact, dynamic, oscillating</i>	
S02-J09	
Other testing of machines, structures or appts.	
Includes testing during production, performance testing, and model-based simulation testing. See also T01-J15H for simulation of non-electronic systems.	
S02-J10	[1992]
Investigating elasticity of structures	
(S02-J09)	
<i>Extension, strain, stress, Young's modulus</i>	

S02-K	
Indicating or recording – general	
S02-K01	
Appts. indicating/recording function of variable, e.g. r.m.s., mean	
<i>Integrate, meter, data analysis, plotting best straight line, form factor, statistical methods, standard deviation, median, average, mean, least squares, regression</i>	
S02-K02	
Appts. with compensating correcting/protection features	
S02-K02A	[1992]
Compensation/correction for transducer characteristics	
Includes linearizing.	
<i>Linearity, law</i>	
S02-K02B	[1992]
Compensation/correction for ambient variations	
Includes compensation for variation of temperature.	
<i>Pressure</i>	
S02-K02B1	[1997]
Temperature compensation	
(S02-K02B)	
S02-K02B3	[1997]
Pressure compensation	
(S02-K02B)	
S02-K02B9	[1997]
Other environmental compensations	
(S02-K02B)	
S02-K02C	[1992]
Protection	
Includes protection from overload, excess signal level etc.	
S02-K02D	[1992]
Noise reduction	
S02-K02X	[1992]
Other aspects of compensation, correcting and protection	

S02-K03

Transferring or converting sensor output

Transducer, encode, analogue-digital, A-D

S02-K03A

Electrically or magnetically

S02-K03A1

Influencing current/voltage capacitively or electrodynamically

S02-K03A1A [1992]

Electrodynamically

Tacho-dynamo

S02-K03A1C [1992]

Capacitively

S02-K03A2

Influencing current/voltage resistively or inductively

S02-K03A2A [1992]

Resistively

Potentiometer

S02-K03A2C [1992]

Inductively

LVDT, coil, movable armature

S02-K03A5 [1992]

Using magnetic effects

(S02-K03A9)

S02-K03A5A [1992]

Magnetoresistance

S02-K03A5C [1992]

Magnetostriction

S02-K03A5E [1992]

Hall effect

S02-K03A5F [1997]

Magneto-optical

(S02-K03A, S02-K03B)

S02-K03A5X [1992]

Other magnetic effects

S02-K03A9

Other electrical or magnetic transfer

S02-K03B

Optically

Light, fiber, fiber-optic, reflect, beam, intensity, interferometer, laser

S02-K03B1 [1992]

Using fiber optics

See also V07-K10 codes.

S02-K03B9 [1992]

Other optical transference or conversion

S02-K03X

Other (incl. using fluid or mechanically)

Covers use of piezoelectric transducer.

Pressure

S02-K04

Indicating measured values

Alarm

S02-K04A [1992]

Audible indication

S02-K04C [1992]

Visible indication

Display, LED, LCD

S02-K04G [1992]

Indicating threshold value

S02-K04D [2006]

Haptic indication

Prior to 2007, covered by S02-K04X. See W05-A01A1 for general haptic annunciators and alarms.

Tactile feedback, vibrating indicator

S02-K04X [1992]

Other measured value indication

S02-K05

Recording measured values

Includes memory details, pen recorders, line printers etc. See S06 codes for line printer details.

Plot, position, writing, print, mark, paper, platen, X-Y, graphical

S02-K06

Component parts of recording/indicating appts.

Line printers are only included when specifically for printing measured values. See S06 codes for line printer details.

S02-K06A

Scales, dials, pointers

Instrument, display, indicia, markings

S02-K06B

Recording elements

Print, ink, paper, mark

S02-K06B1

Electric, magnetic, heated, optical, perforating elements

Electrode, beam, dot matrix, electrocardiogram

S02-K06B2

Ink transfer recording elements

S02-K06X

Other component parts of recording/indicating appts.

Includes vehicle dashboard instrumentation; see also X22-E codes.

S02-K07 [1992]

Testing, calibration and monitoring

(S02-K09)

S02-K07 codes are only applied when the instrument used is unclear. Otherwise, specific calibration/testing codes from the relevant S02-A to S02-G sections should be applied instead, such as S02-B10 for testing and calibration of surveying and navigation equipment.

S02-K07A [2005]

Testing and monitoring

(S02-K07, S02-K09)

S02-K07B [2005]

Calibration

(S02-K07)

S02-K08 [1992]

Remote reading; tariff metering

(S02-K09)

S02-K08A [1992]

Remote reading

See also S02-K08B for remote reading of e.g. gas, water (S02-C02 codes also), or electricity meters (S01-B01 also), and W05-D codes, e.g. W05-D04A5 for radio link or W05-D07G if for vehicles, which cover telemetry in general.

S02-K08B [1992]

Tariff metering appts.

S02-K09

Other indicating or recording

From 201401, monitoring details are coded under S02-K07A. This code remains searchable and valid for monitoring details for records prior to 2014.

S03: Scientific Instrumentation

S03-A

Measuring optical radiation (IR, visible and UV)

See also S03-E04 for appts. having provision for investigating material sample. Measurement performed on laser beam is also coded in V08-A06. Includes black body radiation source.

S03-A01

Photometry

S03-A01A

Photometry by comparison with reference light or electric value

S03-A01B

Photometry using electric radiation detectors

Includes meters/sensors for measuring and/or detecting a light source, e.g. infrared detectors. See also U12-A02 codes.

Laser power meter

S03-A01B1 [1997]

Photometry using photovoltaic detectors

(S03-A01B)

See also U12-A02A2 and X15-A02A codes.

Photodiode, bandgap, depletion region, space charge, solar cell

S03-A01B3 [1997]

Photometry using capacitive detectors

(S03-A01B)

Includes ferroelectric devices. For discrete ferroelectric devices, see V01-B02B9. For integrated ferroelectric devices, see also U12 codes, e.g. U12-C02F for capacitor and U12-D02A7 for transistor.

S03-A01B5 [1997]

Photometry using photoresistive detectors

(S03-A01B)

See also U12-A02B1.

Photoconductive

S03-A01B7 [1997]

Photometry using array of detectors

(S03-A01B)

See U13-A01X for focal plane array and W04-M01B5 for producing video image with optical radiation, and W04-M01E1A for producing video image with infrared radiation.

Mosaic

S03-A01B9 [1997]

Other electric radiation detectors

(S03-A01B)

PMT, photomultiplier

S03-A01X

Other photometry aspects

Includes measuring e.g. visually, chemically etc., also general details.

S03-A02

Spectrometry; colorimetry; polarimeters

See S03-E04 codes for more details.

Spectroscope

S03-A02A

Generating spectrum e.g. by prism or diffraction grating; measuring line intensity

Wavelength

S03-A02A1 [1997]

Monochromators

(S03-A02A)

S03-A02B

Absorption, double-beam, flicker or Raman spectrometry

S03-A02C

Colorimetry; polarimeters

See also S03-E04B5.

Colour, filter, polarise, Nessler tube, polarisation, birefringence, refractive index

S03-A02F [1997]

Interferometric spectrometers

(S03-A02X)

Includes Fourier Transform spectrometers, e.g. FTIR spectrometer. For novel aspects of the interferometer, see S02-A03A. See T01-J04B1 for novel computing aspects of the Fourier Transform.

Golay detector

S03-A02X

Other spectral measurements

Includes atomic emission spectrometers (See also S03-E04D3) and spectroradiometers.

S03-A03

Pyrometry and IR temperature measurement

Infrared, temperature, pyrometer, pyroelectric, heat-sensing, remote, bolometer, actinometer

S03-A04	[1997]
Cooling arrangements for optical instruments	
(S01-J02)	
Covers all devices within the context of S03-A and S03-E04. Covers cooling arrangements for IR detectors. See S01-J02 for cooling arrangements for other measuring instruments.	
<i>Dewar</i>	
S03-A05	[1992]
Calibration/testing of optical instruments and compensation aspects	
(S02-K02, S02-K09)	
S03-A05A	[1992]
Testing of optical instruments	
S03-A05C	[1992]
Calibration of optical instruments	
S03-A05E	[1992]
Compensation aspects of optical instruments	
S03-A09	
Other optical measurements	
Measuring optical phase difference, degree of coherence, optical wavelength, velocity of light.	
<i>Interferometer, phase</i>	
S03-B	
Thermometers and calorimeters	
Covers temperature and heat quantity measurements.	
S03-B01	
Thermometers	
Medical thermometers with electrical content are also coded in S05-D01E.	
<i>Fuse, catalyst</i>	
S03-B01A	
Thermoelectric	
<i>Thermocouple, junction, Seebeck</i>	
S03-B01B	
Linear resistance e.g. platinum resistance thermometer	
<i>Resistor, film, wire</i>	

S03-B01C	
Other electric/magnetic type	
Includes e.g. using semiconductor p-n junction, crystal resonator frequency, thermal noise of resistance or conductor. Also includes measurement by unspecified electric transducer.	
<i>Thermo-electromotive</i>	
S03-B01D	
Integrating or differentiating expansion or contraction e.g. mercury thermometer	
<i>Bimetal, alcohol, maximum-minimum</i>	
S03-B01E	
Adaptations and novel measurements for specific purposes	
Includes novel measurement of temperature where sensor is of unspecified type or unimportant.	
S03-B01E1	[1992]
For aggressive environments	
S03-B01E9	[1992]
Other adaptations of thermometers for specific purposes	
S03-B01F	[1983]
Thermistors	
Thermistors per se are also coded in V01-A02A.	
<i>Resistor, PTC, NTC, positive, negative, temperature coefficient</i>	
S03-B01G	[1992]
Optical	
(S03-B01X)	
Covers aspects where there is modification of some optical property, e.g. polarisation state or refractive index. Thermometers using colour changes, e.g. of liquid crystals or chemical indicators, are covered by S03-B01X. Pyrometry is covered by S03-A03.	
<i>Fiber-optic</i>	
S03-B01H	[1992]
Testing, calibrating and compensation	
(S03-B01X)	
S03-B01H1	[1992]
Testing of thermometers	
S03-B01H3	[1992]
Calibration of thermometers	

S03-B01H5 [1992]
Compensation aspects of thermometers

S03-B01K [1992]

Display of temperature

(S02-K04, S03-B01)

Includes recording of temperature. See also S02-K04 and S03-B01.

Display, LED, LCD, record

S03-B01X

Other thermometers

Includes e.g. casings, measuring temp. using acoustic effect or colour change of liquid crystal/chemical indicator.

Ultrasonic, thermochromic

S03-B02

Calorimeters

Heat quantity measurement. Includes electrical measurement for domestic heating system, see also X27-E01A. Also includes calibration, testing and compensation of calorimeters. Calorimetry for investigation of sample properties is coded in S03-E01C.

Flow, thermal flux

S03-C

Geophysics

Includes non-geophysical applications such as detecting presence of objects, e.g. using light barrier (S03-C08). (See also S03-C06). Well logging apparatus with electrical content is also coded in X25-E02.

Geomodeling, geological modeling

S03-C01

Seismology, seismic/acoustic prospecting

Seismic, exploration, log, prospecting, reflect, surveying, oil, gas

S03-C01A

Generating seismic waves

Vibration, piston, generator, hydraulic, shear, explosive charge, pneumatic cannon

S03-C01B

Detecting, transmission, or recording of seismic signals

Also includes transmitting seismic signals to recording apparatus (see also W05-D codes, e.g. mud pulse telemetry W05-D06M1). Towed hydrophone arrays are covered by S03-C01C1.

Geophone

S03-C01C

For water-covered areas; for well logging

S03-C01C1 [1983]

For water-covered areas

Marine, streamer, tow, hydrophone

S03-C01C5 [1983]

For well-logging

Borehole, formation, downhole

S03-C01X

Other seismology, seismic/acoustic prospecting (incl. processing seismic data)

S03-C02

Electric, magnetic, em prospecting, measuring earth's magnetic field

Well-logging appts. is coded under respective prospecting type.

S03-C02A [1983]

With electric current

Electrode, probe, resistor

S03-C02B [1983]

With magnetic/electric field

Includes measuring Earth's magnetic field and proximity sensors. For weapon detection at airports, see also S03-C06 and W06-B02A1.

Coil, resonance, oscillator, pipe-finder, metal detector, magnetotelluric, terrestrial

S03-C02F [1997]

Using quantised spin properties

(S03-C02X)

S03-C02F1 [1997]

NMR

(S03-C02X)

For NMR details per se, see S01-E02A1 and S03-E07C.

S03-C02F3 [1997]

MRI

(S03-C02X)

For MRI per se, see S01-E02A2 and S03-E07A.

S03-C02F5 [1997]

Nuclear Quadrupole Resonance

(S03-C02X)

NQR

- S03-C02F9 [1997]**
Using other quantised spin properties phenomena
(S03-C02X)
ESR, EPR
- S03-C02M [2022]**
Geophysical muon imaging
Includes use of cosmic ray muon radiography to investigate density distribution inside geological structures for mapping/imaging.
Muography, muon mapping, attenuation, flux, trajectory
- S03-C02X [1983]**
Other electric, magnetic, em prospecting (incl. electromagnetic prospecting methods)
Antenna, borehole, RF, microwave
- S03-C03**
Prospecting using nuclear radiation
Gamma, neutron, X-ray
- S03-C04**
Gravimetric or other prospecting; measuring gravitational field/waves
Gravity
- S03-C04A [1997]**
Optical prospecting
(S03-C04)
Includes thermal prospecting. Does **NOT** include light barriers (see S03-C08 codes).
Thermal
- S03-C05 [1992]**
Geophysical natural disaster prediction and detection
(S03-C09)
Includes e.g. earthquake, volcano and landslide prediction and detection techniques. See also S03-C01 codes for seismic detection apparatus per se. See W05-B08 codes for natural disaster alarm systems.

- S03-C06 [1997]**
Detecting presence of person or object
This code is used to differentiate between prospecting and presence detection and is technology non-specific. It will thus almost always be combined with another (usually S03-C) code: e.g. detecting presence of contraband using Nuclear Magnetic Resonance would be coded as S03-C02F1 and S03-C06. Includes also baggage inspection at airport (See also W06-B02A5) and pipeline detection (see also X25-Y02). See W05-B and W05-C for alarms in general.
Drugs, Narcotics, Explosives
- S03-C07 [2005]**
For non-seismic well-logging or open water prospecting
These codes are used to differentiate between well-logging, open water prospecting or presence detection and are technology non-specific. Thus, they will almost always be combined with other (usually S03-C) codes. For seismic well-logging or open water prospecting, see S03-C01C codes.
- S03-C07A [2005]**
Non-seismic well-logging
- S03-C07B [2005]**
Non-seismic open water prospecting
- S03-C08 [1992]**
Light barriers
(S03-C09)
Packaged semiconductor light transmitting and receiving devices for light barriers are coded in U12-A02C2. Optical intruder detection is covered by W05-B01C2 codes.
Machine-operator protection
- S03-C08A [1992]**
Construction details
- S03-C08C [1992]**
Circuitry
- S03-C09**
Other geophysics
Includes mechanical well diameter measurement.
- S03-C10 [1997]**
Testing, calibrating and compensation aspects of geophysics devices
(S03-C09)
Includes testing of geophones. For geophones per se, see S03-C01B codes.

S03-D

Meteorology

Includes weather houses, sunshine duration measurement, rainfall or precipitation gauges, windspeed.

Atmosphere, pollution, pressure, precipitation, rain, satellite, balloon, probe, ionospheric sounding

S03-D01 [1992]

Wind speed and direction gauges

See also S02-G02 for anemometer details.

S03-D02 [1992]

Detection of precipitation; Air humidity measurements

S03-D02A [1992]

Measuring rainfall

Precipitation, gauge

S03-D02B [1992]

Detecting presence of rain, snow, ice or fog

Smog measurements are coded under S03-D06 only.

S03-D02B1 [1992]

For non-meteorological application

Includes detection for automatic actuation of vehicle windscreen wipers (See also X22-J01).

S03-D02C [2016]

Air humidity measurements

See also S03-F09A.

S03-D03 [1992]

Atmospheric pressure measurements

Fluid pressure measurements are covered by S02-F04 codes.

Barometers

S03-D04 [1992]

Air temperature measurements

Thermometers are covered by S03-B01 codes.

S03-D05 [1992]

Weather prediction systems, weather forecasting

Includes weather satellite and weather radar systems. Includes prediction of cyclones, thunderstorms, hurricanes, etc. See W06-A04H2 for weather radar, S02-B04 for satellite surveying of the earth. See also W05-B08 section for adverse weather alarms.

S03-D06 [1992]

Pollution, fall-out measurements

Includes all environmental pollution measurement, e.g. marine, fresh water, air, soil, etc. For air quality per se, see S03-E14N codes.

Smog

S03-D09 [1992]

Other meteorology

Includes detection of atmospheric measurements for non-meteorological applications, and meteorological data processing. Also includes lightning strike detectors.

S03-E

Investigating physical or chemicals properties of materials: methods and appts.

Electrical apparatus for medical purposes is also coded in S05-C if in-vitro, or S05-D01G/S05-D01L if in-vivo. Electrical exhaust sensors for internal combustion engines are also coded in X22-A05B.

S03-E01

Thermal (by investigating)

S03-E01A

Changes of state or phase; sintering; coefficient of expansion; thermal conductivity

Using melting or boiling points, distillation, sublimation, expansion, thermal conductivity.

S03-E01B

Moisture content; flash-point, explosibility; presence of flaws

Includes e.g. psychrometry, dew point, humidity, hygrometry

S03-E01B1 [1997]

Thermal cycling

(S03-E01B)

Includes thermal test chambers for PCBs and integrated circuits. See also V04-R06 codes for PCB testing and U11-F01G for burn-in testing of integrated circuits. Includes thermal cycling of test pieces, such as might be carried out in a metallurgy laboratory. If the material under test is subjected, additionally, to a load, see also S03-F02B for time varying load and S03-F02C for fixed load.

Temperature excursion, PCB, semiconductor device, integrated circuit, coupon

S03-E01B3 [1997]

Flaw detection

(S03-E01B)

Includes detection of flaws using infra-red radiation. For flaw detection using visible or ultraviolet radiation, see S03-E04F2. Includes thermal imaging.

Defect

S03-E01C

Calorimetry

Includes e.g. combustion. Calorimeters per se are in S03-B02.

S03-E01E [1992]

Emissivity determination and differential thermal analysis

Includes acoustic thermography. For detecting flaws, see also S03-E01B3.

S03-E01X

Other thermal investigation

S03-E02

Electrical (by investigation)

Moist, liquid, flow, humidity

S03-E02A

Resistance of solid absorbing or reacting with fluid

Includes e.g. semiconductor gas sensor.

Oxide, metal, film, moist, humidity, resistor, bridge, oxygen, semiconductor

S03-E02B

Resistance of liquid or electrically heated body in material

Catalyst

S03-E02C

Capacitance

Dielectric

S03-E02C1 [1997]

Moisture detection

(S03-E02C)

S03-E02C3 [1997]

Flaw or contamination detection

(S03-E02C)

S03-E02C5 [1997]

Capacitance spectroscopy

(S03-E02C)

Includes Deep Level Transient Spectroscopy, TSCAP and Admittance Spectroscopy. For measurements on semiconductor materials, see U11-F01A codes. For measurements on devices, see U11-F01C codes.

DLTS, deep level, impurity, trap, lifetime

S03-E02D [1992]

Impedance

S03-E02F [1992]

Using tunnel current and analogous effects

(S03-E02X)

Includes all scanning probe microscope types and all adaptations for measurement, e.g. measurement of electric or magnetic fields, photon excitation, capacitance and ionic conductance, in addition to other relevant instrumentation codes.

See also V05-F for novel microscope and manufacturing details and S02-A codes for novel cantilever displacement measurement.

For optical scanning tunnelling or near-field optical microscopes with tunnel current type probes, see additionally S02-J04B1 and S03-E04R.

Does NOT include use of scanning probe technology for patterning techniques or recording - see V05-F05D and relevant T03-C and U11 codes.

SPM, magnetic force, MFM, SNOM, shear-force microscopy

S03-E02F1 [1997]

Scanning tunnelling microscopes

(S03-E02F)

STM

S03-E02F3 [1997]

Atomic force microscopes

(S03-E02F)

AFM

S03-E02X

Other electrical investigation

Includes e.g. measuring Q-factor change on oscillating piezoelectric crystal resonator caused by deposition (see also S03-E12), investigating breakdown voltage (see also S01-G03), electrostatics.

S03-E03

Electrochemical

For ion sensor FET see U12-D02A also.

Chemical

S03-E03A

Measuring deposition or liberation from electrolyte e.g. coulometric titration

Electrolytic, coulometer, titration, Karl Fischer

S03-E03B

Measuring currents/voltages in voltaic cells

S03-E03B1

Due to effects at electrodes; e.g. potentiometric titration

Includes vehicle lambda probes.

Fuel, air, engine, exhaust

S03-E03B2

Due to effects in the electrolyte; concentration cells

Includes electrochemical pH sensors. See also S03-F10. For non-electrochemical pH detection, see relevant S03-E04 and E09 codes, as well as S03-F10.

pH sensor

S03-E03B9

Other measuring currents/voltages in voltaic cells

S03-E03C

Containers, electrodes, membranes, partitions

Includes CHEMFETS, ISFETs and integrated circuits using these transducers (also coded in U12-D02A and U12-B03E for discrete devices, and U13-D02 for integrated circuit structure). Also includes electrolyte.

S03-E03C1 [1997]

Biosensors

(S03-E03C)

See also S03-E14H codes.

Membrane

S03-E03E [1992]

Electrophoresis

(S03-E03X)

Includes isoelectronic focussing. For detectors to identify substances separated by electrophoresis, see S03-E09C7 codes.

Separation, gel, macromolecular, protein

S03-E03X

Other electrochemical investigation

Prior to 2005, included non-electrochemical pH measurement. After 2005, see S03-F10 only.

S03-E04

Optical (by investigating)

See also S03-A02 codes.

Photometer, light, centrifuge

S03-E04A

Colour; spectral properties

Spectroscope, colour

S03-E04A1

Using photoelectric detection

S03-E04A4 [1992]

Measurement using radiation at two wavelengths

Includes measurement of blood oxygen content using catheter (S05-D01G).

S03-E04A5 [1992]

Wavelength dependent absorption

(S03-E04A9)

Includes atomic absorption spectrometers. See also S03-A02 codes.

S03-E04A5A [1992]

With light modulation

Includes photoacoustic absorption spectroscopy.

PAS

S03-E04A5B [1997]

Infrared spectroscopy

(S03-E04A5)

S03-E04A5E [1997]

Visible/ultraviolet spectroscopy

(S03-E04A5)

UV, electronic transition, Hund's rules

S03-E04A5G [1997]

Gaseous phase

(S03-E04A5)

"Gaseous phase" refers to the phase to which the radiation is applied. Includes, therefore, atomic absorption spectrometers. This code will nearly always be combined with at least one other S03-E04A5 code.

S03-E04A5L [1997]

Liquid phase

(S03-E04A5)

"Liquid phase" refers to the phase to which the radiation is applied. This code will nearly always be combined with at least one other S03-E04A5 code.

S03-E04A5S [1997]

Solid phase

(S03-E04A5)

“Solid phase” refers to the phase to which the radiation is applied. Includes Attenuated Total Reflectance Spectroscopy. This code will nearly always be combined with at least one other S03-E04A5 code.

ATR

S03-E04A9

Other spectral properties

S03-E04B

Reflection, refraction, transmission; dichroism; phase- or polarisation affecting properties

S03-E04B1

Transmission; specular reflectivity

S03-E04B1A [1992]

Transmission

Includes non-dispersive gas analysis. Includes measurement by splitting light source into two paths, one for reference/control, one for test sample, and measuring relative absorption.

Turbidity, densitometer

S03-E04B1B [1992]

Specular reflectivity

Reflectance

S03-E04B5 [1983]

Refraction; phase; interference; dichroism; polarisation; diffraction

Polarise, refractometer, interferometer, ellipsometer, measuring refractive index

S03-E04B5A [2005]

Surface plasmon resonance

(S03-E04B5)

S03-E04C

Scattering, diffuse reflection

Includes Rayleigh and Tyndall scattering. Also includes Optical Time Domain Reflectometry (from 1992; previously coded in S03-E04B1).

OTDR

S03-E04C1

In moving fluid; e.g. smoke detection

See W05-B02A1 also for smoke detecting fire alarm using scattering effects.

Suspension, particle, fire alarm, turbidity

S03-E04C2

In material in container

S03-E04C3 [1997]

Optical computerised tomography

OCT, optical coherence tomography

S03-E04D

Optical, electrical, mechanical or thermal excitation

Fluorescent, atomise, plasma, flame, photothermal, phosphorescence

S03-E04D1 [1992]

Raman scattering

S03-E04D3 [1997]

Atomic emission spectrometer

(S03-E04D)

S03-E04D3A [1997]

Inductively coupled

(S03-E04D)

S03-E04E

Chemiluminescence; bioluminescence; observing effect on chemical indicator

React, luminescent, reagent

S03-E04F

Jewels; Detecting flaws or contamination

See T04-D for automated visual inspection techniques. For systems using IR detection of thermal images S03-E01B takes precedence.

Inspect, reflect, semiconductor, mask, pcb, printed circuit board, recognition, visual, comparison

S03-E04F1 [1992]

Detecting contamination or impurities

S03-E04F2 [1992]

Flaw detection

S03-E04F3 [1992]

Optical examination of jewels

Gem, cut, facet

S03-E04G

Moving sheets

Paper, newspaper

S03-E04H

Moving fluids or granular solids

S03-E04J [1997]

On-line measurements

Covers arrangements for use in a production line/manufacturing environment (see also X25 codes). S03-E04J will nearly always be combined with at least one other S03-E04 code.

S03-E04P [1992]

Calibration/compensation/testing of optical measurement system

(S02-K02, S02-K09)

S03-E04R [1992]

Optical microscopy

(S03-E04X)

See also S02-J04B1 for microscope appts.

S03-E04R1 [2006]

Confocal Microscopy

Includes laser scanning microscopy. See also S03-E04D/E04E if used with fluorescent staining methods.

S03-E04T [1997]

Using Fourier Analysis

Includes use of Fast Fourier Transform (see also T01-J04B). This code will nearly always be combined with at least one other S03-E04 code.

FFT

S03-E04X

Cuvettes; Imaging and other optical investigation

Includes automatic optical analysis apparatus (with S03-E15 codes), forming picture using TV camera.

S03-E05

Using microwaves and other radio frequency waves

This code covers methods and apparatus for investigating physical or chemical properties of materials by means of microwaves and other radio waves, including microwave spectrometry and general terahertz radiation investigation. (TeraHertz imaging is covered by S03-E05E). For investigation using electromagnetic waves other than radio waves see S03-E04 codes (optical) and S03-E06 codes (X-rays, neutrons, electrons, etc.).

Investigating properties using electric and magnetic fields are covered by S03-E02 codes and S03-E11 codes respectively, and use of spin effects by S03-E07 codes.

Dipole moment, loss factor, moment of inertia, gas phase, radio frequency, RF, waveguide

S03-E05A [1997]

Moisture detection

(S03-E05)

S03-E05C [1997]

Flaw detection

(S03-E05)

Defect

S03-E05E [2005]

Terahertz radiation imaging

(S03-E05)

S03-E06

Using e.g. X-rays, neutrons, electrons

Includes use of ionizing or particle radiation for determining properties of a sample, e.g. patient x-ray diagnosis or scanning electron microscopy. For measurement of ionizing radiation intensity per se (x-ray, gamma ray, alpha, beta etc.), particle behaviour or electron beam current density, see S03-G codes.

Medical apparatus is also coded in S05-D codes. For luggage check see also S03-C03, S03-C06 and W06-B02A. Measurement of radioactive emission from sample injected into human body, e.g. scintigraphy is not included (see S03-G02B3). Control of X-ray equipment in general is covered by V05-E02 codes. Includes use of gamma rays.

Tube, beam, radiate, radioactive

S03-E06A

Measuring absorption

S03-E06A1 [1992]

Flaw detection

S03-E06A3 [1997]

Moisture detection

(S03-E06)

S03-E06B

Forming picture

Scan, tomography, scintillation, display, phosphor, stimuable sheet

S03-E06B1 [1992]

Microscopes

See also V05-F codes for electron, ion and X-ray microscopes. Prior to 2005, included tunnelling microscopes - now only coded in S03-E02F codes.
SEM, TEM, STEM

S03-E06B3 [1992]

Electronic imaging

Includes use of e.g. video camera systems responsive to radiation, and stimuable-sheet phosphor imaging (see also S05-D02A5C for medical X-ray stimuable-sheet system and S06-K codes for aspects analogous to facsimile, especially S06-K99G).

S03-E06B3A [2005]

Computer tomography

S03-E06B5 [1992]

Photographic recording

S03-E06B9 [1992]

Other image-forming methods

S03-E06C

Diffraction, reflecting, scattering e.g. back-scattering radiation

Crystal structure, Compton

S03-E06C1 [1992]

Flaw detection

S03-E06D

By measuring secondary emission, e.g. X-ray fluorescence

Does not include fluoroscopy.
Auger electrons, photoelectric effect, X-ray spectrometer

S03-E06D1 [2005]

Flaw detection

S03-E06H [1992]

Details of apparatus

S03-E06H1 [1992]

Radiation source

Includes control, e.g. source intensity control, dosage etc. For source positioning see S03-E06H4.

S03-E06H2 [2006]

Detector positioning

See S03-E06H5 codes for novel detection system per se.

S03-E06H3 [1992]

Specimen positioning

S03-E06H4 [2005]

Source positioning

S03-E06H5 [1992]

Detection system

Includes e.g. cassettes.

S03-E06H5A [2005]

Semiconductor detectors

For measurement of ionizing radiation intensity using semiconductor detectors, see S03-G02B2G.

S03-E06H5B [2005]

Scintillation detectors

For measurement of ionizing radiation intensity using scintillation detectors see S03-G02B1.

S03-E06H5C [2005]

Stimulable sheet phosphors

For novel stimulable sheet phosphors per se, see V05-M01C1. For novel stimulable phosphor read-out systems, see S06-K99G and other S06-K codes as appropriate.

S03-E06H5D [2005]

Video systems

For novel X-ray video systems per se, see W04-M codes.

S03-E06H7 [1992]

Shielding, protection

S03-E06H9 [1992]

Other appts. details

S03-E06X

Other uses of X-rays, neutrons, electrons

Includes contrast agents for X-rays.

Contrast media

S03-E07

NMR, EPR or other spin effects

See S01-E02A codes. S03-C02F is used when the purpose is prospecting, together with S03-C06 if for contraband or intruder detection. For static and gradient field coils, see also X12-C and V02-F01G respectively and for coils in general see S01-E02A8A. For medical apparatus, see also S05-D02B codes.

Spin echo, tomography, axis

S03-E07A [1992]

MRI

See also S01-E02A2 codes. Contrast agents are coded in S03-E09X also.

S03-E07C [1997]

NMR

(S03-E07)

Includes NMR spectroscopy. See also S01-E02A1 codes.

Nuclear Magnetic Resonance

S03-E07E [1997]

ESR/EPR

(S03-E07)

See also S01-E02A4.

Electron spin resonance, paramagnetic, klystron

S03-E07G [1997]

Nuclear Quadrupole Resonance

(S03-E07)

See also S01-E02A3. For contraband detection, see also S03-C02F5, and S03-C06 codes.

NQR

S03-E07X [1997]

Other quantised spin measurements

(S03-E07)

See also S01-E02A9.

Cyclotron resonance

S03-E08

Using sonic or ultrasonic vibrations

Includes vibrations which may be induced acoustically, thermally, optically, magnetically etc., but detected using acoustic apparatus. For photo-acoustic spectroscopy where optical radiation is detected, see S03-E04A5A. For ultrasound generating transducers, see V06-V01N. For ultrasound "measurement" transducers, see V06-V04G codes. See S02-A05B codes for acoustic dimension measurement. For medical imaging see also S05-D03 codes and V06-V04K for transducers for specifically medical use.

Transducer, piezoelectric

S03-E08A

Flaw detection

Includes acoustic emission techniques, e.g. where a material is subjected to a mechanical stress and the acoustic output detected by a microphone. See S03-F02B and S03-F02C for tensile testing per se.

Crack, inspect, material, pipe, weld, non-destructive testing

S03-E08C [1992]

Specific property

Covers investigation of a specific physical property by measurement of sonic or ultrasonic vibration.

Includes e.g. analysing fluids; measuring attenuation, speed, density, frequency spectrum to characterise medium.

S03-E08E [1997]

Imaging

(S03-E08, S03-E08A)

E.g. using visualisation of interior, using Barkhausen effect.

S03-E08G [1992]

Acoustic microscopes

Covers acoustic microscopes per se.

S03-E08X

Other sonic or ultrasonic measurements

Includes construction details of ultrasonic equipment, e.g. probes and arrangements for orientation - see also V06. Measuring deposition on crystal resonator using variation in Q-factor or impedance is not included - see S03-E02X. Includes contrast agents.

Contrast media, UCA

S03-E09

Chemical methods

S03-E09A

Precipitation; Absorption; Adsorption

S03-E09B

Ion-exchange; Catalysis; Combustion

Catalyst

S03-E09C

By chromatography e.g. column, plate

Gel, injection, flow, needle, capillary, vaporise

S03-E09C1 [1983]

Gas chromatography

S03-E09C3 [1992]

Thin layer chromatography

S03-E09C5 [1983]

Liquid and ion exchange chromatography

S03-E09C7 [1997]

Chromatography and electrophoresis detectors

(S03-E09C)

From 2006, this code covers detectors to identify substances separated by electrophoresis.

Electrophoresis per se is covered in S03-E03E.

S03-E09C7A [1997]

Optical

(S03-E09C)

See also S03-A01B codes.

S03-E09C7B [1997]

Mass spectrometric

(S03-E09C, S03-E10A)

For mass spectrometers, see S03-E10A and V05-J01 codes.

GCMS

S03-E09C7C [1997]

Thermal conductivity

(S03-E01A, S03-E09C)

For thermal conductivity measurements per se, see S03-E01A.

Katharometer

S03-E09C7D [1997]

Ionisation

(S03-E09C)

Includes flame ionisation and photo-ionisation detectors.

S03-E09C7E [1997]

Electron capture

(S03-E09C, S03-E03)

S03-E09C7F [1997]

Electrochemical

(S03-E09C)

For electrochemical sensors generally see S03-E03 codes.

S03-E09C7X [1997]

Other chromatography detectors

(S03-E09C)

S03-E09D

Titration, micro-analysis

Karl Fischer, sample, end-point

S03-E09E

Chemical indicators

Reagent, strip, colour, chart, compare

S03-E09F [2005]

Immunoassay techniques and biological indicators

Includes all novel reagents and techniques. See also S03-E04D and S03-E04E for fluorescence detection and observation techniques. For radiopharmaceutical immunoassay indicators, see also S03-G02B9. For microarray and biochip techniques, see also S03-H01 codes. Prior to 2005 coded in S03-E14H4. From 2022, see also B11-C08N codes to highlight different biological testing methodologies. See also B11-C08E3, B11-C08N, C11-C08E3, C11-C08N and D05-H18B codes.

Antibody, assay, antigen, binding, ligand, fluorophore, monoclonal, conjugate, PCR testing, polymerase chain reaction testing, drug screening

S03-E09X

Other chemical investigation methods

Includes contrast agents for MRI (see S03-E07A also).

S03-E10

Investigating ionisation of gases or electric discharges

S03-E10A [1992]

For mass spectrometer or spectrograph

See also V05-J01 codes.

Ionise, smoke detector

S03-E10A1 [1997]

Using magnetic sectors

(S03-E01A)

S03-E10A1A [1997]

Double focussing mass spectrometers

(S03-E10A)

Nier-Johnson, Mattauch-Herzog

S03-E10A2 [1997]

Tandem mass spectrometers

(S03-E10A)

MS/MS, GCMS

S03-E10A3 [1997]

Time-of-flight mass spectrometers

(S03-E10A)

Includes e.g. ion mobility spectrometers. Also includes Coaxial Impact Collision Ion Scattering Spectrometer.

TOF, GCMS, CAICISS

S03-E10A4 [1997]

Secondary Ion Mass Spectrometers

(S03-E10A)

Includes spark source mass spectrometry and ion scattering spectrometry. For ESCA, Auger spectroscopy, electron microprobe see S03-E06D; for low energy electron diffraction, see S03-E06C.

SIMS, duo-plasmatron, SSMS, ISS

S03-E10A5 [1997]

Quadrupole mass analysers

(S03-E10A)

Includes ion trap mass spectrometers.

GCMS

S03-E10A6 [1997]

Inductively coupled mass spectrometers

(S03-E10A)

ICP

S03-E10A7 [1997]

Ion Cyclotron Resonance Mass Spectrometers

(S03-E10A)

Includes Fourier Transform Mass Spectrometers.

ICR, FTMS

S03-E10A8 [2002]

MALDI/SELDI mass spectrometers

(S03-E10A)

For mass spectrometers with matrix assisted laser desorption ionisation source. See V05-J01E for novel ionising arrangements.

Matrix assisted laser desorption ionisation, surface enhanced laser desorption ionisation

S03-E10B [2005]

Energy spectrometers

S03-E10C [1992]

Investigating discharges per se

Includes, e.g. plasma processing endpoint detection through plasma colour change.

S03-E11

Investigating magnetic variables

Flux, Hall, diamagnetic, paramagnetic

S03-E11A [1983]

Flaw detection (incl. eddy current)

Surface, inspect, fault, crack, weld, non-destructive testing

S03-E11C [1992]

Specific property

Covers measurement of a specific physical property using investigation of magnetic variables, e.g. using saturation of remanence to investigate mechanical hardness (mechanical testing of hardness in general is covered by S03-F02A).

S03-E11C1 [1997]

Contamination detection

Debris

S03-E11X [1992]

Other magnetic variable investigation

S03-E12

Analysing by weighing; by measuring pressure/volume of gas

Balance, vapour pressure, gas sorption, adsorption, absorption

S03-E12A [1992]

By analysing weight/ by weighing

Includes gravimetric analysis.

S03-E12B [1992]

Specific weight determination

S03-E12C [2005]

By measuring pressure/volume of gas
(S03-E12)

S03-E13

Sampling; specimen preparation

S03-E13A

Sampling solids
Microtome, cut, slide

S03-E13B

Sampling liquid or fluent material
Also includes sampling of granular solids, e.g. sand, flour, salt etc.
Flow, water, liquid, powder

S03-E13B1

Dippers, dredgers, suction or ejector devices
Pipette

S03-E13B2

Intake at several levels; splitting samples; flowing or falling material sampling

S03-E13B9

Other sampling liquid or fluent material
Includes sampling of suspensions from liquids, gases or other fluent materials, e.g. exhaust gas particulate sampling.
Aerosol

S03-E13C

Sampling gases

S03-E13D

Preparing specimens for investigation
Centrifuge, filter, separate, freeze

S03-E13D1 [1992]

For automatic analysers
See S03-E15 codes also. Includes preparation of many samples from one original which will be subjected to different test procedures.

S03-E13F [2006]

Sample holders, carriers or storage systems
Includes e.g. microscope slides, sample refrigerators, cuvettes, novel instrumentation-type glassware, e.g. test tube, petri dish. Note that general laboratory glassware is not included.

S03-E14

Investigation methods (for)

Codes in this section are used when testing methods or appts. are specifically intended for investigation of the material or substance concerned. Depending on the scope of the invention, codes for a specific testing method may also be assigned.

S03-E14A

Food, Pharmaceuticals and Cosmetics

S03-E14A1 [1992]

Drugs, medicines, pharmaceuticals
Electrical aspects of pharmaceuticals manufacture are covered by X25-P02. See also S05-C05.
Capsule, tablet

S03-E14A2 [2005]

Food and drink
Milk, meat, tobacco, alcohol

S03-E14A3 [2005]

Cosmetics

S03-E14B

Water
See X25-H03 for electrical aspects of water and sewage treatment.
Sea, waste, effluent, pollution, process

S03-E14C

Metals
Electrical aspects of metallurgy are covered by X25-Q codes, and of working metals by X25-A codes, e.g. X25-A01 (casting).
Melt, cast, metallurgy, phase, assay

S03-E14C1 [1992]

Testing metallic electrodes
For electrodes per se, see S03-E03.

S03-E14C3 [1997]

Alloys
(S03-E14C)

S03-E14C3A [1997]

Steel
(S03-E14C)
See X25-Q01 for electrical aspects of steel manufacture.

S03-E14C3X [1997]

Other alloys

(S03-E14C)

Brass, solder, bronze

S03-E14D

Concrete, glass, ceramics, refractories, resins, plastics, rubber, leather, wood

Asphalt, chalcogenide

S03-E14D1 [1983]

Concrete

Cement, strength, setting

S03-E14D4 [1983]

Glass, ceramics, refractories

Electrical aspects of glass working are covered by X25-A05.

S03-E14D7 [1983]

Resins, plastics, rubber, leather, wood

Electrical aspects of plastics working are covered by X25-A06, of rubber working by X25-A07.

S03-E14E

Fuels; Explosives; Soil

S03-E14E1 [1992]

Fuels

Includes crude oil and oil-derived fuels, as well as coal, natural gas etc. Oils for lubrication are covered by S03-E14F.

Gas, liquid, hydrocarbon, crude, refine, LNG, LPG

S03-E14E3 [1992]

Explosives

Blasting, detonate, pressure

S03-E14E7 [1992]

Soil

Rock, core, sample, groundwater recharge, minerals

S03-E14F

Oils; Viscous liquids; Paints; Inks

Includes lubricating oils. Fuel oils are covered by S03-E14E1.

Lubricate, flow, cleaning products

S03-E14G

Paper; textiles

See X25-T codes for electrical aspects of paper and textile manufacture.

Sheet, fabric, web, yarn, fiber, pulp

S03-E14H

Biological material

For electrical aspects of biological material investigation see S05-C codes also where medical application stated.

Medical, clinical, forensic, diagnose

S03-E14H1

Blood

Coagulate, plasma, platelet, cell count

S03-E14H2 [2005]

Biological fluids

(S03-E14H9)

Includes urine, semen, saliva, phlegm etc.

S03-E14H3 [2005]

Nucleic acids

(S03-E14H)

Includes general DNA/RNA sequencing and tests for specific gene sequences, where there are no specific details. Where novel reagents are claimed, see also S03-E09F.

For microarray or biochip technology see also S03-H01A codes.

S03-E14H4* [1983-2004]

Immunoassay

*This code is now discontinued and transferred to S03-E09F, but remains searchable and valid for records from 1983-2004.

Antibody, assay, antigen, monoclonal, conjugate, bonding, HIV, AIDS, hepatitis

S03-E14H5 [1992]

Enzymes, proteins and amino acids

(S03-E14H9)

S03-E14H6 [1992]

Tissue samples

(S03-E14H9)

S03-E14H9

Other biological material

Breath

S03-E14J [1992]

Plants

Includes seeds, crops.

S03-E14L [1992]

Chemical and biological warfare agents

Includes detection. See S03-E09 for chemical detection techniques, S03-C06 for luggage or mail inspection methods or S03-H01 for lab-on-chip or biochip technology.

For electrical aspects of chemical or biological warfare detection see W07-F01 also.

S03-E14M [1992]

Herbicides; Pesticides

S03-E14N [1992]

Air quality

Covers air quality, e.g. in workplace, hospitals and home. See S03-D06 also for pollution monitoring. Details of gas analysis and gas sensors are also coded under S03-E14P.

Breathable, pollution, contaminant

S03-E14N1 [1997]

In buildings

(S03-E14N)

S03-E14N3 [1997]

Clean room

(S03-E14N)

See U11-C15B for clean room used in semiconductor manufacture and T03-A02B9 for clean room used in magnetic record carrier manufacture.

Semiconductor, impurity

S03-E14N9 [1997]

Other air quality measurements

(S03-E14N)

S03-E14P [1997]

Gas sensor; Gas analysis

Includes determining the components of a gas. See also S03-E02A and S03-E03 for electrical and electrochemical gas sensors, respectively. Details of air quality analysis (pollution) are coded under S03-E14N and S03-D06.

Gas detection

S03-E14P1 [1997]

For combustion products

Carbon monoxide, sulphur dioxide, nitrogen dioxide

S03-E14P3 [1997]

For chemical reaction products

S03-E14P9 [1997]

Gas sensor for other products

Livestock, poultry, SF6

S03-E14R [2006]

Flame/combustion detector

Includes methods/apparatus for detection of flames or combustion, e.g. for fire alarm (see also W05), or industrial/domestic combustion equipment (see also X25-X13/ X27-G02). For pyrometric detection, see also S03-A03; for optical detection, e.g. UV, see S03-E04 codes.

S03-E14W [2016]

General industrial waste

S03-E14X

Other (investigation methods for)

Dust

S03-E15 [1992]

Automatic analysis equipment

Codes in this section are used with other S03-E codes depending on the specific nature of the equipment. For example use S03-E15 and S03-E14H codes for automatic biological material analysis apparatus.

S03-E15A [1992]

Control

For computer control aspects see e.g. T01-J08A.

S03-F

Investigation of physical or chemical properties of materials: specific properties

S03-F01

Density

Densimeter

S03-F01A

Investigation of density by immersion in fluid; from transmission of radiation; pressure difference

Includes measurement of density by cosmic ray muon tomography / radiography. From 2022, see S03-C02M for geophysical muon imaging.

Displacement, ultrasonic

S03-F01X

Other density measurement

S03-F02

Mechanical strength

S03-F02A

Hardness

Load, indent, ball, bearing, Vickers, Rockwell, Mohs

S03-F02B

Resistance to wear or heat; Machinability; Cutting ability

Includes applying time varying (cyclic) loading. If the sample is also subjected to temperature excursions, the code S03-E01B1 is additionally applied.

Abrasion, tool, bearing, erosion

S03-F02C

By applying steady tension or compression

If, in addition to steady tension or compression, the sample is subjected to temperature excursions, the code S03-E01B1 is also applied.

Tensile, stress, strain, fatigue

S03-F02D

By steady bending, twisting or shearing

Torque, shaft, flexure, axis

S03-F02E

By applying impulsive forces

Impact, shock, frequency

S03-F02X

Other mechanical strength measurement (incl. ductility, twisting and coiling properties)

S03-F03

Flow properties

Includes viscometers.

Fluid, liquid, viscosity, thixotropic, Poiseuille's formula, Stokes' law, Ostwald, Newtonian fluid

S03-F03A

By moving body in material

E.g. rising or falling speed, rotary bodies, rotational, damping effect.

Vibratory viscometer

S03-F03X

Other flow properties

Includes measuring flow of material e.g. through capillary tube.

Rheometer

S03-F04

Diffusion effects; Surface or boundary effects

Includes e.g. measurement of wettability.

Surface tension, Ficks law, solder wettability

S03-F05

Particle size; Sedimentation of suspensions

For blood, see S03-E14H1 also, and S05-C01 if electrical appts. is involved.

S03-F05A

[1992]

Sedimentation

S03-F05C

[1992]

Particle size

Includes cytometry.

S03-F06

Concentration of suspensions; permeability, pore-volume or surface area of porous materials

S03-F06A

[1983]

Concentration of suspensions

Aerosol, Colloid, Emulsions, Slurry

S03-F06B

[1983]

Permeability, pore-volume or surface area of porous materials

Pressure, osmosis, porosity, filter, gas-mask, respirator

S03-F06C

[1992]

Particle counters

Includes cytometry.

S03-F07

Weather-, light- and corrosion resistance

S03-F08

Coefficient of friction; Adhesion

Surface, adhesives

S03-F09

Moisture content (incl. hydrometers); detecting flaws or contamination

S03-F09A [2005]

General moisture detection / humidity measurements

Includes measurement of moisture e.g. mechanically, but not measurement using capacitance, microwaves or radiation absorption; for these cases see S03-E02C1, S03-E05A, S03-E06A3 respectively. Air humidity measurement used in meteorology is coded under S03-D02C.

Hygrometer

S03-F09B [2005]

General flaw detection

S03-F09C [2006]

General contamination detection

Prior to 2007, covered by S03-F09B.

Turbidity

S03-F10 [2005]

pH measurement

(S03-E03X)

See also S03-E03B2 for electrochemical methods, and S03-E09E and S03-E04E for chemical indicators. Prior to 200501, non-electrochemical pH measurement was coded in S03-E03X.

S03-F11 [2014]

Non-destructive testing

This code is used to highlight the non-destructive aspect of the testing or analysis. This code can be applied with other S03-F codes to highlight the type of analysis/test done.

S03-F20

Other physical or chemical properties

For sampling devices see S03-E13 codes.

Growth measurement

S03-G

Measurement of nuclear or X-radiation

Codes in this section are concerned with novel methods and equipment for measuring radiation per se. For measurement on materials using radiation see S03-E06 codes, and for object detection/prospecting see S03-C codes, e.g. S03-C03.

Beta, gamma, particle, radioactive

S03-G01

Recording/ processing movements of particles, measuring neutron radiation

Includes processing or analysis of tracks. Neutron dosimetry is also in S03-G02A.

Track

S03-G01A [1992]

Recording/ processing movements of particles

Wilson cloud chamber, bubble, scintillation, track

S03-G01C [1992]

Measuring neutron radiation

S03-G01X [1992]

Other recording/ processing movements of particles, measuring neutron radiation

S03-G02

Measuring nuclear or X-radiation

S03-G02A

Dosimeters; Integrating detectors

Includes e.g. chemical, photographic, luminescent dosimetry, and arrangements integrating the output of an electrical detector.

Thermoluminescent, expose, film badge, TLD

S03-G02B

Measuring intensity

Codes in this section are used for particular radiation detection arrangements.

Count, camera, discriminate

S03-G02B1

Scintillation detectors

S03-G02B2

Counting-tubes, ionisation chambers; Cerenkov, semiconductor, resistance or secondary emission detectors

For tube type detectors see V05-H also.

S03-G02B2A [1992]

Counting tube (e.g. Geiger-Muller)

S03-G02B2C [1992]

Ionisation chamber

S03-G02B2E [1992]

Secondary emission detector

S03-G02B2G [1992]

Semiconductor detector

See U12-A03 also.

S03-G02B3 [1997]

Nuclear imaging

(S03-G02B)

Covers all cases where a radiopharmaceutical is injected into the patient, e.g. in Positron Emission Tomography or Single Photon Emission Computed Tomography. See also S05-D02C. See U22-D02C for coincidence circuit for PET apparatus.

See S03-E06B codes for imaging using externally applied radiation, e.g. X-ray tomography.

SPECT, PET, Gamma camera, Anger camera, Compton camera

S03-G02B9

Other nuclear radiation intensity measurement

Includes radioactive immunoassay techniques - see also S03-E09F.

Image, phosphor, scan, sheet

S03-G02C

Beam position/section; spatial/spectral distribution; polarisation, absorption cross section; half-life

S03-G02C1 [1992]

Beam measurements

Covers position or section measurements.

Faraday cup

S03-G02C1A [1992]

Beam polarisation

S03-G02C1C [1992]

Cross section

Beam area, absorption, barn

S03-G02C3 [1992]

Radiation spectrometers

Includes, e.g. X-ray or Mössbauer spectrometers.

Note: This code is reserved for analysing nuclear radiation for the purest of reasons, e.g. at a nuclear power station or a nuclear research institute.

Using nuclear radiation (X-rays, neutrons, gamma rays etc.) to analyse material properties is covered by S03-E06 codes, e.g. S03-E06D.

S03-G02C5 [1992]

Half life measurements

Decay

S03-G05 [1992]

Calibration, testing and compensation aspects

S03-H [2005]

General scientific instrumentation technology details

These codes can be used with S01 and S02 instrumentation types, except for the S03-H03 codes. For testing, calibration or compensation, see relevant sections in S01 and S02.

S03-H01 [2005]

Lab on Chip and Microarray technology

These codes are used in combination with other S03 codes to denote specific technology types. For general automatic analysis equipment, see S03-E15. See also U13-D04 codes for semiconductor based technology. For instrumentation using electrochemical techniques, see S03-E03 codes.

LOC, Lab-on-chip

S03-H01A [2005]

Microarrays and Biochips

(S03-E15)

See relevant S03 codes for detection type. See S03-E09F for Immunoassay techniques. Prior to 2005, see S03-E15.

DNA Chip, Protein Chip, GeneChip™

S03-H01B [2005]

Microfluidic instrumentation

S03-H02 [2005]

Micro/nanometre scale instrumentation

See also V06 codes for micro and nano-scale actuators/motors/sensors and U12-B03F codes for MEMS/NEMS technology in general.

S03-H02A [2005]

Micrometre scale instrumentation

In general, covers instrumentation technology involving manipulation or manufacture at a scale of greater than 0.1 microns.

S03-H02B [2005]

Nanometre scale instrumentation

In general, covers instrumentation technology involving manipulation or manufacture beneath 0.1 microns, or 100 nanometres.

S03-H03 [2005]

Testing, compensation and calibration

These codes are used to indicate general testing, calibration or compensation for S03 equipment. Note that some areas of S03 already have testing, calibration and compensation codes. Where these codes already exist, they take precedence over S03-H03, e.g. S03-A05 codes, S03-C10 and S03-E04P. Prior to 2005, see S02-K and S01-J02.

S03-H03A [2005]

Testing

S03-H03B [2005]

Compensation

S03-H03C [2005]

Calibration

S04: Clocks and Timers

All aspects of clocks and watches are included, whether electrical or not.

S04-A

Mechanical aspects of clocks and watches

S04-A01

Drive, geartrains, escapements, balances etc.

Includes clutch mechanisms, weights, chains, mainsprings etc.

Gear, wheel, pendulum, movement, pivot, adjust

S04-A02

Time indication

Hour, rotating, analogue, face, indicia, minute

S04-A02A

Hands, dials, drums

Sundials are in S04-A09 only.

Face, disc, display, timepiece, concentric, ring

S04-A02B

Day, date, tide or local time indicators

Calendar, display, zone, disc, window, world, month, ring, year

S04-A02X

Other (time indication)

Includes illumination, striking, alarms, ringing, etc.

Bell, chime, light

S04-A03

Winding; setting

Including clutch wheel and locking bar mechanisms.

Adjust, hand, spring, compress, pushbutton

S04-A04

Cases, glasses

Display, window

S04-A04A

Constructions

Includes watch straps and clock stands. Details of watch straps are also coded under P23-C02.

Ring, seal, mount, housing, plastics, body, face, frame

S04-A04A1 [1992]

Anti-magnetic shielding

S04-A04A2 [1992]

Water-proofing

S04-A04B

Materials and manufacture

Glass, metal, titanium, alloy, nitride, aluminium, carbide, coating, deposit, film, jewel, bind

S04-A05

Frameworks, bearings, calipers

Plate, metal, plastics, rotor, spring, wheel

S04-A09

Other (mechanical aspects)

Includes combination of timepieces with other measuring instruments. Metronomes, sundials, hourglasses and other gravitational timepieces.

Dial, display, compass, magnetic

S04-B

Electrical aspects of clocks and watches

Smartwatch devices are primarily classed as wearable computers (T01-M06A1D). See also S05-D01 codes for physiological measurements, and W04-X01A1 for performance-related measurements during sports or fitness training.

S04-B01 [1983]

Power supplies; electrical winding; motor driven time indication

Inverter, voltage, capacitor, control

S04-B01A [1983]

Power supplies; electrical winding

For batteries see X16, for solar cells see X15-A02, U12-A02A codes.

S04-B01B [1983]

Motor driven time indication

For stepper motors see also V06-M05. For motor control see also V06-N codes, e.g. V06-N01.

Rotor, drive, stator, pulse, synchronous, pole, circuit, current, analogue, switch, gear, magnetic

S04-B02

Oscillators

S04-B02A

Balances, pendulums, tuning forks

Drive, movement, spring

S04-B02B

Quartz

Crystal, piezoelectric, resonance, trimmer

S04-B02X

Other (oscillators)

Includes laser and maser oscillators (see also V08-A01A and V08-B) and atomic clocks. Atomic oscillators are covered by U23-A06 from 2016 (pre-2016 by U23-D02). Time and frequency standards are also coded in S04-C09.

Beam

S04-B03

Timing chains; setting

Includes drive blocking and radio transmission aspects.

Display, counter, divider, memory, digital, microprocessor

S04-B04

Electronic displays

S04-B04A [1992]

Electro-optic displays

Includes lamps, LEDs, LCDs etc.

Digital, liquid, indicate, segment, analogue, calendar, date

S04-B05

Acoustical time indication; alarms

For combined radio/alarm appts. see also W03-G03A. Piezoelectric devices, buzzers etc. are in V06 also.

Signal, sound, frequency, tone

S04-B05A [1992]

Musical animation

Nursery

S04-B06

Master slave clocks and radio controlled setting

Radio and line transmission details of timing signals, drive mechanisms, pulse transmission systems etc.

Signal, control, circuit, receive, adjust, phase, reference, standard time signal, MSF, WWV, DCF-77

S04-B07 [1992]

Braille clock

Blind

S04-B08 [1992]

Motion clock, e.g. cuckoo or movable drum

S04-B09 [1980]

Other (electrical aspects)

Includes casings and manufacture for electronic timepieces. Clocks/watches integral with gaming, cooking, medical etc. devices. All aspects of circuitry specifically for timepieces.

Memory, radio, dial, smartwatch

S04-C

Timers

Circuit, control, automatic, program

S04-C01

Time switches

If switch details are claimed, then see V03-C08 also. For cooking appliances see X27-C. For washing/drying appliances see X27-D.

Cam, set, circuit, domestic, drive, mechanism, contact, rotating, washing, cycle

S04-C02

Timer clocks

For cooking appliances see also X27-C. For audio/video appts. see also T03, W03, W04.

Switch, set, interval, select

S04-C02A [1992]

Including time indicator or alarm

S04-C02X [1992]

Other (timer clocks)

S04-C03

Measuring unknown time intervals

For sports equipment see W04-X. Includes stopwatches.

Counter, period, start-stop, elapsed, oscillator, hand, second

S04-C03A [1992]

Measuring methods and equipment per se

S04-C03C [1992]

Applications

S04-C03C1 [1992]

Measuring electronic signals and pulse duration

See also S01-D06.

S04-C03C2 [1992]

Measuring duration of activities, operations, and events

See T05-G for specific monitoring of vehicles, machines, etc.

S04-C03X [1992]

Other (time interval measurements)

S04-C07 [1992]

Colour change time indication, e.g. for perishable goods

S04-C09

Other (timer aspects)

Includes time and frequency standards (see also S04-B02X) and also electronic metronomes and hour-glass type timers. For clocks using gravitational effects see S04-A09 also.

Frequency, standard, atomic, resonance, select, interval, program, pulse, stabilised, adjust, microprocessor, molecular, oscillator, count, delay

S04-D

Watchmakers' tools

Includes tweezers, eyepieces, measuring and calibrating appts., and relevant electronic test gear.

S04-E [1992]

Time recording

Includes e.g. time clock for employees.

S05: Electrical Medical Equipment

Electrical aspects only are included, except for documents with A61N IPC, which guarantees inclusion whether electrical or not.

S05-A

Therapy

For treatment of abnormal cells/tissues etc. using non- or minimally invasive equipment, e.g. electrotherapy, magnetotherapy, radiation therapy, ultrasound therapy etc. See S05-B codes for corresponding surgical equipment, and S05-D codes for measurement of bioelectric currents.

Condition, treat, beauty, patient

S05-A01

Heart pacemakers and defibrillators

Includes all aspects of electrical cardiovascular stimulation.

Cardiac, sense, implant, lead, pulse, atrium, control, tissue, ventricle, physiological, time

S05-A01A [1992]

Pacemakers

Includes general heart stimulation arrangements.

S05-A01A1 [1992]

Demand pacemakers

Includes pacemakers controlled by physiological parameter e.g. heart biopotential.

S05-A01A5 [1992]

Programming and control aspects

Includes programmed control of pacemakers, e.g. using stored program. See T01-J06A for data processing in medical applications.

S05-A01A5A [1997]

Remote programming and control

(S05-A01A5)

Includes arrangements for programming and controlling operation from external source, e.g. for modifying version of control program.

S05-A01B [1997]

Defibrillators

(S05-A01)

Can be used for both internal and external defibrillators.

S05-A01C [1997]

Power supplies and storage

(S05-A01)

Includes power supplies and storage for all implanted heart therapy equipment, and charge storage arrangements for defibrillators. See U24 codes for power supplies in general, and X16 codes for power storage aspects.

S05-A02

Electrodes and connecting leads

Includes any apparatus attached to or through skin for purpose of applying electric field or current. If current application is also claimed then see also S05-A04.

Contact, lead, connect, conducting, implant, stimulating, flexible

S05-A02A [1997]

For stimulation of heart

(S05-A02)

Covers electrodes used in conjunction with pacemaker or defibrillator.

S05-A02B [1997]

For stimulation of nervous system

(S05-A02)

Covers electrodes used to apply current to muscles or nervous system for e.g. pain relief, i.e. TENS.

S05-A03

Radiation/Ultrasonic therapy (including magnetic fields)

Including optical, magnetic, X-ray irradiation, and protection from undesirable radiation.

Frequency, hyperthermia, beam, electromagnet, isotope

S05-A03A [1983]

Optical radiation (including IR, UV and Laser)

Laser apparatus is in V08 also. For UV and sun-ray lamp apparatus see X27-A02A2 also. Lamps per se are also in X26. Radiation therapy using visible light is in S05-A03A9 only.

Ultraviolet, tan, lamp, cooling, lens, sun, beam

S05-A03A1 [1997]

Infrared

(S05-A03A)

Includes application of heat from Infrared source. See also S05-A05B for heat therapy in general.

S05-A03A2	[1997]
Laser	
(S05-A03A)	
Includes laser for cosmetic use, e.g. laser hair and tattoo removal.	
S05-A03A3	[1997]
Ultraviolet	
(S05-A03A)	
S05-A03A9	[1997]
Other light, including visible light spectrum	
(S05-A03)	
S05-A03B	[1997]
Electric fields therapy	
(S05-A03)	
Includes application of static electricity and electric fields. From 2016, all RF-based therapy inventions are coded in S05-A03D. Prior to 2016, RF-based therapy inventions were coded in S05-A03B or S05-A03X depending on novel aspect.	
S05-A03C	[1997]
Sonic or ultrasonic therapy	
(S05-A03)	
See S05-B02 for ultrasonic surgical equipment e.g. lithotripsy, and S05-A05 for massage using ultrasound. Infra-sonic can also be coded here. For music therapy see S05-A09.	
S05-A03D	[1997]
Microwave and other radio-frequency (RF) therapy	
(S05-A03)	
From 2016 includes all RF-based therapy. Prior to 2016, inventions were coded in S05-A03B or S05-A03X depending on novel aspect. See X25 for microwave heating.	
S05-A03E	[1997]
Magnetic fields	
(S05-A03)	
Includes all aspects of magnetotherapy e.g. using magnetic fields produced by coils or permanent magnets, applied externally, or internally using implanted elements.	
S05-A03E1	[2002]
Magnetotherapy	
(S05-A03)	
Includes use of permanent magnets, e.g. traditional Chinese medicine.	

S05-A03E2	[2002]
Electromagnetic therapy	
S05-A03F	[1997]
Using X-Rays	
(S05-A03)	
See S05-D02 codes for X-Ray diagnostic equipment.	
S05-A03X	[1997]
Other radiation	
(S05-A03)	
Includes Gamma-ray therapy and particle irradiation therapy.	
<i>Brachytherapy</i>	
S05-A04	[1983]
Applying currents	
(S05-A09)	
Electrodes per se are also in S05-A02. Includes all aspects of nerve, muscle and skin stimulation for e.g. pain relief, i.e. transcutaneous electrical nerve stimulation, and also depilation.	
<i>Pulse, frequency, implant, HF, muscle, regulate, ECT, TENS, depilation</i>	
S05-A04A	[1992]
Iontophoresis	
See also S05-J02 for administering drugs through the skin.	
S05-A05	[1983]
Physical therapy, massage, acupuncture	
(S05-A09, S05-X)	
Not steam baths, saunas, etc. These are coded under S05-A09 and X27-E03A1 only. Includes massagers using ultrasound. See W04-X01A for sports training equipment. See X27-A02A2 for massage/vibrators.	
<i>Exercise, cycle, treadmill, vibration, heat, limb, movement, mechanical</i>	
S05-A05A	[1997]
Artificial respiration and cardiac assistance	
(S05-A05)	
For cardiac assistance and respiratory aids using e.g. heart massage, pumping and applied pressure etc. Applying electric currents for heart stimulation is coded in S05-A01. Respiratory aids using e.g. gas or air are coded in S05-G02E.	
<i>Pump, squeeze, pressure, cardiac wrap/harness</i>	

S05-A05B [2002]

Heat and cooling therapy

Therapy using direct application of heat. Also includes therapy using cooling techniques.

S05-A05C [2005]

Massage

Massage details for domestic items, such as beds, chairs, beauty treatment, etc. are also coded under X27-A02A2.

S05-A05D [2005]

Acupuncture

S05-A05E [2007]

Physical therapy

S05-A07 [1992]

Eye exercise, strengthening defective eye muscles

Optical

S05-A09

Other (e.g. speech therapy, relaxation therapy)

Includes electrical aspects of e.g. aromatherapy and homeopathy, steam baths, saunas etc., audio relaxation, deaf/dumb speech therapy, insomnia curing apparatus, air cleaners and filters.

S05-A10 [2006]

Patient positioning for therapy

Used for cases where the novelty is in the positioning of a patient rather than in the therapeutic device itself.

S05-B

Surgery

Surgical instruments, devices and equipment. See S05-A codes for therapeutic equipment. Anaesthesia apparatus is in S05-L. Diagnostic endoscopes are in S05-D04.

Instrument, shock, wave, tissue, pressure, coagulate, incision, cut, cauterisation

S05-B01 [1992]

Using laser, IR, or UV

Includes all aspects of laser surgery.

Light, optical, beam, focus

S05-B02 [1992]

Using sonic or ultrasonic equipment

Includes extracorporeal shock-wave lithotripsy e.g. using ultrasonic waves. See V06 for details of ultrasonic transducers.

Lithotripsy, stone, concretion

S05-B03 [1992]

Using mechanical or electrical equipment

Includes electrosurgical apparatus and electrosurgical cauterisation instruments.

S05-B04 [1992]

Monitoring during surgery

From 2006, S05-B04 codes cover monitoring during the complete surgery, including the patient (S05-B04B), the surgical instruments (S05-B04A1) and the surgical procedure per se (S05-B04A).

S05-B04A [1997]

Monitoring of surgical apparatus/procedure

For monitoring status of surgical equipment during surgery, e.g. temperature of cauterisation appts., power used by ablation appts. etc. From 2006, also includes monitoring progress of surgical procedure itself, e.g. amount of tissue removed, status of tissue surrounding operation site etc. Also includes intra-operative imaging appts/methods.

S05-B04A1 [2006]

Monitoring location of surgical instruments

(S05-B09)

Includes equipment for tracking the location of surgical instruments inserted into patient, and monitoring location of instruments in the operating theatre, e.g. instrument tags, swab counters etc.

Prior to 2006 coded in S05-B04A.

Tagging, swab

S05-B04B [2006]

Monitoring patient during surgery

For monitoring vital signs, etc. of patient during surgery. Prior to 2006 coded in S05-B04.

S05-B05 [1997]

Endoscopic surgery

(S05-B09)

Includes apparatus for keyhole surgery. See S05-D04 for diagnostic endoscopes.

S05-B06 [2002]

Cryosurgery

Cryogenics

S05-B07 [2005]

Remote control and automated/robotic surgical systems

All aspects of automated / robotic systems used in surgical procedures including 5G wireless network-enabled telesurgery devices.

S05-B09 [1992]

Other (Surgical equipment)

Irrigation

S05-C

Medical analysis of biological materials

S05-C codes cover electrical aspects only. See S03-E13 codes for sampling, S03-E14H codes for specific sample types and other relevant S03 codes for specific testing techniques. Includes polymerase chain reaction (PCR) testing for medical applications. See also B11-C08E3, B11-C08N, C11-C08E3, C11-C08N and D05-H18B codes.

Sample, cell, liquid, microscope, measure

S05-C01

Blood

See also S03-E14H1. Breathalysers are in S05-C09. Covers in-vitro testing.

Flow, fluid, monitor, test, coagulate, corpuscle

S05-C02 [1997]

Biological fluids

(S05-C09)

For medical analysis of biological fluids such as urine, semen, saliva, phlegm. See also S03-E14H9.

Urine

S05-C03 [1997]

Biological tissues

(S05-C09)

In-vitro analysis of tissue samples for detection of abnormal cells from e.g. biopsy. See also S03-E14H6.

Biopsy, culture, cell

S05-C05 [1992]

For testing medicine, drugs

See also S03-E14A1.

S05-C09

Other (analysis of biological materials)

Includes breathalysers (see also S03-E14H9) and electrical DNA analysis (see also S03-E14H3).

Measure, chamber, fluid, test, assay, electrophoresis, DNA, ultrasonic

S05-D

Electrical diagnosis

S05-D01

Measuring and recording systems

For indicating and recording in general see also S02-K. For details of wearable computing / fitness sports training devices see also T01-M06A1D and W04-X01A1.

Electrode, data, display, monitor, physiological, process, image, probe, transducer

S05-D01A

For bioelectric currents

Including measuring neurological and nerve stimulation, electrodes, physiological testing and encephalographic apparatus.

Conducting, potential, brain, EEG, physiological

S05-D01A1 [1983]

Electrocardiographs

ECG, EKG, signal, cardiac, heart, lead, tachycardia, bradycardia, fibrillation, QRS complex

S05-D01A1A [1997]

Electrodes

(S05-D01A1)

Includes electrodes adapted for ECG measurements e.g. scalp, chest etc.

Scalp, foetal monitoring, cardiology

S05-D01A2 [1997]

Neurological currents and signals

(S05-D01A)

Includes measurement of neurological bioelectric currents and signals e.g. electroencephalography, electromyography, magnetoencephalography etc.

EMG, EEG, MEG, squid

S05-D01A2A [1997]

Electrodes

(S05-D01A)

Electrodes for detecting bioelectric signals other than ECG, i.e. EEG, EMG e.g. needle electrodes.

S05-D01B

For heart rate, blood pressure

Pressure measuring devices are also in S02-F04 codes for flow measuring see also S02-C. Includes vein and artery wall thickness and blockage measurement.

Catheter, pulse, ultrasonic

S05-D01B1	[1983]
Blood pressure or flow	
<i>Sphygmomanometer, Korotkoff, cuff, Doppler, fluid, electro-arteriograph</i>	
S05-D01B1A	[1997]
Blood pressure	
(S05-D01B1)	
S05-D01B1B	[1997]
Blood flow	
(S05-D01B1)	
Includes measurements of blood flow velocity and cardiac output.	
<i>Tracer, thermo-dilution, catheter</i>	
S05-D01B5	[1983]
Heart rate, pulse	
Measuring or recording pulse. See S05-A05 for exercise.	
<i>Cardiac, frequency, stethoscope</i>	
S05-D01C	
For lungs, body shape, or movement	
S05-D01C1	[1983]
Lungs and respiration	
Includes all aspects of breathing, exhaled air gas content and volume measurement.	
See S05-C09 for breathalysing for e.g. alcohol or drug content.	
<i>Pressure, expire, inhale</i>	
S05-D01C5	[1983]
Body shape or movement	
Detecting, measuring or recording systems for testing shape, size and movement of body parts; e.g. bone and muscle strength and dimension measurements.	
<i>Position, limb, gait, posture</i>	
S05-D01C5A	[1992]
Measurements for non-medical purposes	
Includes fingerprint identification, driver alertness sensors and determining eye movements for use in controlling aircraft, etc.	
<i>Gaze</i>	
S05-D01C7	[2020]
Sleep monitoring	
For monitoring sleep patterns and other sleep parameters. Used in conjunction with other S05 codes depending on specific monitoring and measurement technologies.	

S05-D01D	
Using electric currents or magnetic fields	
Includes all aspects of electrical current, voltage, and frequency measurement not covered elsewhere in S05-D01. NMR diagnosis is in S05-D02B only. From 2006, audiometry is coded under S05-D01D2 only.	
<i>Electrode, sense, frequency, tone, ear, generator, skin, polygraph</i>	
S05-D01D1	[1997]
Body impedance measurements	
(S05-D01D)	
S05-D01D2	[2006]
Audiometry	
<i>Hearing test</i>	
S05-D01E	[1992]
For body temperature measurement	
<i>Thermometer</i>	
S05-D01F	[1992]
For reflex and reaction measurement	
S05-D01G	[1992]
In-vivo blood composition measurement	
Includes in-vivo measurements of blood characteristics e.g. blood gas concentration, pH value, glucose monitoring.	
<i>Oximeter</i>	
S05-D01H	[1992]
Stethoscopes	
Instruments for auscultation. See V06 for acoustic transducers.	
S05-D01J	[1997]
Tissue, bone content and properties measurement	
(S05-D01C5)	
Includes measurement of bone density, bone mineral content, water, fat content and properties such as tissue elasticity etc. See S05-D01G for in-vivo blood composition measurement.	
<i>Bone marrow, bone mineral</i>	
S05-D01K	[2005]
Internal Pressure Measurement	
Blood pressure measurement is coded in S05-D01B1A only, and Intraocular pressure measurement is coded in S05-D05 only.	
<i>Cystometer</i>	

S05-D01L [2006]

In-vivo fluid measurement

This code is for in-vivo measurement of bodily fluids other than blood. Includes spinal fluid, stomach acid, urine, sperm etc. For in-vivo blood measurement, see S05-D01G only.

Spinal fluid, stomach acid, urine, sperm

S05-D01X

Other (Psychotechnics)

Includes pain threshold sensing.

Psychotechnics, mental state

S05-D02

Radiation diagnosis

See S03-E06 codes for analysis by radiation in general. See S05-A codes for therapeutic equipment using radiation e.g. X-Rays. For nuclear or X-radiation measurement see also S03-G02 codes. Video cameras/signal generation - see also W04-M01F.

Image, phosphor, stimable sheet, light, radiographic, read-out, tomography, scintillation

S05-D02A

Using X-rays

Radiographic, support, dental, image, source

S05-D02A1 [1983]

Tomography

Computer, source, beam, CAT, CT, project

S05-D02A3 [1983]

Generating X-rays; protection

Includes equipment for protection from radiation and safety aspects. See V05-E codes for X-ray tubes and control in general.

Voltage, beam, source, anode, radiographic, cathode

S05-D02A5 [1983]

Recording; analysing

Film, light, video, intensify, radiate, radiographic, display, ray, cassette

S05-D02A5A [1992]

Photographic

Electrical aspects of film cartridge and developing apparatus are also coded in S06.

S05-D02A5B [1992]

Video

For X-ray TV system see also W04-M01F, and V05-D for tube aspects.

Fluoroscopy, feature

S05-D02A5C [1992]

Stimulable sheet phosphor

See also S06-K99G and S03-E06B3. See also V05-M01C codes for image storage screens.

S05-D02A5D [2002]

Other detectors

Includes, for example, photon detectors.

S05-D02A5E [1992]

Processing of recorded image

Includes all aspects of processing recorded X-ray image for e.g. storage, enhancement, analysis, enlargement, rotation etc. See T01-J10 codes for image processing using digital computers, and T01-J06A for data processing systems for medical applications.

S05-D02A6 [1992]

X-ray table, positioning

S05-D02A6A [1997]

Positioning X-ray source

S05-D02A6B [1997]

Positioning X-ray detector

S05-D02A7 [2006]

X-ray contrast media

See also S03-E09X for contrast agents.

S05-D02B [1992]

NMR diagnosis

(S05-D02X)

S05-D02B1 [1992]

NMR equipment, magnet, RF pulse generator

See also S01-E02A and S03-E07 codes for MRI/NMR measurements in general.

S05-D02B2 [1992]

Image processing, analysing

Includes processing of recorded image for e.g. enhancement, enlargement, analysis etc. See T01-J10 codes for image processing, and T01-J06A for medical data processing systems.

S05-D02B3 [1992]

MRI contrast media

See also S03-E09X for contrast agents.

S05-D02B4 [2006]

Adaptations for MRI compatibility

Adaptations to electrical medical appts. for use in MRI environment or for mitigating unwanted effects due to MRI procedures, e.g. shielding for implanted devices.

S05-D02C [1992]

Using nuclear radiation

Covers cases in which radiopharmaceutical is injected into patient. Includes gamma camera, SPECT and PET. See also S03-G02B3.

S05-D02E [1992]

Patient table, patient positioning

Operating tables specifically for scanning are in S05-D02E only, not S05-G.

S05-D02X

Other (radiation diagnosis, e.g. optical)

Includes use of radiation e.g. thermal, optical, microwave radiation for investigating physical or chemical properties. Includes lamp, laser, UV, Infrared equipment.

Resonance, radiate, spin, echo, frequency phase, IR, UV, light

S05-D03

Ultrasonic diagnosis

See S03-E08 codes for sonic and ultrasonic testing in general.

Ultrasound, image, linear scan, sector scan, echo, frequency, probe, acoustic, tissue, blood

S05-D03A [1992]

Transducers

Includes general transducer aspects. See also V06.

Piezoelectric

S05-D03A1 [1992]

Device details

Acoustic, ultrasonic diagnostic transducers, magnetostrictive, electrostrictive, crystal, ceramic

S05-D03A2 [1992]

Arrangements of transducers

Includes transducer arrangements for transmission and reception of ultrasonic waves, e.g. array.

Ultrasonic transducer array

S05-D03B [1992]

Equipment other than transducers

S05-D03C [2006]

Ultrasound contrast media

See also S03-E09X for contrast agents.

S05-D03E [1992]

Image processing and analysing

For processing recorded image for e.g. enhancement, storage and analysis. See T01-J10 for image processing in general, and T01-J06A for medical data processing systems.

S05-D04 [1983]

Endoscopes

(S05-D09)

For endoscopic surgical equipment see S05-B05. See also S02-J04B3C and V07-N02 for optical fiber details.

Light, optical fiber, image, illuminate, reflect, laser, arthroscope, laparoscope, colonoscope

S05-D04A [1997]

Control aspects

(S05-D04)

Covers arrangements for controlling movement and positioning of endoscopes within body.

Endoscope positioning, endoscope control

S05-D04B [1997]

Imaging aspects

(S05-D04)

Includes equipment for capturing image of internal organs/cavities, e.g. video camera, CCD, ultrasound etc. See W04-M01 codes for video camera equipment.

S05-D05 [1992]

Eye testing, examination

(S05-D09)

Includes all arrangements for examining the eye for diagnostic purposes; e.g. determining cornea shape, examining eye fundus, measuring cornea curvature, intraocular pressure measurement, testing astigmatism, glaucoma etc. Detecting eye movements for controlling e.g. photographic camera, aircraft etc. is coded in S05-D01C5A.

Intraocular pressure, cornea, astigmatism, ophthalmoscope, ophthalmic, eye photography, gonioscope, glaucoma, patient chair

S05-D06 [1997]

Diagnostic information systems

Includes computer systems designed to aid in patient diagnosis e.g. expert systems and diagnostic databases. See T01-J16A for expert systems in general, and T01-J06A1 for medical information systems.

Information system, medical diagnostic database, medical expert system

S05-D06A [2005]

Telediagnosis

Includes systems for patient diagnosis where patient and medical expert are in different geographical locations e.g. where patient's image, measurements etc. are transferred via internet, wireless telephone. N.B. Used for initial diagnosis of the patient only. For everyday monitoring of patients from remote locations, see S05-G02B2A.

S05-D07 [1997]

Diagnostic displays and monitors

Includes equipment for displaying diagnostic information, e.g. radiation images. See T04-H for visual display units, W05-E codes for general display arrangements, and W03 for television displays.

Terminal, monitoring, diagnostic display

S05-D08 [2005]

General diagnostic processing

S05-D08A [2005]

General image processing

Can be applied either when type of image isn't mentioned or when it isn't important.

S05-D08B [2005]

General data processing

Can be applied either when type of data isn't mentioned or when it isn't important.

S05-D09

Other electrical diagnosis

Including aspects of diagnosis associated with pregnancy e.g. conception, sex and ovulation determination. Includes measurements associated with nutritional management systems, e.g. diet planners, calorie counters.

Foetus, ovulation, gender, conception

S05-E

Dentistry

Electric toothbrushes are covered by X27-A02A3A only. For sterilising apparatus see also S05-G. Anaesthesia is also in S05-L.

Optical, motor, handpiece, tooth, grip, X-ray

S05-E01 [1992]

Dental surgery and treatment apparatus

Includes apparatus for dental surgery and general dental treatment, such as tooth cleaning device, root canal treatment, etc.

S05-E02 [1992]

Peripherals, e.g. lamp or chair

Light

S05-E03 [1997]

Diagnostic equipment and measurement e.g. X-rays

(S05-E)

Includes all electrical equipment for dental diagnosis and measurement. Includes initial electrical measurements for dental prosthetics design. See S05-D02 for radiation diagnosis in general.

S05-F [1983]

Prostheses

Constructional details of prostheses are coded under P32-A40 codes.

Implant, artificial, larynx, nerve, stimulating, tactile

S05-F01 [1992]

Hearing aids

Includes only implanted hearing aids.(See W04-Y codes for all aspects of implanted and non-implanted hearing aids).

Ear, cochlea, deaf, sound

S05-F02 [1992]

Internal incontinence devices

S05-F03 [1992]

Arm or leg prostheses

Limb

S05-F04 [1992]

Artificial heart pumps

Includes permanent artificial hearts only. Blood pumping and treatment circuits for use during surgery, and therapy e.g. dialysis, are coded in S05-H. Heart pacemakers are coded in S05-A01A codes only. Heart pump motors are also coded in X25-L03A.

S05-F05 [1997]

Artificial aids for eyesight

Corneal implant, artificial eyes, contact lens

S05-F09 [1992]

Other (protheses)

Includes medical splints.

S05-F10 [2024]

Design of prosthetic devices

Includes details for designing a prosthesis tailored to the patient's physical needs and lifestyle. See also T01-J15X for computer/software-based design, and T01-J06A for medical applications. This code is to be used with other S05-F codes to specify the type of prostheses designed, e.g. S05-F03 for arm/leg prostheses. Manufacturing details of prostheses are coded under P32-M.

Custom prosthetics

S05-G [1983]

Medical and Digital Health systems, hospital equipment, sterilization equipment

(S05-X)

For dentistry equipment see S05-E also.

S05-G01 [1992]

Sterilising

Includes electrical equipment for sterilising or disinfecting medical equipment only. For sterilization of medical waste before disposal see S05-W. For non-medical sterilisation or disinfection see X27.

S05-G01A [1992]

Using mechanical cleaning, or chemicals

Includes ultrasonic vibrations and disinfectant.

S05-G01B [1992]

Using heat, radiation, or electricity

Sterilisation using hot gases, plasma or microwave radiation etc.

Ultraviolet, microwave, hot gas, steam

S05-G02 [1992]

Medical and Digital Health systems, hospital equipment

Includes medical and healthcare IT systems. Also includes patient monitoring and life support systems, and equipment for use in operating theatres, doctor and dentist surgeries and ambulances.

Incubators, patient transport

S05-G02A [1992]

For moving patients (includes wheelchairs)

Electric wheelchairs may also be coded as electric vehicles in X21, depending on claimed content.

Stretcher, trolley, patient shifter

S05-G02B [1992]

Beds, nursing equipment

Monitor

S05-G02B1 [1997]

Patient beds

(S05-G02B)

Includes beds configured for medical use; e.g. with adjustable frame, patient lifting apparatus, tiltable axes etc.

S05-G02B2 [1997]

Patient monitoring

(S05-G02B)

Includes monitoring equipment for use by nurses for observation and long-term monitoring of e.g. unconscious patients in intensive care unit, ward etc. to determine change in condition, e.g. heart attack.

ITU, patient monitor

S05-G02B2A [1997]

Monitoring patients from remote location

(S05-G02B)

Includes equipment for monitoring patients who are at home or other location remote from the hospital.

S05-G02B2B [1997]

Portable hospital equipment

Includes monitoring equipment for use in e.g. ambulance and equipment which may be carried easily by a person.

Ambulance equipment, portable patient monitor

S05-G02B3 [1997]

Life support systems

S05-G02B3A [2002]

Incubators for infants

S05-G02C [1992]

Operating theatre equipment

Operating tables specifically for radiation diagnosis go in S05-D02E only.

S05-G02D [1992]

Nurse call systems

See also W05-A, and W01-C04 codes for intercoms.

S05-G02E [1997]

Respiratory aids using gas

(S05-G02)

Includes devices for assisting respiratory system using gas, e.g. ventilators, inhalators etc., and monitoring mixture of supplied gas. See S05-A05A for assistance of respiration by e.g. mechanical/electrical means. See S05-D01C1 for aspects of breathing, exhaled air gas content and volume measurement.

Ventilator, breathing aid, inhalator

S05-G02F [2006]

Tissue and fluid extraction equipment

Electrical novelty in equipment used to withdraw fluids and tissue, e.g. for testing, therapy.

S05-G02G [1992]

Medical IT systems

See also relevant T01 codes for computing aspects.
Hospital asset management, inventory

S05-G02G1 [1997]

Patient's medical records

(S05-G02G)

For patient record storage and administration in e.g. hospital. See T01-J05B for database aspects.

Electronic patient record, EPR

S05-G02G2 [1997]

Health care administration

(S05-G02G)

Includes health administration and insurance processing systems. See T01-J05A2 for administration using computers in general.

Health care scheduling, health insurance, health cover

S05-G02G3 [2005]

Data transfer/storage methods and apparatus

(S05-G02G)

Includes all aspects of data transfer between medical equipment, from equipment to central database or from remote location to medical centre. Includes encryption, image compression, access control, network or database details, etc.

S05-G02G4 [2006]

Treatment planning systems

This code is used for systems such as radiotherapy planning systems, wherein for example the size, shape and location of a tumour are used to calculate the most effective positioning and intensity of X-ray generators. Can be used with S05-A or S05-B codes if system is integral with therapeutic or surgical apparatus.

S05-G02G5 [2020]

Pharmacovigilance systems

Control, analysis and management of systems for recording and analyzing data associated with pharmacovigilance, clinical trials, drug screening etc.

S05-G02G9 [2005]

Other medical IT systems methods/apparatus

(S05-G02G)

Includes medical surveys, population screening etc.

S05-G02H [2021]

Nursing trolleys, carts

Electrical details of trolleys and similar equipment used in hospitals.

S05-G02X [2012]

Other hospital equipment

Includes special equipment used in hospital bathrooms, such as baths for patients with lower body bone fractures or whole body bone fractures. Includes equipment used outside hospitals e.g. at doctor surgeries etc. (equipment used in dental surgeries is coded under S05-E02 only) and electrical aspects of wearable devices, hospital clothing and household medical equipment. Includes electrical details of diagnosis boxes/bags and boxes for storing medical instruments.

Gynaecological lamp, RFID belts

S05-H	[1983]
Dialysis; pumping (S05-X) Permanent artificial hearts are coded in S05-F04 only, even if pumping aspects are claimed. Includes all aspects of filtering. Electrical aspects of pumps are also coded in X25-L03A. <i>Blood, flow, fluid, valve, piston, chamber, hemodialysis, liquid, monitor, kidney</i>	
S05-H01	[1997]
Dialysis and blood treatment circuits (S05-H) Covers all aspects of blood treatment; blood oxygenators, filtering, artificial kidneys, dialysis systems etc. <i>Haemofiltration, diafiltration, oxygenator, blood treatment, peritoneal</i>	
S05-H02	[1997]
Blood pumping systems (S05-H) <i>Transfusion, blood pump, circulatory assistance</i>	
S05-J	[1983]
Infusion Includes all electrical aspects of syringes and intravenous fluid administering and control apparatus. For anaesthetic administration control see S05-L also. <i>Pump, reservoir, drug, valve, volume, deliver, meter, chamber, implant, membrane</i>	
S05-J01	[1992]
Fluids <i>Liquid, flow</i>	
S05-J01A	[1992]
Monitoring of intravenous fluid delivery	
S05-J02	[1992]
Drugs through skin Delivery of drugs for anaesthesia is coded in S05-L02. See also S05-A04A for iontophoresis.	
S05-K	[1992]
Aids for handicapped people (e.g. Braille devices) (S05-X) <i>Blind, obstacle detection</i>	

S05-K01	[1997]
Mobility aids <i>Invalid vehicle, vehicle access, invalid mobility</i>	
S05-L	[1992]
Anaesthesia (S05-X)	
S05-L01	[1997]
Gas delivery systems (S05-L)	
S05-L02	[1997]
Intravenous or intramuscular delivery systems (S05-L) <i>Local anaesthesia, relaxation, analgesia</i>	
S05-M	[1992]
Electrical drug storage and dosing (S05-X) Manufacturing details of medicines, tablets, etc. are not coded under S05-M, but under X25-P02 (electrical details only).	
S05-M01	[1997]
Drug delivery systems (S05-M) <i>Drug dosing, drug delivery, dispenser</i>	
S05-M02	[1997]
Monitoring medication compliance (S05-M) Arrangements for indicating time for taking medicine, programmed dispensers, monitoring medicines taken etc. <i>Regime, pill counter, timer</i>	
S05-M03	[1997]
Drug storage systems (S05-M) Includes storage facilities for drugs, etc. in hospitals, doctors' surgeries.	
S05-M04	[1997]
Ventilator systems with medication (S05-M) See S05-G02E for respiratory aids e.g. ventilators. <i>Inhaler</i>	

S05-M05 [2019]
Pharmaceutical dispensing and delivery systems

Includes dispensing and delivery of medical prescriptions within hospitals and other pharmacies.
Pharmacy, Dispensary

S05-P [1997]
Medical simulation systems

For medical education using training and simulation aids, i.e. for training in medical procedures e.g. surgical, therapeutic, analysis, nursing etc. See W04-W07 for simulator systems, training and demonstration, T01-J15H for simulation of non-electronic systems, and T01-J06A for data processing in medicine. See also P85-A codes, in particular P85-A01G, for non-electrical aspects.
Medical education, medical simulation, medical training

S05-V [2006]
Veterinary

This code is to highlight veterinary application and can be used in conjunction with other S05 codes which highlight novelty. See also X25-N02 codes. Prior to Jan 2007 these were coded in S05-X.
Veterinary

S05-W [2015]
Medical waste management

Sterilization of medical waste before disposal. For sterilising or disinfecting medical equipment only see S05-G01. Includes recycling aspects. See also X25-W01 and X27-D.

S05-X
Miscellaneous

From 2007, veterinary applications are coded under S05-V only. Includes teaching, transplanting, atomising and enuresis detection. For teaching involving training and simulations aids, see also S05-P.
Air, respiration, valve, flow, patient, infant, pressure, gas

S05-Y [2005]
Additional medical device details

S05-Y01 [2005]
Testing and monitoring of medical equipment and systems
Includes methods and apparatus for alerting an operator when an abnormality occurs in an electrical medical apparatus.

S05-Y02 [2005]
Nano/micro scale medical devices

S05-Y03 [2005]
Implantable medical devices

S05-Y04 [2005]
Ingestible medical devices

S05-Y05 [2006]
Control, monitoring and communication of internal devices
Includes e.g. magnetic control of ingestible devices, remote monitoring of implanted devices etc. Can be used in conjunction with specific device codes. See also W05-D codes for remote control, communication and monitoring apparatus per se.

S05-Y07 [2019]
Manufacture of medical equipment
Includes manufacturing of diagnostic and surgical equipment.

S06: Printing and Photography

S06-A* [1980-2009]

Electrography, electrophotography, magnetography

*This code is now discontinued, see S06-D to K.
Includes electrical and non-electrical aspects.
Copier, copy, image, photocopier

S06-A01* [1980-2009]

Recording members

*This code is now discontinued, see S06-E01.
Layer, charge, conducting, image, surface, acceptor, compound, donor, dope

S06-A01A* [1980-2009]

Photoconductive layers

*This code is now discontinued, see S06-E01A.
Includes all types of charge-generating layers and photosensitive paper.
Hydrazone, photoreceiver, accept

S06-A01A1* [1980-2009]

Organic photoconductive layers

*This code is now discontinued, see S06-E01A1.
Cyclic, polycyclic, heterocyclic, quinone

S06-A01A2* [1980-2009]

Inorganic photoconductive layers

*This code is now discontinued, see S06-E01A2.
Amorphous, silicon, selenium, carry, dope, surface, oxide, polycrystalline

S06-A01A3* [1980-2009]

Sensitisers; binding materials

*This code is now discontinued, see S06-E01A3.
Dye, composition, photosensitiser, organic, oxidative potential

S06-A01A4* [2007-2009]

Treatment of recording members

*This code is now discontinued, see S06-E01A4.
Includes application of a lubricant to the surface of the drum, etc.

S06-A01A9* [1980-2009]

Other (photoconductive layer aspects)

*This code is now discontinued, see S06-E01A9.
Includes aspects of photoconductive belt/drum not covered by other S06 codes.

S06-A01B* [1980-2009]

Carriers; intermediate or cover layers

*This code is now discontinued, see S06-E01B.
Sensitive, image, amorphous, coating, drum, base layer, protective layer.

S06-A01D* [1997-2009]

Manufacture of recording members for magneto-, electro(photo)-graphy

*This code is now discontinued, see S06-E01C.
Includes deposition of layers on drum.
Depositing

S06-A01D1* [1997-2009]

Apparatus used for manufacturing of recording members for magneto-, electro(photo)-graphy

*This code is now discontinued, see S06-E01C1.

S06-A01F* [1997-2009]

Temperature control

*This code is now discontinued, see S06-E01D. For warming up photoconductor layers on drum or belt up to normal working operation temperature.
Heater

S06-A01X* [1980-2009]

Other (Recording members)

*This code is now discontinued, see S06-E01X.
Includes thermoplastic and photoelectric layers, paper treatment and manufacture, see S06-C02 codes for lithographic plate manufacture.
Image, electrostatic, surface, copy, substrate, polymer

S06-A02* [1980-2009]

Sensitising

*This code is now discontinued, see S06-E02.
Electrode, surface, electrostatic

S06-A02A* [1997-2009]

Corona charger

*This code is now discontinued, see S06-E02A.
Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.
Discharge, electrode, grid, scorotron, corotron, dicorotron

S06-A02B* [1997-2009]

Contact charger

*This code is now discontinued, see S06-E02B.
Roller, brush

S06-A03* [1980-2009]

Exposing

*This code is now discontinued, see S06-D/E03.
Includes aspects of platen movement, copying station or unit holding original document, lens/mirror systems and drum and belt drive details.

S06-A03A* [1983-2009]

Frame scanning

*This code is now discontinued, see S06-D01A.
Includes slit and full frame scanning.

S06-A03B* [1983-2009]

Line (i.e. raster) scanning

*This code is now discontinued, see S06-D01B.
Raster output scanner
Laser, modulate, polygonal, mirror

S06-A03C* [1983-2009]

Synchronisation; changing magnification

*This code is now discontinued, see S06-D10A.
Includes all aspects of magnification/reduction lens systems.
Size, variable, enlarge, ratio, paper, select, adjust

S06-A03D* [1992-2009]

Optical elements, e.g. lenses

*This code is now discontinued, see S06-D03/E03B
Mirror

S06-A03E* [1992-2009]

Light source driver (e.g. biasing)

*This code is now discontinued, see S06-D02A/E03A1.
Illuminate, biasing

S06-A03E1* [1997-2009]

Light source per-se

*This code is now discontinued, see S06-D02/E03A. Includes lamps (see also X26) and e.g. laser (see also U12/V08).
Lamp, LED

S06-A03F* [1992-2009]

Driving system and construction

*This code is now discontinued, see S06-D04/E03C. Includes mountings for optical system
Glass, feed, position

S06-A03F1* [1997-2009]

Document feeder

*This code is now discontinued, see S06-D04B.
Original, sheet, page, contact glass

S06-A03G* [1992-2009]

Image reading appt.

*This code is now discontinued, see S06-D. Includes electronic image acquisition scanner, raster input scanner.
Read

S06-A03G1* [1997-2009]

Image sensor

*This code is now discontinued, see S06-D05. Electronic image CCD pick-up element of line type and of matrix type.
CCD

S06-A03G3* [1997-2009]

Determining details of original document

*This code is now discontinued, see S06-D06. Density and size measurement, color, page width/length, see also S02-A03B2 for length/width/thickness measurements.

S06-A03H* [1992-2009]

Magnetographic and non-light exposure

*This code is now discontinued, see S06-D09.

S06-A03X* [1992-2009]

Other (Exposing)

*This code is now discontinued, see S06-D09. Includes thermal and X-ray (electroradiography) exposure.
Electroradiography, X-ray

S06-A04* [1980-2009]

Developing

*This code is now discontinued, see S06-E04. Includes copy density and darkness control and brush or magnetic applicator details
Bias, contrast, replenishment

S06-A04A* [1980-2009]

Using solid developer

*This code is now discontinued, see S06-E04A.
Powder particles

S06-A04A1* [1992-2009]

Dry toner supply and storage e.g. reservoir

*This code is now discontinued, see S06-E04C. Toner supply from container, tank, hopper to developer chamber

S06-A04A1A* [1992-2009]

Toner level detector

*This code is now discontinued, see S06-K07B1.
Refill

S06-A04A1B* [2002-2009]

Toner density detector

*This code is now discontinued, see S06-K07B2.
Refill

S06-A04A2* [1992-2009]

Toner application

*This code is now discontinued, see S06-E04C.
Includes application by magnetic brush arrangement, scavangeless.

S06-A04A9* [1992-2009]

Other (using solid developer)

*This code is now discontinued, see S06-E04.

S06-A04B* [1980-2009]

Using liquid developer

*This code is now discontinued, see S06-E04B.
Flow, fluid, suspension

S06-A04C* [1980-2009]

Developer materials

*This code is now discontinued, see S06-E04.
Codes in this section cover materials per se and their manufacture only. Includes toner details for electrophotographic facsimile and laser printer.
Compound, particle, cellulose, composition, copolymer, disperse, dry, magnetic

S06-A04C1* [1980-2009]

Powder

*This code is now discontinued, see S06-E04A1.
Charge, resin, binder, component, polymer, coating

S06-A04C2* [1980-2009]

Liquid

*This code is now discontinued, see S06-E04B1.
Suspension, polymer, resin, solvent, acid, aqueous, dispersion

S06-A04C5* [1997-2009]

Manufacture and manufacturing appt.

*This code is now discontinued, see S06-E04D.

S06-A04C9* [1997-2009]

Other (developer materials)

*This code is now discontinued, see S06-E04X.
Cyan, ester, solution, aerosol

S06-A04X* [1997-2009]

Other (developing)

*This code is now discontinued, see S06-E04X.
Storing waste toner for disposal.

S06-A05* [1980-2009]

Transferring images

*This code is now discontinued, see S06-E05.
Includes removal of recording sheet from drum after transfer.
Surface, receive, separate, contact, dielectric

S06-A05A* [1997-2009]

Corona charger

*This code is now discontinued, see S06-E05A.
Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.
Discharge

S06-A05A1* [2002-2009]

Corona charger transfer of toner

*This code is now discontinued, see S06-E05A1.
Discharge

S06-A05A2* [2002-2009]

Corona charger separation of paper

*This code is now discontinued, see S06-E05A2.
Discharge

S06-A05B* [1997-2009]

Contact type charger

*This code is now discontinued, see S06-E05B.
Transfer roller, blade, belt

S06-A05B1* [2002-2009]

Transfer roller or belt, toner transfer details

*This code is now discontinued, see S06-E05B1.

S06-A05B2* [2002-2009]

Transfer roller or belt, paper separation details

*This code is now discontinued, see S06-E05B2.

S06-A05C* [1997-2009]

Intermediate belt/drum

*This code is now discontinued, see S06-E05C.

S06-A05D* [2008-2009]

Care of transfer appts.

*This code is now discontinued, see S06-E05D. For lubrication of transfer roller, belt, intermediate roller or belt.
Lubricant

S06-A06* [1980-2009]

Fixing

*This code is now discontinued, see S06-E06.
Flash

S06-A06A* [1992-2009]

Heat and pressure application

*This code is now discontinued, see S06-E06A. If heater aspects are claimed see X25-B codes also.
Fuse

S06-A06B* [1992-2009]

Roll and roll driving

*This code is now discontinued, see S06-E06B1. Includes clearing jams in fixing system.
Roller

S06-A06B1* [1997-2009]

Belt and belt driving

*This code is now discontinued, see S06-E06B2.

S06-A06C* [1992-2009]

Fuser oil composition and application

*This code is now discontinued, see S06-E06C.

S06-A06C1* [1992-2009]

Fuser oil composition

*This code is now discontinued, see S06-E06C1.

S06-A06D* [1997-2009]

Lustre control

*This code is now discontinued, see S06-E06D.
Heating, gloss, pre-heating

S06-A06P* [2008-2009]

Pre-fixing

*This code is now discontinued, see S06-E06P. E.g. for reducing the moisture content of the transfer material to increase its rigidity.

S06-A06X* [1992-2009]

Other (fixing)

*This code is now discontinued, see S06-E06X.
Cooling

S06-A07* [1980-2009]

Multi-processing stations

*This code is now discontinued, see S06-E. This code is used when the system or process as a whole is claimed rather than any specific aspect.
Processor cartridge

S06-A07A* [1997-2009]

Drive system for several imaging stations

*This code is now discontinued, see S06-E. Driving linked colour stations

S06-A08* [1980-2009]

Using magnetic patterns or thermoplastic layers

*This code is now discontinued, see S06-E07. Includes all aspects of magnetography. Magnetic printer head details may also have T03-A03 codes assigned, depending on content.
Latent, heat, permeable, field, deformation

S06-A09* [1980-2009]

Electrography not using charge patterns

*This code is now discontinued, see S06-E08. Includes electrophoresis.
Polymer, deform, electrostatic, field, impact, magnetic, paper

S06-A10* [1980-2009]

Cleaning, residual charge elimination etc.

*This code is now discontinued, see S06-K06. Includes corona discharge, scrapers, ozone gas removal and charge-unifying drum exposure.
Develop, light, residue, dust, roll, collect, filter

S06-A10A* [1992-2009]

Toner removal

*This code is now discontinued, see S06-K06C. Involves removal of toner.
Surface, brush, lube block

S06-A10A1* [1992-2009]

Using blade

*This code is now discontinued, see S06-K06C1.
Scraper

S06-A10B* [1992-2009]

Charge removal and ozone removal

*This code is now discontinued, see S06-K06B.
Drum, discharge

S06-A10C* [1997-2009]

Returning toner for re-use

*This code is now discontinued, see S06-K06C2.
Recycle

S06-A10D* [2007-2009]

Transfer of toner to collection or waste container

*This code is now discontinued, see S06-K06C3. Covers mechanism for transferring toner to the collection or waste container for later removal and recycling outside the copier.

S06-A10E* [2007-2009]

Removal of other material, e.g. dust

*This code is now discontinued, see S06-K06D.
Includes details of air cleaning systems. If cleaned air is expelled outside the copier, see also X27-E01B2 (electrical aspects only).

S06-A11* [1980-2009]

Multicolour systems

*This code is now discontinued, see S06-K01. Used for any aspect of colour system, with other codes as appropriate.

Dye, pigment, tint

S06-A11A* [1992-2009]

Full colour

*This code is now discontinued, see S06-K01A.
Four colour, magenta, cyan, yellow, black

S06-A11B* [1992-2009]

Two colour, highlighting

*This code is now discontinued, see S06-K01B.
Red

S06-A12* [1983-2009]

Sheet handling/feeding

*This code is now discontinued, see S06-K02.
Includes all mechanisms for transporting sheet through copier, collators and sorters.
Paper, document, roller, guide, position, side, belt, detect, platen, path

S06-A12A* [1983-2009]

Multicopies; duplex

*This code is now discontinued, see S06-K02A.
Reverse, double, invert

S06-A12B* [1983-2009]

For different paper sizes

*This code is now discontinued, see S06-K02B. For feeding paper of different lengths and thickness.

S06-A12C* [1992-2009]

Collators and sorters

*This code is now discontinued, see S06-K02C.
Includes feeding paper containing classified info to a locked tray. Includes paper stores.
Stack, tray

S06-A12D* [2002-2009]

Paper skew detection, skew correction, clearing jams

*This code is now discontinued, see S06-K02D.

S06-A12E* [1997-2009]

Sheet decurling

*This code is now discontinued, see S06-K02E.

S06-A12F* [2008-2009]

Duplex sheet feed

*This code is now discontinued.

S06-A14* [1987-2009]

Control, monitoring, warning devices

*This code is now discontinued, see S06-K07.
Includes operating status display (for display control circuitry see T04-H codes), mode selection devices, microprocessor details (see also T01-J codes, e.g. T01-J08A), and recording inhibiting devices.

S06-A14A* [1992-2009]

User input and display

*This code is now discontinued, see S06-K07A1.
Includes mode selection keys, etc.
Indicate

S06-A14B* [1992-2009]

Monitoring and error detection

*This code is now discontinued, see S06-K07B.
Fault, reset

S06-A14C* [1992-2009]

Control of copier operation

*This code is now discontinued, see S06-K07A.
Covers general details of control system.

S06-A14D* [1997-2009]

Power supply control

*This code is now discontinued, see S06-K07A2.

S06-A14E* [1997-2009]

Remote monitoring and control

*This code is now discontinued, see S06-K07C1.
Billing

S06-A14F* [2005-2009]

Management of confidential/secure documents, e.g. prevention of illegal copying

*This code is now discontinued, see S06-K07A3.
Preventing illegal copying of banknotes, securities and private documents, recognising copy prevention marks on documents, output to authorised operator. See also T01/T04 for image processing aspects and T05-J for testing of securities, banknotes, etc.

S06-A15* [2002-2009]

Electrophotographic copier rollers

*This code is now discontinued, see S06-K03H.
General constructional details of rollers.

S06-A16* [1987-2009]

Electronic copier

*This code is now discontinued, see S06-K07.

S06-A16A* [1992-2009]

Digital copier, editing copier

*This code is now discontinued, see S06-K07A4.
Includes picture processing and modification aspects of otherwise conventional appt.

S06-A16B* [1992-2009]

Systems with non-electrophotographic input or output arrangements

*This code is now discontinued, see S06-K99B a together with S06-F/G/H/J codes. Includes systems with CCD sensor input, and thermal output.

S06-A16C* [1997-2009]

Systems with electrophotographic and non-electrophotographic output

*This code is now discontinued, see S06-K99B a together with S06-F/G/H/J codes.

S06-A17* [1997-2009]

Recycling Systems

*This code is now discontinued, see S06-K04. From 2005 covers all aspects of recycling. See also X25-W04 for electrical aspects of recycling systems in general.

S06-A17A* [2005-2009]

Paper Recycling

*This code is now discontinued, see S06-K04A. For removing toner from recording paper to enable re-use of paper.

Paper

S06-A17B* [2005-2009]

Toner Recycling

*This code is now discontinued, see S06-K04B together with appropriate S06-E04 codes.

S06-A17C* [2005-2009]

Component Recycling

*This code is now discontinued, see S06-K04C. See also V04/X12 for recycling electrical components.

S06-A18* [1992-2009]

Finishing apparatus

*This code is now discontinued, see S06-K05.

S06-A18A* [1997-2009]

Stapling, binding, paper cutting, paper punching, paper folding

*This code is now discontinued, see S06-K05A.
Includes bookbinding/stapling/cutting/punching devices situated inside the copier or separate bookbinding/stapling/cutting/punching machines attached to the copier.

S06-A18B* [2006-2009]

Laminating

*This code is now discontinued, see S06-K05B.

Laminating, protective layer

S06-A18C* [2008-2009]

Shredding

*This code is now discontinued, see S06-K05C.
Includes immediate shredding directly after scanning.

S06-A18D* [2008-2009]

Attachment or printing of copy prevention marks to document to prevent forgery

*This code is now discontinued, see S06-K05D.
Includes applying a magnetic wire, RFID tag, etc., as part of the printing process. If attaching a RFID tag, see also T04-K codes. Details on watermarking also coded under T01.

S06-A19* [1992-2009]

Construction

*This code is now discontinued, see S06-K03.
Includes details of machine casing, framework, etc., and also internal mounting arrangements of components and modules

S06-A19A* [1997-2009]

Paper holders

*This code is now discontinued, see S06-K03B.

Container, storage

S06-A19A1* [1997-2009]

Cassettes

*This code is now discontinued, see S06-K03B1. For holding paper sheets before being fed for copying onto.

Container

S06-A19A2* [1997-2009]

Trays, bins

*This code is now discontinued, see S06-K03B2. For receiving documents or copy paper sheets after copying operation, duplex intermediate tray.

S06-A19B* [1997-2009]

Ventilation and humidifying mechanisms

*This code is now discontinued, see S06-K03C.
Fan

S06-A19C* [1997-2009]

Frames, casings, bearings

*This code is now discontinued, see S06-K03D.

S06-A19D* [2007-2009]

Manufacture and manufacturing apparatus

*This code is now discontinued, see S06-K03E.
Covers manufacturing method and apparatus for the manufacture of copier elements.

S06-A19E* [2008-2009]

Packaging for electrography, electrophotography and magnetography

*This code is now discontinued, see V04-X together with S06-K99 codes.

S06-A20* [1980-2009]

Other (electrography, electrophotography, magnetography)

*This code is now discontinued, see S06-E09.
Includes forming electrostatic latent image as initial stage in data acquisition for e.g. audio and video systems, e.g. still picture camera with electrostatic latent image production (see also T03 and W04). Includes electrophotographic displays (see W05-E codes also), recycling other than paper and ink, non-copy-able documents, etc.
Display, light

S06-B

Photography

Electrical aspects only are included. Video and electronic still-picture cameras are covered by W04-M01 codes.
Image, optical, instant-picture, SLR, disc, roll, cartridge, film

S06-B01

Focussing; indicating

Lens, automatic, adjust, reflect, drive, intensity, light, display

S06-B01A [1983]

Focus detection; rangefinders

Rangefinders combined with surveying navigating appt. are coded in S02-B01. (See W06-A codes for radar and analogous systems.)

Position, distance, beam, drive, element, IR, infrared, ultrasonic, UV, ultraviolet

S06-B01B [1983]

Lens positioning; indicating

Includes all aspects of positioning motors (see also V06), viewfinder display details and film data marking appt.

Focal, alarm

S06-B01B1 [1992]

Lens positioning, driving

Length, barrel, zoom, correcting focus

S06-B01B2 [1992]

Film data marking

Information, record, print, time, date

S06-B01B2A [1997]

Optically

LED

S06-B01B2B [1997]

Magnetically

Magnetic marking see also T03 codes
Magnetic head

S06-B01C [1997]

Viewfinder display

LCD

S06-B01E [1997]

Eye gaze direction detection

Detects pupil of eye for controlling direction of line for auto-focussing or line of view. See S05-D01C5A for eye ball position detection.

S06-B02

Camera exposure control

Automatic, lens, manual, speed

S06-B02A

Light metering

See also S03-A01 codes.

Intensity, compensate, bright, photometry

S06-B02B

Exposure time and aperture evaluation and setting

Includes evaluation using film speed/sensitivity information.

S06-B02B1 [1997]

Reading data from film/film cartridge

Using pre-set data on film or cartridge to automatically set camera. Reading magnetic marking see T04 and T03 codes also.

DX code

S06-B02B2 [1997]

Aperture/shutter speed setting

Includes manual input for pre-setting aperture size or shutter speed.

S06-B02C

Shutter and aperture control

Includes remote actuation.

Electromagnet, magnet, motor, drive, blade, diaphragm, mechanism, open, time

S06-B02C1 [1992]

Remote actuation

See W05-D04 codes for optical or radio controlled system.

S06-B02C5 [1992]

Actuation using timer delay

See also S04-C01.

S06-B02E [1997]

Camera shake detection/correction

For sensing movement due to user of camera in order to perform compensation e.g. optically using lens or to warn user of excessive movement or to prevent photo-taking operation.

Movement sensing

S06-B03

Flash units

Part of camera, lamps, tubes, reflectors, fittings, and operating circuits are coded in X26 also.

Illuminate, pulse, strobe, gun, trigger, charge, built-in

S06-B03A [1983]

Electronic

Covers discharge tube flash units, xenon discharge tube, capacitor discharge circuit.

Capacitor discharge, xenon lamp

S06-B03A1 [2002]

Pre-light emission

Pre-light emission before discharge of flash to prevent red eye. See only W04-M01H codes if for digital camera.

S06-B03B [1983]

Non-electronic

Covers incandescent lamp flash units.

S06-B04 [1983]

Film processing

Electrical aspects of developing exposed film, exposing photographic paper, scanning negative, developing exposed film and paper. Includes electrical aspects of X-ray film processing. Does not include electrical aspects of film manufacture or details of film material.

Image, colour, print, expose, negative, positive, copy, dark-room

S06-B04A [1983]

Photographic printing appts.

Electrical aspects of printer for wet developing of photographic film or paper to produce photographic print. Control and monitoring of process. For positive or negative scanning to provide digital image to computer and computer output appt. see S06-B06B. For printing from digital camera see also W04 esp. W04-D10, for non-wet printing see S06-E to S06-K codes.

Frame, original, scan filter, magnify, reduce, colour output on microfilm

S06-B04A1 [1992]

Copiers using microcapsule sheets

Cylith, cycolour

S06-B04A2 [2005]

Processing exposed film

Electrical aspects of developing, fixing, washing and drying negative.

S06-B04A3 [2005]

Processing developed negatives

Electrical aspects of processing developed negative to produce photographic prints.

Enlarging, exposing, rinsing, fixing, washing, drying

S06-B04A5* [1992-2004]
Control and monitoring of printing station

*This code is now discontinued and transferred to S06-B04A2 for film/slide processing, including control and monitoring details and S06-B04A3 for print/slide making, as well as control and monitoring details and modification of exposure based on e.g. negative characteristics.

Correct, auto-exposure, contrast measurement, density

S06-B04B [1983]
Photographic film manufacture

Includes electrical aspects of photographic film manufacture only. See S06-B04A2 for developing exposed film and electrical aspects of chemical, thermal development and S06-B04A3 for developing photographic paper and electrical aspects of chemical, thermal development.

Develop, electrolytic, solution, emulsion, heat, dry, flow, fluid, liquid, mix, roll, silver, agitate, recovery, halide

S06-B04C [1997]
Film order processing

Mini-lab, direct plate exposure

S06-B04E [1997]
Photographic film or paper feeding (not in camera)

Convey, feed

S06-B05
Cinematography

Includes cinema equipment and projectors. for motion picture film, telecine machine. Magnetic and video recording are covered by T03 and W04.

Cine, picture, motion, sound, track, record, tape, frame, television, telecine, reel, synchronising, screen

S06-B06 [1983]
Projectors, viewers (incl. microform)

Video projectors are covered by W04-Q01 codes and only coded in S06-B06 if they are either a permanent part of a photographic projector, or intended for use as an overhead projector transparency. For projector synchronisation with audio/video recording appts. see W04-K01 also.

Transparency, cassette, frame

S06-B06A [1992]
Projectors

Display, slide, screen, reel

S06-B06B [1992]
Film scanners and viewers

Scanning positive or negative to provide digital image to computer, printer, self service kiosk etc.

S06-B06C [1992]
Microfilm apparatus

Read, fiche, microfiche

S06-B08 [1983]
Other camera electrics

Includes e.g. motorised control for instant-picture camera, eyepiece lamps, microprocessor control of camera and/or lens etc, mode selection control. Remote control is covered by S06-B02C1.

Control, drive, data, transmission

S06-B08A [1992]
Film winding in camera

Reel, perforation detection

S06-B08B [1997]
Film loading detection

For determining correct cartridge loading and film feed.

S06-B08C [1997]
Power source details

Includes storage compartments for battery and detection of battery voltage level. See also X16 for battery details, if measuring battery level see X16 and S01. See U24 for power supply details.

Battery

S06-B09
Other (photography)

Includes electrical aspects of X-ray photography (processing is also coded in S06-B04 codes).

Radiate, beam, colour, cassette, medical, tomography, photobooth, separate flash units and lighting units, photothermography

S06-C

Printing

Includes electrical aspects of presses, rotary machines etc. but **not** character and line printers, printers as computer peripherals, which are covered by S06-D to K codes. For textile printing see also X25-T.

Colour, image, scan, picture

S06-C01

Photoelectronic composing; controlling composing machines

Pre-press proofing, colour proofing.

Character, select, text, space, graphic, laser, font, phototypeset, typeset

S06-C02

Plate production; colour separations

Imagesetter, platesetter, computer to plate, electrophotographic plates per se are coded in S06-A01X.

Tone, beam, half, night, pixel, reproduce, lithography, flat-bed scanner, drum, gravure

S06-C02A [1992]

Plate production

S06-C02A1 [2006]

Computer to plate manufacture

Covers all aspects of direct plate manufacture and production from computer original without intermediate stages. See also T01 for computer design aspects.

CTP, computer-to-plate

S06-C02B [1992]

Colour separation

S06-C03

Printing, press control

Control of flexographic, offset lithographic, screen printing, gravure, printing processes, etc.

Machine, plate, rotating, cylinder, sheet, roll, ink, offset, lithography, stencil printer

S06-C03A [1992]

Control

Control system for plate loading, sheet feeding, wash-up, damping, inking and registering, etc.

S06-C04 [2008]

Media conveying details

Includes electrical details of media, e.g. paper or web, conveying in printer, e.g. offset printer.

S06-C05 [2002]

Print finishing equipment

Novel electrical aspects of sheet/batch collators, folders, booklet makers, binders, perforator, scorer, numberer

Staple, sheet separation, stack, bind, feed

S06-C09

Other (printing)

For textile printing see also X25-T.

S06-D [2010]

Scanning Systems

Previously coded as S06-A03, W02-J01, W02-J02A. Includes aspects of platen movement, copying station or unit holding original document, lens/mirror systems, drum and belt drive details and scanning drive (See also V07-K05). See also U14-H01B for thin film image sensor, U13-A01 and U13-A02 for circuitry and CCD. Details of scanners that are not part of an image forming device (e.g. flat bed scanners) are coded in T04-M only.

S06-D01 [2010]

Scanning Type

S06-D01A [2010]

Frame Scanning

Previously coded as S06-A03A. Includes slit and full frame scanning.

S06-D01B [2010]

Raster/Line Scanning

Previously coded as S06-A03B. Raster output scanner

Laser, modulate, polygonal, mirror

S06-D02 [2010]

Light Source

Previously coded as S06-A03E1. Lamps (see also X26) and e.g. laser (see also U12/V08).

Lamp, LED

S06-D02A [2010]

Light Source Driving

Previously coded as S06-A03E.

Illuminate, biasing

S06-D03 [2010]

Optical Elements

Previously coded as S06-A03D, W02-J01A. See also S06-D01 if specific to type of exposure.

Polygonal

S06-D04 [2010]

Drive System and Construction

Previously coded as S06-A03F, W02-J01B. Includes mountings for optical system. See also V06 codes for motor details.

Glass, feed, position

S06-D04A	[2010]
Position detection and adjustment	
Previously coded as W02-J01C. Includes control and error compensation of scanning velocity and position.	
S06-D04B	[2010]
Document feeder in scanning system	
Previously coded as S06-A03F1. Feeding of paper through the copier other than through the scanning arrangements are coded under S06-K02	
<i>Original, sheet, page, contact glass</i>	
S06-D05	[2010]
Sensors	
Previously coded as S06-A03G1, W02-J02A1. Electronic image CCD pick-up element of line type and of matrix type.	
<i>CCD, photoelectric detector, thin film image sensor, multi-element array</i>	
S06-D05A	[2010]
Integral reading circuitry	
Previously coded as W02-J02A1A.	
S06-D06	[2010]
Determining details of original document	
Previously coded as S06-A03G3. Density and size measurement, color, page width/length, see also S02-A10B for length/width/thickness measurements.	
S06-D09	[2010]
Non-light exposure	
Previously coded as S06-A03H, S06-A03X. Includes thermal and X-ray (electroradiography) exposure.	
<i>Electroradiography, X-ray</i>	
S06-D10	[2010]
Combined scanning and printing arrangements	
S06-D10A	[2010]
Synchronising, changing magnification	
Previously coded as S06-A03C. If synchronisation with sheet feeding is involved, then S06-K02 codes are also assigned. Includes all aspects of magnification/reduction lens systems.	
<i>Size, variable, enlarge, ratio, paper, select, adjust</i>	

S06-E	[2010]
Electrophotographic Image Production	
Previously coded as S06-A, T04-G04, W02-J02B2.	
S06-E01	[2010]
Recording members	
Previously coded as S06-A01, T04-G04C. Drum driving aspects are coded in S06-E03 codes only. Includes photosensitive paper, photoconductive belt, drum, etc. Toner is coded under S06-E04 only. Constructional details are also coded under S06-K03.	
<i>Layer, charge, conducting, image, surface, acceptor, compound, donor, dope, photoconductor, belt</i>	
S06-E01A	[2010]
Photoconductive layers	
Previously coded as S06-A01A. Includes all types of charge-generating layers and photosensitive paper. Also cross reference with T04-G04C for photosensitive materials for optical printer.	
<i>Hydrazone, photoreceiver, accept</i>	
S06-E01A1	[2010]
Organic	
Previously coded as S06-A01A1.	
<i>Cyclic, polycyclic, heterocyclic, quinone</i>	
S06-E01A2	[2010]
Inorganic	
Previously coded as S06-A01A2.	
<i>Amorphous, silicon, selenium, carry, dope, surface, oxide, polycrystalline</i>	
S06-E01A3	[2010]
Sensitiser; binding materials	
Previously coded as S06-A01A3.	
<i>Dye, composition, photosensitiser, organic, oxidative potential</i>	
S06-E01A4	[2010]
Treatment of recording members	
Previously coded as S06-A01A4. Includes application of a lubricant to the surface of the drum, etc.	
S06-E01A9	[2010]
Other (photoconductive layer aspects)	
Previously coded as S06-A01A9. Includes aspects of photoconductive belt/drum not covered by other S06-E01A codes.	

S06-E01B [2010]

Carriers; intermediate or cover layers

Previously coded as S06-A01B.

Sensitive, image, amorphorous, coating, drum, base layer, protective layer.

S06-E01C [2010]

Manufacture

Previously coded as S06-A01D. Includes deposition of layers on drum.

Depositing

S06-E01C1 [2010]

Manufacturing apparatus

Previously coded as S06-A01D1.

S06-E01D [2010]

Temperature control

Previously coded as S06-A01F. For warming up photoconductor layers on drum or belt up to normal working operation temperature. The control aspect is also coded by S06-K07A1. See also X25-B codes for details of electric heating.

Heater

S06-E01X [2010]

Other (recording members)

Previously coded as S06-A01X. Includes thermoplastic and photoelectric layers, paper treatment and manufacture, see S06-C02 codes for lithographic plate manufacture. Electric details of paper manufacture is also coded under X25-T09A.

Image, electrostatic, surface, copy, substrate, polymer

S06-E02 [2010]

Sensitising

Previously coded as S06-A02. Desensitisers for removing residual charge are coded in S06-K06.

Electrode, surface, electrostatic

S06-E02A [2010]

Corona charger

Previously coded as S06-A02A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.

Discharge, electrode, grid, scorotron, corotron, dicorotron

S06-E02B [2010]

Contact charger

Previously coded as S06-A02B.

Roller, brush

S06-E03 [2010]

Exposure

Previously coded as S06-A03. See also S06-D for combined scanning and printing arrangements.

S06-E03A [2010]

Light Source (for exposure)

Previously coded as S06-A03E1, T04-G04B. See X26 for lamp details, for LED heads see also U12-A01A3 or U12-A01A6.

Lamp, LED

S06-E03A1 [2010]

Light Source Driving (for exposure)

Previously coded as S06-A03E.

Illuminate, biasing

S06-E03A2 [2010]

Light source type - LED

Previously coded as W02-J02B2A.

S06-E03A3 [2010]

Light source type - Laser

Previously coded as W02-J02B2B.

S06-E03B [2010]

Optical Elements

Previously coded as S06-A03D, T04-G04A1.

Polygonal, galvanometer

S06-E03C [2010]

Drive System and Construction

Previously coded as S06-A03F, T04-G04A2. Includes mountings for optical system. Details of sheet feeding are coded under S06-K02 codes. See also V06 codes for motor details.

Scan

S06-E03C1 [2010]

Position detection and adjustment

S06-E04 [2010]

Developing

Previously coded as S06-A04. Includes copy density and darkness control and brush or magnetic applicator details. For removal of developer from drum see S06-K06. For colour developer, see also S06-K01 codes. See also S06-K07B1A and S06-K07B1B for level detection and density detection of developing agent respectively. Inkjet inks and thermal ink ribbons are not coded here, but are coded by S06-G04 and S06-H02 respectively.

Bias, contrast, replenishment

S06-E04A [2010]

Using solid developer

Previously coded as S06-A04A.

Powder particles

S06-E04A1 [2010]

Composition of solid developer

Previously coded as S06-A04C1.

Charge, resin, binder, component, polymer

S06-E04B [2010]

Using liquid developer

Previously coded as S06-A04B.

Flow, fluid, suspension

S06-E04B1 [2010]

Composition of liquid developer

Previously coded as S06-A04C2.

Suspension, polymer, resin, solvent, acid, aqueous, dispersion

S06-E04C [2010]

Developer application

Previously coded as S06-A04A2. Includes application by magnetic brush arrangement, scavangeless.

S06-E04D [2010]

Manufacture of developer agent

Previously coded as S06-A04C5.

S06-E04E [2010]

Toner supply and storage

Previously coded as S06-A04A1. Toner supply from container, tank, hopper to developer.

S06-E04X [2010]

Other developing and developer materials

Previously coded as S06-A04C9, S06-A04X.

S06-E05 [2010]

Transferring images

Previously coded as S05-A05. Includes removal of recording sheet from drum after transfer.

Surface, receive, separate, contact, dielectric

S06-E05A [2010]

Corona charger

Previously coded as S06-A05A. Includes all aspects of corona discharge. If corona ring or loop is claimed, then also coded in X12-F04.

Discharge

S06-E05A1 [2010]

Corona charger - transfer of developer

Previously coded as S06-A05A1.

S06-E05A2 [2010]

Corona charger - separation of paper

Previously coded as S06-A05A2.

S06-E05B [2010]

Contact type charger

Previously coded as S05-A05B.

Transfer roller, blade, belt

S06-E05B1 [2010]

Contact type charger - transfer of developer

Previously coded as S06-A05B1.

S06-E05B2 [2010]

Contact type charger - separation of paper

Previously coded as S06-A05B2.

S06-E05C [2010]

Intermediate belt/drum

Previously coded as S06-A05C.

S06-E05D [2010]

Care of transfer apparatus

Previously coded as S06-A05D. For lubrication of transfer roller, belt, intermediate roller or belt.

Lubricant

S06-E06 [2010]

Fixing

Previously coded as S06-A06.

Flash

S06-E06A [2010]

Heat and pressure application

Previously coded as S06-A06A. If heater aspects are claimed see X25-B codes also.

S06-E06B [2010]

Fuser mechanism and driving

S06-E06B1 [2010]

Fuser roller

Previously coded as S06-A06B. See also S06-K03H for constructional details of rollers.

Roller

S06-E06B2 [2010]

Fuser belt

Previously coded as S06-A06B1.

S06-E06C [2010]

Fuser oil

Previously coded as S06-A06C.

S06-E06C1 [2010]

Fuser oil composition

Previously coded as S06-A06C1.

S06-E06D [2010]

Lustre control

Previously coded as S06-A06D.

Heating, gloss, pre-heating

S06-E06P [2010]

Pre-fixing

Previously coded as S06-A06P. E.g. for reducing the moisture content of the transfer material to increase its rigidity.

S06-E06X [2010]

Other fixing details

Previously coded as S06-A06X.

Cooling

S06-E07 [2010]

Using magnetic patterns or thermoplastic layers

Previously coded as S06-A08, T04-G09. Includes all aspects of magnetography. Magnetic printer head details may also have T03-A03 codes assigned, depending on content. Includes magnetic line printers used as computer peripherals.

Latent, heat, permeable, field, deformation

S06-E08 [2010]

Electrography not using charge patterns

Previously coded as S06-A09. Includes electrophoresis.

Polymer, deform, electrostatic, field, impact, magnetic, paper

S06-F [2010]

Impact Image Production

Previously coded as T04-G01. Includes mechanical action. Electromagnet and solenoid drive aspects are coded in V02-E02A also.

Armature, coil

S06-F01 [2010]

Dot Printer

Previously coded as T04-G01A.

Matrix, pin, wire, needle

S06-F02 [2010]

Using Type

Previously coded as T04-G01B. Self contained typewriters are in S06-K99A.

Select, hammer, daisy-wheel, disc, step, font, typeface, golf-ball

S06-F03 [2010]

Ribbon

Previously coded as T04-G01C. Includes printer ribbon re-inking.

Ink, cassette

S06-G [2010]

Ink-Jet Image Production

Previously coded as T04-G02, W02-J02B3.

Liquid, dye, nozzle, resin, water, channel, drop, pressure, reservoir, eject, electrode, pulse

S06-G01 [2010]

Drop-on-demand

Previously coded as T04-G02A.

Thermal ink-jet, bubble, piezoelectric, ultrasound

S06-G02 [2010]

Selective drop deflection

Previously coded as T04-G02B.

Charge, electrode, stream, gutter, continuous

S06-G03 [2010]

Printhead details

Previously coded as T04-G02A1, T04-G02B1, W02-J02B5. Search together with S06-K03 for constructional and manufacturing details. See also S06-G01 or S06-G02 to highlight the type of inkjet system. See also S06-K06A for printhead cleaning. Details of piezoelectric elements for inkjet printheads are also coded under V06-M06D.

S06-G04 [2010]

Inkjet ink

Previously coded as T04-G02C.

S06-G05 [2010]

Recording Media

Previously coded as T04-G02E. Includes media composition and manufacture. Includes pre-print application of liquid (not ink) to paper/ pre-treatment of paper for ink jet printing. See also X25-T09A for electrical details of paper manufacture.

Paper, fabrics, OHP sheet, recording pattern of LCD screen

S06-G06 [2010]

Ink Chamber/Cartridge

Previously coded as T04-G02G. See also S06-K03 for chamber construction. Search together with S06-G03 for combined chamber and printhead details. See also S06-K07B1A and S06-K07B1B for level detection and density detection of inkjet ink respectively.

S06-G06A [2010]

Refilling of ink cartridge

Previously coded as T04-G02F.

S06-G07 [2010]

Post ink application processing

Previously coded as T04-G02H. Includes processes for treating ink after application using e.g. heat or UV light.

S06-G10 [2010]

Applications of ink-jet printing technology

Previously coded as T04-G02J. Covers printing on non-paper-like media e.g. CD (see also T03). Includes textile printing (see also X25-T04D), Manufacturing LCD screens and filters (see also U14). 3D / 4D printing and other industrial applications using inkjet technology (see also X25-A08).

S06-H [2010]

Thermal Image Production

Previously coded as T04-G03, W02-J02B1. Includes thermal ink compositions and heat sensitive paper and ribbons. For photo-thermography, see also S06-E04.

Transfer, thermosensitive, resistive elements, thermal transfer ink ribbon

S06-H01 [2010]

Using thermally sensitive paper

Previously coded as T04-G03A.

S06-H01A [2010]

Composition of heat-sensitive layer

Previously coded as T04-G03A1.

S06-H02 [2010]

Using thermal ribbon

Previously coded as T04-G03B. Includes use of thermal transfer sheets.

Cartridge

S06-H02A [2010]

Thermal ink composition

Previously coded as T04-G03B1. Includes composition and manufacture of thermal ink. If colour ink, see also S06-K01. Ink for inkjet printer is only coded under S06-G02C.

Dye

S06-H03 [2010]

Printhead details for thermal printer

Previously coded as T04-G03C. See also S06-K06A for printhead cleaning. For thin-film resistor heads see also U14 codes, e.g. U14-H01B.

S06-J [2010]

Electrode (e.g. electrosensitive/erosive) Image Production

Previously coded as T04-G05.

S06-K [2010]

Image Production Units features

Covers features common to all printer types such as paper feeding and control systems.

S06-K01 [2010]

Colour system

Previously coded as S06-A11, T04-G04, W02-J07. Used for any aspect of colour system, with other codes as appropriate.

Dye, pigment, tint

S06-K01A [2010]

Full colour

Previously coded as S06-A11A.

Colour, magenta, cyan, yellow, black, CMY, CMYB, RGB

S06-K01B [2010]

Two colour, highlighting

Previously coded as S06-A11B.

S06-K02 [2010]

Media feeding, e.g. sheet feeding

Previously coded as S06-A12, T04-G06A, W02-J05A. Includes all mechanisms for transporting sheet through copier, collators and sorters. For feeding of an original document through a scanner, see S06-D04B only. Constructional details of sheet feeding mechanisms are coded under S06-K03 codes.

Paper roll, paper tray, document holder

S06-K02A [2010]

Multicopies; duplex

Previously coded as S06-A12A.

Reverse, double, invert

S06-K02B [2010]

For different paper size, clearing jams, skew correction

Previously coded as S06-A12B. For feeding paper of different lengths and thickness. Paper skew detection is coded by S06-K02D.

S06-K02C [2010]

Collators and sorters

Previously coded as S06-A12C. Feeding paper containing classified info to a locked tray. See T04-J codes for feeding outside printing unit.

S06-K02D [2010]

Paper skew detection

Previously coded as S06-A12D. Paper skew correction is coded by S06-K02B. For clearing jams in fixing system see also S06-E06.

S06-K02E [2010]

Sheet decurling

Previously coded as S06-A12E.

S06-K03 [2010]

Construction

Previously coded as S06-A19, T04-G11, W02-J05, W02-J06. Includes details of machine casing, framework, etc., and also internal mounting arrangements of components and modules.

S06-K03A [2010]

Carriage/Motor aspects

Previously coded as T04-G06. Includes all carriage systems not coded elsewhere. Constructional details of motors are covered by V06 codes.

S06-K03B [2010]

Paper Holders

Previously coded as S06-A19A.

Container, storage

S06-K03B1 [2010]

Cassettes

Previously coded as S06-A19A1. For holding paper sheets before being fed for copying onto.

S06-K03B2 [2010]

Trays, bins

Previously coded as S06-A19A2. For receiving documents or copy paper sheets after copying operation, duplex intermediate tray

S06-K03C [2010]

Cooling, ventilation & humidifying mechanisms

Previously coded as S06-A19B.

Air filter, fan

S06-K03D [2010]

Frames, cases, bearing

Previously coded as S06-A19C.

S06-K03E [2010]

Manufacture and manufacturing apparatus

Previously coded as S06-A19D. Covers manufacturing method and apparatus for the manufacture of elements.

S06-K03F [2010]

Connectors, circuitry

Previously coded as W02-J05C.

S06-K03G [2010]

Power supply

Previously coded as W02-J06. Includes mains and battery supplies for all types of units including portable systems. Control aspect of power supplies are coded by S06-K07A2 only. Also includes protection circuits. See U24-D, U24-E, U24-F and U24-X codes.

Surge, overload, back-up

S06-K03H [2010]

Rollers

Previously coded as S06-A15. General constructional details of rollers. See also S06-E05B for transfer roller or S06-E06B1 for fuser roller.

S06-K04 [2010]

Recycling

Previously coded as S06-A17, T04-G11B, W02-J05D. See also X25-W04 for electrical aspects of recycling systems in general.

S06-K04A [2010]

Paper recycling

Previously coded as A06-A17A. For removing toner from recording paper to enable re-use of paper.

S06-K04B [2010]

Recording agents recycling

Previously coded as S06-A17B.

S06-K04C [2010]

Components recycling

Previously coded as S06-A17C. See also V04/X12 for recycling electrical components.

S06-K05 [2010]

Finishing

Previously coded as S06-A18, T04-G06B, W02-J05B. For collators and sorters see S06-K02C.

S06-K05A [2010]

Stapling, binding, cutting, punching, folding

Previously coded as S06-A18A. Includes bookbinding/stapling/cutting/punching devices situated inside the copier or separate bookbinding/stapling/cutting/punching machines attached to the copier.

S06-K05B [2010]

Laminating

Previously coded as S06-A18B.

Laminating, protective layer

S06-K05C [2010]

Shredding

Previously coded as S06-A18C, T04-G06S. Includes immediate shredding directly after scanning/printing.

S06-K05D [2010]

Attachment of anti-copy mark

Previously coded as S06-A18D. Includes applying a magnetic wire, RFID tag, etc., as part of the printing process. If attaching a RFID tag, see also T04-K codes. Detection of copy prevention marks on documents are also coded under S06-K07A3. Details on watermarking also coded under T01.

S06-K06 [2010]

Cleaning/Recording Agent Removal

Previously coded as S06-A10, T04-G02D. Covers mechanism for transferring toner to the collection or waste container for later removal and recycling outside the copier. For details of toner or ink recycling, see S06-K04B.

S06-K06A [2010]

Printhead cleaning

S06-K06B [2010]

Charge and ozone removal

Previously coded as S06-A10B.

Drum, discharge

S06-K06C [2010]

Removing excess developer agent

Previously coded as S06-A10A. Involves removal of toner.

S06-K06C1 [2010]

Using blade

Previously coded as S06-A10A1.

Scraper, doctor blade

S06-K06C2 [2010]

Returning toner / ink for re-use

Previously coded as S06-A10C.

S06-K06C3 [2010]

Transfer of developing agent to waste container

Previously coded as S06-A10D. Covers mechanism for transferring developing agent to the collection or waste container for later removal and recycling outside the printer/copier/facsimile. See S06-K06C2 when the toner is recycled within the copier for immediate re-use. See S06-K04B for details of recording agents recycling.

S06-K06D [2010]

Removing dust, etc. from components

Previously coded as S06-A10E. Includes details of air cleaning systems. If cleaned air is expelled outside the copier, see also X27-E01B2 (electrical aspects only). Constructional details of ventilation and humidifying mechanisms are also coded by S06-K03C.

S06-K07 [2010]

Communication and Control

Previously coded as S06-A14, S06-A16, T04-G10, W02-J03, W02-J08. Includes operating status display (for display control circuitry see T04-H codes), mode selection devices, microprocessor details (see also T01-J codes, e.g. T01-J08A), and recording inhibiting devices. Does not include motors and solenoids for carriage and platen movement.

S06-K07A [2010]

General control systems

Previously coded as S06-A14C, T04-G10A, W02-J03A7.

S06-K07A1 [2010]

User input and display

Previously coded as S06-A14A, T04-G10A1, W02-J03A4. Includes mode selection keys, etc

Operator warning device, mode setting, touchscreen

S06-K07A2 [2010]

Power supply control

Previously coded as S06-A14D.

S06-K07A3 [2010]

Management of confidential/secure documents

Previously coded as S06-A14F, T04-G10F, W02-J11. Preventing illegal copying of banknotes, securities and private documents, recognising copy prevention marks on documents, output to authorised operator. See also T01/T04 for image processing aspects and T05-J for testing of securities, banknotes, etc. Attachment of anti-copy mark, e.g. a RFID, is also coded under S06-K05D. Secrecy details during communication, such as transmission data encoding, password, data encryption, etc., are also coded by S06-K07C7.

S06-K07A4 [2010]

Image processing

Previously coded as S06-A16A, W02-J03A1, W02-J03A2. Includes details of digital copiers. See also T01.

Picture signal amplifier, halftone screening, edge enhancement, noise or error suppression

S06-K07A4A [2010]

Compensation for acquisition aspects

Previously coded as W02-J03A1A.

Shading compensation

S06-K07A4B [2010]

Changing magnification, composing and electronic layout control

Previously coded as W02-J03A2A, W02-J03A2B.

S06-K07A4C [2010]

Image outputting

Previously coded as W02-J03A3. Includes systems for generating previews of image before sending (using e.g. a facsimile) or printing. Details of user display is also coded by S06-K07A1.

S06-K07A4D [2010]

Compression/bandwidth reduction

Previously coded as W02-J03B. See U21-A05 codes for coding in general, W04-P01A codes for TV signal compression, and W02-G04A codes for bandwidth reduction in general.

S06-K07A5 [2010]

Copy sheet counting

Previously coded as W02-J03A7A.

S06-K07B [2010]

Monitoring systems

Previously coded as S06-A14B, T04-G10G, W02-J03A5. Covers monitoring systems of the device, monitoring of the communication system is S06-K07C6 only.

S06-K07B1 [2010]

Monitoring of recording agent

Refill

S06-K07B1A [2010]

Recording agent level detection

Previously coded as S06-A04A1A.

S06-K07B1B [2010]

Recording agent density detection

Previously coded as S06-A04A1B.

S06-K07C [2010]

Communication

Previously coded as W02-J03C, W02-J08. Includes input-output arrangements, telephone interface and secrecy systems (with W02-L). Search W01-C05B1 and W01-C01H for telephone aspects also. For ISDN aspects see W01-C05B7. For LAN aspects see W01-A06 codes.

S06-K07C1	[2010]
Remote control/monitoring	
Previously coded as S06-A14E, T04-G10E. Search together with S06-K07A and S06-K07B codes as applicable.	
S06-K07C1A	[2010]
Print Job/Queue	
Previously coded as T04-G10E1.	
S06-K07C2	[2010]
Interfacing	
Previously coded as T04-G10C.	
S06-K07C2A	[2010]
Telephone interfacing	
Previously coded as W02-J03C7. Includes combined facsimile-telephone. See W01-C01P4. Also W01-C05B3H.	
S06-K07C2B	[2010]
Network interfacing	
Previously coded as W02-J08A. Includes aspects of printers with built in print server.	
S06-K07C2C	[2010]
ISDN interfacing	
Previously coded as W02-J08C. Also W01-C05B7 codes for general aspects of ISDN.	
S06-K07C2D	[2010]
Computer interfacing	
Previously coded as W02-J03C8. See also T01-C03B code.	
S06-K07C3	[2010]
Signal processing	
Previously coded as W02-J03C1.	
S06-K07C4	[2010]
Determining and setting transmission	
Previously coded as W02-J03C2. Includes detecting type of receiving station (e.g. G3, G4). <i>Autodialler, modem</i>	
S06-K07C5	[2010]
Reception details	
Previously coded as W02-J03C5. <i>Automatic answering</i>	

S06-K07C6	[2010]
Monitoring and error checking	
Previously coded as W02-J03C3.	
S06-K07C7	[2010]
Secrecy/Authentication	
Previously coded as W02-J03C6. Includes transmission data encoding, password, data encryption. Management of confidential/secure documents are also coded by S06-K07A3.	
S06-K99	[2010]
Machine Type	
The machine type codes cover the application of a patent for a particular function. Patents that describe multiple applications will not be covered (except MFP).	
S06-K99A	[2010]
Self-contained printing machine	
Self-contained typewriters, label printers, independent units, hand held printing devices.	
S06-K99B	[2010]
Copier	
S06-K99C	[2010]
Printer	
Printer peripherals for use with a computer.	
S06-K99D	[2010]
Fax	
S06-K99E	[2011]
Plotters	
Previously coded as T04-H02.	
S06-K99F	[2010]
Multifunctional peripheral	
Includes patents describing the combination of two or more other machine types. <i>MFP</i>	
S06-K99F1	[2010]
Multifunctional peripheral including fax application	
Previously coded as W02-J07.	
S06-K99G	[2010]
Analogous systems	
Previously coded as W02-J10. For medical stimuable sheet phosphor systems see also S05-D02A5C. For electronic blackboard (previously coded in W02-J09) see also W04-W05.	

S06-K99X [2010]

Other (printer types)

Previously coded as T04-G09. Includes Braille printers,(see S05-K, T04-X for other Braille aspects), electronic pen recorders. Magnetic printers are coded under S06-E07 only.

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T01: Digital Computers

T01-A

Mechanical digital computers

Align, calculate, register, interlock

T01-B

Fluid-pressure digital computers

Pneumatic, hydraulic, valve

T01-C

Input/output arrangements

Covers specific input arrangements for transferring data to be processed into a form which is capable of being handled by a computer. See T01-H for information transfer. Peripheral devices per se are in T04. See U21 for electronic switching.

Port

T01-C01

For record carriers (e.g. magnetic tape)

Includes buffering. See T01-C07C1 for smart card interface.

Card, disc, drive, reader, SCSI (small computer system interface), PCAT, SASD

T01-C01A [1997]

To/from DASD

Includes details of all defined standards, e.g. ATA, SATA, SCSI, iSCSI, IDE.

Floppy disc, hard disc, CD-ROM

T01-C01C [1997]

To/from semiconductor memory

See also U14-A codes.

Flash memory

T01-C02

For manual input device

Mechanical switches are coded in V03, and electronic switch details in U21.

Coordinate, enter, key, touch, matrix

T01-C02A [1987]

Keyboard interface

Alphanumeric code generation, key stroke detector

T01-C02A1 [1992]

In co-operation with display

Includes keys used in conjunction with icons or instructions displayed on the screen such as help keys, cursor control keys and function select keys. Details of icons used for program management are coded in T01-J12D.

T01-C02A9 [1992]

Other (optoelectronic keyboard)

Opto-electronic keyboard

T01-C02B [1987]

Position-digital value converters

Digitiser, co-ordinate

T01-C02B1

In cooperation with display

See also T01-J12 for GUI/HCI, and T01-J12B for GUI windows.

T01-C02B1A* [1992-2001]

For mouse

*This code is now discontinued, see T04-F02B1 from 2002. Includes use of mouse to 'pull down' icon functions and windows. See also T01-J12B for windows in general.

T01-C02B1B* [1992-2001]

For joystick

*This code is now discontinued, see T04-F02B3 from 2002. Includes interfaces and code translators for joysticks. See T01-P02 and W04-X02 codes also, if used for computer/arcade games.

T01-C02B1C* [1992-1996]

For light pen

*This code is now discontinued. See T01-C02B1H from 1997-2001 and T04-F02A1 from 2002.

T01-C02B1D* [1992-2001]

Virtual keyboards and touch screens

*This code is now discontinued, see T04-F02A2 from 2002. Includes interfaces and 'key' / position code translation. Also includes finger-operated mouse.

T01-C02B1E* [1997-2001]

Three-dimensional space signal input/output

*This code is now discontinued, see T04-F02B from 2002. Includes virtual reality handsets/sensor, gloves (see W04-V07E codes also).

T01-C02B1G* [1997-2001]

Tracker ball

*This code is now discontinued, see T04-F02B5 from 2002.

T01-C02B1H* [1997-2001]

Pen input

*This code is now discontinued, see T04-F02A1 from 2002. Includes input by inductive or capacitive pen, light pen and touch pen. For pen sensing details, see T04 and U21.

T01-C02B1J* [1997-2001]

Finger-shaped or hand input

*This code is now discontinued, see T04-F02B from 2002. Devices which use relative movement of finger or hand as input to processor.

Thimble

T01-C02B9* [1992-2001]

Other (position-digital value converters)

*This code is now discontinued, see T04-F02B from 2002.

T01-C03

Data exchange with distant stations

Bus, transmit, receive, terminal, link, line receiver

T01-C03A [1992]

Arrangements for interfacing with networks

Transmitting information between computers via communication medium. Including LAN and WAN interfacing details of computer networks. See T01-H07 for inter-computer communication and T01-M02 for multiprocessing structure. For bus arbitration and cycling arrangements see T01-H05B. Also includes computer peripheral network connections, but see also appropriate code for specific peripheral e.g. T01-C05A1.

ARPANET (advanced research project agency network), binding

T01-C03B [1992]

Data communication

Includes telephone interfaces and modems.

RS-232 (Recommended Standard 232), RS-485, RS-422, RS-423

T01-C03C [1997]

Wireless link

Connection between/to devices, for connection to peripheral (e.g. printer) see T01-C07C3 instead. Includes, satellite, radio, infra-red, etc. interfaces for accessing a network. See also W01-A06C3 and W01-A06C4.

T01-C03C1 [1997]

Broadcast radio/television signal input

TV card

T01-C04

Output to displays

Video, colour, graphics, character, monitor, colour/intensity

T01-C04A

For CRTs

Monitor, VDU

T01-C04B

For display panels

Flexible display monitors are coded under T04-H03N. Details of general foldable/bendable displays are coded under W05-E05F.

Matrix, LCD, gas discharge, plasma, hologram, flexible panel, foldable panel

T01-C04C [1997]

LED display

(T01-C04)

T01-C04D [1997]

Display processing

(T01-C04)

Graphics card

T01-C04X

Other (output to displays)

Update, Bitmap

T01-C05

Output to printers (incl. plotters, typewriters)

Character, font, format, graphic, line, text, ink-jet, impact, thermal, X-Y, chart

T01-C05A [1992]

To printer

For '3D/4D printing' technology such as Fused Deposition Modelling (FDM) see T01-J07B3.

Ink-jet, impact, thermal, laser

T01-C05A1	[1997]
To/from networked/shared printers	
T01-C05B	[1992]
To plotter	
<i>X-Y, chart</i>	
T01-C06	[1992]
Scanning	
(T01-C09)	
Bar code reading and character recognition, such as OCR, are covered by T04-A03B1 and T04-D04 codes respectively. Hand scanners for computer input are coded in T04-M02. This code is used for computer interfacing details only.	
<i>OCR, bar codes</i>	
T01-C06A	[2012]
To/from networked/shared scanner	
Covers the scanners that share with the network	
<i>Remote scanner</i>	
T01-C07	[1992]
Interconnections (subsystems)	
Includes general aspects not specific to interfaced devices such as input/output and data communications. See T01-H05A for I/O controllers and processors, and T01-L09 for physical structures.	
T01-C07A	[1992]
Asynchronous/Synchronous operation	
Covers interfaces characterised by communication mode. See T01-H07B for bus protocol details.	
<i>USART (sync/async receiver/transmitter), start-stop bit, flip-flop</i>	
T01-C07B	[1992]
Fiber optics	
Also coded in V07.	
T01-C07C	[1992]
Interfaces	
Includes backplanes, cables, chip carriers and plugboard/card/overlay motherboards. See also T01-L02 and V04 for hardware details, and T01-L09 for wiring and connectors.	
<i>Current loop, EIA, interrupt, DMA/program controlled, slave, adaptor card, latch-chip, SCSI</i>	
T01-C07C1	[1992]
Smart card reader interface	

T01-C07C2	[1992]
Buffers	
Includes structure e.g. shift registers, re-circulating, and buffer/interface function such as rate control.	
T01-C07C3	[1997]
Non-wired connection between peripheral and computer	
Includes radio and optical signal transfer between computer and peripheral. Remote control of computer.	
<i>Free space, wireless, infrared</i>	
T01-C07C4	[1997]
Serial ports, parallel ports, serial-parallel conversion	
<i>Centronics (RTM), USB</i>	
T01-C07C4A	[2005]
Serial interface with additional features	
Additional features such as power supply. See also T01-H07, T01-H05B for bus transfer and T01-L01/3 for connector details. See also V04 codes.	
<i>USB, universal serial bus interface, hot swap, plug and play, firewire, IEEE 1394, i-link®</i>	
T01-C07C5	[1997]
Using standard interfaces or expansion cards	
See T01-C11 for PCMCIA cards per se.	
<i>PCI, PCI-X.</i>	
T01-C07D	[1992]
Topology	
Covers wiring arrangements and connections to interface including power arrangements. Includes interface buses and point-to-point connection. See T01-H07A for bus structures.	
T01-C08	[1992]
Digital input/output using sampling of analog signals	
<i>Analog to digital converter</i>	
T01-C08A	[1992]
Speech recognition/synthesis input/output	
(T01-C09)	
See also W04-V codes for sound wave analysis/synthesis, speech to text, text to speech and T01-J18 for speech/audio processing.	
<i>Telephone, output, sound</i>	

T01-C08B [1997]
Measurement signal input
See also T01-J07A for data acquisition applications.

T01-C09
Other input/output arrangements

T01-C10 [1997]
Non-manual human input
(T01-C09)
Includes eye input, foot input and neurological input to computer.

T01-C11 [1997]
PCMCIA cards
See also T04 and U11.

T01-D
Data conversion
See U21-A for coding and code conversion in general.

T01-D01 [1992]
Data encryption and Decryption
Includes private and public key encryption. See W01-A05 codes for data communications aspects.
DES, RSA

T01-D01A [2002]
Encryption algorithm
For encoding a plain text message using number of division using ki dimensional vector on a finite field.
Polynomial, primary number

T01-D02 [1992]
Coding and information theory
Includes data compaction/compression, formal communication models, and non-secret encoding systems. Image compression prior to 1997 - see also T01-J10A1. T01-J10B, now indexed in T01-J10D.
Lempel-Ziv, sliding window, Huffman, holotropic, fractal coding

T01-D02A [2005]
Watermarking
See also T01-J10D for image watermarking and W04 for audio/visual watermarking.
Stenography

T01-D03 [1992]
Shifting
Includes justifying, scaling and normalising.

T01-D04 [2005]
Data flow speed conversion
Pre 2005 see T01-D09.

T01-D09 [1992]
Other data conversion details
From 2005 see T01-D04 for data flow speed conversion.

T01-E
Data processing
Instruction, masking, bit manipulation

T01-E01
Sorting, selecting, merging or comparing data
Algorithm, key, routine, sequence generator, word, bit stream manufacture

T01-E01A [1992]
Sorting
Includes grouping data records, rearranging, and re-recording.
Software Boolean logic operation

T01-E01B [1992]
Selecting
Includes special character detection.

T01-E01C [1992]
Comparing
Includes merging.

T01-E02
Computation using only denominational number representation
Digital processing using binary, ternary etc. number systems.
Arithmetic, binary, decimal, exponent, floating-point, integer, logic, mantissa, operand, fixed point, coded decimal

T01-E02A
Adding, subtracting
Addend, carry, even, subtrahend, sum

T01-E02B
Multiplying, dividing
Multiplication, multiplier, product

T01-E02C [1997]
Logic processing
See U21-C for logic circuits.

T01-E02D	[1997]
ALU	
T01-E02X	
Other (incl. evaluating functions)	
<i>Approximation, interpolation, complex numbers, logarithm, root, square</i>	
T01-E03	
Computation using digital non-denominational representation	
<i>Integration, differentiation, increment, pulse, proportional, multiplier, divider, P-modulo arithmetic</i>	
T01-E04	
Comparing digital values; random number generators	
See also T01-J15 for chaos modelling. <i>Pseudo random binary sequence (PRBS), comparator, hashing</i>	
T01-E05	[1992]
Novel data processing technology	
(T01-E09)	
T01-E05A	[1992]
Optical/Electro-optical	
See also T01-M06D and T02-A03 for analogue optical computing and T02-B for hybrid arrangements. Pure optical, electro-optical components are found in V07-K06. <i>SLM (spatial light modulators), SLR (spatial light rebroadcasters)</i>	
T01-E05B	[1992]
Neuronal configurations	
Neural networks in general are covered by T01-J16C1. See T02-A04A5 for analog neural networks.	
T01-E05C	[1992]
Superconducting elements	
Superconducting computing systems are covered by T01-M06E. See also U14-F02B.	
T01-E05D	[1992]
Biocomputer	
T01-E05Q	[2005]
Quantum Computing	
Using quantum theory for processing. Prior to 2005 see T01-E05X. For Quantum processor architecture see T01-M06Q.	

T01-E05X	[1992]
Other novel data processing technology	
T01-E09	
Other data processing details	
T01-F	
Program control	
<i>Software</i>	
T01-F01	
Microprogramming	
T01-F01A	[1987]
Enhancement of operating speed	
Includes use of several micro-control devices operating in parallel. <i>Score boarding</i>	
T01-F01B	[1992]
Loading	
T01-F01B1	[1997]
Firmware microprogramming	
See T01-S01A for disclosure of firmware code.	
T01-F01C	[1992]
Address formation	
Includes address formation of next microinstruction selection.	
T01-F02	
Interrupt, multi-programming, multi-tasking, software interrupts	
Covers supporting and keeping track of operations of multiplicity of users who are running numerous concurrent processes. <i>Access, multi-port, multi-task, request, poll, queuing control</i>	
T01-F02A	[1992]
Task transfer initiation	
Covers multiple task sequencing and selection. Initiating and controlling task operations and use of system resources.	
T01-F02A1	[1997]
Interrupt handling/processing	
T01-F02B	[1992]
Saving or restoring of program or task	
Covers program control blocks and multiple register set usage.	

T01-F02C	[1992]
Task interaction	
Includes multiprocessor transaction management protocol and allocation of resources to processes, load balancing and scheduling. <i>Lock-out avoidance, IPC</i>	
T01-F02C1	[1997]
Synchronisation	
<i>Multimedia</i>	
T01-F02C2	[1997]
Resource allocation	
T01-F02C3	[2006]
Multi-thread	
The ability of an operating system to execute different parts of a program simultaneously.	
T01-F02C4	[2007]
Data transfer between applications	
T01-F03	
Execution of machine instructions	
<i>Fetch, instruction, nodes, pipeline, pre-fetch</i>	
T01-F03A	[1987]
Address formation of next instruction, branching, access of instruction operand	
T01-F03B	[1987]
Concurrent instruction execution, pipeline, look-ahead	
<i>Low level parallel mechanisms, RISC</i>	
T01-F03B1	[1997]
Pipelining	
T01-F03C	[1997]
Instruction decoding	
T01-F04	[1987]
Subprogram execution	
<i>(T01-F09)</i>	
T01-F05	[1987]
Arrangements for executing specific programs and system management software	
<i>(T01-F09)</i>	
Includes operating systems, supervisors, executives and monitors.	
<i>Debug, edit, execute, state-machine</i>	

T01-F05A	[1992]
High level language and language processors	
Binary Compilers and Assemblers for e.g. operating system compilation. Use of Application Programming Interface (API), Dynamic Link Libraries (DLLs) during program execution. From 2007, for use of API during software development see T01-J20B1, and for Compilers and Assemblers used in software development, see T01-J20B1. <i>Cobol, Fortran, Pascal, Lisp, C, C++, Java®</i>	
T01-F05B	[1992]
Bootting/initialisation and recovery	
<i>(T01-G05A)</i>	
Includes reconfiguration, retry, checkpointing and restoring.	
<i>Start-up</i>	
T01-F05B1	[1997]
Resetting	
T01-F05B2	[1997]
Configuring	
Boot-up and program loading. Hot configuration. Version management of software e.g. BIOS firmware. For version management of software code see T01-F05F or T01-J20B2 during development. For Installation and/or updating of software involving transmission over network see T01-N02B1E. For network security software updates see T01-N02B3.	
<i>Plug and play</i>	
T01-F05B3	[1997]
Sleeping and waking, power-up/down, halting	
Includes Power Management	
T01-F05C	[1992]
Interactive support programs	
Includes time share control.	
T01-F05D	[1992]
Job entry system programs	
T01-F05E	[1992]
Data handling programs and storage management	
Includes allocation/deallocation strategies, distributed memories, segmentation, storage hierarchies and swapping. See also T01-E01 and T01-J05B.	
<i>BIOS, Kernel, utilities, file management, up/down loading, share seize mechanisms</i>	

T01-F05E1 [2008]

Middleware

T01-F05F [2007]

Software version management

T01-F05G [1997]

Operating systems and virtual systems

Machine emulation including network operating systems.

MS-DOS, Unix, OS/2, Novell NetWare, Windows NT, LINUX

T01-F05G3 [1997]

Virtual systems

Includes shells and interfaces created by OS and emulation of terminal types by OS software.

Bourne-shell, utilities

T01-F05G5 [1997]

System management

Includes user privilege set-up; security - see T01-J12C, usage monitoring see - T01-G05C, T01-G11; file management - see T01-F05E.

T01-F05G5A [2006]

Screen savers

T01-F05G7 [2006]

Real time clock

Covers updating and management of real time system clock.

T01-F06 [1992]

Program control arrangements

(T01-F09)

Covers program arrangements were instructions are pre-programmed before processing is carried out. See T01-M05 for architecture. Non-numerical controllers per se are covered by T06-A04B. For disclosure of firmware see T01-S01A. See also U21 for logic devices.

PLD, PLC, EEPROM

T01-F07 [1992]

Object based systems

Links, AKO, ISA, object-oriented programming (OOP), object-oriented database (OODB)

T01-F09

Other program control details

T01-G

Error detection/correction; monitoring

Software debug systems are covered by T01-J20.

T01-G01

Using redundancy in data representation

See also U21-A06 for error correction/ detection circuitry, and W01-A01 codes for data transmission aspects.

T01-G01A [1992]

Using checking codes

Error correction words (ECW), Error correction codes (ECC), Hamming distance

T01-G01A1 [1992]

Using parity

T01-G02

Testing hardware during idle time

Includes integrated circuits with on-chip testing circuitry. See also S01-G01A, U11-F01D2, U13-C07, U14-D.

Diagnose, check-bit, routine, sub-routine, program, signature analysis

T01-G02A [1987]

Defective hardware location subsystems

T01-G02A1 [1987]

On integrated circuit

Includes LSSD (level sensitive scan design). See also U13-C07.

T01-G02A2 [1992]

System/field testing

Includes Computer Aided Test (CAT) system comprising of microcomputer/computer to aid testing of processor/CPU based systems or appts. See also T01-J07B for quality control

T01-G02A2A [1992]

Automatic Testing Equipment (ATE)

See also T01-J08F for system test other than processor systems.

T01-G02A2B [1992]

Built in testing

Includes scanpath, signature and boundary analysis.

Built in block operation (BILBO)

T01-G02A2C [1992]

By comparison

Includes comparing with known 'good' cards or appts.; redundancy in registers and comparing results in both; and signature analysis.

Goldcard, Signature analysis

T01-G02A2D [1992]

Test programs and algorithms

Includes software for generating test patterns and/or collecting results and analysing faults. Also software controlling test procedures or appts.

T01-G02B [1992]

Marginal testing

Includes preventative maintenance and safety margins.

T01-G03

Using redundancy in operation or hardware

Redundant processors - see T01-G05B from 1997.

Passive fault masking, active fault masking, backward error recovery, single event upset (SEU) prevention, RAID

T01-G04 [2014]

Computer vibrating testing

Includes testing computer assemblies for resistance to the effects of mechanical vibration and shock. See also S02-E (Measurement of mechanical vibrations).

T01-G05 [1987]

Fail-safe and monitoring systems

(T01-G09)

Includes appts. for error recovery and monitoring during operation of processor or processing system for reliable operation of hardware or software. See T06-A08 also for control system applications and T01-J20 for software debug and test.

Fail, fail-safe, fault-tolerant

T01-G05A [1987]

Watchdog monitoring / Ensuring proper program flow

Includes halting of operation of all processing within computing system upon detection of error. See also T01-F05B for booting/initialisation and recovery from 1992.

Rollback, halting operation, freeze

T01-G05B [1987]

Using additional processors

Includes redundant processor techniques (see T01-G03 for non-processor redundancy).

T01-G05C [1992]

Monitoring

(T01-G09)

Includes patterns, pulse trains and error processing.

T01-G05C1 [1992]

Recording or statistical evaluation of computer activity

(T01-G09)

T01-G06 [1992]

Logic simulation

(T01-G09)

Includes simulation machine/processor executing logic simulation, and logic models; and several simulation processors working in parallel. See also T01-J15A3 for electrical/electronic circuit emulation in CAD systems; T01-F05G3 for machine emulation.

Event driven, levelized

T01-G06A [1992]

Compiled code

LCC (levelized compiled code)

T01-G06B [1992]

Table driven

Using look-up tables to model logic functions.

T01-G06C [1992]

Hardware accelerators

(T01-G09)

Includes use of hardware for certain functions of simulation in cooperation with software to reduce load on processor to speed up process.

T01-G07 [1992]

Fault simulation

(T01-G09)

Includes introduction of known faults and monitoring/analysing effect such as stuck-at-one and stuck-at-zero techniques.

T01-G07A [1992]

Test sequence generation

Includes test vector compression.

T01-G07X [1992]

Other fault simulation details

T01-G08 [1992]

Computer Diagnostics

(T01-G09)

Includes fault location, file/diagnostic dictionary software, remote diagnostic (see also T01-N codes), fault masking and fault documentation. See T01-J08F for diagnostic of non-computer equipment.

T01-G08A [1997]

Systems support

Includes systems support repository, help system. For AI based expert system support, see also T01-J16A.

T01-G09

Other error detection/correction or monitoring details

From 1992 see T01-J20C for software debug systems; T01-G05C for monitoring of computer systems; T01-G06 for logic simulation systems; T01-G07 for fault simulation systems; and T01-G08 for diagnostic systems.

T01-G11 [1997]

Measurement of non-processing parameters of computer systems

(T01-G05C, T01-G09)

Includes smoke or fire detection (see W05-B02 codes also), alarm generation, power/spike failure in computer systems. See also T01-G05C for processor related monitoring. See T01-J08F for computer testing and monitoring of non-computer equipment.

T01-G11A [1997]

Power supply

Includes measurement and control of external power supply to computer. See T01-L01 for computer power supplies and T01-G05A.

T01-G11B [1997]

Temperature measurement and control

Includes measuring temperature/humidity of computer surroundings to maintain optimum operating conditions. See also T01-G05A.

T01-G11C [1997]

User monitoring, e.g. tiredness

Includes measuring muscle tiredness, time of continuous use (see also T01-G05C), harmful screen emissions.

RSI

T01-G11F [2012]

Fan speed measurement and control

Covers measuring the speed of the fan and controlling the speed depends on the CPU usage

T01-G11X [2005]

Other measurement of non-processor parameters

T01-H

Data storage and memory, interconnection, data transfer

See U14-A for semiconductor memories per se, and T03 for data storage and recording by relative movement between head and record carrier.

T01-H01

Interconnections to random access memory, addressing and memory allocation, memory systems and architectures

Harvard architecture

T01-H01A [1987]

Module Addressing Technique

Shadowing, memory allocation table, look ahead addressing

T01-H01B [1987]

Memory storage components, hardware, or use of

Includes data layers, data logging memory cards and cassettes. See T04-K for smart cards per se. See also T01-H01C for unauthorised copying or memory protection (e.g. for disk or ROM). For physical construction of record carriers, see U14 for semiconductor memories and T03 for disks and tapes etc.

T01-H01B1* [1992-2004]

Dynamic recording by relative movement between recording head and storage medium (disk, drum, tape etc.)

*This code is now discontinued. See T01-H01B4, T01-H01B5 and T01-H01B6 from 2005.

File server, disk, drum, tape

T01-H01B1A* [1997-2004]

Storage Arrays

*This code is now discontinued. See T01-H01B7 from 2005.

RAID

T01-H01B2* [1992-2004]

Optical, magneto-optical computer memory

*This code is now discontinued. See T01-H01B4/5/6 from 2005

Hologram, CD-ROM, DVD

T01-H01B3 [1992]

Semiconductor / solid state memory

Includes semiconductor, bubble, capacitor, card, core, and RAM. See also U14-A codes.

RAM, ROM, DRAM, EPROM, EEPROM, flash memory

T01-H01B3A [1992]

Memory card

Search together with other T01-H01B3 codes for type, see also T04-K. for removable memory.

MMC, SD, CF, Memory Stick

T01-H01B3B [2005]

Static Magnetic Memories

Covers solid state magnetic memories.

MRAM

T01-H01B3C [2005]

Static Optical Memories

Covers solid state optical memories.

T01-H01B3D [2006]

Non-volatile electronic semiconductor memories

Flash memories, see also T01-H01B3A flash memory cards.

T01-H01B4 [2005]

Dynamic Magnetic

Includes Hard Disks, floppy disks.

T01-H01B5 [2005]

Dynamic Magneto-Optical

Mini-disc

T01-H01B6 [2005]

Dynamic Optical

For CD, CD-ROM, DVD.

T01-H01B6A [2005]

Volume Read e.g. Holographic

For use of media that is read by passing a light beam through (not off) the material such as holographic storage.

T01-H01B7 [2005]

Storage Arrays

Also code under memory type, see also T01-G03 for redundant storage areas, e.g. RAID. See T01-H01B1A prior to 2005.

T01-H01B9 [2005]

Others (including all non-semiconductor static memories)

T01-H01C [1987]

Memory/Storage Protection Arrangement/method

For data back-up/protection see T01-G and T01-F05E.

T01-H01C1* [1992-2005]

Smart card fraud protection

*This code is now discontinued. See T04-K04 from 2006.

T01-H01C2 [1992]

Illegal memory access prevention

T01-H01C3 [1992]

For prevention of memory loss including refresh

See also U14-A03B4A. Prevention of memory loss due to defective memory.

T01-H01C4 [1992]

Other details of memory/storage protection arrangement/method

T01-H01D [1987]

Stacks and Registers

Covers fast-access temporary storage locations within CPU. Dual port memory is covered by T01-H03D from 1992.

T01-H01X [1987]

Other details of interconnections to RAM, memory allocation, memory systems and architectures

Includes high performance storage units (HPSU). *BICPU (bimemory independent CPU)*

T01-H02* [1987-1991]

Virtual memory, cache stores

*This code is now discontinued. See T01-H03A from 1992.

T01-H03 [1992]

Memory type

(T01-H02, T01-H09)

T01-H03A [1992]

Cache memory, virtual memory and hierarchical memory

Includes use of small, high speed buffer, virtual and hierarchical memories. Includes address translation (see also T01-H01A). Prior to 1992 covered by T01-H02, now discontinued. Network Caching is covered by T01-N01D4 from 2005.

Ageing

T01-H03B [1992]

Associative memory

Includes content addressable and parallel searching.

T01-H03C [1992]

Interleaved memory and mass storage

Includes secondary memory.

Expanded memory unit

T01-H03D [1992]

Sequential access and shared memories

(T01-H09)

Includes common shared bus, multiport, crossbar switching memories (Dual port memory was coded in T01-H01D prior to 1992).

Dual port memory, video RAM

T01-H03X [1992]

Other memory types

Primary

T01-H05 [1987]

Computer peripheral control / General request handling/ Bus Accessing

T01-H05A [1987]

Program control for computer peripherals

See also T03 for data storage controllers for dynamic recording, e.g. T03-A10 codes (magnetic), T03-B08 (optical) and T03-D01E5 (magneto-optical).

Channel processor

T01-H05B [1987]

Handling requests

For interconnection or data transfer. See also W01-A03A for general data communication access systems.

Access

T01-H05B1 [1992]

For access to memory bus

Includes priority.

T01-H05B2 [1992]

For access to input/output bus

Includes polling, interrupt, burst mode, DMA, cycle steal.

T01-H05B3 [1992]

For access to common bus or bus system

Includes centralised access control, request, token, time dependant, slot and contention.

T01-H05B4 [1997]

Local bus systems

(T01-H05B, T01-H05B2, T01-H05B3)

PCI, VL-bus

T01-H07 [1987]

Information transfer / Bus structures

(T01-H09)

Search T01-C03 also for data exchange interfacing with distant stations, and W01-A for digital transmission in general.

T01-H07A [1987]

Bus structures

See also T01-C07D for bus interface.

T01-H07A1 [1992]

Type of bus structures

Includes common/parallel, plural and variable width/speed buses.

T01-H07A2 [1992]

Control

Includes centralised, decentralised control.

T01-H07A9 [1992]

Other bus structures

T01-H07B [1987]

Bus transfer protocols

See W01-A03A also for control of access to transmission path.

Handshaking, synchronous, asynchronous, conversion

T01-H07C* [1992-2001]

Information transfer

(T01-H09)

*This code is now discontinued, see T01-N and W01-A from 2002. Includes computer network management, routing and communication control. See also T01-J08C and W01-A for communication in general. See also T01-C03B for computer interface for communication via modem.

Inter-operability, open systems, GroupWare, CSCW

T01-H07C1* [1992-2001]

Electronic mail

*This code is now discontinued, see T01-N01C and W01-A06E1, W01-A06G2, W01-A06X from 2002. Voice mail in telephone system coded in W01-C02B7C. See also W01-A06E1, W01-A06G2, W01-A06X.

Computerised voice mail

T01-H07C3* [1997-2001]

Data / Media Transfer Applications

*This code is now discontinued, see T01-N01D from 2002. Includes downloading file from remote site (FTP).

T01-H07C3A* [1997-2001]

Audio, sound transfer

*This code is now discontinued, see T01-N01D1A from 2002.

Internet radio

T01-H07C3B* [1997-2001]

Computerised video and image file transfer

*This code is now discontinued, see T01-N01D1B from 2002. Includes computerised video conferencing.

JPEG, MPEG

T01-H07C3C* [1997-2001]

Electronic document transfer

*This code is now discontinued, see T01-N01D2 from 2002. For intranet and internet documentation and web page transfer.

WWW, TCP/IP

T01-H07C3D* [1997-2001]

Multimedia transfer

(T01-J09)

*This code is now discontinued, see T01-N01D1 from 2002. Combination of text, data, image, sound, or computer programs. Audio/video aspects of multimedia systems are also assigned W04-K10.

T01-H07C3E* [1997-2001]

Running / executing software from remote site or server

*This code is now discontinued, see T01-N01D3 from 2002.

Applet, Java

T01-H07C5* [1987-2001]

Distributed and networked computer communication

*This code is now discontinued, see T01-N02 from 2002.

T01-H07C5A* [1997-2001]

Computer network control, monitoring and management

*This code is now discontinued, see T01-N02 from 2002. See T01-J08C for communication controllers and W01-A06 for data transmission systems in general.

T01-H07C5C* [1997-2001]

Data transfer over private network, intranet transfer

*This code is now discontinued, see T01-N02A2A from 2002. Data and file transfer within single computer network.

T01-H07C5E* [1997-2001]

Over public network, internet transfer

*This code is now discontinued, see T01-N02A2B from 2002. Data and file transfer between networks. Includes on-line systems.

PSTN, TCP/IP, gateway

T01-H07C5S* [1997-2001]

Using server

*This code is now discontinued, see T01-N02A2C.

Print server

T01-H07C7 [1997]

Local inter-processor data transfer

Inter-processor communication in multiprocessor computer.

T01-H07C7C [1997]

Connections

Non-bus interconnections.

Matrix, circuit-switched

T01-H07P* [1997-2001]

Computer communication protocols

(T01-H07C)

*This code is now discontinued, see T01-N02A from 2002. See T01-H07C prior to 1997, T01-J12C for computer security and T01-D01 for encryption. Bus transfer protocols are found in T01-H07B.

T01-H08 [1992]

Multiprocessor memory management

(T01-H09)

See also T01-M02 for multiprocessor systems and details. See also T01-J05B4 (DBMS) for locking.

Distributed system, parallel-processor, single instruction multiple data (SIMD)

T01-H09

Other details of data storage and memory, interconnection and data transfer

T01-J

Data processing systems

Routine

T01-J01

Desk and pocket calculators

See also T01-M06A1 where no processing details mentioned.

T01-J02* [1980-1991]

Multi-processor systems

*This code is now discontinued, see T01-M02 from 1992.

T01-J02A* [1987-1991]

Distributed

*This code is now discontinued, see T01-M02A from 1992.

T01-J02B* [1987-1991]

Co-operating processor

*This code is now discontinued, see T01-M02B from 1992.

T01-J02C* [1987-1991]

Array/parallel

*This code is now discontinued, see T01-M02C from 1992.

T01-J03

For evaluating statistical data

See also T01-J04B2 for correlation.

Histogram

T01-J04

For function synthesis/ analysis or equation solving

T01-J04A [1983]

For solving equations

Differential, polynomial, linear programming

T01-J04B [1983]

For correlation or transformation, e.g. Fourier, Walsh, etc.

T01-J04B1 [1992]

Transformation function

Includes Walsh, Fourier and multi-dimensional transforms.

FT, FFT, S-transform

T01-J04B2 [1992]

Correlation function

Includes digital filtering, array and convolution. Digital filters in general are coded in T01-J08B and U22-G01 codes. See also T01-J03 for statistical analysis using correlation.

T01-J04C [1992]

Matrix or vector computation

Includes complex numbers.

T01-J04D [1992]

Function evaluation by approximation

T01-J04E [2005]

Mathematical Modelling

See also T01-J15H for simulation systems involving mathematical models.

Chaos theory

T01-J05

For administration, commerce or information retrieval

T01-J05A [1987]

Non-Specific Administration, business and commercial Tool

See T05-L codes also for EFT, point-of-sale and automatic teller machines. From 2002 see T01-N01A for on-line business systems.

Cash, cash-transaction, point-of-sale, meter, postage, management

T01-J05A1 [1992]

Financial/Monetary

Includes banking, billing, Point of Sale (POS), and metering.

T01-J05A2 [1992]

Administration and Management Tools

Includes management, resource allocation, business, education, government, marketing and law. Also includes decision support, MIS, stock control, workflow control and project management.

T01-J05A2A [2002]

Business Models

Includes business to public administration relationship models, problem solving/identifying solutions, requirements, and end-to-end thread, see T01-N01A2 for Internet Business models and T01-J05A2 prior to 2002.

T01-J05A2B [2002]

Workflow Management

Includes execution and automation of a business process, see T01-J05A2 prior to 2002.

T01-J05A2C [2002]

Data Analysis

Includes assessing the financial health of a company, processing of market data to predict the future demand of a product/service, surveying and polling in order to obtain data, cost model and TCO, see T01-J05A2 prior to 2002.

T01-J05A2D [2002]

Inventory Monitoring/Management

Includes cash register/terminal maintaining or updating a record of goods, see T01-J05A2 prior to 2002.

T01-J05A2E [2002]

Insurance and Risk Analysis

Includes processing and assessing insurance claims, evaluation of risk factors in a loan determination, see T01-J05A2 prior to 2002.

T01-J05A2F [2002]

Investment portfolio selection, planning analysis and trading

This code covers evaluation of securities or other types of investments, and trading in commodities and securities, see T01-J05A prior to 2002.

T01-J05A2G [2005]

Intellectual Property and Copyright management

See T01-N01A2G for on-line systems. See also W04 for audio/video aspects.

T01-J05A2H [2005]

Personnel Management

Includes internal business administration, health and safety, employment tribunal, organisation chart, people performance management, payroll, pensions, benefits, recruitment, career development, etc. See T01-N01A2H for online personnel management.

Peoplesoft™, OrgPlus™

T01-J05A2L [2007]

Legal and Regulatory

Includes legal services such as litigation and contracts as well as accountability and compliance with government regulations.

T01-J05A2M [2011]

Marketing and Advertising

Includes all off-line advertising and marketing aspects.

T01-J05A2N [2024]

Business processes related to the Transportation industry

Includes vehicle sharing, ride hailing, etc. Details of vehicle rental, hiring and sharing systems are also coded under X22-U for motor vehicles and X21-U for electric vehicles.

T01-J05A3 [2005]

Tools for Government

This code is intended for electronic public administration and management tools used by governmental bodies or agencies to implement government-to-citizen (G2C), government-to-business (G2B) and/or government-to-government (G2G) service(s). Includes commerce, voting/election, immigration, law enforcement, licensing, taxation, records management etc. See T01-N01A3 for on-line systems and T05-F for voting.

IRS, legislation, ID, social services, Citizenship

T01-J05A4	[2024]
Information processing for Agriculture, Fishing, Forestry and Mining	
Includes information analysis or data storage related aspects of analysis on agriculture, fishing, forestry, mining, animal husbandry. See also X25-N codes for agriculture (including livestock) and X25-D02 for mining.	
T01-J05B	[1987]
Data storage and retrieval, databases	
Includes directory structures, filing, and storage. See T01-J10 also for image and pictorial data storage and accessing. For data recording see appropriate T03, W04 codes.	
<i>Database, file, directory, storage</i>	
T01-J05B1	[1992]
Content analysis and indexing	
Includes abstracting, linguistic processing, and thesauri.	
T01-J05B2	[1992]
Storage	
Includes directory, file organisation and record classification.	
T01-J05B2A	[1997]
Image filing/archiving	
T01-J05B2B	[1997]
Data and directory structures	
Includes hashing, tree structures.	
T01-J05B2C	[2007]
Metadata	
T01-J05B3	[1992]
Search and retrieval	
Includes algorithms for reducing time required for searching large data bases e.g. clustering, query formulation, searching and selecting, Presentation of results. For on-line searching see T01-N03A2.	
T01-J05B4	[1992]
Database	
Includes current awareness, information networks, question-answering, fact retrieval, database.	
T01-J05B4A	[1997]
Distributed databases, blockchains	
Includes distributed ledger systems such as Blockchain.	

T01-J05B4B	[1997]
Relational database	
T01-J05B4C	[1997]
Object-Oriented database	
T01-J05B4D	[1997]
Deductive database	
T01-J05B4F	[1997]
Image and video databases	
T01-J05B4M	[1997]
Database Management	
Includes database updating, version control, concurrency and access control.	
T01-J05B4P	[1997]
Database Applications	
For database software applications or systems that use databases.	
T01-J05B9	[1992]
Other details of data storage and retrieval, databases	
<i>Data bank sharing, library automation</i>	
T01-J05C	[1997]
Information analysis	
T01-J06	
Medical equipment and information systems	
T01-J06A	[1983]
Medical	
See also S05 codes for electrical medical equipment in general. For initial diagnostic, S05-D06A. For continuous monitoring, S05-G02B2A. From 2005 see T01-N01E for on-line systems. For non-medical biological processing see T01-J13A only.	
<i>Diagnose, patient, biological, medical</i>	
T01-J06A1	[1997]
Medical information systems	
See also S05-G02G. For medical records, S05-G02G1. For administration including appointments, S05-G02G2. From 2005 see T01-N01E1 for on-line systems.	

T01-J06B* [1983-2001]

For vehicle or missile guidance

*This code is now discontinued, see T01-J07D from 2002. See X22-E06 for land vehicle on-board systems and W06-B01B1 and W06-C01B1 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes.

Aircraft, flight, navigation, map, guide, course, track following, collision avoidance

T01-J06B1* [1997-2001]

Geographical Information Systems

*This code is now discontinued, see T01-J07D3A from 2002. For map generation see T01-J10C2A
GPS

T01-J07 [1983]

For industrial process control

(T01-J09)

Manufacture, parameter, factory automation (FA)

T01-J07A [1987]

Data collection/acquisition

See W05-D codes for measurement and control signal transmission systems.

Process variable, nuclear physics, meteorology

T01-J07A1 [1997]

Portable data input devices

See T01-M06A1 for portable computers.

T01-J07A3 [1997]

Multiple sensor data acquisition

T01-J07B [1992]

Computer control of manufacturing/industrial machines and Quality Control (QC)

Includes Computer-Aided Manufacture (CAM) and computerized robotics/mechatronics. See T01-J16 for Artificial Intelligence (AI), Fuzzy Logic, and Neural Network aspects. See also T06-A, T06-D and X25-A codes.

CAM, industrial robot, Industry 4.0

T01-J07B1 [1997]

Quality control

T01-J07B2 [2005]

Semiconductor manufacture control

This code covers aspects of semiconductor manufacture and cleaning processes. See also U11-C (especially U11-C15C).

T01-J07B3 [2016]

3D / 4D printing / additive manufacturing

Includes control of machines used for 3D / 4D printing / additive manufacturing technologies such as Solid Freeform Fabrication (SFF), stereolithography, Laminated Object Manufacturing (LOM), and Fused Deposition Modelling (FDM). See also X25-A08 codes. For computer control and interfacing with printing devices such as inkjet or laser printers and plotters, see T01-C05.

T01-J07C* [1992-2001]

Vehicle microprocessor systems

*This code is now discontinued, see T01-J07D1 from 2002. Includes aerospace, shipping. See also T01-J06B and T06-B01 for vehicle guidance. See also X22 codes.

Heating system control

T01-J07C1* [1992-2001]

Transmission

*This code is now discontinued, see T01-J07D1A from 2002. See also X22-G01 for vehicle transmission systems per se.

T01-J07C2* [1992-2001]

Multiplex control system

*This code is now discontinued, see T01-J07D1B from 2002. Vehicle multiplex systems per se are covered by X22-K, and signal transfer aspects in W05-D02 and W05-D07D.

T01-J07D [2002]

Vehicle/Aircraft/Missile process control systems

(T01-J06B)

Includes microprocessor systems for aircraft, vehicles, and missiles. See X22 and W06 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes.

Aircraft, flight

T01-J07D1 [2002]

Vehicle microprocessor systems

(T01-J07C)

Includes aerospace, shipping. See also T01-J06B (pre-2002), T01-J07D3 and T06-B01 for vehicle guidance. See also X22 codes and T01-J07C1 prior to 2002.

Heating system control

T01-J07D1A [2002]

Transmission

(T01-J07C1)

See also X22-G01 for vehicle transmission systems and T01-J07C2 prior 2002.

T01-J07D1B [2002]

Multiplex control systems

(T01-J07C2)

Vehicle multiplex systems per se are covered by X22-K, and signal transfer aspects in W05-D02 and W05-D07D. See also T01-J07C2 prior 2002.

T01-J07D3 [2002]

For guidance

(T01-J06B)

See X22-E06 for land vehicle on-board systems and W06-B01B1 and W06-C01B1 for aircraft and ship based systems. Navigation in general is covered by S02-B and W06-A codes. Also see T01-J06B1 prior 2002.

Aircraft, flight, navigation, map, guide, course, track following, collision avoidance

T01-J07D3A [2002]

Geographical Information Systems

(T01-J06B1)

For map generation see T01-J10C2A.

GPS

T01-J08 [1983]

For electrical equipment

(T01-J09)

Computer-control, component, frequency, test, digital signal processors, DSP

T01-J08A [1992]

Equipment support processing

This code is intended to highlight that a device uses a processing system when nothing is particularly novel about the processing system. Some applications have specific codes in T01 e.g. T01-J07D for vehicles or T01-J07B for industrial machinery, which should always be used in preference to this code. This does not apply to the sub-levels of this code (i.e. T01-J07D1 and T01-J08A2 could be used together to show a vehicle microprocessor system based around a DSP).

Microprocessor based system, ASIC

T01-J08A1 [1997]

Using external, general purpose computer e.g. Personal Computer

T01-J08A2 [1997]

Using Digital Signal Processors

Covers processor converting analogue signals to digital. See also U22-G codes.

DSP

T01-J08A3 [2011]

For game machine

Includes all processing aspects of integrated game devices/machines. See also T05-H05E and W04-X02.

Pachinko machines, Arcade games, pinball game machines, etc

T01-J08B [1992]

Digital filters

Corresponding math function in T01-J04B2. See also U22-G01 codes.

T01-J08C [1992]

Communication controller

See T01-H07 for inter computer communication.

T01-J08F [1997]

Testing or monitoring of equipment function and parameters

See T01-G for microprocessor and computer testing.

T01-J08F1 [2006]

Performance and data logging

T01-J08X [1992]

Other details of equipment support processing

T01-J09* [1980-2011]

Other

*This code is now discontinued. Includes multimedia up to 1996, see T01-J30 from 1997.

T01-J10 [1987]

For image processing

(T01-J09)

See also T04-D for image recognition and pre-processing, and under application in e.g. W04-P codes for video processing, respectively. Control of photographic film cameras is found in T01-J08A and S06-B.

T01-J10A [1987]

Image acquisition

T01-J10A1* [1992-1996]

Data compression

*This code is now discontinued. See T01-J10D from 1997. Codes remain valid before 1997; see also T01-D02, T01-J10B for image compression prior to 1997.

T01-J10A2 [1992]

Image memory management

Covers use of memory system for processing in conjunction with a data presentation/computer graphics system e.g. manipulating the address or contents of image or text information stored in memory. For display memory organisation and structure for storing an image and manipulating image data between the display memory and the display system see T01-C04. See also T01-J05B for information storage and retrieval.

T01-J10B [1987]

Image processing

Covers digital image processing arrangements using a personal/mobile computer, e.g. image enhancement, analysis, objects processing, optical character recognition (OCR), edge detection, facsimile, and video. If processing is in peripheral or other device then see T04-D. T04-D07 can be applied to highlight applications. (T01-J10 and T04-D are only used together when the novelty does not describe how/when the processing is carried out).

Pel, pixel

T01-J10B1 [1992]

Image enhancement

Includes use of histogram, deblurring, noise filtering, edge detection, scratch removal and geometric correction.

T01-J10B2 [1992]

Image analysis

Includes determination of characteristic parameters and scene analysis.

T01-J10B2A [2002]

For recognition

Includes character and image recognition, OCR, and object recognition.

Pattern recognition, mark recognition

T01-J10B3 [1992]

Object processing

T01-J10B3A [1997]

Object enlargement, reduction and rotation

T01-J10B3B [1997]

Object colour processing and colour system conversion

T01-J10C [1987]

Image generation

Graphics, function generator, fractal image generation

T01-J10C1 [1992]

Generating graphs

T01-J10C2 [1992]

Generating shapes, curves, lines

T01-J10C3 [1992]

In text

Includes form filling and format. Processing ideographic/pictographic languages and characters. Font generation and manipulation.

Graphic character representation

T01-J10C4 [1992]

3-dimensional

Includes solid modelling, mesh, surface determination, tessellation, voxel, and shading.

T01-J10C4A [1997]

Virtual reality

Generating and displaying of virtual reality images.

T01-J10C4B [1997]

Computer tomography

T01-J10C5 [1992]

Stored modelling data, animation and graphic packages

Texture mapping

T01-J10C7 [1997]

Composite image formation

Combining two or more objects or images.

T01-J10C9 [1992]

Other details of image generation

'Painting systems'

T01-J10D [1997]

Image digitisation/coding/compression

See T01-J10A1 and T01-J10B prior to 1997. See also T01-D02.

T01-J10E [1997]

Image storage

(T01-J05B, T01-J10A2)

Image filing and archiving. See T01-J10A2 for image memory management. See also T01-J05B2A for image filing, and T01-J05B4F for image and video databases. Also includes video storage.

T01-J10G [1992]

Applications

Includes film, TV, tomography, robotic eye, facsimile, automatic focussing image processing.

T01-J10X [1992]

Other image processing details

See T01-H07C3B between 1997 and 2002. See T01-N01D1B post 2002.

T01-J11 [1992]

Productivity Tools and Applications

Includes WYSIWYG, typesetting and editing.

T01-J11A [1992]

Word processing (WP)

T01-J11A1 [1997]

Spelling/dictionary, grammar-checking, parsing

T01-J11B [1992]

Desk top publishing (DTP)

(T01-J09)

Ventura®, PageMaker®, QuarkXpress®

T01-J11C [1997]

Electronic and intranet documentation

See T01-N03B2 for on-line aspects.

T01-J11C1 [1997]

Using Mark-up languages and navigating documents using hypertext

Includes page description languages.

HTML, SGML, XML

T01-J11C2 [1997]

Help documentation

T01-J11C3 [2007]

Parsing markup language documents

T01-J11D [1997]

Document delivery system and office automation

T01-J11E [2005]

Presentation Software

Presentation software, includes multimedia presentation software, see also T01-J30 and W04-W.

PowerPoint®

T01-J11F [2005]

Organiser/scheduler

See also T01-J05A2B for business schedule organising. See T01-N03A3 for networked aspects.

Calendar

T01-J11G [1997]

Spreadsheets

T01-J12 [1992]

Program management, GUI/WIMPS/HCI

Covers software and processing aspect of interactive operator interface windows applications security, and pull down menus.

T01-J12A [1992]

Prompting

T01-J12B [1992]

Window/split screen

Includes menu driven system where options are presented for selection by user. See also T01-C02 for means of selection.

Menu driven, front of screen

T01-J12B1 [1997]

User interface management system

T01-J12C [1992]

Security

(T01-X)

Preventing unauthorised access to files and processing systems such as anti-hacking and copy protection; electronic security systems for computers. See also T01-H01C2 for illegal memory access prevention.

T01-J12C1 [2006]

Authentication

See also W04-V04A3 for voice authentication.

T01-J12C1A [2006]

Using Password

Covers password systems for gaining access to computer system. See T01-N02B1B for network based password systems.

T01-J12C1B	[2006]
Using Biometrics	
Covers biometric systems for gaining access to computer system. See T01-N02B1H for network based biometric systems. See also T04-D07F for biometric image recognition and S05-D01C5A for measuring systems.	
T01-J12C2	[2006]
Security System Administration	
T01-J12D	[1992]
Icons, Widgets	
Covers use of graphic object displayed as a symbolic reference for a process or file which may be selected by user. Includes cursor and pointer manipulation. See also T01-J10C.	
T01-J13	[2005]
Scientific analysis	
Processing systems used to support scientific analysis. See S03 for analysis acquisition systems.	
T01-J13A	[2005]
Biological analysis	
Biological analysis includes DNA analysis and other biological systems. See also T01-J06A for medical applications.	
T01-J14	[1992]
Language translation	
See T01-J16C3 for intelligent natural language processing.	
T01-J15	[1987]
Computer-aided design (CAD) and simulation	
Includes computer modeling and simulators. See also T01-J10C for image generation, and T01-E04 for random number generation. For Computer-aided manufacturing (CAM) see T01-J07B.	
<i>Netlist, net library</i>	
T01-J15A	[1987]
Design and simulation of electrical circuits and hardware	
See also U11 or V04. Includes CAD systems for mask design.	
T01-J15A1	[1987]
Logic circuit, CPU design	
T01-J15A2	[1987]
Wiring layout, PCB's, integrated circuits	

T01-J15A3	[1992]
Computer simulation of electrical and electronic circuits	
(T01-J15A1)	
Includes use of graph models, petri net and analog modelling.	
<i>GPSS, SPICE, VHDL, Computer timing analysis</i>	
T01-J15A4	[1992]
Network design	
Includes positioning and routing.	
T01-J15B	[1997]
Design verification	
Includes fault finding techniques.	
T01-J15H	[1997]
Simulation of non-electronic systems	
Includes simulation of e.g. thermodynamics and weather systems, and also includes electrical systems not covered by T01-J15A/B codes. See also T01-J04E for mathematical modeling.	
T01-J15K	[2025]
Digital twinning	
Includes a computer model that simulates the behaviour of a physical system, replicating it to predict opportunities for change, advise real-time actions for optimization, and alleviate unexpected events by observing, evaluating and verifying the model. Also includes the predictive analysis of the model by using software platform.	
T01-J15X	[1987]
CAD for non-electronic applications	
Computer-aided design (CAD) for all applications (including electrical systems) not covered by T01-J15A/B codes.	
T01-J16	[1992]
Artificial intelligence (AI)	
(T01-J09)	
Covers knowledge processing, inexact reasoning e.g. fuzzy logic. Also see T01-N01G for Artificial Intelligence using internet/network.	
T01-J16A	[1992]
Expert systems	
Comprising a system of an integrated collection of facts and relationships, including knowledge base and table searching, question and answering. Includes knowledge base, rule base and table searching.	
<i>Teiresias, rulebase</i>	

T01-J16B [1992]

Fuzzy logic systems

Includes circuits for performing logic with more than two levels e.g. non-binary or analog logic systems. See also T02-A04B6 for hardware details, and U21-C03B1B for logic circuits. For implementation details search appropriate codes, e.g. X22-A03K for vehicle engine control using fuzzy logic.

T01-J16C [1992]

Knowledge processing

Forward chaining

T01-J16C1 [1992]

Neural networks

Includes the use of parallel distributed processing elements constructed in hardware or simulated in software. For implementation details search appropriate codes, e.g. T06-A05A for neural network based control systems. For analogue aspects and implementations see T02-A04A5. *SPANN (sequence processing artificial neural network)*

T01-J16C2 [1992]

Machine learning/learning

Includes use of a specific method or system to adjust the rules, i.e. connection weights, e.g. concept learning algorithm.

T01-J16C3 [1992]

Natural and pictorial language processing

Includes where presentation of data to the user includes non-verbal representations or symbol, or statements in standard English language syntax. Non intelligent language translation is covered by T01-J14.

Semantics, abstracting concepts, phrases, natural language generation, named entity recognition, text structure, hallucination

T01-J16C3A [2025]

Speech processing

This code covers the presentation of data, which is majorly sound/audio/speech. Includes applications text-to-speech, speech-to-text, comparing speech, question/answer using speech, etc. See W03-A02C5L for voice recognition-based remote control, W04-V04A5 for voice-actuated control of equipment or machines and T01-C08A for speech recognition.

Native language, sound processing, voice processing, speech to text, speech recognition

T01-J16C3B [2025]

Computer vision

This code covers the presentation of data, which is majorly image/video/vision. Includes applications like trained image encoder, image tokenization, image-text dataset, image-to-text models, etc. See W04-P01A for video encoder, T01-J11 code normal presentation (PDF) to word conversion.

Image analysis, image processing, image conversion

T01-J16C3C [2025]

Large language models (LLM)

This code covers model processing tasks based on large data sets. The model works on the principle of processing large-scale text data or data sets.

Includes learning models of statistical/ mathematical/ functional relationships from large data/ text sets. This code can be applied in conjunction with other T01-J16 codes based on the type/application mentioned.

Large set of datasets, generation of text, ontology, texts analytics, hallucination

T01-J16C4 [1992]

Genetic algorithms

Includes creating new solutions by dividing and splicing the old and determining the fitness of the new. Also includes artificial life. Duplicating the laws of nature e.g. inheritance and evolution.

T01-J16C5 [2025]

Predictive analytics/ Probabilistic reasoning

This code covers AI model based on data sets by probabilistic functions/ predictive analysing methods to obtain a solution to the problem. Data is analysed for various purposes through probabilistic models/ method. See T01-J04D for function evaluation by approximation.

Naive Bayes algorithm, uncertainty, probabilistic or predictive analysis, least squares regression, Bayes theorem

T01-J16C6 [1997]

Intelligent searching

Includes heuristics, hill climbing, depth first and breadth first searching, simulated annealing, travelling salesman etc.

T01-J16C9 [1992]

Other AI

T01-J16D [2025]

Distributed artificial intelligence

This code is applied when sharing resources like computation, storage, network, communication, power, and application functions to data sources at the point of AI action or result. It is also used for data security/ data control and data privacy regulations of AI. See T01-J05B4A for distributed databases, blockchains.

Complex learning, planning, and decision-making problems. AI/ spatial distribution

T01-J16E [2025]

AI human-computer interface

This code covers user interaction by designing interactive models/ interfaces. It includes personal devices, computing devices, and covers all cognitive interactions (sight, touch, hearing, voice, spatial). See T01-J12 for program management, GUI/WIMPS/HCI, T01-J21 section for GPS/ non-vehicle navigation details, and T01-J20B1 for software development kit/ application program interface (robotic process automation).

Chatbot, intelligent bot, speech bot, ChatGPT, AI Agent, hallucination

T01-J16E1 [2025]

Virtual assistants

This code includes applications used for a question/answer, problem to a solution, giving nearby solutions or sending assistance to a higher level if a problem exists based on datasets available. It also includes scheduling appointments, sending notifications, alerting, emailing, and other administrative aspects. See T01-J12B1 for display interface aspect.

AI Virtual assistants

T01-J16P [2025]

AI applications

Virtual assistants are coded under T01-J16E1.

T01-J16P1 [2025]

Agriculture, Fishing & Forestry

Includes precision agriculture to determine the best crops to grow based on weather patterns, soil deficiencies, etc. Also includes automated machinery. See also T01-J16P9 for transportation, and X25-N codes for agriculture.

Agronomy, pesticide, agrochemical, fertilizer

T01-J16P2 [2025]

Industrial & Manufacturing

Includes machine & tool management and inspection, industrial supply, chain manufacturing. See also X25 codes, such as X25-F07 for automated warehousing, etc.

Automation, mining, robotics

T01-J16P3 [2025]

Education, Arts & Entertainment

Includes creative writing, photography, online gaming, digital education, personalised learning, interactive learning, e-learning, distance learning, automated administrative tasks such as grading papers or scheduling timetables for students.

Also include the generation and detection of deep-fakes, including cloning human voices and images.

Fine arts, performing arts, architecture, music, cinema, writing, painting, theatre, learning management system, collaborative learning

T01-J16P4 [2025]

Business, Banking, Finance & Retail

Includes business intelligence (BI) tools to collect, analyse and visualise data to help businesses with decision-making. Also includes risk and fraud detection, personalised recommendations such as personalised shopping experience, inventory management in shops, electronic commerce (e-commerce), secure online transactions. Also includes social media to help generate targeted advertising, monitor trends, combat cyberbullying and harmful or illegal content (see also T01-J16P7).

Marketing, forecasting, taxonomies, money laundering, customer service, digital cash, electronic data interchange, electronic funds transfer, online shopping, online banking, IT architectures, IT governance, enterprise information systems, enterprise resource planning, enterprise modeling, enterprise data management, enterprise computing infrastructures, enterprise interoperability, information integration, information interoperability

T01-J16P5 [2025]

Domestic & Personal

Personal health monitoring is also coded under T01-J16P6A. See also X27 codes such as X27-V for home automation.

Smart home, smart living

T01-J16P6 [2025]

Healthcare, Scientific analysis/Research

T01-J16P6A [2025]

Healthcare

Includes medical applications, such as disease diagnosis, personalised care, medical dictations, machine-led surgeries, patient monitoring, etc.

The use of AI for e.g. genotyping, bioinformatics, research, etc. is covered under T01-J16P6B.

Medical equipment and information systems are also coded under T01-J06 codes. Patient monitoring is also coded by S05-G02B2 codes.

Health, tailored treatment

T01-J16P6B [2025]

Scientific analysis/research

Includes early warning systems of disasters and environmental issues, such as earthquakes, heavy rainfalls, droughts, landslides, etc. Also includes research such as computational biology, molecular sequence analysis, molecular evolution, transcriptomics, biological networks, sequencing, genotyping, proteomics, genomics, bioinformatics, metabolomics, metabonomics, genetics, transcriptomics, drug discovery, etc.

Biology, life sciences, space exploration

T01-J16P7 [2025]

Military & Security

Includes crime detection, warfare, cyber warfare, cyber security, target recognition, threat monitoring, casualty care and evacuation, strategic decision making, surveillance, drone swarms, investigation techniques, combat simulation and training, evidence collection, network and system forensics, data recovery, computer forensics. See also W07 codes for military equipment.

Army, weapon, peacekeeping, biometrics, battlefield, public safety

T01-J16P8 [2025]

Telecommunications

Includes telecom, telephone, communication, network, radio, smartphone, wireless, satellite, television.

T01-J16P9 [2025]

Transportation (vehicles & traffic management)

Includes control but also design of all types of vehicles. Also includes traffic management such as smart traffic lights, autonomous driving, etc. See also T07 codes for traffic management, such as T07-M for traffic administration and traffic modelling/design.

Aerospace, spacecraft, roads, automobile, trucks, trains, freight, boats, aeronautics, aircraft, drone, helicopter

T01-J16P10 [2025]

Energy/power generation & transmission

Includes improvement of energy efficiency, prediction of energy demand, etc. See also X12-H05 for network simulators and X12-H08 for smart grids.

Smart grid

T01-J16P99 [2025]

Other AI applications

T01-J17 [1992]

Digital function generators

(T01-X)

Trigonometric, Look-up table

T01-J18 [1997]

Computer processing for speech/audio

(T01-C08A, T01-J08, T01-J09)

T01-J20 [1987]

Software development

Covers only software programming techniques and production / compilation / debug aids. For software implementations, search T01-J, T01-N codes e.g. T01-J12B for windowing software, T01-N03B for Internet constructional software. For program code patents, see T01-S.

T01-J20A [1992]

Programming techniques

Includes functional, automatic, computer-generated, concurrent, sequential, object-oriented, procedural and network programming. For Object-based systems, see T01-F07. For Object-oriented database, see T01-J05B4C.

Object orientated programming (OOP), architecture neutral/dependent distribution format (ANDF),(ADDF)

T01-J20B [1992]

Software Development Tools, Systems Analysis

Languages, methodologies, development environment, systems analysis.

Structured, top-down, work bench SSADM

T01-J20B1 [1997]

Software Development Kit

Integrated Development Environment. Programming Tools. API for software development only. For use of API in program execution see T01-F05A. Program Compilers and Assemblers. Software source code libraries. For dynamic link libraries (DLLs) see T01-F05A.

API, code libraries, code text editors, software robots (RPA)

T01-J20B2 [1997]

Systems Analysis, Documentation

Systems Analysis and Design, Specifications, Source code development version management. From 2007, for version management of other software e.g. BIOS, embedded software, application package, network security software see T01-F05B2, T01-N02B1E, T01-N02B3 as appropriate.

T01-J20B2A [1997]

Software registration and Anti-piracy

For incorporation of Software registration and Anti-Piracy coding mechanisms at development stage of software. See T01-J20X before 1997. See T01-J05A2G, T01-N01A2G for Intellectual Property and Copyright management.

Software protection

T01-J20C [1992]

Software Test, Verification, Debug, Optimization

(T01-G09)

Software test, verification and debug within and without Integrated Development Environment. Test data generation. Quality Assurance. Optimization of source code. Software simulation.

Beta-testing, debug, test case simulation

T01-J20D [1992]

Anti-Virus and Security program development

Development of Anti-Virus, Anti-Spyware programs. Analysis of Virus signatures. From 2007, see T01-N02B3 for applications of Anti-Virus software.

Virus signature analysis

T01-J20X [1992]

Other software details

For Software copyright protection see T01-J20B2 from 1997 - 2006, and T01-J20B2A from 2007.

T01-J21 [2006]

Non-vehicle navigation

For vehicle guidance see T01-J07D3, covers all other guidance systems. See also S02-B08.

T01-J21A [2006]

Geographical information systems

Includes updating or displaying geographical information.

T01-J21B [2006]

Position fixing

Processing details used to fix position of user, see also W01/W02 for communication system position fixing and W06 for position fixing in general.

T01-J21C [2006]

Route planning

T01-J30 [1997]

Multimedia computer systems

For details of media systems see W03-G03C1. See T01-J09, T01-J10 prior to 1997.

T01-J30A [2002]

Educational aids

Includes use of multimedia systems for education and training purposes, CAI, tuition support systems, and student. Educational equipment is also assigned W04-W codes, also see T01-P01 prior to 2002. From 2005 see T01-N01B codes for on-line systems.

T01-J30B [2002]

For computer games

See W04-X02C for video games, and T01-J10C for image generation aspects, see T01-P02A prior to 2002.

T01-J30B1 [2002]

For toys and novelties

See T01-P02 prior to 2002.

T01-J30C [2005]

Media Players

Includes computer-based media players that are not browser based for playing CDs, DVD's (see also T01-H01B), videos and audio files. See also T01-N03A1B for on-line systems and W04 for media.

Windows® Media Player, iTunes®

T01-J30D [2005]

Computer processing for sports and training equipment

Covers use of digital computing in sports and exercise equipment. See also W04.

T01-J30E [2006]

E-book reader software

T01-J30F	[2006]
Image/Video/Audio editing software	
See T01-J12 for GUI aspects and W04 for details of image/video/audio being edited.	
T01-J31	[2011]
Computer processing for physically handicapped persons	
Includes processing equipment for blind, dumb etc.	
T01-J40	[1997]
Virtual reality systems	
(T01-J10C4, T01-J10C9)	
T01-J40A	[2002]
Games	
(T01-J10C4, T01-J10C9, T01-J40)	
Search T01-J40 together with T01-P02A to prior to 2002.	
T01-J40B	[2002]
Training/Sports Aids Equipment	
(T01-P02B, T01-J40)	
See also W04-X01 codes for electrical aspects of sports equipment in general, search T01-J40 together with T01-P02B to prior to 2002.	
T01-J40C	[2006]
Augmented reality systems	
Combining virtual reality displays with real world views allowing a user to see both at the same time. See also T01-J10C codes for image generation aspects. See also W04-W07E codes for virtual reality in general, as well other W04 codes for virtual reality and display aspects, e.g. W04-Q01K for head up displays.	
T01-J40D	[2022]
Mixed reality systems	
This code covers details of devices or systems which are used for merging of real world and virtual world environments.	
T01-J45	[2012]
For evaluating software application or package	
Covers evaluating the performance and load testing of a software application using a framework or by a CPU	
T01-J50	[2012]
Trial period software	
Includes software intended to be used for a defined period of time, search together other T01-J or T01-N codes for type of software	

T01-K	[1983]
Clock signal generation/distribution	
(T01-X)	
See also U22 codes for clock generators and distributors, e.g. U22-A04A2 and U22-D06 respectively.	
<i>Oscillator, synchronisation, timing</i>	
T01-K01	[1997]
Varying clock rate/frequency	
(T01-K)	
Clock generators with variable or programmable frequency, e.g. for slowing/increasing clock frequency.	
<i>Programmable frequency, variable clock rate</i>	
T01-L	[1987]
Computer equipment details	
(T01-X)	
T01-L01	[1987]
Power supplies, stand-by arrangements	
Mains supply are covered by U24-D and E and X12-H and J. See X16 for battery systems and X15 for solar power/renewable resources.	
<i>Back-up, automatic switching, regulator, stabiliser</i>	
T01-L01A	[2005]
Primary power supply	
Note that for portable devices the battery is the primary power source and would be coded here (as well as T01-M06A1). Also see X16-B codes for rechargeable batteries per se.	
T01-L01B	[2005]
Back-up power supply	
Also see U24-J01 for battery back-up and U24-K for power saving operation modes.	
<i>UPS, battery back up</i>	
T01-L01C	[2011]
Solar power supply	
See also X125 for details of solar power system.	
T01-L01D	[2021]
Wireless power charging	
See also U24-H02 for general low power non-contact power distribution aspects and X12-H01E for higher power levels. Non-contact battery charging in general is covered by X16-G03.	

T01-L02 [1987]

Constructional details

See V04-T for constructional details of electronic appts. in general.
Stand, support

T01-L02A [1997]

Cooling and ventilation

(T01-L02)

Includes electrical and mechanical cooling and ventilation systems for computer equipment, including data centre facilities. See also T01-G11B for temperature measurement and control aspects, and V04-T03 for electronic equipment cooling and heating arrangements in general.

T01-L02B [1997]

Housing

(T01-L02)

Includes peripheral installations in computer housings e.g. internal drives, trackballs etc. See also V04-S codes.

Housing, casing, cabinet

T01-L02C [1997]

PCB mounting

(T01-L02)

For mounting of PCBs in computer housing and devices being mounted on the PCB. See V04-T02 for PCB racking.

Racking, PCB, mounting

T01-L02D [1997]

EM shielding

(T01-L02)

See V04-U for EMI shielding.

T01-L02E [2002]

Prevention of theft

Includes devices which prevent the theft of computer equipment.

T01-L02F [2006]

Computer system acoustic noise reduction

Includes noise reduction for forced cooling (e.g. fans and liquid cooling pumps etc).

T01-L02G [2011]

Shock-proof and absorption

Includes proofing against earthquakes, etc. Search together with other T01-L codes as appropriate (e.g. T01-L02B for shock absorber in housing)

T01-L03 [2005]

Connectors, cables and wiring

Includes cables, wiring, etc. for computers. Prior to 2005 see T01-L09. See also V04 (particularly V04-M30E) and X12.

Connector, computer cable, wiring

T01-L09 [1987]

Other computer equipment details

From 2005 see T01-L03 for connectors.

T01-M [1992]

Computer/processing architecture

These codes are used for novel architectures, and in conjunction with other T01 codes as additional descriptive detail or as a more general description. See T02 for analogue or hybrid systems. For computer systems using redundancy, see T01-G03 and T01-G05B codes.

T01-M01 [1992]

Single processor computer units

Covers processor arrangements where instructions are received from an external source. See T01-M05 for pre-programmed architectures.

Microprocessor, CPU

T01-M02 [1992]

Multiprocessor systems

(T01-J02)

Covers use of multiple processors to process logically- or functionally-divided jobs or tasks, and to execute programs or program segments concurrently, asynchronously or simultaneously. Multi-tasking is covered by T01-F02 codes.

Master-slave

T01-M02A [1992]

Distributed

(T01-J02A)

Covers use of separate computers that are linked through communications network to process task/job.

Plain, true, distributed

T01-M02A1 [1992]

Computer networks

Computer network interfacing is covered by T01-C03A. Inter-computer communication is covered by T01-H07C. See also W01-A06 codes for network details and networks in general.

LAN, WAN

T01-M02A1A [1997]

Network-only computers

(T01-M02A1)

Includes computers designed to operate using software accessed via a network e.g. Internet.

Internet, network computer, network terminal

T01-M02A1B [1997]

Client-server systems

(T01-M02A)

Covers architecture details of Client-Server systems. Computer networks in general are covered by W01-A06 codes. Data communication within Client-Server Networks are covered by T01-N02A2C. Use of servers is coded in T01-N02A3C.

Client-server, back-end, front-end

T01-M02A1C [1997]

Internetworking

Covers architectural details of internetworking systems such as the Internet, 'Internet-of-Things', WANs and the associated interconnection details. See also W01-A06B7 for Internets, W01-A06G for interconnection details and T01-N02A2 for communication details.

Internet, intranet, WAN, LAN

T01-M02B [1992]

Cooperative

(T01-J02B)

T01-M02C [1992]

Parallel/array

(T01-J02C)

Computer architectures designed to carry out multiple arithmetic operations simultaneously or concurrently.

Systolic, hypercube

T01-M02C1 [1992]

Characterised by instruction/data relationship

Architectures classified by the presence of single or multiple streams of instructions and data.

SIMD (single instruction multiple data), SISD (single instruction single data), MIMD (multiple instruction multiple data), MISD (multiple instruction single data)

T01-M02C2 [1992]

Pipeline/vector computers

Instruction pipelining is covered by T01-F03B.

T01-M02C3 [2005]

Superscalar computers

For processors that execute multiple scalar operations in parallel. Includes Very Long Instruction Word processors. See T01-M02C prior to 2005.

VLIW, 2nd Generation RISC, Trace Scheduling

T01-M02D [1997]

Master-slave systems

(T01-M02)

Master-slave

T01-M03 [1992]

Data/demand driven

Architectures for executing only executable code components required to provide requested data.

T01-M04 [1992]

Reduced instruction set computers

See T01-F03B for pipelined execution of machine instructions.

RISC

T01-M05 [1992]

General microcomputing architectures

(T01-J)

Covers processor arrangements where instructions are pre-programmed or hardwired into the processor before processing is carried out. See also T01-F06 for program arrangements.

ASIC

T01-M06 [1992]

Characterised by type

T01-M06A [1992]

Mini/micro/PC

(T01-X)

Covers personal computers. For use as descriptive code with other T01 codes.

T01-M06A1 [1992]

Portable

Includes laptop, notebook, hand-held and calculator. For processing aspect of calculator see also T01-J01.

T01-M06A1A [1997]

Hand-held; Tablet computers

(T01-M06A1)

For mobile telephones with computer functionality see W01. Pre-1997, search T01-J01, T01-J05, T01-J09, T01-M06A1.

iPad™

T01-M06A1B [1997]

Docking stations

(T01-M06A)

T01-M06A1C [2006]

E-book reader hardware

Hardware specifically for displaying E-books. Includes details of screens, controls and design intended to simulate a conventional paper book. See also T01-N01B5 for online aspects, U14 for novel display aspects T01-M06A1A, T01-L02B, V04 for novel casings.

E-book reader

T01-M06A1D [2006]

Wearable computers

Includes 'smartwatches' and other computer devices used for applications such as fitness tracking and health monitoring. For physiological measurements search with S05-D01 codes and for performance-related measurements during sports or fitness training search with W04-X01A1.

T01-M06A3 [1997]

Desktop/mini-tower

(T01-M06A)

T01-M06A5 [2006]

Consoles

This code covers computer systems designed as one self-contained unit, e.g. video game console.

T01-M06A9 [1992]

Other (personal computer types)

T01-M06B [1992]

Mainframes

(T01-X)

Covers systems handling large base of time-sharing terminal users.

T01-M06C [1992]

Supercomputers

(T01-X)

T01-M06D [1992]

Optical systems

See also T01-E05A for digital optical processing elements, and T02-A03 for analogue and hybrid optical processing elements.

T01-M06E [1992]

Superconductor systems

(T01-X)

See also T01-E05C for superconducting elements. See also U14-F02 codes.

T01-M06Q [2005]

Quantum Systems

Using quantum devices for processing. Prior to 2005 see T01-M06C/X. See T01-E05Q for processing systems using quantum mechanics.

Quantum well gate

T01-M06S [2005]

Servers

Covers architecture and construction of servers. Use of servers in computer networks is covered in T01-N02A3C, client-server systems communications in T01-N02A2C and architecture of client-server systems in T01-M02A1B. Constructional details are also coded in T01-L section.

T01-M06X [1992]

Other (computer types)

T01-M09 [1992]

Other (inc. virtual machines)

Virtual machines are also coded in T01-F05. See also T01-F05G3 for virtual systems, and T01-F02 for multiprogramming.

Emulation

T01-N [2002]

Internet and information transfer

(T01-H07C)

T01-N01 [2002]

Applications

Documents describing specific applications of network communication and Internet systems.

T01-N01A [2002]

Financial/Business

Includes Internet banking, billing, point of sale (POS) and metering, see T01-J05A1 and T01-H07C5E prior to 2002.

T01-N01A1 [2002]

Financial technology systems

Includes 'FinTech', cryptocurrency, electronic payment systems e.g. Near-Field Communication (NFC), Internet banking, billing, point of sale (POS) and metering (T01-J05A1 and T01-H07C5E prior to 2002). See also T05-L for POS systems in general.

FinTech, bitcoin, altcoin, Ethereum, electronic funds transfer (EFT), digital wallet

T01-N01A2 [2002]

Internet Business models

Includes Business Models for the Internet, See T01-J05A and T01-H07C5E prior 2002, and T01-J05A2 for non-Internet related Business models.

T01-N01A2A [2002]

E-shop, e-auction, e-mail, and e-services

Includes On-line ordering, transactions of goods and services, and virtual market place, See T01-J05A together with T01-H07C5E prior to 2002.

On-line shopping, auction, e-commerce

T01-N01A2B [2002]

E-procurement

Includes seeking suppliers, electronic tendering. See T01-J05A2 together with T01-H07C5E prior to 2002.

T01-N01A2C [2002]

Advertising and Marketing

Includes network based systems such as web marketing, common marketing, consumer buying habits, feedback and banner advertising. See also T01-N01A1 and T05-L02 if involving financial incentives (coupons) and W05-E03E for display aspects.

T01-N01A2D [2002]

Social media / virtual communities

Includes social media discussion forums and message posting. See also T01-N03A1C for messaging applications. Prior to 2002 see T01-J05A and T01-H07C5E.

Facebook™, Twitter™

T01-N01A2E [2002]

Value chain service providers and Integrators

Includes logistics, production management, web based shipping support, web hosting and integrated on-line management.

T01-N01A2F [2002]

Information Brokerage

Includes financial advice, consultancy, stock/commodities/futures market monitoring/trading (see also T01-N01A1 and T05-L02 for trading). See T01-J05A2 with T01-H07C5E prior to 2002.

On-line broker

T01-N01A2G [2005]

On-line Intellectual Property (IP) and Copyright management

See T01-J05A2G for off-line systems including protecting copyright of downloaded files. See also W04 for audio/video aspects.

T01-N01A2H [2005]

On-line Personnel Management

Includes internal business administration, performance management, payroll, pensions, benefits, recruitment, career development, etc. See T01-J05A2H for offline personnel management.

T01-N01A2J [2005]

On-line insurance and risk analysis

Includes on-line processing and assessing insurance claims, evaluation of risk factors in a loan determination.

T01-N01A2L [2007]

Legal and Regulatory

Includes legal services e.g. litigation , contracts, accountability and compliance with government regulations.

T01-N01A2M [2010]

Carbon trading

Covers emissions trading, pre-2010 see T01-N01A2F.

Cap and trade, Kyoto protocol

T01-N01A3 [2005]

E-Government

For network-based electronic public administration and management tools used by governmental bodies or agencies to implement government-to-citizen (G2C), government-to-business (G2B) and/or government-to-government (G2G) service(s). Includes commerce, e-voting, immigration, law enforcement, licensing, taxation, records management, environmental, social and governance (ESG), sustainable development goals (SDG) etc. See T01-J05A3 for off-line systems and T05-F for voting.

E-Gov, G2C, G2B, G2G, ESG, SDG, E-voting

T01-N01A4 [2007]

On-line non-profit organization

Includes charities.

T01-N01B [2002]

Education, information and entertainment

From 2005 includes on-line educational systems.
Prior to 2002 see T01-H07C together with T01-H07C5E.

T01-N01B1 [2002]

Gaming

Includes network, on-line gaming, cloud gaming and on-line gambling (see also T01-N01A1, T01-N01D3, T05-L02 and W04). See T01-H07C3B, T01-H07C3D and T01-H07C5E prior to 2002. See T01-J30 for off-line systems.

Internet gaming, MUD, multi user dungeon, MMOG, MMORPG, massive multi-user on-line game

T01-N01B2 [2002]

Chat rooms

See T01-H07C3D together with T01-H07C5E prior to 2002.

T01-N01B3 [2005]

On-line Education

Covers Educational systems using a computer network and use of computer networks in an educational environment. See T01-J30A together with T01-N01D prior to 2005. See also T01-N01A2D for virtual classrooms, etc.

T01-N01B3A [2005]

Remote examination/testing

T01-N01B4 [2005]

News systems

Covers on-line systems for news updates including e-mail subscription services (together with T01-N01C).

T01-N01B5 [2006]

E-books

Documents describing E-book (electronic book) per say including file format aspects see also T01-N01A2G for copyright control aspects T01-J11C for electronic documents in general.

E-book, Electronic book

T01-N01B9 [2002]

Other internet education, information and entertainment

T01-N01C [2002]

E-mail

Includes electronic mail for use by computer systems connected to a network. Facsimile services are covered by S06 codes, telex systems by W02 codes and message switched networks by W01-A codes. See also W01-A06E1, W01-A06G2, and W01-A06X.

Computerised voice mail

T01-N01D [2002]

Data Transfer

Includes downloading file from remote site (FTP). See T01-H07C3 and T01-H07C5E prior to 2002.

T01-N01D1 [2002]

Multimedia

(T01-J09, T01-H07C3D)

Combination of text, data, image, sound, or computer programs. Audio/video aspects of multimedia systems are also assigned W04-K10. See T01-H07C3D prior to 2002.

T01-N01D1A [2002]

Audio, sound transfer

See T01-H07C3A prior to 2002.

Internet radio

T01-N01D1B [2002]

Video and Image transfer

(T01-H07C3B)

Includes computerised video conferencing. See T01-H07C3B and T01-H07C5E prior to 2002. See also W01-A06E1A for data conferencing and broadcasting and W02-F01E3 interactive Internet broadcasting.

JPEG, MPEG

T01-N01D2 [2002]

File Transfer

(T01-H07C3C)

For transfer of files other than multimedia. Includes downloading non-internet executable programs, as well as web page transfer. Includes the transfer of Instant Message (IM) data between users in real time.

WWW, URL

T01-N01D3 [2002]

From remote site or server

(T01-H07C3E)

Includes networks where applications are run on server under the control of a client system. See T01-H07C3E prior to 2002.

Applet, Java, thin-client

T01-N01D3A [2012]

Cloud computing services

Includes network systems where applications are run using a virtual system from remote locations, such as Software as a Service (SaaS), Infrastructure as a Service (IaaS).

Cloud Computing, Citrix®, Virtualization, Virtual Desktop

T01-N01D4 [2005]

Network File Caching

For storage of regularly accessed files such as web graphics. See also T01-N02A3C for server based caching, T01-N03A1 for browser based caching, see also T01-H03A before 2005.

T01-N01D5 [2006]

Multicasting

T01-N01E [2005]

On-line Medicine

See also S05 codes for electrical medical equipment in general. For initial diagnostic, S05-D06A. For continuing monitoring, S05-G02B2A. From 2005 see T01-N01E for on-line systems. For drug delivery/ordering systems see also T01-N01A2 codes.

T01-N01E1 [2005]

On-line Medical information systems

See also S05-G02G. For medical records, S05-G02G1. For administration including appointments, S05-G02G2.

T01-N01F [2017]

Internet of Things

Interconnection / Internetworking of computers, devices and systems used in applications such as home automation (see also X27-V), smart grids. For cellular IoT technology such as 5G wireless network-based systems see W05-D06 codes.

T01-N01G [2025]

Artificial intelligence using internet/network

This code is applied when AI is used in conjunction with internet/ computer networks. It is applied for technical aspects of IoT, cloud computing, cybersecurity, etc with AI. See other T01-N codes for specific details of computer networks and their applications. Also see T01-J16 codes for artificial intelligence aspects.

Peer-to-peer network, central network, cloud storage

T01-N02 [2002]

Communications and Control

(T01-H07C5A)

See T01-H07C3A prior to 2002.

See T01-J08C for communication controllers and W01-A06 for data transmission systems in general

T01-N02A [2002]

Communication

Includes computer communications within a network.

T01-N02A1 [2002]

Communication Protocol

(T01-H07P, T01-H07C)

Covers novel aspects of TCP/IP and novel uses of other protocol types for transfer over a network. See also W01-A06F for protocols in general and W01-A06F2 for network protocols. See T01-H07P prior to 2002, T01-H07C prior to 1997. Bus transfer protocols are found in T01-H07B.

T01-N02A1A [2005]

Addressing

Covers network addressing as opposed to routing. For setting and determining destination of packets, not route that they will travel. Includes Domain Name System (DNS), network identification and Universal Resource Locators (URLs). See also W01-A06F2.

IP address

T01-N02A1B [2005]

Ad-hoc network systems

Includes setting up dynamic networks. See also under application, e.g. T01-N01B2 for chat rooms, T01-N01A2C for advertising. See also W01 for network codes, e.g. W01-A06C4A for Bluetooth network or W01-A07H2A for Bluetooth interface.

ProximityMail™, BluePing™, 'on the fly' wireless network, relay area network, RAN, localised community messaging network.

T01-N02A2 [2002]

Network Communication

(T01-H07C5A, T01-H07P)

For communications between computers in a network, see T01-H07C5A and T01-H07P prior to 2002.

T01-N02A2A [2002]

LAN

(T01-H07C5C)

Includes computer communication over a private network i.e. interconnected distributed communities of computer based data terminals within a single building or a localised group of buildings. See T01-H07C5C prior to 2002, and also see W01.

Intranet, local area network

T01-N02A2B [2002]

WAN

(T01-H07C5E)

Includes computer communication over a public network i.e. networks which link computers, data terminals or Local Area Networks which are physically located in different locations or establishments, also see T01-H07C5E prior to 2002 and see W01.

Internet, wide area network, Gateway, PSTN, TCP/IP

T01-N02A2C [2002]

Client/Server systems

(T01-H07C5S)

Includes computer communication using a client/server relationship, see T01-H07C5S prior to 2002.

T01-N02A2D [2005]

SAN

Code covers storage area networks. See also T01-H01B codes for storage media type, T01-N02B codes for access and W01-A06B5B for network aspects.

T01-N02A2E [2005]

Peer-to-peer networks

Covers network communication between stations without using a central server. See also W01-A06B8C and W01-A06E2B.

Viral network, p2p

T01-N02A2X [2002]

Other Network communication system

Includes other types of computer communications not already covered in T01-N02A2.

T01-N02A3 [2002]

Hardware

Includes physical hardware such as computers and servers used for accessing a network, see T01-H07C5S prior to 2002.

T01-N02A3A [2002]

Dedicated systems for accessing the Internet e.g. set top box

Includes systems designed specifically for accessing the Internet, also see W04.

T01-N02A3B [2002]

Computer based routing

(T01-H07C5A)

Includes routing and management of network traffic, also see W01 and see T01-H07C5A prior to 2002.

T01-N02A3C [2002]

Servers

Includes processing performed on the server and claimed server devices, see T01-M06S for architecture and construction (along with T01-L). See T01-H07C5S prior to 2002.

T01-N02B [2002]

Control

Includes control of computer software.

T01-N02B1 [2002]

Access and Control

Includes control of access to file and folders.

Permissions, access control list, ISP

T01-N02B1A [2002]

File management and access, databases

Includes watermarking (see also T01-D02A from 2005), hashing e.g. for blockchain / distributed ledger systems (see also T01-E04) and digital certificates for file authentication. See also T01-N01D (for file transfer) and T01-J05B (for data storage and retrieval, databases).

Hash values, digital certificates

T01-N02B1B [2002]

User Privileges/Password systems

Includes access file/folders and restricted areas using a password, see T01-J12C prior to 2002.

Security, login, Permissions, access control list

T01-N02B1C [2005]

Unsolicited Advertising Protection

Includes spam and pop up protection, see also T01-N01C for e-mail.

Spyware, adware, browser hijack

T01-N02B1D [2005]

Firewalls

Includes devices or software for controlling access to network data or resources from external network connections and for controlling access to external network resources or data by internal network clients.

Firewall, intrusion detection, port forwarding, port blocking, NAT, Stateful packet inspection

T01-N02B1E [2006]

Network operating system management

Management of network operating systems. Installation and/or updating of software involving transmission over network. For network security software updates see T01-N02B3.

Automatic software updates

T01-N02B1F [2006]

Internet portals

T01-N02B1G [2006]

Internet gateway

T01-N02B1H [2006]

Biometric authentication

Covers biometric authentication for computer networks. See T01-J12C1B for off-line systems. See also T04-D07F for biometric image recognition and S05-D01C5A for measurement systems.

T01-N02B2 [2002]

Monitoring

Includes monitoring computer/network communications and hardware. Prior to 2002 see T01-H07C5A.

T01-N02B2A [2002]

User monitoring

Includes monitoring user(s) activity on computers and networks.

Cookie

T01-N02B2B [2002]

System and Fault monitoring

Includes monitoring systems which are used to monitor computer hardware operation, log events, report failures also, on-line(internet-based) monitoring and on-line diagnosis of any electronic system, see T01-H07C5A prior to 2002. For monitoring of electrical appliances over the internet see T01-N01D and W05.

Event monitor, system log, event viewer

T01-N02B2C [2005]

Transmitted content analysis

Monitoring contents of transmitted files, including emails.

Packet sniffing, chat room monitoring

T01-N02B3 [2006]

Network security, anti-malware

Anti-Virus, Anti-Spyware Software applications. Testing server security and setting updates for security programs. For security program update via network transmission see T01-N02B1E. Before 2007 see T01-J20D for Anti-Virus software applications.

Anti-Virus, Anti-Spyware, Trojan, Worm, Hacking

T01-N02B5 [2006]

Web site management

Incorporation of multimedia content in websites. Changing content viewed by different visitors to site.

T01-N03 [2002]

Internet Software

Search together with T01-S03.

T01-N03A [2002]

User Applications

T01-N03A1 [2002]

Browsers, apps

Includes browsers and other applications (apps) which enable users to interface with internet content. See T01-J12B prior to 2002. See T01-J12B1 for user interface management details.

Internet Explorer™, Netscape™, Safari®, Chrome®

T01-N03A1A [2002]

Content management/Parental control

Includes controlling the content viewed using a browser.

Net nanny

T01-N03A1B [2002]

Media players

Includes software which allows multimedia content/information to be viewed/played.

Real player™

T01-N03A1C [2002]

Messaging/chat applications

Includes pop-up messaging/chat windows. See also T01-N01A2D for social media in general.

WhatsApp™, ICQ, emoji

T01-N03A2 [2002]
Search Engines and Searching
Pre-2002, search with T01-J05B3 and T01-H07C5E.

T01-N03A3 [2005]
Meeting co-ordination and organiser/calendar applications
Covers applications to arrange meetings with groups of people through software. Covers a personal calendar application linked to an email program. See T01-J11E for off-line see also T01-N01C email.
Microsoft Outlook®, MS Teams®, Lotus Notes®

T01-N03B [2002]
Constructional Software
Includes software used to design websites / webpages.

T01-N03B1 [2002]
Internet executable programs
Includes executable programs e.g. applets, which enable viewing of content. Covers only novel aspects - see T01-N01D3 or T01-N03A1 for applications.
Applet, Flash™, Java bean

T01-N03B2 [2002]
Mark up languages
Includes page description language used in creating, editing, and navigating electronic documents, see T01-J11C1 prior to 2002.
Hypertext, HTML, XML

T01-N03B2A [2002]
Editors
Includes editors used to edit mark-up language e.g. Microsoft® FrontPage.

T01-N03B2B [2007]
Parsing markup language documents

T01-N03B3 [2005]
Scripting Languages
Covers patents concerned with web based scripting languages which are neither compiled nor mark-up languages.
PHP, ASP, JavaScript, PERL, CGI

T01-N03B4 [2005]
Format conversion
Covers conversion of media from one network standard to another one. Includes converting e-mail (T01-N01C) to e.g. Facsimile (S06) or SMS (W01), also includes converting web browser formats such as SGML, XML and HTML (T01-N03B2).

T01-P* [1992-2001]
Computer educational aids and toys
(T01-X)
*This code is now discontinued, see T01-J30 and T01-J40 from 2002.

T01-P01* [1992-2001]
Educational
*This code is now discontinued, see T01-J30A from 2002. Includes use of computers for education and training purposes, question and answer systems, computer aided instruction, CAI, tuition support systems, student testing and computerised marking systems (see also T04 codes). Educational equipment is also assigned W04-W codes.

T01-P02* [1992-2001]
Toys, games and novelties
*This code is now discontinued, see T01-J30B1 from 2002. Covers all computer games and computerised toys. See W04-X codes for electrical aspects of games and amusements.

T01-P02A* [1997-2001]
Computer video games
(T01-P02)
*This code is now discontinued, see T01-J30B and T01-J40A from 2002. See W04-X02C for video games, and T01-J10C for image generation aspects.

T01-P02B* [1997-2001]
Sports equipment
(T01-P02)
*This code is now discontinued, see T01-J40B from 2002. See also W04-X01 codes for electrical aspects of sports equipment in general.

T01-S [1997]
Software content
These codes are used to indicate documents that have a significant software content, and which contain either a program listing, or in which software is used. T01-S codes are used in conjunction with other T01 codes to indicate software aspects.

T01-S01 [1997]

Software listings

Software in the form of a program listing.

T01-S01A [1997]

Machine-oriented low-level languages

(T01-S)

Documents containing listings written in e.g. binary, machine, assembler and firmware languages.

T01-S01B [1997]

High-level languages

(T01-S)

Documents containing source code written in high level language, e.g. C, C++, Java, Visual Basic, Python, Swift etc.

T01-S01C [1997]

Pseudo-code and Algorithms

(T01-S)

Documents in which algorithms, rather than software is disclosed.

T01-S02 [1997]

Software patents

Covers documents in which an invention is described and claimed in terms of software, but in which no program listing is included.

T01-S03 [1997]

Claimed software products

Claimed products based on software, and stored on e.g. CD-ROM, in which the use of a computer program or software components is stated in an independent claim.

T01-X

Miscellaneous

T02: Analogue and Hybrid Computers

T02-A

Analogue computers

T02-A01

Hand-manipulated

Slide-rule, linear, circular

T02-A02

Mechanical or fluid-pressure computers

Pneumatic, hydraulic, gearing

T02-A03

Using optical or electro-optical, elements

See also T02-B and T01-E05A. Optical components per se are found in V07.

Transform, correlation, acoustic-optical

T02-A03A [1992]

Implementations

Includes diffraction grating and Fourier analysis implemented using optical elements.

T02-A03B [1992]

Optical computers

Digital optical computers are coded in T01-M06D and digital components in T01-E05A.

T02-A04

Electric or magnetic computers

T02-A04A

Applications

Modelling, simulation

T02-A04A1

Economics, statistics, electric equipment, structures

T02-A04A5 [1992]

Neuronal

(T02-A04A9)

Neural networks are also coded in T01-J16C1 and digital neural elements in T01-E05B.

T02-A04A9

Other (applications)

T02-A04B

Processing

Operational amplifier

T02-A04B1

Multiplication or division

T02-A04B2

Integration or differentiation

Integrator

T02-A04B2A [1992]

Convolution

SAW convolver

T02-A04B3

Evaluating polynomials, roots, exponentials, discontinuous functions

Square-root, exponent, logarithm, tangent, cotangent, sine, cosine, trigonometry

T02-A04B4

Arbitrary function generation

T02-A04B5

Interpolation, extrapolation, equation solving

T02-A04B6 [1992]

Fuzzy Logic

(T02-A04B9)

See also T01-J16B and U21-C03B1B.

T02-A04B9

Other (incl. optimisation or addition)

Includes correlation transforms, (coded in T02-A04B1, T02-A04B2 prior to 8701).

T02-A04X

Other (incl. programming)

T02-B

Hybrid computing arrangements

See also T02-A03 and T01-E05A for use of optical components.

T03: Data Recording

This class covers dynamic recording systems, i.e. those based on relative movement between record carrier and transducer. Record carriers themselves are included irrespective of application and are covered in T03 alone. Mechanical aspects of carrier driving and head positioning are also included in T03 for all applications, but W04 codes are assigned as well to indicate intended use for audio/video recording. All other aspects of audio and video recording, such as circuitry and signal processing, are covered in W04 only. Static stores themselves are coded in U14 and computer storage systems using them in T01-H codes. Abstract storage systems (e.g. software for controlling storage) that do not contain any details of physical recording equipment, such as methods for backing up computer data, are covered in T01 and are not coded in T03. Bar-coding is not covered in T03, being covered by T04-A03B1.

In class T03, recording technologies are split into 'group' (5 character) codes covering four main areas :

T03-A – magnetic recording, e.g. 'hard disk drives', but also including floppy disks, magnetic tapes, cards and tickets.

T03-B – optical recording, e.g. optical disks such as 'CD' and 'DVD', optical cards and tapes also being included.

T03-C – capacitive recording, electron beam recording and 'tunnel current' recording.

T03-D – 'combination' recording, i.e. recording using two (or more) of the above methods, e.g. magneto-optical recording such as 'MiniDiscs ®' but also including electro-optical recording and other technologies.

Apart from the above codes, the other code groups in T03 are independent of 'recording technology' and can be assigned alone - when inventions are broadly applicable - or in conjunction with the technology codes to convey more detail. For example, within the T03-F disk drive codes, T03-F02C1 represents a novel drive motor. In the T03-A codes specific to magnetic recording T03-A08A1C is assigned for any aspect of hard disk drives. Thus a novel disk drive motor for an HDD is coded as T03-A08A1C and T03-F02C1.

T03-A

Magnetic recording/reproduction

'Combination' recording involving magnetic methods such as magneto-optical, is not included - see T03-D01 codes.

T03-A01

Record carriers

Includes materials for cards with magnetic strip - see T04-C01 also. Magnetic record carriers per se are coded in T03 only, even if audio-video application is stated. For records prior to 2002 carriers with containers (e.g. tape cassettes) are also coded in W04 when application to audio or video recording is stated or implied.

T03-A01A

Magnetic layers

Prior to 2007 all magnetic materials and films are also coded in V02-A01 and V02-B01 codes respectively. From 2007 V02-B01 has been discontinued while V02-A01 codes are only applied for magnetic materials of general application. Therefore V02 is no longer routinely assigned for magnetic recording media and heads with the exception of nanostructures, which are coded in V02-B04.

Particle, bind, ferromagnetic, film, coating, layer

T03-A01A1 [1987]

Magnetic materials

Includes composition and physical details of materials.

T03-A01A1A [1992]

Metal and alloy compositions

Prior to 2007 this topic was also coded in V02-A01A2. This topic is no longer coded V02.

Chromium, cobalt, iron, nickel

T03-A01A1C [1992]

Non-metallic compositions

Includes ferrite materials. Prior to 2007 this topic was also coded in V02-A01B2.

Oxide, ferrous, ferric, gamma

T03-A01A1E [1992]

Physical details

Covers details such as e.g. size or shape of magnetic particles themselves - details of physical properties of magnetic layer as a whole are covered by T03-A01A8.

Acicular, diameter, needle

T03-A01A3 [1987]

Binder materials

Includes composition, physical details and manufacture.

Resin, polyurethane, PVC, polymer, copolymer

T03-A01A5 [1992]

Additional non-magnetic material in magnetic layer

Includes lubricant (see also T03-A01B5 codes).

T03-A01A6 [1992]

Multilayer magnetic coatings

Layer arrangements of carrier as a whole are covered by T03-A01F.

T03-A01A6A [2006]

Exchange coupling systems

T03-A01A7 [1992]

Complete magnetic layer formula

See also T03-A01A which will continue to be used for cases where precise details cannot be identified.

Recipe, formulation, composition

T03-A01A8 [1992]

Physical details of magnetic layer

Details of magnetic materials per se are covered by T03-A01A1 codes.

T03-A01A8A [1997]

Physical and chemical details of magnetic layer

Covers thickness, hardness, etc. and also inventions specifying low level of, or absence of, certain elements.

Hardness, HB, HR, HV, durability, roughness, film

T03-A01A8C [1997]

Magnetic property details of magnetic layer

Covers details such as specific coercivity, Curie point etc.

T03-A01A9 [1992]

Other magnetic layer details

T03-A01B

Base layers; protective coatings

Film, surface, protect, substrate, lubricate, organic

T03-A01B1 [1987]

Base layers, substrates

T03-A01B1A [1992]

Substrates

Polyester, polyethylene, terephthalate, resin, glass, aluminium, titanium, alloy

T03-A01B1B [1992]

Base layers

Covers layers applied to substrate before magnetic layer is deposited.

Under-layer

T03-A01B1X [1992]

Other layers below magnetic layers

Indicates layers between magnetic layers, normally used with T03-A01A6, which indicates multilayer magnetic coatings.

Intermediate

T03-A01B3 [1987]

Backing layers

Covers layers on opposite side of substrate to magnetic film.

Back-coating layer, reverse

T03-A01B5 [1987]

Protective coating and lubricating layers

T03-A01B5B takes precedence over T03-A01B5A if the position of the lubricating layer is not disclosed or determinable.

Film, anti-abrasion, slide, friction

T03-A01B5A [1992]

Lubricating layers part of magnetic layers

See T03-A01A5 also.

T03-A01B5B [1992]

Lubricating layer separate from magnetic layers

Covers layer subsequently applied to carrier surface.

Disk

T03-A01B5C [1992]

Protective coating layers

Antistatic layers are covered by T03-A01B5D.

Anti-corrosion, nitride

T03-A01B5D [1992]

Antistatic layers and materials

For antistatic measures and materials in general see X25-S codes.

Charge, triboelectric, conductive dispersion, carbon black

T03-A01B5X [1992]

Other layers above magnetic layer

Includes 'parking area' e.g. for CSS operation of a hard disk (T03-A01C1A). See also T03-A01G.

Contact-start-stop, zone

T03-A01B7 [2008]

Heat transfer layers

This code covers heat transfer layers chiefly for thermo-assisted magnetic record carriers, for which T03-A01T is also assigned.

Thermal, laser, heating, spot

T03-A01C

Characterised by form

Codes in this section are applied to indicate the type of carrier only and are used in conjunction with other T03-A01 codes as appropriate. To distinguish recording apparatus in general by carrier type, see T03-N codes.

T03-A01C1 [1987]

Disk

T03-A01C1A [1992]

Hard disk

Covers disk with rigid substrate.

Stack, cylinder, bulk store

T03-A01C1C [1992]

Flexible disk

Covers floppy disks.

T03-A01C3 [1987]

Tape

T03-A01C3A [1992]

For helical scan recording

T03-A01C5 [1992]

Card

(T03-M01)

See T04 also for card carriers of 'magnetic strip' type.

T03-A01C7 [1992]

Drum

T03-A01C8 [1992]

Characterised by intended application

Codes in this section are only used if the carrier is specified (not necessarily claimed) to be primarily for a specific purpose.

T03-A01C8A [1992]

Audio recording

T03-A01C8B [1992]

Video recording

VTR, camera-recorder, camcorder, electronic still picture camera, Mavica

T03-A01C8C [1992]

Computer data recording

This code is **not** used for hard disks, the assumption being made that such carriers are chiefly intended for this purpose.

T03-A01C8X [1992]

Other recording applications

T03-A01C9 [1992]

Other magnetic carriers

Includes work piece adapted to store limited amount of data e.g. for identification purposes. This code, when assigned with T03-M02 indicates photographic film with an integral magnetic carrier. (See also S06-B codes).

T03-A01D [1987]

Vertical recording medium

This code is used with other T03-A01 codes as appropriate.

Perpendicular, thickness direction

T03-A01E [1992]

Superconducting magnetic record carriers

This code is used with other T03-A01 codes as appropriate. See T03-A06K for other aspects of using superconductors in magnetic recording. General aspects of recording using superconductors (other than in magnetic recording) are covered by T03-C07. Superconductive devices and materials in general are covered by U14-F codes. (X12-D06 codes are assigned for high-power aspects of superconductors).

T03-A01F [1992]

Layer arrangements

(T03-A01X)

This code deals with emphasis on sequence of layers without particular reference to any one layer. Multilayer magnetic coatings are covered by T03-A01A6.

T03-A01G [1992]
Additional recording area and physical recording format
(T03-A01X)
This code covers the physical arrangement of the record carrier into separate areas, either for dedicated (e.g. servo tracks) or general use. Recording formatting on a physically continuous recording surface is covered by T03-A06F1.
Hard sectoring, index, format, pre-format, reference

T03-A01G1 [1992]
Separate magnetic tracks
(T03-A01X)

T03-A01G3 [2008]
Carrier with discrete magnetic recording areas
Includes magnetic carrier with patterned magnetic layer, such as nano-imprinted type. For hard disk carriers search with T03-A01C1A and other T03-A01 codes as appropriate. Manufacture of such carriers is covered by T03-A02G3 and other T03-A02 codes as appropriate.
Pattern, depression, pit

T03-A01G5 [1992]
Using other recording method
(T03-A01X)
Covers the use of non-magnetic storage, e.g. a magnetic carrier with an optical or capacitive servo track.

T03-A01H [1992]
Leader
(T03-A01X)
Includes compositions, details of optical transparency, etc. See T03-E05A5 for leader-sensing mode control in tape drives.
Colour, light, transmission, autostop

T03-A01R [2006]
Recycling and destroying magnetic carrier
This code is used for recycling and destroying of **magnetic** record carriers only. Recycling and destroying of optical carriers is covered by T03-B01R and of magneto-optical carriers by T03-D01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

T03-A01T [2008]
Thermo-assisted magnetic record carrier
Covers magnetic carriers which are locally heated to facilitate high-density recording. Equipment using this type of recording is assigned T03-A06N1 codes, (T03-A06M codes from 2007-2012), and other T03 codes as appropriate.
HAMR, heat assisted magnetic recording

T03-A01X
Other magnetic carrier details
Marking, cinefilm magnetic soundtrack

T03-A02
Record carrier manufacture
For manufacture restricted to a specific type of carrier, search with T03-A02E codes.

T03-A02A [1987]
Applying magnetic film to substrate
Includes apparatus (with T03-A02D1) and methods for liquid deposition, sputtering, evaporation, and other techniques. Prior to 2007 see V02-H02 codes also for magnetic film application. Therefore V02 is no longer routinely assigned for manufacture of magnetic recording media with the exception of nanostructures, which are coded in V02-H02G. Manufacturing processes other than magnetic layer deposition are covered by T03-A02B codes. (See note for T03-A02B8).
Vapour deposition, vacuum deposition, plating, coating

T03-A02A1 [1992]
Coating by liquid method, including plating
Prior to 2007 magnetic film deposition by plating was also coded in V02-H02C.
Electrolytic, electroless, spray, dip

T03-A02A3 [1992]
Coating by sputtering, vapour deposition
Vacuum

T03-A02A3A [1992]
Sputtering
Prior to 2007 this topic was coded in V02-H02B as well. Sputtering apparatus of general application is also coded in X25-A04 and V05-F codes.

T03-A02A3B [1992]
Vapour deposition
Heat, vessel, evaporate

T03-A02A3X [1992]

Other details of coating by sputtering, vapour deposition

Includes techniques such as plasma spraying.
Flame, jet

T03-A02A5 [1992]

Treatment of deposited layer

T03-A02A5A [1992]

During deposition

Includes e.g. magnetic orientation.
Field, orient, direction

T03-A02A5C [1992]

After deposition

Includes e.g. heat treatment.
Drying

T03-A02B [1992]

Substrate and non-magnetic layer processing

Codes in this section are used to describe manufacturing processes (or equipment when used with T03-A02D codes) other than for magnetic layer deposition, which is covered by T03-A02A.

T03-A02B1 [1992]

Manufacture of substrate and base layers

T03-A02B1A [1992]

Manufacture of substrate per se

Includes shaping, stamping etc. but **not** manufacture of substrate material, which is covered by T03-A01B1A. Prior to 1997, this code covered texturing and polishing of substrates (chiefly for hard disks, in which case T03-A02E1A is also assigned). From 1997 these topics are transferred to T03-A02B1C and T03-A02B1D. Both codes are assumed to relate to substrates, unless T03-A02B1B is also assigned to indicate base layer treatment.
Moulding, rolling, punching, extruding, stretching

T03-A02B1B [1992]

Base layer application and treatment

Covers manufacture and deposition of base layers prior to magnetic layer deposition. Manufacture of base layer materials per se is covered by T03-A01B1B.

T03-A02B1C [1997]

Polishing

(T03-A02B1A)

It is assumed that this code relates to substrates unless T03-A02B1B is also assigned to indicate base-layer treatment.

T03-A02B1D [1997]

Texturing

It is assumed that this code relates to substrates, unless T03-A02B1B is also assigned to indicate base-layer treatment.

CSS, flying height, slider, roughness

T03-A02B3 [1992]

Backing layer manufacture

Covers production of back-coat layers, but **not** materials manufacture which is covered by T03-A01B3.

T03-A02B5 [1992]

Protective and lubricating layer manufacture

Covers deposition of layers only, for compositions see T03-A01B5 codes.

T03-A02B7 [1992]

Additional manufacturing processes

Covers manufacturing steps carried out after basic carrier manufacture, e.g. cleaning, tape slitting (previously coded in T03-A02 and T03-M02), etc., but not loading into carrier case which is covered by T03-H01 codes. Equipment performing these processes is coded in T03-A02D3.

Post-treatment

T03-A02B8 [1992]

Multistep manufacturing processes

This code is used for inventions covering a number of manufacturing steps without apparent emphasis on any one, and therefore takes precedence over T03-A02A codes if magnetic layer deposition is mentioned as only one of several process steps.

T03-A02B8A [1992]

Multistep manufacturing process for whole carrier

This code is used for inventions describing the complete manufacturing process only.

T03-A02B9 [1992]

Other manufacturing processes

Includes packing and shipping of manufactured carrier. Also includes writing of servo tracks during manufacture.

T03-A02C	[1992]
Quality control, testing (methods and equipment)	
<i>QC, evaluate, inspect</i>	
T03-A02C1	[1992]
Checking manufacturing process	
<i>Monitoring, control, instrumentation</i>	
T03-A02C5	[1992]
Checking finished or partially finished carrier	
<i>Flaw, inspection, testing, still-picture, contact-stop-start, CSS, lifetime</i>	
T03-A02C5A	[1992]
Using optical or other inspection	
See also appropriate code in S03, e.g. S03-E04F2, which covers optical flaw detection.	
<i>Chemical, corrosion, humidity, heat, wear, exfoliation, abrasion, durability, asperity</i>	
T03-A02C5B	[1992]
By test recording	
<i>Error, bit error rate, BER, check</i>	
T03-A02D	[1992]
Manufacturing equipment	
T03-A02D1	[1992]
For manufacture of carrier per se	
This code is used with other T03-A02 codes as appropriate, to indicate specific purpose. For example, use T03-A02A codes with T03-A02D1 for equipment used to apply magnetic layer to the carrier substrate; for general aspects of equipment for magnetic disk manufacture use T03-A02D1 with T03-A02E1.	
T03-A02D3	[1992]
For subsequent processing	
Includes equipment for treatment carried out after manufacture of carrier per se, e.g. slitting of tape (previously coded in T03-A02 and T03-M02), and general handling aspects.	
<i>Stack, wind, conveyor, feed</i>	
T03-A02D5	[1992]
For bulk storage, e.g. pancake	
<i>Reel, drum</i>	

T03-A02E	[1992]
Characterised by type of carrier	
Codes in this section are used (with other manufacturing codes as appropriate) to indicate the type of carrier being manufactured only. Prior to 1992 use T03-N codes.	
T03-A02E1	[1992]
Disk	
T03-A02E1A	[1992]
Hard disk	
T03-A02E1C	[1992]
Flexible disk	
T03-A02E3	[1992]
Tape	
T03-A02E5	[1992]
Card	
T03-A02E7	[1992]
Drum	
T03-A02E9	[1992]
Other magnetic carrier	
T03-A02G	[2008]
Manufacture of carrier with separate recording areas	
Includes manufacture of magnetic carrier not having magnetic recording film over the whole area.	
T03-A02G1	[2008]
Manufacture of carrier with separate magnetic recording tracks	
Includes manufacture of magnetic carrier with separate magnetic track regions. For hard disk carriers search with T03-A02E1A and other T03-A02 codes as appropriate.	
T03-A02G3	[2008]
Manufacture of carrier with discrete magnetic recording areas	
Includes manufacture of magnetic carrier with patterned magnetic layer, such as nano-imprinted type.	
<i>Pattern, depression, pit, stamper</i>	

T03-A02G5 [2008]

Manufacture of carrier including non-magnetic recording areas

Includes manufacture of magnetic carrier with separate recording area using other technology, such as optical, for which T03-B codes are also assigned. Magneto-optical record carriers are not included here, being covered by T03-D01A8 codes.

T03-A03

Heads

Prior to 2007 see also V02-A02 codes for magnetic materials. Prior to 2002 if audio/video application is indicated see also W04-B02A. For erase heads search with T03-A06E1. From 2002 heads for audio/visual recording are no longer coded in W04-B02. Audio/visual applications are indicated by W04-B10, W04-B12, W04-B14 and W04-B16 codes.
Field, transducer, coil, flux, bias, inductance, yoke, core, ferromagnetic, pick-up, read, write

T03-A03A

Heads with multiple active gaps

Multichannel, multitrack, film, glass, erase

T03-A03A1 [1992]

For operation on same track

T03-A03A5 [1992]

For operation on different tracks

For array type heads T03-A03A7 takes precedence.
Stereophonic, DCC

T03-A03A7 [1992]

Array-type multiple head

Matrix

T03-A03B

Other inductive head structures

This code is used for inductive head structures not catered for by other T03-A03 codes which take precedence, or when precise detail cannot be determined.

T03-A03C

Flux-sensitive heads

Includes magneto-resistive aspects (covered in T03-A03C3).

Read-only

T03-A03C1 [1992]

Combined with write head

Composite, disk drive

T03-A03C3 [1992]

Using magnetoresistive material

All heads with thin film construction are additionally coded in T03-A03E. For biasing arrangements see T03-A03J9 also. Magnetoresistive elements used in non-head devices such as MRAM are coded in U12-B01B. Prior to 2007 thin film heads were also coded in V02-B03 but this code is now discontinued.

T03-A03C3A [1997]

Using giant magnetoresistance (GMR) effect

GMR, spin valve, Barkhausen

T03-A03C3C [2005]

Tunnel junction magnetoresistive head

See also T03-A03C3A for tunnel junction giant magnetoresistive head.

T03-A03C3G [2006]

Ballistic magnetoresistive head

T03-A03C3X [2006]

Other magnetoresistive head types

Colossal

T03-A03C5 [1992]

Using semiconductor-type device

See also U12-B01 codes.

Hall effect

T03-A03C9 [2005]

Flux sensitive head details

T03-A03C9A [2005]

Magnetic layers

Pinned layer, free layer

T03-A03C9C [2005]

Spacer layer

Includes conductive non-magnetic layer between magnetic layers.

T03-A03C9E [2005]

Tunnel barrier layer

Includes insulating non-magnetic layer between magnetic layers.

T03-A03C9G [2005]

Exchange layer

Anti-ferromagnetic

T03-A03C9J [2005]

Shielding layer

Used for internal shielding layers of magnetoresistive heads only. For other shielding aspects see T03-A03J7A.

T03-A03C9L [2005]

Layer arrangements

Covers emphasis on sequence of layers without particular reference to any one layer.

T03-A03C9N [2005]

Biasing arrangements

Circuitry for biasing magnetic heads is covered in T03-A06G.

T03-A03C9X [2005]

Other details of flux sensitive heads

T03-A03D [1987]

Vertical recording heads

This code is used with other T03-A03 codes as appropriate.

Perpendicular

T03-A03E [1987]

Thin film heads

Assumed to be for inductive type head structures unless applied in conjunction with T03-A03C codes. This code is intended for magnetic heads wholly of film-circuit type construction, i.e. including thin film coil windings (for details of which search with T03-A03J5). Magnetic heads in which only the core and related magnetic circuit components are of thin film construction are not included. Cores for such heads are covered by T03-A03J1C, and for thin film circuit type heads by T03-A03J1E. Metal-in-gap heads are covered by T03-A03F codes. Prior to 2007 magnetic film details of 'thin film' heads of both types were also coded in V02-B03, which has now been discontinued. For film circuits in general, see U14-H codes, which are not assigned for thin film magnetic heads.

T03-A03E1 [2006]

Lead layers

Covers layer arrangements for internal head connections. External head connections are covered in T03-A05C8.

T03-A03F [1992]

Metal-in-gap heads

MIG

T03-A03F1 [1992]

Gap-filling material

Details of gap materials and structure for magnetic heads in general are covered by T03-A03J3C.

T03-A03J [1992]

General magnetic head details

Covers details of inductive type heads. For details of magnetoresistive heads see T03-A03C9 codes.

Codes in this section are used alone or in conjunction with other T03-A03 codes as appropriate.

T03-A03J1 [1992]

Head cores

Carrier-contacting surfaces, including pole-pieces, are covered by T03-A03J3.

T03-A03J1A [1997]

Magnetic material composition

Prior to 2007 see also V02-A02 codes for further details of materials.

T03-A03J1C [1997]

Thin film cores (for non-film head)

This code relates to magnetic heads with film-type cores, other parts of the head, such as windings, being of conventional construction. Prior to 2007 see also V02-B codes, especially V02-B03. From 2007 these codes are discontinued. Heads which are entirely of film circuit construction are covered by T03-A03E, their cores being covered by T03-A03J1E. Metal-in-gap heads are covered by T03-A03F codes.

T03-A03J1E [1997]

Thin film head cores

This code is intended for core details of magnetic heads which are entirely of film circuit type construction, also coded in T03-A03E. See T03-A03J1C for magnetic film cores for otherwise conventional heads. (Prior to 2007 V02-B03 is also assigned for all aspects of thin magnetic films used for heads).

T03-A03J3 [1992]

Carrier-interfacing surface

Covers mechanical aspects and magnetic details such as pole pieces, but **not** cores, which are covered by T03-A03J1.

T03-A03J3A [1992]

Pole pieces

Includes flux guides. Details of cores are covered in T03-A03J1.

T03-A03J3C [1992]

Gap details

Metal-in-gap head details are covered by T03-A03F codes.

T03-A03J3E [1992]

Head face

Covers mechanical aspects of carrier-contacting surface surrounding active part of head, such as shape, friction-reduction, etc.

Hardness, roughness, smooth, projection, asperity

T03-A03J3J [2007]

Heating device

(T03-A03J9)

Covers arrangements for heating carrier-interfacing surface of head to control fly height. Also coded in T03-A05C1. Arrangements for thermo-assisted magnetic recording (where portion of carrier is heated as part of the recording process) are not coded here, being covered in T03-A06M instead.

T03-A03J5 [1992]

Windings

HF coils in general are covered by V02-F01 codes. Prior to 2007 HF coils for magnetic heads were also coded in V02-F05, which has now been discontinued.

T03-A03J7 [1992]

Casing, shielding, substrates

From 1997 codes in this section include substrates, previously covered in T03-A03J9.

T03-A03J7A [1997]

Casing and external shielding

T03-A03J7C [1997]

Internal shielding layers

Includes shielding layers within film-type heads (see T03-A03E). For shielding layers within magnetoresistive heads see T03-A03C9J.

T03-A03J7E [1997]

Substrate

(T03-A03J9)

T03-A03J8 [2006]

Internal head connections

See T03-A03E1 for internal head connections for thin-film heads (e.g. magnetoresistive or inductive heads). External head connections are covered in T03-A05C8.

T03-A03J9 [1992]

Other general head details

Prior to 1997 this code included head substrates, now covered by T03-A03J7E and prior to 2005 also included biasing arrangements for magnetoresistive heads which are now covered in T03-A03C9N. Circuitry for biasing magnetic heads is covered in T03-A06G.

T03-A04

Head manufacture, testing, demagnetisation, cleaning

T03-A04A [1987]

Manufacture, testing

Prior to 2007 see also V02-H codes and V02-H05. From 2007 manufacture and testing of magnetic heads is covered in T03 only.

T03-A04A1 [1992]

Head manufacture

T03-A04A1A [1992]

Assembly

T03-A04A1B [1992]

Film deposition

T03-A04A1C [1992]

Coil winding

T03-A04A1D [1992]

Casing manufacture

Includes manufacture of shield and mounting arrangements.

T03-A04A1E [1992]

Mechanical or chemical treatment

Includes e.g. burnishing, etching etc.

T03-A04A5 [1992]

Head testing

Includes test recording and non-electrical testing and inspection methods (also coded in e.g. S03).

T03-A04B [1987]

Demagnetisation, cleaning

See V02-D for demagnetisation in general.

Abrasion

T03-A04B1 [1992]

Demagnetising magnetic heads

Degaussing, coil, solenoid, decay

T03-A04B3 [1992]

Cleaning magnetic heads

Cleaning of record carriers and of recording equipment in general is covered by T03-H02B and T03-H02C respectively.

Aerosol, cartridge

T03-A04B3A [1992]

Cleaning compositions

Solvent

T03-A04B3B [1992]

Dummy carrier for cleaning

Includes cleaning cassettes, floppy disks adapted for cleaning, etc.

Cleaning tape

T03-A04B3C [1992]

Brush

T03-A05

Head mounting and positioning

For records prior to 2002 audio/video head mounting and positioning is also coded in W04-B03. From 2002 W04-B03 is no longer used, audio/visual applications being indicated by W04-B10, W04-B12, W04-B14 and W04-B16 codes.

Drive, motor, stepper, track, control, rotating, read, write, slide, carriage

T03-A05A

Azimuth correction, track centering, alignment maintenance

Error detection, angle, pitch

T03-A05A1 [1987]

Dynamic adjustment, i.e. dependent on recorded signals.

Includes use of piezoelectric elements for head deflection.

Control, pilot

T03-A05A1A [1992]

Head adjusting element

See also V06-M06D for piezoelectric actuator. Includes shape memory alloy elements with self heating or auxiliary heater.

SMA, bimorph

T03-A05A1B [1997]

Head position adjustment based on maximum read signal level

Covers dynamic arrangements positioning head for optimum output, without necessarily using dedicated servo information for track following (covered by T03-A05A1C).

Peak, maximise

T03-A05A1C [1992]

Track-following system, servo

For combined track accessing and following servo system see T03-A05B1A which is used as the default 'servo' code for magnetic recording and takes precedence over this code. For track following servos in general see T03-G02C1. For layout of servo tracks on magnetic carriers see T03-A06F codes. Details of physically separate servo tracks (magnetic and non-magnetic) created during formation of magnetic layer on carrier are covered in T03-A01G.

T03-A05A1D [1992]

Speed control for moving head

Covers rotary-head speed control. See T03-E03A7 for helical scan tape speed control.

T03-A05A1E [2008]

Head positioning for dual actuator systems

Includes control of a secondary actuator, e.g. on the main head arm of a disk drive, for fine positioning. For details of head adjusting elements per se see T03-A05A1A.

Piezoelectric

T03-A05A1G [2005]

Using non-magnetic servo information

Includes use of optical servo tracks.

T03-A05A1X [1992]

Other dynamic adjustment

T03-A05A3 [1992]

Adjustment not dependent on recorded signal alignment, setting up

Includes temp. compensation and manual adjustment of e.g. azimuth. See T03-K07 codes for testing also.

Screw, spring, pitch

T03-A05B [1992]

Track selection

(T03-A05X)

Covers arrangements to position head over desired track.

T03-A05B1 [1992]

By recorded signal

(T03-A05X)

Includes track accessing servo. See T03-G02B1 for track accessing servos in general.

Index, count, track crossing

T03-A05B1A [1992]

Switching to track following servo action

This code is used as the default 'servo' code for magnetic recording. Inventions specific to track following servos only for magnetic recording are covered by T03-A05A1C.

T03-A05C [1992]

Head support structure

(T03-A05X)

Includes details of head to medium interface such as air bearing, contouring, gimbal, suspension and load arm. Use with T03-A05F codes for disks.

T03-A05C1 [1992]

For head-to-carrier spacing adjustment

(T03-A05X)

Raise, lift, lower

T03-A05C1A [1992]

Slider

(T03-A05X)

T03-A05C3 [1992]

Head support arm

(T03-A05X)

Covers details of arm per se such as shape, mounting etc.

Swage

T03-A05C3A [2007]

Dual actuator systems

(T03-A05X)

Covers arrangements for mounting a secondary actuator on main head arm for fine positioning. For details of head adjusting elements per se and positioning methods see T03-A05A1A codes.

T03-A05C5 [1992]

Motor drive

(T03-A05X)

Includes motors per se - see V06-M codes also. See T03-A05D7 for helical-scan head motor drive.

Bearings

T03-A05C5A [1992]

Rotary drive

T03-A05C5C [1992]

Linear drive

T03-A05C8 [2005]

Connections to read/write head

Includes wiring formed on head support arm. Prior to 2005 this was covered by T03-A05C3 and T03-A06C.

T03-A05D [1992]

Specific head positioning details for helical-scan tape

(T03-A05X)

T03-A05D1 [1992]

Layout of heads, i.e. disposition

(T03-A05X)

T03-A05D3 [1992]

Signal coupling arrangements

(T03-A05X)

Codes in this section are concerned with signal transfer between the rotating heads and stationary part of equipment.

T03-A05D3A [1992]

Inductive, e.g. transformer

(T03-A05X)

See V02-F02 codes also.

T03-A05D3C [1992]

Optical

(T03-A05X)

T03-A05D3E [1992]

Radio frequency

(T03-A05X)

T03-A05D3G [1992]

Brushes

(T03-A05X)

See V04-L01 codes also.

T03-A05D3X [1992]

Other rotary signal coupling

(T03-A05X)

T03-A05D5 [1992]

Rotary head drum

(T03-A05X)

Covers details of head drum per se, such as shape, materials, etc.

T03-A05D7 [1992]

Rotary head motor drive

(T03-A05X)

Includes motor per se. Motor-driven positioning for non-rotary heads in general is covered by T03-A05C5 codes.

T03-A05E [1992]

Head positioning for longitudinally-scanned tape

T03-A05F [1992]

Head positioning for disk

Codes in this section are used either alone or with other T03-A05 codes, if the use of T03-A05F codes conveys additional information. See also T03-A08 codes, now assigned for all aspects of magnetic recording equipment. Prior to 1997, T03-A05F codes may be used to discriminate equipment type when head positioning is involved.

T03-A05F1 [1992]

Non-contacting during operation

Hard disk, stack, CSS

T03-A05F5 [1992]

Contacting during operation

Floppy, flexible, diskette

T03-A05G [2005]

Parking, latching arrangements

Includes load-unload ramps in hard disk drives, for which T03-A08A1C is also assigned. Prior to 2005 this topic was covered by T03-A05X.

LUL

T03-A05X

Other head positioning aspects

T03-A06

Recording, reproducing or erasing methods/circuits

See T03-P codes for signal processing for recording in general, and W04-F and W04-G01 codes for video and audio recording signal processing in general.

T03-A06A

Direct, FM, PM or boundary displacement analogue recording

Frequency, phase, modulate, pulse

T03-A06B

Other analogue recording

T03-A06C

Digital recording

Code, decode, pulse, bit, mark, space

T03-A06C1 [1992]

Recording/write circuitry

T03-A06C3 [1992]

Read circuitry

Sense, threshold, peak

T03-A06D [1992]

Equalisation

(T03-A06X)

T03-A06E [1992]

Erasing

(T03-A06X)

Coil, magnet

T03-A06E1 [1992]

In equipment

(T03-A06X)

Oscillator, head

T03-A06E3 [1992]

Bulk

(T03-A06X)

See V02-D for demagnetising in general. Prior to 1992 T03-H02 was used for bulk erasure.

T03-A06F [1992]

Format

(T03-A06X)

Covers signals recorded as magnetic information on carrier only. See T03-A01G codes for physical aspects of record carrier formatting, e.g. hard sectoring. See W04-B01A codes for formatting aspects relevant to audio/video recording.

T03-A06F1 [1992]

Track layout

(T03-A06X)

T03-A06G [1992]

Biasing

(T03-A06X)

Arrangements for biasing magneto-resistive heads are covered in T03-A03C9N (prior to 2005 this was covered in T03-A03J9).

T03-A06H [1992]

Skew correction, timebase correction

(T03-A06X)

See W04-F02B and W04-G01 codes for video and audio recording aspects.

T03-A06K [1992]

Superconductive magnetic recording

See T03-A01E for superconductive magnetic record carriers per se.

T03-A06M* [2005-2012]

Thermo-assisted magnetic recording

*This code is now discontinued. Prior to 2013 it was used to indicate localised heating, usually by a laser, of an area on a magnetic record carrier to be written on. From 2013 this technology is transferred to T03-A06N1 within the category of energy-assisted magnetic recording.

T03-A06M1* [2007-2012]

Thermo-assisted magnetic recording methods

*This code is now discontinued. Prior to 2013 it was used to indicate recording methods using heat assistance. From 2013 this technology is transferred to T03-A06N1A within the category of energy-assisted magnetic recording.

T03-A06M3* [2007-2012]

Heat source

*This code is now discontinued. Prior to 2013 it was used to indicate novel aspects of the heat source for heat-assisted recording. (Also covered in V08 for novel details of lasers and U12 for semiconductor lasers). From 2013 this technology is transferred to T03-A06N1C within the category of energy-assisted magnetic recording.

T03-A06M5* [2007-2012]

Optical system

*This code is now discontinued. Prior to 2013 it was used to indicate novel aspects of the optical system for heat-assisted magnetic recording. From 2013 this technology is transferred to T03-A06N1E within the category of energy-assisted magnetic recording.

T03-A06N [2013]

Energy-assisted magnetic recording

This code and its subdivisions cover the use of a separate energy source to enable writing to a magnetic record carrier using a lower magnetic field strength, i.e. to lower the coercivity of a storage bit while it is being written. The technology is assumed to apply to vertical/perpendicular recording and the general code for that topic, T03-A06V, is **not** normally assigned for energy-assisted magnetic recording. For application to hard disk drives search with T03-A08A1C. Note that magneto-optical recording is **not** included and is covered by T03-D01 codes.

T03-A06N1 [2013]

Thermo-assisted magnetic recording

Covers thermo-assisted ('heat-assisted') magnetic recording. Between 2005 and 2012 this topic was covered by T03-A06M codes.

HAMR

T03-A06N1A [2013]

Thermo-assisted magnetic recording methods

Covers thermo-assisted ('heat-assisted') magnetic recording methods. Between 2005 and 2012 this topic was covered by T03-A06M1 codes.

T03-A06N1C [2013]

Heat source for thermo-assisted magnetic recording

This code covers novel aspects of the heat source for heat-assisted recording, e.g. a laser. (Also covered in V08 for novel details of lasers and U12 for semiconductor lasers). Prior to 2013 this technology was covered by T03-A06M3.

T03-A06N1E [2013]

Optical system for thermo-assisted magnetic recording

This code covers novel aspects of the optical system for heat-assisted recording. Prior to 2013 this topic was covered by T03-A06M5.

Lens, near-field optics, solid immersion

T03-A06N3	[2013]
Microwave-assisted magnetic recording	
Search with T03-A03 codes for magnetic head details, e.g. T03-A03C3A for heads based on giant magnetoresistance effect or T03-A03C3C for tunnel junction magnetoresistive heads. From 2014 oscillators based on spin transport electronics effects are also assigned U23-A05.	
<i>GMR, MAMR, oscillating field, spin torque oscillator, STO, TMR</i>	
T03-A06N3A	[2013]
Microwave-assisted magnetic recording methods	
T03-A06N9	[2013]
Other energy-assisted magnetic recording	
Covers the use of a separate energy source, other than heat or microwave energy, to lower storage bit coercivity during writing.	
T03-A06V	[2007]
Vertical recording	
This code is used for highlighting the relevance of vertical recording methods where neither a novel vertical recording medium or novel vertical recording head is involved. Novel vertical recording media and heads are not routinely coded here, being covered by T03-A01D and T03-A03D respectively. Note that energy-assisted magnetic recording (as covered from 2013 by T03-A06N codes) is assumed to involve use of vertical/perpendicular magnetic recording and so T03-A06V is not routinely assigned for that topic.	
T03-A06X	
Other recording circuitry and methods	
T03-A07	[1987]
Re-recording	
(T03-A09)	
Prior to 2006 this section included write/erase protection. From 2006 hardware aspects of write/erase protection for all types of recording are transferred to T03-H07 while signal format and signal processing methods are covered solely in T03-P07. T03-A codes are now used in addition to T03-H07 or T03-P07 codes to indicate applicability to magnetic recording.	
<i>Copy, master, duplicate</i>	
T03-A07A*	[1992-2005]
Preventing overwriting, erasure or copying	
*This code is now discontinued. See T01-H01C and T01-J12C for computing aspects.	

T03-A07A1*	[1992-2005]
Preventing accidental loss of data	
*This code is now discontinued.	
T03-A07A1A*	[1992-2005]
By hardware detail, e.g. erase tab etc.	
*This code is now discontinued. Prior to 2006 the code was used with T03-N03 for tape cassette systems and with T03-N01 for disks.	
T03-A07A1B*	[1992-2005]
By signal format, by recorded data	
*This code is now discontinued. See T03-P07 for general non-magnetic recording signal processing aspects of data erasure or copying prevention.	
<i>Pilot, inhibit</i>	
T03-A07A3*	[1992-2005]
Preventing unauthorised deliberate access or copying	
*This code is now discontinued.	
T03-A07A3A*	[1992-2005]
By hardware detail, e.g. disk drive lock	
*This code is now discontinued.	
T03-A07A3B*	[1992-2005]
By signal format	
*This code is now discontinued.	
T03-A07B	[1992]
Copying; re-recording	
Covers authorised copying of magnetic recordings.	
T03-A07B1	[1992]
Duplication of pre-recorded information at post mfg. stage, e.g. time code carrier	
Includes servo track writing post manufacture, e.g. in hard disk drive. Duplication of whole carrier information is covered by T03-A07B3 codes.	
<i>Pre-formatting, servo, index, SMPTE</i>	
T03-A07B3	[1992]
Duplication from one carrier to another	
T03-A07B3A	[1992]
Making many copies from one master	
T03-A07B9	[1992]
Other copying, re-recording	

T03-A08 [1992]

Magnetic drive

Codes in this section are used with either T03-E or T03-F codes as appropriate to indicate carrier positioning aspects. Portable standalone drives are also coded in T04-P. Prior to 1997, these codes were used to indicate these aspects only, but are now widened in scope to be applied for any novel aspect of magnetic drives which would be included in T03. To further discriminate the type of equipment concerned, codes from the T03-N section should be used where T03-A08 codes are not sufficiently specific.

T03-A08A [1992]

Disk drive

See T03-F codes also.

T03-A08A1 [1992]

Single disk drive module

From 2012 T03-A08A1G is introduced for portable hard disk drives that are used for external storage. Hard disk drives of normal form factor for use within computers, servers, etc., are covered by T03-A08A1C and card-type or similar small form factor drives are covered by T03-A08A1E. In 2002 the title of T03-A08A1 was amended to better reflect its intended coverage of single units which may drive one or more magnetic disks. Storage systems based on multiple magnetic disk drive modules used together are covered by T03-A08A5 codes.

T03-A08A1A [1992]

Floppy disk drive

T03-A08A1C [1992]

Hard disk drive

This code is used as the default reference for a 'hard disk drive'. Card type, or similar small form factor magnetic disk drives used within equipment are covered by T03-A08A1E and external hard disk drives by T03-A08A1G (from 2012), both of which are assigned instead of T03-A08A1C. Please note that since T03 codes cover dynamic recording systems only, SSDs and similar solid-state replacements for hard disk drives are not assigned this code and are instead covered by T01-H01B3 codes.

T03-A08A1E [1997]

Card type, small form factor magnetic disk drive

This code covers compact and/or thin drives, assumed to be of hard disk type unless other codes indicate otherwise, that are mounted inside the equipment using the stored data. Portable hard disk drives that are external to the computer or other equipment with which they are used are covered by T03-A08A1G.

PCMCIA

T03-A08A1G [2012]

Portable hard disk drive

This code covers hard disk drives that are self-contained and used as external drives, e.g. for connection to a PC via a USB or similar interface. T04-P is also assigned for external computer storage disk drives. Standard hard disk drives and compact drives of e.g. card-type that are mounted inside equipment are covered by T03-A08A1C and T03-A08A1E respectively.

Back-up, desk-top, external storage

T03-A08A5 [1992]

Multiple disk drive modules

From 2002 the title of this code has been amended to better reflect its intended coverage of multiple disk drive units (assumed to be for hard disks unless T03-A08A1A also assigned).

Stack

T03-A08A5A [1997]

RAID system

Redundant array inexpensive disks

T03-A08C [1992]

Card drive

See T03-F and T04-A03A/T04-J codes also.

T03-A08E [1992]

Tape drive

See also T03-E codes. This code is intended solely for drives intended for computer storage applications, e.g. tape streamers. It is **not** applied for details of audio or video tape recorders.

T03-A08M [2007]

Multiple head actuator type drive

Drives with multiple heads mounted in a fixed relationship with respect to each other are not routinely coded here.

T03-A09

Other details of magnetic recording/reproduction

T03-A10 [1992]

Interfacing with magnetic recorder

T03-A10A [1997]

Interfacing hardware

Includes plugs, sockets, cables etc.

T03-A10C [1997]

Interface circuitry

T03-A10E [1997]

Control aspects

See T01-C01 and T01-H01 codes also. Use with T03-A08A5A for RAID aspects.

T03-A10E1 [1997]

Data transfer aspects

T03-A10E3 [1997]

Control of storage

Includes file allocation, etc.

FAT

T03-B

Optical recording/reproduction

For records prior to 2002 audio/video applications are assigned W04-C codes also. From 2002 carriers and head/record carrier driving aspects of audio/video optical recording are **no longer** coded in W04. For audio/video applications of optical recording drives see W04-C10 codes. Hard formatting aspects specific to audio/video recording are also covered in W04-C01F while signal formatting aspects are covered in W04-C05. Optical reading/writing circuitry is coded in W04-C06.

These codes are **not** used for cinematography per se (S06-B05), but optical soundtrack systems are included. 'Combination' optical recording, e.g. magneto-optical (T03-D01 codes), is **not** assigned T03-B codes unless stated to be applicable to optical recording also.

Disk, storage, compact, laser, beam, light

T03-B01

Record carriers and their manufacture

For records prior to 2002 all aspects of record carriers per se are assigned W04-C01 codes also, irrespective of stated application. From 2002 W04-C01 codes are no longer used. Codes for carrier type (T03-B01D section) are assigned when possible, to indicate this aspect only. (Prior to 1992 use T03-N codes). From 2002 T03-B01D codes can be used to indicate audio/video carrier applications. From 1997, T03-B01H is used for layer arrangements without particular reference to any one (previously assigned the general T03-B01 code).

T03-B01A [1987]

Substrates

Mould, transparent

T03-B01A1 [1992]

Compositions

Includes glues, resins used for bonding multiple substrates.

PMMA, polycarbonate, resin

T03-B01A5 [1992]

Structure; shape

T03-B01A5A [1992]

Double substrate

Double-sided, dual-substrate

T03-B01B [1987]

Light sensitive layers

Photo-sensitive, photochromic, contrast, reflection, pit

T03-B01B1 [1992]

Light sensitive materials

Spiropyran

T03-B01B1A [1992]

Light absorbing materials

Includes IR-absorbing compounds.

T03-B01B5 [1992]

Characterised by recording process

Codes in this section are only assigned when some aspect of the light sensitive layer is novel, **not** to routinely indicate carrier type, which is catered for by T03-B01D codes.

T03-B01B5A [1992]

Ablation

Covers methods involving depletion of material, such as hole burning.

Ablative, evaporation, metal film, surface tension

T03-B01B5C [1992]

Deformation

Includes formation of bubbles.

Polymer, metal, bi-layer, gas, scatter

T03-B01B5E [1992]

Interaction

Includes alloying or segregation of material.

Exothermic, chemical reaction, alloy, separate, crystallisation, bi-layer

T03--B01B5G [1992]

Phase transition

Includes change between crystalline and amorphous states.

Phase-change, liquid crystal

T03-B01B5J [1992]

Combination of methods

Includes use of more than one recording mechanism for multilevel recording of data. From 1997, multiple light sensitive layer arrangements and (single) layers sensitive to more than one wavelength, previously coded here, are respectively transferred to T03-B01B5N and T03-B01B5P.

High density, tri-level

T03-B01B5L [1992]

Reversible process

See T03-B01D8 for rewritable optical carrier in general.

Erasable, rewritable, photochromic

T03-B01B5N [1997]

Multiple light-sensitive layer

(T03-B01B5J)

T03-B01B5P [1997]

Layer sensitive to different light wavelengths

(T03-B01B5J)

T03-B01B5X [1992]

Other recording processes

T03-B01C [1987]

Protective layers, (anti-) reflective layers

Coating, film

T03-B01C1 [1992]

Internal reflective or antireflective layers

This code takes precedence over T03-B01C3 and is used for indeterminate cases.

T03-B01C3 [1992]

External reflective or antireflective layers

T03-B01C5 [1992]

Protective (ext.) layers

Anti-abrasion, scratch-resistant, antistatic

T03-B01C7 [1992]

Protection subsequently applied to carrier

Includes plastic air-occlusion film applied to surface of compact disk.

T03-B01C8 [2007]

Labelling layers

(T03-B01C9)

Includes optical and thermo sensitive layers for recording human readable information as well as layers suitable for printing e.g. by ink jet (see S06-G codes). Layers for recording data are covered in T03-B01B and are not coded here.

T03-B01C9 [1992]

Other details of protective layers and (anti) reflective layers

T03-B01D [1992]

Record carrier type

Codes in this section are used in conjunction with either those for features of carriers per se, or those for manufacture, to indicate the type of the carrier only.

T03-B01D1 [1992]

Disk

T03-B01D1A [2002]

For audio/video storage

(W04-C01)

T03-B01D3 [1992]

Card

Includes cards with circular tracks and centre-hole to allow recording/playback in optical disk recorder.

T03-B01D3A [2002]

For audio/video storage
(W04-C01)

T03-B01D4 [2006]

Super resolution carrier

Includes layer arrangements on carrier, e.g. mask layers, to increase resolution beyond wavelength of read/write laser. Super resolution arrangements involving optical components of head are covered in T03-B02B6 and are not coded here.

Super RENS, Super Resolution Near Field Structure

T03-B01D5 [1992]

Tape

T03-B01D5A [2002]

For audio/video storage
(W04-C01)

T03-B01D6 [1997]

Multilayer carriers

Includes double-substrate arrangements (also assigned T03-B01A5A) and carriers with multiple light sensitive layers on one substrate (see also T03-B01B5N).

T03-B01D7 [1992]

Non-erasable carrier

This code is only used when this aspect of the carrier is stated, and not merely instead of T03-B01D8. Search in conjunction with T03-B01D8 for hybrid carrier arrangements with erasable and non-erasable areas.

Direct read after write, DRAW, write once read many times, WORM, compact disk, CD

T03-B01D7A [1997]

Read only

Includes CD-ROM.

T03-B01D7C [1997]

WORM

Covers carrier enabling writing, but not erasing.
Archive

T03-B01D8 [1992]

Erasable and rewritable carrier

For details of recording layers see T03-B01B5L. Search in conjunction with T03-B01D7 for hybrid carrier arrangements with erasable and non-erasable areas.

T03-B01E [1992]

Manufacture

Use with T03-B01D codes to indicate manufacture of a particular type of carrier.

T03-B01E1 [1992]

Equipment

T03-B01E1A [1992]

Stamper

From 1997, this code will be used to cover stampers per se only -see note for T03-B01E3E.

Press, punch, form, substrate, roll, sheet

T03-B01E1B [1992]

Coating equipment

Covers equipment for applying any type of layer to substrate.

Evaporate, coat, deposit, spray, sputter, vacuum, vapor

T03-B01E1M [2006]

Mastering equipment

Includes equipment for writing to glass master and performing other mastering processes. See V05 codes for novel aspects of electron beam writing equipment.

Electron beam writer

T03-B01E3 [1997]

Characterised by process

Codes in this section are used with other T03-B01E codes as appropriate to provide additional information on the processes involved in an invention.

T03-B01E3A [1997]

Fabrication and recording of master

Includes production of master from raw material and also process of recording data on it which carriers will finally store.

Glass, cut, tape master, hard disk, subcode

T03-B01E3C [1997]

Production of intermediate copies

Includes production of 'metal master' and 'metal mother'.

Plating, sputtering, coating

T03-B01E3E

Production of stamper per se

Stampers per se, and materials for them, are coded in T03-B01E1A. From 1997, their manufacture will be described by use of T03-B01E3E together with T03-B01E1 or T03-B01E5 as appropriate. (Prior to 1997, T03-B01E1A itself was used with either 'apparatus' or 'method' codes).

T03-B01E3G [1997]

Pressing

Includes bonding of multiple substrates and setting resins as well as sheet stamping methods. See T03-B01E3X for punching hole in substrate after pressing.

Injection moulding

T03-B01E3J [1997]

Applying coatings after pressing

Includes labelling where label is part of carrier (also coded in T03-H02A1A and X25-F08 when there are significant electrical details). Chiefly covers application of reflective and protective films after pressing process. T03-B01E1B will continue to be assigned (in addition to T03-B01E3J) where novel coating equipment is involved.

T03-B01E3L [2011]

Polishing and cleaning

This code covers polishing and cleaning of an optical recording medium or a stamper or similar (e.g. with T03-B01E3E) **as part of a manufacturing process**. Polishing, cleaning or reconditioning of already-manufactured optical carriers by a user is **not** included and is covered by T03-H02B with T03-B01D codes assigned also as appropriate to denote the form of the carrier, e.g. T03-B01D1 for disk cleaning or scratch repair.

T03-B01E3P [1997]

Packing and shipment

Includes placing CDs in 'jewel boxes' ('jewel boxes' per se and their manufacture are covered by T03-L01A1), labelling, etc. Electrical details of packing and labelling of carrier containers are also assigned X25-F codes.

T03-B01E3S [2002]

Multistep manufacturing process

This code is used for inventions covering a number of manufacturing steps without apparent emphasis on any one.

T03-B01E3X [1997]

Other optical carrier manufacturing processes

T03-B01E5 [1992]

Methods

T03-B01E7 [1992]

Testing, monitoring

T03-B01E7A [1992]

Of manufacturing process

Instrumentation, check, measure

T03-B01E7B [1992]

Of carrier during manufacture

T03-B01E7C [1992]

Of complete carrier

Includes test recording and inspection by e.g. optical testing methods.

T03-B01F [1992]

Recording format

Covers physical aspects only such as groove/land structure and other aspects fixed at time of disk manufacture, as well as geometry of recordable and non-recordable pits. See T03-B05 for signal aspects of recording formats, including spatial arrangement of data on carrier and between carrier layers.

Sector, servo, index

T03-B01F1 [1992]

To increase storage density

Capacity, data

T03-B01F1A [2007]

Multivalued data formats

Includes recording marks that are able to contain several pieces of information by using variations in length, width or depth, to store data values with base greater than two.

T03-B01F5 [1997]

Details of grooves, pits, etc.

T03-B01F5A [1997]

Relating to tracking

Track following and accessing is covered in T03-B02A3 codes, also assigned where appropriate.

T03-B01H [1997]

Layer arrangements

Covers details of sequence layers making up record carrier without specific reference to any one layer.

T03-B01R [2006]

Recycling and destroying optical carrier

This code is used for recycling and destroying of **optical** record carriers only. Recycling and destroying of magnetic carriers is covered by T03-A01R and of magneto-optical carriers by T03-D01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

T03-B02

Heads and head/light source positioning

T03-B02A [1987]

Positioning, focusing

Codes in this section cover both lens positioning for focusing, and positioning of the head as a whole for track selection and alignment.

T03-B02A1 [1992]

Lens positioning for focusing

Positioning of the head moving across the carrier is covered by T03-B02A3 codes.

T03-B02A1A [1992]

Drive element per se

Includes voice coil motor. (See V06-M04 also).
VCM

T03-B02A1C [1992]

Focus detection and control

Includes focus servo arrangements.
Feedback, error, lens, position

T03-B02A3 [1992]

Head positioning

Covers positioning of head as a whole, for track selection or following, **not** focusing, which is covered by T03-B02A1 codes.

T03-B02A3A [1992]

Drive element per se

Includes linear motor. (See V06-M06B also).
Coil, pulse, step

T03-B02A3B [1992]

Movable mounting structures

Includes rail assembly allowing head movement.
Guide, slide

T03-B02A3C [1992]

Track selection and access

Includes track-accessing servo arrangements. (For track access servo in general, see T03-G02B1 codes).

Index, seek, kick pulse, step, initialise

T03-B02A3D [1992]

Track following

Includes track-following servo arrangements. (For track-following servos in general see T03-G02C1).

Alignment, feedback, off-track, shift, compensate, tilt

T03-B02A3E [1992]

Interchangeable servo system

Includes track accessing servo switching to track following mode. This code takes precedence over T03-B02A3C and T03-B02A3D.

T03-B02A4 [2005]

Tilt correction

Covers arrangements involving movement of lens or using other optical systems e.g. liquid crystal element. Search in conjunction with T03-B06 codes for compensation by signal processing.

T03-B02A5 [1992]

Compensation system

Includes arrangements compensating for temperature change or vibration, in either focus or track access/following system.

Shift, disturbance, distortion, jitter

T03-B02A7 [1992]

Light source control

Includes control of bias circuit for semiconductor laser (see also U12-A01B4 and corresponding codes in V08).

Monitor, current, feedback, LED, photodiode, APD sensor

T03-B02A8 [1997]

Using multiple heads, head positioning for double-sided disk

From 2007 this code has been expanded to include multiple head systems not exclusively used for double-sided disks. Previously this code covered only head positioning for double-sided disks.

T03-B02A8A [2007]

Head positioning for double-sided disk

All general aspects of multiple head drives are also covered in T03-B10M. Includes dual-head systems and arrangements for single head to move to other side of disk. Search using T03-B02A8 for all records prior to 2007.

T03-B02A8C [2007]

Reading multiple formats

T03-B02A8E [2007]

Increasing access speed

T03-B02A8G [2007]

Simultaneous reading of multiple tracks

T03-B02B [1992]

Head

The codes in this group cover constructional aspects of optical heads per se. Head positioning is covered by T03-B02A codes.

T03-B02B1 [1992]

Light source

This code covers novel light sources themselves, such as laser diodes, specific details of which are covered by U12-A01B codes and also codes in V08. It does not refer to assemblies including the light source and associated optical elements external to it which are covered by T03-B02B if no specific detail is given, or by other T03-B02B subdivisions as appropriate. Light sources are normally assigned T03-B02B1 only but in cases of specific application to reading or writing, subdivision codes are assigned instead. Frequency doubling or other multiplying optical arrangements are covered by T03-B02B7E (coded as T03-B02B1 and T03-B02B7 prior to 1997). Light source control aspects are coded in T03-B02A7.

LED, laser, solid, gas

T03-B02B1A [1992]

For recording

Writing, erasing, overwrite

T03-B02B1B [1992]

For reading

T03-B02B3 [1992]

Photodetector for focus and read

Photodiode, diode, APD, quadrant, sensor

T03-B02B5 [1992]

Lenses

T03-B02B6 [1997]

'Super-resolution' optical aspects

Aperture, Rayleigh, wavelength, refraction

T03-B02B7 [1992]

Optical systems, optical elements

Includes other optical elements e.g. lightguides for transferring reading or writing light, (see V07-F01 codes for novel aspects). Lenses are covered by T03-B02B5. 'Super-resolution' optical aspects are indicated by assignment of T03-B02B6 with T03-B02B5 or T03-B02B7 codes as appropriate.

T03-B02B7A [1997]

Beam splitter

Prism

T03-B02B7C [1997]

Polarising arrangements

T03-B02B7E [1997]

Harmonic generators

(T03-B02B1, T03-B02B7)

Covers arrangements effectively reducing wavelength of recording or reading light.

T03-B02B7G [2005]

Diffraction gratings

T03-B02B7M [2006]

Multiple optical path

Includes systems for reading different types of optical disk.

T03-B02B8 [1992]

Optical recording head cleaning, head manufacture, head testing

From 2012 the scope of this code has been expanded to include manufacture and testing of optical heads, respectively covered by subdivisions T03-B02B8C and T03-B02B8E, in addition to optical head cleaning, for which T03-B02B8A is now the main code. Note that T03-B02B8 codes refer to the optical head itself, as defined by T03-B02B codes, and not head positioning aspects as covered by T03-B02A codes. Prior to 2012 T03-B02B8 covered only arrangements for cleaning sources, detectors, and optical system with cleaning of e.g. an optical disk player lens by a dummy carrier being covered by T03-B02B8A. From 2012 T03-B02B8A is used as a general reference for head cleaning. Cleaning of recording equipment in general is covered by T03-H02C.

T03-B02B8A [1992]
Optical recording head cleaning, including use of dummy carriers

From 2012 the scope of this code has been expanded to cover general arrangements for cleaning optical recording and playback heads, such as lens cleaners, in addition to its previous coverage of dummy carriers for cleaning. Prior to 2012, T03-B02B8A was used for cleaning using dummy carriers such as cleaning disks and T03-B02B8 served as a general 'optical head cleaning' code. (Prior to 1992 T03-B02 and T03-H02 were assigned for optical head cleaning).

Wipe, pad, brush, solvent, lens

T03-B02B8C [2012]
Optical recording head manufacture

Between 2006 and 2011 search T03-B02B codes with T03-M08 (general manufacturing code) for optical recording head manufacture. From 2012 T03-M08 is no longer assigned for this topic.

T03-B02B8E [2012]
Optical recording head testing

Between 1992 and 2011 search T03-B02B codes with T03-K07 codes (general testing code) for optical recording head testing. From 2012 T03-K07 codes are no longer assigned for this topic. When optical testing is involved codes in e.g. S02-J04 or S03-E04 subgroups are also assigned as appropriate.

T03-B02C [1992]
Static carrier reading and writing system

Covers arrangements for reading or writing where relative movement of light source/sensor with respect to recording medium does not involve physical movement of either record carrier or a head apparatus. Instead relative movement takes place, for instance, by optical beam scanning with electro-optical or electromechanical scanning, or use of an switched optical array. Does not cover optical static stores, which are covered by U14-A02 codes.

T03-B03* [1992-2004]
Record carrier positioning

*This code is now discontinued and from 2005 novel aspects of optical record carrier positioning are assigned the appropriate T03-B10 code in conjunction with T03-F or T03-E codes.

T03-B03A* [1992-2004]
For disks

*This code is now discontinued. Prior to 2005 T03-N01 was also assigned and T03-F codes were applied for specific details.

T03-B03C* [1992-2004]
For cards

*This code is now discontinued Prior to 2005 T03-N05 was also assigned and also T03-F codes for specific details. Codes in T04, e.g. T04-A03B and T04-J are assigned for this topic.

T03-B03E* [1992-2004]
For tape

*This code is now discontinued Prior to 2005 T03-N02 and/or T03-N03 or T03-N04 were also assigned along with T03-E codes, which are still assigned for specific tape drive details.

T03-B05 [1992]
Signal recording format and methods

T03-B05A [2005]
Recording methods
Includes arrangements for recording label information using data recording equipment on visible light sensitive layer. For this topic see also T03-H02A.

T03-B05A1 [2005]
Optimisation methods
Includes use of test recording area. Use with appropriate code, e.g. T03-B02A7 for controlling light source power.

T03-B05F [2005]
Format
Covers arrangement of data only, physical aspects such as hard sectoring of data, are covered by T03-B01F. Index signal recording and related aspects are also in T03-J01 codes.
Constant, angular, linear, velocity, CAV, CLV

T03-B05F1 [2007]
Data arrangement within recording layers
Covers two dimensional data layout.

T03-B05F5 [2007]
Data arrangement between recording layers
Covers arrangement of different data types between different layers, e.g. layer used for interactive data such as Java info in Blu-Ray disks.

T03-B05F9 [2007]
Other data arrangements

T03-B05K	[2005]
Determining format or type of carrier inserted	
E.g. distinguishing between CD and DVD or between CD-R and CD-RW in drive capable of handling multiple formats.	
T03-B06	[1992]
Reading/writing circuitry	
This code is used with T03-P codes when signal processing aspects are involved.	
<i>Laser, diode</i>	
T03-B06A	[1992]
Writing	
T03-B06C	[1992]
Reading	
T03-B07	[2007]
Re-recording, duplication	
(T03-B01E3X, T03-B05A)	
Includes equipment and methods for duplicating optical carriers by recording on writable media.	
Production of optical carriers by pressing is covered in T03-B01E and is not coded here.	
T03-B08	[1992]
Interfacing with optical recording equipment	
T03-B09	
Other optical recording/reproduction aspects	
Includes editing/recording techniques esp. for optical recording, track flaw detection, noise elimination etc., when not relevant to other T03-B codes.	
T03-B10	[2005]
Optical drive	
Portable standalone drives are also coded in T04-P. From 2005 optical drives are coded in this section in accordance with carrier type and are no longer assigned a corresponding T03-N code. Prior to 2002 optical drives are coded in T03-N as appropriate and W04-C10. From 2002 W04-C10 codes are applied only for audio/video recording applications and therefore between 2002 and 2005 optical drives with no audio/video aspect were assigned a T03-N code in conjunction with the appropriate T03-B codes to denote novel aspects.	

T03-B10A	[2005]
Disk drive	
<i>CD, CD-ROM, CD-R, CD-RW, DVD, DVD-ROM, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+RW, HD-DVD, BD-ROM, BD-R, BD-RE, BluRay, UMD</i>	
T03-B10A1	[2005]
Multilayer disk	
From 2002 to 2005 drives for optical disk with multiple recording layers, e.g. DVD-9, DVD-10 and DVD-18 formats, are assigned W04-C10A2 where the invention has significant audio/video recording aspects. From 2005 W04-C10A2 is no longer used and all multi-layer aspects of drives are coded here. Optical disk drives for audio/video recording which are also used for recording other data formats are coded in W04-C10A3A.	
T03-B10C	[2005]
Card drive	
T03-B10E	[2005]
Tape drive	
T03-B10M	[2007]
Multiple head type drive	
T03-B12	[2005]
Holographic recording	
This code is applied in conjunction with other T03-B codes to denote the relevant aspect. Prior to 2005 holographic recording was assigned T03-C09 as well as in T03-B codes.	
T03-C	
Other dynamic recording/reproducing methods	
Audio/video applications are coded in W04-D codes also. For records prior to 2002, where application to audio/video recording is not stated, only capacitive record carriers and recording equipment are routinely assigned W04 codes also (in W04-D section). From 2002 W04-D codes are only applied where audio/video applications are specifically mentioned. For static stores see U14-A codes.	
T03-C01	[1992]
Capacitive	
Includes ferro-electric probe storage.	
<i>PVC, carbon, conductive, lubricant, stylus, diamond, shank, antistatic</i>	

T03-C03 [1992]

Using electron beam

See also V05-F08C3 and other V05-F codes for equipment aspects, as appropriate.

T03-C05 [1992]

Using tunnelling effects

See also V05-F08C3 and V05-F01A5, and other V05-F codes for equipment aspects, as appropriate.

T03-C05A [1997]

Record carriers and their manufacture

T03-C07 [1992]

Using superconductive element

See T03-A01E for superconducting magnetic record carriers, and T03-A06K for superconductive magnetic recording systems. Superconductive materials and devices in general are coded in U14-F codes, (X12-D06 codes are assigned for high-power electrical aspects of superconductors).

T03-C09 [1992]

Other recording methods

T03-D

Recording/reproducing using combination of methods

Audio/video applications are assigned in W04-D codes also.

T03-D01 [1987]

Magneto-optical recording

T03-D01 codes cover recording intended to be read as changes in reflected light due to the Kerr effect and not recording based on temporary lowering of coercivity by a heat source that is read magnetically, as in heat-assisted magnetic recording (covered by T03-A06N1). Prior to 2002 all aspects of magneto-optical recording were assigned W04-D codes. From 2002 carriers and mechanical aspects of magneto-optical recording are no longer coded in W04. Carriers intended specifically for audio/video recording are coded in T03-D01A1K. Audio/video applications of magnetic-optical recording drives are assigned W04-D20 codes. Inventions are assigned T03-D01 codes when specific reference is made to magneto-optical recording. However, it should be noted that T03-B should be considered also for general aspects, such as optical systems, which may also be relevant to magneto-optical recording, and to allow for cases where the magneto-optical aspect cannot be ascertained.

Photomagnetic, Kerr effect, disk, substrate, film, rare earth, amorphous, optomagnetic

T03-D01A [1992]

Record carriers

Prior to 1997, this code included disclosures dealing with a sequence of layers without emphasis on any specific one. This subject matter is now transferred to T03-D01A4.

T03-D01A1 [1992]

Carrier type

Codes in this section are used to indicate carrier type for both novel carrier details and novel manufacturing aspects. For these aspects, T03-N codes are **not** assigned from 1992.

T03-D01A1A [1992]

Disk

T03-D01A1C [1992]

Card

T03-D01A1E [1992]

Tape

T03-D01A1K [2002]

For audio/video recording

T03-D01A2 [1992]

Substrate

T03-D01A3 [1992]

Reflective, antireflective, and dielectric layers

The title of this code has been expanded to reflect the previous inclusion of dielectric layers, now covered by T03-D01A3E.

T03-D01A3A [1992]

Antireflective layer

T03-D01A3C [1992]

Reflective layer

T03-D01A3E [1997]

Dielectric layers

This code is mainly intended for layers internal to the carrier. Spacing layers between two magnetic layers are covered by T03-D01A5G. External protective layers are covered by T03-D01A7 codes.

T03-D01A4 [1997]

Layer arrangements in general

This code is used for inventions where structures involving several layers are claimed, without particular emphasis on any one. See other T03-D01A codes for novel details of specific layers.

T03-D01A5 [1992]

Magnetic layers

See V02-A01 codes for magnetic compositions also, and V02-B01 for magnetic film in general.

T03-D01A5A [1992]

Recording layers

T03-D01A5C [1992]

Reference layers

T03-D01A5E [1997]

Exchange coupling system

(T03-D01A5A, T03-D01A5C)

T03-D01A5G [1997]

Spacing layers

Covers layers consisting of metallic or non-metallic material separating two magnetic layers. Dielectric layers in general are covered by T03-D01A3E.

T03-D01A5J [2005]

Domain wall displacement system

Covers systems which transfer high density recorded marks from memory/recording layer to displacement/reproduction layer via switching layer through exchange coupling force, then causing exchange coupling force to disappear through heating and shifting domain wall in reproduction layer to increase size of mark so as to allow reading by standard wavelength laser.

Memory layer, switching layer, displacement layer, control layer, reading layer, magnetically amplifying magneto optical system (MAMOS)

T03-D01A7 [1992]

Overcoat layer

T03-D01A7A [1992]

Lubrication aspects of overcoat layer

T03-D01A8 [1992]

Record carrier manufacture and testing

Prior to 2002 this aspect was also coded in W04-D01A1, irrespective of application. From 2002 W04-D01A1 is no longer used. Use T03-D01A1 codes to discriminate carrier type (T03-N codes not assigned from 1992).

T03-D01A8A [1992]

Substrate manufacture

T03-D01A8C [1992]

Reflective layer deposition

T03-D01A8E [1992]

Magnetic layer deposition

Also coded in V02-H02 codes for novel aspects of equipment or process. Magnetic layer deposition for purely magnetic record carriers is covered by T03-A02A codes.

T03-D01A8G [1997]

Overcoat and lubricating layer deposition

T03-D01A8J [1992]

Carrier testing

For non-recording testing aspects see S02/S03 codes, e.g. S03-E04F2 for optical flaw testing.

T03-D01A9 [2005]

Recording format

Covers physical aspects only, e.g. details of grooves and pits. See T03-D01E7 for signal aspects of recording format.

T03-D01B* [1992-2004]

Record carrier positioning

*This code is now discontinued. From 2005 novel aspects of magneto-optical record carrier positioning are assigned T03-F or T03-E codes in conjunction with the appropriate T03-D01K code.

T03-D01B1* [1992-2004]

For disks

*This code is now discontinued. Prior to 2005 T03-N01 was also assigned along with T03-F codes for specific details.

T03-D01B5* [1992-2004]

For tape

*This code is now discontinued. Prior to 2005 T03-N02 and/or T03-N03 or T03-N04 were also assigned. See T03-E codes for tape drive details.

T03-D01C [1992]

Optical head details

T03-D01C1 [1992]

Optical elements

Includes light guides (see V07-F01 codes also).

T03-D01C1A [1992]

Lenses

T03-D01C1C [1992]

Beam splitter, polarizer

T03-D01C1E	[1997]
'Super-resolution' optics	
<i>Numerical aperture, NA, Rayleigh, refraction</i>	
T03-D01C1G	[1997]
Harmonic generator	
Covers arrangements effectively reducing wavelength of recording or reading light.	
T03-D01C3	[1992]
Light source	
See U12 and V08 codes as appropriate for details of lasers and their control.	
T03-D01C3A	[1992]
Light source control	
T03-D01C5	[1997]
Photodetector	
See U12-A02B codes for semiconductor device respects.	
<i>Photodiode, diode, APD, quadrant, sensor</i>	
T03-D01D	[1992]
Optical head positioning	
T03-D01D1	[1992]
Focusing	
T03-D01D1A	[1992]
Focus servo	
T03-D01D1C	[1992]
Motor drive	
Includes voice-coil motors and their control. See also V06-M04 and V06-N codes.	
T03-D01D3	[1992]
Track selection and accessing	
Includes motor drive for head positioning. See also V06-M and V06-N codes as appropriate.	
T03-D01D3A	[1992]
Track accessing servo	
Track access servo systems in general are covered by T03-G02B1.	
T03-D01D3C	[1992]
Switching to track following servo action	
T03-D01D5	[1992]
Track following	

T03-D01D5A	[1992]
Track following servo	
Track following servo systems in general are covered by T03-G02C1.	
T03-D01D7	[1992]
Motor drive for track selection and following	
Includes motor per se and also drive circuitry not specifically part of track access or track following servo systems, these being covered by T03-D01D3A and T03-D01D5A respectively.	
T03-D01E	[1992]
Erasing, rewriting, writing, interfacing methods and circuits	
The title of this code has been expanded to reflect its wider use since 1992 to include reading and writing circuitry (now covered by T03-D01E3 codes) and interfacing aspects (T03-D01E5 codes).	
T03-D01E1	[1992]
Erasing/rewriting methods	
Includes methods intended to reduce access time.	
T03-D01E1A	[1992]
Reducing unnecessary erasure	
Includes monitoring of unrecorded areas to allocate data accordingly.	
T03-D01E3	[1997]
Writing and reading circuitry	
See also T03-P codes where broader signal processing aspects are involved.	
T03-D01E3A	[1997]
Writing	
T03-D01E3C	[1997]
Reading	
T03-D01E5	[1997]
Interfacing aspects	
Includes actual interfacing circuits and also storage control aspects, e.g. file allocation, etc. See also T01-H codes for computer storage systems.	
<i>FAT</i>	
T03-D01E7	[2005]
Signal recording format, methods	
T03-D01E9	[1997]
Other magneto-optical recorder aspects	

T03-D01F [1992]

Magnetic system

T03-D01F1 [1992]

Magnetic head

Includes manufacture of head (see V02-H05 also).
Magnetic heads for purely magnetic recording are covered by T03-A03 codes.

T03-D01F1A [1992]

Head movement

Covers spacing/movement of head relative to disk surface. Optical head positioning is covered by T03-D01D codes.

T03-D01F3 [1992]

Bias magnet, initialisation system

Novel permanent magnets are also coded in V02-E01, electromagnets in V02-E02 codes.

T03-D01F3A [1992]

Position adjustment

Includes movement towards disk surface.

T03-D01H [1992]

Recording method

Codes indicating recording method are assigned to indicate equipment type, and thus may be used with any other T03-D01 code provided the type of recording is disclosed.

T03-D01H1 [1992]

Magnetic field modulation

Covers systems with constant intensity (unmodulated) light beam.

T03-D01H5 [1992]

Light beam modulation

Covers systems with constant (unmodulated) magnetic field.

T03-D01K [2005]

Magneto-optical drive

Portable standalone drives are also coded in T04-P. From 2005 magneto-optical drives are coded in this section in accordance with carrier type and are no longer assigned a corresponding T03-N code. Prior to 2002 magneto-optical drives are coded in T03-N as appropriate and W04-D20. From 2002 W04-D10 codes are applied only for audio/video recording applications and therefore between 2002 and 2005 optical drives with no audio/video aspect were assigned a T03-N code in conjunction with the appropriate T03-D01 codes to denote novel aspects.

T03-D01K1 [2005]

Disk drive

T03-D01K3 [2005]

Card drive

T03-D01K5 [2005]

Tape drive

T03-D01R [2006]

Recycling and destroying magneto-optical carrier

This code is used for recycling and destroying of magneto-optical record carriers only. Recycling and destroying of magnetic carriers is covered by T03-A01R and of optical carriers by T03-B01R. Where an invention is applicable to recycling or destruction of several types of carrier or the type is not disclosed the general code T03-H02R is assigned instead. For recycling of recording or playing equipment see V04-X01C.

T03-D03 [1992]

Electro-optical recording

Includes photorefractive ferroelectric carrier system with e.g. static electric field and modulated light beam. For details of head and carrier positioning see T03-E, T03-F, and T03-G codes, as appropriate.

T03-D03A [1992]

Record carriers and their manufacture

Prior to 2002 W04-D01A codes were also applied. From 2002 W04-D01A codes are no longer used.

T03-D09 [1992]

Other combination recording methods

T03-E

Tape (filament) transport

For records prior to 2002 tape transport for audio/video recording was also coded in W04-B04B or W04-E02B. From 2002 tape transport aspects are no longer covered in these equivalent codes in W04, but are assigned W04-B10A or W04-B12A as appropriate if specific to video or audio tape recorders respectively. T03-N codes are assigned as appropriate to indicate equipment type.

Motor, rotor, drive, belt, gear, tape deck

T03-E01

Spools; cassette changing; loading; threading

Spools within cassette housings are coded in T03-H01B, or T03-H01C only. Winding tape onto spools during manufacture is covered by T03-H codes only. Includes retention of cassette/spool in position during recording/playback.

Engage, guide, cam, gear, eject

T03-E01A [1992]

Spools

Hub, reel, flange, leader

T03-E01B [1992]

Cassette changing

Load, eject, slot, slide, carriage

T03-E01B1 [1992]

Changing/ejecting mechanism within apparatus

T03-E01B1A [1992]

Cassette door

Flap, damping, spring

T03-E01B5 [1992]

External feeding apparatus

From 2006 external tape feeding for library systems is no longer included here, being covered by T03-Q01 and T03-Q07A. Prior to 2006 search with T03-E01B5 and T03-Q01 for external feeding arrangements for tape libraries.

T03-E01B7 [1992]

Handling different sized cassettes

Cassette adaptors per se (e.g. for enabling insertion of small cassette into standard machine) are covered by T03-H01B6.

T03-E01C [1992]

Looping, threading

T03-E01C1 [1992]

For helical scan tape

Includes arrangement to withdraw loop of tape from cassettes. Also coded in T03-N02 and T03-N03. Prior to 2002 audio/video applications of this technology were also assigned W04-B04B7A which is discontinued from 2002 and thus no longer assigned.

T03-E02

Other tape guidance

Includes capstan and rotary head guides, vacuum arrangements and pressure pads.

T03-E03

Controlling, regulating or indicating speed

T03-E03A [1992]

Speed control

Servo, feedback

T03-E03A1 [1992]

By measurement of carrier speed

Tachometer, pulse counting

T03-E03A5 [1992]

By recorded data

T03-E03A7 [1992]

In conjunction with helical-scan head

See also T03-A05A1D for helical scan head speed control, also coded in T03-N02.

T03-E04

Tape tension control; speed changing; reversing

Fast forward, rewind, selector, motor

T03-E05

Control of operating mode

For records prior to 2002 audio/video applications are coded in W04-B04B5 codes. From 2002 these codes are no longer assigned.

Select, switch, function, play, rewind, fast forward, display, pause, cue, autostop, solenoid

T03-E05A [1992]

Based on sensed carrier features e.g. autostop

T03-E05A1 [1992]

Sensing recorded data

T03-E05A3 [1992]

Sensing tape tension

T03-E05A5 [1992]

Sensing non-magnetic feature on tape e.g. leader

Includes optical detection. (Leader per se is covered by T03-A01H and T03-A01C3).

Light transmission, transparent

T03-E05A7 [1992]

Sensing speed of carrier

Includes detection of drop in speed, e.g. at end of tape, to halt operation.

T03-E05A9 [1992]

Other control based on sensed carrier features

T03-E05B [1992]

Manual control

Includes operating controls, keys, switches, etc.
Pushbutton

T03-E05C [1992]

Remote control

See W04-E04A for remote control specific to audio or video recording.
Optical, IR, ultrasonic, radio, wire

T03-E06

Driving spools

Includes motor, gearing and pulley systems, torque adjustment.
Reel, belt, tension, friction

T03-E06A [1992]

Motor

This code is used as a general code for tape drive system motors.

T03-E07

Driving tape

Includes capstan/pinch roller systems.

T03-E08

Other driving arrangements

Includes braking arrangements. Spool rotation preventing devices within cassettes are covered by T03-H01B7A.
Clutch, reel, torque

T03-F

Disk, drum, etc. drive and positioning

This section deals mainly with disk drive arrangements (general), but also covers analogous systems for card, drum, or other carriers. (For convenience the term 'disk' is used below). Search with T03-N codes to discriminate type of equipment, and with specific codes from other sections, e.g. T03-A08, T03-B03, etc.
Motor, floppy, hard, card, drum, cylinder

T03-F01

Automatic disk changing

Includes all types of loading/ejection mechanism where disk is not placed in final recording/reproducing. Position by hand.
Load, arm, cartridge, eject, feed

T03-F01A [1992]

Loading mechanism and drive

Includes disk tray.

T03-F01A1 [1992]

Disk shutter opener

Disk cartridge shutters per se are covered by T03-H01A5. Includes arrangements to extract disk from cartridge within drive for playback/reproduction.
Pin, tab, lever

T03-F01A5 [1992]

Ejection system

This code covers arrangements peculiar to the ejection of carriers, and **not** merely part of the reciprocating system for loading/unloading, which is covered by T03-F01A.

T03-F01A7 [1997]

Handling different disk size or type

T03-F01B [1992]

Disk positioning and centering

Hub, locate

T03-F01C [1992]

Disk changing control system

Monitor, controller, circuit

T03-F01D [1992]

Manual loading of carrier

T03-F01E [1992]

Loading from carousel container for several carriers

Covers arrangements enabling simultaneous loading of several carriers, which are then played or recorded on, sequentially or non-sequentially. 'Internal' jukebox arrangements are covered by T03-F01F1. Carousel container per se is covered by T03-H01A2.

T03-F01F [1992]

Automatic feeding of single carrier from e.g. stack

T03-F01F1	[1992]
Feeding from stack within recording apparatus	
Includes jukebox systems. Feeding systems from external stack (apart from library systems) are covered by T03-F01F5. Library systems are covered by T03-Q codes.	
T03-F01F5	[1992]
Feeding from stack or system external to equipment per se	
From 2006 library systems are no longer included here, being covered by T03-Q codes.	
T03-F01X	[1992]
Other feeding arrangements	
T03-F02	
Driving; control of drive and operating function; other	
Motor details are coded in V06.	
T03-F02A	[1992]
Drive control	
Covers circuitry supervising and monitoring operation. Aspects specific to disk changing are covered by T03-F01C. See V06-N codes for motor control circuits.	
T03-F02A1	[1992]
Speed control	
T03-F02A5	[2005]
Motor tilt control	
T03-F02C	[1992]
Drive components	
Covers only those mechanical or electromechanical elements concerned with driving carrier.	
T03-F02C1	[1992]
Drive motor	
See V06-M codes also for motor details. <i>Spindle motor</i>	
T03-F02C3	[1992]
Turntable, spindle, bearings, disk clamping	
T03-F02C3A	[1997]
Disk clamping arrangements	
(T03-F01B, T03-F02C3)	
Covers arrangements to clamp disk onto shaft. Clamp arrangements for drive braking are covered by T03-F02C5.	

T03-F02C3C	[1997]
Bearings	
T03-F02C5	[1992]
Braking arrangements	
Arrangements to fix disk(s) on driving shaft are covered by T03-F02C3.	
T03-F02E	[1992]
Carrier pressure arrangements	
Includes arrangement to press floppy disk against magnetic head.	
T03-F02G	[1992]
Ventilation, cooling, air filters	
Includes fans, heatsinks, etc. Cooling of electronic equipment in general is covered by V04-T03 codes.	
T03-F02G1	[1992]
Air filters and particle/contaminant trapping	
Air filters of general application are covered by T03-H02C. Prior to 1992 see T03-F02 and T03-H02. Includes the use of coatings etc. inside a drive to adsorb contaminants e.g. in an HDD (with T03-A08A1C).	
T03-F02J	[1992]
Multi-carrier type drives	
This code is used with other T03-F codes as appropriate and covers arrangements specific to driving several carriers simultaneously.	
T03-F02L*	[1992-2004]
Casings, constructional details	
*This code is now discontinued and since 2005 codes in this section are no longer used. Constructional aspects of disk drives are now assigned T03-L05 codes in conjunction with T03-A08A, T03-B08A or T03-D01K1 as appropriate, or in conjunction with T03-N01 for general cases.	
T03-F02L1*	[1997-2004]
Casings, housings	
*This code is now discontinued.	
T03-F02L5*	[1997-2004]
Internal construction	
*This code is now discontinued.	

T03-F02X [1992]

Other disk drive details

Includes internal connectors, e.g. between drive assembly and PCB. Prior to 2005 this code included external interfacing connectors, which are now covered in T03-M07. Includes arrangements for lubricating carriers within disk drives. For lubricating arrangements for motor bearings see T03-F02C3C along with V06.

T03-G

General head arrangements

To be used where appts. is non-specific or common to several types of recording. For specific applications see the relevant code group, e.g. T03-A05 for magnetic, and T03-B02A for optical recording.

Disk, drive, arm, carriage, position, motor, mount, rotating, transducer, align, stepper, slide, pick-up

T03-G01

For adjusting head/record carrier spacing

Air, bearing, lower, pressure, raise

T03-G02

For track selecting/aligning

Covers mechanical and electromechanical arrangements.

T03-G02A [1992]

Head position actuator

T03-G02A1 [1992]

Drive motor

See V06-M codes for details of motor per se.

T03-G02A5 [1992]

Mounting, support

Includes support arms, bearings etc.

T03-G02B [1992]

Track selection

T03-G02B1 [1992]

Track access servo

T03-G02B1A [1992]

Switching to track following action

T03-G02C [1992]

Track alignment

T03-G02C1 [1992]

Automatic alignment, track following servo

T03-G02C5 [1992]

Manual alignment; setting up

For testing aspects see T03-K07 codes also.

T03-G02E [1992]

Preventing servo crosstalk or unwanted interaction

Includes arrangements to prevent crosstalk between e.g. track following servo and focus servo in optical or magneto-optical disk systems, (see T03-B and T03-D01 codes also as appropriate).

T03-G09

Other head arrangements

Includes other head locking/positioning appts. and head/carrier pressure maintaining appts.

T03-H

Record carriers and accessories in general

T03-H01

Containers

Codes in this section relate to containers, casings, sleeves etc. in which record carrier is driven. Storage containers in which the carrier is removed for playing are covered by T03-L01 codes.

Sleeve, cover, cartridge, housing material, fabric, fiber

T03-H01A

For disks

Prior to 2002 disk containers for audio/visual recording applications were also coded in W04-E02A1. From 2002 these codes are no longer used and T03-H01A6K is applied for disk containers specifically intended for audio/visual recording. (G11B-023)

Floppy, hard, compact, envelope, jacket, fold, flexible

T03-H01A1 [1992]

Materials

Covers composition of container.

T03-H01A2 [1992]

For multiple disk container

Includes carousel arrangement in which carriers can be driven for recording or reproduction. See T03-F01E also for carousel-changing aspects.

T03-H01A3 [1992]

Structure

T03-H01A4	[1997]
Liner for disk container	
T03-H01A5	[1992]
Protective arrangement, e.g. shutter	
Disk drive arrangements for opening shutters are coded in T03-F01A1.	
T03-H01A6	[1992]
Disk type	
T03-H01A6A	[1992]
Magnetic	
T03-H01A6B	[1992]
Optical	
T03-H01A6C	[1992]
Capacitive	
T03-H01A6D	[1992]
Magneto-optical	
T03-H01A6K	[2002]
For audio/video recording	
(W04-E02A1)	
T03-H01A6X	[1992]
Other disk type	
T03-H01A7	[1992]
Disk hub	
T03-H01A8	[1992]
Manufacture and assembly	
Covers manufacture of component parts of container and mounting carrier inside it.	
T03-H01A9	[1992]
Other disk container details	
T03-H01B	
Cassettes for end-to-end webs/filaments	
Prior to 2002 this topic was also coded in W04-B04B1 and W04-E02B1. From 2002 these codes are no longer used and audio/visual applications are indicated using T03-H01B4. Cassettes are assumed to be for magnetic tape unless other codes indicate otherwise.	
<i>Tape, guide, insert, reel, spool, end, leader</i>	

T03-H01B1	[1992]
Materials	
<i>Polycarbonate, plastics</i>	
T03-H01B3	[1992]
Construction	
Covers shape, internal arrangement of component parts, etc.	
T03-H01B4	[2002]
For audio/video recording	
(W04-B04B1 and W04-E02B1)	
T03-H01B5	[1992]
Protective arrangement e.g. tape cover	
Search with T03-N02 for helical scan cassettes.	
T03-H01B6	[1992]
Cassette adaptor	
Arrangements in a recorder to allow loading of different sized cassettes are covered by T03-E01B7.	
T03-H01B7	[1992]
Spools, spool locks	
Spools not part of a cassette are covered by T03-E01A.	
T03-H01B7A	[1992]
Spool locks	
Preventing spool rotation by tape drive components (e.g. brakes) is covered by T03-E08.	
T03-H01B8	[1992]
Loading with tape, manufacture of cassette per se	
Includes manufacture and assembly of cassette.	
T03-H01B8A	[1992]
Loading cassette with tape	
Includes arrangements for cutting tape and attaching leader, gripper or buckle etc. For novel gripper or buckle arrangements per se, see T03-H01B9.	
<i>Pancake</i>	
T03-H01B8C	[1992]
Manufacture of cassette per se	
Includes moulding of cassette halves.	
T03-H01B9	[1992]
Other end-to-end cassette details	
Includes labels (with T03-H02A1A). Includes attachments to tape leader for gripping etc.	

T03-H01C

Cassettes for endless webs/filaments

Loop, continuous, spool, message recorder, telephone answering, announcement

T03-H01X

Other container details

T03-H02

Record carriers, cleaning

Magnetic head cleaning is covered by T03-A04B codes only.

Disk, tape, cassette, head, compact, housing, cartridge, filter, fluid

T03-H02A [1992]

General aspects of carriers, including labels

Prior to 2002 labels for audio/video recording carriers and cassettes were coded in W04-E03A. From 2002 this code is no longer used and audio/video applications of labels are coded in T03-H02A8. Includes labels applied to carrier itself and to housing, e.g. cassette case, jewel box, etc.

T03-H02A1 [1997]

Labels and authentication marks

T03-H02A1A [1997]

Labels

Includes labels applied to carrier itself and to housing, e.g. cassette case, jewel box. For labelling during manufacture of optical media see T03-B01E codes and X25-F08 (if there are significant electrical details).

T03-H02A1C [1997]

Authentication markings for record carrier

Includes both human-readable and machine-readable markings, such as bar coding (see T04-A and T04-C codes also). Identification of counterfeit recordings by added signals is **not** included being covered in T03-P07C, and for audio and video recording in W04-G01L3 and W04-F01L3 respectively.

T03-H02A3 [2002]

Integrated circuit storing carrier information

This code is intended for ICs incorporated in record carriers to act as e.g. 'electronic labels', with the possibility of reading contents information, or similar, either by recording equipment itself, or by an accessory system.

T03-H02A8 [2002]

For audio/video recording

(W04-E03A)

T03-H02B [1992]

Cleaning of carriers

This code is used to highlight the cleaning or re-conditioning of record carriers by an end user and **not** as a step in a manufacturing process. For cleaning, re-conditioning and similar processes as part of record carrier manufacture see codes for manufacture of the particular carrier type, e.g. T03-A02 codes for magnetic carriers, T03-B01E3L and other T03-B01E codes for optical carriers, or T03-D01A8 codes for magneto-optical carriers.

T03-H02C [1992]

Cleaning equipment, including air filters

Air filters specifically designed for disk drives are coded in T03-F02G1 only. Prior to 1992 search T03-F02 and T03-H02. Cleaning of magnetic and optical heads is not included and is respectively covered by T03-A04B3 codes and T03-B02B8 codes (from 1992).

T03-H02R [2006]

General carrier recycling and destroying arrangements

This code is used for recycling and destroying of record carriers in general, i.e. where the invention is applicable to several types of carrier or the type is not disclosed. It is **not** assigned when recycling or destroying of a **specific** type of carrier is involved, for which T03-A01R (magnetic carriers), T03-B01R (optical carriers) or T03-D01R (magneto-optical carriers) is assigned. For recycling of recording or playing equipment see V04-X01C.

T03-H07 [2006]

Preventing overwriting, erasure or copying

Covers hardware-based methods of write/erase protection, e.g. erase tab, disk-drive lock. See T03-P07 for erasure/ copy prevention using signal formats/signal processing.

T03-H07A [2006]

Preventing accidental loss of data

T03-H07C [2006]

Preventing unauthorised deliberate access or copying

T03-H09

Other record carrier and accessory aspects

Including spool manufacture, tape winders/rewinders and disk-sleeve insertion appts.

T03-J

Indexing; synchronising; measuring tape travel

This section includes codes for counters, gap inserting, cue recording, and carrier storage marking/indication. Labels for carriers are covered by T03-H02A1A. For audio/video applications see W04-H and W04-K codes also.

Pulse, code, position, track, time, counter, indicate, display

T03-J01 [1992]

Index signal recording and detection

T03-J01A [1992]

Time code

SMPTE

T03-J01C [1997]

Indexing information relating to carrier contents

Includes 'table of contents' information, recorded separately or interleaved with main recorded information, but usually by same recording process in either case. Labels providing such information in human-readable form are covered by T03-H02A1A.

TOC

T03-J01C1 [1997]

User-recordable contents index information

Includes 'user table of contents' information, and thus implies use of recordable, rather than 'read-only' carriers.

UTOC

T03-J01E [2006]

Error management information

T03-J03 [1992]

Synchronising

T03-J03A [1997]

Synchronising data with carrier speed or head position

Codes in this section cover both control of carrier speed based on data rate, and modification of data rate based on head or carrier drive aspects. Details of clock circuits and systems are in T03-J03C.

CAV, CLV, angular, linear, wobble

T03-J03A1 [1997]

Controlling carrier speed based on recording data rate

See also T03-E03A5 and T03-F02A1 for tape and disk drive aspects respectively. Arrangements modifying data rate based on carrier speed or position of head on carrier, e.g. differing linear velocity along radius of a disk, are covered by T03-J03A3 and T03-J03A5 respectively.

T03-J03A3 [1997]

Modifying data rate based on carrier speed

Covers arrangements to modify data rate based on measured speed of carrier.

T03-J03A5 [1997]

Modifying data rate based on head position

Includes arrangements to modify data rate based on change in linear velocity of tracks on a disk along its radius.

T03-J03C [1997]

Clock system details

See appropriate codes in e.g. U22 and U23 for actual oscillator and clock extraction circuits.

Phase, PLL

T03-J03C1 [1997]

Clock generation and recording

Crystal, resonator, feedback, ring

T03-J03C5 [1997]

Clock recovery

This code is intended for read circuitry establishing a clock signal from recorded data itself.

T03-J05 [1992]

Measuring carrier travel

T03-J05A [1992]

Measuring tape travel

Includes tape counters. Search with T03-E05A1 for arrangement for stopping e.g. in response to gaps in recorded information.

Automatic music search system, AMSS, display

T03-K

Editing; monitoring

Includes dubbing, splicing, displays, disk speed monitoring, etc. For audio/video applications see W04-H and W04-J codes also. See T03-P01A for digital recording error correction.

Control, check, monitoring

T03-K01	[1992]
Editing, splicing tape	
<i>Dubbing</i>	
T03-K01A	[1992]
Splicing	
<i>Tape, join, repair, bond</i>	
T03-K03	[1992]
Operation displays	
<i>VU, volume unit, meter, mode, indicate</i>	
T03-K05	[1992]
Recording equipment control and circuits (general)	
Includes control systems compensating for ageing effects, temperature change, etc.	
T03-K05A	[1992]
Adaptive control systems	
T03-K07	[1992]
Recording equipment testing	
Electronic circuitry testing in general is covered by S01-G01 codes.	
T03-K07A	[1992]
Testing during manufacture	
From 2012 T03-K07 codes are no longer assigned for optical recording head testing. See T03-B02B8E.	
<i>Production line, evaluate, reject</i>	
T03-K07C	[1992]
Complete equipment testing	
Includes self-test facilities and performance testing of finished equipment.	
<i>Test tape, test disk, error check</i>	
T03-K07E	[2006]
Detecting carrier defect	
Covers arrangements to protect drive from damage. For detection of defects using BER measurements search along with T03-P01A. Arrangements to store information concerning the location of carrier errors, e.g. bad sectors, in order to speed up read and write processes are not coded here, being covered in T03-P01A and T03-J01E instead. Prior to 2006 this topic was covered in T03-P01A and T03-J01C.	
T03-K09	[1992]
Other monitoring details	

T03-L	
Recording housings	
Codes in this section relate to storage housings for record carriers, and also constructional details of recording equipment.	
<i>Disk, cassette, storage, magnetic, tape, floppy, cover, lock, support, case, compact, compartment, stack</i>	
T03-L01	[1987]
Cases and storage racks or boxes for record carriers	
T03-L01 codes relate to casings and housings for record carriers, from which the carriers can be removed, and are not assigned for casings and housings of equipment, which are covered by T03-L05A. T03-L01 codes cover cassette boxes, racks, storage boxes for floppy disks, hard disks, tape reels etc. but not casings inserted into recording equipment in which the carrier is driven during recording/playing process (covered by T03-H01 codes). Prior to 2002, record carrier containers for optical recording carriers and other carriers specifically used for audio / video recording were also assigned W04-L01 codes. From 2002 these codes are no longer used and T03-L01K codes are used to indicate the type of carrier that the container is used for, and where appropriate, its application.	
T03-L01A	[1992]
Record carrier containers	
Includes packaging aspects, e.g. shipping containers.	
T03-L01A1	[1992]
For disks	
<i>Compact, CD case, sleeve</i>	
T03-L01A3	[1992]
For tape	
Search with T03-N03 for cassettes, and also T03-N02 for helical scan cassettes.	
<i>Video rental</i>	
T03-L01C	[1992]
Storage racks and cases	
Includes arrangements for home or office use, mounting in car, etc., and also display stands for use in e.g. shop.	
<i>Retail, store</i>	
T03-L01C1	[1992]
For disks	
<i>Floppy, computer, data, file, box</i>	

T03-L01C3	[1992]
For tape	
T03-N02, T03-N03 are also assigned as appropriate.	
<i>Spool, reel, cassette, drawer, rack, box</i>	
T03-L01K	[2002]
Carrier type	
T03-L01K1	[2002]
Magnetic	
T03-L01K3	[2002]
Optical	
T03-L01K5	[2002]
Magneto-optical	
T03-L01K8	[2002]
For audio/video recording	
(W04-L01)	
T03-L01N	[2007]
Novelty housings, containers, combined with other article	
Covers record carrier containers used for additional function. Includes record carrier cases and racks combined with other article, e.g. drinks can. Use in conjunction with other T03-L codes to indicate type of container.	
T03-L05	[1987]
For recording equipment; constructional details of recording equipment	
T03-L05 codes relate to recording equipment per se and mounting details. T03-L01 codes are only assigned in addition when e.g. a storage rack is an integral part of an automatic feed system. (For library systems T03-Q codes are also assigned plus T03-E/T03-F as appropriate).	
Housings/constructional details specific to audio/visual recording equipment is also coded in W04-L05.	
<i>Mount</i>	
T03-L05A	[1987]
Cabinets, casings, stands	
T03-L05B	[1987]
Construction	
Includes mounting of components, internal layout, cooling etc. See V04-T for constructional details of electronic appts. in general.	

T03-L05N	[2005]
Noise and vibration reduction using constructional techniques	
This code covers constructional arrangements to reduce acoustic noise and vibration generated by the recording and reproducing equipment itself. Arrangements to reduce electrical noise in recorded or reproduced signals are covered by T03-P05.	
T03-L05S	[2005]
Shock absorbing and damping	
This code covers constructional arrangements to reduce the effects of externally-applied shocks and vibration on the recording and reproducing equipment. Arrangements to reduce acoustic noise and vibration produced by the recording or reproducing equipment itself are covered by T03-L05N.	
T03-M	[1983]
General	
T03-M01	
For flat record carriers	
This code was used to indicate card-type carrier systems prior to 1992. From 1992, T03-N05 will be assigned instead.	
<i>Card, strip</i>	
T03-M02	
For web and other record carriers	
Prior to 1992, this code was chiefly used to indicate certain magnetic tape manufacturing processes (with T03-A02), such as slitting. From 1992 these are covered by T03-A02B7 and T03-A02E3, and T03-M02 is now mainly used for non-standard web carriers such as photographic film with e.g. magnetic recording aspects, (also assigned T03-A01C9).	
<i>Tape</i>	
T03-M05	[2005]
Power supply details	
T03-M07	[2005]
Interfacing, connectors	
Covers external interfacing and connectors e.g. between drive and other equipment, only. Interfacing for magnetic drives and optical drives is covered in T03-A10 and T03-B08 respectively, and is not coded here. See V04 codes also.	

T03-M08 [2006]

General equipment manufacturing details

This code covers the manufacture of recording and playback equipment in general and is not assigned where more specific codes are available, such as T03-A04A1 codes for magnetic head manufacture and (from 2012) T03-B02B8C for optical head manufacture. T03-M08 is not assigned for manufacture of 'bought-in' components used in recording equipment, or for record carrier manufacture which is covered by specific codes in e.g. T03-A02 (magnetic carriers), T03-B01E (optical carriers), T03-C (capacitive and other carriers), T03-D01A8 (magneto-optical carriers), T03-D03A (electro-optical carriers) and T03-D09 (other 'combined method' carriers).

T03-M09

Other general recording aspects

T03-N [1983]

Recorder types

Notes :

- (1) Codes in this section are applied to indicate equipment type only, and do not themselves indicate novel features;
- (2) It is not intended that the codes be used in isolation, but rather to restrict the scope of other T03 codes;
- (3) From 1992, T03-N codes have not been assigned to record carriers per se which can be assigned codes from the following sections: T03-A01C, T03-A02E, T03-B01D, T03-D01A1;
- (4) Prior to 2005 T03-N codes were assigned to all inventions involving a record carrier drive used for a given type of record carrier. From 2005 codes in this section will be only be applied where the recording method, e.g. magnetic. optical etc. is unknown or the invention is of a general nature. T03-A08, T03-B08 and T03-D01K codes are applied for inventions involving a particular method of recording;
- (5) Carriers in casings (e.g. cassettes, diskettes as covered by T03-H codes) are also assigned T03-N codes.

T03-N01

Disk

T03-N02

Helical scan

T03-N03

Cassette

T03-N04

Reel-to-reel

T03-N05 [1992]

Card recorder

(T03-M01)

See also T04 and T05-H02 codes for card-freed systems.

T03-N06 [1997]

Drum recorder

Magnetic

T03-P [1987]

Signal processing for recording (general)

Codes in this section may be used in conjunction with other T03 codes, or alone. For audio applications see W04-G01A also, and for video recording see W04-F codes.

T03-P01 [1987]

Digital recording

T03-P01A [1987]

Error detection

See U21-A06 for error detection in coding systems in general.

Decode, code, block, interleave, Reed Solomon, cyclic, correct, memory

T03-P01B [1992]

Compression and decompression codes

See T01-D02 for computer application of data compression and U21-A05A2 in general.

Compaction

T03-P01D [2005]

Equalisation, thresholding and digital signal processing

Covers signal processing circuitry for detection and reading of signals. Can be used in conjunction with T03-A06C3 and T03-B06C for specific application to magnetic and optical recording respectively. Prior to 2007 inventions specific to magnetic or optical read circuitry were assigned T03-A06C3 or T03-B06C only. See also U22-G codes for digital signal processing.

T03-P01F [1997]

Formatting aspects

Formatting aspects of magnetic record carriers, with emphasis on layout of tracks, are covered by T03-A06F codes.

T03-P02 [1987]

Analogue

Demodulate, AM, FM, PM

T03-P05 [1992]

Noise reduction

This code covers arrangements to reduce electrical noise in recording or reproducing signals. Error detection and correction in digital recording is covered by T03-P01A. Reduction of acoustic noise (sound energy) generated by the equipment is not included and is covered by T03-L05N.

T03-P07 [1992]

Signal processing to restrict or monitor access, writing, erasing or copying

W04-F01L and W04-G01L codes cover analogous arrangements specifically for audio and video recording and in these cases T03-P07 codes are not assigned. Prevention of overwriting, erasing or copying using hardware techniques, for all types of recording, is covered in T03-H07. Prior to 2006 T03-A07 codes covered anti-copying aspects specific to magnetic recording.

T03-P07A [1997]

Signal processing to prevent unauthorised access or copying

T03-P07C [1997]

Signal processing to identify occurrence of copying

T03-Q [1992]

Library systems

Covers systems for bulk storage of data, especially with automated retrieval.

T03-Q01 [1992]

Tape storage

Covers magnetic tape storage, unless additional codes indicate otherwise.

T03-Q05 [1992]

Disk storage

T03-Q05A [1992]

Magnetic disk library

T03-Q05C [1992]

Optical disk library

T03-Q05E [1992]

Magneto-optical disk library

T03-Q05X [1992]

Other disk library

T03-Q07 [2006]

General aspects of recording media library

From 2006 this section covers all media library loading mechanisms and control systems.

Previously this topic was covered in T03-E01B5 and T03-F01 for tape and disk systems respectively.

T03-Q07A [2006]

Loading mechanism and drive

T03-Q07B [2006]

Media changing control system

T03-S [2005]

Use of data recording apparatus for non-recording applications

Use in conjunction with T03-B01D1 for articles incorporating optical disks, e.g. clocks, drinks coasters. Also for using storage media for holding biological/chemical samples, testing/instrumentation aspects are also coded in S03.

T04: Computer Peripheral Equipment

T04-A

Using digitally marked record carriers

Read, card, data, print, sense, code, document, mark, encode, bar codes

T04-A01

Punched card or tape punches and readers

Optical, hole, punch hole, aperture

T04-A02

Other digital marking (writing)

Includes credit or security card marking. Digitally marked cards per se are covered by T04-C codes. Writing to IC cards is covered by T04-K02. Includes erasure of markings.

T04-A02A [1992]

Electrostatic or magnetic

T04-A02B [1992]

Digital marking to be read using light (incl. IR, UV)

Includes bar code marking, two-dimensional bar code marking.

T04-A02X [1992]

Other writing

T04-A03

Other digital mark sensing (reading)

Reading of IC cards is covered by T04-K02.

Head, pick-up, sweep

T04-A03A

By detecting electrostatic or magnetic field change

Strip

T04-A03B

Using light (incl. IR, UV)

Optical, beam, illuminate, laser, lens, reflect

T04-A03B1 [1992]

Bar code reading

Search with T05-L01C for point of sale application, T01-C06 for computer interfacing and T04-M02 for hand-held bar-code scanner.

UPC, POS, two-dimensional code

T04-A03B9 [1992]

Other reading with light

Concealed data

T04-A03X

Other reading

Contact, key, electrode, acoustic, ultrasound

T04-A05 [2005]

Card feeding apparatus

Card feeding details for digitally marked record carrier. See T04-A03 for reading aspects.

T04-B

Verifying correctness of digital marking

Covers checking and monitoring of marking e.g. for alignment, **not** routine reading to determine authorisation, etc. Includes error detection.

T04-C

Digitally marked record carriers

Includes physical aspects, material, shape, etc. Covers only carriers with digital markings, digitally marked ID on items. 'Smart' cards are in T04-K01. Includes punched paper cards or tape (punches/readers are in T04-A01) see also T05-H02C5.

Identify, code

T04-C01 [1992]

Magnetic

Magnetic carriers are also assigned T03-A codes, or T03-A02 codes for manufacture, cross reference with T05-H02C5A.

Strip, card

T04-C02 [1992]

Using light (incl. IR, UV)

Cross reference to V07 hologram, T05-D card/badge access, T05-H cash payment, T05-C fare registering.

Optical, hologram, bar code

T04-C09 [1992]

Other record carriers

Includes electrostatic cards, inductive cards and remote sensing.

T04-D

Character and signal pattern recognition

For data processing aspects of image acquisition and processing devices e.g. analysis, image detection, scanning, optical character recognition, camera, e.g. recognition for edge detection in peripheral. (T01-J10 and T04-D are only used together when the novelty does not describe how/when the processing is carried out). See also X25 codes, e.g. X25-A03E for robot manipulators. If novelty is in camera then see W04.

Image, detect, camera, digital, identify, scan, optical, video, facsimile, line, pixel, analysis

T04-D01

Using characters containing code marks

Used for system where character conveys additional information, e.g. in stroke width, or magnetic ink character recognition systems.

MICR

T04-D02

Image acquisition

Scanning, reader, image pick-up, TV camera, alignment, CCD camera

T04-D02A [1992]

Mechanical and optical aspects of image acquisition

Lens, focus

T04-D02B [1992]

Circuitry, processing of image acquisition

Processing within pick-up device, else coded in image processing see T01-J10 codes.

T04-D03

Image pre-processing for image recognition

Image pre-processing before recognition processing, cross reference to T01-J10B2 for image processing/image analysis.

Filtering, quantising, compression, expansion, enhancement, contour, sensing

T04-D03A [1992]

Noise reduction

Noise reduction done in peripheral unit.

T04-D03B [1992]

Edge recognition and determining orientation

Alignment

T04-D04

Recognition

Includes OCR (optical character recognition) and fingerprint identification, (see S05-D01C5A also). For speech recognition, see W04-V codes only. Scanner-computer interface details are coded in T01-C06.

Compare, reference, digital, memory, match

T04-D05 [1992]

Monitoring and error detection

(T04-D09)

Covers monitoring of parts of recognition system only. Using pattern recognition to detect errors in a pattern is in T04-D07A.

Fault detection

T04-D07 [1992]

Applications of recognition techniques

See also under application.

Inspection

T04-D07A [1992]

Detecting defect in pattern

Errors in the recognition system itself are covered by T04-D05. Flaw detection, also see S03-E.

Includes comparison with original pattern e.g. PCB, workpieces, valuable papers etc. Cross reference to U11 for checking circuit/wiring layout, see also T01-J15A2.

T04-D07B [1992]

Sorting objects by type

Includes quality pass-fail tests based on e.g. colour. See also T05-K and X25-F06 for sorting.

Select

T04-D07B1 [1992]

Using patterns specifically applied as identification marks

Label

T04-D07C [1992]

Identification of item

T04-D07D [1992]

Detecting movement or position

T04-D07D1 [1992]

Detecting movement

T04-D07D3 [2011]

Detecting dimensions

Covers uses of recognition system to determine dimensions of an object, e.g. height, length, etc. See also S02-A03. Details of 3D scanners are coded under T04-M05 only.

T04-D07D5 [1992]

Detecting position or orientation

T04-D07E [1992]

Hand written character recognition

Cross reference to T04-F04 input of handwritten characters.

T04-D07F [2006]

Biometrics

For image recognition relating to fingerprint recognition. See T04-D04 only prior to 2006. See also T05-D01B for entry/exit registers based on human characteristics. See also S05-D01C5A where novel detection systems are included.

T04-D07F1 [2006]

Facial recognition

T04-D07F1A [2007]

Eye detection

Includes iris recognition, for red eye detection see also W04.

T04-D07F2 [2006]

Fingerprint recognition

Includes palm recognition.

T04-D07F9 [2007]

Other biometrics

T04-D07K [1992]

Using non-visible light images (e.g. IR, UV)

T04-D07X [1992]

Other recognition applications

T04-D08 [1992]

Colour systems

T04-D09

Other recognition aspects

T04-E

Graph reading

Includes curve followers and devices for converting position of manually operated writing or tracing member into an electrical signal. Light pens, joysticks, etc. are covered by T04-F02 codes. See T01-C02 codes for computer interfacing of manual input interfacing systems and T01-C06 for scanner interfacing.

Position, tablet, coordinate, optical, digital, screen, matrix, point

T04-F

Manual input arrangements for computers and computer controlled equipment

Only used if input devices details are given. Covers manual or other physical input arrangements. Covers input for computer controlled devices. Includes keyboards/keypads, trackpads and touchscreens for personal digital assistants (PDAs), handheld video games, handheld GPS systems, etc. See T01-C02 codes for interface to computer.

Position, select, switch, contact, digital, touch, coordinate

T04-F01 [1983]

Keyboards and keypads

For typewriter keyboards, see also S06-K. For switch and key actuation aspects, see V03-C01, cross reference T01-C02A for keyboard interface. Virtual keyboards are coded in T01-C02B1 only. Details of keypads for mobile phones are coded under W01-C01B8 only. If use of keypad/keyboard is not precise, no T04-F code is applied, but V03 codes instead.

Layout

T04-F01A [1992]

Control, circuitry

T04-F01A1 [1992]

Key operation circuitry

Including scanning. See also U21-B02C.

T04-F01A5 [1992]

Key coding aspects

See also U21-A05D codes for key coding aspects.

Foreign, function key

T04-F01B [1992]

Construction

Cross reference to V03 for constructional details.

Key, membrane, pushbutton, pressure, casing, housing

T04-F02 [1983]
Analogue-based positional input devices

This code includes computer input-type devices which operate on absolute or relative positional movement-based inputs.

Control, video game, indicate, matrix

T04-F02A [1992]

Based on absolute position

Devices which provide input based on the particular position pressed or touched by the device user.

X-Y, coordinate

T04-F02A1 [1992]

Light pens

Optical, light pointer, laser pointer

T04-F02A2 [1992]

Touchscreens

Details of touch sensors are coded under U21-B02C. Constructional details of the touchscreen are also coded under T04-F02C. Details of touchscreens for mobile phones are coded under W01-C01B8H only, details of touchscreens for digital cameras and camcorders are coded under W04-M01D3E instead, and details of touchscreens for printers and copiers are coded under S06-K07A1 only.

T04-F02A5 [1992]

Manual input pad and stylus

Includes details of digitiser tablet, graphic interface, touch pad, and recording pen.

Pen, matrix, pen recorder, dictation pen

T04-F02B [1992]

Based on relative position

Devices which provide input based on the relative position of the device with respect to a cursor or pointer on the display.

T04-F02B1 [1992]

Mouse and other mouse-type input device

Mouse-type input devices including wired and wireless mice, click-and-point devices used in conjunction with presentation software, and combinations of the various device types. Details of laser pointers are also coded under T04-F02A1.

Wireless presenter, clicker, laser pointer

T04-F02B1A [2005]

Optical mouse or mouse-type input device

Mouse-type devices which use optical sensors instead of roller balls or wheels.

T04-F02B2 [2005]

Track Pads

Touch pad used as mouse input e.g. on laptop computer.

T04-F02B3 [1992]

Joysticks, gamepads

Includes input devices used for gaming machines, e.g. joypad, driving wheel, etc. that are used in place of joystick. Three-dimensional input devices, such as virtual reality gloves, are coded under T04-F02B7.

T04-F02B3A* [2002-2006]

Force feedback for joystick

*This code is now discontinued. From 2007 see T04-F03.

Pen, matrix

T04-F02B5 [1992]

Track balls

T04-F02B7 [2002]

Three dimensional input

Includes power gloves, virtual reality gloves, 3-D input with strain gauges, virtual reality and acceleration measurements used as input e.g. tilt sensor used to scroll display on a PDA.

Glove, Wiimote®, Wii remote®, VR glove

T04-F02C [2005]

Construction, manufacturing and testing details of analogue-based positional input devices

Includes mechanical details, manufacture and manufacturing apparatus. See also codes for type (e.g. T04-F02B1 for mouse, etc.). See T04-L01/L05 prior to 2005.

T04-F03 [2007]

Haptic feedback for manual input devices

Previous to 2007 see T04-F02B3A.

T04-F04 [1992]

Input of hand written characters

T04-F05* [1992-1996]

Hand scanners for computer input

*This code is now discontinued but remains searchable and valid for records from 1992 to 1996. From 1997 see T04-M02. See also S06 codes. Scanner computer interfacing details are covered by T01-C06 and image acquisition details are covered by T01-J10A codes.

T04-F06 [2007]

Miscellaneous input devices

Includes buttons and foot pads for input. See also V03 or U21 for details of device.

T04-G* [1980-2009]

Printers

*This code is now discontinued. See S06-D to K. Press/plate-type printers are in S06-C only. Includes all aspects of individual character and line printers. (Computer output interface details are in T01).

Drive, feed, roll, copy, character, line, carriage, motor, head, record, word-processor

T04-G01* [1980-2009]

Impact

*This code is now discontinued. See S06-F from 2010. Includes mechanical action. Electromagnet and solenoid drive aspects are coded in V02-E02A also.

Armature, coil

T04-G01A* [1983-2009]

Dot printers

*This code is now discontinued. See S06-F01 from 2010.

Matrix, pin, wire, needle

T04-G01B* [1983-2009]

Using type

*This code is now discontinued. See S06-F02 from 2010.

Select, hammer, daisy-wheel, disc, step, font, typeface, golf-ball

T04-G01C* [1992-2009]

Ribbon

*This code is now discontinued. See S06-F03 from 2010.

Ink, cassette

T04-G02* [1980-2009]

Ink-jet

*This code is now discontinued. See S06-G from 2010.

Liquid, dye, nozzle, resin, water, channel, drop, pressure, reservoir, eject, electrode, pulse

T04-G02A* [1983-2009]

Drop-on-demand

*This code is now discontinued. See S06-G01 from 2010.

Thermal ink-jet, bubble, piezoelectric, ultrasound

T04-G02A1* [2002-2009]

Print head for ink jet drop-on-demand printer

*This code is now discontinued. See S06-G03 from 2010.

Thermal ink-jet, bubble, piezoelectric, ultrasound

T04-G02B* [1983-2009]

Selective drop deflection

*This code is now discontinued. See S06-G02 from 2010.

Charge, electrode, stream, gutter, continuous

T04-G02B1* [2002-2009]

Print head for selective drop deflection printer

*This code is now discontinued. See S06-G03 from 2010.

Charge, electrode, stream, gutter, continuous

T04-G02C* [1992-2009]

Ink

*This code is now discontinued. See S06-G04 from 2010.

T04-G02D* [2002-2009]

Inkjet head cleaning and general maintenance of printhead

*This code is now discontinued. See S06-K06 from 2010.

T04-G02E* [1997-2009]

Recording media

*This code is now discontinued. See S06-G05 from 2010. Includes pre-print application of liquid (not ink) to paper/ pre-treatment of paper for ink jet printing. See also X25-T09A for electrical details of paper manufacture.

Paper, fabrics, OHP sheet, recording pattern of LCD screen

T04-G02F* [2002-2009]

Refilling of ink cartridge

*This code is now discontinued. See S06-G06A from 2010.

T04-G02G* [2005-2009]

Ink Chamber

*This code is now discontinued. See S06-G06 from 2010.

T04-G02H* [2005-2009]

Post ink application processing

*This code is now discontinued. See S06-G07 from 2010. Includes processes for treating ink after application using e.g. heat or UV light.

T04-G02J* [2005-2009]

Applications of ink-jet printing technology

*This code is now discontinued. See S06-G10 from 2010. Covers printing on non-paper-like media, e.g. CD (see also T03). Includes textile printing (see also X25-T04D), 3-D printing and other industrial applications using inkjet technology. Manufacturing LCD screens and filters (see also U14).

T04-G03* [1983-2009]

Thermal

*This code is now discontinued. See S06-H from 2010. Includes thermal ink compositions and heat sensitive paper and ribbons.

Transfer, thermosensitive

T04-G03A* [1992-2009]

Using thermally-sensitive paper

*This code is now discontinued. See S06-H01 from 2010.

T04-G03A1* [1992-2009]

Composition of heat-sensitive layer

*This code is now discontinued. See S06-H01A from 2010.

T04-G03B* [1992-2009]

Using thermal ribbon

*This code is now discontinued. See S06-H02 from 2010. Includes use of thermal transfer sheets.

Cartridge

T04-G03B1* [1992-2009]

Thermal ink composition

*This code is now discontinued. See S06-H02A from 2010. Includes composition and manufacture of thermal ink.

Dye

T04-G03C* [1992-2009]

Printhead details for thermal printer

*This code is now discontinued. See S06-H03 from 2010. For thin-film resistor heads see also U14 codes, e.g. U14-H01B.

Printhead

T04-G04* [1983-2009]

Optical (incl. laser)

*This code is now discontinued. See S06-E from 2010. For line projection onto photosensitive medium which is then electrophotographically developed. If light deflection or modulation aspects are claimed, then see V07-K codes also.

Toner, laser

T04-G04A* [1992-2009]

Optical system, and driving system

*This code is now discontinued. See S06-E03 from 2010.

T04-G04A1* [1992-2009]

Optics (e.g. lenses and mirrors)

*This code is now discontinued. See S06-E03B from 2010.

Polygonal, galvanometer

T04-G04A2* [1992-2009]

Driving system

*This code is now discontinued. See S06-E03C from 2010. See also V06 codes for motor details.

Scan

T04-G04B* [1992-2009]

Printhead details, including light source

*This code is now discontinued. See S06-E03A from 2010. For LED heads see also U12-A01A3 or U12-A01A6.

Array, LED, shutter

T04-G04C* [1992-2009]

Photosensitive materials

*This code is now discontinued. See S06-E01 from 2010. Includes photosensitive paper, photoconductive belt, drum, etc.

Photoconductor, belt, sheet

T04-G05* [1983-2009]

Electrode (e.g. electrosensitive/erosive)

*This code is now discontinued. See S06-J from 2010. Electrostatic printing using any means other than light for charging. For electrographic details (e.g. developing), see also S06-A codes. If not specifically for printing, see also S02-K.

Electrostatic, dielectric, electrochromic, stylus

T04-G06* [1983-2009]

Sheet breadth control, carriage drive for sheet control

*This code is now discontinued. See S06-K03A from 2010. Includes solenoids and motors, but not control circuitry.

Position, step, margin, tabulate, space, nip

T04-G06A* [1992-2009]

Media feeding

*This code is now discontinued. See S06-K02 from 2010.

Line feed, paper

T04-G06B* [2005-2009]

Finishing apparatus

*This code is now discontinued. See S06-K05 from 2010.

Includes stapling, binding, laminating, etc. See also S06-C05 for industrial process. For devices independent of printer see T04-J02.

T04-G06C* [2006-2009]

Transferring image

*This code is now discontinued. See S06-K05 from 2010. E.g. in ink jet printer - jetting onto substrate and then transfer to final substrate.

T04-G06S* [2008-2009]

Shredding

*This code is now discontinued. See S06-K05C from 2010. Includes details of shredder integrated into printer, e.g. for automatically shredding confidential paper after paper jam.

T04-G07* [1992-2009]

Colour printing

*This code is now discontinued. See S06-K01 from 2010.

CMYK

T04-G08* [1992-2009]

Self-contained typewriters and printing devices

*This code is now discontinued. See S06-K99A from 2010. Includes details of label printers, independent units, and hand held printing devices.

T04-G09* [1980-2009]

Other printer types

*This code is now discontinued. See S06-K from 2010. Includes magnetic and Braille printers (see S05-K, T04-X for other Braille aspects), electronic pen recorders.

T04-G10* [1992-2009]

Control systems for printers

*This code is now discontinued. See S06-K07 from 2010. Does not include motors and solenoids for carriage and platen.

T04-G10A* [1992-2009]

Internal control

*This code is now discontinued. See S06-K07A from 2010. Includes control circuitry, power management.

T04-G10A1* [2005-2009]

User input and display

*This code is now discontinued. See S06-K07A1 from 2010. Includes mode selection keys, etc.

T04-G10C* [1992-2009]

Interface

*This code is now discontinued. See S06-K07C2 from 2010. Also coded in T01-C05A.

Serial, parallel, Centronics, RS232

T04-G10E* [1992-2009]

Control from outside printer

*This code is now discontinued. See S06-K07C1 from 2010. See T01-C05A for output to printer, T01-H05A for print drivers and T01-J08F for diagnostic aspects of any peripheral equipment. Network printers will also require other T01 codes.

Network printer, print driver

T04-G10E1* [2005-2009]

Print Job/Queue

*This code is now discontinued. See S06-K07C1A from 2010. See also T01-C05A/T01-C05A1 for output to printer and T01-H05A for print drivers.

T04-G10F* [2006-2009]

Management of confidential / secure documents, e.g. prevention of illegal copying

*This code is now discontinued. See S06-K07A3 from 2010. Prevention of illegal printing of private documents, etc, recognizing or printing copy prevention mark on documents, output to authorised operator. See also T01 for image processing aspects, and T05-J for testing of securities, banknotes, etc.

T04-G10G* [2007-2009]

Monitoring of printing

*This code is now discontinued. See S06-K07B from 2010.

T04-G11* [2005-2009]

General construction

*This code is now discontinued. See S06-K03 from 2010.

T04-G11A* [2005-2009]

Construction and manufacturing details of printer

*This code is now discontinued. See S06-K03 from 2010. Includes mechanical details, manufacture and manufacturing apparatus. See T04-L01/L05 prior to 2005.

T04-G11B* [2005-2009]

Recycling systems

*This code is now discontinued. See S06-K04 from 2010. See also X25-W04 for electrical aspects of recycling systems in general.

T04-H

Visual display units

Includes displays for computer related equipment such as for laptops and PDA's (personal digital assistants) and portable game consoles (e.g. Nintendo DS™, Nintendo Switch™, Sony PSP™). For signal processing aspects e.g. contrast control, white balance control etc, see also W03 codes.

Screen, video, cursor, terminal, processor, VDU, graphic, line, monitor

T04-H01

CRT control arrangements

For CRT per se see V05-D codes. CRT TV display aspects are covered by W03-A08A codes.

Image, deflect, raster, pixel

T04-H01A

For single beam tubes

T04-H01A1 [1983]

Character and stroke generators

Pattern, vector

T04-H01B

For storage, colour or other tubes

Beam index, beam penetration

T04-H01B1 [1992]

Colour

T04-H02 [1985-2010]

Plotters*

*This code is now discontinued. See S06-K99E from 2011. For computer interface per se see T01-C05B also.

Record, pen, drive, motor, X-Y, chart, curve, draw, mark

T04-H03

Arrangements for other visual indicators

Includes LED, LCD element drive arrangements. Display arrangements in general are in W05-E codes also. Plasma displays per se are coded in V05-A codes also.

Gas discharge, optical, panel, number, alphanumeric, character, symbol

T04-H03A [1983]

For single character

Seven segment, decoder, segment

T04-H03B [1983]

For several characters, e.g. matrix

From 2005 all display types (except LED) will not be coded in this section without novel details of the matrix array.

Row, column, driver, address

T04-H03C [1992]

Characterised by type

T04-H03C1 [1992]

LED

See also U12-A01A.

T04-H03C1A* [1997-2010]

Driver circuitry

*This code is now discontinued, see T04-H03F together with T04-H03C1 from 2010. See also U12-A01A5B for array or U12-A01A5A for single LED.

T04-H03C2 [1992]

LCD

See also U14-K01.

Liquid crystal, ferroelectric, anti-ferroelectric, deformed helical ferroelectric

T04-H03C2A* [1997-2009]

Driver circuitry

*This code is now discontinued. See T04-H03F together with T04-H03C2 from 2010. See also U14-K01A3.

- T04-H03C3** [1992]
Electroluminescent
See also U14-J03.
- T04-H03C3A*** [1997-2009]
Driver circuitry
*This code is now discontinued. See T04-H03F together with T04-H03C3 from 2010. See also U14-J03.
- T04-H03C4** [1992]
Plasma display panel
See also V05 codes.
- T04-H03C4A*** [1997-2009]
Driver circuitry
*This code is now discontinued. See T04-H03F together with T04-H03C4 from 2010. See also V05-A01G.
- T04-H03C5** [2002]
Field emission display
- T04-H03C5A*** [2002-2009]
Field emission display driver circuitry
*This code is now discontinued. See T04-H03F together with T04-H03C5 from 2010. See also V05.
- T04-H03C6** [2002]
Digital micromirror display
See also V07 for mirror control.
- T04-H03C6A*** [2002-2009]
Digital micromirror display driver circuitry
*This code is now discontinued. See T04-H03F together with T04-H03C6 from 2010.
- T04-H03C7** [2006]
Electrophoretic display
Based on electrophoresis effect, microencapsulated EPD, partition-type EPD, charged particle display, electrochromatic display, electrostatic display.
- T04-H03C7A*** [2006-2009]
Electrophoretic display driver circuitry
*This code is now discontinued. See T04-H03F together with T04-H03C3 from 2010.
- T04-H03C8** [2007]
Interference based MEMS display
See also U12-B03F1 and V06-M06G.

- T04-H03C9** [1992]
Other display types
Includes Braille type displays (Braille printers are coded under S06-K99X).
Head mounted display
- T04-H03D** [1992]
Back lighting for displays
See also X26-U04A.
Illuminate
- T04-H03E** [2005]
Projectors
See also W04-Q01 for novel projector details, projectors don't receive any other T04-H codes.
- T04-H03F** [2010]
Driver circuitry
Search together with other T04-H02 codes as appropriate to denote application of driver circuitry.
- T04-H03M** [2008]
Multi-display systems
- T04-H03N** [2023]
Flexible display monitors
This code covers constructional aspects of flexible panel of computer displays/ monitors. Details of general foldable/bendable displays are coded under W05-E05F.
- T04-H04** [2005]
Construction, manufacturing and testing details of display
Covers display housings, casings, stands, supports, wiring components, etc. previously coded in T04-L. Does not include details of the display elements per se which are covered by the relevant class (e.g. U14 for LCD). Search with other T04-H codes for display types. Packaging of computer displays is coded under Q34-M02.
- T04-H06** [2007]
Stereoscopic and 3D displays
-
- T04-J**
Conveying record carriers between independent stations
Including computer paper perforation and sprocket details, collators and sorting appt. For digitally marked record carriers see T04-A05 from 2005. See also S06-C05 and X25-F02A.
Guide, position, web, card, document

T04-J01	[1992]
Media feeding	
See S06-K for paper feeding in printer, T04-K02C1 for smart card feeding, and T04-A05 for card feeding.	
<i>Transport, path</i>	
T04-J02	[1992]
Collating, sorting	
<i>Sort, staple</i>	
T04-K	[1987]
Smart media e.g. cards incorporating integrated circuit memory etc.	
Includes reading aspects. Constructional details are coded in U11/U14 as appropriate. See also under application (T05, W05, W06 or X25). For protective coatings see V04-R03E. See also X25-F08 if details of the actual attachment of the tag (e.g. RFID tag) to an item.	
<i>IC, memory, contactless, smart paper</i>	
T04-K01	[1992]
Smart media details	
Includes all construction aspects of smart media.	
<i>Key, IC</i>	
T04-K01A	[2006]
Circuitry, inc. encapsulation	
For construction and manufacturing of the circuitry aspects of smart media. See also U11, U14 and V04 for details.	
T04-K01B	[2006]
General construction details	
For all aspects of smart media construction/manufacture except circuitry which is coded in T04-K01A.	
T04-K01C	[2007]
Antenna	
See also W02-B codes for aerials, V04-Q for PCB details and U13 for integrated circuit details.	
T04-K02	[1992]
Reading and writing aspects	
Including smart card feed/conveying. See also T01-H01B3A. See also W02-C02G7 (near-field radio) or W02-G05 (transponder) for non-contact details.	
<i>PCMCIA, contact, non-contact</i>	
T04-K02A	[2006]
Contact	

T04-K02B	[2006]
Non-contact	
Covers non-contact reading/writing, physical details of the non-contact system only should be covered in K01 and/or K03. For example the construction of the antenna in a transponder is T04-K01C and T04-K03B and would not be included here unless a communication aspect is also described. See also W02-C02G7 (smart cards) and W02-G05 codes (transponders and tags).	
T04-K02C	[2006]
Reading/Writing apparatus	
Covers all aspects of the apparatus used to read from or write to smart media, rather than the media itself.	
T04-K02C1	[2006]
Feeding mechanisms	
Prior to 2006 see T04-J.	
T04-K02C2	[2007]
Constructional details of card reader / writer	
Includes non-electrical constructional details such as housing and mountings. Details of circuits, connectors, interfaces, etc. go under T04-K02C.	
T04-K02C3	[2010]
Control, circuitry of card reader/writer	
T04-K03	[2006]
Media type	
Codes used to highlight the type of media used. Search together with other T04-K codes as required.	
T04-K03A	[2006]
Smart card	
T04-K03B	[2006]
RFID/transponder	
T04-K03C	[2006]
Paper/cardboard	
T04-K03D	[2006]
Memory card/stick	
T04-K03D1	[2006]
USB Memory stick	

T04-K04 [2006]

Security

All security aspects including physical protection of the hardware, encryption (see also T01-D01) and fraud protection (previously coded T01-H01C1).

T04-K05 [2012]

Testing smart media

For security aspects see T04-K04

T04-L [1987]

Constructional details of peripheral and ancillary equipment

(T04-X)

Includes construction of peripheral equipment not covered by T04-F01B, T04-F02C, S06-K or T04-H04. Computer housing and constructional details are covered by T01-L02. See also V04-T and V04-S.

T04-L01 [1987]

Casings, cabinets of peripheral equipment

Includes details of housing, stand, support. Furniture aspects of 'electronic office' are coded in T04-L07 from 1992.

Adjust, position, angle, stand, hinges

T04-L02 [2005]

Power supply arrangements for peripheral equipment

See also U24 and X12.

T04-L05 [1987]

General constructional details

Includes mounting of PCB's, components, leads, rails, leverage system, etc.

T04-L07 [1992]

Furniture aspects of 'electronic office'

(T04-L01)

Includes furniture aspects. See also T01-L02 for furniture specifically for computer.

Desk, cable, chair, flooring

T04-L08 [2012]

Cleaning of computer and peripheral devices; Computer room air cleaning

Includes cleaning details of internal and external components of computer and peripheral equipment. Use in conjunction with other T04 codes to highlight the type of computer equipment. Also includes devices used for removing dust in a computer rooms or laboratories. Electric details of clean rooms are also covered by X25-S01, and electric details of air cleaners are also covered by X27-E01B2. Measurements of air quality in clean rooms are coded by S03-E14N3.

Dust proof, HEPA filter

T04-L09 [1987]

Other peripheral accessories etc.

Includes details of mouse mat, arm rest, theft alarm (see also W05 codes) or document stand.

Packaging of peripheral equipment is coded under Q34-M02.

Filter, screen, antistatic, theft alarm, mouse mats, arm rest, attachments, protective cover

T04-M [1992]

(Digitiser) Scanner for computer input

(W02-J)

See S06-D only from 2010 for scanning arrangements for image forming devices.

T04-M01 [1997]

2D scanner, incl. flatbed scanner

See also T04-D codes for image processing aspects, S06 as appropriate, and T01-C06 for computer interfacing details. Details of 3D / 4D printing technology are also coded under X25-A08.

T04-M02 [1997]

Hand-held scanner

(T04-F04)

Includes hand-held bar-code scanner (see also T04-A03B1). Pre-1997, hand scanners for computer input were coded under T04-F05 (now discontinued). Details of 3D / 4D printing technology are also coded under X25-A08.

T04-M03 [2010]

Construction and manufacturing details of scanners

Includes details of casing, framework and internal mounting arrangements of components and modules. Details of 3D / 4D printing technology are also coded under X25-A08.

Frames, glass, sheet, PCB

T04-M04 [2010]

Control circuitry of scanners

Includes internal control and power management.
Details of 3D / 4D printing technology are also
coded under X25-A08.

Control, circuit, power supply

T04-M05 [2016]

3D scanner

Details of 3D / 4D printing technology are also
coded under X25-A08.

T04-N [2012]

Audio input/output

Includes speakers, headphones and microphones
specifically for computer applications.

T04-P [1997]

Drives for computer input

External drive unit, see also T03.

T04-X

Miscellaneous

Includes card case/wallet (see also T03), office
automation, cleaning appt. for computer
peripherals, computer equipment for handicapped
people (see also S05-K, and for Braille printer see
also S06-K99X), and maintenance equipment,
shedder, electric stapler and general packaging
specifically for office equipment. Details of
packaging for office equipment such as keyboards,
staplers, etc are also coded under Q34-M02, and
electrical stationary such as electric staplers are also
coded under X27-A02C.

T05: Counting, Checking, Vending, ATM and POS Systems

T05-A

Counting objects

Counting of coins or banknotes is covered by T05-L07. Vehicle counting is covered by T07-A01C.

T05-A01

On conveyor

For electrical conveyor aspects see X25-F01 codes.

Production line, manufacture, process, monitor

T05-A02

In stack or randomly distributed

Sheet, card, lamina, pile

T05-B

Counting mechanisms

Includes mechanical, electromechanical, and electronic arrangements. These codes are **not** used for counting circuits in general, which are covered by U21-D codes. T05-B codes are used for counting devices per se which may be used to count objects, events, units of distance travelled, etc. For some non-electronic applications see:

- (1) T05-A codes for object counting
 - (2) T05-G codes for registering/indicating
 - (3) T05-L09 for currency counting
 - (4) S02-B12 for distance recorders and pedometers.
- Wheel, disc, register, pin, reset, restore*

T05-B01

Counters with additional facilities

Includes arrangements for performing an operation at predetermined count. For tape recorder see T03-J05A and W04-H03 also.

T05-C

Ticket-issuing, fare-registering, franking appts.

For electrical printing aspects see S06 codes also.

Meter, memory, transport, vehicle

T05-C01 [1992]

Ticket and receipt issuing

Includes label printing devices. See T05-H codes as appropriate for payment-operated systems and T05-K02 for mail delivery. See S06 for printing aspects.

Bill, invoice, slip, cut, separate, pass, toll, mark, perforate

T05-C03 [1992]

Fare registering

Includes taximeters (see also T05-G01 and X22-E05 for electrical aspects) and charge indicating aspects of vehicle toll systems (see T05-C01 for ticket issuing aspects and T05-D02 for monitoring aspects).

Distance, time, rate

T05-C05 [1992]

Franking appts.

Includes all aspects of franking equipment, such as registering of credit, security, and control. See also T01 codes e.g. T01-J05A1 for financial data processing systems, and S02-D codes for weighing. Sorting of mail is **not** included - see T05-K02.

Postage, meter, rate, reset, verify, stamp

T05-D

Individual entry or exit registers

Includes systems for control and recording of access. See W05-B01 codes for intruder alarm aspects and X25-M codes for locks.

Identify, pass, code, enter, security, authorise, door, gate, checkpoint

T05-D01 [1992]

For personnel control

Turnstiles per se are coded in T05-D01X.

Restricted area, banking, lobby, automatic teller/transaction machine, ATM

T05-D01A [1992]

With record carrier

See T05-H02 codes as appropriate for card-freed aspects in payment-based systems, see T04 for record carry types and W02-G for transponders.

Includes checking/validating ticket or pre-paid card

Data, optical, magnetic, barcode, record, carrier, transponder, token

T05-D01A1 [2005]

With portable electronic device

Covers the use of a mobile device, e.g. PDA or mobile phone as the record carrier. See also W05-D08C and W05-D06G for remote control aspects.

T05-D01B [1992]

With human characteristic detection

Includes e.g. finger or palm-print analysis by pattern recognition (see S05-D01C5A and T04-D codes also), and voice recognition (see W04-V codes also).

Recognise, ID, face, feature, retina, voiceprint

T05-D01X [1992]

Other details of personnel control

Includes turnstiles per se, toll-gate, barrier control, adjustable entry gate and structural details.

Stadium, arena

T05-D02 [1992]

For vehicles

Includes toll systems, automatic fee charging system while entering/exiting motorway. See also T05-C01 and T05-C03 respectively for ticket/card issuing and charge indicating aspects. For automatic vehicle identification see T07-A03. See W02-C and W05-D for communication aspects.

T05-E

Checking occurrence of condition

Includes pass/fail test in e.g. production line manufacturing process. Also for lottery or bingo games. Audible or visible signalling for industrial aspects refer to W05-A.

Identify, compare, inspect, authorisation, entry

T05-F

Voting and lottery appts; generating random numbers

See T01-E04 for digital random number generators, and U22-A01A for random pulse generators.

Game, select, display, bingo, card, ticket, ballot, cast, majority, register, betting

T05-G

Registering/indicating

Display, record, register, measure, indicate, monitor, check

T05-G01

Vehicle working

Includes on-board distance and operation recording equipment which is also coded in X22 when electrical. For taximeters see also X22-E05 (fare-indicating aspects are also covered by T05-C03). For tachographs see also X22-E05, and S02-K05/S02-K06 codes for chart recorder details, T01-H01B3 codes for electronic data storage in memory modules.

Tachograph, fuel, speed, tachometer, taximeter

T05-G02

Machine working

Includes systems and apparatus monitoring the operation of a single machine or a group of machines, e.g. in a manufacturing environment. For computer-aided manufacturing aspects see T01-J07B also.

Safety, press, tool, factory, automation, FA, CAM, QC, quality control, idle time, down time

T05-G02A [1992]

For maintenance

Includes operation cycle counters and logging arrangements to determine maintenance intervals, remaining lifetime, etc.

Log, maintain, repair, recondition

T05-G02B [1992]

Production line process monitoring

Remote monitoring of measured values in general is covered by W05-D codes.

Work-area, workstation, track, conveyor, materials handling, truck

T05-G02B1 [1992]

Using record carrier attached to workpiece

Includes arrangements to identify workpiece, manufactured item, etc., using e.g. barcode, magnetic label, or other passive record carrier (See T04 codes also, e.g. T04-A03B1 for optical barcode reading). Transponder systems are covered by T05-G02B1A.

Ferromagnetic, magnetise, electrostatic, light, IR, UV, visible, human-readable, pattern recognition

T05-G02B1A [1992]

Transponder interrogation systems

Covers systems using an electronic 'tag' attached to workpiece, manufactured item, etc., which can be interrogated by a central station, or equipment at a particular workstation. Interrogation-based systems of this type are also coded in W06-A04B5, and details of transponders per se in W02-G05 codes.

T05-G03

Time of events

Time measurement in general is covered in S04. This code is used for arrangements to monitor both the time at which events occur and also their duration (see S04-C03 and S04-E codes also). It includes timing for sporting events (see W04-X01 codes for electrical aspects) e.g. lap time recording systems, start and finish times, etc., and also registering systems for employee attendance, time and motion study, etc.

Clock, clock in, period, elapsed time, night watchman, security, patrol, race, photo-finish, trigger, actuate, work study

T05-G03A [1992]

Parking meter

See T05-H codes also for coin- or card payment aspects. Parking control systems are covered by T07-F.

Vehicle, bay, credit, reset

T05-H

Coin-, token-, or card-freed appts

This section deals with direct or indirect payment-based arrangements for dispensing, or providing services. Dispensing involving volume measurement is covered by S02-C04 codes. Documents are assigned T05-H codes either by virtue of G07F IPC, which may involve inventions without electrical aspects, or based on their electrical content. In the latter case, X25-F03 codes may also be assigned e.g. X25-F03B1 for food/drink vending machines. T05-H codes may be assigned for any payment-based provision of goods or services, and hence codes for the particular application should also be searched.

Vending, slot, dispense, cash, denomination, insert, automat, unattended

T05-H01

Coin-actuated mechanisms; interlocks

Includes mechanical and electrical systems. See T05-H03 for coin testing/sorting aspects.

Lock, release, activate, chute, lever, switch

T05-H02

Equipment actuated by objects other than coins

Codes in this section are used with other T05-H codes as appropriate.

T05-H02A [1992]

Actuated by banknote

T05-H02B [1992]

Actuated by token

T05-H02C [1992]

Actuated by record carrier

Includes card-operated systems e.g. with data stored in magnetic strip or electronically. See also T04, e.g. T04-A03 codes.

Card

T05-H02C1 [1992]

Using dedicated record carrier

Includes e.g. telephone card, pre-paid card not usable for other purposes. (See also T05-H05C and W01-C07A codes).

T05-H02C3 [1992]

Using non-dedicated record carrier

Includes use of credit/debit banking card and multi-purpose pre-paid card.

Charge, account

T05-H02C5 [1992]

Characterised by type of carrier

Codes in this section are used to indicate system type only, and not necessarily novel aspects.

T05-H02C5A [1992]

Magnetic card

See T04-C01 also for card per se, and T04-A03A for reading aspects.

T05-H02C5B [1992]

Optical card

See T04-C02 also for card per se, and T04-A03B codes for reading aspects.

T05-H02C5C [1992]

Smart card, IC card

Integrated circuit memory cards per se are coded in T04-K01. For reading/writing aspects see T04-K02 and T01-H01B3A also. For non-contact type see also W02.

T05-H02C5X [1992]

Other types of carriers

T05-H02D [2005]

Actuated by Mobile Device

For equipment actuated by fund or credit transfer from mobile telephone devices or portable computing devices, via e.g. cellular phone network, Internet, Bluetooth® or local wireless network. See W01-C and T01-N01A1 and T01-M06A1, T05-L02 codes.

T05-H02E [1992]

Reverse vending, e.g. for returnable container

Includes arrangement returning deposit on receipt of one or more containers. Returnable-deposit systems for supermarket trolleys are covered by T05-H05A1.

Recycle, returnable, carton, box, bottle, can, crusher, deposit

T05-H02X [1992]

Other details of equipment actuated by objects other than coins

T05-H03

Coin testing or sorting appts. combined with coin-freed appts.

Includes analogous testing arrangements for token- or banknote-freed systems. Includes change giving mechanism. See also codes in S03 for e.g. optical, magnetic testing etc. and T04-D codes for pattern recognition aspects.

Select, reject, validate

T05-H04

Apparatus dispensing discrete articles

Includes packaged items such as canned beverages, but arrangements dispensing liquids into cups are covered by T05-H06.

Select, storage, vending, cigarette, confectionery, newspaper, contraceptive, ticket

T05-H04A [1992]

Involving heating/cooking

See also X25-F03B1 and X27-C for cooking aspects. Payment-freed cooking/heating apparatus for food supplied by customer is covered by T05-H05. For patents involving heating and cooling, only T05-H04 is applied.

Microwave, IR, grill, conveyor, oven, meal

T05-H04B [2011]

Involving cooling/freezing

For patents involving heating and cooling, only T05-H04 is applied. See also X27-F for refrigeration.

T05-H05

Appts. for hiring articles, coin-freed facilities, and services

T05-H05A [1992]

Article hiring apparatus

Video, tape-cassette, sports equipment

T05-H05A1 [1992]

Returning payment or part payment on return of article

Includes supermarket trolley with coin-freed lock. (Reverse vending encouraging return of containers is covered by T05-H02E).

Deposit, unlock, chain, free

T05-H05C [1992]

Payment-freed provision of services

Includes payment of parking meters (see T05-G03A also) and public telephones (see W01-C07A codes also). Automatic banking machines are coded in T05-H02 codes for card/note accepting aspects and in T05-L03 codes.

Prepayment, call box, left luggage, locker, launderette, washing machine, dryer, lighting, illumination, toilet, commentary, cable TV subscription, car wash

T05-H05E [1992]

Payment-freed amusement and entertainment systems

See W04-X02A also for electrical aspects of gaming machines and W04-X03A1 also for jukeboxes. See also T01-J30B for video game machines.

Gambling, prize, reward, award, win, lose, skill, AWP, amusement-with-prizes, slot machine, pinball, pachinko

T05-H06

Apparatus dispensing fluids, granular material or electricity

Includes quantity and tariff adjustment. Meter rental charges. Electricity consumption meters are also assigned S01-B codes. Dispensing of canned drinks is covered by T05-H04.

Beverage, sachet, ingredients, powder, mix, liquid, meter, pump, water

T05-H08 [1992]

General details of vending and analogous apparatus

Codes in this section are used alone, or with other T05-H codes as appropriate.

T05-H08A [1992]

Constructional details

Housing, mounting, casing, support, reinforce, door, access, lock, maintain, refill, cashbox

T05-H08C [1992]

Control systems

See also T01 where significant control aspects are included.

Microprocessor, computer, logic, monitor, fault, alarm, antitheft

T05-H08C1 [2005]

Control from outside unit

Covers control, management and monitoring of payment freed devices from an external unit such as a central server. Includes inventory monitoring for vending machines (see also T01-J05A2D), control of multiple gambling machines in casino (see also W04-X02A8).

Microprocessor, computer, logic, monitor, fault, alarm, antitheft

T05-J

Testing coins or valuable papers

Testing of coins or banknotes in e.g. vending machines is covered by T05-H03.

Banknote, denomination, value, counterfeit, currency, reject, validate

T05-K

Sorting and delivering

See X25-F06 also for electrical aspects of sorting in general.

Conveyor, select, separate, divert, channel, grade, evaluate, compare

T05-K01 [1983]

Coins and tokens

See T05-H03 for coin-sorting aspects of coin-freed apparatus. Includes change giving apparatus and coin wrapping (see T05-L09 also).

T05-K02 [1983]

Valuable papers (including mail)

Franking equipment is covered by T05-C05.

Banknote, dispense, bank, note, sheet, feed, envelope, letter, post, postcode

T05-K05 [1992]

Objects on conveyor, and manufactured objects

T05-K09 [1992]

Other details of sorting and delivering

T05-L

Point-of-sale equipment, EFT, and other currency handling systems

Cash, bill, note, coin, banking, reject, refund, dispense

T05-L01 [1992]

Point of sale equipment

Checkout antitheft alarms are coded in W05 only, e.g. W05-B01A codes.

POS, shop, store, retail

T05-L01A [1992]

Cash register

See also T01-J05A1 for processing aspects.

ECR, till drawer, key, lock, receipt, paper roll, printer, display, calculate, processor

T05-L01B [1992]

Card reader

Includes credit/debit card reading system. See also T05-H02D codes and T05-L02 for electronic funds transfer aspects.

EFT, EFTPOS, wipe, swipe, terminal, validate

T05-L01C [1992]

Product code reader

For both checkout and inventory purposes.

Scan, laser, polygon, mirror, orient, decode, format, check, portable, data terminal

T05-L01C1 [2006]

Using bar code

See also T04-A03B1 for bar code reading in general.

T05-L01C3 [2006]

Using mobile electronic device

Contactless payments using smartphone or other mobile device incorporating RFID/transponder technology. See also T04-K and W02 for RFID/transponders in general.

Digital wallet

T05-L01C9 [2006]

Other details of product code reader

Includes image recognition of item (see T04-D).

T05-L01D [1992]

Data transfer and network aspects

Includes networks linking cash registers and central computer. See also T01 and W01-A06 codes.

LAN, WAN, local area, wide area, bus, loop, ring, interconnect, interface

T05-L01E [2005]

POS Weighing Scales

See T05-L01X prior to 2005. See also S02 for weighing apparatus in general.

Scales, weigh

T05-L01F [2005]

Electronically Addressed shelf edge display

Coded as T05-L01X prior to 2005.

T05-L01H [2006]

POS printers

T05-L01X [1992]

Other POS equipment or systems

Conveyor, automatic packing, price

T05-L02 [1992]

Electronic payments

Includes Electronic Funds Transfer (EFT) and digital wallet systems. See T01-N01A1 for Computer/Internet aspects and W01-C05B3C for telephone line data transmission aspects.

T05-L03 [1992]

Cash dispensing and depositing machines

Includes automatic teller machines.

Bank, terminal, banknote, card, ATM

T05-L03A [1992]

Cash-handling aspects

See T05-K02 for banknote sorting/delivering in general.

T05-L03A1 [1992]

Cash-receiving

Deposit, envelope

T05-L03A5 [1992]

Cash dispensing

T05-L03C [1992]

Security and control

See T05-H02 codes for card operated access system details, and T05-D01 codes for control of access to enclosure.

Lobby

T05-L03C1 [1992]

General control system

Includes display arrangements and selection keys.

Microprocessor, computer, controller, program

T05-L03C5 [1992]

Security system aspects

Authorise, validate, personal identification number, PIN

T05-L03E [1992]

Constructional details

Includes internal details such as component mounting, and also housing, reinforcement, etc.

Casing, support, bezel, escutcheon, display filter

T05-L05 [1992]

Cashboxes, strongboxes, safes, moneyboxes

See W05-B01 codes for theft/burglar alarms.

T05-L05A [1992]

Strongboxes, safes

Lock, combination, tumbler, time delay, release

T05-L05B [1992]

Personal moneybox, coin holders

T05-L07 [1992]

Coin and note counting

T05-L09 [1992]

Other details of POS equipment, EFT, and other currency handling systems

Coin wrapping, minting

T06: Process and Machine Control

These codes cover general or unspecified control systems and methods. T06 codes are often applied due to the presence of guaranteed G05B (T06-A codes) and G05D (T06-B codes) IPCs, as well as G05G (T06-C codes), as long as there is some electrical content for the latter. In the absence of a guaranteed G05B or G05D IPC, if the control is "specific", then T06 codes are not normally applied. For example, non-specific or general torque control will be coded in T06-B12, but if the patent details control of electric motor torque, e.g. for a motor vehicle power steering system, then T06 codes will not be applied (unless there is e.g. a G05D-017 IPC assigned), because the control can be much more accurately highlighted by applying specific V06-N (motor torque control) and X22-C05A (vehicle power steering) codes.

T06-A

General control systems

This code is used for systems for regulating specific variables which are more generally applicable.

T06-A01

Comparing elements

Includes electric analogue and digital comparators. General electronic comparators are coded in U22-A04D5.

Error detectors

T06-A02

Anti-hunting and internal feedback arrangements

Includes electric and fluidic anti-hunting measures; electric and fluidic feedback to obtain proportional, integral and differential characteristics. See also T06-A06A9 for PID control per se.

PI, PD, PID

T06-A03

Obtaining smooth (dis)engagement of automatic control; safety arrangements

Includes both electric and fluidic arrangements.

T06-A04

Programme-control systems

T06-A04A

Numerical controllers

NC

T06-A04A1

Using measuring device

T06-A04A2

Characterised by computer; with central computer controlling several NC machines

See T01-F06 for CNC-related microprocessing.

CNC, computerised numerical controller

T06-A04A2A [1997]

Total factory control

For central factory control not using NC systems, see T06-A04B7.

FA, DNC, Direct/distributed numerical controller

T06-A04A3 [1997]

Positioning or contouring control systems

Also includes tool centring, measuring workpiece for machining, backlash and other types of error compensation, and control of velocity, etc.

T06-A04A4 [1997]

Machine data input and handling arrangements

Includes NC systems where form of data input is the characterising feature e.g. manual data input, generating data from the drawing, or using design data from a CAD/CAM system. Also includes reading, buffering or conversion of data.

T06-A04A5 [1997]

Using tool path interpolation

T06-A04A6 [1997]

Monitoring and safety systems

See also T06-A03 and T06-A08 for general safety and monitoring systems, respectively.

T06-A04A9

Other numerical controller aspects

Includes open loop systems.

T06-A04B

Non-numerical

T06-A04B1 [1997]

Sequence or logic controller

Also includes programmable logic controllers. See also T01-F06 for program control arrangements e.g. using stored programs, such as in PLC, for control of computer peripheral. For general safety and monitoring systems, see T06-A03 and T06-A08, respectively.

PLC, relay ladder, graph set processing

T06-A04B3 [1997]

Fluidic control systems

T06-A04B5 [1997]
Recording and playback/teaching systems

T06-A04B7 [1997]
Total central control of factory

For central factory control using NC systems, see T06-A04A2A.

FMS, Flexible manufacturing system, CIM, computer integrated manufacturing, multi-machine control, IMS, integrated manufacturing system

T06-A05
Adaptive (optimum) control systems

T06-A05A [1992]
Artificial Intelligence-based systems

Includes expert-, rule-, or knowledge-based systems. See also T01-J16 codes.

AI, KBE, rule acquisition, inference engine, neural network, heuristic rules

T06-A05A1 [1992]
Fuzzy control

See also T01-J16B.

T06-A05C [2007]
Using algorithms

Includes adaptive control systems using algorithms to optimise system performance. E.g. includes control algorithms used in washing machines (see also X27-D01A5) to optimise wash cycle based on sensed parameters such as weight of clothes, temperature etc.

T06-A06
Automatic controllers

T06-A06A
Electric

T06-A06A1
(Dis)continuous controllers

T06-A06A1A [1992]
Continuous
(T06-A06A3)

Output of controller is continuous function of deviation from desired value. See T06-A06A3 for records from 1983 to 1991.

T06-A06A1D [1992]
Discontinuous

(T06-A06A5)

Output of controller is discontinuous function of deviation from desired value e.g. two or multi-step controllers. See T06-A06A5 for records from 1983 to 1991.

T06-A06A2
With output pulse-train signal; with multiple inputs and outputs

Includes systems where the output of controller is pulse-height, -width, or frequency-modulated; multiple inputs obtained from more than one sensor and outputs applied to more than one correcting element.

T06-A06A3* [1983-1991]
Continuous

*This code is now discontinued and transferred to T06-A06A1A from 1992 onwards to indicate its proper hierarchical relationship to T06-A06A1. It is still searchable and valid for records of 1983 to 1991.

T06-A06A5* [1983-1991]
Discontinuous

*This code is now discontinued and transferred to T06-A06A1D from 1992 onwards to indicate its proper hierarchical relationship to T06-A06A1. It is still searchable and valid for records of 1983 to 1991.

T06-A06A9
Other electric automatic controllers
Includes arrangements to obtain PID and proportional, integral, or differential characteristics.

T06-A06B
Pneumatic or hydraulic only

T06-A07
Computer controlled systems; systems using models

T06-A07A [1992]
Computer-controlled systems

This code is used together with other codes only if substantial computing details are disclosed. For example, CNC machine tool motor control systems would be coded only in T06-A04A. See also T01-J07B for the computing aspects of industrial process controllers.

CAE, CAI, CAM

T06-A07A1 [1992]

Distributed control systems

T06-A07B [1992]

Systems using models

T06-A08

Testing and monitoring control systems

T06-A10 [1992]

Sampled-variable control systems

(T06-A20)

T06-A11 [1997]

Control systems-related (data) communications arrangements

(T06-A20)

See also W01-A06 codes for data communications in general. RF type communications are in W02 and transmission systems for measurement and control systems are covered by W05-D codes. Only used when 'control' data is being communicated.

MAP

T06-A20

Other general control systems aspects

Includes open-loop automatic control systems; general constructional details of controllers e.g. control boards or racks for electronic controllers (see V04-T codes for electronic equipment constructional features).

T06-B

Control of non-electric variables

Includes normally documents with the G05D IPC, or those with substantial electrical content but **no** relevant provision elsewhere in EPI, e.g. flow control. Does **not** cover automotive vehicle controllers like torque (see X22-A03D instead), etc. unless G05D is applied.

T06-B codes are primarily applied with regard to the final variable being controlled, though in some cases, an intermediate variable being controlled may also be coded, if deemed helpful. For example: in a system controlling the flow of fluid by varying the speed of a pump, T06-B04 will be the code normally applied to highlight the desired flow control aspect (if a G05D IPC is assigned or no specific application is detailed), and in most cases the intermediate speed control aspect (T06-B09) will not need to be coded.

T06-B01

Vehicle position, course, altitude or attitude

For aircraft flight controllers, see W06-B01A5.

T06-B01A

Position or course in two dimensions

Includes vehicles using near-field transmission system e.g. having buried conductors in floor etc. (see W02-C02 also).

Steering, tracking, robotic vehicles, navigation

T06-B01B

Altitude or attitude; target seeking control

See W07-A codes also for missile guidance.

Aircraft, flight, satellite

T06-B01X

Other vehicle position/course control

Includes 3-dimensional position or course control.

T06-B02

Position or direction

T06-B02A

Without feedback

T06-B02B

With feedback

T06-B03

Material dimensions

T06-B04

Flow

T06-B04A

Without auxiliary power

T06-B04B

Using electric means

T06-B04X

Other flow controller

T06-B05

Level

T06-B06

Chemical or physico-chemical variables

T06-B07

Humidity; viscosity; light intensity

Only used for general or non-specific control systems. For illumination control/light dimming see X26-C codes only, for controlling light intensity of display see appropriate U14, W05 etc. display codes only, and for humidifiers per se see X27-E01B2 only.

T06-B08

Ratio

T06-B08A

Of two or more fluid flows

T06-B08A1

Electrical

T06-B08A9

Other ratio control with(out) auxiliary power

T06-B08X

Other ratio control

T06-B09

Speed; acceleration

T06-B09A

Without auxiliary power; with auxiliary non-electric power

T06-B09B

Using electric means

T06-B10

Mechanical force or stress

T06-B11

Fluid/Gas pressure

T06-B11A

Without auxiliary power

T06-B11X

Other fluid pressure control

T06-B12

Torque; mechanical power; mechanical oscillations

T06-B13

Temperature

Control of electric heaters is in X25-B04, central heating control in X27-E01A.

Thermostats

T06-B13A

Without auxiliary power

T06-B13B

Using electric means

T06-B13B1

Using elements with temp. dependent electric or magnetic properties

T06-B13B2

With auxiliary heater

T06-B13B9

Other electric temperature control

T06-B13X

Other temperature control

T06-B14

Several variables simultaneously

T06-B20

Other non-electric variables' control

Includes simultaneous control of electric and non-electric variables.

T06-C

Mechanical control devices or systems

Included in EPI only if application is for electrical systems or devices.

T06-C01

Controlling and controlled members

Includes knobs for switches or variable resistors, etc. See V03-B09, V01-A03.

T06-C02

Limiting movement

T06-C03

Manually operated mechanisms

T06-C03A

With single controlled member

T06-C03B

With several controlled members

T06-C09

Other mechanical control devices or systems

T06-D

Applications

In general, relates to items in X25, which should also be searched.

T06-D01

Agriculture

T06-D01A [1983]

Soil working, sowing, harvesting

See also X25-N01A for electrical equipment.

Tractor, depth, plough, harvester, agricultural vehicles

T06-D01B [1983]

Irrigating, fertilising, culture

See also X25-N01B for electrical equipment.

Sprinklers

T06-D01C [1987]

Livestock industry

Includes feeding, milking, and enclosure heating and air conditioning. See also X25-N02.

Feeding control

T06-D02

Food, pharmaceuticals and tobacco processing

See also X25-P.

T06-D02A [1987]

Pharmaceuticals

See also X25-P02.

Drugs, medicines

T06-D02B [2011]

Tobacco

Includes control of tobacco processing plant.

T06-D02C [2014]

Food

Includes control of food processing plant.

T06-D03

Textile and paper manufacture

T06-D03A [1983]

Paper and cardboard making

See also X25-T09.

T06-D03B [1983]

Fiber, yarn, etc. manufacture

See also X25-T04A.

Spinning, winding, twisting, combing, carding, tension-control

T06-D03C [1983]

Fabric manufacture

See also X25-T04B codes.

Looms, knitting machines, wefting machines, warping machines, weaving, textile manufacture

T06-D03D [1983]

Sewing machine/Embroidery machines

See also X25-T04C.

Embroidery

T06-D04

Separating; crushing; mixing, sorting

See also X25-J for crushing and mixing. Also includes shredder.

T06-D04A [2020]

Sorting

T06-D05

Metal working; casting

T06-D05A [1983]

Metal working

T06-D05A1 [1987]

Shaping; rolling; hammering; bending; punching

Includes shaping of materials (excluding cutting), e.g. rolling (see also X25-A02B), bending, punching and hammering (see also X25-A02D), and extruding.

T06-D05A2 [2011]

Pressing

(T06-D20)

See also X25-A02A for presses per se.

Press

T06-D05B [1983]

Casting

See also X25-A01.

T06-D06

Machine tool control

Control of portable power driven screw or nut setting.

T06-D06A [2019]

Riveting control

See also X25-A03R and X25-A03F for riveter control. See T06-D20 prior to 2018.

T06-D07

Grinding; polishing; cutting; drilling; manipulators

T06-D07A [1983]

Milling; grinding; polishing

See also X25-A03C codes as appropriate.
Abrading, honing, lapping, planing, sanding, burnishing, blasting

T06-D07B [1983]

Manipulators

Also see X25-A03E. See T06-D08F and X25-F05A instead for autonomous and robotic vehicles.
Robots

T06-D07C [2011]

Turning; boring; drilling; cutting

Also see X25-A03A and X25-A03B codes as appropriate.
Sawing, trimming, grooving, lathe

T06-D08

Conveying, lifting, hauling, handling materials

T06-D08A

Web-advancing

Includes strip and coil handling. Also see X25-F02 for web/strip/coil handling per se. Includes cable winding aspects. Also see X12-D07X or X12-G10 for cable winding machine and cable drums/reels.
Sheets, roll, paper, filaments

T06-D08B

Article feeding; tension regulating

T06-D08C

Conveyors

See also X25-F01A for control details of conveyors.
Belts, transporting goods, shelving and retrieving, locating, addressing

T06-D08D

Lifts

See also X25-F04A for control details of lifts.
Elevators, car call control, escalators, cabins, cages

T06-D08E

Cranes, load engaging equipment, soil shifters

See also X25-F05 for cranes and X25-D01 for excavators and soil shifting.
Hoists, excavators, winches

T06-D08F [1987]

Trucks, goods or robotic vehicles

Includes goods conveying vehicle control (see also X25-F05A codes).
Robotic vehicles, autonomous vehicles, trucks, fork lift trucks, trolleys

T06-D08X

Other material handling control systems

T06-D09 [1983]

Metallurgy

See also X25-A codes for metal working, and X25-Q codes for iron and steel manufacture, furnace control (see X25-X13 also), heat treatment etc.

T06-D10 [1983]

Chemical processing

T06-D11 [1987]

Mining

(T06-D20)
See also X25-D02 for mining.
Conveyors, machines

T06-D12 [1987]

Earth drilling; Well production

(T06-D20)
Includes oil, gas and water wells drilling. Drilling for building construction is **not** covered. See also X25-E01 for drilling equipment. Also see H01 codes.
Boreholes

T06-D13 [1987]

Plastics

(T06-D20)
See also X25-A06 for plastic working per se.
Extruding, injecting, moulding

T06-D14 [2011]

Rubber

(T06-D20)

Includes control of rubber processing and tyre manufacturing plant. See also X25-A07 for rubber working per se.

T06-D15 [2014]

Packaging/filling/dispenser/bottling/labeling

Includes control of packaging/dispensing machines.

T06-D16 [2017]

Wood

Includes all processing and manufacturing aspects of wood.

T06-D17 [2022]

3D / 4D / 5D printing; Additive manufacturing

See also X25-A08 codes.

T06-D18 [2022]

Spraying; Coating

See also X25-K for spraying and coating equipment.

Paint spraying

T06-D20 [1997]

Other applications of control systems

Includes drying (see X25-G), etc. From 2011 control of presses is transferred to T06-D05A2. From 2019 control of riveting machines is transferred to T06-D06A (see also X25-A03R).

T07: Traffic Control Systems

Traffic control systems specifically for rail, air/marine transport are not included, and are covered by X23 and W06 codes respectively. Some offboard roadside aspect or traffic control centre must be present to be coded in T07. Purely onboard motor vehicle aspects are coded in X22 only.

T07-A

Determining road vehicle position, speed or flow

T07-A01 [1992]

Monitoring flow of traffic

Includes measurement of number of vehicles passing within fixed time period.

Congestion, volume, closed-circuit TV, CCTV, survey, cable, pressure, detect

T07-A01A [1992]

Measuring speed of traffic

Includes measurement of average speed.

T07-A01A1 [1992]

Measuring individual vehicle speed

Includes police speed trap using e.g. radar, laser, etc. (For driver countermeasures see X22-E08 and W06-A04E3C).

Gun, check, readout

T07-A01B [1997]

Detecting presence of vehicle

This code is for detecting the presence of a vehicle in a known local position, e.g. using cameras or inductive loops embedded in roadway that detect change in magnetic field caused by presence of the vehicle. For detecting the presence of vehicles specifically for traffic signal control, e.g. traffic light control, see T07-C03A only. For detecting free parking space see T07-F also. For systems detecting an unknown geographic location of the vehicle see T07-A05 codes instead.

Video camera

T07-A01B1 [1997]

Detecting 'wrong way' travel

Use with T07-E codes also.

T07-A01C [1992]

Vehicle counting

See also T07-F for counting number of vehicles entering car park.

T07-A01D [2002]

Vehicle classification system

Includes classification of vehicle type, e.g. car, lorry, motorbike, and e.g. monitoring of vehicle height. Includes optical systems in which light beam is interrupted when high vehicle such as truck passes by.

Classify, vehicle type, height sensing

T07-A03 [1992]

Identifying and recording individual vehicle information

T07-A03A [1997]

Transponder interrogation

Transponder interrogation systems for vehicle identification in general are covered by T04-K03B, T04-K02 and W06-A04B1 codes and W02-G05 codes for novel RF details.

RFID, transponder, tag

T07-A03A1* [1997-2001]

For tolls or other charging systems

*This code is now discontinued; the transponder aspect is now transferred to T07-A03A and the toll aspect is transferred to T07-A03E from 2002 onwards. T07-A03A1 remains searchable for records between 1997 and 2001.

T07-A03C [1997]

Recording images

Includes systems triggered by detecting vehicle speeding, or travelling through stop signal.

Automatic camera, number, offence, violation

T07-A03C1 [1997]

By photography

Electrical aspects of photography are also assigned and are coded in S06-B, especially S06-B02 codes.

T07-A03C5 [1997]

By video systems

Closed circuit TV systems are assigned W02-F01 codes. See W04-M01 codes for details of video cameras.

CCTV, VCR, tape, playback

T07-A03C5A [1997]

With pattern recognition of licence plate information

See T04-D codes also.

T07-A03E [2002]

Toll and charging arrangements

Transponder aspects for transmission of data between toll booth and vehicle are coded in T07-A03A also. See T05-D02 also and T05-C03 for charge indicating aspects. See X22-X07 also for on-board vehicle aspects such as windscreen mounted transponder.

Transponder, card, debit, toll

T07-A05 [1992]

Monitoring position of vehicle

This code is for monitoring the geographic position of a vehicle. For position monitoring in conjunction with mobile radio systems see W02-C03C codes (e.g. W02-C03C1E). For T07-A05 to be applied there needs to be some offboard or roadside aspect. Purely onboard vehicle position determination is coded in X22-E06 instead, as well as e.g. S02-B08C and W06-A03A5C if GPS is used for the position fixing. For systems detecting the position or rather presence of a vehicle at a known point on the road, see T07-A01B instead, or T07-C03A if the aim of the presence detection is for road traffic signal control.

Location, city, zone, district, road, street, plan, moving map, destination

T07-A05A [1992]

Monitoring position of scheduled vehicle e.g. bus

Includes systems for monitoring position of buses or other vehicles such as delivery vehicles following a set route or travelling between specific destinations, e.g. to allow off-board controller to monitor vehicle progress. See also T07-A05L for display of vehicle position to controller. See also X22-P05A and other appropriate X22 codes for on-board bus details.

T07-A05A1* [1992-2006]

Displaying information to passenger

*This code is now discontinued and transferred to T07-A05D and T07-A05S. T07-A05A1 remains searchable for records from 1992-2006.

Time, interval, indication, boarding, alighting

T07-A05A3* [1992-2001]

Displaying information to controller

*This code is now discontinued; the display to central controller aspect is transferred to T07-A05B and the application to scheduled vehicles is covered by T07-A05A. T07-A05A3 remains searchable for records between 1992 and 2001.

Central station, route

T07-A05B [2002]

Displaying information to controller

Includes informing central station of vehicle position, e.g. to allow controller to monitor vehicle progress and alter vehicle schedule if required (see also T07-A05S). See also X22-E06F for updating vehicle navigation display.

Central station, route

T07-A05C [1992]

Displaying information to driver

Includes arrangements indicating position of vehicle to driver, e.g. using roadside beacons or other roadside based navigational systems. Systems transmitting actual control signals affecting vehicle steering for example, are covered by T07-D01 (and X22-C05B for automatic steering details). See also X22-E06F and S02-B08 codes. Includes use of offboard traffic centre to inform driver of best route to destination, e.g. due to traffic congestion, i.e. to reduce processing requirements of on-board navigation system. T07-G01 may also need to be applied for indication of traffic congestion.

CD-ROM

T07-A05D [2007]

Displaying information to passenger

(X22-A05A1)

Includes systems for informing passenger of current position of bus or taxi or its expected arrival time. Includes display of vehicle position on hand-held device, in-bus display or on off-board bus stop display.

T07-A05U [2007]

Monitoring position of un-scheduled vehicle e.g. taxi

(X22-A05)

Includes systems for monitoring position of taxis, e.g. to allow dispatcher to efficiently dispatch taxis to most appropriate pick-up points. See also T07-A05L for display of taxi position to controller, T07-A05N for display of pick-up point to taxi driver, and T07-A05J for informing passenger of current taxi location and expected arrival time. See X22-P05C and other appropriate X22 codes for on-board taxi details.

T07-B

Traffic signals and road signs

The codes in this section relate to equipment providing both variable traffic instructions and fixed information.

Display, road, warning, optical, reflect, sign, emergency, light

T07-B01 [1992]

Signal details

T07-B01A [1992]

Light source

Only includes novel light sources/bulbs etc. per se. See X26 for lamps and U12-A01A codes for LEDs. Lampholders are coded in T07-B01B.

Incandescent, discharge, bulb, fluorescent, light emitting diode, LED, HID

T07-B01B [1992]

Reflectors, filters, lenses, fittings

Includes holders for lamps or other light source.

T07-B01C [1992]

Constructional details

Casing, mounting, cable, harness, seal, post, street furniture

T07-B05 [1992]

Signal type

Codes in this section are used to indicate signal type either alone, in conjunction with T07-B01 codes, or with T07-C codes.

T07-B05A [1992]

Traffic intersection control

Includes standard 'traffic lights' and pedestrian crossing systems.

T07-B05A1 [1992]

Portable, temporary unit

Includes portable display used at traffic intersection. For movable displays used in other situations see T07-B05G only.

Road works, repairs, one-way, alternate, single line, battery

T07-B05A5 [1992]

Indicating elapsed time

Includes indication of time before next signal change.

Period, warning, fuel saving, pollution

T07-B05C [1992]

Variable information display

Includes matrix displays e.g. indicating temporary speed limit, motorway lane closure, etc.

T07-B05E [1992]

Fixed display

Includes illuminated direction signs.

T07-B05G [2002]

Movable display

Includes portable or temporary displays, e.g. mounted on movable trailer, and used at roadworks along motorway to inform drivers of temporary speed limit or lane closures. Portable displays used for traffic intersection signalling such as temporary traffic lights are coded in T07-B05A1 only.

T07-B07 [2002]

Traffic signals and road signs with ancillary signalling

Includes roadside transmitters, e.g. incorporated in road sign to transmit radio position signal or speed limit signal to vehicle. See also T07-D03 if vehicle speed is automatically controlled.

Radio transmitter, beacon, speed limit notification

T07-C

Controlling traffic signals

For control of a particular type of signal search with T07-B05 codes (except T07-B05E).

T07-C01 [1992]

Control circuitry

Computer, microprocessor, sequential, program, logic, clock, time

T07-C03 [1992]

Switch and detector arrangements

Includes manual switch for e.g. pedestrian crossing. See also V03 codes for novel mechanical switches per se.

Pushbutton

T07-C03A [1992]

Detecting presence of vehicle

Includes using inductive loops below road surface (also coded in S03-C02B) to detect vehicle presence and then control traffic signal. For vehicle presence detection not associated with traffic signal control see T07-A01B only.

Sense, pressure, magnetic field

T07-C05 [1992]

Monitoring and alarms

Includes safety measures to prevent signal conflict, warning of signal lamp failure, etc.

T07-C07 [1992]

Over-ride control system

Includes emergency services vehicle priority system. See also X22 and e.g. W05-D codes for wireless remote control.

T07-D

Vehicle guidance and control systems

Includes offboard systems that effect automatic control or guidance of land vehicle.

Car

T07-D01 [2002]

Vehicle guidance systems

This code covers arrangements controlling vehicle travel direction in road traffic or off-road traffic system, normally where there is some traffic contention aspect, e.g. to prevent collisions. (See T06-B01A, X22-C05B and W02-C02 codes for inductive loop and radiating cable guidance systems also. For materials handling vehicles, see X25-F05A codes). Systems providing navigational information only, without automatic guidance control, are covered by T07-A05C and also included in X22-E06 codes for onboard aspects, and in S02-B08. Information processing aspects of vehicle guidance irrespectively are covered by T01-J07D codes.

Position, road, track, cable, near field, automatic steering

T07-D03 [2002]

Vehicle automatic control systems

Includes automatic regulation of vehicle speed in response to signal transmitted from roadside transmitter. See also T07-B07 if transmitter is incorporated into road sign. X22-A03B and X22-C02D codes may also need to be applied for automatic vehicle speed and braking control.

Speed limit enforcement, speed control, automatic braking, by-wire

T07-E

Anti-collision systems

See X22-J05 codes for self-contained on-board road vehicle systems, which are **not** coded here, and W06-A codes for 'radar' types, e.g. W06-A04H1.

Ultrasonic, light, beam, distance, receive, transmit, rear, indicate, safety, warning, obstacle

T07-E01 [1992]

Warning of or preventing collision

Includes warning of insufficient vehicle spacing.

T07-E05 [1992]

Warning of unsafe vehicle position

Includes warning of deviation from lane using some road based apparatus such as passive radar reflector or transponder embedded in road. Excludes on-board vehicle optical detection of painted white line.

White line, pattern, stud

T07-F

Parking control systems

Includes indication of occupancy of parking spaces (see T07-A01B also for vehicle presence detector and T07-A01C for vehicle counting) and vehicle access control and direction of vehicle to parking space. See also T05-D codes for barrier/access control aspects per se. See X25-U02 only for vehicle handling/lifting/storing via powered equipment in multi-storey car park. Parking meters are not included-see T05-G03A.

Time, display, vehicle, car, card, fee, ticket, charge

T07-G [1992]

Informing driver of traffic, road and weather conditions

From 1997, the scope of this code has been widened to include warning of traffic congestion. Includes use of radio broadcasting or telephone information services. See W01-C05 codes for telephone aspects, W02 codes for radio systems (especially W02-E01B5 for RDS-based systems) and W05 for signalling in general. T07-B codes may be relevant also for signalling aspects.

T07-G01 [1997]

Informing driver of traffic congestion

Includes use of roadside display to inform driver of delays or transmission of information directly to onboard vehicle display (see also X22-E11). For systems also displaying alternative route to driver to avoid congestion, also see T07-A05C and X22-E06F codes. Includes communication of traffic data between traffic infrastructure, roadside devices and vehicle. See X22-K08 for traffic centre to vehicle communications and X22-K02 for providing traffic information to vehicle via the cloud.

Accident, road works, lane closure, traffic jam, diversion, signal failure, alternative route, V2I, C-V2I

T07-G02 [2013]

Informing driver of road surface conditions

Includes informing driver of temporary road surface, resurfacing works, pot holes, raised ironwork etc. For warning of road flooding etc. see T07-G05 instead. If the monitoring system is located on the road, X25-U05 should also be applied. If the monitoring system is mounted on the vehicle, see X22 only.

T07-G05 [1997]

Adverse weather condition monitoring and warning

For warning driver of severe weather such as flooding so that alternative route can be used. See S03-D codes for meteorological aspects also.

Visibility, fog, mist, temperature, frost, ice, black ice, flood

T07-H [2002]

Intelligent highway systems

Includes general details of intelligent roadways, such as roadside infrastructure, e.g. beacons or transponders beside or embedded in road, to assist with automatic vehicle steering (see also T07-D01) or vehicle separation distance control (see also T07-D03). For vehicle control via a central traffic centre, see T07-A05 codes instead. See X21-K and X22-K codes for motor vehicle and electric vehicle to infrastructure communications and connectivity.

V2I, C-V2I

T07-M [2012]

Traffic administration and traffic modelling/design

Includes traffic planning and designing. Also see T01-J05A for administration or T01-J15X for computer design and modelling.

T07-X

Other electrical traffic control aspects

Includes illuminated road studs and lane markings, and electrically height adjustable road bumps. Includes warning triangle placed on road by vehicle driver, e.g. to guide emergency vehicle to accident site. See also X22-B03.

Cats eye, speed bump, warning triangle

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U11: Semiconductor Materials and Processes

U11 covers processing, packaging, assembly, testing and handling of the devices in U12 to U14, but note that aspects of manufacture specific to certain devices can be found in U12 and U14, under codes for LEDs, lasers, solar cells, thick film and hybrid circuits. Liquid crystal layer manufacture is included in U14-K01A1. Chip carrier, multilayer substrate circuit board and chip-on-substrate technologies are coded under integrated circuit packaging in U11-D01A, and hybrid circuits in U14-H03 and U14-H04.

U11-A

Materials

See U11-B03, U11-C01J, U12-B03C, U12-E01 and X12-D01C for chemical details of produced crystals, structures and organic semiconductors.

U11-A01

Semiconductor materials, dopants

Includes preparation of semiconductor material from precursors, refining and purification, new semiconductor material. For solar cell material see also appropriate code in U12-A02A2.

U11-A01A [1992]

Silicon

Silane, fluoride, chloride

U11-A01A1 [1997]

Porous silicon

(U11-A01A)

LED

U11-A01B [1992]

AIII-BV compounds

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride, arsinogalanes

U11-A01C [1992]

AI-BVI compounds

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-A01D [1992]

Group IV elements and their compounds (except elemental silicon)

Silicon carbide, diamond, germanium

U11-A01F [1992]

Organic semiconductor materials

U11-A01M [1992]

Dopants

U11-A01X [1992]

Other semiconductor materials

Includes materials not covered by U11-A01A to U11-A01F codes, e.g. AIIV-BVI group, AI-BIII-CVI group, AI-BIV-CV group semiconductors.

Lead sulphide, lead telluride, chalcopyrite compounds, copper indium sulphide, copper gallium selenide, chalcogenide compounds, zinc tin arsenide, cadmium germanium arsenide

U11-A02

Piezoelectric, electrostrictive, magnetostrictive materials

Materials for transducers are also coded in V06-V. Includes electrets of organic materials which exhibit piezoelectric and pyroelectric properties. Also includes Ferroelectric materials

Lead, titanate, zirconate, titanium, zirconium, bismuth, permalloy, lead scandium tantalate, polyvinyl fluoride, polyvinyl chloride, polyacrylonitrile

U11-A03

Liquid crystal, electrochromic materials

U11-A03A [1992]

Liquid crystal material, compounds, additives

See also V07-K10A.

Chiral, ester, phenyl, smectic, cholesteric, nematic, twisted nematic, cyano, hydroxy, mesogenic, polymer dispersed LC, PDLC, polymer network LC, halo-acetylene derivatives, phenyldioxanes, ferroelectric LC

U11-A03C [1992]

Electrochromic materials

For details regarding electrochromic display (structures, circuits) see U14-K02 codes.

U11-A04

Magnetic materials

Magnetic materials in general are coded in V02-A. *Iron, garnet, alloy, oxide*

U11-A05

Thick and thin film materials

Includes conductive pastes and inks, thick film resistive compositions (see also V01-A02C1). For general thick film aspects see U14-H02.

Vehicle, solvent, frit, powder, paste

U11-A05A [1987]

Screen print solders

Gold, silver, glass frit inks

U11-A05B [1987]

Substrate materials

Includes novel composite material, new materials for multilayer ceramic substrate (see also U14-H03B1), materials for other hybrid circuit substrate (see also U14-H03C). For general integrated circuit substrate see also U11-D01A.

U11-A06 [1983]

Resists for semiconductor device manufacture

(U11-A09)

Includes photosensitivity increasing substances. See V04-R01A for resists used in PCB manufacture. Apparatus for coating, processing photoresist are covered by U11-C04A1 codes.

Photolithography, photosensitive, positive, negative

U11-A06A [1992]

Organic resist for semiconductor device manufacture

Quinonediazides, phenol resin

U11-A06B [1992]

Inorganic resist

Germanium selenide, amorphous silicon

U11-A07 [1983]

Encapsulants, sealants

(U11-A09)

See V04-S01A for compounds used to encapsulate complete modules, circuit boards etc.

Resin, epoxy, coating, powder, cure, harden, glass, polyethylene terephthalate

U11-A08 [1992]

Insulating, conductive materials

U11-A08A [1992]

Insulating materials for dielectric layer

Includes preparation of material from precursors, any other aspect relating to layer structure or deposition being covered by the appropriate codes U11-C05A or U11-C05B.

U11-A08A1 [1992]

Organic insulating material for semiconductor manufacture

(U11-A05A)

Polyquinoxalines, polyquinoxalones, polybenzoxazoles, polyimide crosslinking agents

U11-A08A2 [1992]

Inorganic insulating material for semiconductor manufacture

(U11-C05B5, U11-C05B7)

Prior to 1992, coded in U11-A09 and/or U11-C05B5, or U11-C05B6, or U11-C05B7.

U11-A08B [1992]

Conductive materials for semiconductor manufacture

(U11-A09, U11-D03A1, U11-D03B)

Includes metals, alloys for e.g. electrodes, wires, interconnections, lead frames. See also appropriate code in U11-D to identify use of respective metal or alloy, e.g. U11-D03A1 for beam leads, U11-D03B for interconnections, electrodes.

U11-A08B1 [2005]

Organic conductive materials for semiconductor manufacture

U11-A08B2 [2005]

Inorganic conductive materials for semiconductor manufacture

(U11-A09, U11-D03A1, U11-D03B)

U11-A09

Other materials for semiconductor manufacture

Includes resins not used as encapsulants or sealants.

Adhesives

U11-A10 [1992]

Abrasives, polishers, cleaners, etchants used in semiconductor manufacture

(U11-A09)

Includes materials used in mechanical and/or chemical treatment. Resist strippers are also coded here. See also U11-C06A1, U11-C07A1, or U11-C07B as appropriate.

- U11-A11 [1992]**
Developers for microlithography
(U11-A09, U11-C04A1)
- U11-A12 [1997]**
Gases for semiconductor technology
(U11-A09)
For reactive processing gases see also U11-A13.
Argon, nitrogen, helium, ozone
- U11-A13 [2005]**
Precursors for deposition process in semiconductor manufacture
(U11-A09)
Includes reactive gases, liquid and solid precursors.
- U11-A14 [2006]**
Nano-structural materials
Use in conjunction with other U11-A codes to indicate type of material. For conductive nano-structural materials in general, see also X12 codes.
- U11-A15 [1992]**
Electroluminescent materials
(U11-A09, U14-J)
Also includes other novel luminescent materials used in semiconductor devices, e.g. phosphors, photoluminescent and fluorescent materials. See U14-J codes for electroluminescent devices and displays (structure, circuits, manufacture).
- U11-A15A [2002]**
Inorganic electroluminescent materials
- U11-A15B [2002]**
Organic electroluminescent materials
Includes polymeric and organometallic complexes.
- U11-A16 [2007]**
Immersion lithography fluid
See U11-C04K codes for immersion lithography apparatus and method.

U11-B
Bulk crystal growth
Includes methods of growing monocrystals of silicon, germanium and other homogeneous materials except those covered by subclass U11-B03 below. See U11-C01J1 for epitaxy and U11-C01H for liquid phase deposition on substrate.
Single crystal, monocrystalline, polycrystalline

- U11-B01 [1983]**
Pulling from melt crystal growth for semiconductor manufacture
Includes Czochralski method.
CZ pull, boules, liquid encapsulated Czochralski, LEC
- U11-B02 [1987]**
Zone refining, other
- U11-B02A [1992]**
Zone refining crystal growth for semiconductor manufacture
Includes floating zone method.
Zone melting
- U11-B02B [1997]**
Crystal growth from melt in crucible
(U11-B02X)
Bridgman
- U11-B02C [2002]**
Spherical crystal growth methods
Includes e.g. droplet method. For spherical ICs see U13-D06.
- U11-B02X [1992]**
Other crystal growth methods for semiconductor manufacture
Includes vertical, horizontal gradient freeze method, floating fluidised bed method. For ribbon techniques, edge defined film growth, see U11-B04.
- U11-B03 [1987]**
Characterised by crystal material and crystallographic orientation
Includes chemical techniques rather than apparatus details. This code is usually used in conjunction with other codes, whenever crystallographic structure is emphasised.
Oriented films
- U11-B03A [1992]**
Bulk crystal growth of AIII-BV compounds
Includes complex ternary and quaternary compounds.
Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-B03B [1992]

Bulk crystal growth of All-BVI compounds

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-B03C [1992]

Bulk crystal growth of AIV elements and their compounds

Excludes elemental silicon.

Carbon, germanium, silicon carbide

U11-B03X [1992]

Bulk crystal growth of other semiconductor compounds

Includes bulk growth of elemental silicon crystal, or bulk growth of any other semiconductor material not mentioned in U11-B05 section.

U11-B04 [1987]

Ribbon techniques, pulling/casting from melt for semiconductor device manufacture

Includes edge-defined film-fed crystal growth process, forming dendritic web e.g. for photovoltaic applications.

EFG, monocrystal, polycrystal

U11-B05 [2002]

Apparatus details for crystal growth

U11-B05A [2002]

Crucibles, crystal holders

U11-B05B [2002]

Crystal pulling mechanisms

Includes pulling-rods, pull-seeds etc.

U11-B05C [2002]

Heating/cooling arrangements for growth vessel, crucible

U11-C

Substrate processing for semiconductor device manufacture

In U11-C, each sub-group (-C01, -C02, -C03 etc.) covers a distinct category of processing e.g. deposition, doping, heat treatment etc. and is further divided to indicate techniques used for a particular device or technology, such as FET or gallium arsenide. For example, electrode manufacture for gallium arsenide devices is coded

in U11-C05E(-1 or -2) and U11-C05F3; in another example, forming smoothing insulating layer over interconnection structure is coded in U11-C05B9 and U11-C05D1. Aspects regarding processing apparatus are covered by U11-C09 codes.

U11-C01

Deposition of active materials (e.g. semiconductors)

U11-C01A to U11-C01H are applied for deposition using specified apparatus, with details about apparatus covered by U11-C09 codes. U11-C01J codes are used to indicate details of substrates or the nature of deposited active layers. Note that U11-C01J1 is used only when epitaxy is emphasised as an important aspect of the invention. For methods which imply epitaxial deposition e.g. molecular beam epitaxy, liquid phase epitaxy, U11-C01J1 is not used.

U11-C01A

Physical deposition of semiconductor layer

U11-C01A1 [1987]

Thermal evaporation for deposition of semiconductor layer

Arc evaporation, thermal vacuum evaporation using e.g. resistive heating, or inductive (RF) heating.

U11-C01A2 [1987]

Molecular beam, atomic beam, ion beam deposition of semiconductor layer

Includes cluster ion beam deposition. For reactive ion beam deposition see U11-C01B.

MBE

U11-C01A3 [1997]

Sputtering deposition of semiconductor layer

(U11-C01A9)

Includes deposition by glow/RF discharge, magnetron sputtering. Prior to 1997 sputtering was covered in U11-C01A9.

U11-C01A9 [1987]

Other methods of physical deposition

Includes also laser ablation.

U11-C01B

Chemical vapour deposition of semiconductor layer

For apparatus see U11-C09B and in case of plasma enhanced CVD and electron cyclotron resonance CVD, U11-C09C. Also includes reactive ion beam deposition and seeded crystallisation deposition techniques. Prior to 199201 for PECVD see U11-C01A9 and U11-C01B. Also cover Vapour phase epitaxy (VPE).

CVD, low pressure, LPCVD, PECVD, photochemical, PhCVD, atmospheric pressure, APCVD, ECRCVD, hot filament, HFCVD, metal-organic, MOCVD, organometallic, OMCVD

U11-C01B1 [1987]

Beam/mask assisted CVD of semiconductor layer

Using beam/mask defining areas of localised reactive deposition.

Laser assisted, LACVD

U11-C01C [1987]

Large surface area deposition

E.g. physical or chemical vapour deposition for solar cells (see also U12-A02A3), semiconductor memories arrays (see also U11-C18B5).

Roll to roll, continuously moving web, continuous belt

U11-C01D [1987]

Other methods of deposition of semiconductor layer

(U11-C01X)

U11-C01F [1992]

Langmuir Blodgett method

(U11-C01D)

Mono-molecular films

U11-C01H [1992]

Liquid phase deposition of semiconductor layer

(U11-C01D)

Includes sliding or sloping position liquid phase epitaxy, electrophoresis, atomised films, conversion of insulating layer (e.g. oxide) into semiconductor by immersion into solution.

LPE

U11-C01J [1987]

Nature/structure/material/composition of active layers

When method of deposition is specified, U11-C01J codes are used in conjunction with codes above (-C01A,-C01B, etc.).

U11-C01J1 [1987]

Epitaxial growth of semiconductor layer

Only used when epitaxy is emphasised as essential for method of deposition or structure described. For epitaxy by seeded crystallisation see also U11-C01B and U11-C01J8. This code is **not** used for methods of deposition which imply epitaxy e.g. molecular beam epitaxy, liquid phase epitaxy.

Single crystal layer, atomic layer epitaxy, ALE

U11-C01J2 [1987]

Semiconductor amorphous/polycrystalline film

Includes specific crystalline form e.g. HSG, spherical grain.

Thin film

U11-C01J3 [1987]

Deposition of semiconductor layers other than silicon

U11-C01J3A [1992]

Deposition of AIII-BV compound layer

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C01J3B [1992]

Deposition of AII-BVI compound layer

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C01J4 [1987]

Deposition of other inorganic semiconductor material layers

U11-C01J4A [1997]

Deposition of group IV element/compound layer

(U11-C01J4)

Silicon carbide, diamond, germanium

U11-C01J5 [1987]

Polymer, organic film structures

Macromolecular

U11-C01J6 [1987]

Heterojunction, superlattice structures, quantum wells, wires, boxes manufacture

U11-C01J6A [2006]

Strained layers and their manufacture

Manufacture of strained layers to enhance material properties such as charge-carrier mobility. For device with strained layer structure see also U12-E01B1A.

Strained silicon, strained-layer super lattice, strained layer, relaxed layer, SLS

U11-C01J7* [1987-1996]

Other active layers, electroluminescent, ferroelectric

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1996. Includes layers e.g. for bubble memories, SAW devices. For electroluminescent layer deposition see also U14-J01. For ferroelectric layer deposition e.g. for capacitor manufacture, see U11-C05G1B and U11-C05B codes.

U11-C01J8 [1987]

Characterised by substrate details

E.g. for solar cells, thin films, rugged, trenched substrate, three-dimensional structures with layers built up to include isolation regions. Includes deposition with lattice adaptation on substrate being crystalline insulating material or semiconductor material, also deposition on substrate with particular geometry e.g. grooves, holes. For selective, lateral epitaxy by seeded crystallisation see also U11-C01B and U11-C01J1. Covers also separation of epitaxial device layers (see also U11-C01J1) from substrates on which they are grown (see also U11-C04D1).

Sandwich wafer

U11-C01J8A [1997]

Substrate bonding

(U11-C01X)

Covers bonding of semiconductor layers to insulation or semiconductor substrate, forming protection film on back of wafer to prevent autodoping, (previously coded in U11-C01X). For silicon on insulator structures see also U11-C08A6. *SOI*

U11-C01J8B [1997]

Preventing lattice mismatch

(U11-C01J8)

Includes forming buffer layer for lattice compatibility.

U11-C01X

Other aspects of deposition

Covers deposition using vibrating substrate, e.g. in liquid phase deposition (see also U11-C01H), etc.

U11-C02

Doping for semiconductor device manufacture

For introducing impurities (dopant) during growth or deposition of material, U11-C02 should be used in conjunction with appropriate codes in U11-B or U11-C. Codes in this sub-class should be used in conjunction with each other. For example, ion implantation of gallium arsenide layers for MESFET using beams oriented at a certain angle is coded in U11-C02B2, U11-C02J1A and U11-C02J6 (if structure of device is novel, or in order to identify type of device, U12 codes will be also used).

U11-C02A

Diffusion, apparatus and associated techniques

U11-C02A1 [1987]

Diffusion apparatus

Electrical aspects of diffusion furnaces are also covered by X25-C codes.

U11-C02A2 [1987]

Diffusion techniques, dopant layer structures

Used only if special conditions for dopant diffusion or structures are emphasised, e.g. using masks for edge diffusion or under slanted angle. Includes diffusion from solid or gaseous phase dopant source in contact with semiconductor surface.

U11-C02B

Ion implantation, apparatus and associated techniques

Ion injection, ion bombardment

U11-C02B1 [1987]

Ion implantation apparatus

For novel aspects of ion beam apparatus. see also V05-F05A7C.

Ion source, ion beam generator, focussing, deflection, control, processing chamber

U11-C02B2 [1987]

Ion implantation techniques

Used only if special ion implantation conditions are emphasised, e.g. using masks, implantation at certain angle between ion beam and surface plane or crystal planes (to avoid channelling), etc.

Recoil implantation

U11-C02J

Doping aspects relating to substrate, structures, layers, devices being processed

U11-C02J1 [1987]

Doping non-silicon semiconductor substrate

U11-C02J1A [1992]

Doping AIII-BV compounds

Includes complex ternary and quaternary compounds

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C02J1B [1992]

Doping AII-BVI compounds

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C02J1C [1992]

Doping AIV elements and their compounds

Germanium, diamond, silicon carbide

U11-C02J1X [1992]

Doping other semiconductor materials

U11-C02J2 [1987]

Doping heterojunction structures

U11-C02J3 [1987]

Doping non-semiconductor layers, insulators, polymers

Includes e.g. implanting wiring surface prior to patterning in order to prevent formation of hillocks (see also U11-C05D3, U11-D03B2).

Macromolecular

U11-C02J4 [1987]

Other techniques and apparatus

Includes doping aspects using wave or particle treatment. Includes alloying of doping materials with semiconductor body.

Radiation-enhanced diffusion

U11-C02J5 [1987]

Doping for bipolar device manufacture

Includes doping of electrode regions, formation of buried layers.

Shallow junction

U11-C02J6 [1987]

Doping for FET manufacture

Includes doping of electrode regions e.g. using gate electrode as mask for forming source and drain.

Channel stop implants, LDD

U11-C02J7 [1987]

Doping for other semiconductor device manufacture

Capacitor, LED, solar cells

U11-C02X* [1988-1996]

Other doping

*This code is now discontinued, but remains searchable and valid for records from 1988 to 1996. See U11-C02J4 from 1997 for alloying aspects.

U11-C03

Heat, electrical, radiation treatment of semiconductor body; Apparatus

Codes from U11-C03B to U11-C03D, representing various treatment techniques, are used in conjunction with U11-C03J1 to U11-C03J3 codes for structures, and/or U11-C03J8 codes for specific materials.

U11-C03A [1987]

Heat, radiation, furnace treatment

Includes temperature control systems and apparatus for semiconductor manufacture, or substrate in vacuum processing apparatus, e.g. sputtering, CVD or etching apparatus (see also appropriate codes in U11-C09). Electrical aspects of furnaces are covered by X25-C codes.

Heater, temp, control, IR, lamp

U11-C03B	[1987]
Electron/ion beam treatment of semiconductor	
For apparatus, see also V05-F05A codes.	
U11-C03C	[1987]
Other type of treatment of semiconductor	
<i>Plasma, hydrogen plasma, electrical pulse, mechanical pulse</i>	
U11-C03D	[1992]
Laser treatment of semiconductor	
(U11-C03C)	
U11-C03E	[1997]
Radiation treatment of semiconductor	
(U11-C03B, U11-C03C)	
Includes bombardment with wave or particle radiation.	
<i>Radioactive pulse</i>	
U11-C03J	[1987]
Nature of process/techniques, structure/material being treated	
U11-C03J1	[1987]
Recrystallising semiconductor layer	
(H01L-021/324)	
U11-C03J2	[1987]
Annealing, defect control, gettering of semiconductor	
U11-C03J2A	[1992]
Annealing semiconductor layer	
<i>Rapid thermal annealing, RTA</i>	
U11-C03J2B	[1992]
Gettering, defect control of semiconductor	
Includes introducing internal imperfections, strained layers and methods for external gettering e.g. honing, sandblasting, backside damage. Covers also deep level dopants for lifetime carrier control, killer dopant (see also U11-C02 codes where doping techniques or structures are novel).	
<i>Intrinsic gettering, bulk micro defects</i>	
U11-C03J3	[1987]
Blanket treatment of semiconductor	
E.g. forming punch through implants to reduce short-channel effects in submicron CMOS (see also U11-C02B2, U11-C02J6).	

U11-C03J4	[1987]
Heat/radiation treatment for very large surface area	
E.g. for solar cell.	
U11-C03J5	[1987]
Beam treatment of localised areas on surface	
U11-C03J6	[1987]
Semiconductor heat/radiation treatment using masks, structures on substrate	
U11-C03J7	[1987]
Producing localised depth profile, and other structures by semiconductor treatment	
Includes e.g. potential barrier diffusion region below deep contact diffusion to suppress software errors produced by radiation (see also appropriate U11-C02 codes and U14-A11), inhibiting dopant diffusion in semiconductor (e.g. silicon) by using preamorphising agent (e.g. germanium) to create shallow junction with lateral containment (see also U11-C02 codes).	
U11-C03J8	[1992]
Heat/radiation treatment of non-silicon semiconductor material	
U11-C03J8A	[1992]
Heat/radiation treating AIII-BV compounds	
Includes complex ternary and quaternary compounds.	
<i>Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride</i>	
U11-C03J8B	[1992]
Heat/radiation treating AII-BVI compounds	
Includes complex ternary and quaternary compounds.	
<i>Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury sulphide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide</i>	
U11-C03J8C	[1992]
Heat/radiation treating AIV elements and their compounds	
<i>Diamond, silicon carbide</i>	

U11-C03J8X [1992]

Heat/radiation treating of other semiconductor materials

U11-C04

Lithography (photo-, beam-, etc.), masks, techniques, exposure and alignment

The following codes are no longer applied but remain valid for records prior to 199201: U11-C04A2, U11-C04A3, U11-C04A4, U11-C04A5, U11-C04C1.

U11-C04A [1983]

Resist processing, mask manufacture and inspection, and exposure control in microlithography

(G03F-007)

U11-C04A1 [1987]

Cleaning, rinsing, spin coating, developing, inspection for microlithography

From 1992 all cleaning processes not related to microlithography are covered by U11-C06A1B.

U11-C04A1A [1992]

Wafer preparation for resist coating

Includes cleaning, rinsing, drying, baking, priming or silylating.

U11-C04A1B [1992]

Wafer coating with resist for microlithography

Includes forming 'charge-up' preventing layer on top of resist.

Spin coating

U11-C04A1C [1992]

Developing, resist stripping (wet process) for microlithography

For developer materials see U11-A11.

U11-C04A1D [1992]

Plasma oxidising or ashing for microlithography

Includes resist selective removal by e.g. laser, ion beam. For apparatus, see U11-C09C.

U11-C04A1E [1992]

Testing, measurement and inspection of mask for microlithography

For inspection of lithographic layers see also U11-F01B code. For all other measurement, testing or inspection for microlithography see also U11-F01 and S02/S03 codes as appropriate.

U11-C04A1F [2005]

Resist processing

Includes all post wafer coating processes to prepare resist on wafer for lithographic exposure.

Hard bake, soft bake, surface treatment, hydrophilization, solvent evaporation

U11-C04A1H [1997]

Anti-reflective layers for microlithography

See also U11-C04E1.

U11-C04A2* [1987-1991]

Optical masks

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04E2.

Shielding layer

U11-C04A3* [1987-1991]

X-ray masks

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04H2.

U11-C04A4* [1987-1991]

Other masks

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. Includes masks e.g. for sputter apparatus. From 1992 see U11-C04F2, U11-C04G2.

U11-C04A5* [1987-1991]

Electron/particle beam apparatus

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04F1 for electron beam apparatus, and U11-C04G1 for ion beam apparatus.

U11-C04A6 [1987]

Control of exposure apparatus

From 1992 this code is used in conjunction with U11-C04E1 for control of optical exposure light source (e.g. laser, lamp), or with U11-C04F1 for control of electron beam apparatus, or with U11-C04G1 for control of ion beam apparatus, or with U11-C04H1 for control of X-ray apparatus.

U11-C04A7 [2005]

Other lithographic aspects for microlithography

Includes e.g. biological process. For Micro- and Nano imprint lithography from 2005 see U11-C04J codes.

U11-C04B [1983]

Alignment

U11-C04B1 [1987]

Producing alignment marks on substrate, mask and mark details

U11-C04B2 [1987]

Mark detection and position control signal generation in microlithography

See also S02-A03 codes for optical systems, in particular S02-A10D2 for checking of alignment.
Optical recognition, through-the-lens, TTL

U11-C04B3 [1987]

Alignment for beam equipment in microlithography

(H01L-021/027, G03F-007/20)

U11-C04C [1983]

Exposure for microlithography

U11-C04C1* [1987-1991]

Exposure source details

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U11-C04 (-E1,-F1,-G1,-H1) codes, as appropriate for type of exposure source used in lithographic process.

U11-C04C2 [1987]

Focussing control for exposure apparatus

This code is used in conjunction with other U11-C04 (-E1,-F1,-G1,-H1) codes, depending on type of exposure source used, e.g. lens focussing in laser microlithographic system is coded in U11-C04C2 and U11-C04E1.

Optical system adjustment, lens positioning

U11-C04C3 [1987]

Vertical alignment and tilt control for exposure apparatus

Through-the-lens, TTL

U11-C04C4 [2002]

Reticle and stage drive mechanisms

This code is used in conjunction with other U11-C04 (-E1,-F1,-G1,-H1) codes, depending on type of exposure source used.

Step-and-repeat, wafer stepper scan.

U11-C04C5 [2005]

Vibration control and compensation for microlithography

Includes e.g. reaction frames, balance mass, and mounts.

U11-C04D [1987]

Masking techniques for microlithography

Relates to lithographic structures on semiconductor or active layer. Until 200701 includes e.g. lift-off, sequences of masking and etching techniques to produce patterned structures on integrated circuit, and masking techniques used in non-microlithographic steps of semiconductor manufacture. From 200701 see U11-C06C for all non-microlithographic masking, along with other relevant codes, e.g. U11-C05D3 for masking techniques applied to interconnection manufacture, U11-C07D1 for masks used in etching fine details, U11-C18D and U14-K01A1C for masks used in optical filter manufacture. for LCD, etc.

Pattern transfer, Dissolving mask

U11-C04D1 [1987]

Conformal masks, lift-off techniques for microlithography

U11-C04D2 [1987]

Non-mask fine line width production for microlithography

Includes e.g. use of holograms, diffraction grating, phase segregation of metals.

Two beam interference exposure

U11-C04E [1992]

Photolithography for semiconductor manufacture

U11-C04E1 [1992]

Apparatus and method for photolithography

(U11-C04C, U11-C04C1)

Includes exposure using optical and non-ionising ultraviolet radiation (for exposure using ionising ultraviolet radiation e.g. EUV see U11-C04H codes). For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. Includes e.g. exposing peripheral portion of wafer.

Laser, UV, lamp, stepper, light source, projection, dummy wafer

U11-C04E1A [2005]

Optical elements and systems for photolithography

Includes individual lenses and mirrors as well as multiple lens/mirror systems, and other non-electrical optical elements for beam focus.

U11-C04E2 [1992]

Optical masks for photolithography

(U11-C04C2)

Includes mask repair, pellicle protection, case holders for masks (see also U11-F02), mask inspection.

Phase shifting, photomask, reticle

U11-C04F [1992]

Electron beam lithography for semiconductor manufacture

U11-C04F1 [1992]

Apparatus and method for electron beam lithography

(U11-C05A5, U11-C04C, U11-C04A6)

For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. Includes methods of avoiding 'charge up' of resist. See V05-F codes for novel details of apparatus and methods of apparatus monitoring, operation and control.

Beam modulation, electrodes

U11-C04F2 [1992]

Masks for electron beam lithography

(U11-C04A4)

Also see V05-F codes for novel electron beam lithography masks.

Stencil mask

U11-C04G [1992]

Ion beam lithography for semiconductor manufacture

U11-C04G1 [1992]

Apparatus and method for ion beam lithography

For control and focusing aspects see also U11-C04A6 and U11-C04C2 respectively. See V05-F codes for novel details of apparatus and methods of apparatus monitoring, operation and control.

U11-C04G2 [1992]

Masks for ion beam lithography

(U11-C04A4)

Also see V05-F codes for novel ion beam lithography masks.

Stencil mask

U11-C04H [1992]

X-ray lithography for semiconductor manufacture

Roentgen

U11-C04H1 [1992]

Apparatus and method for X-ray lithography

(U11-C04C, U11-C04C1)

Includes exposure using X-ray, soft X-ray and ionising ultraviolet radiation (for exposure using non-ionising ultraviolet radiation e.g. DUV see U11-C04E codes). For control and confinement aspects see also U11-C04A6 and U11-C04C2 respectively. See V05-E and V05-F codes for novel details of apparatus and methods of monitoring, operation and control.

Extreme ultraviolet, EUV

U11-C04H2 [1992]

X-ray masks

(U11-C04A3)

Also see V05-E08 codes and V05-F codes for novel X-ray, soft X-ray and EUV lithography masks.

U11-C04J [2005]

Imprint lithography for semiconductor manufacture

Includes use of stamps and presses to form pattern.

Soft lithography

U11-C04J1 [2005]

Stamp design and manufacture

U11-C04J2 [2005]

Process methods and control

U11-C04K [2005]

Immersion Lithography

Includes all apparatus and methods for exposure through a liquid. See other U11-C04 codes for type of exposure source used. For immersion fluid composition see U11-A16.

U11-C04K1 [2007]

Fluid management apparatus

Includes all apparatus associated with handling, processing and delivering fluids for immersion lithography.

U11-C04K2 [2007]

Fluid management methods

Includes all methods and processes for fluid manipulation, including measurement and monitoring aspects (see also appropriate S02 and S03 codes)

U11-C05

Layer formation

Includes insulating, passivating and conductive layers.

U11-C05A

Organic insulating layer formation

Prior to 1992 this code included new materials as well as methods and structures related to organic insulating layer. From 1992 see U11-A08A1 for new materials. See also other relevant codes, e.g. U11-C05B9 when organic layer is used for planarising interconnection structures, U14-H03A1 or U14-H03A4B4 when used for packaging mountings or multichip interconnect.

U11-C05A1 [1987]

Combined with organic materials

U11-C05B

Inorganic insulating layer deposition

U11-C05B1 to U11-C05B4 are used where apparatus and associated techniques are emphasised (see also U11-C09 codes for apparatus details); U11-C05B5 to U11-C05B8 are used for type of deposited material and substrate; e.g. CVD of a silicon dioxide layer on gallium arsenide substrate is coded in U11-C05B2, U11-C05B7 and U11-C05B8. For novel materials see U11-A08A2.

U11-C05B1 [1983]

Chemical reaction of semiconductor substrate for insulating layer formation

E.g. oxide, nitride.

Oxidation, thermal oxidation, anodic oxidation, nitridation

U11-C05B2 [1987]

Insulating layer deposition using physical/chemical vapour apparatus

For apparatus details see also U11-C09 codes.

U11-C05B3 [1987]

Localised deposition of insulating layer

Includes e.g. deposition using beam induced CVD or masks.

U11-C05B4 [1987]

Modifying materials deposited on substrate (metallic oxides)

Includes e.g. oxidation of metallic layer (e.g. forming alumina film by oxidation of aluminium layer).

U11-C05B5 [1987]

Deposited inorganic nitrogen containing insulating layers

Includes all nitrides of silicon and silicon oxide using methods in U11-C05B1, U11-C05B2 or U11-C05B3. Silicate glasses and silicon oxides without nitride content are covered by U11-C05B7.

U11-C05B6 [1987]

Chemically altered deposited layers

Alumina layer, metal nitrides, metal oxides, hafnium oxide

U11-C05B7 [1987]

Chemically altered semiconductor material and other nitrogen free dielectric layers

Includes all silicate glasses and silicon oxides without nitride content. Includes also fluoride type dielectric layers. It also covers deposition of ferroelectric film e.g. for capacitor dielectrics.

Phospho-silicate glass, PSG, BPSG, spin on glass, SOG, calcium fluoride, barium strontium fluoride, calcium strontium fluoride, silicon dioxide

U11-C05B8 [1987]

Non-silicon semiconductor substrate for insulating layer deposition

U11-C05B8A [1992]

AlIII-BV compound substrate for insulating layer deposition

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C05B8B [1992]
All-BVI compound substrate for insulating layer deposition
Includes complex ternary and quaternary compounds.
Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C05B8C [1992]
AIV element/compound substrate for insulating layer deposition
Silicon carbide, diamond

U11-C05B8X [1992]
Other non-silicon substrate for insulating layer deposition

U11-C05B9 [1987]
Characterised by sequence of steps to produce insulating layer structure, shape
Includes e.g. dielectric layer applied over interconnection structure (see also U11-C05D1), planarisation layers, passivation films, patterning, etching dielectric layers with metallic interconnection aspects (see also other relevant codes e.g. U11-C05D1, U11-C05D3). Also covers layers to prevent soft errors (inside device, rather than package adaptations). Includes post-treatment of insulating layers.

U11-C05B9A [1997]
Planarisation/protection
(U11-C05B9)
Includes e.g. dielectric layer applied over interconnect structure (see also U11-C05D01), planarisation layers, patterning etching dielectric layers with metallic interconnect aspects (see other relevant codes e.g. U11-C05D1, U11-C05D3). Also covers passivation films, films for moisture protection, etching stop layers and films for radiation protection.
Smoothing, field oxide

U11-C05B9B [1997]
Insulating side wall formation
(U11-C05B9)
Includes forming side wall spacers.

U11-C05B9C [1997]
Buried insulating film formation
(U11-C05B9, U11-C08A1)
Buried layer

U11-C05C
Electrode and interconnection layer formation
Includes methods of deposition of conductive layers. For apparatus details see U11-C09 codes. From 1997, U11-C05C codes cover specific deposition methods for superconductive films (see also U14-F02A). Prior to 1997 for superconductive film deposition see U11-C01 codes.
Silicide, polysilicon, metallisation

U11-C05C1* [1983-1986]
Interconnections
*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. See U11-C05D from 1987.

U11-C05C2 [1987]
Physical deposition of conductive layer
E.g. sputter, thermal evaporation, electron beam evaporation, etc. For apparatus see U11-C09A.
Magnetron sputter deposition, refractory metal silicide

U11-C05C3 [1987]
Reactive chemical deposition of conductive layer
For apparatus, see U11-C09B.
CVD

U11-C05C4* [1983-1986]
Electrodes
*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. See U11-C05E from 1987.
Silicide

U11-C05C5 [1987]
Localised deposition of conductive layers, selective deposition
Covers beam induced deposition or use of masks.
Anisotropic directional deposition

U11-C05C6 [1987]

Other methods of forming conductive layer

Includes electroplating, transformation of deposited layer, (e.g. semiconductor into conductor, or insulator into superconductor), deposition by solution process (electroless by chemical reaction) etc. For doping aspects related to permanent or temporary change of conductivity, e.g. reduction of contact resistance, see also U11-C02J3.

U11-C05C7 [1987]

Chemical, metallurgical details of conductive layers, using CVD, sputter deposition

Includes pre or after-treatment of deposited layer or substrate on which conductive layer is deposited.

U11-C05C9 [1983]

Other aspects of conductive layer formation

From 198701 for formation of resistive layers and bumps see U11-C05G.

U11-C05D [1987]

Interconnections (U11-C05C1)

U11-C05D1 [1987]

Nature of material

Mainly used for multilayer wiring insulating layers, e.g. for smoothing surface topography. Covers use of dielectric layers in multilayer interconnects both in integrated circuit chips and in multichip modules. Includes interlayer insulating film for mutually insulating wires (including electrodes) arranged on same plane or upper and lower wires. Includes shaping of insulator around deposited interconnection (see also U11-C05B9).

U11-C05D2 [1987]

Multilayer metallisation manufacturing techniques

Includes sequence of steps to result in multilayer structure i.e. deposition, shaping in which the techniques may be routine, but succession of steps or final structure is novel. Covers metallic layer deposited simultaneously over two differing apertures on two different levels. Includes Damascene processes.

U11-C05D3 [1987]

Lateral/vertical interconnection manufacture

Includes lithographical aspects, etching, deposition for shaping conductor, through holes to accommodate contacts to devices and contacts between levels. For opening, etching vias, windows into dielectric over region to be contacted see also U11-C07D2. Also covers filling of contact holes with conductive material or forming conductive plugs in windows. For 'back-side metallisation', vias, substrate through holes see also other relevant codes, e.g. U11-C05G2, U11-D03B3, U11-D03C3. For metallurgical aspects, e.g. electromigration, diffusion barriers, low resistance interconnection, see also U11-D03B2. Includes dual-damascene processes.

Buried interconnections, windows, contacts, step coverage, runners

U11-C05D4 [1987]

Interconnections to semiconductor device electrodes

Includes metallisation that facilitates electric current conduction to and from semiconductor device (see also U11-C05E, U11-C05F codes). For metallurgy related to e.g. electromigration, low resistance interconnections, see also U11-D03B2.

U11-C05E [1987]

Electrode manufacture (U11-C05C4)

Includes metallic, dielectric and doped semiconductor regions that form electrode with or without electrical connection thereto. For contacts to electrodes see also U11-C05D4, for metallurgical aspects see also U11-D03B2. For electrode bump see U11-C05G2B and/or U11-D03B1. If electrode structure is novel see also U12-E02.

U11-C05E1 [1987]

Ohmic, Schottky etc. electrode manufacture

For contacts to semiconductor device electrodes see also U11-C05D4, for metallurgical aspects see also U11-D03B2.

U11-C05E2 [1987]

Geometric structure miniaturisation for electrode manufacture

Includes e.g. submicron gate, T-shaped gate manufacture.

U11-C05E3 [1992]
Self-alignment for electrode manufacture
Used e.g. for self-aligned silicon gate manufacture (see also U11-C05F1), self-aligned emitter-base contacts in bipolar transistor (see also U11-C05F2).

U11-C05F [1987]
Electrode manufacture for specific device, semiconductor substrate

U11-C05F1 [1987]
Electrode manufacture for FET

U11-C05F1A [2005]
Gate insulation layer manufacture
Includes forming insulated gate structures for all MOS gated devices.

U11-C05F2 [1987]
Electrode manufacture for bipolar device
Includes electrode manufacture for diodes, bipolar transistors.

U11-C05F2A [1992]
Electrode manufacture for bipolar device with polysilicon emitter

U11-C05F3 [1987]
Electrode manufacture for non-silicon semiconductor

U11-C05F3A [1992]
Electrode manufacture for AIII-BV substrate
Includes complex ternary and quaternary compounds.
Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C05F3B [1992]
Electrode manufacture for AIV substrate
Diamond, germanium, silicon carbide

U11-C05F3D [1992]
Electrode manufacture for AII-BVI substrate
Includes complex ternary and quaternary compounds.
Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C05F3X [1992]
Electrode manufacture on other semiconductor substrate

U11-C05F4 [1987]
Electrode manufacture for heterojunction
Heterojunction gate

U11-C05F5 [1987]
Electrode manufacture for thin film transistor

U11-C05F6 [1987]
Electrode manufacture for other devices e.g. SAW, CCD, semiconductor lasers, photovoltaic, superconducting devices
This code is used in conjunction with other relevant codes to identify type of device, e.g. U14-G for SAW, U13-A02 for CCD, U14-F for superconducting devices, etc. It also includes electrode manufacture for resistors (see also U11-C05G1A), capacitors (see also U11-C05G1B).

U11-C05G [1987]
Passive component manufacture
Includes formation of resistive layers, contact bumps, fuses.

U11-C05G1
RLC component manufacture

U11-C05G1A [1992]
Resistor manufacture
For details regarding resistor structure see also U12-C03.

U11-C05G1B [1992]
Capacitor manufacture
For details regarding capacitor structure see also U12-C02 codes.

U11-C05G1C [1992]
Inductor manufacture
For details regarding inductor structure see also U12-C03.

U11-C05G2 [1987]
Fuses, contact bumps and pads, vias manufacture for semiconductor device

U11-C05G2A [1992]

Fuses manufacture

Includes antifuse manufacture. See also U12-C04 for fuse structure after 2002. Prior to 2002 see U11-D03B2A.

U11-C05G2B [1992]

Contact bumps, bonding pads manufacture

See also U11-D03B1 for metallurgical details.

U11-C05G2C [1992]

Vias, pillars, studs manufacture

See also U11-C05D3, U11-D03C3, U11-D03B9. Includes e.g. back side metallisation (see also U11-D03B9) and metallised vias through ceramic substrate for HF circuits.

'plated through holes', plug

U11-C05X [1992]

Other aspects of layer formation

U11-C06

Mechanical treatment, surface chemical treatment of semiconductor substrate and beam lead manufacturing techniques

U11-C06A [1987]

Mechanical and surface chemical treatment

U11-C06A1 [1992]

Cleaning, polishing or grinding

(U11-C04A1)

Prior to 1992 all cleaning processes are covered by U11-C04A1. From 1992 for cleaning processes relating to microlithography see U11-C04A1A. For cleaning leads after package encapsulation see U11-E02B. For materials involved e.g. polishers, abrasives, etc. see also U11-A10.

U11-C06A1A [1992]

Grinding, bevelling, lapping, polishing

U11-C06A1B [1992]

Cleaning

(U11-C04A1)

Includes drying of wafer after cleaning process. Includes dry cleaning e.g. electrostatic. It also covers native oxide removal, but not etching of previously deposited Insulating layer. Includes cleaning apparatus but excludes cleaning of processing apparatus or package.

U11-C06A1C [2002]

Process endpoint detection for cleaning, polishing or grinding

U11-C06A2 [1992]

Cutting, dicing

Includes wafer production by crystal slicing or sawing, also dice preparation from wafer by scribing, making grooves, cracking, cleaving, breaking or cutting. For 'sticky-back' adhesive tape which holds wafer in place while cutting it into separate dice see also U11-F02A2.

Grind, groove, slice, divide

U11-C06B [1987]

Beam lead device manufacturing techniques

See also U11-C08A5 when beam lead technique is used as isolation method between circuit elements. See also U11-C05D4 or/and U11-D03A1 codes when metallisation process is emphasised as main part of lead beam technique. Also includes manufacture of other structures on wafer usually assembled after dicing, e.g. lenses and encapsulant structures.

U11-C06C [2007]

Masking techniques unrelated to microlithography

Masks and masking techniques for general etching, deposition or treatment, for semiconductor manufacture. Before 2007 see U11-C04D for all masking, along with other relevant codes, e.g. U11-C05D3 for masking techniques applied to interconnection manufacture, U11-C07D1 for masks used in etching fine details, U11-C18D and U14-K01A1C for masks used in optical filter manufacture for LCD, etc.

U11-C07

Etching; Chemical treatment for semiconductor manufacture

Includes processes, e.g. dry, wet, beam etching to produce patterned structures. Also covers nature of material being etched and techniques to obtain intended etched structure.

U11-C07A [1983]

Dry etching

For microlithography, e.g. plasma ashing, see U11-C04A1D.

U11-C07A1 [1987]
Reactive vapour, plasma-assisted etching techniques

Includes reactive ion etching, sputter etching and ion milling, plasma etching, reactive ion beam etching. For apparatus, see also U11-C09C. For etchant composition see also U11-A10.

U11-C07A2 [1987]
Using optical or particle beam to induce localised etching in ambient atmosphere of reactive gas

Includes e.g. selective laser induced etching (e.g. for metal-interconnection etching, where laser beam cracks oxide formed on metal surface prior to reactive etching).

U11-C07A3 [1987]
Detecting dry etching completion
Includes instrumentation and control. See also appropriate S02-A codes.
Monitor, endpoint

U11-C07A4 [1987]
Laser or beam scribing, usually using air/inert atmosphere
Used also for fuse cutting or melting by laser (see also U11-D03B2), circuit trimming or repair (see also U11-C19A). For apparatus see also V05-F05A1.
Pattern, surface, trim, laser zapping

U11-C07B [1987]
Other wet-etching
Includes apparatus used for wet etching. For etchant composition see also U11-A10. For wet etching intended as cleaning process see also U11-C06A1B. For microlithography see also U11-C04A1 codes.
Solution, tank, water, fluid, acid, spray etching, aerosol jet, electrolytic etching

U11-C07B1 [1987]
Detecting wet etching completion
Includes instrumentation and control. See also S02-A codes.
Monitor, endpoint

U11-C07C [1987]
Nature of materials being etched

U11-C07C1 [1987]
Etching silicon
For polysilicon used as conductive layer, or in gate manufacture see also U11-C07C2.

U11-C07C2 [1987]
Etching conducting layers

U11-C07C3 [1987]
Etching insulating layers

U11-C07C4 [1987]
Etching non-silicon semiconductor

U11-C07C4A [1992]
Etching AIII-BV compounds
Includes complex ternary and quaternary compounds.
Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C07C4B [1992]
Etching AII-BVI compounds
Includes complex ternary and quaternary compounds.
Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C07C4C [1992]
Etching AIV elements and their compounds
Excludes elemental silicon.
Silicon carbide, diamond

U11-C07C4X [1992]
Etching other semiconductor material

U11-C07C5 [1987]
Etching thin film
Layer

U11-C07D [1987]
Etching techniques
Includes techniques for specific objectives.

U11-C07D1 [1987]
Etching to produce finer details
Includes use of sequence of etch and mask stages. For lift off see also U11-C04D1.

U11-C07D2 [1987]
Etching to produce taper or structural profiles of deposited layers on substrate

U11-C07D3 [1987]
Planarisation by etching
Includes e.g. etching followed by smoothing layer (which may be also covered by U11-C05B9A).
Smoothing layer

U11-C07D4 [1992]
Etching to produce trenches, grooves in semiconductor substrate
(U11-C07D9)

U11-C07D9 [1987]
Other etching aspects

U11-C08
Isolating IC components

U11-C08A [1987]
Methods for isolating IC components

U11-C08A1 [1987]
P-N junction for isolating IC components
From 1997 buried insulating layer is coded in U11-C05B9C.
Diode isolation, buried layer

U11-C08A2 [1987]
LOCOS or local substrate chemical reaction for isolating IC components
Bird's beak, sidewall masked isolation, SWAMI, sealed interface local oxidation, SILO, selective polysilicon oxidation, SEPOX

U11-C08A3 [1987]
Dielectric, polycrystalline silicon trench for isolating IC components
Includes trench refilling with dielectric or e.g. polysilicon. If used as sidewall isolation e.g. for SOI structures, P-N junction structures, see also U11-C05B9B, U11-C08A6 and U11-C08A1 codes as appropriate.
Buried oxide, BOX

U11-C08A4 [1987]
Dielectric isolation process (sacrificial substrate) for isolating IC components
Dielectric islands, epitaxial passivated IC, EPIC

U11-C08A5 [1987]
Other methods for isolating IC components
Includes proton bombardment, combination of above methods. Includes air gaps for isolation.

U11-C08A6 [1992]
Semiconductor on insulator
(U11-C08A5, U13-D)
Includes bonded wafers (see also U11-C01 and U11-C01J8A), full isolation by porous oxidised silicon (FIPOS), zone melted recrystallisation (ZMR), separation by silicon implanted buried oxide layer (SIMOX). See also U11-C08C for recrystallisation over insulating layers, selective epitaxial growth.
SEG, epitaxial lateral overgrowth, ELO, SOI, silicon on sapphire, SOS

U11-C08B [1987]
IC component isolation characterised by non-silicon semiconductor substrate

U11-C08B1 [1992]
Isolating IC components on AIII-BV substrate
Includes complex ternary and quaternary compounds.
Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium nitride, cubic boron nitride

U11-C08B2 [1992]
Isolating IC components on AII-BVI substrate
Includes complex ternary and quaternary compounds.
Mercury sulphide, cadmium mercury telluride, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium sulphide

U11-C08B3 [1992]
Isolating IC components on AIV element/compound substrate
Silicon carbide, diamond

U11-C08B9 [1992]
Isolating IC component on other substrate material

U11-C08C [1987]

Isolating IC component combined with subsequent further semiconductor material deposition

Includes recrystallisation of semiconductor over insulating layers (see also U11-C03J1), 3-D structures (see also U13-D05), selective epitaxial growth/epitaxial lateral overgrowth.

SEG, ELO

U11-C09 [1983]

Sputtering, vapour deposition, plasma etc. apparatus for semiconductor processing

From 1997 vacuum apparatus for semiconductor processing is covered by U11-C09Q. For electrical details see also X25-A04 codes. For generic deposition process masks use appropriate U11-C09 code with U11-C06C, and for specific material deposition use U11-C06C with other U11-C codes.

Chamber, vessel, gas, vacuum, holder, wafer boat

U11-C09A [1987]

Sputtering and other physical deposition apparatus

Includes targets, power supply and control. Also covers apparatus for thermal evaporation. See also V05-F05C codes.

Chamber, vessel, gas, vacuum, holder

U11-C09B [1987]

Chemical vapour deposition apparatus

For Plasma enhanced CVD apparatus, electron cyclotron resonance CVD apparatus see also U11-C09C. Also cover vapour phase epitaxy (VPE) apparatus.

CVD, PECVD, ECRCVD, vertical reactor

U11-C09B1 [2002]

Gas delivery head details for chemical vapour deposition

Showerhead, gas flow

U11-C09C [1987]

Plasma, reactive ion apparatus

Includes dry etching apparatus (see also U11-C07A1), and apparatus for plasma activated CVD (see also U11-C09B). See also V05-F05C codes.

Microwave, source, generator, PECVD, ECRCVD

U11-C09D [1992]

Molecular beam epitaxy apparatus

(U11-C09X, U11-C01A2)

Includes molecular beam and ion beam apparatus.

U11-C09E [2002]

Sintering/curing furnaces

Details of furnaces used for ceramic sintering, photoresist/other layer baking/drying, or encapsulant curing. For all other heating methods and equipment for semiconductor manufacture see U11-C03A.

U11-C09F [1987]

Cleaning and maintenance of apparatus

Refers mainly to apparatus covered by U11-C09 codes.

Surface-trap, particle

U11-C09F1 [2006]

Testing of manufacture apparatus

See also U11-C09 codes for type of apparatus being tested.

Fault diagnosis

U11-C09G [2010]

Laser Treatment apparatus

Includes all laser treatment apparatus used for manufacturing semiconductor devices. If used for heating a semiconductor substrate or wafer then also see U11-C03D.

U11-C09M [1997]

Multi-chamber apparatus for semiconductor processing

(U11-C09)

Includes self-contained apparatus with several rooms for various processes e.g. cleaning, deposition, etching.

U11-C09Q [1997]

Vacuum equipment and pumps for semiconductor processing

(U11-C09)

Prior to 1997, for vacuum equipment see U11-C09.

General pumps, vacuum, holder

U11-C09X [1987]

Other apparatus for semiconductor processing

U11-C10 [2005]

Prevention of charge build-up on wafer

Includes methods and apparatus for removing charge build-up on wafer which can cause incorrect operation of apparatus or damage to wafer during e.g. plasma process, charged particle beam lithography and charged particle beam microscopy. See also U11-F01B1 and S01 codes for monitoring of wafer charging.

Plasma damage

U11-C11 [2005]

Pattern formation using scanning tunnelling microscope

Includes e.g. patterning, localised deposition and oxidation using scanning probe microscopes and other analogous microscopy techniques. Use in conjunction with other U11-C codes where applicable to particular process (e.g. U11-C11 and U11-C05C5 for localised deposition of conductive layer using SPM). Does not include microscopy per se, see S03-E02F codes and U11-F01B4 for application to semiconductor wafer measurement. See V05-F codes for novel apparatus and methods of apparatus monitoring, operation and control.

Scanning probe microscope, SPM, scanning tunnelling microscope, STM, atomic force microscope, AFM

U11-C12 [2006]

Self-assembly monolayers

Includes self-assembled monolayer deposition of all material types for semiconductor manufacture.

SAM, viral deposition

U11-C13 [2007]

Nano scale structure formation and deposition

U11-C15 [1987]

General aspects of semiconductor manufacture

U11-C15A [1992]

Wafer identification, shaping

Includes wafer labelling and reading wafer markings. Covers also shaping, bevelling wafer edges (see also U11-C06A1A). For marking IC package see U11-E02B. For marking defective chips on wafer as result of testing procedure see U11-F01D.

Wafer tracking, optical character recognition, bar code

U11-C15B [1992]

Semiconductor plant and facilities

U11-C15B1 [1997]

Semiconductor equipment and clothing

(U11-C15B)

Includes systems for air conditioning, filtering, hazardous gas leak monitor. Covers protective clothing and anti-static materials used in clean room.

Air conditioning, filtering, environmental control, anti-static systems, gas supply, hazardous gas leak monitor

U11-C15B3 [1997]

Water purification

(U11-C15B)

Water purification

U11-C15C [1992]

Semiconductor manufacture process control

For large scale process control, not for single processes. See also T01-J07B2 for computerised control systems.

Production management

U11-C15D [2006]

Control and monitoring of single or specific process/apparatus only

Includes automated fluid/gas control systems. See also U11-F01B and S02/S03 codes for film measurement. See U11-C04 codes or U11-C03A for control of lithography or temperature respectively. For process control of complete production facility and multiple processing stages see U11-C15C and T06 and T01 codes.

Feedback

U11-C15Q [1997]

Waste reprocessing and disposal in semiconductor processing

(U11-C15X)

Includes exhausts and exhaust management systems. For vacuum pumps and systems associated with exhaust and gas removal see also U11-C09Q. Prior to 1997 see U11-C15X.

U11-C15X [1992]

Other semiconductor plant aspects

U11-C18 [1987]

Multistep processes for semiconductor device manufacture

U11-C18A	[1987]
Complete manufacture of transistor devices	
This code is used for a sequence of steps with claims encompassing several of the above sections. For phototransistor manufacture see U11-C18B4. For BiCMOS complete manufacture see U13-D03B2. For CMOS manufacture see U13-D02A.	
U11-C18A1	[1992]
Thin film transistor manufacture	
(U11-C18)	
For TFT manufacture for active matrix LCD see also U14-H01A and/or U14-K01A2B.	
U11-C18A2	[1992]
Bipolar transistor manufacture	
This code may be used in conjunction with U12-D01A codes to identify type of transistor.	
U11-C18A3	[1992]
Unipolar transistor manufacture	
This code may be used in conjunction with U12-D02A to U12-D02X codes to identify type of transistor.	
<i>FET</i>	
U11-C18B	[1987]
Multistep processes for manufacture of electronic devices other than transistors per se	
Capacitor manufacture is covered by U11-C05G1B, resistor manufacture by U11-C01G1A, inductor manufacture by U11-C05G1C. For Hall-effect device, galvanomagnetic device manufacture, see U12-B01 codes.	
U11-C18B1	[1992]
Complete manufacture of diode devices	
Photodiode manufacture is covered by U11-C18B4.	
U11-C18B2	[1992]
Complete manufacture of thyristor devices	
U11-C18B3	[1992]
Complete manufacture of charge coupled devices	

U11-C18B4	[1992]
Complete manufacture of optoelectronic devices	
Includes manufacture of monolithic and thin film photosensitive device e.g. photodiode, phototransistor, light emitting diode, laser diode, integrated optics. Laser diode manufacture is also covered by U12-A01B2. For LED manufacture see also U12-A01A2.	
<i>OEIC</i>	
U11-C18B5	[1992]
Complete manufacture of memory	
See also appropriate codes in U13-C, U13-D and/or U14.	
U11-C18B9	[1992]
Complete manufacture of other devices	
Includes manufacture of e.g. SAW devices (see also U14-G), field emitting structures (see also U12-B03D), superconductive devices (see also U14-F02B), photovoltaic devices (see also U12-A02).	
U11-C18C	[1987]
Mechanical structures e.g. membranes etc., transducers manufacture	
See also U12-B03E or U12-B03F.	
<i>Pressure diaphragm, anisotropic, pressure</i>	
U11-C18D	[1987]
Optical filter, lens array manufacture	
Includes e.g. filters for CCD, transparent conductive layers for e.g. LCD, integrated optics. See also U14-H01E for thin-film spin-coated or dipped layers. Includes pixel/colour filters, lithography for general imager/display use.	
U11-C19	[1992]
Trimming, circuit repair, safety circuits for semiconductor device	
(U11-C20)	
U11-C19A	[1992]
Circuit repair and redundant circuitry for semiconductor device	
Includes late stage tailoring, cutting fuses with laser, focused ion beam (see also U11-C07A4), or opening fusible links with high current. For circuit repair by localised deposition see also U11-C05C5. For trimming thin/thick film for hybrid circuit see U14-H04B3B. For repair of integrated circuits using redundant circuitry. For memory redundancy see U14-D01A.	
<i>Laser zapping</i>	

U11-C19B [1992]

Method of securing IC from unauthorised copying and use

Includes narrow circuit cuts in metallised connections lines, disordering lattice structure or changing the doping level of a semiconductor region, by using e.g. laser or ion beam. For package adaptations see U11-D01C4.

U11-C20

Other aspects of semiconductor manufacture

U11-D

Packages, mountings and terminals for semiconductor devices

Includes on-chip interconnection layout and metallurgical details.

U11-D01

Containers, enclosures and housing for semiconductor device

From 1997 sockets, connectors, holders for semiconductor devices are coded in U11-D01Q and V04-K02.

U11-D01A [1987]

Integrated circuit packages and mountings

Includes substrates, mountings, e.g. ceramic, glass, metallic, used in packaging. Multilayer circuit packages, e.g. high density interconnect, are covered by U14-H03A1, U14-H03A4, and also, where appropriate, U11-D03C3 and/or U11-D03B codes. See also U14-H03C for high grade ceramic substrate, e.g. aluminium nitride. Multilayer ceramic substrates are also covered by U14-H03B codes for materials/structure.

U11-D01A1 [1987]

Lead frame or brazed type ceramic/resin encapsulated/metallic packages

Includes packages for both through hole and surface mounted devices (see also U11-D01A3). Prior to 199201 brazed type packages are covered by U11-D01A9.

Case, dual in line package, DIP, single in line package, SIP, zigzag in line, ZIP, CERDIP, CERQUAD, pin insertion type, chip in tape, TAB, anodised aluminium, hollow package, LOC, lead on chip

U11-D01A3 [1987]

Leadless/Surface mounting for semiconductor packages

Includes leadless with via holes, but leadless arrays with stand-offs, e.g. pad grid arrays, are also covered by U11-D01A5. Prior to 199201 for chip carrier package see U11-D01A. For sockets for surface interconnect package to board see U11-D01 and V04-B01 or V04-K02. For flip-chip process and package see U11-E01C.

Surface mounted device, SMD, small outline integrated circuit, SOIC, flat pack, chip carrier, plastic leaded chip carrier, PLCC, gull-wing leads, TAB package, chip in tape, plastic quad flat pack, PQFP, ball grid array, BGA

U11-D01A3A [1997]

Chip on board packages

Includes direct attachment with protective polymer overcoat (see also U14-H03A3).

COB, glob top

U11-D01A4 [1992]

High frequency packages

(U11-D01A9)

Includes packages for high speed IC with large number of transmission and power lines. See also U14-H03C2 for microstrip/stripline circuitry and/or U11-D03B9 for metallurgical details. For terminals for high frequency devices see U11-D03A6.

Microwave, MMIC package

U11-D01A5 [1987]

High pin count packages

E.g. pin/pad grid arrays, and high ball count BGAs (see also U11-D01A3).

Pad grid array, PGA, BGA

U11-D01A6 [1992]

Multichip modules, high density packages

(U11-D03D, U14-H03C3)

For multichip PGA modules see also U11-D01A5.

For high-density package mountings, e.g. high density interconnect, see U14-H03A1 and/or U14-H03A4, with manufacture covered by the appropriate subclasses in U11-C05D, U11-D03B, U11-D03C, U14-H04A. For hybrid circuit package see also U14-H03C3.

MCM

U11-D01A7 [1987]

Low profile card type packages for e.g. un-encapsulated IC

Includes package for 'smart' card (see also T04-K). See U14-H01D for thin film aspects.

U11-D01A8 [1987]

Wafer level packages

Includes chip packaging on wafer.

U11-D01A9 [1987]

Other types of packages

Includes e.g. transistor outline (plug type) package and bare chips (unpackaged).

TO package

U11-D01B [1987]

Discrete device package structure

Aspects regarding terminals for low/high power devices are covered by U11-D03A4/U11-D03A5.

Seal

U11-D01B1 [1987]

Two terminal packages

For LED packages see U12-A01A4, for laser diode package see U12-A01B3, for solar cell see U12-A02A1, for photodiode package see U12-A02B3.

Diode

U11-D01B3 [1987]

Three or more terminal packages

Includes bridge rectifier. For phototransistor package see U12-A02B3.

Transistor, bipolar, FET

U11-D01C [1987]

Special package adaptations

Includes package getters.

U11-D01C1 [1987]

Window structures e.g. for image sensors, ROM's

Glass, pick-up, light, transparent, translucent, UV erasable memory

U11-D01C2 [1992]

Package protection against radiation

Includes protection against e.g. light, alpha radiation, etc.

U11-D01C3 [1992]

Package protection against electrostatic discharge

(U11-D03C1)

See X25-S for general applications for static electricity prevention.

U11-D01C4 [1992]

Package protection from inspection and reverse engineering

(U11-D01C9)

Includes e.g. security coatings and/or other adaptation to prevent unauthorised reproduction of the integrated circuit.

U11-D01C5 [1997]

Electromagnetic shielding for semiconductor packages

(U11-D01C9)

U11-D01C6 [1997]

Thermal protection for semiconductor packages

(U11-D01C9)

U11-D01C9 [1987]

Other special package adaptations

Includes e.g. special moisture barrier, protection against short-circuit. For fire retardant barriers. Hermetic seal structures (for sealing process see also U11-E02A2)

U11-D01Q [1997]

Sockets, connectors and holders

(U11-D01)

Previously coded in U11-D01. For conversion sockets. Sockets, connectors, holders for semiconductor devices are also coded in V04-K02. See also appropriate package code.

U11-D02

Cooling, heating and ventilating arrangements for semiconductor packages

See V04-T03 codes for cooling/heating of electronic equipment in general.

Fin, heat sink, block, radiate, coolant, liquid

U11-D02A [1987]

High power thyristor, transistor, rectifier cooling arrangements

U11-D02A1 [1987]

Stacks, installations cooling

U11-D02B	[1987]
Medium power transistor modules and heat sinks	
Includes materials that facilitate heat transfer.	
U11-D02B1	[1987]
Internal cooling structures on chip or within package	
Includes permanent, non-removable heat sinks.	
U11-D02B2	[1987]
External heat sink mounted on package	
Includes mainly detachable heat sinks.	
U11-D02C	[1987]
Cryogenic - for photodetector or superconductor electronics	
Search with U14-F for superconductor aspects. See X25-V for electrical aspects of cryogenic system per se.	
<i>Cryostat</i>	
U11-D02D	[1987]
Cooling for surface mounted chip assemblies, modules, chip on substrate	
U11-D02D1	[1992]
Cooling arrangements with heat transfer by fluid means	
U11-D02D2	[1992]
Cooling arrangements with Peltier element	
U11-D02E	[2007]
Heating arrangements for semiconductor package	
Includes package structures, internal or external to cause or facilitate heating within a semiconductor package.	
U11-D03	
Lead-frames, terminals, interconnections, wiring layout	
U11-D03A	[1983]
Lead and terminal arrangements	
U11-D03A1	[1987]
Lead frames; Carrier tapes (structure, manufacture)	

U11-D03A1A	[1992]
Lead frames	
For transporting, handling lead frames see also U11-F02A. Materials, e.g. metallic alloys, are also covered by U11-A08B and U11-D03B. Includes manufacture, although if particular aspects of manufacture are emphasised, other relevant codes may be used, e.g. U11-C05C6 for electroplating.	
U11-D03A1B	[1992]
Carrier tapes	
Includes leads in insulating substrates, e.g. tapes for TAB; multilayer metal beam tape e.g. for area array TAB. Also covers editing or cutting to remove defective pattern units from TAB tape and to rearrange remaining desired portions. For carrier tapes for transporting semiconductor device packages see U11-F02A4.	
<i>ATAB</i>	
U11-D03A2	[1987]
Connection details between lead frame and chip terminals	
Includes wire and gang bonding (see also U11-E01A, U11-E01B respectively). For bonding pads, bump terminals, e.g. raised pad on bonding tape, see also U11-D03B1.	
U11-D03A3	[1987]
Details of other types of terminals for IC packages	
Includes aspects regarding shape of leads, pins. For forming leads after encapsulation see U11-E02B.	
<i>J leads, gull-wing leads</i>	
U11-D03A4	[1987]
Terminals for low/medium power diodes and transistors	
U11-D03A5	[1987]
Terminals for higher power diodes/transistors/thyristors	
U11-D03A6	[1987]
Terminals for high frequency devices	
<i>Microwave</i>	
U11-D03A9	[1987]
Other types of connection to chips	
For solder preforms see also U14-H03A2 (hybrid circuits). See also V04-A06 for direct connections to PCBs using conductive adhesives, and V04-A11 for direct connection using anisotropic connectors.	

U11-D03B [1983]
Metallurgical connections, materials, structure, details of interconnections on or within chip, bonding pads, wire bonds

U11-D03B1 [1987]
Terminals to chip, bonding pads, wire bonds, bonding wire, bump terminals
Includes flip chip pads (see also U11-E01C). For complete manufacture of contact bumps or bonding pads see U11-C05G2B.
Ball limiting metallurgy, BLM, top surface metallurgy, TSM

U11-D03B2 [1987]
Metallurgical aspects of interconnections within chip, packaging
Includes forming of diffusion barrier, e.g. titanium nitride, titanium tungsten, to prevent spiking, methods and structure to prevent electromigration, e.g. slits in bent wiring section etc. Also includes metallurgical aspects related to electrodes. Covers structure which ensures minimum resistance interconnections, also air-bridges, fuses (for fuse manufacture, see U11-C05G2A).
Electromigration, air bridges

U11-D03B2A* [1997-2001]
Fuses, antifuses
(U11-D03B2)
*This code is now discontinued, but remains searchable and valid for records from 1997 to 2001. See U12-C04 from 200201. For manufacture of fuse see U11-C05G2A.

U11-D03B3 [1987]
Metallurgy, solder, conductive adhesive connecting chip base to substrate or lead-frame
Includes forming conductor patterns on ceramic, glass based packaging, joints or bonds in multilayer packages between metallised components such as pins, leads or heat sinks and ceramic substrates. Covers joining metal-ceramics when, e.g. attaching lids to ceramic package (see also U11-E02A2). Also includes adhesives for die bonding (see also U11-E02A3).
Plated heat sink, eutectic alloying, self-soldering, solder reflow, solder mask

U11-D03B9 [1987]
Other metallurgical aspects
Includes high frequency monolithic signal transmission lines (see also U14-H03C2 and, where appropriate, U11-D03C1, U11-D03C3), wafer scale and thin film circuit multilayer interconnection. Also covers back-side metallisation for MMIC.
Microstrip

U11-D03C [1987]
Integrated circuit wiring details
Includes layout, logic, signal transfer and multichip interconnection details. See also corresponding U13 and U14 codes where appropriate.
Cell

U11-D03C1 [1987]
Power supply, grounding details, wiring layout
Includes analogue wiring, capacitors or other passive components, protection fuses fixed inside package, I/O pad layout, wiring reconfiguration, wafer test pad wiring layout e.g. for built-in testing (see also U11-F01D2). For design aspects regarding wiring layout see U11-G.

U11-D03C1A [1997]
Wiring layout, power supply
(U11-D03C1)
Includes analogue wiring, I/O pad layout, wiring reconfiguration, wafer test pad wiring layout e.g. for built-in testing (see also U11-F01D2). For design aspects regarding wiring layout see U11-G.

U11-D03C1B [1997]
Passive elements within package
(U11-D03C1)
Includes by-pass capacitors or other passive components, protection fuses fixed inside package.
Decoupling capacitor

U11-D03C2 [1987]
High density digital wiring
Includes wiring for gate arrays (see also U13-C04D).
Master-slice

U11-D03C3 [1987]
Power/signal transfer
Includes e.g. opto-electronic, inductive, capacitive, feed-through arrangements for high speed devices. For multichip high-density interconnect see also U14-H03A1 and/or U14-H03A4.

U11-D03C3A [1997]

Noise reduction

For noise reduction interconnections, and removal of cross talk, coupling/decoupling capacitance.

Cross talk, Parasitic capacitance

U11-D03C3B [1997]

3-D interconnection, chip on chip

Includes e.g. opto-electronic, inductive, and capacitive feed through arrangements for high speed devices. For multi-chip high density interconnect see also U14-and/or U14-H03A4. Also includes interconnects for spherical ICs.

U11-D03D [1987]

Other metallurgical aspects of lead frames

U11-E

Assembly for semiconductor package

U11-E01

Attaching leads to semiconductor package

U11-E01A [1983]

Wire bonding for semiconductor package

For wire material see also U11-A08B and U11-D03B1. Includes e.g. thermosonic and thermocompression bonding.

Capillary

U11-E01B [1987]

Tape automated bonding for semiconductor package

Includes inner and/or outer lead bonding by, e.g. thermosonics, thermocompression, laser bonding. Also covers beam lead bonding. For carrier tape structure and manufacture, see U11-D03A1B.

TAB, Bread-board, ILB, OLB, gang bonding

U11-E01C [1992]

Flip chip technology for semiconductor package

Contact bump manufacture is covered by U11-C05G2B. For metallurgical aspects relating to bumps, e.g. ball limiting and/or top surface metallurgy, see also U11-D03B1.

Controlled collapse bonding, CCB, controlled collapse chip connection, C4, face down

U11-E01X [1987]

Other methods for attaching leads to package

Covers e.g. cleaning aspects related to lead attaching, fitting PGA pins, etc.

U11-E02

Mounting; Encapsulating; Filling

U11-E02A [1987]

Encapsulation

For non resin or metallic encapsulation.

Seal, glass, glaze

U11-E02A1 [1987]

Resin encapsulation

Includes mould design, manufacture, materials. Also covers coatings to protect stress sensitive areas, e.g. wires or die during encapsulation. If mentioned covers are meant to improve radiation immunity, see also U11-D01C2. For encapsulant materials see U11-A07.

Transfer moulding

U11-E02A2 [1987]

Package assembly. Attaching covers, joining dissimilar materials

Includes CERDIP technology to ensure hermetic seal ceramic packages. For joining metal-ceramic interfaces see also U11-D03B3.

Alignment, airtight seal, hollow package

U11-E02A3 [1987]

Handling chip, die bonding

Includes die attachment to appropriate mount media, e.g. paddle of lead frame or refractory ceramic packages. If die attach pad is novel, e.g. for reducing die stress in semiconductor die assembly, see also U11-D03A1. For metallurgical aspects of eutectic, solder or polymer die bonding see also U11-D03B3. For positioning aspects see also U11-F02B.

Wafer, slice

U11-E02A9 [1987]

Other encapsulation details

Includes e.g. positioning of chip in rapport with predeterminable stress factors to reduce voltage offsets, marking TAB before encapsulation, forming lens on package, etc. Also includes use of phosphor within package encapsulant e.g. for white light LED (see also U12-A01A4A).

U11-E02B [1987]

Processes undertaken after encapsulation

Includes opening package for internal inspection and package repairs.

U11-E02B1 [1997]

Shaping and trimming leads

(U11-E02B)

Includes isolation of leads and paddle from each other and frame, i.e. lead frame trimming, lead forming. Also covers forming shorting bar protection to prevent lead deformation during transport, lead cladding or solder application to outer leads.

Cut, bend, press, shape, soldering barrier, chip carrier ring

U11-E02B3 [1997]

Cleaning and marking package

(U11-E02B)

Includes cleaning, deburring and marking package.
Mark, deflashing, deburring

U11-F

Measuring; Positioning for semiconductor technology

U11-F01 [1983]

Measuring; Testing (including sorting) for semiconductor technology

See also S01-G01, S01-G02, for testing electrical properties. For checking store/memory operation see also U14-D. Measurement of non-electrical properties, e.g. dimensions, flaw detection etc., is also coded in S02 and S03 as appropriate.

U11-F01A [1983]

Measuring material properties for semiconductor manufacture

U11-F01A1 [1992]

Doping and carrier transport related measurements

Includes measuring doping level, concentration, minority carrier lifetime, carrier mobility, semiconductor wafer conductivity. See also S03-E02 codes.

Deep level

U11-F01A2 [1992]

Measuring level and nature of defects in semiconductor material

Includes measurements related to e.g. stacking faults, dislocations, inherent stress in material.

Oxidation-induced stacking fault, OSF

U11-F01A3 [1992]

Surface topography measurements for semiconductor processing

See also S02-A codes.

Flatness, curvature, profile, smoothness

U11-F01A4 [1992]

Measurements of physical parameters, e.g. temperature for semiconductor processing

Includes measurements for various processes in semiconductor manufacture, e.g. annealing, deposition. See also S03-B, S03-A codes.

U11-F01A5 [1997]

Chemical composition measurement for semiconductor processing

Bragg diffraction testing for semiconductor wafer. Also includes impurity analysis.

Spectroscopy

U11-F01A9 [1992]

Other measurements for semiconductor processing

Includes energy bandgap measurement. Covers also dielectric test (e.g. measuring relative dielectric constant). For crystal structure.

U11-F01B [1983]

Film parameter measurement for semiconductor processing

U11-F01B1 [1987]

Measuring during semiconductor manufacturing process, within reaction vessels

In situ

U11-F01B2 [1987]

Measuring using beam scanning

Includes measurements related to point defects, e.g. dust on wafer surface. For optical inspection in general see S03-E04 codes. In particular, S03-E04F codes cover optical techniques for flaw detection or contamination. For Electron beam microscopy see also U11-F01B4 and V05-F01 codes as appropriate. See also V05 codes for novel electron beam methods and apparatus aspects.

U11-F01B3 [1987]

Measuring using image recognition

See T04-D codes also.

Pattern, memory, compare, discriminate

U11-F01B4 [1997]

Optical or electron microscopy for semiconductor processing

(U11-F01B9)

Includes visual inspection. For electron microscopy at film level. For electron microscopes per se see also S03-E06B1 and V05-F01 codes.

U11-F01B5 [1997]

Film thickness measurement for semiconductor processing

(U11-F01B)

Includes measuring thickness of deposited layer, profile of semiconductor structure. (See also S02-A02 codes). Prior to 199701 see U11-F01B.

U11-F01B6 [2007]

X-ray testing for semiconductor package

Includes all testing of semiconductor chip at package level.

U11-F01B7 [2007]

X-ray testing for semiconductor processing

Includes testing at wafer level during manufacture using X-ray equipment. See also U11-F01D3 for test apparatus.

U11-F01B9 [1987]

Other measuring/testing aspects for semiconductor processing

U11-F01C [1983]

Semiconductor device testing

Includes measurements on individual semiconductor chips, after separation from wafer and/or individual module package. Measurements at internal circuit nodes for wafers are covered by U11-F01D. If details regarding type of testing are emphasised, see appropriate code in U11-F01C and U11-F01G. For on-chip testing, e.g. built-in test, see U11-F01D2, U13-C07, U21-C03D.

Known good die

U11-F01C1 [1987]

Probes, connector apparatus for semiconductor device testing

Includes probe heads, contact parts, e.g. clips, sockets, liquid or conductive rubber contacts, connection to mount, strip line. See also S01-G02B5 and S01-H03 codes. Probes for testing semiconductors mounted on PCB's are coded in V04-R06 codes.

Burn in board, prober

U11-F01C3 [1987]

Testing integrated circuits

Includes measurement on encapsulated chip, or die prior to encapsulation, the IC being regarded as a functional block (see also S01-G02B codes).

Covers also automated testing by using off-chip random pattern generators (see also U11-F01D2B).

"Stuck at" fault testing, IDDQ, quiescent current, DUT

U11-F01C5 [1987]

Testing diodes, transistors, solar cells, CCD, others

Includes semiconductor laser testing (see also V08-A04A, V08-A06) and memory testing (see also U14-D codes).

U11-F01D [1983]

Testing circuits on wafer

Includes testing performed on individual device at wafer level, marking defective chips on wafers. Also covers built-in testing (U11-F01D2). For testing at interval circuit nodes see S01-G01A1 or S01-G01C1; for checking device as functional block see S01-G02B1.

U11-F01D1 [1987]

Probes, contacts, signal transfer methods for testing circuits on wafer

Includes wafer prober, probe card. See also S01-G02B1 and S01-H03 codes. For probes for testing semiconductors mounted on PCB's are coded in V04-R06 codes.

U11-F01D2 [1987]

Circuitry on chip to aid testing

See also U13-C07 and/or U21-C03D for digital/logic circuit aspects. For computer processing details see also T01-G02A2B.

Built-in self-test, BIST

U11-F01D2A [1992]

Scan based testing method for integrated circuits

(U11-F01D, U13-C07)

Includes level sensitive scan design.

LSSD, scan path, set/scan logic

U11-F01D2B [1992]

Signature analysis and random pattern generation for testing integrated circuits

(U13-C07, U21-C03D)

For off-chip random pattern generators see also U11-F01C3.

U11-F01D3 [1987]

Separate electronic testing apparatus for testing semiconductor devices, ICs, etc

Includes all apparatus for testing of semiconductor devices, separate or at substrate level, includes apparatus for testing of e.g. LED/OLED displays, solar panels etc.

U11-F01E [1987]

Testing circuit packages, chip carriers and multilayer circuit boards

Includes e.g. bonding strength test, detection of abnormal bonding, air-tightness test, moisture resistance of encapsulation, lead or bump inspection. For automatic visual inspection see also T04-D07 codes.

Pin

U11-F01F [1987]

Hybrid circuit testing

Includes also testing matrix array, for LCD (see also U14-K01A8). For hybrid circuits testing see also U14-H04B9.

U11-F01G [1992]

Characterised by type of tests being carried out

This code is usually applied with one of above U11-F01 codes depending on device being tested. Includes life test, ageing, e.g. acceleration test, burn-in test, fatigue test, also mechanical strength test, e.g. vibration, impact test, moisture resistance, e.g. pressure cooker test, thermal impact test (see also appropriate codes in S01, S02, S03).

U11-F02 [1983]

Handling components

U11-F02A [1983]

Wafer/chip holders and conveyors

Includes e.g. lead frame transfer, transport (see also U11-D03A1 codes).

U11-F02A1 [1987]

Wafer holders and conveyors for storage, transport

Includes transfer from processing station to another. Also includes transfer and storage of LCD parts during LCD panel manufacture and assembly, also U14-K01A1K.

Carry, position, feed, support, tweezers, SMIF, standard mechanical interface, pod

U11-F02A1A [1992]

Wafer protection during transport and storage

Includes covering wafer with cling film, oxide layer for protection during wafer handling.

U11-F02A2 [1987]

Jig holders for handling wafers within processing apparatus

Includes also clamping mechanism with temperature regulated platen (see also U11-C09 codes).

Chuck, table, vacuum, hold down, susceptor, electrostatic

U11-F02A3 [1987]

Chip die handling

Includes carrier tapes for die transport.

U11-F02A4 [1987]

Holders and transport for IC packages, encapsulated devices

Includes carrier lines to e.g. test devices (see also U11-F01C), integrated circuit magazine, sockets to prevent lead deformation during transport, carrier tapes. For transporting packages and storage of devices.

U11-F02B [1983]

Positioning for semiconductor device manufacture

Includes detecting, positioning, of wafer orientation flat.

Orient, angle, align, rotate, stage, control, notch

U11-G [1987]

Integrated circuit design including wiring layout, use of CAD etc.

Includes geometrical layout of components, e.g. standard cell, custom LSI, semi-custom input/output layout, automatic routing. See also T01-J15A2. See also U11-C15C for computer simulation of manufacture process. For computer simulation of semiconductor device operation see also U11-F01.

Pattern, LSI, connect, computer aided design

U11-G01 [2002]

Integrated circuit design using CAD

U11-G02 [2002]

Automated component/interconnect layout design

Includes software packages. For software simulation see T01-J15 and U11-C15C codes.

VHDL

U11-G03 [2002]

Circuit simulation and/or fault-finding techniques

Includes software simulations.

U11-G09 [2002]

Other IC design aspects

U11-H [2007]

End of life-cycle product recycling

Includes: old displays, LCDs or any U11 to U14 product recycling that has reached the end of its life-cycle.

U12: Discrete Devices

This section deals with individual semiconductor devices for use either as discrete device per se, or as an element of an integrated circuit. U12 codes are also used for inventions involving manufacture (together with U11 codes) to define as far as possible the nature of the device being manufactured. From 9201 U12-Q code has been introduced to indicate devices used in integrated circuit embodiments.

U12-A

Opto-electronic devices

U12-A01

Light emitting devices with jump or surface barrier

Including packages, arrays and electronic drive circuitry.

U12-A01A

Light emitting diodes

U12-A01A1 [1987]

Semiconductor structure of individual LED

Covers chip layer structure of LED. See U12-A01A4 for LED package structure.

U12-A01A1A [1992]

LED with AIII-BV compound layers

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium indium phosphide, gallium phosphide, gallium aluminium arsenide, indium phosphide

U12-A01A1B [1992]

LED with AII-BVI compound layers

Includes complex ternary and quaternary compounds.

Cadmium telluride, cadmium sulphide, zinc sulphide, mercury selenide, cadmium selenide, cadmium mercury telluride

U12-A01A1C [1992]

LED with AIV element/compound (except elemental silicon) layers

Diamond, silicon carbide

U12-A01A1D [1997]

LED with indirect bandgap semiconductor

Silicon, germanium

U12-A01A1E [2006]

LEDs with Organic Materials

(U12-A01A1X)

OLED

U12-A01A1X [1992]

LED with other type of semiconductor

From 2006 see U12-A01A1E for polymeric and organic LEDs. See also U12-B03C for general organic device aspects. Includes layer of quantum, quantum dots, electro-emissive or electroluminescent quantum dot displays.

Lead sulphide, QLED, QDLED, EL-QLED

U12-A01A2 [1987]

LED manufacture

Includes manufacture of single LED device of LED display, or more specific aspects e.g. polarizing/optical film, electrodes, arrays of LEDs. If deposition/etching techniques are emphasised, see also U11-C01/U11-C07 codes.

LED, OLED, QLED display manufacture

U12-A01A3 [1987]

Monolithic or hybrid circuit LED arrays

Display, optical printhead, Mini LED, Micro LED

U12-A01A4 [1987]

Package construction for LED

See also U11-D01B1.

Resin, seal, lens

U12-A01A4A [2005]

Packages for white LEDs

Covers package aspects for white LEDs, including phosphors for white LEDs.

U12-A01A4B [2006]

Packages for coloured LEDs

Covers package aspects for red, green or blue and other non-white LEDs, including phosphors for coloured, non-white LEDs.

U12-A01A5 [1987]

Drive circuitry for LED

See also under application. Includes pixel circuits or structures.

Switch, control, modulator, pixel

U12-A01A5A [1992]

Drive circuit for individual LED

U12-A01A5B [1992]

Drive circuit for LED array

U12-A01A6 [1987]

Arrays of encapsulated LEDs

Display, optical print head

U12-A01A7 [2007]

Light emitting diode displays

For display drivers see also U12-A01A5 codes. For monolithic and un-encapsulated LED array displays see also U12-A01A3, and for encapsulated LED array displays see also U12-A01A6.

LED display, OLED display

U12-A01B

Semiconductor lasers

See V08-A04A also. For testing of semiconductor laser see U11-F01C5.

U12-A01B1 [1987]

Semiconductor details of laser body

Includes p-n junction lasers. For manufacture of laser electrodes see U11-C05F6 and V08-A01B also.

Ohmic contact, Schottky barrier layer, PN-junction, homojunction laser

U12-A01B1A [1992]

Heterojunction semiconductor laser

Includes carrier confinement structures e.g. inverted rib, ridge waveguide, etched mesa, buried heterostructure, channelled substrate buried heterostructure, constricted mesa. For quantum well, superlattice lasers U12-A01B1B takes precedence.

U12-A01B1B [1992]

Quantum well semiconductor laser

Includes superlattice aspects.

Vertical-cavity surface-emitting, stripe confinement, double heterojunction

U12-A01B1J [1992]

Semiconductor laser arrays

(U12-A01B1, U13-D04)

U12-A01B2 [1987]

Laser diode manufacture

Use instead of U12-A01B1 if emphasis is on manufacture rather than semiconductor body details. See also appropriate codes in U11 if particular aspects of e.g. deposition, etching, isolation, electrode manufacture are emphasised. Excludes any packaging aspects.

Etch, cladding layer

U12-A01B3 [1987]

Packages for semiconductor lasers

For particular aspects of packaging which may be also applicable to other semiconductor devices, see also U11-D codes. Includes impedance matching, terminals. For connection to optical fiber see also U12-A01C.

Bond, mount, cap, cover, glass, interconnect

U12-A01B3A [1992]

Cooling arrangements for semiconductor laser package

See also appropriate codes in U11-D02 and V08-A05.

U12-A01B4 [1987]

Electronic drive circuitry for individual semiconductor laser

See also V08-A02A.

U12-A01B6 [1992]

Semiconductor laser characterised by type of semiconductor material

This code does not apply to semiconductor lasers using conventional materials belonging to AIII-BV group. It includes e.g. heterojunction with beryllium carbon nitride, boron nitride, cadmium telluride layers.

Chalcopyrite, zinc blend crystal

U12-A01C [1987]

Optical fiber connections to LEDs, lasers or photoreceivers

When the connection to optical fiber implies package alterations see also appropriate code i.e. U12-A01A4 for LED, U12-A01B3 for laser, U12-A02B3 for photoreceiver. See also V07-G10C.

Couple, align, waveguide, photocoupler

U12-A01X

Other aspects of light emitting devices

U12-A02

Radiation sensitive devices

U12-A02A

Radiation sensitive devices for energy conversion

See X15 also for solar power generation.

Photovoltaic, solar cell

U12-A02A1 [1983]

Single solar cell

Prior to 1997 all packaging aspects of individual solar cells were covered by this code, from 1997 they are covered by U12-A02A4E.

U12-A02A2 [1987]

Semiconductor materials and structures for solar cells

E.g. for monocrystalline, amorphous and heterojunction structures. For thin film solar cells see also U12-B03B.

U12-A02A2A [1992]

Solar cells with All-BVI compounds

U12-A02A2B [1992]

Solar cell with AIII-BV compounds

U12-A02A2C [1992]

Solar cell with AIV compounds

Excludes elemental silicon.

U12-A02A2D [2006]

Solar cells with organic materials

Excludes elemental silicon.

U12-A02A2E [1997]

Solar cell with chalcogenide/chalcopyrite compounds

(U12-A02A2X)

Includes materials not covered by U12-A02A2A to U12-A02A2C codes, e.g. Al-BII-CVI, All-BIV-CV, All-BIV-CVI group semiconductors. For heterojunctions with e.g. copper indium selenide/cadmium sulphide films or copper indium selenide/cadmium sulphide films see also U12-E01 codes.

Copper indium sulphide, copper gallium selenide, copper indium selenide, lead sulphide

U12-A02A2F [1992]

Solar cell with amorphous, polycrystalline semiconductor

Includes thin film, perovskite thin film materials.

Hydrogenated a-Si

U12-A02A2Q [1992]

Solar cell structure

For tandem solar cells see U12-A02A4C. Includes tunnel oxide passivated contact cells, passivated emitter and rear contact cells.

Back surface field, textured cell, V-groove multi-junction, TOPCon cell, PERC cell

U12-A02A2X [1992]

Other semiconductor materials for solar cells

From 2006 see U12-A02A2D for devices using polymeric and organic layers. Includes perovskite material for solar cells.

U12-A02A3 [1987]

Characterised by solar cell manufacture

Includes manufacture of single or assembly of solar cells and manufacturing apparatus. If material manufacturing details are emphasized use U12-A02A2 section. See also U11-C18B9 for photovoltaic devices manufacture.

U12-A02A4 [1987]

Solar cell substrate, electrode and packaging

U12-A02A4A [1992]

Solar cell electrodes

Include electrode structure and material. For manufacture see U11-C05F6. For thin film transparent conductive layer details see also U14-H01E.

U12-A02A4B [1992]

Solar cell substrate details

U12-A02A4C [1992]

Multijunction tandem solar cells

Includes both mechanically stacked cells (held together by an adhesive or bonding techniques), and monolithically integrated multijunction cells.

U12-A02A4D [1992]

Covering layers for solar cells

Includes e.g. passivating, anti-reflection film, back surface layers. Also resin layers and/or adhesive layers as part of protection film/barrier layer only.

U12-A02A4E [1997]

Packaging aspects for solar cells

(U12-A02A1)

U12-A02A5 [1983]

Assemblies of solar cells

(U12-A02A5, U12-A02A6)

Includes microlithography for forming interconnections and monolithic integration. Also includes frame assembly, installation of solar panels, supporting of solar power generation module.

Solar battery

U12-A02A6* [1987-1996]
Assemblies of cells on separate substrates

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1996. From 1997 all aspects regarding solar cell assemblies are covered by U12-A02A5.

U12-A02A7 [1992]
Power transfer, circuitry arrangements for solar cells
(U12-A02A9)
Control, voltage/current regulator, charge

U12-A02A8 [2005]
Dye sensitised solar cells
See also X15 codes as appropriate.

U12-A02A9 [1987]
Other radiation sensitive devices for energy conversion
Includes e.g. hybrid systems (wind-photovoltaic, thermophotovoltaic, etc.). For photoelectrochemical cells after 2005 see U12-A02A8.

U12-A02B
Photoreceiver for controlling current flow
Optical, IR, light, photoelectric, photodetector, avalanche

U12-A02B1 [1987]
Photoresistor, photoconductor

U12-A02B2 [1987]
Phototransistor, photodiode
Infrared light, optical, photoelectric

U12-A02B2A [1992]
Photodiode
Includes p-n junction diode, p-i-n diode, metal-semiconductor diode (Schottky barrier), heterojunction diode, avalanche photodiode.
APD, PD, PIN

U12-A02B2B [1992]
Phototransistor
Includes bipolar and field effect phototransistor.
FET

U12-A02B2C [1992]
Photothyristor
(U12-A02B, U12-A02B2, U12-D01B)
Light activated thyristor

U12-A02B3 [1987]
Package details for photoreceiver
Includes packages for devices in U12-A02B1 and U12-A02B2. For specific packaging aspects which may be also applicable to other semiconductor devices, see also U11-D codes.
Window, cap

U12-A02B4 [1987]
Electronic circuits for photodiodes and phototransistors
See also under application, e.g. for opto-receiver amplifiers in general see U24-G01A5, and for such amplifiers in optical communication systems see also W02-C04A3B.
Bias, current, amplify, demodulate

U12-A02B5 [1992]
Photoreceiver characterised by material
(U12-A02B)

U12-A02B5A [1992]
Photoreceiver with AII-BVI compounds
Includes complex ternary and quaternary compounds.
Cadmium sulphide, cadmium telluride, mercury selenide, cadmium mercury telluride, zinc sulphide, mercury zinc selenium telluride

U12-A02B5B [1992]
Photoreceiver with AIII-BV compounds
Includes complex ternary and quaternary compounds.
Gallium indium arsenide, gallium arsenide phosphide, gallium arsenide, gallium phosphide, indium arsenide

U12-A02B5C [1992]
Photoreceiver with amorphous, polycrystalline semiconductor
Hydrogenated a-Si

U12-A02B5D [1997]
Photoreceiver with AIV elements and their compounds
(U12-A02B5X)
Diamond, silicon carbide, germanium

U12-A02B5E [2006]
Photoreceiver with organic materials
(U12-A02B5X)

U12-A02B5X [1992]

Photoreceiver with other semiconductor materials

Includes materials not covered by U12-A02B5A to U12-A02B5D codes, e.g. Al-BIII-CVI group and All-BIV-CV group semiconductors.

Chalcopyrite compounds, copper indium sulphide, copper gallium selenide, chalcogenide compounds, zinc tin arsenide, cadmium germanium arsenide, lead sulphide, bacteriorhodopsin

U12-A02C

Structurally combined with light emitter

U12-A02C1 [1987]

Optocouplers, optoisolators

Includes structure, packaging aspects.

Light, LED, photodiode, phototransistor, photocoupler

U12-A02C2 [1987]

Light path emerging from package

E.g. for reflective light barrier, rotary encoder. (See also S03-C09, U21-A03J/W05-D01 codes respectively).

Light switch, photointerrupter, reflection switch

U12-A02C3 [1987]

Semiconductor light transmitting and receiving device

Includes light amplifiers, modulators (see also V07-K01A, V07-K01C1).

U12-A03 [1992]

Devices sensitive to X-ray, gamma ray, particle and ions

(U12-A02B, U12-B03X)

See S03-G02B2G for radiation intensity measurement using semiconductor sensors or S03-E06H5A for semiconductor x-ray imaging detectors.

U12-B

Hall-, Ovshinsky- and Gunn-effect devices; Dielectric triodes and other devices not catered for elsewhere in U12

U12-B01 [1987]

Hall-effect, magnetoresistive or spintronic devices

U12-B01A [1992]

Hall effect devices

Includes materials, manufacture and structure of device.

U12-B01B [1992]

Magnetoresistive or spintronic devices

Covers manufacture or structure of all magnetoresistive devices. Includes spintronic devices that involve giant magnetoresistance. Also covers spin detection in ferromagnetic semiconductor sources.

Giant magnetoresistive (GMR) device, spintronic device

U12-B02 [1987]

Ovshinsky devices. Bulk negative differential resistance (NDR) devices

For negative resistance FET see U12-D02J1.

U12-B02A [1992]

Gunn-effect devices

Includes Transferred-Electron Devices.

TED

U12-B03 [1987]

Other devices and thick/thin film and organic semiconductor devices

See also U14-H codes for film circuits.

U12-B03A [1987]

Thin/thick film transistors (inorganic)

Covers materials and structural details of individual device rather than array or layout details. Includes coplanar type, stagger structure TFT.

Reverse staggered

U12-B03B [1987]

Thick/thin film devices (inorganic) other than transistors

Includes e.g. thin film solar cells (see also U12-A02 or U12-A02A2Q).

U12-B03C [1987]

Organic devices

Excludes chemical or pressure-sensitive transducers (see U12-B03E). For LEDs, Solar cells and photoreceivers with organic layers see U12-A01A1E, U12-A02A2D and U12-A2B5E respectively.

Bacteriorhodopsin

U12-B03D [1992]

Cold cathode field emission devices

(U12-B03X)

See also V05 codes. Covers micro-scale, or smaller, devices created using IC manufacturing processes. For complete manufacture see also U11-C18B9, or relevant U11-C codes for specific processes.

FED

U12-B03E [1992]

Semiconductor transducers

(U12-B03X)

See also appropriate codes in S02, S03 and V06 classes. For non-semiconductor piezoelectric elements/transducers see V06 codes only. Includes e.g. pressure sensitive (see also S02-F04B3), piezoresistive, and chemical sensors. For manufacture see also U11-C18C.

CHEMFET, ISFET

U12-B03F [1992]

Microstructural or nanostructural devices or systems

(U12-B03X)

For manufacture, see also U11-C18C codes. See X25-L01A and X25-L03A codes for microvalves and micropumps respectively, and V06-M06G codes for micromotors.

U12-B03F1 [2002]

Microstructures

See S03-H02A for micrometre scale instrumentation.

U12-B03F1A [2002]

Microstructural devices

Includes individual MEMs devices

U12-B03F1B [2002]

Microstructural systems

Includes assemblies of MEMs devices, and MEMs systems.

U12-B03F1C [2006]

Micromachine packages

See also V06 codes. For package details see also U11-D codes and for packaging processes see also U11-E codes.

U12-B03F2 [2002]

Nanostructures

See S03-H02B for nanometer scale instrumentation.

U12-B03F2A [2002]

Nanostructural devices

U12-B03F2B [2002]

Nanostructural systems

U12-B03X [1987]

Other discrete devices

From Jan 2002 see U12-B03F2 codes for nanotechnology.

U12-C

Other two terminal devices (incl. resistors, capacitors)

Resistors and capacitors not implemented in semiconductor form are covered by V01 codes.

U12-C01 [1983]

Diodes (incl. rectifier assemblies)

The following codes are no longer applied but they remain valid for records prior to 9201: U12-C01A, U12-C01B. For complete manufacture of diode devices see U11-C18B1. For Gunn diodes see U12-B02A. For variable capacitance diode, see U12-C02B. For Shockley diode and two terminal semiconductor controlled rectifier (SCR) see U12-D01B4.

U12-C01A* [1987-1991]

Diodes - low, medium power

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U12-C01C to U12-C01X codes.

U12-C01B* [1987-1991]

Diodes - high power

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U12-C01C to U12-C01X codes.

U12-C01C [1992]

Rectifier diodes

Includes Schottky, planar, p-i-n diodes.

PIN, PN, hot carrier diode, hot electron diode, Schottky barrier

U12-C01D [1992]

Breakdown diodes

Includes Zener, avalanche diodes.

Avalanche breakdown, voltage reference

U12-C01E	[1992]
IMPATT and related transit time diodes	
(U12-B, U12-B02)	
Includes barrier junction injection and transit time diode, trapped plasma avalanche triggered transit diode, double velocity transit time diode, mixed tunnelling avalanche transit time.	
<i>BARRITT, TRAPPATT, DOVETT, MITATT</i>	
U12-C01G	[1992]
Tunnel diodes	
(U12-C, U12-B)	
Includes metal-insulator-semiconductor tunnel diode, metal-insulator-metal tunnel diode, Esaki diode, but also quantum effect diodes, e.g. resonant tunnelling diodes.	
<i>MIS, MIM, RTD</i>	
U12-C01X	[1992]
Other types of diode	
U12-C02	[1987]
Capacitors	
U12-C02A	[1987]
Metal-insulator-semiconductor capacitors e.g. MOS	
U12-C02A1	[1987]
For memories e.g. dynamic RAM	
U12-C02B	[1992]
p-n junction capacitors	
Includes variable capacitance diodes, e.g. varactors. See V01-B02B1 for discrete diode embodiments.	
U12-C02C	[1992]
Metal-insulator-metal capacitors	
When used as LCD driving element in active matrix see also U14-H01A and U14-K01A2A.	
<i>MIM</i>	
U12-C02F	[1997]
Ferroelectric capacitor for integrated circuits	
(U12-C02X)	
For capacitors used in ferroelectric memories see also U14-A03F.	
U12-C02X	[1992]
Other types of capacitor	

U12-C03	[1987]
Resistors, inductors	
Includes resistors with PN junction.	
U12-C03A	[2002]
Resistors	
Includes PN junction structure aspects.	
U12-C03B	[2002]
Inductors	
Includes structure of inductive aspects of monolithic microwave integrated circuits (MMIC) (see also U14-H03C2 codes). For telecommunications aspects see W01 codes.	
U12-C04	[2002]
Fuses	
For all structural aspects of fuses/antifuses including memory redundancy circuits (see also U14-D01A). Before Jan 2002 see U11-D03B2A for structural aspects. For fuse manufacture see U11-C05G2A.	
U12-D	
Electrically controllable semiconductor devices	
Codes in this section are used on their own for novel device structures, but also together with U11 codes to identify type of device whose manufacture is covered by U11 codes. For example, electrode manufacture for SOI insulated gate field effect transistor is coded in U11-C05F1 and U12-D02A4. For thin film transistor see U12-B03A and appropriate U12-D codes according to type of transistor.	
U12-D01	
Bipolar devices	
U12-D01A	
Bipolar transistors	
<i>Bipolar junction, Darlingtion transistor</i>	
U12-D01A1	[1992]
MOS gated bipolar transistor	
Includes insulated gate bipolar transistor	
<i>IGBT, conductivity modulation MOS</i>	
U12-D01A2	[1992]
Heterojunction bipolar transistor	
See also U12-E01 for details regarding materials, structures of the heterostructure.	

U12-D01A3 [1992]

Hot electron bipolar transistor

This code takes precedence over U12-D01A2, e.g. for HBT with heterostructures. For hot electron unipolar transistors see U12-D02J.

Auger transistor

U12-D01A4 [1992]

Bipolar transistor with tunnelling mechanism

Includes resonant tunnelling bipolar transistor.

RTBT

U12-D01A5 [1992]

Bipolar transistor with semiconductor on insulator substrate

(U11-C08A5, U13-D, U12-D01A)

For manufacturing aspects regarding silicon-on-insulator structures see U11-C08A6.

SOI

U12-D01A9 [1992]

Other types of bipolar transistor

Covers aspects such as lateral/vertical collector diffused isolation structure.

U12-D01B

Thyristors

For light activated thyristors see U12-A02B2C.

U12-D01B1 [1992]

Field controlled thyristor (FCT)

For MOS gated control turn-off see also U12-D01B3.

MCT

U12-D01B2 [1992]

Bidirectional thyristors

Includes triacs (triode ac switch), diacs (diode as ac switch).

Bilateral diode switch, diac, bilateral triode switch, triac

U12-D01B3 [1992]

Gate turn-off thyristor

GTO

U12-D01B4 [1997]

Semiconductor controlled rectifier

(U12-D01B9)

Prior to 1997 for SCR see U12-D01B. For bilateral devices see U12-D01B2. Includes Shockley diodes.

Forward blocking, reverse blocking

U12-D01B5 [1997]

Static induction thyristor

(U12-D01B9)

Static induced thyristor

U12-D01B9 [1992]

Other types of thyristor

Includes silicon unilateral/bilateral switch. From 1997 see U11-D01B4 for Shockley diodes and U11-D01B5 for static induced thyristors.

U12-D02

Unipolar devices

U12-D02A

IGFETs

Also includes device in which insulator is made of material other than oxide e.g. nitride, and gate electrode is made of material other than metal, e.g. polysilicon. See also S03 codes for FETs used as sensors.

MOSFET, MISFET, CHEMFET, ISFET

U12-D02A1 [1983]

FET with floating gate

For memories using floating gate FETs see U13-C04A, U13-C04B2, U14-A03B7 codes.

U12-D02A2 [1992]

FET with metal-insulator-silicon oxide-silicon (MIOS) structure for memories

Includes metal-nitride-oxide-semiconductor type. For memories using this type of transistor see U13-C04 codes and/or U14-A03B7.

MNOS

U12-D02A3 [1992]

FET with lightly doped drain

(U11-C02J6, U12-D02A)

LDD

U12-D02A4 [1992]

FET with semiconductor on insulator substrate

(U11-C08A5, U12-D02A, U13-D)

For manufacturing aspects regarding silicon-on-insulator structures see U11-C08A6.

SOI

U12-D02A5 [1992]

IGFET with heterostructure

HIGFET, SISFET, heterostructure MISFET

U12-D02A7 [1997]

Ferroelectric transistor
 (U12-D02A9)

U12-D02A9 [1992]

Other IGFETs

Includes vertical MOS, trench, U-shaped grooved MOS, double diffused MOS, trench type MOSFET, Schottky barrier source and drain MOS. Also includes magnetoelectric FET, Spin-FET, Magnetic-FET MAGFET. For superconductive FET see also U14-F02B. From Jan 2006 see U12-D02E for multigate MOSFETs.

VMOS, UMOS, DMOS, DIMOS

U12-D02B [1992]

FET with pn-junction or Schottky barrier diode gate
 (U12-D02X)

MESFET, JFET, dual-gate MESFET

U12-D02C [1992]

Transistor with static field regions
 (U12-D02X)

Includes static induction transistor, permeable base transistor.

SIT, PBT

U12-D02D [1992]

FET with quantum well, wire
 (U12-D02X, U12-E01)

Includes doped channel hetero-MISFET (see also U12-D02A5), semiconductor gate heterostructure FET (see also U12-D02A5), double heterostructure FET. See also U12-E01 codes for details regarding materials, structures of the heterostructure.

U12-D02D1 [1997]

One-dimensional charge carrier FET
 (U12-D02D)

Quantum wire FET

U12-D02D2 [1997]

High electron mobility transistor
 (U12-D02D)

Includes Modulation doped FET, Two dimensional electron gas FET, Separately doped FET, Quantum well FET, Two dimensional hole gas FET.

SQWFET, HEMT, MODFET, TEGFET, 2DHGFET, SISFET, DHFET, HFET, doped channel heterojunction

U12-D02E [2006]

Multi-gate Unipolar transistors

Used in conjunction with other U12-D02 codes where necessary to indicate the type of device, e.g. for Dual-gate MESFET see also U12-D02B.

Double-gated MOS, FINFET

U12-D02J [1992]

Hot electron transistor (HET)

(U12-D01A, U12-D02X)

Includes metal base transistor, planar doped barrier transistor.

PDB

U12-D02J1 [1992]

Real space transfer transistor

Includes negative resistance FET, charge injection transistor.

NERFET, CHINT, delta doping

U12-D02J2 [1992]

FET with tunnelling mechanism

Includes resonant tunnelling hot electron unipolar transistor, resonant tunnelling gate field effect transistor, ballistic transistor, tunnelling hot electron transfer amplifier, MIMIM structure tunnel transistor.

RHET, RT-FET, THETA

U12-D02K [1992]

Quantum interference devices

(U12-D02X)

Covers devices whose operation is based on wave phenomena (e.g. electrons in two parallel high-mobility channels are made to interfere constructively).

U12-D02X

Other unipolar devices

U12-E

General

U12-E01

Semiconductor bodies

Heterojunction

U12-E01A [1992]

Semiconductor body characterised by materials

U12-E01A1 [1992]

Semiconductor body with AIII-BV compound layers

Includes complex ternary and quaternary compounds.

Gallium arsenide, gallium phosphide, indium phosphide, gallium aluminium arsenide, gallium indium arsenide, gallium indium phosphide, gallium nitride, cubic boron nitride

U12-E01A2 [1992]

Semiconductor body with AII-BVI compound layers

Includes complex ternary and quaternary compounds.

Mercury sulphide, cadmium sulphide, zinc sulphide, mercury selenide, zinc selenide, cadmium selenide, cadmium telluride, cadmium mercury telluride

U12-E01A3 [1992]

Semiconductor body with group IV element/compound (except elemental silicon) layers

Includes silicon-germanium layers.

Silicon carbide, diamond, germanium

U12-E01A4 [1997]

Semiconductor body with chalcogenide/chalcopyrite compounds

For solar cells, see U12-A02A2E. Includes semiconductors such as AI-BII-CVI, AII-BIV-CV, AII-BIV-CVI, etc.

Copper indium sulphide, copper gallium selenide, copper indium selenide

U12-E01A5 [1997]

Silicon-on-insulator structure

(U12-E01A, U12-E01A9)

For SOI manufacture, see U11-C08A6. This code is used for discrete device with SOI substrate. For integrated circuit with SOI substrate see U13-D07.
SOI

U12-E01A9 [1992]

Semiconductor bodies characterised by other materials

U12-E01B [1992]

Characterised by semiconductor structure

U12-E01B1 [1992]

Semiconductor body with heterojunctions

U12-E01B2 code takes precedence.

U12-E01B1A [2006]

Device with strained layer structure

Includes strained channel to enhance charge-carrier mobility. For strained layer super lattice see also U12-E01B2.

Strained silicon, strained layer, relaxed layer, SLS

U12-E01B2 [1992]

Semiconductor body with quantum wire, wells, superlattice

SQW, multi-quantum well, MQW

U12-E02

Electrodes for semiconductor devices

Includes ohmic electrodes, Schottky barrier electrodes and metal-insulator-semiconductor electrodes. Also includes novel gate structures. For electrode manufacture see U11-C05E and U11-C05F codes.

Schottky, ohmic

U12-Q [1992]

Device intended to be used as part of integrated circuit

This code is used for individual devices intended to be used as elements of an integrated circuit. For example, a floating gate transistor for an EPROM is coded in U12-D02A1, U12-Q, U14-A03B7 and, if integration aspects are important, in U13-C04A.

U13: Integrated Circuits

U13-B/C codes in this section are not used for circuitry which is routinely integrated e.g. logic gates, low power amplifiers etc. for which codes indicating the form of implementation in the appropriate sections of U21-U25 should be used. See U14-H01 for thin film circuitry e.g. for memories, display devices and large area contact image pick-up devices. For individual devices intended to be used in an integrated circuit see U12-Q and the more specific U12 code indicating the type of device (e.g. U12-D02A1 for floating gate IGFET, U12-C02A1 for capacitors used in DRAMs).

U13-A

Charge transfer devices; Radiation sensors/detectors

Includes most types of solid state image sensors e.g. charge coupled devices, MOS. For video cameras see W04-M01.

U13-A01 [1983]

IC radiation sensors, e.g. imagers characterised by detecting element

For complete manufacture see U11-C18B4. For Line image sensors (thin film) see U14-H01B. For CMOS image sensor structure and manufacture see also U13-D02A.

Image pick-up, matrix, row, column, photoelectric

U13-A01A [1987]

IC radiation sensor with photodiode, photoconductor

For individual device see U12-A02B2A. Includes MOS imagers.

U13-A01B [1987]

IC radiation sensor with phototransistor

For individual device see U12-A02B2B.

Vertical, horizontal transistor

U13-A01B1 [1987]

IC radiation sensor with static induction transistor (SIT)

U13-A01D [1997]

Packaging aspects of IC radiation sensor (U13-A01X)

Specific package aspects for individual photodiode, phototransistor are covered by U12-A01B3.

U13-A01F [1997]

Optical elements for IC radiation sensor

(U13-A01X)

Includes optical filters, lenses. For complete optical filter manufacture see U11-C18D. For package window structures see U13-A01D and U11-D01C1.

Filter, lens

U13-A01G [2002]

Wavelength conversion layers for IC radiation sensors

Includes phosphors coated onto photodiode-based MOS imagers which fluoresce under X-ray radiation (see S05 codes for medical applications).

U13-A01H [2006]

Circuits, drivers for IC radiation sensors

U13-A01X [1987]

Other aspects of IC radiation sensors

Includes focal plane array constructional details.

Smear, blooming

U13-A02 [1983]

Charge transfer devices

Includes acoustic charge transport devices, (see also U14-G if SAW driving employed). For complete manufacture see U11-C18B3. For CTD used as shift registers see U14-A01B. See also W04-M01 codes for area imagers, and S06-D05 codes for linear imagers. Includes any aspect regarding discrete CCD and also integrated CCD for imagers (see also W04-M01B).

Read, shift, register, clock

U13-A02A [1992]

Charge transfer device structure

Includes charge coupled devices, bucket brigade devices, charge injection devices.

Surface channel, SCCD, buried channel, BCCD, fill and spill, CCD, BBD, CID

U13-A02B [1992]

Circuits, drivers for CCD

U13-A02C [1992]

Packaging aspects of CCD

U13-A02D [2006]

Optical elements for CCD imagers

Includes optical filters, lenses that are inside, or part of, the package. For complete optical filter manufacture see U11-C18D. For package window structures see U13-A02C and U11-D01C1.

U13-A02X [1992]

Other aspects of CCD

Smear, blooming

U13-B

Analogue circuits

Mainly used for A-D and D-A converters (see also U21-A codes), but includes also modulators, demodulators, mixers and active filters which are integrated and do not have a specific code breakdown indicating IC details. Prior to 1997 for analogue and digital circuits integrated on same semiconductor chip see U13-B and U13-C; from 1997 for analogue/digital integration on same semiconductor substrate see U13-C09.

U13-B01

Analogue circuits with bipolar devices

For semiconductor structure see U13-D01 codes.

U13-B01A* [1987-1991]

With FET elements

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U13-B03.

U13-B02

Analogue circuits with FETs

For semiconductor structure see U13-D02 codes.

U13-B02A [1987]

Analogue circuits with MOSFETs

CMOS

U13-B02B [1987]

Analogue circuits with MESFET, JFET

U13-B02C* [1987-1991]

FET with bipolar transistor

*This code is now discontinued, but remains searchable and valid for records from 1987 to 1991. From 1992 see U13-B03.

U13-B03 [1992]

Analogue circuits with combined FET and bipolar devices

(U13-B01A, U13-B02C)

Includes e.g. Bi-FET operational amplifier. For semiconductor structure see U13-D03 codes.

BiCMOS

U13-B04 [1992]

Analogue circuits with diodes and/or capacitors and/or resistors

(U13-B01A, U13-B02C)

For semiconductor structures see U13-D01B.

U13-B09 [1987]

Other aspects for analogue circuits

Includes custom analogue array.

U13-C

Digital circuits

Binary

U13-C01

Digital circuits with bipolar devices

For semiconductor structures see U13-D01 codes.

U13-C01A [1992]

Digital circuits with diodes, capacitors, resistors

For semiconductor structures see U13-D01B.

U13-C02

Digital circuits with FETs

For semiconductor structures see U13-D02.

Buffer, compound

U13-C02A [1987]

Digital circuits with MOSFETs

CMOS

U13-C02B [1987]

Digital circuits with MESFET, JFET

U13-C02C [1992]

Digital circuit with FET and diodes, capacitors, resistors

For semiconductor structures see U13-D03A.

U13-C03 [1987]

Digital circuits with combined bipolar and FET

For semiconductor structures see U13-D03B.

U13-C04 [1987]

Digital circuits with repetitive structures

E.g. matrix layout for read-only memories, programmable logic arrays, random access memories, gate arrays (for wiring and layout details see also U21-C01E and/or U11-G).

U13-C04A [1987]

Read only memory (non-electrically alterable)

Includes read only memory, programmable read only memory, erasable programmable read only memory, matrix layout. For more specific memory aspects see U14-A03B7, U14-A06C (for EPROM), U14-A06B1 (for PROM), U14-A06B5 (for ROM). For complete memory manufacture see also U11-C18B5.

Mask ROM

U13-C04A1 [1997]

Electrically-programmable ROM

(U13-C04A)

EPROM

U13-C04B [1987]

For RAMs and electrically alterable ROMs

Includes matrix layout. For complete memory manufacture see also U11-C18B5.

U13-C04B1 [1992]

Dynamic/static RAMs

Random access

U13-C04B1A [1992]

Dynamic RAM

Includes single transistor-single capacitor cell, three transistor cell. For specific aspects regarding capacitor manufacture, see U11-C05G1B, for capacitor structure see U12-C02A1. Prior to 1992 for transistor-capacitor DRAM structure, see U13-D03; after 1991 see also U13-D03A. For data refreshing, see U14-A03B4A.

U13-C04B1B [1992]

Static RAM

For bipolar static RAM, E/R static RAM, flip flop, see also e.g. U14-A03A or U14-A03B1 codes.

Pseudo-static RAM, PSRAM

U13-C04B2 [1992]

Electrically erasable (alterable) PROM

For specific transistor structure see e.g. U12-D02A1, U12-D02A2 as appropriate. See also U14-A03B7 for memory details.

EEPROM, E2PROM, EAROM, FLASH EPROM

U13-C04C [1987]

Integrated circuit Programmable Logic Devices

Includes field programmable logic devices, programmable logic arrays, programmable array logic, logic cell arrays. See also U21-C01E for circuitry for PLD e.g. power controller, sense amplifiers etc.

FPLA, PLA, PAL, fixed OR array, FOA, programmable interconnect, user configurable arrays

U13-C04D [1987]

Full custom or semi-custom integrated circuit arrays

Includes application specific integrated circuits e.g. gate arrays, master slice, uncommitted logic arrays, configurable gate arrays.

Sea of gates, channel-less, channel type gate array, logic array, ASIC, basic cell, ULA

U13-C05 [1987]

Computer integrated circuit aspects. Single chip computer

See also T01-M05.

Microcomputer, microprocessor, one chip, system on chip, SOC

U13-C06 [1997]

Large scale IC, Ultra large IC, wafer scale digital circuit aspects

Covers circuit and logic aspects only, for constructional details see U13-D codes.

Cellular, VLSI, ULSI, LSI

U13-C07 [1987]

On-chip testing circuits

Includes scan based testing, pattern generation (See also U11-F01D2A, U11-F01D2B). For computer aspects of shift path maintenance techniques, see T01-G02A1 also. Includes analogue test/trimming and multiple usage of terminals.

Scan testing

U13-C08 [1997]

Circuit trimming

For physical circuit repair see U11-C19A. For trimming thin/thick film for hybrid circuits see U14-H04B3B.

U13-C09 [1997]
Analogue/digital integration on same semiconductor chip

(U13-B, U13-C)

Prior to 199701, see U13-B and U13-C.

U13-D

Integrated circuit structures

Prior to 1992, for integration on all insulating (e.g. SOI) substrates see U11-C08A5 and U13-D. From 1992 for integrated circuits on insulating substrates see U13-D07.

U13-D01

Integrated circuit structure with bipolar devices

U13-D01A [1992]

Integrated circuit structure with complementary bipolar devices

Includes NPN-PNP structures.

U13-D01B [1992]

Integrated circuit structure with diodes, passive components

Includes bipolar transistor-diode, diode-diode, capacitor, resistor integration.

U13-D02

Integrated circuit structure with FET

Field effect

U13-D02A [1983]

CMOS integrated circuit structure

Includes manufacture.

Complementary metal oxide semiconductor

U13-D03 [1983]

Combined FET and bipolar integrated circuit structure

U13-D03A [1992]

FET in combination with diodes and/or capacitors and/or resistors

For one-transistor DRAM cell see also U14-A03B4. For transistors, diodes, used as protective elements e.g. for MOS devices see also U13-E01.

U13-D03B [1992]

Bipolar-FET transistor integrated circuit structures

Includes BiCMOS, BiFET structures.

U13-D03B1 [1992]

Integrated circuit characterised by novel structure

U13-D03B2 [1992]

Integrated circuit characterised by novel method for structure manufacture

U13-D04 [1987]

Integrated circuit structure in combination with other elements

Includes integration with e.g. SAW devices, piezo-electric, thermoelectric, Hall effect devices.

U13-D04A [1992]

Opto-electronic integrated circuits

For optoelectronics using integrated optical waveguides see also V07-F01A5.

OEIC

U13-D04B [2005]

Lab-On-Chip (LOC)

Includes DNA microarrays or biochips using semiconductor based technology. For instrumentation details see also S03-H01 codes. For MEMs aspects see V06, and U12-B03F codes for micro- and nano-structural electronic or MEMs aspects. For glass microarray or non-semiconductor fluorescence based techniques see S03 codes only.

Microfluidic, microarray, DNA chip, biochip, Gene Chip™

U13-D05 [1987]

Three-dimensional, wafer-scale integration

Includes constructional details of master-slice circuitry. See also U11-D01A8 (packages) and U11-D03C3 (chip-on-chip). For 3-D structure manufactured by semiconductor recrystallisation over insulating substrates see also U11-C08C, U11-C03J1. For wafer scale circuitry see U13-C06.

Laminate

U13-D06 [2002]

Spherical integrated circuit structures

Includes spherical sensor circuits for in-situ monitoring of body functions (see also S05 codes for medical applications).

U13-D07 [1992]
Integrated circuit with semiconductor on insulator structure

For semiconductor on insulator manufacture see U11-C08A6. For bipolar and field effect transistor on insulating substrate see U12-D01A5 and U12-D02A4 respectively.
SOI, SOG, SOS

U13-D08 [1997]
Radiation hardened integrated circuits
Rad hard

U13-D09 [2006]
Integrated circuit with strained structures
Includes CMOS with strained channel structure to enhance charge-carrier mobility (see also U13-D02A), lattice mismatch and bandgap engineering.
Strain

U13-E [1987]
Circuitry in general

U13-E01 [1992]
Electrical and thermal protection of integrated circuit
Includes protection against transient condition, reverse battery condition, electrostatic discharge. For fuses see U11-D03B2. For logic circuit aspects see U21-A03A2. For general low power electronic circuit protection see U24-F codes. For electrostatic, electromagnetic, thermal protection implemented as IC package adaptation see U11-D01C codes.
Latch-up prevention

U13-E02 [1992]
Power supply, substrate biasing of integrated circuit
For supply grounding see U11-D03C1. For amplifier protection see U24-G03C. For logic circuit aspects see U21-C03A2.
Charge pumps

U13-E03 [1997]
Input/output circuitry for integrated circuit
Includes input/output circuitry on integrated circuit chip. For layout design see U11-G.
Buffer

U13-E04 [2002]
Clocking and synchronisation circuitry for integrated circuits
Includes on chip real-time clocks.

U13-E09 [1992]
Other general aspects IC of circuitry

U14: Memories, Film and Hybrid Circuits

U14-A

Digital static stores

Dynamic recording is in T03 and W04. Storage systems for digital computing are in T01-H.

U14-A01

Shift stores (serial access)

U14-A01A

Magnetic devices

For magnetic film/core memories, see U14-A04 codes.

U14-A01A1 [1983]

Bubble memories (non-volatile)

Includes Bloch line memory, but when used as RAM see U14-A04A.

U14-A01B

Charge transfer devices

Includes serpentine, serial parallel serial (SPS) structure, recirculating shift registers. Any aspect regarding CTD structure, packaging is covered by U13-A02 codes.

U14-A01X

Other types of shift store memories

For FIFO aspects see U14-A08B1 also.
Inverter, LIFO

U14-A02

Memories using (electro-, magneto-) optical elements

U14-A02A [1992]

Memories using electro-optical or magneto-optical elements

U14-A02B [1992]

Memories using optical storage elements

U14-A02B1 [1992]

Optical memories with interference, diffraction patterns

Includes e.g. holograms.

U14-A02B9 [1992]

Other types of optical memories

U14-A03

Memories using electric elements

U14-A03A

Memories with bipolar devices

Includes memories with diodes and thyristors.

U14-A03A1 [1992]

Memories with bipolar transistors

Covers memories using bipolar transistors as main constituents. Includes ECL RAMs (bipolar static RAM), ECL and Schottky TTL PROMs (programmed by blowing fusible links, see also U14-A06B1). For static RAM structures and/or complete manufacture see also U13-C04B1B and/or U11-C18B5.

SRAM

U14-A03B

Memories with FETs (NMOS, CMOS)

U14-A03B1 [1983]

Memories with FET in bistable cell configuration

Includes flip-flop, enhancement/resistance, six transistor cell static RAM (see also U13-C04B1B). For complete memory manufacture see also U11-C18B5.

(E/R)SRAM, (4T-2R)SRAM, random access

U14-A03B4 [1983]

Memories with capacitor store

(U14-A03X)

Includes planar, trench, stacked capacitor dynamic RAM. For structure and manufacture see U13-C04B1A, U13-D03 and U11-C18B5. If only capacitor manufacture and/or structure emphasised see U11-C05G1B and/or U12-C02A1.

DRAM, random access

U14-A03B4A [1992]

Data refreshing for memories

(U14-A20)

Includes both internal and external refresh for dynamic RAM, pseudo-static RAM.

U14-A03B5 [1992]

Memories with FET-bipolar integration

(U14-A03A, U14-A03B)

For bipolar static RAM with e.g. CMOS circuitry, i.e. BiCMOS static RAM, see also U14-A03A and/or U13-C04B1B, U13-D03B codes if structure and manufacture are important. For BiCMOS dynamic RAM see also U14-A03B4 and/or U13-C04B1A, U13-D03B codes if structure and manufacture are important. Complete memory manufacture is covered by U11-C18B5.

BIMOS, SRAM, DRAM

U14-A03B7 [1983]

Memories with adjustable threshold MOS transistor

(U14-A03X)

Covers electrically programmable read-only memory, electrically erasable programmable read-only memory, electrically bulk erasable programmable read only memory. Includes variations of floating gate type e.g. floating gate tunnel oxide, textured polysilicon, split gate, floating gate avalanche MOS, stacked gate avalanche injection MOS, as well as variations of silicon-nitride-oxide-silicon type e.g. silicon-oxide-oxide-silicon, metal-nitride-oxide-silicon. For more specific details regarding floating gate MOS transistor or MIOS type transistor see also U12-D02A1, U12-D02A2 respectively. For matrix layout see U13-C04A1 for EPROMs, and U13-C04B2 for EEPROMs.

EPROM, EEPROM, E2PROM, FLASH EEPROM, FLOTOX, FAMOS, SAMOS, SNOS, SONOS, MNOS, Fowler-Nordheim tunnelling, hot carrier injection

U14-A03B9 [1987]

Memories with combined ROM and RAM memory cells

Includes e.g. non-volatile RAM in which SRAM array is duplicated (shadowed) by an equivalent EEPROM.

NOVRAM, shadow RAM

U14-A03F [1992]

Memories with ferroelectric elements

(U14-A03X)

Includes e.g. non-volatile variable resistive EEPROMs, non-volatile ferroelectric RAMs, ferroelectric capacitor memories (see also U14-A03B4).

'Cross point arrays'

U14-A03G [1992]

Memories with superconductive elements

(U14-A03X)

See also U14-F02B.

Josephson, superconducting

U14-A03H [2006]

Programmable conductor RAM (PCRAM)

Includes chalcogenide memories, phase change ovonic unified memories, phase change memories, and programmable resistor memories, resistive memories.

OUM

U14-A03X

Other types of memories with electric elements

Includes e.g. memories based on electrochemical cell, organic films etc. For variable resistance memories see U14-A03H from 2006.

U14-A04

Memories with magnetic elements

U14-A04A [1992]

Memories with magnetic thin films

Includes crosstie random access memory, Bloch line memory element used for non-volatile RAM.

CRAM, magnetoresistive RAM

U14-A04A1 [2006]

Using giant magnetoresistance effect

E.g. using ferromagnetic layers separated by metallic layer. Includes pseudo spin valve MRAM devices.

GMR, spin valve, spin transistor, pseudo spin valve, PSMRAM

U14-A04A2 [2006]

Using tunnel magnetoresistance effect

E.g. using ferromagnetic layers separated by electrically insulating layer. Includes magnetic tunnel junction or tunnelling magneto-resistance MRAM devices.

TMR, spin tunnel transistor, tunnel junction, MJT

U14-A04X

Memories with core stores

Includes ring shaped ferrite cores.

U14-A05

Associative memories

Includes content addressable memory.

CAM

U14-A06

(Semi-)permanent (non-volatile) ROM

U14-A06A* [1983-1986]

Electrically alterable semiconductor stores

*This code is now discontinued, but remains searchable and valid for records from 1983 to 1986. From 1987 see U14-A03B7.

U14-A06B [1983]

Non-reprogrammable stores (fixed-program memory)

Includes one-time programmable or 'one shot' EPROMS (without guard window to allow UV erasure).

OTP

U14-A06B1 [1987]

Non-reprogrammable memories using diodes or fuses

Includes PROM based on e.g. bipolar transistors (ECL or Schottky TTL) which are programmed by blowing fusible links.

Zener-zap

U14-A06B5 [1987]

Mask programmable, ion implantation programmable ROM

Includes ROM custom programmed during manufacture, obtained both with bipolar or MOS technology, by using e.g. contact window method, diffusion layer method, or ion implantation. For details of manufacture, see appropriate codes in U11 and for structure see also U13-D codes and/or U13-C04A.

U14-A06C [1987]

Non-electrically (e.g. UV) erasable ROM

Includes EPROM which can be programmed by user. See also U13-C04A and/or, prior to 1992, U13-C04B, U14-A03B7, as appropriate.

U14-A06X [1987]

Other non-volatile memories

U14-A07

Reading/writing

Includes data-in/data-out (I/O) control circuits, I/O signal interface, bit line control e.g. precharge and equalisation circuitry, voltage boosters, clocking circuits for read/write operations, safety circuits to prevent inadvertent reading/writing, initialisation circuits. Prior to 1992, some aspects regarding circuitry for reading/writing were covered by U14-A20.

U14-A07A [1983]

Reading, sensing circuits

Includes reading methods, sense amplifiers and associated circuitry e.g. sense reference voltage generator, charge pump circuits for providing current to sense amplifiers.

U14-A07B [1992]

Programming, erasing circuits

Includes voltage boosters for e.g. erasing/programming EEPROMs.

U14-A07C [1997]

Clocking circuits, synchronisation

(U14-A07)

General aspects of digital circuit synchronisation are covered by U22-H.

Time skewing

U14-A08

Address selection; Transmission of information between stores

For shift aspects of FIFO stores see U14-A01X also. Includes address, decoders and associated circuits, word line control circuits, timing circuits for address selection, two dimensional and multiplexed addressing. Prior to 1992 some aspects regarding circuitry for addressing were covered by U14-A20.

U14-A08A [1983]

Address-selection

Includes e.g. page mode and static column mode operation, chip selection circuitry.

Row address strobe, RAS, column address strobe, CAS

U14-A08B [1983]

Transmission of information between stores

Serial transmission, cache memory

U14-A08B1 [1992]

Multiport memories

Includes both random access memories and sequential memories (for the latter see also U14-A01X). Prior to 1992, first in-first out aspects are covered by U14-A08 and, for shift stores, by U14-A01X.

FIFO, dual port RAM, dual port burst access memory, BAM

U14-A09 [1992]

Power supply for memories

(U14-A20)

Includes power back-up and data preservation aspects.

U14-A10 [1992]

Packages for memories

(U14-A20)

For specific aspects of packaging see appropriate subclasses in U11-D, U11-E. Includes special adaptations e.g. small battery provided inside package.

U14-A11 [1992]

Software error prevention modifications

(U14-A20)

Includes e.g. method to prevent errors introduced by radiation (see also U11-D01C2 for package adaptations).

U14-A20

Other memory circuits

U14-B

Electric analogue stores

Sample-and-hold arrangements are coded in U21-B03.

Analogue memory

U14-B01

Multilevel memory

Includes digital memory functionality with cells holding more than two voltage levels (not strictly digital)

U14-B02 [2002]

With elements simulating neuronal cells

For complex neuronal configurations see T01-E05B and/or T02-A04A5.

U14-C

General layout aspects regarding memories; Interconnection arrangements

Core, matrix, plate, unit, frame

U14-C01 [1992]

Interconnecting storage elements

(U14-A20)

Include power/signal transmission line layout relating to bit and word lines. See also appropriate codes in U11-C05, U11-D03, U11-G.

Open bit line architecture, folded bit line architecture

U14-D

Checking store operation, redundancy

U14-D01 [1987]

Memory built-in self test, redundancy

Includes detecting defective memory elements and replacing them with redundant memory elements.

U14-D01A [1987]

Redundant arrangements, fuses

Includes redundant memory cells used to replace defective cells of main memory array and associated techniques e.g. cutting the fuse with laser beam.

U14-D01B [1997]

Testing memory operation using internal circuit

(U14-D01)

Self-test, built-in circuit

U14-D02 [1987]

Testing memory using error correction codes

Includes two dimensional codes e.g. Hamming codes, horizontal and vertical parity, BCH codes and multidimensional codes.

U14-D03 [1987]

Testing memory using external circuit or apparatus

E.g. for testing bubble memories.

U14-D09 [1987]

Other memory testing aspects

U14-E

Thermoelectric/magnetic devices

Peltier effect, Seebeck effect

U14-E01 [1987]

Radiation pyroelectric detector

Includes image sensors. See also S03-A03 and S03-A01B codes.

U14-E01A [1992]

Pyroelectric device characterised by material

(U11-A02, U14-E)

For pyroelectric materials see also U11-A02.

U14-E01B [1992]

Structure of pyroelectric device

See also S03-A03 for pyrometry in general.

Dielectric bolometer, pyroelectric sensor

U14-E01C [1992]

Pyroelectric device manufacture

U14-E02 [1992]

Thermomagnetic devices

(U14-E)

Includes devices using Nernst-Ettinghausen effect.

Covers manufacture.

U14-E05 [1987]

Power generation, cooling, temperature sensors

Includes devices with junction of dissimilar materials exhibiting Seebeck, Peltier effect.

U14-E05A [1992]

Characterised by function of thermoelectric device

U14-E05A1 [1992]

Power generating thermoelectric device

Thermopiles

U14-E05A2 [1992]

Heat extracting thermoelectric devices

Heat pumps, cooling, Peltier, electrocaloric effect, thin film perovskite PZT

U14-E05A3 [1992]

Thermoelectric sensors

(U14-E09)

See also S03-B01A.

Thermocouple

U14-E05B [1992]

Thermoelectric device characterised by material

(U14-E)

Bismuth telluride (with antimony)

U14-E05C [1992]

Thermoelectric device manufacture

U14-E09 [1987]

Other aspects regarding thermoelectric devices

U14-F

Superconductive devices

Josephson

U14-F01 [1992]

Materials for superconductive devices

Includes novel compositions (chemical and crystalline structures), and their manufacture and processing to improve characteristics, (e.g. grinding, mixing, pressing, sintering etc.).

Materials, devices and equipment specifically for heavy/power electrical use are covered by X12-C05, X11-H05, X12-D06 codes. Materials for unspecified uses are covered by U14 and X12-D06B codes. For testing aspects see also U11-F01 codes.

U14-F01A [1992]

Superconductive metal alloys and their manufacture

U14-F01A1 [1992]

Superconductive alloy manufacture and processing

U14-F01A5 [1992]

Novel superconductive metal alloys

U14-F01B [1992]

Non-metal superconductive materials and their manufacture

U14-F01B1 [1992]

Manufacture and processing of ceramic superconductive materials

Milling, mixing, calcination, sintering, cold/hot pressing

U14-F01B5 [1992]

Superconductive oxide novel materials

U14-F01B7 [1997]

Other superconductive materials

(U14-F01B)

For materials not covered by U14-F01A5 and U14-F01B5, e.g. for superconductive organic material.

U14-F02 [1992]

Superconductive device, circuits

These codes imply use of oxide materials unless specified by presence of U14-F02H code.

U14-F02A [1992]

Superconductive thin/thick film

Includes deposition, patterning, metallurgical details, patterned layers. For techniques of deposition or etching see also U11-C05C codes U11-C01 or U11-C07 codes, for apparatus see also U11-C09 codes. See also U14-H02 for thick film.

U14-F02B [1992]

Superconductive devices

For manufacture of complete device see also U11-C18B9; for specific aspects e.g. electrode manufacture, see also U11 codes e.g. U11-C05F6. For superconductive FET see also U12-D01A9.

Josephson tunnel junction, SQUID

U14-F02C [1992]

Circuits using superconductive devices

(U21-A03G, U21-C01X)

For logic circuits see also U21-C01F. For analogue to digital converters using superconductive elements see U21-A03G.

U14-F02H [1992]

Superconductive devices, circuits using metal alloys

This code is used in conjunction with U14-F02 codes to indicate use of alloy material rather than oxide for particular circuit, device.

U14-G

Acoustic wave devices

For surface acoustic wave generator, see also V06-V01E1. For acoustic charge transport device using SAW see also U13-A02A.

Elastic, surface, SAW

U14-H

Film and hybrid circuits, multilayer substrates, IC chip mounting

See V04-R also for details applicable to PCB manufacture.

U14-H01

Thin film

U14-H01A [1987]

Thin film two dimensional arrays e.g. for memories, LCDs, ELDs

Used for layout and manufacturing aspects. Use U12-B03A for semiconductor physics, material and heterostructure details. For LCD see also U14-K01A2 codes; for electroluminescent displays see also U14-J codes.

Display, matrix

U14-H01B [1987]

Thin film transducers, printers, line image sensors

For facsimile applications see S06-D05 also. Used for sensor arrays not having sufficient semiconductor body details for inclusion in U12-A02B. For thermal printer heads/materials see S06-H03 or for thermal ink jet printer see S06-G01. Does not include thin film magnetic heads, for which see T03-A03E.

U14-H01C [1987]

Thin film circuits, amplifiers, filters

For thin film capacitors, resistors with emphasis on semiconductor body see U12-B03B and U12-C02 or U12-C03 as appropriate.

U14-H01D [1987]

Thin film packages, interconnections

See also U11-D codes.

U14-H01E [1987]

Thin film transparent conductive layers

See U11-C18D also for sputtered optical layers. Includes pixel/colour filters, lithography, and general imager-display use.

Indium tin oxide, ITO, lead oxide, zinc oxide

U14-H01E1 [2015]

Transparent conductive oxides

Includes indium tin oxide (ITO), zinc oxide compounds etc.

U14-H01E2 [2015]

Transparent conducting polymers

Includes polythiophenes, e.g. Poly(3,4-ethylenedioxythiophene) (PEDOT), Poly(4,4-dioctylcyclopentadithiophene) etc.

U14-H01E3 [2015]

Metal compositions

Includes metal halides, such as silver halide, copper iodine. Can be used in conjunction with U14-H01E1 for example film containing indium oxide (ITO) and copper iodide.

U14-H01E4 [2015]

Nanowire transparent conductive films

Includes use of carbon, silver or copper nanowires or nanotubes or nano-particles as transparent conductive films.

U14-H01E5 [2015]

Mesh structured films

Includes copper mesh, silver mesh, metal mesh PET

U14-H01F [1987]

General thin film layer details

Includes e.g. insulating, conductive, lithography, multi-layer structures (e.g. for chip-carrier boards), using thin-film deposition (see also U11-C and U11-D codes).

U14-H02

Thick film

For material composition of thick films see U11-A05 codes.

U14-H03

Hybrid circuits

From 2009 IC chip mountings have been transferred to U14-H05. See also V04-R and V04-Q codes.

U14-H03A* [1987-2008]

Mountings for unpackaged IC chips onto substrate (ceramic, polymer, dielectric)

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes.

U14-H03A1* [1987-2008]

Un-encapsulated IC chip mounting arrangement (ceramic, multilayer ceramic, polymer, semiconductor substrate)

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Used for chip carrier which implies subsequent encapsulation of device once mounted (for encapsulation see U14-H03A3). See also U11-D01 for package details. For general chip carrier substrate aspects see U11-D01A. For high density multilayer interconnect see U14-H03A4. Multilayer ceramic boards are also covered by U14-H03B for structure/material, and by U14-H04A3 for manufacture.

U14-H03A2* [1987-2008]

Other chip to substrate connection

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For solder preforms see also U11-D03A9 (semiconductor mountings and terminals). Prior to 1992 this code included flip chip technology, (from 1992 see U11-E01C).

U14-H03A3* [1987-2008]

Encapsulation details for individual chip mounted on substrate

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For general aspects regarding multi-chip module, see U11-D01A6 or, for hybrid circuit packages see U14-H03C3.

U14-H03A4* [1987-2008]

Interconnections between several chips on substrate

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Includes use of e.g. wire bonding between chips on same substrate (which may also include semiconductor, e.g. silicon). Covers Advanced VLSI packaging, high density interconnect. Also includes optical contactless connection for communication between chips (see also U11-D03C3).

AVP, HDI, high density multi-chip interconnect, HDMI

U14-H03A4A* [1992-2008]

Thick film modules using e.g. ceramic dielectric

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See also relevant codes in U11 class, e.g. U11-D03B9, U11-D03C3 and/or other relevant codes in U14 class, e.g. U14-H03A1, U14-H02, U14-H03B, U14-H04A3.

U14-H03A4B* [1992-2008]

Thin film modules using e.g. polymer dielectric

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See also relevant codes in U11 class e.g. U11-C05A, U11-C05D2, U11-C05D3, U11-D03B9, U11-D03C3 and/or relevant codes in U14 class, e.g. U14-H01D, U14-H01F, U14-H03A1.

Polyimide thermoset, KAPTON

U14-H03B* [1987-2008]

Multilayer ceramic wiring boards

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For chip carriers see also U11-D01A, for un-encapsulated IC mountings see also U14-H03A1. For high density multilayer interconnect see U14-H03A4.

U14-H03B1* [1987-2008]

Details of materials/structures for multilayer ceramic substrates

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes.

U14-H03B2* [1987-2008]

Other details associated with chip mounted on multilayer ceramic substrate

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. Includes e.g. recess to facilitate enclosure of chip, terminals, capacitors included in the multilayer board (see also U11-D03C1) etc.

U14-H03C* [1987-2008]

Hybrid circuits (general)

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03G. Includes substrates not covered elsewhere in U14-H03. See also U11-A05B for material aspects, and U11-D01A for chip carrier.

Aluminium nitride, silicon carbide

U14-H03C1* [1987-2008]

Alignment of chips in array

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. E.g. for line image sensor, facsimile, photoelectric reader.

Facsimile, reader, photoelectric

U14-H03C2* [1987-2008]

Analogue circuitry - transistor and transmission line details

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. See W02-A also for microstrip/stripline circuitry.

Triplate

U14-H03C2A* [1997-2008]

High frequency integrated circuits

(U14-H03C2)

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see code U14-H03H for high frequency circuits. Includes monolithic microwave integrated circuits. For package aspects see U11-D01A4. For integrated circuit structures see also U13-D codes.

MMIC

U14-H03C3* [1987-2008]

Hybrid circuit packages and terminals

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H03D to U14-H03H codes. For multi-chip modules see also U11-D01A6.

Lead, Pin

U14-H03D [2009]

Hybrid circuits using thick films

U14-H03E [2009]

Hybrid circuits using thin films

U14-H03F [2009]

Substrates for hybrid circuits

U14-H03F1 [2009]

Ceramic substrates

Includes any details of ceramic substrates to do with hybrid circuits.

U14-H03F2 [2009]

Other substrates types

Includes all substrates other than ceramic substrates associated with hybrid circuits.

U14-H03G [2009]

Hybrid circuits(general)

Covers general hybrid circuit aspects that are not covered in above H03 codes. Replaces retired code, H03C.

U14-H03H [2009]

High frequency integrated circuits

(U14-H03C2A)

Covers all high frequency integrated circuits. Includes high frequency ICs for RFID tags and other RF devices.

MMIC, RFID

U14-H04
Hybrid and thick film circuit manufacture

U14-H04A [1983]
Film and substrate processing for hybrid circuits

U14-H04A1 [1987]
Screen printing; Thick film layer processing
Includes ceramic 'wafer' dicing.
Squeegee, print, bake

U14-H04A2 [1987]
Electroplating, vapour beam deposition, sputtering processes to apply conductive layers to ceramic or hybrid substrates
For metallurgical aspects regarding conductor patterns on ceramic substrate see also U11-D03B3.

U14-H04A3 [1987]
Ceramic circuit board manufacture (For hybrid circuits only)

U14-H04A4 [2009]
Trimming of thin/thick film components
(U14-H04B3B)

U14-H04A9 [1987]
Other hybrid circuit manufacturing aspects

U14-H04B [1983]
Hybrid circuit assembling
Includes all aspects of hybrid circuit assembling and manufacture, previously coded before 2009 in U14-H04B1 to U14-H04B9.

U14-H04B1* [1987-2008]
Hybrid circuit packaging
*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Coating with resin, sealing package.

U14-H04B2* [1987-2008]
Applying terminals for hybrid circuits
*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Includes e.g. connector for hybrid circuit (see also V04-K02 and V04-B01).

U14-H04B3* [1987-2008]
Mounting components onto substrate; Trimming of layer components

*This code is now discontinued, but remains searchable and valid for records from 1987 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture.

U14-H04B3A* [1992-2008]
Bonding, mounting components on hybrid circuit substrate

*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture.

U14-H04B3B* [1992-2008]
Trimming of thin/thick film components

*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04A4.

U14-H04B9* [1992-2008]
Other hybrid circuit assembling aspects

*This code is now discontinued, but remains searchable and valid for records from 1992 to 2008. From 2009 see U14-H04B which now includes all aspects of hybrid circuit assembling and manufacture. Includes e.g. demounting defective components in multi-chip modules (see also U11-E02B). For testing aspects see also U11-F01F.

U14-H05 [2009]
Hybrid circuit package and/or terminal arrangements
(U14-H03)

Includes mountings of chips on substrates, leads, terminals, sockets, holders and packaging.

U14-J
Electroluminescent light sources
For electroluminescent materials see U11-A15. See also X26-J only if device is used for illumination purposes. Excludes devices covered by U12-A01.

U14-J01 [1992]
Electroluminescent source manufacture

U14-J01A	[2005]
Manufacture for electroluminescent displays	
Includes all methods of manufacture for electroluminescent displays.	
U14-J01B	[2005]
Equipment for manufacture of electroluminescent devices or displays	
Includes all equipment for both electroluminescent devices or displays.	
U14-J02	[1992]
Electroluminescent display structure	
<i>ELD</i>	
U14-J02A	[1992]
With electrode details of electroluminescent display	
For thin film transparent conductive layer on glass substrate see also U14-H01E. From 2002 use with U14-J02D codes to indicate material aspects of structure.	
<i>Indium tin oxide, ITO</i>	
U14-J02B	[1992]
Module details and sealing arrangements of electroluminescent display	
Includes connections to external electrodes or PCBs.	
U14-J02C	[2005]
EL display optical components	
For complete filter manufacture see also U11-C18D.	
U14-J02D	[2002]
Inorganic/organic electroluminescent displays	
U14-J02D1	[2002]
Inorganic electroluminescent displays	
U14-J02D2	[2002]
Organic or polymeric electroluminescent displays	
Includes structures with polymeric and organometallic complexes.	

U14-J02E	[2005]
Switching elements for active matrix electroluminescent displays	
Includes two and three terminal switching arrays	
U14-J03	[1992]
Circuits and drivers for electroluminescent devices	
From 2002 use with U14-J02D codes to indicate material aspects of structure.	
U14-J03A	[2007]
Circuits and drivers for electroluminescent displays	
U14-J03B	[2007]
Circuits and drivers for other electroluminescent devices	
U14-J04	[2005]
Testing aspects of Electroluminescent displays	
Testing for active matrix see also U11-F01F and U11-F01D codes. For module testing see also S01-G01A3 and V04-Q02A2.	
U14-J05	[2007]
Electroluminescent device structure	
For electroluminescent devices other than displays.	
U14-J05A	[2007]
Electrode details for electroluminescent devices	
U14-J05B	[2007]
Module/Package details and sealing arrangements of electroluminescent devices	
U14-J05C	[2007]
Optical elements for electroluminescent devices	
U14-J05D	[2007]
Electroluminescent devices	
U14-J05D1	[2007]
Inorganic electroluminescent device	
U14-J05D2	[2007]
Organic electroluminescent device	

U14-K

Passive displays

Refers to displays modifying light generated elsewhere.

U14-K01 [1983]

Liquid crystal displays

For materials see U11-A03A, V07-K10A. For light valves, shutters, light spatial modulator see V07-K01A2. Testing aspects of active matrix are also covered by U11-F01F. For storage effect see U14-A02A.

LCD

U14-K01A [1983]

Cells, constructional details, and circuits of LCD

U14-K01A1 [1987]

Transparent conductive films, alignment layers, spacers of LCD

U14-K01A1A [1992]

LCD alignment layer

(U11-A09, U14-K01A1)

Includes films and materials used for alignment, cloths for rubbing the alignment coating, etc.

Orientation

U14-K01A1B [1992]

Transparent conductive films, and electrodes of LCD

Includes electrode details for passive LCD, i.e. with parallel conductive tracks. See also U14-H01E for transparent conductive film.

U14-K01A1C [1992]

LCD optical components

Includes filters, polarisers, phase retarders. For complete filter manufacture see also U11-C18D.

U14-K01A1D [1992]

Spacers used in LCD

(U14-K01A, U14-K01A2)

U14-K01A1G [1992]

Characterised by specific electro- or magneto-optical effect of LC material

Includes field induced birefringence, guest-host effect, dynamic scattering, etc. For optical addressing (thermally induced phase transitions) see V07-K01A2.

Field induced phase change, cholesteric, twisted nematic, orientation, plechroic dye

U14-K01A1J [1992]

LCD manufacture

(U14-K01, U14-K01A)

Include e.g. filling the cell with LC material. For manufacture of switching elements for driving active matrix see U14-K01A2 codes.

U14-K01A1K [2005]

Equipment for manufacture of LCDs

Includes all equipment for manufacture of LCD, including substrate handling equipment, etching, lithography etc. See also U11 codes for individual processes and equipment.

U14-K01A1L [2007]

LCD repair and correction

See also U14-K01A8 for LCD testing aspects.

U14-K01A2 [1987]

Other constructional details, coating, and optical layers of LCD

Includes manufacture and structural details regarding switching elements for driving active matrix display. Also covers antireflective coatings.

U14-K01A2A [1992]

For two terminal switching elements of LCD

Includes diodes, MIM elements, varistors. For thin film aspects see also U14-H01A. See also other appropriate codes in U11 and U12 e.g. U11-C05G1, U11-C18B1, U12-C01, U12-C03.

U14-K01A2B [1992]

For three terminal switching elements of LCD

Includes thin film transistor (TFT) aspects. See also U14-H01A and where appropriate, U11-C18A1, U12-B03A, U12-D02A.

U14-K01A2C [1997]

Plasma addressed LCD

(U14-K01A2, U14-K01A1B)

See also V05-A01A7.

U14-K01A2D [1997]

LC cells integral with photoconducting, ferroelectric layer

Prior to 1997 see also U14-K01A1G, V07-K01A, V07-K05.

U14-K01A2E [2007]

Coatings for LCD

Covers all protective coatings, includes anti-reflective films coating for LCDs

U14-K01A3 [1987]

Circuits, drivers of LCD

Includes mainly drive circuitry integral with LCD or circuitry which depends on specific characteristics of LCD., e.g. feedback control for detection of ambient light and control of light valve. More general aspects of drive circuitry are covered by T04-H03C2 or W03-A08B codes. See also under application.

U14-K01A4 [1987]

LCD associated with mountings, PCB connectors. Module details

Includes back-lighting aspects (see also W05-E05B).

U14-K01A4A [1997]

Modular details of LCD

(U14-K01A4)

Includes sealing aspects.

U14-K01A4B [1997]

Connections of LCD to external electrodes or PCB

(U14-K01A4)

See also V04 codes. Includes connections from electrodes to cell terminals.

U14-K01A4C [1997]

LCD illumination arrangements

(U14-K01A4)

Includes internal and reflection type LCD illumination. From 2007, also see X26-U04A1 for backlighting and backlight circuitry including ambient environment detection and feedback control. See W05-E05B1 and relevant X26 codes prior to 2007.

U14-K01A5 [1997]

LCD substrate details

(U14-K01A, U14-K01A2)

For production and processing aspects of substrate. See U11 codes also. For active matrix aspects see U14-K01A2 codes.

Glass

U14-K01A8 [1997]

Testing aspects of LCD

(U14-K01A)

For testing of liquid crystal materials see also S02-J04A3; for active matrix testing see also S02-J04A3A and U11-F01F and/or U11-F01D codes. For module testing see also S01-G01A3 and V04-Q02A2.

Probe

U14-K02 [1992]

Electrochromic displays

(U14-K09)

For building and vehicle windows using electrochromic layers see X25-U01 and X22-J codes respectively.

U14-K02A [1992]

Constructional details and manufacture of electrochromic display

(U14-K09)

U14-K02A1 [1997]

Structural arrangements for electrochromic display

(U14-K02A)

Includes spacers, gaskets, electrodes.

U14-K02A2 [1997]

Electrochromic display manufacture

(U14-K02A)

For materials see U11-A03C only.

U14-K02B [1992]

Circuits, drivers of electrochromic display

(U14-K09)

U14-K03 [1992]

Electrophoretic displays

(U14-K09)

Includes materials, constructional details. For electrostatic ball displays see appropriate W05-E08 codes.

U14-K03A [2005]

Constructional details and manufacture of electrophoretic displays

U14-K03A1 [2005]

Structural arrangements for electrophoretic displays

U14-K03A2 [2005]

Electrophoretic display manufacture

U14-K03B [2005]

Circuits, drivers of electrophoretic displays

U14-K04 [1992]

Electro-optic displays based on ceramics or electro-optical crystal exhibiting Kerr or Pockells effect

(U14-K09)

For optical shutters see V07-G15 and V07-K01A.

PLZT

U14-K05 [2014]

Electrowetting displays

Includes manufacture, structure, drive circuits etc.

U14-K09 [1983]

Other passive displays

Includes electronic paper, can be used in conjunction with any other U14-K codes. For electronic paper in general see also W05-E10.

Magnetophoretic

U14-L [2021]

Non-display switchable glass panels

Includes electronic switching glass panels used for non-display purposes, e.g. for privacy, or light dimming in places such as building windows, privacy screens, vehicle windows, dimming mirrors etc.

Smart glass, Electrolytic PDLC Film, Electrochromic glass, LCD Glass

U21: Logic Circuits, Electronic Switching and Coding

U21-A

Coding, decoding

Encode, compress, predict

U21-A01* [1980-1991]

Pulse code modulation

*This code is discontinued from 1992. In addition to U21 codes, inventions involving PCM may be assigned the following codes depending on applications and their precise nature:

- (1) W02-C06 for general transmission systems using PCM
- (2) W02-F07 codes for PCM TV transmission systems
- (3) S06-K07A4D for facsimile coding and compression
- (4) W04-F01F codes for video recording using compression coding
- (5) W04-G01F for audio signal recording coding and compression
- (6) W04-P01A codes for video signal coding
- (7) W04-V05G codes for speech signal coding
- (8) W04-V10 codes for coding of audio signals in general

U21-A02

D/A conversion

Search with U21-A04A for sigma-delta type.

U21-A02A [1987]

Digital-to-analogue converters

DAC

U21-A02A1 [1992]

Binary-weighted D/A converters

Weighted resistor

U21-A02A2 [1992]

Ladder-type D/A converters

R-2R ladder

U21-A02A3 [1992]

D/A converters with intermediate conversion to time or frequency of pulses

U21-A02A4 [2006]

Resistor string

U21-A02A5 [2007]

Switched capacitor D/A converters

U21-A02A9 [1992]

Other D/A converters

Includes e.g. multiplying D/A converter.

U21-A02B [1987]

Broader system details, testing of D/A converters

U21-A02B1 [1997]

Broader system details

(U21-A02B)

U21-A02B1A [2005]

Input/output circuitry

U21-A02B1B [2006]

Voltage reference circuits

Also see relevant U24 codes for novel voltage reference circuits.

U21-A02B1C [2005]

Clock arrangements

U21-A02B1X [2005]

Other details

U21-A02B2 [1997]

Testing and calibrating

(U21-A02B, U21-A03F1)

Prior to 1997 testing and calibrating for DAC was covered by U21-A02B and U21-A03F1.

DC offset, auto-zero

U21-A02B3* [1997-2004]

Noise reduction and error correction

(U21-A02B, U21-A03F3)

*This code is now discontinued and from 2005 noise reduction and error correction for DACs is covered by U21-A02B7G. Prior to 1997 noise reduction for DAC was covered by U21-A02B and U21-A03F3.

U21-A02B7 [2005]

Improvements to DA converter performance

U21-A02B7A [2005]

Increased resolution

U21-A02B7C [2005]

Increased conversion speed

U21-A02B7E [2005]

Increased range

Covers increase in number of bits or other change in representation of data, or on analog side by increasing dynamic range, output voltage swing, etc.

U21-A02B7G [2005]

Noise reduction and error correction

U21-A02B7J [2006]

Reducing power consumption

U21-A02B7L [2006]

Size reduction

U21-A02B7N [2012]

Increased accuracy or precision

Prior to 2012 see U21-A02B7G or U21-A02B7X depending on emphasis.

U21-A02B7X [2005]

Other DA converter performance improvement

U21-A03

A/D conversion

Search with U21-A04A for sigma-delta type. ADC

U21-A03A

A/D converters with conversion to duration/frequency

Includes counter ramp (counting) converter when type of conversion is emphasised, otherwise coded in U21-A03B as a converter with feedback. Also includes integrating type e.g. dual slope or ratiometric converter. Search U21-A03X also prior to 1983.

Tracking, servo converter

U21-A03B

A/D converters using D/A converter (feedback type)

Includes successive approximation type. SAR, serial comparator

U21-A03B1 [2006]

SAR

Successive approximation type converters.

U21-A03B3 [2006]

Pipeline

U21-A03B5 [2007]

Switched capacitor A/D converters

U21-A03B9 [2006]

Other feedback types

U21-A03C [1987]

Flash A/D converters

Parallel comparator, simultaneous ADC

U21-A03E [1987]

Interpolating A/D converters, hybrid arrangements combining different converters

Includes serial-parallel type (see also U21-A03B).

U21-A03F [1987]

Testing and calibrating, broader system details

U21-A03F1 [1992]

Testing and calibrating

DC offset, auto-zero

U21-A03F3* [1992-2004]

Noise reduction and error correction

*This code is now discontinued and from 2005 noise reduction and error correction for ADCs is covered by U21-A03F7G.

U21-A03F5 [1992]

Broader system details

U21-A03F5A [2005]

Input/output circuitry

Includes scaling and gain control arrangements, see U24-C codes for novel amplifier/gain control aspects.

U21-A03F5B [2006]

Voltage reference circuits

U21-A03F5C [2005]

Clock arrangements

U21-A03F5X [2005]

Other details

U21-A03F6 [2005]

Sampling

This code covers sampling arrangements and wider sampling aspects. See U21-B03 for novel sample and hold arrangements and U21-A04A for sigma delta converters.

U21-A03F6A	[2005]
Novel sampling circuit	
This code covers all novel sampling arrangements. See other U21-A03F6 codes for sampling function aspect.	
U21-A03F6B	[2005]
Oversampling	
U21-A03F6C	[2005]
Undersampling	
U21-A03F6D	[2005]
Sample modification	
Modification of digital samples in DSP is covered by U22-G03B1 codes ('Re-sampling').	
U21-A03F6X	[2005]
Other sampling functions	
U21-A03F7	[2005]
Improvements to AD converter performance	
U21-A03F7A	[2005]
Increased resolution	
U21-A03F7C	[2005]
Increased conversion speed	
U21-A03F7E	[2005]
Increased range	
U21-A03F7G	[2005]
Noise reduction and error correction	
U21-A03F7J	[2006]
Reducing power consumption	
U21-A03F7L	[2006]
Size reduction	
U21-A03F7N	[2012]
Increased accuracy or precision	
Prior to 2012 see U21-A03F7G or U21-A03F7X depending on emphasis.	
U21-A03F7X	[2005]
Other AD converter performance improvement	

U21-A03G	[1987]
A/D converters implemented using other technology	
Includes use of e.g. SAW, optical, Josephson junction devices (for superconductive devices, circuits, see also U14-F02 codes).	
U21-A03H	[1992]
Reversible converters	
(U21-A02B, U21-A03F)	
U21-A03J	[1992]
Position encoders	
(U21-A03X)	
For absolute encoders for which displacement directly generates unique digital value U21-A03J5 is assigned with other U21-A03J codes as appropriate. See also S02-K03	
U21-A03J1	[1992]
Optical position encoders	
(U21-A03X)	
<i>Rotary encoders, shaft angle, moire fringes</i>	
U21-A03J2	[1992]
Magnetic or inductive position encoders	
(U21-A03X)	
U21-A03J5	[2002]
Absolute position encoders	
This code is assigned with other U21-A03J codes as appropriate, depending on technology, and refers to encoders with a unique relation between position and output code. Such types were indicated by the additional assignment of W05-D01 codes (now discontinued) prior to 2002.	
<i>Gray code, disc, scale, track.</i>	
U21-A03J9	[1992]
Other types of position encoders	
(U21-A03X)	
Includes electric type e.g. capacitive, brush arrangements.	
<i>Wiping contact, potentiometer</i>	
U21-A03X	
Other aspects of A/D conversion	
U21-A04	
Delta and differential modulation	
For testing aspects see also U21-A03F1.	

U21-A04A [1992]

Delta-sigma converters

Includes oversampled converter architectures. Where sampling is novel see U21-A03F6 and also see U21-A02/A03 codes as appropriate.

Sigma-delta, continuously variable slope delta, CVSD, delta modulator, oversampling

U21-A04B [1992]

Differential modulation

Adaptive differential PCM, ADPCM

U21-A05

Code conversion

See W01-A02 also for application of code conversion to data transmission in general. Coding of audio and video signals is not included and is covered by W04-P01A codes (video signals), W04-V05G codes (speech signals) and W04-V10 codes (audio signals in general). Coding for error detection and correction in general is covered by U21-A06 codes.

Bit structure, character interval, format, mapping, recoding

U21-A05A

Static code converters

U21-A05A1 [1987]

Parallel code conversion. Conversion to or from (non-) weighted or stochastic codes

Includes decimal code, binary coded decimal code, conversion from or to n out of m codes, to or from one out of m codes, conversion to or from floating point codes, conversion to or from Gray codes.

BCD

U21-A05A2 [1987]

Compression, expansion, suppression of redundancy

This code is used in a general way to represent 'coding', e.g. for data compression. It is assigned alone or in conjunction with other codes - e.g. for audio or video coding, or coding for data transmission - **if** U21-A05A2 codes can highlight additional detail e.g. if using U21-A05A2A enables 'variable length coding' to be highlighted. When specific codes exist for the type of coding involved in an invention and U21-A05A2 codes do not provide additional focus, they are not assigned. Specific codes for particular coding applications are : S06-K07A4D for document imaging and copying; T01-D02 for computer data coding; T01-J10D for image compression; T03-P01B for compression of recorded data; W01-A02A for data transmission; W04-F01F for video signal recording coding, W04-G01F for audio signal recording

coding, W04-P01A codes for video signal coding, W04-V05G for speech coding; W04-V10 for general audio coding.

U21-A05A2A [1992]

Conversion to or from variable length codes

Shannon-Fano code, Huffman code, Morse code

U21-A05A2B [1992]

Conversion to or from run length codes

U21-A05B [1987]

Parallel/series and series/parallel conversion

Series-in parallel-out register, SIPO, series-in series-out register, SISO, parallel-in series-out register, PISO, serial-parallel, parallel-serial

U21-A05C [1987]

Series transmission code. Manchester, biphasic level coding

Includes conversion to or from representation by three or more level pulses.

NRZ

U21-A05D [1987]

Coding associated with computer keyboard or printers. Language scripts

For key scanning and coding aspects see also T04-F01A5. For keyboard interfacing see also T01-C codes.

U21-A05D1 [1987]

Language script coding techniques

Includes coding for dealing with e.g. Chinese, Arabic characters. Search with W01-C01B8M for application to coding for telephone keys.

Kanji, Kana, Arabic characters

U21-A06

Error detection and correction

U21-A06 codes are assigned for error detection/correction in general, and to provide specific details of error correction coding in conjunction with codes in other classes, such as with T03-P01A for data recording error correction. For applications specific to telecommunications alone, W01-A01B codes are applied instead.

U21-A06A [2005]

Using block codes

Covers error detection/correction coding where a predetermined number of check bits are joined to a predetermined number of information bits.

U21-A06A1 [2005]

Cyclic redundancy check

U21-A06A2 [2005]

Parity bit

U21-A06A3 [2005]

Hamming codes

U21-A06A4 [2005]

Reed Solomon coding

U21-A06A9 [2005]

Other block codes

U21-A06C [2005]

Using convolutional codes

Covers error detection/correction coding where the coded sequence is algorithmically achieved through the use of current data bits plus some of the previous data bits from the incoming stream.

U21-A06C1 [2005]

Viterbi coding

U21-A06C2 [2005]

Turbo coding

U21-A06C3 [2005]

Trellis coding

U21-A06C9 [2005]

Other convolutional codes

U21-A06E [2005]

Using Interleaving techniques

Covers error detection/correction arrangements where the data structure is re-organised to reduce errors.

U21-A06G [2006]

Using multiple coding techniques

This code covers error correction/detection using either multiple (two or more) block or convolutional codes or a combination of block and convolutional. The coding types of the combination are applied in addition to this code. Please note, this code is only applied where the combination is the novel aspect and not where multiple coding techniques are merely listed as separate possibilities.

U21-A06G1 [2014]

Multiple codes used together

Covers the simultaneous use of two or more error-detecting or error-correcting codes, e.g. either multiple block or multiple convolutional codes or a combination of block and convolutional codes, used together.

U21-A06G5 [2014]

Multiple codes used separately (i.e. one at a time)

Covers the separate use of two or more error-detecting or error-correcting codes, e.g. either multiple block or multiple convolutional codes or a combination of block and convolutional codes, used at different times.

U21-A06X [2005]

Other error detection/correction

U21-B

Electronic switching or gating

Purely mechanical and electromechanical switches using moving metallic contacts are covered in V03 and X13. Note that mechanical details of actuating elements and the like for electronic switches in which part of the switch moves (e.g. as denoted by U21-B02C2) are also covered in V03 (e.g. by V03-B and V03-C codes) when necessary. Electronic switching without any physical movement is covered in U21 only.

U21-B01

Electronic switching or gating characterised by switching device

U21-B01A

Switching using bipolar transistors and diodes

Includes Darlington configuration.

U21-B01A1 [2006]

Switching using IGBTs

U21-B01B

Switching using field effect transistors

U21-B01C

Switching using thyristors, triacs etc.

Note that U21-B02H (novel bi-directional switching arrangements) is not routinely applied with this code for devices such as triacs which are inherently bi-directional.

Gate turn-off, GTO

U21-B01D [1987]

Compound switches (FET/bipolar, thyristor/FET), other semiconductor switches

U21-B01D1 [1992]

Switching using transformer coupling
(U21-B01D)

U21-B01E [1992]

Using optoelectronic devices
(U21-B01X)
Opto-coupler

U21-B01P [2009]

Switching using phase-change devices
(U21-B01X)

This code is intended for electronic switching arrangements using devices with phase-change properties, e.g. based on materials such as chalcogenides. Logic circuits applying this technology are covered by U21-C01P. Phase-change memories are covered by U14-A03H and optical recording materials based on phase-change effects are covered by T03-B01B codes.

Amorphous, chalcogen, crystalline, selenide, sulfide, telluride

U21-B01T [2006]

Using nano-tubes

Other U21-B01 codes are applied where applicable, only electronic switches are coded here, if electromechanical see V03 and if solely optical see V07.

U21-B01X

Other devices

Includes switches using Hall effect devices (when used for proximity switches see U21-B02C), superconductive devices (see U14-F02B also), gas or vacuum tubes, etc.

U21-B02

Circuit details

U21-B02A

Controlling switching point/instant

U21-B02A1 [1987]

Introducing delay before switching using capacitor and transistors

U21-B02A2 [1987]

Introducing delay before switching using digital counter, timer, computer modules

U21-B02A3 [1987]

Providing predetermined threshold before switching and switching at zero-crossing

See U22-D07A for circuits delivering a pulse in response to zero-crossing and U22-A04D5 for comparators in general.

U21-B02B

Affecting states; Power-on resetting

Includes storing actual state of switch when supply voltage fails.

Reset

U21-B02C [1983]

Proximity/touch switches

See T04-F01 also for computer keyboard switches.

U21-B02C1 [1987]

Capacitive/inductive/resistive not requiring displacement of switch element

This code covers 'touch' switches operating without any movement of the switch or switch parts and includes electronic switching aspects of touch screens and the like, which in general are also coded as T04-F02A2. Capacitive, inductive, magnetic or resistive electronic 'touch' switches in which part of the switch moves during operation are covered by U21-B02C2.

U21-B02C2 [1987]

Inductive/capacitive/resistive responding to physical displacement of plate or magnetic flux element

U21-B02C3 [1987]

Using optical or other switching elements

See S03-C08 codes.

Light barrier

U21-B02D [1987]

Accelerating switching speed, reducing power consumption, ensuring fully conductive state, increasing max. current or voltage

(U21-B02X)

Includes also modifications for improving heat dissipation.

U21-B02D1 [1987]

Using series/parallel switches to distribute current/voltage

U21-B02E	[1987]
Switch protection	
(U21-B02X)	
See U24-F for protection of electronic circuits in general.	
U21-B02F	[1992]
Eliminating interference voltages or currents, or other sources of noise	
(U21-B02X)	
U21-B02G	[1992]
Compensating variations of physical values e.g. temperature	
(U21-B02X)	
U21-B02H	[2006]
Bidirectional switching	
This code covers novel bi-directional switching arrangements and is not routinely applied for devices such as triacs which are inherently bi-directional	
U21-B02J	[2006]
Switch testing	
U21-B02X	
Other aspects of electronic switching	
U21-B03	
Sample-and-hold arrangements	
U21-B05	[1987]
Applications of electronic switching circuits	
U21-B05A	[1987]
Analogue switching	
<i>Transmission gate, multiplexer/demultiplexer, signal selector</i>	
U21-B05B	[1987]
Very high power/speed switching	
Includes power-pulse techniques.	
U21-B05C	[1987]
Power converters and power switching	
For low and very high power converters see separately U24-D and X12-J codes.	
<i>Semiconductor relay</i>	

U21-B05D	[1987]
Logic	
This code is used to indicate the application of electronic switching to logic circuitry and is applied for novel electronic switching inventions which can be used in logic circuits. Details of logic circuits themselves are covered by U21-C codes which can be assigned in addition to U21-B05D when an electronic switching invention includes specific details of those circuits. In general, since it is understood that logic circuits involve switching, inventions presented as novel logic circuits are not also assigned U21-B codes.	
U21-B05E	[1992]
Signal switching	
(U21-B05X)	
Includes digital telecommunications, multiplexing/demultiplexing aspects, single/multiple switch arrangements. See also W01-B codes.	
U21-B05X	[1987]
Other applications of electronic switching circuits	
Includes computer applications, pulse distributors etc.	
U21-C	
Logic circuits	
U21-C01	
Logic circuits characterised by components	
U21-C01A	
Bipolar transistors and diodes	
U21-C01A1	[1992]
Diode- or resistor-transistor logic	
Includes complementary transistor logic, Schottky transistor logic.	
<i>CTL, STL</i>	
U21-C01A2	[1992]
Emitter coupled logic	
Includes emitter function logic, base coupled logic.	
<i>ECL, EFL, BCL</i>	
U21-C01A3	[1992]
Transistor-transistor logic	
<i>TTL</i>	

U21-C01A4	[1992]
Integrated injection logic	
Includes integrated Schottky logic, static induction logic.	
<i>ISL, STIL, IIL, I2L</i>	
U21-C01B	
FET	
U21-C01B1	[1987]
MESFET	
U21-C01B3	[1987]
MOSFET	
<i>Complementary, CMOS, enhancement/depletion mode, source coupled field effect logic, SCFL</i>	
U21-C01B5	[1987]
Dynamic MOSFET	
U21-C01C	[1987]
Combined FET and bipolar	
<i>Schottky diode-FET logic, SDFL, BiCMOS, BiMOS, BiFET, BiMIS</i>	
U21-C01D	[1987]
Logic circuits implemented with circuit blocks	
Includes use of e.g. operational amplifiers and multiplexers, and also use of logic gates as 'blocks' to make up larger logic circuits and systems.	
U21-C01E	[1987]
Programmable logic arrays, gate arrays, reconfigurable logic	
(U21-C01X)	
This code is intended to highlight the use of programmable logic, such as semi-custom ASIC e.g. gate arrays (uncommitted logic arrays, configurable gate arrays, logic arrays), programmable logic devices categorised as programmable logic arrays, programmable array logic, programmable logic sequencers. For physical layout and interconnection details see also U11-D03, U13-C04C. To identify type of transistor employed, U21-C01B or U13-C codes are used. Novel logic circuitry details of programmable logic are covered by U21-C03B3.	
<i>PLA, PLD, FPGA</i>	
U21-C01F	[1992]
Logic circuits using superconductive devices	
(U21-C01X)	
See also U14-F02C.	

U21-C01G	[1992]
Logic circuits using optoelectronic devices	
(U21-C01X)	
For optical logic elements, see V07-K06. For digital computing aspects, see T01-E05.	
U21-C01P	[2009]
Logic circuits using phase-change devices	
(U21-C01X)	
This code is intended for logic circuits using devices with phase-change properties, e.g. based on materials such as chalcogenides. Electronic switching circuits applying this technology are covered by U21-B01P. Phase-change memories are covered by U14-A03H and optical recording materials based on phase-change effects are covered by T03-B01B codes.	
<i>Amorphous, chalcogen, crystalline, selenide, sulfide, telluride</i>	
U21-C01R	[1997]
Logic circuits using devices with tunnelling mechanism	
Includes resonant tunnelling transistor or diode.	
<i>RTBT, RHET, tunnel diode</i>	
U21-C01T	[2006]
Logic circuits using nano tubes	
(U21-C01X)	
U21-C01X	
Logic circuits using other technology or components	
Includes logic circuits using magnetic, galvanomagnetic (Hall-effect) devices, ferroelectric capacitors.	
U21-C02	
Interface circuits	
<i>input circuit, output circuit, buffer, transistor level shifting</i>	
U21-C02A	[1987]
Inter-family; Logic level shifting	
<i>TTL-CMOS, TTL-ECL</i>	
U21-C02A1	[2007]
Inter-family	
This code is intended for circuits interfacing between different logic families. Circuits providing an interface between logic circuits of the same type operating from different supply voltages are covered by U21-C02A5.	

U21-C02A5 [2007]

Logic level shifting

This code is intended for circuits providing an interface between logic circuits of the same type operating from different supply voltages. Interfacing between different logic families is covered by U21-C02A1.

U21-C02B [1987]

Drivers for displays, relays etc.

See also T04-H codes for displays, V03-D02 for relays.

U21-C02C [1987]

Tri-state driver and parallel bus

See also appropriate codes in T01 and W01.

U21-C02D [1987]

Serial line transmission

See also appropriate codes in T01 and W01.

U21-C02D1 [2007]

Differential transmission

This code includes e.g. low voltage differential signalling (LVDS) circuits, from 2007 see also W01-A08D for differential data transmission systems in general.

U21-C02E [2006]

IC termination

Covers interface for termination of transmission line for integrated circuits using active or passive components. Includes stand alone or on-chip, see also U25-D05 and/or W01/W02.

U21-C03 [1983]

Logic function and general integrated circuit details

U21-C03A [1987]

Integrated circuit - general gate aspects

U21-C03A1 [1987]

Input-output details, increased speed

Includes modifications to increase fan-in and fan-out, and protection against short-circuited output.

U21-C03A2 [1987]

Power supply and noise prevention

'Power supply details' refers to **internal** details of the logic circuit. Novel circuits for power supplies in general are covered by U24-D and U24-E codes which are also assigned as appropriate when part of the logic circuit itself.

U21-C03A2A [1992]

Modifications to reduce power dissipation

Includes power supply substrate bias.

U21-C03A2B [1992]

Noise suppression

Includes modifications for eliminating interference or parasitic voltages and currents, compensating for variations in temperature, supply voltage etc.

Ground bounce

U21-C03A3 [1992]

Inverter circuit details

(U21-C03A9)

Includes details of pulses for e.g. NMOS, CMOS, BJT inverters (see also U21-C01A, U21-C01B). For pulse aspects see also appropriate U22-D01 codes. Includes also modifications of threshold for gating or switching. Complete novel inverters are coded as logic gates under U21-C03B.

U21-C03A5 [2006]

Reducing circuit size

U21-C03A9 [1987]

Other aspects of logic circuits

U21-C03B [1987]

Logic gates

Includes novel circuits which perform logic functions e.g. AND, OR, NOR, NOT, EXCLUSIVE-OR, NAND.

U21-C03B1 [1987]

Tri- or multi-level, fuzzy logic

U21-C03B1A [1992]

Tri- or multi-level logic

U21-C03B1B [1992]

Fuzzy logic

See T01-J16B for complex systems.

U21-C03B2 [1987]

Arithmetic

Includes majority and minority circuits. See also T01-E02.

Add, carry, computation, equivalence, multifunction, majority, arithmetic logic unit, ALU

U21-C03B3 [2005]

Programmable logic circuitry, including programmable controllers

This code covers novel aspects of programmable logic circuits and programmable controllers. The use of this kind of device in logic systems is covered by U21-C01E and both codes can be assigned together when necessary, e.g. for a novel programmable controller implemented by configurable logic circuits. See also T01 codes for programme control aspects and T06 codes for process and machine control aspects. Programmable controllers without any logic circuit details are not coded in U21 and are generally covered in T06, e.g. by T06-A04B1.

PLC

U21-C03B4 [2005]

State machines

See also relevant T01 codes

State Machine, Finite State Machine

U21-C03B9 [1987]

Other types of logic circuits

U21-C03C [1987]

Fail-safe

Monitor, fault detection, majority

U21-C03D [1987]

Logic simulators, design logic circuit construction, circuit board wiring

Includes e.g. piggy-back construction for bus systems. For CAD applied to integrated circuits, see also U11-G.

Computer-aided logic design, logic CAD, layout optimisation, logic synthesis

U21-C03D1 [1997]

Logic circuit testing

See also S01-G01A codes and, for integrated circuit aspects, U11-F01D and/or U13-C07 codes.

Signal analysis, set/scan logic

U21-D

Pulse counters and frequency dividers

U21-D01

Input/output circuits

Serial-in parallel-out, serial-in serial-out

U21-D02

Starting/stopping/monitoring

U21-D02A [1992]

Starting/stopping

Reset

U21-D02B [1992]

Monitoring; Error correction

U21-D03

Synchronous counting chains

Includes both series (ripple) carry and parallel (look-ahead) carry for enable signal of synchronous counter.

U21-D03A [1992]

Ring counters

Includes feedback shift register counters. For random output counters see U21-D05C6.

Twisted-ring, switched tail, moebius, Johnson

U21-D04

Asynchronous counting chains

Ripple counters

U21-D05 [1992]

Characterised by counter details

U21-D05A [1992]

Reversible

Up-down, forward-backward

U21-D05B [1992]

With non-binary base

Excludes counters with base which is power of two.

U21-D05B1 [1992]

With variable counting base

U21-D05B2 [1992]

Divide-by-N counters

U21-D05B2A [1992]

Decade counters

U21-D05B2B [1992]

In which the base is an odd number

U21-D05B3 [1992]

In which the base is a non-integer

U21-D05C [1992]

Counters characterised by random or specific code output

Excludes standard base types e.g. binary, hexadecimal etc. Includes counting systems for specific coding formats e.g. reflected codes.

U21-D05C1 [1992]

Using Gray code

U21-D05C2 [1992]

Using excess three code

U21-D05C3 [1992]

Using biquinary code

U21-D05C6 [1992]

Random counters

See U22-A01A for random pulse generators in general.

U21-D06 [1992]

Characterised by the type of the device used

U21-D06A [1992]

Using semiconductor devices

U21-D06A1 [1992]

Field effect transistors

CMOS counters

U21-D06A2 [1992]

Bipolar transistors

TTL, ECL

U21-D06A3 [1992]

Opto-electronic devices

U21-D06B [1992]

Using electromechanical devices

Includes counters using e.g. relays.

U21-D06X [1992]

Other devices used as counters

Includes counters using semiconductor devices not covered by U21-D06A, e.g. thyristors, diodes, CCD and other types of device e.g. magnetic cores, gas-filled tubes etc.

U21-D09

Other aspects of pulse counters and frequency dividers

U22: Pulse Generation and Manipulation

U22-A

Generating electric pulses

U22-A01

Generators producing trains of pulses

U22-A01A [1983]

Random pulse generators

See T01-E04 for data processing arrangements for generating random numbers. Random counters are covered by U21-D05C6. Random number generators for e.g. gaming purposes are covered by T05-F and W04-X02 codes.

Pseudo-random generator, pseudo-random binary sequence (PRBS), shift register

U22-A02

Characterised by active element

U22-A02A

Bipolar transistors

U22-A02A1 [1987]

In integrated circuit form

U22-A02B

FET

U22-A02B1 [1987]

In integrated circuit form

U22-A02C

Other semiconductor devices

Includes discrete and integrated devices.

U22-A02D [1987]

Using logic blocks

E.g. gates, counters and flip-flops.

RS/JK/D-type, inverter

U22-A02E [1987]

Using operational amplifiers or comparators

This code covers the **use** only of comparators or operational amplifiers, i.e. where the devices themselves are not novel. Novel OPAMPs are covered by U24-G02A5 codes and novel comparator circuits of general application by U22-A04D5. From 1992 – 2011, U22-A04D1 also covered pulse generators with an overall comparator function.

U22-A02X

Other active element

Includes Josephson superconductor (with U14-F), and use of Wiegand wire.

U22-A03

Using energy-accumulating element and external switching signal

Includes capacitor store discharging into load, transmission line, etc. See also X12-J09 for high power types.

Blumlein, inductive store

U22-A04 [1983]

Circuit type

U22-A04A [1983]

Astable

U22-A04A1 [1987]

Blocking oscillator

Transformer, winding, flux, saturation, inverter, converter

U22-A04A2 [1987]

Crystal

Also coded in U23-A01A codes, based on inherent 'single frequency' aspect. Includes oscillator using other electromechanical resonator types, such as ceramic, SAW, etc. See V06-V codes for details of electromechanical resonators per se.

Piezoelectric, quartz, series, parallel, resonance

U22-A04A3 [1987]

Feedback

Includes oscillator with e.g. logic gates (also covered in U22-A02D) in ring circuit or similar. U22-A04A2 takes precedence for feedback arrangement including resonator element.

U22-A04A4 [1987]

Relaxation

Capacitor, charge

U22-A04A9 [1987]

With voltage or current control

Includes VCO.

U22-A04B [1983]

Mono-stable

U22-A04C [1983]

Bi-stable

U22-A04D* [1987-2011]

Comparator

*This code is now discontinued and from 2012 this subject matter is transferred to U22-A02E in the case of pulse generators based on comparators and U22-D01A1C for circuits performing a thresholding function on pulses. U22-A04D remains valid and searchable for records between 1992 and 2011 when it was used for comparator circuit pulse generators in general.

U22-A04D1* [1992-2011]

Comparator pulse generator

*This code is now discontinued and from 2012 this subject matter is transferred to U22-A02E in the case of pulse generators based on comparators and U22-D01A1C for circuits performing a thresholding function on pulses. U22-A04D1 remains valid and searchable for records between 1992 and 2011 when it was used for circuits configured as comparators with the purpose of generating pulses. Novel comparator circuits are coded in U22-A04D5, irrespective of application. (See note for that code).

U22-A04D5 [1992]

General comparator circuits

This code is used to denote novel comparator circuits per se of general application, i.e. without regard to the pulse/continuous nature of either the input signal(s) or the output produced. The following codes may also be applied depending on the purpose of the circuit:

1. Thresholding circuits, i.e. determining that a pulse has reached a preset amplitude are covered by U22-D01A1C.
2. Circuits comparing pulses or pulse trains with one another are covered by U22-D02 codes.
3. Circuits generating a pulse in response to a given characteristic of an input signal, are covered by U22-D07 codes.
4. Circuits providing a switching function in response to a given input signal characteristic are covered by U21-B02A3.

U22-A04X [1983]

Other circuit type

Includes multistable pulse generating circuits.

U22-B

Generator details

See U22-H also, if phase frequency/control is involved.

U22-B01

Output regulation/control

U22-B02 [1987]

On-chip integrated circuit details

U22-B03 [1987]

General details of larger IC systems

Includes e.g. reset circuits.

U22-B05 [1997]

Parameter compensation

U22-B05 codes are assigned for compensation of parameters of the oscillator/pulse generator circuit itself and for the effect of external parameters. The codes are **not** used for similar arrangements applied to subsequent circuitry such as pulse shaping or pulse amplifying circuits.

U22-B05A [1997]

Active device characteristics

U22-B05C [1997]

Physical characteristics

Temperature, voltage

U22-B09

Other pulse generator details

Includes generator starting circuits.

U22-C

Generating finite slope or stepped portion pulses

U22-C01

Generating triangular shape pulses

U22-C09

Other finite slope or stepped portion pulse generation

U22-D

Manipulating pulses

U22-D01

Shaping pulses

U22-D01A

Thresholding, changing duration, limiting, amplifying, steepening

U22-D01A1 [1987]

Thresholding, limiting, amplifying, steepening

U22-D01A1A [1992]

Level clamping

Covers limiting of amplitude and establishment or removal of offsets.

U22-D01A1C [1992]

Thresholding

This code is used for circuits determining that a pulse signal has attained a preset threshold level, i.e. comparing the amplitude of a pulse with a (usually fixed) reference. For example, a circuit re-establishing logic levels in data read from a magnetic hard disc would be coded here (also in T03-A06C3 and T03-A08A1C). When comparators are used for this purpose U22-D10F is also assigned.

Slicing

U22-D01A3 [1992]

General pulse noise reduction circuits

This code is used for anti-contact-bounce arrangements and for circuitry suppressing the effects of other noise sources on pulses.

U22-D01A5* [1987-1991]

Changing duration without time reference signals

*This code is now discontinued and from 1992 this subject matter is transferred to U22-D01A6A.

U22-D01A6 [1992]

Changing pulse duration

This code covers material previously coded in U22-D01A5 and U22-D01A7, and has been introduced to better reflect the hierarchical relationship of those codes which are now no longer used, but remain valid for records prior to 1992.

U22-D01A6A [1992]

Changing duration without time reference signals

(U22-D01A5)

Includes use of delay line, resonant circuit, etc.

Pulse stretching

U22-D01A6C [1992]

Changing duration using time reference signals

(U22-D01A7)

U22-D01A7* [1987-1991]

Changing duration using time reference signals

*This code is now discontinued and from 1992 this subject matter is transferred to U22-D01A6C.

U22-D01D* [1987-1996]

Characterised by active element technology

*This code is now discontinued. From 1997 see U22-D10 codes which are intended to provide information on active element technology for all U22-D subdivisions. U22-D codes remain valid for records from 1987-1996.

U22-D01D1* [1987-1996]

Integrated circuit implementation

*This code is now discontinued.

U22-D01D3* [1987-1996]

Discrete: FET, bipolar, etc.

*This code is now discontinued.

U22-D01D5* [1987-1996]

Gates, flip-flops, counters

*This code is now discontinued.

U22-D01D7* [1987-1996]

Operational amplifier, comparator

*This code is now discontinued.

U22-D01D9* [1987-1996]

Other technology for pulse shaping

*This code is now discontinued.

U22-D01X

Other pulse shaping

U22-D02

Comparing/sorting pulses

Includes comparison of individual pulses or pulse trains. See note for U22-A04D5 (comparators in general).

U22-D02A [1997]

With respect to amplitude

U22-D02C [1997]

With respect to phase

Includes time-of-arrival comparison pulses.

U22-D02E [1997]

With respect to frequency

U22-D02G [1997]

With respect to duration

U22-D02X [1997]

Pulse comparison based on other characteristic

U22-D03

Monitoring pulses

Includes circuits to detect deviation from desired characteristic of individual pulse and also missing pulses in pulse trains.

U22-D03A [1997]

With respect to amplitude

U22-D03C [1997]

With respect to phase

U22-D03E [1997]

With respect to frequency

U22-D03G [1997]

With respect to duration

U22-D03X [1997]

Pulse monitoring based on other characteristic

U22-D04

Changing timing of pulses at single output

Synchronization, clock, phase, delay, gate

U22-D04A [1997]

Changing pulse timing using active devices

This code covers the use of individual transistors, amplifiers, logic gates etc. to alter the timing of pulses and takes precedence over U22-D04C.

Counter, D-type, flip-flop, memory, register

U22-D04C [1997]

Changing pulse timing using passive devices

This code covers the use of passive components only such as resistors, capacitors, delay lines and networks to alter the timing of pulses.

Coil, CR, filter, inductor, LC, RC, RL, transmission line, winding

U22-D05

Changing pulse train pattern

Includes circuits separating pulses from composite pulse train. For TV synchronizing signal separation in receivers see W03-A06 codes also.

U22-D05A [1987]

Frequency multipliers and dividers

In addition to coverage of circuits providing fixed multiplication or division of pulse signals, from 2011 the scope of this code has been expanded to include digitally controllable devices and circuits, which were previously excluded. Novel aspects of variable divider and multiplier circuits based on counters are covered by U21-D codes which are also assigned as necessary. See U23-B02 for digital frequency multipliers for analog signals, e.g. sinusoidal oscillator signals.

U22-D06

Pulse distributors

Includes clock signal distributors. See T01-K codes also for arrangements specifically for computers.

Clock tree, multiple output

U22-D06A [1997]

With outputs differing in phase

U22-D06C [1997]

With outputs differing in frequency

Clock doubler

U22-D07

Delivering pulse as function of input signal characteristics

Includes comparator type circuits generating a pulse when input signal reaches a preset threshold, and edge triggered circuits. See note for U22-A04D5.

U22-D07A [1987]

Zero crossing, responding to power supply

Includes e.g. power-on-reset circuits (see U21-B02B also). See U21-B02A3 for switching circuits operating at zero-crossing.

U22-D07C [1997]

Individual pulse peak detector

Covers arrangements delivering a pulse in response to the peak value of an input signal. For peak detectors in the context of signal rectifiers see U24-C03A, and for electrical measuring instruments in particular, S01-D01A3.

U22-D10 [1997]
Pulse manipulation circuit implementation

Codes in this section are applied, in conjunction with other U22-D codes, to indicate the technology used only. They do not, in general, represent novel aspects which are indicated by the accompanying code(s) appropriate to the particular pulse manipulation involved. Prior to 1997, technology was indicated for pulse shaping only by U22-D01D codes, which are no longer assigned.

U22-D10A [1997]
Bipolar transistor

U22-D10A1 [1997]
Integrated

U22-D10A2 [1997]
Discrete
(U22-D01D3)

U22-D10B [1997]
Field effect transistor

U22-D10B1 [1997]
Integrated
(U22-D01D1)

U22-D10B2 [1997]
Discrete
(U22-D01D3)

U22-D10C [1997]
Bipolar and FET combined

U22-D10C1 [1997]
Integrated
(U22-D01D1)

U22-D10C2 [1997]
Discrete
(U22-D01D3)

U22-D10D [1997]
Using logic blocks

U22-D10E [1997]
Using computer/microprocessor

U22-D10F [2002]
Using comparator

U22-D10X [1997]
Other pulse manipulation technology

U22-E

**Modulating/demodulating pulses;
Transforming modulation type**

From 1997, this code is expanded to include demodulation of pulses and transformation of modulation type, previously covered by U22-F. U22-F is no longer used but remains valid for records prior to 1997. Pulse amplifying circuits per se are covered by U22-D01A1.

U22-E01 [1997]
Characterised by modulation type

U22-E01 codes are assigned to indicate the type of modulation (or demodulation with U22-E05A) only, and do not themselves represent novel aspects, these being highlighted by other U22-E codes.

U22-E01A [1997]
PWM
PDM, duration, edge modulation, width

U22-E01C [1997]
PPM
Position

U22-E01E [1997]
PAM
Amplitude

U22-E01G [1997]
PFM
Frequency

U22-E01X [1997]
Other pulse modulation type

U22-E03 [1997]
Novel circuitry (including systems)

U22-E05 [1997]
Demodulation of pulses; Transforming modulation type

(U22-F)
Used with other U22-E codes when emphasis is on demodulation.

U22-E05A [1997]
Demodulating pulses
(U22-F)

U22-E05C [1997]
Transforming pulse modulation type
(U22-F)

U22-E07 [1997]
Application of pulse modulation/demodulation
(U22-F)

This code is intended to represent, with U22-E01 and/or U22-E05 codes as appropriate, applications of pulse modulation or demodulation. It may be assigned, therefore, for inventions where circuitry aspects are not novel per se.

U22-E09 [1997]
Other pulse modulation/demodulation

U22-F* [1980-1996]
Demodulating pulses, transforming modulation type
*This code is now discontinued and the subject matter is incorporated into U22-E codes. U22-F remains valid for records prior to 1997.

U22-G
Digital filters and networks
U22-G03 codes cover digital signal processing/networks in general and U22-G01 codes are applied in addition when concerned with digital filters. See U25 codes for analogue equivalent filters and networks. See also T01-J08B for data processing aspects.

U22-G01 [1992]
Digital filters
Codes in this section are split into filter type and filter function. For construction, performance, operation and application see relevant U22-G03 codes. See T01-J08B for computer aspect.

U22-G01A [1992]
Digital filter types

U22-G01A1 [1992]
Recursive
Covers filters incorporating feedback.
Infinite impulse response, IIR

U22-G01A1A [1992]
Wave digital filter

U22-G01A1B [2005]
Kalman filter

U22-G01A3 [1992]
Non-recursive
Covers filters without feedback and includes digital transversal filters. See U25-A02 for analogue transversal filters.
Finite impulse response, FIR

U22-G01A5 [1992]
Adaptive and variable filter
From 2015, the title of this code has been changed to reflect the existing coverage of filters with characteristics that are adjustable but not necessarily varied in response to input signal characteristics, i.e. not necessarily adaptive.

U22-G01A5A [1997]
Coefficient derivation details
Tap

U22-G01A5B [2005]
Matched filter

U22-G01B [1992]
Filter function

U22-G01B1 [1992]
Low pass
U22-G01B6 takes precedence where emphasis is on decimation filtering.

U22-G01B2 [1992]
Band pass

U22-G01B3 [1992]
High pass

U22-G01B4 [1992]
Notch filter
This code covers digital filters which attenuate a band of frequencies and pass those on either side.
Band stop filter

U22-G01B5 [1992]
Comb filter

U22-G01B6 [1992]
Decimation filter

U22-G01B9 [1992]
Other filter function

U22-G01C* [1992-2004]

Filter construction

*This code is now discontinued. From 2005 details of components/configuration of digital signal processing/networks in general are covered by U22-G03 codes.

U22-G01D* [1992-2004]

Filter operation

*This code is now discontinued. From 2005 details of operation and application of digital signal processing/networks in general are covered by U22-G03 codes.

U22-G01X [1992]

Other digital filter aspects

U22-G03 [2005]

Digital Signal Processing/Networks

U22-G03 codes cover digital signal processing and networks and are split to cover constructional details (U22-G03A), digital sampling (U22-G03B), functions and performance (U22-G03C) and operation and application (U22-G03E). U22-G01 codes applied in addition to U22-G03 codes to highlight digital filter aspects.

U22-G03A [2005]

Construction

This code covers constructional details including design, z-transform blocks, DSP block architectures, etc. Testing aspects are covered in U22-G03A1. Other U22-G03 are applied where applicable.

U22-G03A1 [2005]

Testing

U22-G03A5 [2015]

Design of digital filters and digital signal processors in general

This code is assigned for novel aspects of apparatus, methods or software for use in the DSP design process. For computer-aided design (CAD) aspects see also T01-J15A codes.

U22-G03B [2006]

Digital sampling

Includes systems that sample signals that are already digital, for sampling of analog signals see U21-A03F6 codes. Interpolation aspects are coded here.

U22-G03B1 [2006]

Re-sampling

Includes arrangements for interfacing two DSP blocks/systems that have different sampling rates.

U22-G03B1A [2006]

Up-sampling

U22-G03B1C [2006]

Down-sampling

U22-G03C [2005]

Functions and performance

U22-G03C1 [2005]

Functions used in digital signal processing

U22-G03C1 codes are applied to highlight functions performed by digital signal processors and networks. These codes are used to highlight block level functions and not the overall application, which is represented by U22-G03E3 codes. Filtering using digital filters is covered by U22-G01 codes.

U22-G03C1A [2005]

Addition and multiplication

For integration function see U22-G03C1G.

U22-G03C1C [2005]

Delay

U22-G03C1E [2005]

Array handling

This code is applied to highlight the function of fetching values from memory locations and/or copying data from memory to memory.

U22-G03C1G [2006]

Integration

U22-G03C1X [2005]

Other function

U22-G03C2 [2005]

Performance

U22-G03C2A [2005]

Size reduction

U22-G03C2C [2005]

Reduction in power consumption

U22-G03C2E [2005]

Increasing processing speed

U22-G03C2X [2005]

Other performance aspect

U22-G03E [2005]

Operation and application

These codes are used to highlight overall operation and application of a DSP system/network, i.e. the use of DSP blocks to perform e.g. Fourier transform, where the novelty may not be the blocks themselves but is the way the blocks are used to perform the operation.

U22-G03E1 [2005]

Operation

This code is applied to highlight general operation of digital signal processing/networks.

U22-G03E1A [2005]

Software and algorithms

See T01-J04B1 for transformation functions in general.

Fourier transform, Hilbert transform, Polynomial transform, WALSH functions

U22-G03E3 [2005]

Applications of DSP

U22-G03E3 codes are applied to highlight the application of a digital signal processor or network. Filtering using digital filters is covered by U22-G01 codes but applications of filtering can be indicated by assignment of U22-G03E3 codes as well, e.g. a digital filter used for reducing noise would be represented by appropriate U22-G01 codes in conjunction with U22-G03E3A.

U22-G03E3A [2005]

Noise reducing/cancelling

U22-G03E3C [2005]

Equalization

U22-G03E3D [2005]

Correlation

See T01-J04B2 for correlation functions in general.

U22-G03E3F [2005]

Phase shifting and delay

U22-G03E3X [2005]

Other DSP application

U22-G05* [1992-2004]

Digital networks

*This code is now discontinued. From 2005 digital Networks in general are covered by U22-G03 codes.

U22-G05A* [1992-2004]

Network construction

*This code is now discontinued. From 2005 digital network construction in general is covered by U22-G03 codes.

U22-G05B* [1992-2004]

Network operation

*This code is now discontinued. From 2005 digital network operation in general is covered by U22-G03 codes.

U22-G09 [1992]

Other digital network aspects

U22-H

Automatic digital phase/frequency-control and synchronization

This is a general code used to indicate control of phase or frequency in digital systems, especially for synchronization, and includes non-PLL phase control and clock extraction circuits (see W01-A04 codes for data transmission aspects). Other U22 codes are also assigned as necessary, such as U22-D04 codes for delay circuits and U22-D06 codes for clock distribution arrangements. Inventions concerned with digital phase lock loops (PLLs) and delay lock loops (DLLs) are covered by U23-D01 codes which are assigned instead of U22-H.

Fourier, clock signal, clock skew, clock tree.

U23: Oscillation and Modulation

In general this class covers circuits dealing with sinusoidal oscillations, but also includes digital implementations of circuits such as phase-locked loops, phase detectors etc. which may be interfaced with analogue systems. Applications may involve codes in section W for data transmission, radio and TV receivers, etc.

U23-A

Sinusoidal oscillators, (using)

See U23-E codes for control of output.

U23-A01

Amplifier with regenerative feedback

Negative resistance oscillator circuits are coded in U23-A02.

U23-A01A

Electromechanical resonator

Oscillators using logic inverters and the like in a feedback arrangement with an electromechanical resonator are also assigned U22 codes (e.g. U22-A02D and U22-A04A2). Novel aspects of resonators themselves are covered by V06-V01E codes with other V06-V codes as appropriate.

Quartz, crystal, piezoelectric, fundamental, overtone, parallel, series, resonance, effective series resistance, ESR, trim

U23-A01A1 [1987]

SAW resonator

See U14-G and V06-V codes for SAW resonators per se.

Surface acoustic wave, IDT, interdigitated

U23-A01A2 [2006]

MEMs resonator

See V06-V codes for MEMs and NEMs resonators themselves.

Surface acoustic wave, IDT, interdigitated

U23-A01A5 [1992]

With voltage control, e.g. VCXO

This code is used with U23-A01A or U23-A01A1, as appropriate. Voltage controlled oscillators for PLLs are covered by U23-D01A1, and astable multivibrator type VCOs by U22-A04B9.

U23-A01B

Inductive/capacitive resistive elements

U23-A01B1 [1987]

Discrete LCR

Frequency/phase-shift, Wien bridge, parallel-T, tuned circuit, coil, inductor, capacitor, resistor

U23-A01B2 [1987]

Distributed LCR, YIG or dielectric resonator etc.

Includes the use of waveguide-type elements, novel aspects of which are coded in W02-A, e.g. W02-A03A codes for resonators. See U23-Q also for constructional and layout aspects influenced by the frequency of operation.

Coaxial, cavity, tuned line, stripline, microstrip, YIG sphere, magnetic

U23-A01B5 [1992]

With voltage control e.g. VCO

This code is used with U23-A01B1 or U23-A01B2 as appropriate. (See note for U23-A01A5).

U23-A02

Negative resistance element or transit-time effects

Includes oscillators with conventional three-terminal device in negative resistance circuit configuration.

Gunn diode, IMPATT, klystron, magnetron, TWT

U23-A05 [2014]

Oscillators based on spin transport electronics

Covers oscillators using 'spintronics' or 'magnetoelectronics', e.g. spin torque oscillators as used in microwave-assisted magnetic recording, for which T03-A06N3 codes are also assigned. U23-Q is also assigned to denote significant high-frequency (e.g. microwave) aspects.

Giant magnetoresistance, GMR, MAMR, oscillating field, STO, TMR, tunnel magnetoresistance

U23-A06 [2016]

Atomic oscillators

This code is intended to cover oscillators in which signals, e.g. at microwave frequencies, are emitted by electrons in the atoms of gaseous alkali metals changing energy levels. Prior to 2016 this kind of oscillator was coded as U23-A when appropriate but was chiefly covered by U23-D02 which will continue to be assigned for inventions based on the use of such oscillators as a reference frequency source.

Cesium, coherent population trapping, CPT, double resonance, energy transition, gas cell, laser, light, quantum interference, rubidium

U23-B

Frequency multipliers/dividers

U23-B01 [1987]

Analogue

Harmonic resonator, varactor, injection, diode bridge

U23-B02 [1987]

Digital

See U22-D05A for circuits multiplying or dividing pulse rate. Counter circuits are covered by U21-D codes.

U23-C

Phase or frequency comparators

This code covers circuits for comparing the phase of frequency of sinusoidal signals. U23-D01A3A, which covers phase comparators / detectors in phase lock loops or delay lock loops takes precedence over U23-C codes.

U23-C01 [1987]

Analogue phase or frequency comparator

This code covers analogue circuitry used for comparing the phase or frequency of sinusoidal signals.

U23-C02 [1987]

Digital phase or frequency comparator

This code covers digital circuitry used for comparing the phase or frequency of sinusoidal signals. Digital circuits comparing the phase of pulse signals are covered by U22-D02C and their frequency by U22-D02E.

U23-D

Automatic phase/frequency control; Synchronization

Purely digital circuitry e.g. for clock extraction from incoming data stream, is coded in U22-H. From 1992 U23-D01 codes are used for **all** aspects of phase-locked loops, whether of analogue or digital type. U23-D01A8 codes are used to distinguish analogue, digital, or hybrid types when this is significant. Prior to 1992 see U23-D01 codes and U22-H codes as appropriate.

U23-D01 [1987]

Delay lock loop and phase lock loop

In 2005, the title of this code was changed to better reflect its inclusion of delay lock loops as well as phase lock loops. In the case of DLLs U23-D01D is assigned with other U23-D01 codes as appropriate. U23-D01 codes take precedence over the 'general synchronization' code U22-H, which is assigned for digital phase and frequency control circuits not involving a PLL or DLL.

DLL, PLL

U23-D01A [1987]

Loop details

U23-D01A1 [1992]

Voltage controlled oscillator

Reference oscillators for frequency synthesizers are covered by U23-D01B3.

Current/voltage/numerically controlled oscillator, CCO, VCO, NCO, voltage controlled crystal oscillator, VCXO

U23-D01A2 [2007]

Active loop control

Includes control of loop gain, for which U24-C01 codes are also assigned as appropriate.

U23-D01A3 [1992]

Phase detectors and charge pumps

From 2002 the title of this code has been changed to better reflect the previous inclusion of charge pumps, now coded separately as U23-D01A3C.

U23-D01A3A [2002]

Phase detector

U23-D01A3C [2002]

Charge pump

Charge pumps in general are covered by U24-D02A1.

U23-D01A5 [1992]

Lock detector

False lock protection is covered by U23-D01F3.
Out-of-lock detector

U23-D01A6 [2005]

Delay array

Includes delay lines, gates, etc. making up the delay chain. U22-D04 and U25-A05 are also assigned where relevant.

U23-D01A7 [1992]

Loop filter

U23-D01A7A	[1992]
Variable bandwidth	
U23-D01A8	[1992]
Loop type	
U23-D01A8A	[1992]
Analogue	
U23-D01A8B	[1992]
Digital	
U23-D01A8C	[1992]
Hybrid analogue/digital PLL system	
U23-D01B	[1987]
Frequency synthesizers	
See W02-G03A codes also for application to radio communications equipment in general, and U23-F01 codes for direct synthesizers.	
<i>Synthesis, step, select, preset channel, radio receiver, transceiver, transmitter</i>	
U23-D01B1	[1992]
Division circuit, e.g. variable ratio divider	
U23-D01B1A	[1997]
For fractional synthesis	
<i>Fractional-N</i>	
U23-D01B3	[1992]
Reference oscillator	
See U23-A01A also for oscillator circuits employing an electromechanical resonator. VCOs (and VCXOs) are coded in U23-D01A1 and the appropriate U23-A code. For temperature compensation aspects U23-E05 is also assigned.	
<i>Quartz, crystal, SAW, oven, temperature, control</i>	
U23-D01B5	[1992]
Output filter arrangements, improving purity	
This code covers arrangements to reduce noise, spurious signals, etc. which are specific to the synthesizer circuit, i.e. it is not routinely assigned for noise reduction that is actually a property of the PLL itself which is covered by U23-D01F5.	
U23-D01B7	[1997]
Characterised by use of more than one loop	
Includes dual-loop PLL synthesizers.	

U23-D01C	[1987]
Modulation/demodulation applications	
See also other U23 codes for type of modulation.	
U23-D01C1	[1992]
Costas loop system	
U23-D01D	[2005]
Delay lock loop	
This code is assigned to indicate that an invention relates to a delay lock loop rather than a phase lock loop, other U23-D01 codes being assigned with it depending on novelty. When U23-D01 codes are assigned without U23-D01D, it is assumed that a PLL is involved or that the invention is not specific to DLLs.	
U23-D01E	[2006]
PLL and DLL testing	
Includes calibration aspects.	
U23-D01F	[1997]
Modifications and improvements to loop characteristics	
These codes are used with other U23-D01 codes as appropriate.	
U23-D01F1	[1997]
Lock acquisition time reduction	
See also U23-D01A7A.	
<i>In-lock, pull-in, track</i>	
U23-D01F3	[1997]
False lock prevention	
See also U23-D01A5.	
U23-D01F5	[1997]
Noise reduction	
Arrangements specific to indirect frequency synthesizers where the improvement is not a function of loop performance itself, e.g. an improved reference oscillator or an output filter, are covered by U23-D01B5 instead, but both codes can be used together when appropriate.	
U23-D01F7	[1997]
Broadening capture range	
U23-D01F9	[1997]
Other modifications to PLLs	

U23-D02 [1987]
Other phase/frequency shift correction
Includes systems not relying solely on PLLs to correct phase or frequency, e.g. non-feedback frequency control of an oscillator based on sensed temperature, injection locking and use of atomic oscillators. (Time and frequency standards based on atomic oscillators are covered by S04-B02X and S04-C09). Prior to 2016 details of atomic oscillators themselves were chiefly assigned this code but from 2016 novel details of such oscillators, e.g. gas cells containing alkali metals, are covered by U23-A06.

U23-E
Oscillator starting and output control
U23-E codes are assigned for oscillator circuit control and for temperature compensation arrangements associated with the oscillator itself. The codes are **not** used for subsequent circuitry such as phase shifting, phase splitting or amplifying circuits. See U22-B codes for analogous arrangements for pulse generators.

U23-E01 [1992]
Output control
U23-E01A [1992]
AGC-based system
See U24-C01 codes also for automatic gain control circuits.

U23-E05 [1992]
Temperature compensation
Includes choice of components (e.g. complementary temperature-dependent characteristics), temperature-responsive 'trimming' of oscillator circuits, and 'oven' arrangements.

U23-F
Miscellaneous oscillation and noise generators

U23-F01* [1987-2004]
Direct frequency synthesizers
*This code is now discontinued. From 2005 direct frequency synthesizers are covered by U23-F03 codes.

U23-F01A* [1997-2004]
Memory aspects
*This code is now discontinued. From 2005 memory aspects of direct frequency synthesizers are covered by U23-F03A1.

U23-F01C* [1997-2004]
Improving output signal purity
*This code is now discontinued. From 2005 improvements in spectral purity of direct frequency synthesizers are covered by U23-F03B5.

U23-F02* [1987-2004]
Waveform generators using computer ROM and A-D/D-A converters
*This code is now discontinued. From 2005 direct frequency synthesis and direct digital synthesis is covered by U23-F03 codes.

U23-F03 [2005]
Direct Frequency Synthesizers
From 2005 U23-F03 codes have been introduced to better reflect direct frequency synthesis and includes direct digital synthesis. Indirect frequency synthesis is coded in U23-D01B.

U23-F03A [2005]
Novel synthesizer details

U23-F03A1 [2005]
Memory aspect and look-up tables

U23-F03A3 [2005]
Phase accumulators

U23-F03A5 [2005]
D/A and A/D aspects

U23-F03A7 [2005]
Analog circuitry

U23-F03A9 [2005]
Other novel synthesizer details

U23-F03B [2005]
Synthesizer performance

U23-F03B1 [2005]
Improving frequency resolution

U23-F03B3 [2005]
Increasing frequency transition
Includes improving hopping speed.

U23-F03B5 [2005]
Improve spectral purity

U23-F03B9 [2005]
Other synthesizer performance details

U23-F05 [1997]

Noise generators

Chaos, white noise

U23-F09 [1997]

Other oscillation generation

U23-G

Amplitude modulation

This code relates to amplitude modulation of a carrier wave by an **analogue** signal. For AM using **digital** modulating signals see U23-P01C codes. See also U23-P codes for relevant additional details and W02-G01D for transmitter application. This code is intended to highlight novel aspects of amplitude modulators, e.g. with U23-P codes, or novel modulation schemes. It is **not** applied merely to indicate the **use** of AM in a general sense.

Balanced modulator, DSB/SSB modulator

U23-H

Angle modulation

This code relates to frequency or phase modulation of a carrier wave by an **analogue** signal. For FM or PM using **digital** modulating signals see U23-P01A codes. See also U23-P codes for relevant additional details and W02-G01D for transmitter application. This code is intended to highlight novel aspects of frequency or phase modulators, e.g. with U23-P codes, or novel modulation schemes. It is **not** applied merely to indicate the **use** of FM or PM in a general sense.

Reactance modulator, varactor, varicap, phase shifter

U23-J

Mixing; Frequency changing

Radio receiver applications (general) are coded in W02-G03A5.

U23-J01 [1997]

Mixer

See also under applications, e.g. W02-G03A5 for radio receivers in general, W03-B01A5 for broadcast radio receivers, and W03-A01B5 for TV receiver tuners. For image-suppression mixers, search with W02-G03B4A.

U23-J01A [1997]

Characterised by active device

U23-J01A1 [1997]

Diode

U23-J01A3 [1997]

Bipolar transistor

U23-J01A5 [1997]

Field effect transistor

U23-J01A5A [1997]

JFET

U23-J01A5C [1997]

MOSFET

U23-J01A9 [1997]

Other implementation technology

U23-J01C [1997]

Characterised by configuration

U23-J01C1 [1997]

Single-ended

U23-J01C5 [1997]

Balanced

U23-J01C5A [1997]

Single-balanced

U23-J01C5C [1997]

Double-balanced

For ring configurations, U23-J01C5E takes precedence.

DBM

U23-J01C5E [1997]

Ring

This code takes precedence over U23-J01C5C.

U23-J01C5G [2017]

Triple-balanced

Covers use of two double-balanced mixers driven in a push-pull configuration.

Doubly double-balanced mixer, TBM

U23-J01C9 [1997]

Other configuration

U23-J01E	[2002]
Integrated or film circuit implementation	
This code is assigned with other U23-J01 codes as necessary, to indicate a self-contained mixer in integrated form. Specific novel constructional and manufacturing aspects of monolithic and film circuits are also assigned codes from classes U11-U14 as appropriate.	
U23-J05	[1997]
Frequency changing	
U23-J05A	[1997]
Single conversion	
U23-J05C	[1997]
Double and multiple conversion	
This code denotes two or more frequency conversions being performed.	

U23-K	
Amplitude demodulation	
See also U23-P codes for relevant additional details and W02-G03E for (general) radio receiver applications. Demodulators of signals amplitude modulated by digital signals are covered by U23-P01C and U23-P01J3. Signal rectifiers, e.g. for AGC purposes, are covered by U24-C03.	

U23-L	
Angle demodulation	
See also U23-P codes for relevant additional details and W02-G03E for (general) radio receiver applications. Demodulators of signals frequency or phase modulated by digital signals are covered by U23-P01A and U23-P01J3.	
<i>Frequency, phase, FM, discriminator, quadrature detector, limiter</i>	

U23-P	[1987]
Modulation/demodulation, general	
Codes in this section are used either alone, or with other U23 codes as appropriate. Additional codes may be assigned from section W for radio equipment applications.	

U23-P01	[1987]
Digital Modulation/Demodulation	
From 2005 the title of this code has been changed to better reflect its content. U23-P01 codes are chiefly used with W01-A09 codes for carrier systems data transmission. They describe modulation of a carrier by digital signals.	

U23-P01A	[2005]
Angle modulation	
Angle modulation with analogue modulating signals is covered by U23-H.	
U23-P01A1	[2005]
Frequency shift keying	
<i>FSK</i>	
U23-P01A3	[2005]
Phase shift keying	
<i>PSK, QPSK</i>	
U23-P01A5	[2005]
Minimum shift keying	
<i>MSK</i>	
U23-P01A9	[2005]
Other angle modulation details	
U23-P01C	[2005]
Amplitude modulation	
Amplitude modulation with analogue modulating signals is covered by U23-G.	
U23-P01C1	[2005]
Amplitude shift keying	
<i>ASK</i>	
U23-P01C9	[2005]
Other amplitude modulation details	
U23-P01E	[2005]
Hybrid Modulation	
U23-P01E1	[2005]
Quadrature Amplitude Modulation	
<i>QAM</i>	
U23-P01E9	[2005]
Other hybrid modulation details	
U23-P01G	[2005]
Multi-frequency code techniques	
U23-P01J	[2005]
Novel Modulator/Demodulator Circuits	
U23-P01J1	[2005]
Modulator	
Amplitude and angle modulators with analogue modulating signals are respectively covered by U23-G and U23-H.	

U23-P01J3 [2005]

Demodulator

U23-P01J3A [2005]

Coherent detection

U23-P02 [1987]

Analogue circuit details

This code is used in conjunction with U13-B codes for significant integrated circuit aspects.

U23-P03 [1987]

Implementation using digital techniques

See T01-J codes for computer circuit aspects.

U23-P04 [1987]

Broader systems details

Covers circuit blocks used for signal processing, rather than 'internal' circuit details. For amplitude-locked loop demodulation applications, use with U24-C01G.

U23-P05 [1987]

Stereo, mixed AM/FM

See W02-E and W02-F06 codes also for stereophonic broadcasting. Decoders in TV and radio receivers are also coded in W03-A02B1 and W03-B02C3 codes respectively.

U23-Q [1987]

Microwave and HF circuits

(U23-X)

This code is intended to indicate construction and layout aspects of microwave circuits and is used in conjunction with other relevant U23 codes. Waveguide components per se (including microstrip) are covered by W02-A codes. Construction and layout of microwave amplifiers is covered by U24-G04M.

Microwave integrated circuit, MIC, stripline, resonator, cavity

U23-R [2006]

Testing/calibration

This code covers all testing/calibration aspects for U23 type circuits apart from PLLs and DLLs for which U23-D01E is applied. See also S01 codes.

U23-R01 [2006]

Testing

U23-R02 [2006]

Calibration

U23-X

Other aspects of modulation/demodulation

This code includes (de)modulation of EM waves, e.g. in a waveguide, and aspects of modulation or demodulation not otherwise catered for in U23.

U24: Amplifier and Low Power Supplies

Heavy current equipment is in section X.

U24-A* [1980-1986]

Semiconductor/valve amplifiers

*This code is now discontinued. The codes U24-A01 to U24-A09 in this group remain valid for records prior to 1987.

U24-A01* [1980-1986]

DC and low frequency amplifiers

*This code is now discontinued.

U24-A02* [1980-1986]

High frequency and wideband amplifiers

*This code is now discontinued.

U24-A03* [1980-1986]

Power and switching amplifiers

*This code is now discontinued.

U24-A04* [1980-1986]

Differential, operation, push-pull amplifiers; Phase splitters

*This code is now discontinued.

U24-A05* [1980-1986]

Feedback arrangements; Raising efficiency

*This code is now discontinued.

U24-A06* [1980-1986]

Modification for reducing noise/internal impedance effects/ temp. and supply voltage influence/ distortion; Bandwidth extension

*This code is now discontinued.

U24-A09* [1980-1986]

Other (incl. protection circuitry, multi-channel amplifiers)

*This code is now discontinued.

U24-B* [1980-1991]

Parametric, magnetic and dielectric amplifiers, etc.

*This code is now discontinued but remains valid for records prior to 1992. For parametric amplifiers see U24-G04E, dielectric amplifiers see U24-G04X, magnetic amplifiers see U24-E04.

U24-C

Gain control

Includes compression/expansion, AGC, muting, general signal rectifiers.

U24-C01

Automatic gain control

AGC

U24-C01A [1987]

AGC amplifiers with analogue control

U24-C01B [1987]

AGC amplifiers with digital control

U24-C01C [1987]

Control signal derivation

U24-C01C1 [1997]

Novel signal processing per se

Includes processing of derived control signal to achieve particular gain control characteristic.

U24-C01C5 [1997]

Taking other parameters into account

E.g. using ambient acoustic signal, signal produced from mechanical parameters such as vehicle or engine speed, etc.

In-car-entertainment, passenger compartment, microphone, volume

U24-C01G [1997]

Amplitude-locked loop

See U23 codes also for AM and FM demodulation applications. Phase lock loops are covered by U23-D01 codes.

ALL

U24-C02

Compenders; Amplitude limiters

U24-C02A [1987]

Limiters

Clipper circuit

U24-C02A1 [1992]

Soft limiter

(U24-C02)

U24-C02A5 [1992]

DC limiting i.e. level clamp circuit

Video signal clamping circuits for TV receivers are coded in W03-A04C.

U24-C02B [1987]

Companding, compression, expansion

Emphasis, pre-emphasis, compressor, compander, expander, Dolby®, Dolby-B®

U24-C03 [1987]

General signal rectifiers

Covers rectifiers for control signal derivation.
Amplitude demodulators in general are covered by U23-K.

U24-C03A [1997]

Peak detector

See U21-B03 for sample-and-hold circuits.

U24-C05 [1987]

Manual control, combined gain/tone control, muting

(U24-C09)

See W03-C codes also for audio amplifier aspects.

U24-C05A [1987]

Manual gain control

Also coded in W03-C03 for audio amplifiers.
Volume

U24-C05A1 [1997]

Continuously variable

Potentiometer

U24-C05A5 [1997]

Stepped variation

Ladder, resistor, network, switch, tap

U24-C05B [1987]

Digital control details, e.g. by computer

Includes e.g. computer circuit details.

U24-C05C [1987]

Muting

Muting in radio receivers is covered by W02-G03B1.

U24-C05D [1987]

Combined gain and tone control

U24-C09

Other gain control

U24-D

Power converters

Includes normally low electronic power converters. High power converters are in X12-J and their controllers in X13-G03. Indeterminate power converters are in U24 and X12. Unregulated or unstabilized converters are in U24-D. Stabilisers or voltage regulators are in U24-E. Does **not** cover individual components e.g. capacitors, transformers even if specifically intended for converters.

U24-D01

General converter details

U24-D01A

Generation of control voltages

See also U21-B01 and U21-B05 codes for electronic switching.

U24-D01A1 [1992]

For bipolar transistor

U24-D01A1A [1992]

For IGBTs

U24-D01A3 [1992]

For FETs

U24-D01A7 [1992]

For control of other devices

U24-D01A8 [2007]

Multi-phase control

This code is applied in conjunction with other U24-D codes to highlight novel multi-phase control.

U24-D01A9 [1992]

Characterised by PWM

See U22-E codes for PWM in general.

U24-D01B [1992]

Protection

See also U24-F. For high power converters see X12-J01B and X13-C04D.

U24-D01B1 [2005]

Snubber circuits

U24-D01B1A [2005]

Passive

Includes the use of RLC elements and diodes.

U24-D01B1C	[2005]
Active	
Includes the use of transistors, etc.	
U24-D01B1F	[2005]
Dissipative	
Includes arrangements for dumping excess switching energy into a resistor. May be used in conjunction with other U24-D01B1 codes.	
U24-D01B1H	[2005]
Non-dissipative	
Includes arrangements for excess switching energy to be fed back or fed forward, respectively, to the input or output.	
U24-D01E	[1992]
Reducing harmonics and ripples	
(U24-D01X)	
See U25-E codes for filters in general.	
U24-D01E1	[2006]
Harmonics reduction	
U24-D01E2	[2006]
Ripple reduction	
U24-D01E5	[2014]
Reducing electromagnetic interference	
This code covers measures to reduce electromagnetic interference generated by the converter itself, e.g. based on circuitry or on constructional details such as screening for which V04-U codes are also assigned. W02-H01 codes (general codes for EMI/RFI reduction at source) are also assigned as appropriate.	
<i>Electromagnetic compatibility, EM, EMC, filter, harmonic, PWM frequency, radio frequency interference, RF, SMPS, switched mode, switching frequency, switching regulator, switching transient</i>	
U24-D01G	[1992]
General cooling details	
(U24-D01X)	
See also V04-T03 codes.	
U24-D01J	[2005]
Measurements/testing/monitoring	
Includes self-checking arrangements and also monitoring by external equipment. See S01 codes for related electrical instrumentation aspects.	
U24-D01K	[2007]
Constructional details	

U24-D01X	
Other converter aspects	
Includes converter details not covered elsewhere.	
U24-D02	
DC-DC converters	
U24-D02A	
Without intermediate AC	
<i>Charge pump</i>	
U24-D02A1	[2005]
Charge pump	
U24-D02A2	[2005]
Chopper	
U24-D02B	
With intermediate AC	
U24-D02B1	[1992]
Flyback; Forward	
U24-D02B3	[1992]
Half-bridge or single-ended push-pull; Push-pull	
<i>SEPP</i>	
U24-D02B5	[1992]
Full bridge	
U24-D02B7	[1992]
Resonant	
U24-D03	
AC-AC converters	
U24-D04	
AC-DC converter	
<i>Rectifier</i>	
U24-D04A	[1992]
Half-wave	
U24-D04C	[1992]
Full-wave	
U24-D04C1	[1992]
Bridge	
U24-D04C1A	[1992]
Characterised by diodes	

U24-D04E	[1992]
Voltage multiplier	
U24-D04G	[2002]
Synchronous rectifier	
(U24-D04C)	
Includes rectifiers using active transistor switches.	
U24-D05	
DC-AC converter	
<i>Inverter</i>	
U24-D05A	
Full- and half-bridge	
U24-D05A1	[1992]
Characterised by bipolar transistors	
U24-D05A1A	[1992]
Characterised by IGBTs	
U24-D05A3	[1992]
Characterised by FETs	
U24-D05A5	[2006]
Characterised by combination of bipolar/IGBTs/FETs	
U24-D05A9	[1992]
Other inverters	
Includes inverters characterised by type of switch not covered elsewhere.	
U24-D05B	[2005]
Inverter-type	
To be used in conjunction with other inverter codes such as U24-D05A.	
U24-D05B1	[2005]
Voltage source inverter	
U24-D05B2	[2005]
Current source inverter	
U24-D05B3	[2005]
Utility inter-tie inverter	
Includes inverters fed by solar/wind power/etc generators for connecting to a mains/utility supply. For high power inverters, see X12-J codes.	

U24-D06	[2005]
Pulse voltage supply	
See X12-J06 for high power pulse supply. See U22-A03 also for energy-storage pulse generation.	
U24-D09	
Other converters	
Includes other converters not covered elsewhere e.g. dynamic types.	
U24-D10	[2007]
Bidirectional converter	
This code is used in conjunction with other codes to indicate a bidirectional novelty.	
U24-D11	[2007]
Multiple input/output	
This code is used in conjunction with other codes to indicate multiple input/outputs aspects. Caters for, for example, converters that output voltages of different magnitudes.	
U24-D12	[2007]
Intelligent power supply	
Includes power supplies characterised by having a microcontroller for providing programmable features. The latter include the ability to adaptively respond to external conditions, adaptive current limit for different phases of the PSU operation, programmable output voltage, supervisory features, fault recovery, status information provision for remote diagnostics, etc. See also relevant T01-J08 codes.	
U24-E	
Regulating power/current/voltage	
U24-E01	
Non-feedback systems	
Includes e.g. Zener diode.	
U24-E01A	[2005]
AC variable	
U24-E01C	[2005]
DC variable	
U24-E01C1	[2005]
Zener diode-based	

U24-E01C5 [2005]

Current mirror circuits

Includes current sinking/sourcing configurations for the regulating transistor to connect a load to the ground/DC power supply terminal.

U24-E01C7 [2005]

Band gap reference circuits

Includes, generally, regulators using the difference between base-emitter voltages of two bipolar transistors operating at different current densities. For voltage reference circuits using feedback, see U24-E02B7.

U24-E02

Feedback systems

U24-E02A

For AC

U24-E02B

For DC

U24-E02B1

With overload protection

U24-E02B1A [1992]

With overload protection and series dissipative transistor
(U24-E02B3)

U24-E02B2

With transistor

U24-E02B2A [1992]

Switching regulator or switched mode power supply
(U24-E02B4)
SMPS

U24-E02B2D [1992]

Dissipative regulators
(U24-E02B6)

U24-E02B3* [1983-1991]

With overload protection and series dissipative transistor

*This code is now discontinued and was formerly a subdivision of U24-E02B1. From 1992 this subject matter is transferred to U24-E02B1A to indicate its proper hierarchical relationship to U24-E02B1. It remains valid and searchable for documents from 1983 to 1991.

U24-E02B4* [1983-1991]

Switching regulators

*This code is now discontinued and was formerly a subdivision of U24-E02B2. From 1992 this subject matter is transferred to U24-E02B2A to indicate its proper hierarchical relationship to U24-E02B2. It remains valid and searchable for documents from 1983 to 1991.

U24-E02B6* [1983-1991]

Dissipative regulators

*This code is now discontinued and was formerly a subdivision of U24-E02B2. From 1992 this subject matter is transferred to U24-E02B2D to indicate its proper hierarchical relationship to U24-E02B2. It remains valid and searchable for documents from 1983 to 1991.

U24-E02B7 [2006]

Voltage reference circuit

Includes circuit using feedback. For non-feedback voltage reference circuits, see U24-E01C7.

U24-E02B9

Other DC regulators

Includes other DC feedback systems to control power/current/voltage.

U24-E02C [1987]

Regulation for AC or DC variable

U24-E02D [1987]

Regulation of electric power

U24-E02D1 [1987]

Maximum energy transfer from generator
Includes e.g. solar cell circuits.

U24-E02D1A [1997]

Solar power system and associated converter interconnection with commercial utility system
(U24-E02D1)

Generally includes inverter control (see also U24-D codes) to enable max. power transfer. See also X12-H01B.

U24-E02D2 [1987]

Regulating power factor

Capacitor banks for power factor correction in heavy current systems are in X12-H01A.

U24-E03	[1987]
Regulating electric variables using input deviation detection	
<i>Phase/firing angle, phase-switching, fire, zero-crossing detector, trigger</i>	
U24-E03A	[1987]
AC input with thyristors or triacs	
U24-E03B	[1987]
AC input with transistors, FETs	
U24-E03X	[1987]
Other electric output regulation based on input deviation	
Includes other electric variables regulation.	
U24-E04	[1987]
Regulating magnetic variables	
(U24-X)	
Includes magnetic amplifiers using e.g. transducers.	
U24-F	[1983]
Protective circuits	
(U24-X)	
Protection for heavy current systems is covered by X13-C codes.	
U24-F01	[1983]
For automatic disconnection	
(U24-X)	
This code covers protection arrangements for low-power electrical and electronic circuits involving disconnection which may be capable of being reset or may be non-resettable, e.g. based on fuses. Novel details of fuses themselves are not included and are covered by X13-D01 codes.	
U24-F02	[1983]
Limiting excess current/voltage	
(U24-X)	
<i>Surge protection</i>	
U24-F03*	[1997-2016]
Smart protectors	
*This code is now discontinued and from 2017 this subject matter is covered by U24-F05, i.e. as digital protectors. U24-F03 remains valid and searchable for records between 1997 and 2016 when it covered smart protectors using microprocessors and the like. See also U13-E01 for IC protectors and relevant T01-J08 codes for microprocessor control.	

U24-F04	[1997]
Solid-state (analogue) protectors	
U24-F05	[1997]
Digital protectors	
From 2017 the scope of this code is expanded to cover all low-power circuit protection devices which rely on digital circuitry and devices to detect fault conditions and initiate protective measures, including smart protectors which prior to 2017 were covered by U24-F03.	
<i>ADC, analog-to-digital converter, digital relay, digital protective relay, logic, microprocessor, neural network, numerical relay, smart circuit protector, software</i>	
U24-F06	[2002]
Electrostatic protection	
U24-F07	[2002]
Thermal protection	
U24-F08	[2018]
Charging protection	
This code covers protection for energy stores such as secondary cells and capacitors, and equipment using them, from damage arising from charging. The protection may be triggered by an undesired electrical condition or by a physical change, such as deformation of battery casing or temperature rise. Other U24-F codes are also assigned as appropriate, e.g. U24-F01 for protection involving disconnection from a charging source or U24-F07 for protection initiated by rise in temperature. Charging of batteries is also covered by X16-G codes and of capacitor energy stores by U24-L and X16-L02. Protection for high-power batteries and battery systems is covered by X13-C04X.	
<i>Fast charging, gas pressure, overcharging, rapid charging</i>	
U24-G	[1987]
Semiconductor/valve and other amplifiers	
Codes in this section are divided into categories of circuit application (U24-G01 codes), circuit type and configuration (U24-G02 codes), circuit modifications (U24-G03 codes) and implementation technology (U24-G04 codes). In general, codes from the U24-G01,-G02 and -G04 sections are assigned to describe general aspects of the amplifier, novel features being chiefly represented by U24-G03 codes. From 1992, subject matter previously covered by U24-B has been incorporated in this section.	
U24-G01	[1987]
Circuit applications	

U24-G01A	[1987]
Instrumentation servo, sensor opto-receiver (U24-A01, U24-A09)	
U24-G01A1	[1992]
Instrumentation	
Instrumentation in general is covered in section S.	
U24-G01A5	[1992]
Opto-receiver amplifiers	
Covers amplifiers with e.g. photodiode, phototransistor at input. See also codes for application, e.g. W02-C04A3B for optical communication receiving amplifier.	
U24-G01B	[1987]
Power	
U24-G01B1	[1987]
Low frequency	
Also coded in W03-C01C when used as an audio power amplifier.	
U24-G01B5	[1987]
High frequency	
Also coded in W02-G01B when used as transmitter power amplifier. See U24-G04M for microwave amplifier constructional aspects.	
<i>HF, RF, microwave, millimetre, wave</i>	
U24-G01C	[1987]
Audio and general low frequency	
See W03-C codes also for non-power audio amplifiers, e.g. W03-C01A for audio preamplifiers.	
U24-G01D	[1987]
High frequency	
Covers HF/RF signal amplifiers for video and radio equipment. See also under application, e.g. W02-G03A3 for radio receiver RF amplifiers. See U24-G04M for microwave amplifier constructional aspects.	
U24-G01F	[1992]
Logarithmic amplifier	
Compression in general is covered by U24-C02B. Circuit modifications to introduce deliberate nonlinearity are covered by U24-G03K.	
U24-G01X	[1987]
Other amplifier application	
U24-G02	[1987]
Circuit type and configuration	

U24-G02A	[1987]
Differential amplifier, current mirror, operational amplifier	
(U24-A04)	
U24-G02A1	[1992]
Differential amplifier	
From 2002, U24-G02A1C is assigned for amplifiers with both differential input and output, and takes precedence over the other two subdivisions of U24-G02A1.	
U24-G02A1A	[2002]
Differential input	
U24-G02A1B	[2002]
Differential output	
U24-G02A1C	[2002]
Differential input and output	
This code takes precedence over U24-G02A1A and U24-G02A1B.	
U24-G02A3	[1992]
Current mirror	
U24-G02A5	[1992]
Operational amplifier	
U24-G02A5A	[1997]
Transconductance amplifier	
<i>OTA</i>	
U24-G02A5C	[1997]
Current mode operation	
Covers amplifier with predominately current-based feedback.	
U24-G02A7	[1992]
Follower circuit e.g. emitter follower	
U24-G02B	[1987]
Switched capacitor	
This code covers switched-capacitor amplifier technology, and includes any amplifier circuit using this technique. Circuits of this type using 'off-the-shelf' (i.e. not novel) operational amplifiers, used as a functional block or 'black box', are covered by U24-G04C1, which is assigned as well as U24-G02B when necessary. Switched capacitor filters and switched capacitor networks in general are covered by U25 codes.	

U24-G02C	[1987]
Push-pull, phase splitters	
U24-G02C1	[1992]
Phase splitter circuits	
This code is used for novel phase splitting circuits of general application.	
<i>Transformer, transistor</i>	
U24-G02C5	[1992]
Push-pull amplifier	
U24-G02D	[1987]
DC coupled	
U24-G02E	[1987]
Switching Amplifier	
From 2005, the title of this code has changed to better reflect its content. This code covers switching amplifier arrangements or as they are more commonly known Class D amplifiers. Digital Amplifiers and Class E amplifiers are also covered here. See U22-E codes for pulse modulation in general, U21-B codes for electronic switching in general and U24-G01 codes and W03-C codes for audio applications.	
<i>Digital Amplifier, Class D, Class E, PWM, Switching Amplifier</i>	
U24-G02F	[1987]
Gated, two-way, cascade, cascode, bridge, and combination amplifiers	
U24-G02F1	[1992]
Gated amplifier	
Amplifier muting in general is covered by U24-C05C.	
U24-G02F2	[1992]
Multichannel amplifier	
U24-G02F3	[1992]
Bidirectional amplifier	
<i>Two-way</i>	
U24-G02F4	[1992]
Bridge amplifier	
U24-G02F5	[1992]
Cascaded amplifier	
<i>Multistage</i>	
U24-G02F7	[1992]
Cascode amplifier	

U24-G02X	[1987]
Other amplifier circuit configurations	
Includes reflex amplifiers.	
U24-G03	[1987]
Modifications and improvements to amplifiers	
(U24-A05, U24-A06)	
U24-G03A	[1987]
Negative feedback	
<i>NFB</i>	
U24-G03B	[1987]
Positive feedback, feedforward	
U24-G03B1	[1992]
Feedforward	
See U24-G03D5 also when object is distortion reduction.	
U24-G03C	[1987]
Protection	
(U24-A09)	
Overvoltage or overcurrent protection in general is covered by U24-F codes.	
U24-G03D	[1987]
Noise/distortion reduction	
U24-G03D1	[1992]
Noise reduction	
For application to radio receivers, see W02-G03B codes also.	
U24-G03D1A	[2002]
Noise arising from amplifier components	
U24-G03D1B	[2002]
Reducing effect of external noise sources	
U24-G03D3	[2002]
Improvement in dynamic range	
U24-G03D5	[1992]
Distortion reduction, linearity improvement	
For pre-distortion see U24-G03K and when relating to RF systems, W02-G04B codes also.	
U24-G03D5A	[2002]
Harmonic distortion	

U24-G03D5C	[2002]
Intermodulation distortion	
U24-G03D5X	[2002]
Other distortion	
U24-G03E	[1987]
For integrated circuits	
Inventions coded in U24-G03E codes deal with improvements to amplifiers where the integrated aspect is a significant factor, and are not normally coded in U13 unless structural aspects are involved. See U24-G04A codes for general integrated circuit implementation aspects of amplifiers.	
U24-G03E1	[1992]
Measures improving performance	
This code may be used with other U24-G03 codes depending on the nature of the improvement. Includes e.g. improvement in noise figure, slew rate, (see U24-G03D1 and U24-G03J respectively also) etc.	
U24-G03E5	[1992]
Physical measures	
This code is used to denote measures not involving changes to the circuit per se, but to physical characteristics, e.g. enabling reduction of chip area.	
U24-G03F	[1992]
Offset reduction	
For application to DC amplifiers search with U24-G02D.	
U24-G03G	[1992]
Improving immunity to supply voltage change, novel biasing networks	
U24-G03G1	[1997]
Novel biasing networks	
U24-G03H	[1992]
Improving immunity to temperature change	
U24-G03J	[1992]
Extending bandwidth	
Includes improvements to wideband performance, increasing slew rate, etc.	
U24-G03K	[1992]
Deliberate nonlinearity introduction	
For pre-distortion see U24-G03D5 and when relating to RF systems, W02-G04B codes also.	

U24-G03L	[1992]
Measures to improve stability	
<i>Bode, Nyquist, compensation, open, loop, closed loop, feedback</i>	
U24-G03N	[1992]
Improving efficiency, reducing supply voltage	
(U24-G03X)	
U24-G03N1	[1997]
Improving efficiency	
This code mainly relates to power amplifiers in which case U24-G01B codes are also applied.	
<i>Battery saving, headroom improvement</i>	
U24-G03N5	[1997]
Reducing supply voltage	
Includes arrangements for enabling operation with reduced supply voltage, e.g. in battery-operated equipment.	
<i>Headroom, saturation, voltage swing, rail</i>	
U24-G03P	[1997]
Improving CMRR, improving gain	
(U24-G03X)	
U24-G03P1	[1997]
Improving CMRR	
(U24-G03X)	
See U24-G02A5 codes for differential amplifier per se.	
<i>Common mode rejection ratio</i>	
U24-G03P5	[1997]
Improving gain	
(U24-G03X)	
U24-G03Q	[1997]
Reducing dependence on device characteristics	
This code may be used with U24-G03E and U24-G04 codes as appropriate.	
U24-G03R	[1997]
Modifying input-output impedance	
(U24-G03X)	
U24-G03X	[1987]
Other modifications and improvements to amplifiers	

U24-G04 [1987]

Amplifier implementation technology

These codes are applied whenever the implementation is specific to a single main type.

U24-G04A [1987]

Integrated transistor circuits

Inventions assigned U24-G04A codes are not normally coded in U13 unless structural aspects are involved.

U24-G04A1 [1987]

Bipolar

U24-G04A2 [1987]

Field effect transistor

CMOS, FET, IGFET, JFET, MESFET, MISFET, MOS, MOSFET

U24-G04A3 [1992]

Bipolar and FET combined

U24-G04B [1987]

Discrete transistor circuits

U24-G04B1 [1987]

Bipolar

U24-G04B2 [1987]

Field effect transistor

CMOS, FET, IGFET, JFET, MESFET, MISFET, MOS, MOSFET

U24-G04B3 [1987]

Bipolar and FET combined

U24-G04B9 [1987]

Other discrete semiconductor device implementation

U24-G04C [1987]

Amplifier modules using operational amplifiers

Includes circuits using general amplifier configurations as functional blocks. (Analogue computing elements are covered by T02-A04B codes).

U24-G04C1 [1987]

Switched capacitor amplifier using OPAMPs

This code covers the use of non-novel operational amplifiers in switched capacitor amplifier circuit configurations. All aspects of switched capacitor amplifiers are covered by U24-G02B (which is therefore assigned with this code). Switched capacitor networks in general are covered by U25-A01.

U24-G04D [1987]

Valve

Includes klystron, travelling wave tube, etc. amplifiers. For novel details of tubes themselves see V05-B and V05-C codes.

U24-G04E [1992]

Parametric amplifier

Parametric amplifiers are generally coded in U24-G01D also.

U24-G04M [1992]

Amplifiers using microwave or millimeter wave constructional techniques

From 2017 the title of this code has been changed to clarify its coverage of amplifiers whose operating frequency dictates the techniques used, e.g. distributed or transmission line amplifiers (also assigned U24-G02F5) and those employing distributed-constant elements such as waveguides, cavity resonators, and the like. Novel constructional details of amplifiers in general, such as PCB mountings, housings etc. are covered by U24-G05A which can be assigned with this code as necessary. Small-signal amplifiers of this kind are also assigned U24-G01D and RF power amplifiers are also assigned U24-G01B5. Distributed-constant elements such as waveguides, filters and resonators are covered by W02-A codes.

Dielectric resonator, directional coupler, finline, microstrip, probe, stripline

U24-G04X [1987]

Other amplifier implementation technology

U24-G05 [1997]

Constructional details and testing

U24-G05A [1997]

Constructional details of amplifiers

Includes cooling, housings, mounting details, etc. V04-S and V04-T codes for electronic equipment casings and constructional details in general are also assigned as necessary. Amplifiers using microwave or millimeter wave constructional techniques, e.g. microstrip or other types of waveguide, are covered by U24-G04M and are only assigned this code as well for novel constructional details of the amplifier as a whole.

Circuit board mounting, coolant, fan, heatsink, PCB mounting, pillar, rack mount, screening, shielding

U24-G05C [1997]

Testing

Includes amplifier calibration, self-testing and testing using external equipment. To denote testing of a specific amplifier property U24-G03 codes are also assigned as appropriate, e.g. U24-G03F and U24-G05C are assigned for measurement of amplifier offset voltage. For electrical tests S01 codes are also assigned as appropriate.

U24-G09 [1987]

Other amplifier details

U24-H [1992]

Low power systems

(U24-X)

This code is analogous to X12-H.

U24-H01 [2005]

Protection

Includes arrangements to protect LV power networks. For example, vehicle 12V network protection. To be used with U24-F codes, as appropriate. For individual PSU protection, see U24-D01B/F. For high power networks, see X13-C codes.

U24-H02 [2005]

Wireless/non-contact power distribution

Includes low level non-contact power transfer. For non-contact high power distribution see X12-H01E codes. See X16-G03 for non-contact battery charging, W01-C01E5E for wireless phone charging and X21-B01A1C for offboard non-contact charging of electric vehicle batteries.

WPT, near-field

U24-H02A [2021]

Using capacitive coupling

U24-H02B [2021]

Using inductive coupling

Also see V02 for novel inductive components, e.g. V02-G01D for inductive connections. See S05 for biomedical and implant applications.

U24-H02C [2021]

Using radio waves or microwaves

See also W02 codes for novel RF details such as directional array or Yagi antennae, satellite communications and telemetry.

U24-H02D [2021]

Using light

Includes use of off-board mains supply. See X16-G01 for mains battery charging.

U24-H02E [2021]

Using ultrasonic waves

See also V06 codes for novel ultrasonic transducers.

U24-H02L [2021]

Wireless power transmission control, monitoring and optimization

Includes optimizing position for non-contact power transfer; reducing electric, magnetic or electromagnetic leakage/interference; detecting foreign objects; as well as transmitting data during power transfer.

U24-H03 [2005]

Arrangement of power bus(es) fed by multiple sources

Includes several PSUs supplying main bus, or several buses at same or different voltages, that feeds power to one or more loads. Covers, for example, switch control to distribute power where required.

U24-H04 [2005]

Power management techniques

Includes operation of a PSU to save/reduce battery energy dissipation and mains power. Operation measures may include switching off or operating in low power consumption mode, slowing of processor clock frequency, current/voltage control (for which U24-D/E codes are also assigned), to reduce power consumption. Changes to the operation of a PSU within portable equipment so as to reduce battery dissipation are covered by U24-K.

U24-H05 [2006]

Power distribution over communication network

Includes power supply distribution, and its control, over a communication network such as a LAN, for which W01-A06 codes are also assigned as appropriate. The use of power distribution conductors as a communications medium for a data network is covered by W01-A06C6, and for communications in general, by W02-C01A3.

PoE, power over Ethernet®

U24-H06 [2006]

Low power network control

U24-H07 [2006]

Vehicle LV distribution network

Includes systems for IC engine-driven vehicles for voltages up to 42V. HV electric traction vehicle distribution systems are covered by X12-H01B codes and X21/X23. Also includes low voltage electric distribution systems for vehicles (see also X21-B and X22-F codes).

U24-J [1992]

Standby power supply

Includes uninterruptible power supplies. See T01-L01B for computers, W01-A07K for data communications and W01-C07B for telephone systems.

U24-J01 [2005]

Battery back-up

U24-J02 [2005]

Capacitor back-up

U24-J03 [2005]

Power converter back-up

U24-J04 [2005]

Combination of battery and capacitor back-up

U24-K [2005]

PSU power-saving mode/operation

This code covers operation of a power supply unit within portable equipment to reduce battery dissipation. Power management techniques with the emphasis on power distribution are covered by U24-H04.

U24-L [2005]

Capacitor charging circuits

This is analogous to X16-G for battery chargers.

U24-T [2017]

Constructional details of low power supplies and power distribution systems

Includes construction details of all types of low power supply except power converters covered by U24-D01 codes (e.g. U24-D01K). Also covers constructional details of power distribution systems. This code is assigned in conjunction with other U24 'power' codes as necessary, and is intended to highlight mechanical or physical details, including cooling, of inventions in this field. V04 codes dealing with electronic equipment constructional details in general are also assigned as necessary.

Bracket, casing, circuit board mounting, fan, fixing, heatsink, housing, PCB, printed circuit board mounting, ventilation

U24-X

Other low power supply details

Portable power supply, power bank, wearable power supply.

U25: Impedance Networks and Tuning

This section includes mainly lumped-constant circuit elements. Impedance networks with distributed-constant elements are covered by W02-A codes. Subject matter coded in U25 is generally for use in analogue circuits. Digital implementations of filters and similar networks are **not** included here and are covered chiefly by U22-G codes and T01-J08 codes for computing aspects. For application to radio equipment see W02 and W03 codes as appropriate.

U25-A

Time delay and time-varying (incl. adaptive) networks

U25-A01 [1983]

Switched capacitor networks; N-path filters

Switched capacitor amplifiers are covered by U24-G02B.

U25-A02 [1983]

Transversal filters

Digital transversal filters are covered by U22-G01A3.

U25-A03 [1992]

Comb filters

Digital comb filters are covered by U22-G01B5.

U25-A05 [1992]

Time delay circuits

Covers arrangements with emphasis on achieving a required time delay. Circuitry to produce a specific phase shift is covered in U25-F01 codes. Other delay aspects, e.g. for equalisation, are covered by U25-E05Q.

U25-B

Electromechanical networks

This code covers networks of electromechanical devices, i.e. two or more resonators forming e.g. a lattice or ladder filter such as a bandpass filter or a duplexer for a radio transceiver (in which case W02-G02A5B is also assigned). Individual piezoelectric, electrostrictive and magnetostrictive devices are covered by V06-V codes and SAW devices by U14-G, and are not assigned U25-B unless specifically intended for use in a network made up of these devices. U25-B also includes matching transformers (with V02-F02) and other components for electromechanical networks, for which other codes are also assigned as appropriate. U25-D codes are also assigned as necessary, e.g. U25-D01 codes when a splitting

function is performed, U25-D03 for a balun function, and U25-D05 for impedance matching aspects.

Crystal filter, ceramic filter, block filter

U25-C

Active networks simulating reactances; impedance converters

This code covers circuits for simulating reactances, changing their sign (e.g. producing an inductive reactance from a capacitor) and changing their magnitude, such as a 'capacitor amplifier' or 'capacitor multiplier'.

Gyrator, negative/positive impedance converter, NIC, PIC, reactance multiplier, Miller effect

U25-D

Signal splitting/combining, impedance matching, balanced-to-unbalanced networks; Attenuators

U25-D01 [1992]

Signal splitters and combiners

This code and its subdivisions cover active and passive networks for splitting and combining signals, generally without regard to frequency. Splitting and combining circuits based on electromechanical filters are assigned U25-B and U25-D01 codes as appropriate. Where splitting or combining networks involve use of frequency-selective elements such as filters implemented with coils and capacitors, U25-E05K is assigned (with other U25-E codes as appropriate) **instead of** U25-D01 codes. Note that loudspeaker cross-over networks are not included in U25 unless other aspects or wider applications are involved, being covered by W04-T05 and V06-V02S.

U25-D01A [1997]

Active

U25-D01C [1997]

Passive

Transformer

U25-D03 [1992]

Balanced-to-unbalanced converters

Distributed-constant balanced-to-unbalanced converters are covered by W02-A02A5.

Balun

U25-D05 [1992]

Impedance matching networks

Distributed-constant impedance matching is covered by W02-A02A5.

U25-D07 [1992]

Attenuators

Waveguide-technology attenuators are covered by W02-A04C codes.

Insertion loss

U25-D07A [1997]

Active

This code covers the use of semiconductor devices in attenuator circuits, both as switches and as controllable resistances.

PIN diode, FET

U25-D07C [1997]

Passive

U25-E

Frequency selective networks

Codes in this group are used for filters (excluding those covered by U25-A codes and U25-B) involving at least two types of elements, i.e. RC, RL, or LC networks. Thus individual components described as ‘filters’ or ‘noise filters’ in a power supply or other circuit are not included, unless intentionally using a secondary property such as series inductance of a capacitor, or stray capacitance of an inductor. Noise filters for RFI suppression are covered in general in W02-H01 codes and for power supply lines in W02-H03 and U24/X12 codes, whether single components or combinations. Where filter function is specified, codes from the U25-E05 section are used with either U25-E01 or U25-E02. Active networks other than filters are assigned appropriate codes elsewhere in U25. For digital filters see U22-G01 codes. Waveguide technology filters are covered by W02-A05 codes.

Filter, lowpass, bandpass, highpass, notch

U25-E01

Active

U25-E01A [1997]

Biquadratic filter

Biquad

U25-E02

Passive

U25-E02A [1997]

With structurally-associated components

Includes networks implemented with ‘composite’ components. See also V01-A02G5 and V01-B03C8 for composite resistor and capacitor aspects respectively, and V02-F01J for filter inductors.

U25-E05 [1992]

Characterised by function and operation

From 2009 U25-E05K is introduced for frequency selective networks with emphasis on separation or combination of frequency bands and takes precedence over other U25-E05 codes.

U25-E05A [1992]

Lowpass filter

U25-E05B [1992]

Bandpass filter

U25-E05B1 [1997]

Single LC resonant circuit

U25-E05C [1992]

Highpass filter

U25-E05D [1992]

Notch filter

This code covers analog filters which attenuate a band of frequencies and pass those on either side.

Band stop filter

U25-E05H [1992]

Variable characteristic

This code is used with other U25-E05 codes or alone, as appropriate.

U25-E05K [2009]

Combining or separating different frequencies

(U25-E05X)

This code is intended for frequency selective networks, i.e. filters normally, where the emphasis is on combination or separation of frequency bands. Examples include duplexers for radio transceivers, for which W02-G02A5B is also assigned. Where there are **significant novel aspects** in specific filters making up the frequency separating or combining network other U25-E05 codes are also assigned as appropriate, but otherwise U25-E05K takes precedence. Combining and splitting networks (lumped constant type) in general, **without** emphasis on frequency separation, are covered by U25-D01 codes. When frequency-based separation is involved U25-E05K takes precedence. Note that loudspeaker cross-over networks are not included, being covered by W04-T05 and V06-V02S

U25-E05Q [2009]

Delay equalisation and all-pass networks (U25-E05X)

This code is intended for circuits in which emphasis is on delay equalization (and not amplitude equalization) and all-pass networks, in which all frequencies are passed, but the phase of the output is modified. Analogue circuits based on lumped constant impedances for correcting amplitude-frequency distortion are covered by U25-E05X but U25-E05Q takes precedence when delay equalisation is the main purpose.

Group delay

U25-E05X [1992]

Other filter network function

This code includes frequency-dependent circuits used for amplitude equalisation, e.g. to compensate for increasing attenuation in a circuit or transmission line with frequency. (W02-C01B2B is also assigned when the application is to equalization of transmission lines for communications purposes and W01-A08B2 when the emphasis is on pulse shaping for data transmission). Prior to 2009 U25-E05X was also used for circuits with emphasis on delay equalization, now covered by U25-E05Q which takes precedence over this code when both amplitude and delay equalization are involved. Analogue time delay networks are covered by U25-A05. See U25-F01 codes for networks with emphasis on achieving a particular phase shift. From 2009 frequency selective networks (i.e. filters normally) with emphasis on the separation or combining of frequency bands are no longer coded here and are covered by U25-E05K.

Amplitude fall-off, frequency-dependent loss, lowpass characteristic, peaking, roll-off

U25-F

Tone or bandwidth control; Other impedance networks (incl. phase shifters)

U25-F01 [1992]

Phase shift networks

Covers arrangements to produce a particular phase shift, e.g. at a single frequency. Time delay networks are covered by U25-A05 and delay equalisation networks by U25-E05X.

U25-F01A [1992]

Variable phase shifter

U25-F05 [1992]

Bandwidth control

See W03-C05 codes also for audio amplifier tone control circuits.

U25-F05A [1992]

Automatically varied or switched

U25-F05A1 [1992]

Continuous variation

U25-F05A5 [1992]

Switched bandwidth

U25-F05C [1992]

Manual control

U25-F05C1 [1992]

Continuously variable

U25-F05C5 [1992]

Switched bandwidth

U25-F09 [1992]

Other impedance networks

U25-G

Continuous tuning

Includes tracking adjustment.

U25-G01 [1992]

Mechanically varied

Covers tuning by conventional variable capacitor or inductor, either manually or by motor drive. For capacitors and inductors per se see V01-B and V02 codes, e.g. V02-F01.

MEMS actuator, permeability

U25-G03 [1992]

Electrically varied

Includes use of varactor diodes, saturable core inductors, etc.

Varicap, reactance circuit, Miller

U25-H

Discontinuous tuning; Band selection

Step, preset, pushbutton, select

U25-H01 [1992]

Bandswitching

Includes electromechanical and electronic methods and circuits for switching tuning range. (Step tuning within a frequency band is covered by U25-H03).

U25-H03 [1992]

Step tuning e.g. by synthesiser

See U23-D01B codes for details of PLL synthesisers and U23-F03 codes for direct types. (Switching between frequency bands is covered by U25-H01).

U25-H03A [1992]

With channel memory

U25-J

Automatic band scanning; Automatic frequency control

Lock, AFC

U25-J01 [1992]

Bandscanning

Bandscanning arrangements for spectrum analysers/panoramic receivers are coded in S01-D03C1 also, and in W02, e.g. W02-C05 and W02-G03A codes.

Sweep, scan

U25-J01A [1992]

Using synthesiser tuning

See U23-D01B codes for details of PLL synthesisers per se and U23-F03 codes for direct types.

U25-J01A1 [1992]

With channel memory

Preset, select, priority channel

U25-J01C [1992]

Stopping on detected station

U25-J05 [1992]

Automatic frequency control

See U23-D codes for frequency/phase control circuits, and under application, e.g. W03-A02A for AFC in TV receivers, W03-B01B for broadcast radio receivers respectively.

AFT, automatic fine tuning

U25-K

Other tuning

Includes testing and production trimming of tuned circuits and filters, either manually or automatically. (See S01-G08 codes also, together with appropriate code in e.g. W02 or W03). This code also includes remotely-controlled tuning per se. For wider aspects of remote control see W03-A02C, W03-G05A and W04-E04A codes for remote control of TV receivers, audio/video equipment, and recording equipment respectively. (Remote control in general is covered by W05-D codes).

Tuning scale, dial, drive, drum, pointer, illumination, test, align, set-up

Section V: Electronic Components

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V01: Resistors and Capacitors

This section deals with resistors and capacitors usable as discrete components, so that components forming part of an integrated circuit are **not** included. Similarly, thick and thin film circuits are **not** included and are covered by U14-H codes. Power resistors and capacitors are covered by X12-A and X12-B codes respectively.

V01-A

Resistors

V01-A01

Mounting, housing, coding; Terminals

Marking, colour coding, lead, wire

V01-A01A [1992]

Substrate details

Includes composition, structure etc.

Baseplate, ceramic

V01-A01B [1992]

Housing, encapsulation, mountings

Casing

V01-A01B1 [1992]

Encapsulation

Includes compositions.

V01-A01C [1992]

Electrodes and terminals

V01-A01C1 [1992]

Electrodes

Film, end cap, contact

V01-A01C5 [1992]

Terminals

Includes lead arrangements.

Wire, axial, tag, pad

V01-A01D [1992]

Coding, marking

Colour code, value, tolerance

V01-A01X [1992]

Other details of mounting, housing, coding and terminals

Includes shielding and cooling arrangements (for low-power resistors only).

V01-A02

Fixed resistors

V01-A02A

Thermistors

For temperature measurement application see V01-A02A7A and S03-B01F also. This code is intended for resistors using e.g. oxides of transition metals, and not linear TCR devices based on metallic conductors, for which S03-B01B is assigned, (although novel details of such resistances are assigned other V01 codes when appropriate).

Temp, coefficient resistance, PTC, NTC, circuit protector, cold conductor

V01-A02A1 [1992]

Novel thermistor composition

V01-A02A1A [1997]

Manufacture of thermistor material

This code covers the manufacture of material for use in thermistors and does **not** relate to manufacture of thermistors per se, which is covered by V01-A04 codes (especially V01-A04K1).

V01-A02A5 [1992]

Characterised by temperature dependence

TCR, resistance, coefficient

V01-A02A5A [1992]

Negative temperature coefficient

NTC

V01-A02A5B [1992]

Positive temperature coefficient

PTC

V01-A02A7 [1992]

Characterised by intended function

V01-A02A7A [1992]

Measurement of temperature per se

Temperature measurement using thermistors is also coded in S03-B01F.

Thermometer, sensor

V01-A02A7B [1992]

Current limiting

Includes use as cold conductor.

Circuit protector

V01-A02A7C [1992]

Time-dependent current control

Includes use of heating to gradually decrease or increase current, e.g. for degaussing CRT, (see W03-A08A4C also) or for motor starting (see V06-N05 also).

Decay, decrease, time delay, demagnetising

V01-A02A7D [1992]

For self-regulating heating

See X25-B01 codes also.

Self heater

V01-A02A7X [1992]

Other thermistor function

V01-A02B

Voltage dependent resistors

Includes current-responsive resistors.

Nonlinear resistor, varistor, VDR, protection, zinc oxide, sintered

V01-A02B1 [1992]

Novel varistor composition

V01-A02B1A [1997]

Manufacture of varistor material

This code covers the manufacture of material for use in varistors and does **not** relate to manufacture of varistors per se, which is covered by V01-A04 codes (especially V01-A04K2).

V01-A02C

Film resistors

Note - resistors forming part of a film or integrated circuit are not coded in V01- see appropriate codes in section U, e.g. U11-C05G1A for manufacture, U12-C03 for resistors per se, and U14-H01C for film circuit resistors.

Thick film, thin film, layer resistor

V01-A02C1 [1992]

Novel film resistor composition

See U11-A05 also for film compositions.

V01-A02C3 [1992]

Film structure

Covers film structures for discrete resistor components only.

V01-A02C3A [1992]

Thin film

V01-A02C3C [1992]

Thick film

V01-A02D [1987]

Chip resistor

Leadless, surface mounting

V01-A02F [1992]

Wire-wound resistor

(V01-A02X)

V01-A02G [1992]

Composite resistor

(V01-A02X)

Includes resistors structurally associated with other discrete components.

Multiple

V01-A02G1 [1992]

With other resistive components

(V01-A02X)

Includes resistor array.

V01-A02G5 [1992]

With other non-resistive components

(V01-A02X)

Includes RL and RLC elements.

RC, CR, capacitor, inductor, coil

V01-A02H [1992]

Temperature compensation

(V01-A02X)

Resistors with deliberately manufactured positive or negative temperature coefficient are covered by V01-A02A codes.

V01-A02J [2024]

Piezoresistor

V01-A02X

Other details of fixed resistors

Includes low-power liquid resistors. Power types are coded in X12-A only.

V01-A03

Variable resistors

Codes in this section include variable resistors as preset or manual controls, and also resistive transducers in which physical movement is involved. For other types see V01-A02 codes.

Linear, rotary, potentiometer, dual, ganged, winding, track, shaft, spindle

V01-A03A [1992]

Housing, casing, mounting kit

(V01-A01, V01-A03)

From 1992 housing and mounting details of variable resistors are coded in V01-A03 codes only.

V01-A03A1 [1992]

Variable resistor housing

(V01-A01, V01-A03)

V01-A03A5 [1992]

Mounting details for variable resistors

(V01-A01, V01-A03)

Bushing, nut, washer, bracket

V01-A03B [1992]

Electrodes, terminals, slider

(V01-A01, V01-A03)

V01-A03B1 [1992]

Electrodes and terminals

(V01-A01, V01-A03)

Covers end-of-track electrodes. Slider/wiper is covered by V01-A03B5.

V01-A03B5 [1992]

Slider, contact brush

(V01-A01, V01-A03)

V01-A03C [1992]

Novel resistance element details

Includes compositions. Codes in this section are applied to indicate novel aspects only. V01-A03D codes are used for general aspects (not necessarily novel).

V01-A03C1 [1992]

Film track

V01-A03C3 [1992]

Wire track

Includes wirewound variable resistors. Power variable resistors are covered by X12-A.

V01-A03C5 [1992]

Linear track

Covers shape of track only. Arrangements to achieve a particular control law are covered by V01-A03C8. For general details of slide-type potentiometers, see V01-A03D6.

V01-A03C7 [1992]

Rotary track

For general details of rotary potentiometers, see V01-A03D5.

V01-A03C7A [1992]

Helical

Includes track having shape of short section of helix.

V01-A03C8 [1992]

Characterised by resistance law or characteristic

Linear, logarithmic

V01-A03C9 [1992]

Other novel resistance element details

Includes other resistive component configurations, such as switched resistance network, and **use** of magnetoresistors and movable permanent magnet. (Magnetoresistors per se are not covered in V01 - see U12-B01B codes and S02-K03A5A for transducing aspects, these codes also being assigned for this type of 'potentiometer').

V01-A03D [1992]

Characterised by type of adjustment/component

Codes in this section are applied irrespective of claimed novelty to indicate the type of device/adjustment only, either in combination with novel aspect codes, or alone.

V01-A03D1 [1992]

Manual e.g. front panel control

Volume, gain, tone, adjust, set

V01-A03D2 [1992]

Semi-variable

Covers preset control, adjusted for e.g. setting-up.
Trimmer, test

V01-A03D3 [1992]

Measurement transducer

Covers component with variation of resistance value by physical movement, including force, compression, etc. Variation of resistance due to physical parameter other than movement is covered by V01-A02 codes.

V01-A03D4 [1992]

Surface mounting variable resistor

Chip, leadless

V01-A03D5	[1992]
Rotational adjustment	
<i>Rotary</i>	
V01-A03D5A	[1992]
With more than 360 degree rotation	
Includes helical potentiometer.	
V01-A03D6	[1992]
Linear	
Includes slide-type potentiometer.	
<i>Audio, mixing, fade, balance, graphic equaliser</i>	
V01-A03F	[1992]
Control knob, actuator mechanism	
Includes mechanical drive arrangement for e.g. joystick (see T04-F02B3 also).	
<i>Gear, proportional, two-dimensional, X-Y</i>	
V01-A03X	[1992]
Other details of variable resistors	
V01-A04	
Manufacturing resistors	
Includes single and multiple-step resistor manufacturing methods and equipment, and testing of manufactured resistors.	
V01-A04A	[1992]
Substrate processing	
Includes firing, sintering, etc.	
V01-A04B	[1992]
Coating	
Covers deposition of resistive material.	
<i>Sputtering, vapour, flame spraying</i>	
V01-A04C	[1992]
Treating deposited layer	
Use V01-A04E also for heat treatment.	
V01-A04D	[1992]
Encapsulation	
V01-A04E	[1992]
Firing, heat treatment	
Includes sintering, etc.	
V01-A04F	[1992]
Attaching leads, manufacturing electrodes	

V01-A04G	[1992]
Multistep manufacturing process, winding and novel manufacturing equipment	
V01-A04G1	[1997]
Multistep manufacturing process	
This code is used when a sequence of manufacturing steps is claimed without apparent emphasis on any one aspect.	
V01-A04G2	[2024]
Winding	
Includes winding of resistors.	
V01-A04G5	[1997]
Novel manufacturing equipment	
Use with other V01-A04 codes as appropriate.	
V01-A04H	[1992]
Testing, sorting, trimming, marking	
V01-A04H1	[1992]
Testing and sorting resistors	
See S01-D05B1 and S01-G12A for electrical testing of resistors.	
<i>Aging test</i>	
V01-A04H3	[1992]
Trimming resistor value	
See X24-D03B for laser trimming apparatus.	
V01-A04H5	[1992]
Marking resistors	
V01-A04J	[1992]
Tape carriers, packing	
Includes 'bandolier' tape carriers per se (see V04-V01A also), loading finished resistors onto tapes, shipping containers, etc.	
V01-A04K	[1992]
Resistor type	
Codes in this section are used to indicate the type of resistor being manufactured only. V01-A04K codes are not used if a manufactured resistor is also claimed resulting in the assignment of a V01-A02 or V01-A03 code.	
V01-A04K1	[1992]
Thermistor	
Manufacture of thermistor material is not covered here - see V01-A02A1A.	

V01-A04K2	[1992]
Varistor	
Manufacture of varistor material is not covered here - see V01-A02B1A.	
V01-A04K3	[1992]
Film resistor	
V01-A04K4	[1992]
Chip resistor	
V01-A04K5	[1992]
Wirewound resistor	
V01-A04K6	[1992]
Variable resistor	
<i>Potentiometer</i>	
V01-A04K9	[1992]
Other resistor type	
V01-A04R	[2005]
Resistor manufacture process waste disposal and recycling	
<i>(V01-A04X)</i>	
V01-A04R1	[2005]
Waste handling and disposal	
Includes all aspects of waste disposal and waste treatment equipment to make the waste safe in the environment.	
V01-A04R2	[2005]
Materials treatment and recycling	
Includes all aspects of recovery of materials, solutions, and the like for reuse in resistor manufacture.	
V01-A04X	[1992]
Other resistor manufacturing details	
V01-B	
Capacitors	
V01-B01	
Electrolytic devices	
V01-B01A	
Electrodes	
<i>Lead, terminal wire, anode, tag, lug</i>	

V01-B01A1	[1983]
Sintered	
This code is assigned alone or with V01-B01A4 codes describing composition or manufacture of materials.	
<i>Tantalum, solid powder, oxide, alloy, anodised</i>	
V01-B01A3	[2006]
Double-layer and supercapacitor electrodes	
This code is assigned alone or with V01-B01A4 codes describing composition or manufacture of materials. For all other aspects of double-layer and supercapacitors V01-B01D codes are assigned with other V01-B codes as appropriate. Manufacture of these capacitor types is covered by V01-B01G8D and other V01-B01G codes as appropriate.	
V01-B01A4	[2006]
Novel electrode materials composition and materials manufacture	
These codes are normally assigned with V01-B01A1 or V01-B01A3 as appropriate. For details relating to foil electrodes, see V01-B01A5 codes.	
V01-B01A4A	[2006]
Novel electrode materials composition	
V01-B01A4C	[2006]
Manufacture of electrode materials	
This code is intended to cover manufacture of materials to be subsequently used as an electrolytic capacitor electrode, and does not include manufacture or treatment of electrode materials forming part of a process for mfg the capacitor itself, which is covered by V01-B01G1.	
V01-B01A5	[1983]
Foil	
<i>Aluminium, etched, wound</i>	
V01-B01A5A	[1992]
Foil manufacture	
Manufacture and preparation of foil other than as a step in a complete process for making a capacitor is coded here, otherwise see V01-B01G1.	
V01-B01A5C	[1992]
Foil composition	
V01-B01A7	[1992]
Terminals and lead arrangements	
<i>Wire, axial</i>	

V01-B01B

Electrolytes and electrolyte manufacture; Separators; Containers

From 2006 the scope of this code has been expanded to allow electrolyte compositions and electrolyte manufacture to be separately highlighted, and where neither of these aspects are novel, the solid or liquid/paste nature of the electrolyte to be indicated (to define the overall capacitor type) by means of V01-B01B6 codes.

Encapsulation, mounting

V01-B01B1 [1983]

Novel details of solid electrolytes

From 2006, this code has been subdivided to allow novel solid electrolyte compositions (V01-B01B1A) and electrolyte manufacture (V01-B01B1C) to be separately highlighted. The two new codes take precedence over V01-B01B6A which is assigned to indicate that the capacitor is characterised by having a solid (non-novel) electrolyte.

Tetra cyano di-quino methane (TCNQ), complex

V01-B01B1A [2006]

Solid electrolyte composition and materials

Novel details of solid electrolyte composition, and/or materials used in the preparation/manufacture of the solid electrolyte.

V01-B01B1C [2006]

Solid electrolyte and material manufacturing aspects

This code covers the manufacture of materials destined to be used as a solid electrolyte. Manufacture of the capacitor itself is covered by V01-B01G8A and other V01-B01G codes as appropriate.

V01-B01B3 [1992]

Separators

V01-B01B5 [1983]

Novel details of liquid or paste electrolytes

From 2006, this code has been subdivided to allow novel liquid or paste electrolyte compositions (V01-B01B5A) and electrolyte manufacture (V01-B01B5C) to be separately highlighted. The two new codes take precedence over V01-B01B6C which is assigned to indicate that the capacitor is characterised by having a liquid or paste (non-novel) electrolyte.

Aqueous, solvent, ethylene glycol, carboxylic acid, boric acid

V01-B01B5A [2006]

Liquid or paste electrolyte compositions and materials

Novel details of liquid or paste electrolyte composition and/or materials used for the preparation/manufacture of the liquid/paste electrolyte.

V01-B01B5C [2006]

Liquid or paste electrolyte manufacture

This code covers the manufacture of materials destined to be used as a liquid or paste electrolyte. Manufacture of the capacitor itself is covered by V01-B01G8B and other V01-B01G codes as appropriate, e.g. forming aspects in V01-B01G7A.

V01-B01B6 [2006]

Electrolytic capacitor characterised by electrolyte type

These codes are assigned to indicate the physical state of electrolyte only, and are not assigned when novel aspects of electrolyte composition or manufacture can be highlighted by V01-B01B1 or V01-B01B5 codes. For inventions concerned solely with capacitor manufacture V01-B01B6 codes are not assigned and V01-B01G8 codes are applied instead. In cases where novelty exists in both the capacitor and its manufacture V01-B01B6 codes take precedence.

V01-B01B6A [2006]

Solid electrolyte capacitor

This code is assigned just to indicate that a capacitor has a solid electrolyte, which is not itself novel. If the solid electrolyte is novel in some way, V01-B01B6A is not used and V01-B01B1 codes are used instead.

V01-B01B6C [2006]

Liquid or paste electrolyte capacitor

This code is assigned just to indicate that a capacitor has a liquid or paste electrolyte, which is not itself novel. If the liquid or paste electrolyte is novel in some way, V01-B01B6C is not used and V01-B01B5 codes are used instead.

V01-B01B7 [1992]

Housings, seals, mounting

V01-B01B7A [1992]

With pressure-relieving vent

See V01-B01F5 also for pressure relief also causing electrical disconnection.

Blowout, plug

V01-B01B7C [1992]

Mounting kit

Clamp, bracket, lead-spacer, base

V01-B01B7D [1992]

Housing for several capacitors

Multiple capacitor

V01-B01C [1983]

Devices other than capacitors

Electrolytic transducer, photosensitive device, acceleration sensor, electrokinetic cell

V01-B01D [1987]

Double-layer capacitor

See X16-L02 also for energy-storage using capacitors, and T01-H01/T01-L01 codes for computer memory module and power supply systems.

Memory back-up

V01-B01D1 [1992]

Stack of cells

V01-B01D5 [2002]

Super-capacitor

(V01-B01D,V01-B01X)

See T01-H01/T01-L01 codes for computer memory module and power supply systems, e.g. memory back-up; and for high power applications e.g. electric/hybrid vehicles, see X12-B, and X21-B codes. Includes electrostatic double layer capacitors, electrochemical pseudocapacitors and hybrid capacitors such as lithium ion capacitors.

Ultracapacitor, electrochemical double layer, EDLC, high capacitance, pseudocapacitor, hybrid lithium ion, LiC, LIC

V01-B01E [1992]

Leadless electrolytic capacitor

Surface mounting, chip

V01-B01F [1992]

Electrical protective arrangements

(V01-B01X)

Excess pressure venting is covered by V01-B01B7A.

V01-B01F1 [1992]

Involving fuse protection

(V01-B01X)

V01-B01F5 [1992]

Involving mechanical disconnection

(V01-B01X)

Use with V01-B01B7A for end cap movement rupturing leads.

V01-B01G [1992]

Electrolytic capacitor manufacture

See V01-B04 codes for manufacture of non-electrolytic capacitors.

V01-B01G1 [1992]

Electrode manufacture

Includes sintering. Covers treatment of foil to form electrodes, but not manufacture of foil per se which is covered in V01-B01A5A.

Etching, degreasing, anodising

V01-B01G3 [1992]

Winding, laminating, dielectric impregnation

V01-B01G5 [1992]

Assembly

Includes manufacture of leads and external electrodes. Attachment of manufactured leads and external electrodes is covered by V01-B01G5C. Production of internal electrodes is covered by V01-B01G1.

V01-B01G5A [1992]

Encapsulation

V01-B01G5C [1992]

Attaching leads

This code covers the attachment of leads and external electrodes only. Manufacture of leads and external electrodes is covered by V01-B01G5.

V01-B01G6 [1992]

Multistep manufacturing process and novel manufacturing equipment

Includes waste treatment and recovery processes.

V01-B01G6A [1997]

Multi-step manufacturing process

This code is used for processes involving a sequence of steps without emphasis on any particular one.

V01-B01G6C [1997]

Novel manufacturing equipment

Use with other B01G codes as appropriate.

V01-B01G6E [2005]

Process waste management

(V01-B01G6)

This code includes all aspects of treatment of waste and contaminants arising from electrolytic capacitor manufacture, including making safe, waste classification, and separation aspects. Recycling of materials to be reused in the manufacturing process is covered by V01-B01G6G. Prior to 2005 coded in V01-B01G6.

V01-B01G6F* [2005-2007]

Waste handling and disposal

(V01-B01G6)

*This code is now discontinued. From 2008 all aspects of handling, making safe, and disposal of waste from electrolytic capacitor manufacture are now covered by V01-B01G6E.

V01-B01G6G [2005]

Materials recycling

(V01-B01G6)

Includes treatment and recycling, handling equipment and environmental protection and safety equipment aspects for electrolytic capacitor manufacture. Prior to 2005 coded in V01-B01G6. See V04-X01C for other electronics components recycling.

V01-B01G7 [1992]

Forming, testing, ageing, packing

V01-B01G7A [1992]

Forming, ageing

V01-B01G7C [1992]

Testing

Measurement of capacitance value in general is coded in S01-D05A3, and general electrical testing of capacitors in S01-G12C.

V01-B01G7E [1997]

Packing

Includes tape carriers.

V01-B01G8 [1992]

Characterised by type of capacitor

Codes in this section are applied irrespective of claimed novelty to indicate the type of capacitor only. These codes are not used if a manufactured capacitor is also claimed, for which the appropriate V01-B01 code will be assigned.

V01-B01G8A [1992]

Solid dielectric

V01-B01G8B [1992]

Liquid/paste dielectric

V01-B01G8D [1992]

Double layer capacitor

V01-B01G8E [1992]

Leadless capacitor

V01-B01G8X [1992]

Other capacitor type

V01-B01X

Other details of electrolytic devices

V01-B02

Variable capacitors

Capacitive transducers for physical quantities are coded in V01-B02A, where motion of plates or dielectric is involved, otherwise in V01-B02B. For tuning of resonant circuits see U25 codes.

V01-B02A

Mechanically varied

Tuning capacitor, double, differential, ganged, dielectric, shaft, spindle, preset, trimmer

V01-B02A1 [1992]

Electrode details

V01-B02A1A [1992]

Rotor, moving electrode

V01-B02A1B [1992]

Stator

V01-B02A1C [1992]

Terminals, external connections

V01-B02A3 [1992]

Dielectric details

V01-B02A4 [1992]

Substrate, housing, mounting kit

Mount, screw, nut, bushing

V01-B02A5 [1992]

Characterised by type of capacitor

Codes in this section are applied irrespective of claimed novelty to indicate the type of capacitor only.

V01-B02A5A [1992]

Variable during normal operation

Includes e.g. tuning capacitor operated manually or by motor drive.

Tune, resonate, peak

V01-B02A5B [1992]

Pre-set/semi-variable

Includes e.g. trimmer capacitor.

Tune, resonate, peak

V01-B02A5C [1992]

Transducer

Covers transducer where physical movement of plates and/or dielectric is involved. Non-mechanically varied types are coded in V01-B02B3. See also appropriate code in S02 or S03 for the parameter being measured and, in general, S02-K03A1C.

V01-B02A5E [1992]

Surface-mounted variable capacitor

Chip, leadless

V01-B02A5F [1992]

Multi-section variable capacitor

Covers ganged types.

V01-B02B

Non-mechanically varied capacitors

V01-B02B1 [1992]

Varicap diodes

See also U12-C02B. Covers discrete component embodiments only (or where integrated circuit aspect not specified). Prior to 1992 coded in U12 only.

Varactor, depletion layer, reverse bias, voltage-tuned

V01-B02B3 [1992]

Transducer

Covers capacitors changing value in response to physical variable where movement is **not** involved. Types involving movement of plates or dielectric are covered by V01-B02A5C. See also appropriate code in S02 or S03, and in general, S02-K03A1.

V01-B02B5 [1992]

Electrets

Includes devices in non-circuit application, e.g. as air filter.

V01-B02B9 [1992]

Other details of on-mechanically varied capacitors

Includes ferroelectric capacitors.

V01-B03

Fixed capacitors

See X12-E also for dielectric compositions. Search dielectric codes with V01-B03E1 for self-healing aspects. Capacitors with mixed, i.e. inorganic and organic dielectrics, are assigned V01-B03A5.

V01-B03A

With inorganic dielectric

From 1992 see V01-B03A1 to distinguish novel capacitor from novel dielectric compositions.

Ceramic, perovskite, metal-oxide, green sheet

V01-B03A1 [1992]

Novel dielectric composition

See X12-E01 codes also, e.g. X12-E01A for ceramic compositions.

V01-B03A3 [1992]

Manufacture of dielectric material

Covers manufacture of dielectric per se other than as part of capacitor manufacture, which is covered by V01-B04 codes.

V01-B03A5 [2005]

Hybrid dielectric (organic-inorganic) polymer material

Includes all compositions of hybrid dielectric material regardless of percentage of organic/inorganic materials ratio in the composite. See V01-B03A1 and V01-B03B1 for new dielectric compositions.

V01-B03B

With organic dielectric

Plastics, polymer, film, paper, impregnated

V01-B03B1 [1992]

Novel dielectric composition

See also X12-E02 codes, e.g. X12-E02B for synthetic polymer materials.

V01-B03B3 [1992]

Manufacture of dielectric material

Covers manufacture of dielectric per se other than as part of capacitor manufacture, which is covered by V01-B04 codes.

V01-B03C

Characterised by structure

Codes in this section are applied to indicate the structure of the capacitor only and do not necessarily represent novel features.

V01-B03C1 [1983]

Wound

V01-B03C3 [1983]

Flat plate

V01-B03C3A [1992]

Multilayer capacitor

Includes stacked types.

Laminated, layer-built, chip, co-fire

V01-B03C5 [1983]

Leadless

Chip, surface mounting

V01-B03C5A [1992]

Film capacitor

Covers discrete components only.

V01-B03C7 [1987]

Feedthrough capacitor

Use with V01-B03C8 for feedthrough-type LC filter.
See W02-H codes for noise suppression at source in general.

V01-B03C8 [1992]

Composite capacitor

(V01-B03X)

Covers capacitor structurally associated with other component such as RC, LC, or multiple capacitor.
For feedthrough type capacitor filter use with V01-B03C7 also.

V01-B03D

Electrodes; Housings; Terminals

Marking, colour coding, lead wire, tag, lug, can, casing, foil

V01-B03D1 [1992]

Electrodes

This code is intended for **internal** electrodes e.g. in the case of a multilayer capacitor. External electrodes, i.e. terminals if a leadless type, are covered by V01-B03D5.

V01-B03D1A [1992]

Film

Metallisation, sputtered layer

V01-B03D1C [1992]

Foil

V01-B03D1E [1992]

Novel shape or configuration

V01-B03D1G [1992]

Novel composition

V01-B03D3 [1992]

Housing, encapsulation

Includes markings, e.g. of component value.

V01-B03D3A [1992]

Pressure relieving arrangement

See V01-B03E5 for electric protection arrangements.

V01-B03D5 [1992]

Lead and terminal arrangements

This code is intended for **external** electrodes such as terminals of a chip-type laminated capacitor. Internal electrodes are covered by V01-B03D1 codes.

V01-B03D7 [1992]

Mounting kit

V01-B03E [1992]

Protection and self-healing capacitors

V01-B03E1 [1992]

Self-healing dielectric type

See V01-B03A/B codes as appropriate for dielectric details.

V01-B03E5 [1992]

Fuse or other electrical disconnection

See V01-B03D3A for pressure-relief arrangements.

V01-B03H [1997]

Temperature compensation

(V01-B03X)

Use with V01-B03A or V01-B03B codes as appropriate.

V01-B03X

Other details of fixed capacitors

V01-B04

Manufacturing capacitors

Includes testing of manufactured capacitor. See V01-B01G codes for electrolytic capacitor manufacture.

V01-B04A [1992]

Characterised by capacitor type

(As defined by V01-B03C codes). Codes in this section are assigned to indicate capacitor type only. They are not used if the manufactured capacitor itself is also claimed, in which case the appropriate V01-B codes for the capacitor per se will also be applied.

V01-B04A1 [1992]

Wound capacitor

V01-B04A3 [1992]

Flat capacitor

V01-B04A3A [1992]

Single layer

V01-B04A3C [1992]

Multi-layer

V01-B04A5 [1992]

Chip capacitor

V01-B04A5A [1992]

Film capacitor

V01-B04A6 [1992]

Variable capacitors

V01-B04A7 [1992]

Feedthrough capacitor

V01-B04A8 [1992]

Composite capacitor

V01-B04A9 [1992]

Manufacture of other capacitor types

V01-B04B [1992]

Capacitor manufacturing process

V01-B04B1 [1992]

Treatment of dielectric

V01-B04B3 [1992]

Manufacture and application of electrodes

This code relates to manufacture of **internal** electrodes only. Manufacture of external electrodes is covered by V01-B04B5.

Sputtering, metallising, etching, cutting

V01-B04B5 [1992]

Assembly processes

Includes winding, laminating, pressing, impregnating, etc., and also manufacture of **external** electrodes. Production of internal electrodes is covered by V01-B04B3.

V01-B04B7 [1992]

Heat treatment, firing, drying

Co-fire

V01-B04B8 [1992]

Multistep manufacturing processes and novel manufacturing equipment

Includes waste treatment and recovery processes. From 1997 the scope of this code is expanded to include novel equipment for manufacture, which is assigned V01-B04B8C together with other V01-B04 codes as appropriate.

V01-B04B8A [1997]

Multistep manufacturing process

V01-B04B8C [1997]

Novel manufacturing equipment

Use with other V01-B04 codes as appropriate.

V01-B04B8E [2005]

Process waste treatment and recycling

(V01-B04X)

Includes all aspects of waste and contaminant treatment and recycling equipment, for dielectric capacitor manufacture, and all waste classification and separation aspects. Prior to 2005 coded in V01-B04X.

V01-B04B8F* [2005-2007]

Waste handling and disposal

(V01-B04X)

*This code is now discontinued and from 2008 all aspects of handling, making safe, and disposal of waste from capacitor manufacture are now covered by V01-B04B8E.

V01-B04B8G [2005]

Materials recycling

(V01-B04X)

This code covers treatment and recycling of materials, chemicals and the like for reuse in dielectric (i.e. non-electrolytic) capacitor manufacture. Prior to 2005 these topics were covered in V01-B04X. See V04-X01C for other electronics components recycling.

V01-B04B9 [1992]

Other capacitor manufacturing processes

V01-B04C [1992]

Testing, sorting, trimming, marking

V01-B04C1 [1997]

Testing and sorting capacitors

See S01-D05A3 and S01-G12C also for electrical tests on capacitors.

V01-B04C3 [1997]

Trimming capacitor value

See X24-D03B for laser trimming apparatus.

V01-B04C5 [1997]

Marking capacitors

V01-B04E [1992]

Tape carriers, packing, shipping

Includes 'bandolier' tape carrier per se (see V04-V01A also), loading finished capacitors onto tape, packaging cartons, etc.

V01-B04X [1992]

Other capacitor manufacturing aspects

V02: Inductors and Transformers

For power transformers and reactors, see X12-C codes. Inductors/transformers implemented as IC devices are not included; see U11/U12 codes. Printed coils are, however, included here and in V04.

See T03-A codes only for details of recording media and heads.

V02-A

Magnetic materials

From 2007, V02-A01 codes are only applied for magnetic materials of general application. Therefore, V02 codes are no longer routinely assigned for magnetic recording media and heads with the exception of nano-structures, which are coded in V02-B04. See T03-A codes for specific details of recording media and heads.

V02-A01

Hard magnetic materials

V02-A01A

Metals or alloy

Iron, boron, cobalt, ferromagnetic, neodymium, nickel, rare earth metals

V02-A01A1 [1987]

For permanent magnet

V02-A01A2* [1987-2006]

For magnetic recording medium

*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

V02-A01A8 [2006]

Novel hard magnetic metals or alloys

Composition

V02-A01A9 [1992]

Manufacture of hard magnetic metals or alloys

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

V02-A01B

Non-metallic substances

Oxide, ferrite, ferric oxides, metal hydroxide

V02-A01B1 [1987]

For permanent magnet

V02-A01B2* [1987-2006]

For magnetic recording medium

*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

V02-A01B8 [2006]

Novel hard magnetic non-metallic materials

Composition

V02-A01B9 [1992]

Manufacture of hard magnetic non-metallic materials

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

V02-A01C [1992]

Mixtures

Includes mixtures of metallic and non-metallic magnetic substances.

V02-A02

Soft magnetic materials

V02-A02A

Metals or alloys

Iron, silicon steel, boron, cobalt, nickel, aluminium, chromium, ferromagnetic

V02-A02A1* [1987-2006]

For magnetic head

*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

V02-A02A2 [1987]

For electric machine and reactor core

V02-A02A8 [2006]

Novel soft magnetic metals or alloys

Composition

V02-A02A9 [1992]

Manufacture of soft magnetic metals or alloys

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

V02-A02B [1987]

Non-metallic substances

Ferrites, metal oxide

V02-A02B1* [1987-2006]

For magnetic head

*This code is now discontinued and has been transferred to T03-A codes from 200701. It remains searchable for records prior to 2007.

V02-A02B2 [1987]

For electric machine and reactor core

V02-A02B8 [2006]

Novel soft magnetic non-metallic materials

Composition

V02-A02B9 [1992]

Manufacture of soft magnetic non-metallic materials

Includes methods and systems for manufacturing the magnetic composition per se. Other manufacturing details, e.g. magnetic laminations' manufacture, core manufacture, magnet manufacture, etc., are covered by V02-H codes.

V02-A02C [1992]

Mixtures

(V02-A02A, V02-A02B)

Includes mixtures of metallic and non-metallic magnetic substances.

V02-A03 [1997]

Organic or organo-metallic materials

(V02-A01, V02-A02)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated.

V02-A04 [1997]

Magnetic liquids

(V02-A02A)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated.

Ferrofluid

V02-A05 [1997]

Magnetic semiconductor materials

(V02-A01, V02-A02)

Used together with V02-A01 and V02-A02 codes to denote coercivity, if indicated. See also U11-A.

CdCr₂S₄, galvano-magnetic

V02-A09 [2002]

Binders and other additives for magnetic materials

Includes binders/additives for both hard and soft materials. This code will be used in conjunction with the magnetic materials' codes.

V02-A10 [2005]

Nanomaterials and their manufacture

Used in conjunction with hard/soft, metal/non-metallic substances.

V02-A10A [2005]

Novel nanomaterials

V02-A10C [2005]

Manufacture of nanomaterials

V02-B

Thin magnetic films

Prior to 2007, magnetic film details of thin film heads were coded under V02-B03, which has now been discontinued. From 2007, thin film heads are coded only under T03 codes (T03-A03E). However, nanostructures of thin film heads are still coded under V02-B04.

V02-B01* [1987-2006]

For recording medium

*This code is now discontinued and has been transferred to T03-A01 codes from 200701. It remains searchable for records prior to 2007. Includes magnetic films, per se, for tapes, discs or drums. See T03-A01 codes for record carrier details e.g. binders, bases, backing layers.

Magnetic media, photomagnetic/magneto-optical film

V02-B02 [1987]

For bubble memory

See also U14-A01A1 codes.

V02-B03* [1992-2006]

Thin film heads

(V02-B01)

*This code is now discontinued and has been transferred to T03-A03 codes from 200701. It remains searchable for records prior to 2007. See also W04-B codes if audio/video application is intended. Manufacture of thin film heads is covered by T03-A04 codes.

V02-B04 [2005]

Nanostructures

Includes nanostructures of thin film heads. Other details of thin film heads are only coded under T03-A03E codes. Manufacturing details of nanostructures are coded under V02-H02G.

V02-C

Cores, yokes and armatures

For general cases only. For particular application see V02-E, V02-F and V02-G. For high power devices see X12-C.

Magnetic circuits, laminates

V02-D

Coils (incl. connections); (de)magnetising

Includes general coils where an application is not clear. Coils designed for communication or HF applications are coded under V02-F codes (e.g. HF coils are coded under V02-F03B), and coils for power supplies or other uses are coded under V02-G codes.

For high power coils, see X12-C codes.

Degaussing

V02-E

Magnets

High strength magnets and super-conducting electromagnets are, respectively, in X12-C06 and X12-C05A.

V02-E01

Permanent magnets

Rare earth magnets

V02-E02

Electromagnets

Solenoids, operating circuit, coils, cores, energising circuit

V02-E02A

With armature

V02-E02A1 [1987]

For electromagnetic valve

See also X25-L for EM valves and X22 for automotive application.

Fuel injection valves, EM-brake, -gear, -clutch

V02-E02A2 [1987]

For relay, or printer hammer

See also V03-D codes for relays, and S06-D to S06-K codes for details of printers.

V02-E02A3 [2002]

Linear actuator

V02-E02A4 [2002]

Rotary actuator

Rotary solenoid

V02-E02X

Without armature

V02-E02X1 [1992]

Using superconducting coils

V02-E02X2 [2006]

Shim coil

Includes small current-carrying coils that generate the auxiliary magnetic fields for improving the homogeneity of a main field e.g. in an MRI equipment (see also S01-E01 and S03-E07 codes).

V02-F

Inductive components for communications or HF

Inductive components used in applications other than communication or HF applications are coded under V02-G codes. General coils where an application is not clear are coded under V02-D.

V02-F01

Inductances

Includes coils for telecommunications and radio equipment (see also W01 and W02). Constructional details are in V02-F03.

Chokes, HF inductor, antenna coils, radio tuning coils

V02-F01A [1987]

For CRT beam deflection

See also V05-D and W03-A codes for TV deflection. *Vertical-, horizontal- deflection coils*

V02-F01D [1992]

Variable

V02-F01G [1992]

MRI/NMR equipment gradient/HF coil

Also see S01-E02, S03-E07 and S05-D02 codes, respectively, for magnetic properties sensor, MRI/NMR equipment and medical use.

V02-F01G1 [2006]

Gradient coil

V02-F01G2	[2006]
HF coil	
Includes receiver/transmitter antenna coil for detecting an NMR/MRI signal.	
<i>Bird cage-, resonator-, saddle-, surface-coils</i>	
V02-F01J	[1992]
Filter coils	
See W02-H and U25-E01 codes also.	
V02-F01L	[1992]
Chip inductor	
V02-F01N	[1992]
Flat coils	
V02-F01N1	[1992]
Printed circuit coils	
See also V04-Q04 and V04-R codes, respectively, for printed circuits and their manufacture.	
V02-F01P	[2005]
Inductive connector	
For HF use. See V02-G01D for power supply inductive connector.	
V02-F02	
Transformers	
Includes pulse, audio and broad-band transformers. Constructional details are in V02-F03.	
V02-F02A	[1987]
For TV	
See also W03-A codes.	
<i>Flyback transformers, television line output transformers</i>	
V02-F02D	[1992]
Rotary transformer	
See also T03-A05D3A, W04-B03B1 codes for helical scan head positioning.	
V02-F02G	[1992]
Variable	
V02-F03	
Construction details	
Includes constructional details of signal and HF transformers and coils. Used in conjunction with the type of coil or transformer, e.g. V02-F02D. Manufacturing details are coded by V02-H codes.	

V02-F03A	[1997]
Casings, mounting, cooling; Magnetic cores	
V02-F01,V02-F02,V02-F03)	
V02-F03A1	[1997]
Cooling	
(V02-F03)	
V02-F03A2	[1997]
Magnetic cores	
(V02-F01,V02-F02)	
<i>Laminates</i>	
V02-F03A3	[2005]
Cases	
<i>Housing</i>	
V02-F03B	[1997]
Windings	
(V02-F01,V02-F02)	
<i>Bobbins, connections, leads, coils</i>	
V02-F03B1	[1997]
Insulating	
(V02-F01,V02-F02)	
V02-F03C	[1997]
Control	
Includes current collector sliding or rolling on, or along, winding.	
V02-F03C1	[1997]
Using tappings on coil or winding	
V02-F03C2	[1997]
Using movable core, coil or winding, or shield	
V02-F03D	[2005]
Shielding	
(V02-F03X)	
Includes screens, shields, etc.	
V02-F03X	[1997]
Other HF transformer/inductor constructional details	
Includes terminals, circuits for changing electrical characteristics e.g. flux linkage by driving device magnetic circuit into saturation, etc.	
<i>Temperature sensors</i>	

V02-F05* [1992-2006]

Magnetic recording heads

(V02-C, V02-D, V02-E02X)

*This code is now discontinued and has been transferred to T03-A03 codes from 200701. It remains searchable for records prior to 2007.

V02-G

Inductive components for power supplies or other uses

Includes inductive components used in applications other than communication or HF applications. Inductive components used in communications or HF applications are coded under V02-F codes. General coils where an application is not clear are coded under V02-D. High power components are coded in X12-C.

V02-G01

Transformers, reactors, choke coils

Includes vehicle ignition coil (see also X22-A01A).

V02-G01A [1983]

Power transformers

Power supply

V02-G01A1 [1987]

Variable

V02-G01A2 [1997]

Non-linear

Includes transformer, e.g. ferro-resonant, for frequency changing or wave-shape changing.

V02-G01B [1983]

Instrument transformers

Includes current-, voltage-transformers (also in S01-D01D1A), linear variable displacement **transducers** (LVDT).

Measurement transformers

V02-G01C [1983]

Reactors, choke coils

Lamp ballasts

V02-G01C1 [1987]

Variable

V02-G01D [1997]

Inductive connector

For power supply use. See V02-F01P for HF inductive connector.

Inductive coupling

V02-G01E [2002]

Inductive sensor

Includes non-transformer type current/voltage/other sensors.

Voltage-, current-sensor, inductive probe

V02-G01F [2005]

Heating inductor

Low power induction heating coils are included here with high power ones covered by X12-C codes. For general high or low power induction heating, see X25-B02A codes, and X27-C06 for induction cookers.

V02-G02

Constructional details

Manufacturing details are coded by V02-H codes.

V02-G02A

Casings, mounting, cooling; Magnetic cores

V02-G02A1 [1987]

Cooling

V02-G02A2 [1987]

Magnetic cores

Laminates

V02-G02A3 [2005]

Cases

Housing

V02-G02B

Windings

Bobbins, connections, leads, coils

V02-G02B1 [1987]

Insulating

V02-G02C [1987]

Control

(V02-G02B)

Includes current collector sliding or rolling on or along winding.

V02-G02C1 [1987]

Using tapings on coil or winding

(V02-G02B)

V02-G02C2 [1987]

Using movable core, coil winding or shield

(V02-G02B, V02-G02X)

V02-G02D [2005]

Shielding

(V02-G02X)

Includes screens, shields, etc.

V02-G02X

Other power supply transformer/inductor constructional details

Includes terminals, circuit for changing electric characteristics e.g. flux linkage by driving device magnetic circuit into saturation, etc.

Temperature sensors

V02-H

Manufacture

Includes apparatus, methods and testing.

Manufacture of recording media and magnetic heads is not coded under V02 anymore, but only under T03-A codes.

V02-H01

Coil manufacture

Includes winding, insulating, connecting leads.

V02-H01A [1987]

For reactor, choke coil

V02-H01B [1987]

For transformer

V02-H01C [2002]

For electromagnet

V02-H01C1 [2002]

For EM relay

See also V03-D06B.

V02-H01C2 [2002]

For EM valve

See also X25-L01A.

V02-H01C3 [2002]

For printer

See also S06-D to S06-K codes for details of printers.

V02-H01C9 [2002]

Electromagnet coil manufacture for other devices

V02-H01X [2002]

Coil manufacture for other devices

V02-H02 [1983]

Applying magnetic films to substrate

(V02-H09)

Manufacture of recording media is not coded under V02 anymore, but only under T03-A02 codes.

V02-H02A [1987]

Vacuum evaporation

V02-H02B [1987]

Sputtering

V02-H02C [1987]

Electroless and electrolytic plating

V02-H02D [2002]

Plasma processing

V02-H02E* [2005-2006]

Magnetic head

*This code is now discontinued and has been transferred to T03-A04 from 200701. It remains searchable for records prior to 2007.

V02-H02F* [2005-2006]

Magnetic medium

*This code is now discontinued and has been transferred to T03-A02 from 200701. It remains searchable for records prior to 2007.

V02-H02G [2005]

Nanostructures manufacture

Non-manufacturing details of nanostructures are covered by V02-B04.

V02-H03 [1987]

Core manufacture

(V02-H09)

Also includes the rest of the magnetic circuit e.g. yoke, armature. From 2007, manufacture of magnetic heads is not coded under V02 anymore, but only under T03-A04 codes. Also includes the rest of the magnetic circuit e.g. yoke, armature. Manufacture of magnetic heads is not coded under V02 from 2007, but only under T03-A04 codes.

Annealing, laminating

V02-H03A [1987]

For transformer

(V02-H09)

V02-H03C	[2002]
For electromagnet	
V02-H03C1	[2002]
For EM relay	
See also V03-D06B.	
V02-H03C2	[2002]
For EM valve	
See also X25-L01A.	
V02-H03C3	[2002]
For printer	
See also S06-D to S06-K codes for details of printers.	
V02-H03C9	[2002]
For electromagnet core of other devices	
V02-H03E	[2002]
For inductor	
V02-H03X	[2002]
Core manufacture for other devices	
V02-H04	[1987]
Magnet manufacture	
(V02-H09)	
V02-H05*	[1992-2006]
Magnetic recording heads	
(V02-H01, V02-H03, V02-H09)	
*This code is now discontinued and has been transferred to T03-A04 codes from 200701. It remains searchable for records prior to 2007.	
Includes manufacture of coil/winding and core plus other aspects and testing.	
V02-H06	[2002]
Terminal manufacture	
(V02-H09)	
Includes manufacture of terminals for all devices and is generally coded in conjunction with the relevant device code, e.g. V02-G01A for transformer terminals.	
V02-H07	[2002]
Case manufacture	
(V02-H09)	
Includes manufacture of casings for all devices and is generally coded in conjunction with the relevant device code, e.g. V02-G01A for transformer casing.	

V02-H08	[2002]
Testing	
(V02-H09)	
For all aspects of testing transformer, inductor, etc.	
From 2007, testing of magnetic heads is not coded under V02 anymore, but only under T03-A04 codes.	
V02-H09	
Other inductive device manufacturing aspects	
Includes manufacture of devices not specified above.	
V02-H10	[2005]
Device, per se, manufacture	
Includes indeterminate detail manufacture as well as multi-step processes.	

V03: Switches, Relays

NOTE: V03 codes cover low power mechanical and electromechanical switches, i.e. those involving switching by moving contacts to make and break a circuit.

High power switches, circuit breakers and circuit protectors are coded in X13.

Electronic switching and gating are coded under U21-B codes.

V03-A

Contacts (general)

Relay and connector contacts are in V03-D and V04-D, respectively.

V03-A01

Contact material and structures

V03-A01A [1983]

Material

Includes materials such as composite materials containing noble metals, metal with carbide or oxide, copper, carbon particles or fibers, conducting materials dispersed in binding materials, etc.

V03-A01B [1983]

Surface shape/structure

Includes details of the shape or structure of the contact-making surface, e.g. grooved, wetted with mercury, laminated, etc.

V03-A02

Contact engagement techniques

Includes engagement by abutting and sliding.

V03-A03

Protective enclosures

Includes protective enclosures, baffle plates or screens for contacts. Includes contacts sealed in an evacuated or gas-filled envelope, e.g. for reed switches. Reed switches are coded under V03-C06A.

V03-A08 [1992]

Contact manufacture; Testing; Monitoring

Includes manufacturing details of switches contacts, and details for testing and monitoring the integrity of contacts.

V03-A09

Other contact details

Includes increasing contact pressure, preventing vibration of contacts, holding contacts together after engagement, terminals, cleaning or lubricating contact-making surfaces, heating or cooling contacts, etc.

V03-B

Switch operating mechanisms (general)

Details of relays are in V03-D.

V03-B01

Non-hand-operated switches

V03-B01A [1992]

Limit switches

Includes switches actuated when reaching a specified limit, e.g. safety switches.

V03-B01B [1997]

Foot pedal switches or mouth operated switches

From 2009, this code covers both foot pedal switches and mouth operated switches. For constructional details, see also V03-B04 codes.

V03-B01C [1997]

Door switches

See also V03-U18 for doors and windows. If vehicle doors, see also V03-U03A codes for land vehicles, and X22 codes. For other types of doors, see also X25.

V03-B01D [1997]

Mat switches

Includes mats triggering opening of automated doors when user walks on the mat, dance mats or platforms used with game consoles and arcade games, etc. If the mat is part of a game, see also V03-U08.

V03-B01E [1997]

Seat switches

Includes switches triggered when sitting on a seat. If vehicle seat, see also V03-U03A for land vehicles and X22 codes.

V03-B02

Internal power arrangements and driving mechanisms

Includes pneumatic or hydraulic actuator, motor-drive, electromagnet. Also includes transmitting driving force to contacts by ratchet, belt etc.

Switch-actuating, -operating, -driving

V03-B03

Snap-action and time-delay arrangements

Includes devices for introducing a predetermined time delay between the initiation of the switching operation and the opening/closing of the contacts such as dash-pots, flies (e.g. fan governors), thermal timing devices (see also V03-C06B for thermal switches), etc.

V03-B03A [1987]

Snap-action

Includes use of magnet, deformation of elastic member e.g. coil springs, flexing of blade springs, buckling of disc springs, etc., to first store operation energy which is then released to produce or assist the contact movement.

V03-B04

Housing; Fuse, earthing and safety arrangements

Includes built-in fuses, earthing arrangements, anti-static arrangements, and built-in safety spark gaps.

Anti-static arrangement

V03-B04A [1987]

Housing

Includes dust-proof, splash-proof, drip-proof, waterproof or flameproof casings, bases or covers. Also includes arrangements to enable replacement of switch, e.g. cartridge housing.

Walls, cases, boxes, covers, seals

V03-B05

Indicators and markings

Includes 'on-off' switching conditions, markings for easy location in the dark.

Illuminated marking, light display, symbols

V03-B06

Interlocking, locking or latching; Arc control; Cooling

V03-B06A [1987]

Interlocking, locking or latching

Includes interlocking between casing, cover, protective shutter and operating mechanisms, interlocking of two or more switches, locking using a key, etc.

Safety feature, key, latch

V03-B06B [1987]

Arc control

Includes arrangements for extinguishing or preventing arc between current-carrying parts, for preventing discharge to non-current-carrying parts, and for detecting the presence of an arc or discharge.

Blow-out magnet, arcing horns, corona ring, insulation

V03-B09

Other switch details

Includes mechanical arrangements for preventing or damping vibration or shock, lubricating means, levers, turn-knobs and pushbuttons, etc.

V03-B10 [2002]

Modular construction

V03-C

Switches

V03-C01

Linearly-movable operating parts

V03-C01A

Adapted for actuation in one direction only

Pushbutton switches

V03-C01A1

With single operating member

Includes e.g. button switches for cameras, doorbells, flashlights, etc. See also V03-C01A3 for constructional details.

Camera, doorbell, flashlight

V03-C01A1A [2002]

Membrane switch with single operating member

Includes mechanical contact based membrane switches with single operating member. Includes details of the circuit printed on a polyethylene terephthalate (PET) or indium tin oxide (ITO) layer. For electronic membrane switches e.g. detecting a change in resistance caused by depression of the switch, see U21-B codes instead.

PET layer, ITO layer

V03-C01A2

With two or more operating members

Includes e.g. keyboard-type switches for computer keyboards or telephone key pads. See also V03-C01A3 for constructional details, T04-F01 codes for keyboards details and W01-C01B8 codes for keyboards/keypads details.

Keyboard, keypad

V03-C01A2A [1992]

Membrane switch with at least two operating members

Includes mechanical contact based membrane switches with two or more operating members. Includes details of the circuit printed on a polyethylene terephthalate (PET) or indium tin oxide (ITO) layer. For electronic membrane switches e.g. detecting a change in resistance caused by depression of the switch, see U21-B codes instead.

PET layer, ITO layer, control panel for microwave, air conditioner, etc.

V03-C01A3

Constructional details

Includes cases, housings, covers, casings, driving mechanisms, key structures (for keypads or keyboards), etc. for switches adapted for actuation in one direction only.

Case, housing, cover, casing, driving mechanism, coil spring, blade spring, disk spring, keystroke, key cap

V03-C01B

Adapted for actuation in opposite directions

Includes constructional details and driving arrangements for slide switches.

Slide switches

V03-C02

Rotary switches

V03-C02A

Unlimited or unspecified angle

Includes constructional details and driving arrangements for switches operated by turn-knob.

Turn-knob

V03-C02B

Restricted angle only

Includes constructional details and driving arrangements for lever- or handle-operated switches, toggle switches, knife switches, etc.

Toggle, lever, handle, knife switch

V03-C03

Operating part adapted for pulling or compound movement

Includes cord or chain operated switches.

Cord, chain, pull switch

V03-C03A [1992]

Compound movement

Includes constructional details and driving arrangements for switches having operating part movable angularly in more than one plane, e.g. joystick, and movable both angularly and rectilinearly.

Joystick

V03-C04

Tumbler switches

Includes constructional details and driving arrangements for tumbler and rocker switches.

Rocker switch

V03-C05

Lockable switches

Includes key, plug or plate type.

V03-C06

Switches actuated by change of physical condition

V03-C06A

Magnetic or electric field

Includes switch actuated by movement of a float carrying a magnet e.g. level detector.

Reed switch, magnetic switch, electromagnetic switch

V03-C06B

Thermal conditions

Includes constructional details and driving arrangements for switches triggered by a change of temperature. See V03-C06B1 for thermally sensitive members per se. See V03-D05D only for electrothermal relays.

Electro-thermal, temperature, thermostat

V03-C06B1

Thermally sensitive members

Includes bimetal thermostats.

Bimetallic member

V03-C06B9

Other thermal switches

Includes details of bellows, diaphragm, Bourdon tube, etc.

V03-C06C

Position, speed, acceleration

Includes switches operated by change of inclination or orientation, centrifugal action, shock or vibration, inertia.

Impact switches, tilt switches

V03-C06D

Fluid pressure or flow

Includes switches actuated by bellows, diaphragm, Bourdon tube, vane, piston and cylinder.

V03-C06X

Other physical condition responsive switches

Includes switches operated by a change of liquid level, humidity or liquid density.

Float switch

V03-C07

Switch manufacture; Testing; Monitoring

For contact manufacture and testing see V03-A08. Includes all other manufacturing and testing aspects of switches.

V03-C07A [2005]

Micromachining process, method or apparatus

See also U11-C and U12-B03F codes.

MEMS, microswitch, nanoswitch, silicon-machining, micromachining

V03-C08 [1983]

Time (-programme) switches

Includes time or time programme switches operated by rotary or non-rotary parts, thermal action, electrolytic processes or chemical processes. See also S04-C01.

V03-C09

Other switches

Includes liquid contact switches, explosion switches, piezoelectric switches, mercury switches, etc.

Liquid, wet

V03-C10 [1997]

Microswitches; Nanoswitches

Covers details of small-size switches that act by the movement of small levers and used where rapid precise movements are required, especially in keyboards and automatic control devices. For manufacturing details of microswitches or nanoswitches, see also V03-C07A.

Micromachining, MEMS

V03-C10A [2002]

Nanoswitches

For manufacturing details (micromachining), see also V03-C07A.

V03-C15 [1997]

Hybrid switches

Includes combined principle type switches e.g. combined contactless (semiconductor) and contact-type switches.

V03-D

Relays

V03-D01

Circuits and mechanical arrangements modifying relay operation

Includes arrangements for modifying the operation of the relay, e.g. for holding armature in attracted position, for biasing the electromagnet, for introducing delay, etc.

Operation delay arrangement

V03-D02

Energising-current supply circuits

Includes relay coil or coils forming part of a bridge circuit, and EM drive circuit specifically for relay operation.

V03-D03

Magnetic circuits, windings, contacts and driving arrangements

V03-D03A [1983]

Magnetic circuits

Electromagnetic details forming part of relay are also in V02-E02A2.

Armatures, electromagnets, yokes, magnets, cores, poles

V03-D03B [1983]

Windings

Includes magnetic coils or windings, including short-circuited conducting sleeves, bands or discs.

Coils, coil formers, bobbins

V03-D03C [1983]

Contact arrangements

Includes contact spring sets.

V03-D03D [1983]

Magnetic circuit to contact drive

Includes driving arrangements between movable part of magnetic circuit and contact with e.g. lost or snap action, etc. Also includes mechanical arrangements for producing a desired natural frequency using e.g. reed or blade spring, diaphragm, etc.

V03-D04

Electromagnetic relays

V03-D04A

Polarised and sealed relays

V03-D04A1 [1983]

Polarised relays

Includes polarised relays with or without intermediate neutral position of rest.

V03-D04A5 [1983]

Sealed relays

Includes reed relays. For telephony see W01-B.

V03-D04X

Other electromagnetic relays

Includes non-polarised relays, frequency relays, mechanically-tuned relays, self-interrupters, etc.

V03-D05

Non-electromagnetic relays

V03-D05A [1987]

Piezoelectric relays

Includes electrostrictive and piezoelectric relays.
Bimorph elements

V03-D05B [1997]

Magnetostrictive relays

V03-D05C [1997]

Electrostatic relays

Includes electrostatic and electro-adhesion relays.

V03-D05D [1997]

Electrothermal relays

Includes heating arrangements using direct or indirect heat, and self-interrupters. Details of induction or resistance heating per se are also covered under X25-B codes.

Glow discharge, induction or resistance heating, self-interrupters

V03-D05E [1997]

Dynamo-electric relays

Includes electrodynamic relays, ferrodynamic relays, magnetodynamic relays and induction relays.

Electrodynamic, ferrodynamic, magnetodynamic, induction relays

V03-D06

Constructional details; Manufacture; Testing

V03-D06A [1983]

Cases, indicators, shielding, cooling, terminals

Includes bases, casings, covers, indicators, distinguishing marks, electromagnetic or electrostatic shielding, ventilating/cooling of relays and terminal arrangements.

Covers, seals, bases, housing, relay holder

V03-D06B [1983]

Manufacture and testing

Includes materials salvaging, apparatus, methods and testing.

V03-D06B1 [2005]

Micromachining process, method or apparatus

See also U11-C and U12-B03F codes.

MEMS, microrelay, nanorelay, silicon-machining, micromachining

V03-D06C [1987]

Arc control

Includes arrangements for extinguishing or preventing arc between current-carrying parts, for preventing discharge to non-current-carrying parts, and for detecting the presence of an arc or discharge.

V03-D10 [1997]

Microrelays; Nanorelays

For manufacturing details of microrelays or nanorelays, see also V03-D06B1.

Micromachining

V03-D10A [2002]

Nanorelays

V03-D15 [1997]

Hybrid relays

Includes combined principle type relays e.g. combined semiconductor and electromagnetic relays.

V03-D20 [1997]

Smart relays

Includes smart or intelligent relays.

V03-E

Selectors

Includes electrically operated, step-by-step wiper motion switches. For telephony see W01-B.

V03-U [2002]

Switches/relays characterised by applications

V03-U01 [2002]

Domestic

Includes switches for domestic appliances, such as curling irons, ovens, hair dryers, food blenders, washing machines, vacuum cleaners, irons, etc. For switches on personal items, see V03-U02. See also X27 codes for domestic appliances.

V03-U02 [2002]

Personal

Includes switches for personal items, such as toothbrushes, footwear, clothes, razors, etc. For switches on domestic items, see V03-U01. See also X27 codes for personal appliances.

V03-U03 [2002]

Vehicles

Includes switches for unspecified vehicles. If the type of vehicle is specified, see V03-U03A, V03-U03B, V03-U03C, V03-U03D or V03-U03E for land vehicles, avionics, shipping, military or railway vehicles respectively.

V03-U03A [2005]

Land vehicles

Includes switches for land vehicles, such as cars, motor bikes, trucks, tractors, vans, utility vehicles, excavators, etc. See also X22 codes.

V03-U03B [2005]

Avionics

Includes switches for air vehicles, such as planes, helicopters, gliders, etc. See also W06 codes.

V03-U03C [2005]

Shipping

Includes switches for sea vehicles, such as boats, ferries, submarines, yachts, etc. See also W06 codes.

V03-U03D [2005]

Military

Includes switches for military vehicles, such as rockets, tanks, etc. See also W07 codes.

V03-U03E [2010]

Railways

Includes switches for railway vehicles, such as locomotives, carriages, etc. used for passengers, in mines, etc.

V03-U04 [2002]

Information equipment

Includes switches for computers, laptops and notebooks, keyboards, keypads, touchscreens, printers, scanners, copiers, facsimiles, graph plotters, personal digital assistants (PDA), calculators, etc.

See also V03-C01A2 for details of switches, and V03-C01A3 for constructional details. Keypads for mobile phones are coded under V03-U05 only.

Also includes switches used in stationary and business equipment, e.g. shredder, etc.

See also T01 codes for computer details, T04 codes for keyboard and plotter details, S06-D to S06-K codes for copier, printer and facsimile details, and X27-A02C for electrical aspects of stationary and business equipment.

V03-U05 [2002]

Telecommunication and broadcasting

Includes switches for phones, mobile phones, pagers, televisions, receivers, set-top boxes, radios, remote controllers for television, etc., RF communication, etc. See also W01 and W02 codes for mobile phones, pagers, phones, etc, and W03 codes for TV receivers, remote controllers for television, set-top boxes, etc.

V03-U06 [2002]

Machine tools

Includes switches for machine tools such as presses, rolling, milling, drilling, turning, polishing, grinding, boring, cutting, abrading and burnishing machines. See also X25 codes.

V03-U07 [2002]

Industrial

Includes switches used in the industrial field, such as on conveyors, excavators (see also V03-U03A for land vehicles), in the mining industry, on packing, bottling, and sorting devices, cranes, incinerators, engraving systems, in manufacturing and assembly plants, etc. Switches especially for machine tools are coded under V03-U06 only. See also X25 codes.

V03-U08 [2002]

Toys; Games; Sports

Includes switches on toys, dolls, fitness and exercises machines, sport equipment, arcade games such as Pachinko or fruit machines, video consoles, handheld game consoles, musical instruments such as electric guitars, keyboards, etc. See also W04 codes.

Toys, sport equipment, arcade games, game consoles, guitars, keyboards

V03-U09 [2002]

Audio/video equipment

Includes switches on projectors, video recorders (VCR), DVD recorders, Hi-Fi systems, etc. Switches for cameras are coded under V03-U12 only. See also W04 codes.

V03-U10 [2002]

Medical

Includes switches on medical devices, such as pacemakers, hearing aids, defibrillators, diagnostic equipment, life support machines, etc., and on hospital, veterinary, and dentistry equipment, etc. See also S05 codes.

V03-U11 [2002]

Lighting

Includes novel slide switches (V03-C01B) used in flashlights, wall-mounted rocker switches (V03-C04) for controlling house lighting, foot-operated switches (V03-B01B) for controlling floor lamps, and inertia responsive switches (V03-C06C) for automatically applying motor vehicle hazard lights after an accident (see also V03-U03A, X22-N and X22-B02X). See also X26 codes for illumination arrangements per se.

V03-U12 [2002]

Cameras

Includes switches for digital still cameras, film-based cameras and video cameras. For other A/V equipment, see V03-U09 only. See also W04 codes for digital and video cameras, and S06-B codes for film-based cameras.

Digital camera, film camera, 35 mm camera, SLR camera, CCD camera, camcorder, video camera

V03-U13 [2005]

Instrumentation

Includes switches on electrical instruments, engineering and scientific instrumentation. See also S01 to S03 codes.

V03-U14 [2005]

Robotics

Includes switches on robots used in assembly lines (see also V03-U07 for industrial and X25), during surgery (see also V03-U10 for medical and S05), in home automation (see also V03-U01 for domestic and X27), welding robots (see also V03-U07 for industrial and X24), etc.

V03-U15 [2005]

Alarms; Signalling

Includes switches used to e.g. activate silent alarm used to covertly alert police during robbery, indicate unauthorised opening of window in house (see also V03-U18 and X25-U01), or to remotely signal to owner that parked vehicle is being tampered with (see also X22-N and X22-D03C). See also W05-B codes for novel details of alarms per se.

V03-U16 [2005]

Monitoring; Control

Includes e.g. key sheets used in television remote control units (see also V03-U09 and W03-A02C), pedestrian traffic light control pushbuttons (see also T07-B05A and T07-C03), wall-mounted switches for remotely controlling lighting (see also V03-U11, X26-C03C and W05-D codes) and switches for monitoring whether patient gets out of bed (see also V03-U10 and S05-G02B2 codes).

V03-U17 [2005]

HVAC; Refrigeration

Includes switches used in heating, ventilating and air conditioning systems, and refrigeration system. See also X27-E and X27-F codes.

V03-U18 [2005]

Doors and windows

Includes switches using on doors, gates and windows. For alarms systems, see also V03-U15 and W05 codes. See also X25 codes.

V04: Printed Circuits and Connectors

NOTES:

- (1) Includes low power electronics and domestic mains type connectors.
- (2) High power connectors for power distribution are in X12-G.
- (3) Thick and thin film circuits and hybrid circuits are in U14-H, although aspects relevant to printed circuits are in V04-Q and V04-R.
- (4) For batteries search V04 and X16, and for telephony V04 and W01 together.
- (5) Indeterminate type connectors are in V04 and X12.
- (6) Direct connections used for 2-part connector terminations are in V04-A and the relevant connector e.g. IDC termination for a 3-pin mains plug is in V04-A03, V04-F, V04-M02 and V04-M07.

V04-A

Direct connections

Relates to electrically conductive connections for two or more conductive members which are in direct contact.

V04-A01

Soldered, welded, riveted

See X24 for general soldering, welding and riveting. Manufacture of such connections is covered by V04-P codes.

V04-A02

Twisted, wrapped, bent, crimped

Crimping sleeve, ferrule

V04-A03

With insulation penetrating/displacement member

See also V04-M07.

Insulation displacement connector (IDC), needle point, prong

V04-A04

Clamped or spring

V04-A04A

Using clamping member acted on by screw or nut

V04-A04B

Using screw or nut clamping member

V04-A04C

Using spring, clip, or resilient member

V04-A04X

Other details of clamped or spring direct connections

Includes connections using cams, wedges, cones or balls to maintain contact.

V04-A05

To earth

Grounding electrode, earthing connector

V04-A06 [1992]

Conductive adhesive

V04-A07 [1992]

'Zebra' connector

(V04-A09)

Includes block of insulating material with alternative conductive areas.

Elastomer block

V04-A08 [1992]

Insulating connections

(V04-A09)

Includes end caps, sleeves etc.

V04-A09

Other details of direct connections

Includes connections using shape memory contact, etc.

V04-A10 [1992]

Superconducting wires connection

For high power superconducting wire connectors, see X12-G02G.

V04-A11 [1992]

Anisotropic connector

(V04-A09)

V04-B

Terminal strips and blocks; Terminals mounted on base

Connectors or connecting arrangements of this type provide a number of mutually insulated connections.

V04-B01

For printed circuits

Includes bed-of-nails connector, see also V04-M05. For semiconductor device holders see also V04-K02, and U11-D01Q codes.

IC socket, holder

V04-B02 [1987]

For flat cables

(V04-B09)

See also V04-M04.

Ribbon cable connector

V04-B03 [1992]

For coaxial cables

(V04-B09)

See also V04-M03.

High frequency, data communication

V04-B04 [1992]

End pieces for multiconductor cables

(V04-B09)

V04-B05 [1992]

Terminals or binding posts, terminal strips, terminal blocks, terminal boards

(V04-B09)

Includes fastening of connecting parts to base or case.

Distributor block

V04-B05A [1992]

Clip-on terminal blocks for mounting on rail or strip

(V04-B09)

V04-B09

Other details of terminal strips and blocks, and terminals mounted on base

V04-C

End pieces for wires or cables; 2 or more spaced connecting locations

V04-C01 [1992]

End pieces

Includes end pieces supported by wire or cable and for connection to another wire, terminal or conductive member. For multiconductor cables, see V04-B04.

Clamps, battery post, eye-, fork-, hook-terminals, crocodile clips, spade terminals, probes, needle points, spring clip, ferrule, sleeve, screw, nut

V04-C05 [1992]

Two or more connecting locations

Includes connectors for conductive members providing two or more spaced connecting locations which are thereby interconnected.

V04-D

Connector details

Details only of connectors of the type covered by H01R-015-033 are included here.

V04-D01

Contact members

Includes composition of contacts; hermaphroditic contacts; etc. Conductive materials in general are covered by X12-D01 codes.

Machined, stamped, formed, single beam, dual leaf, crimp-, wire wrap-, angled solder-, straight solder-pin termination

V04-D01A [1983]

Pins, blades, or prongs

Male, termination

V04-D01B [1983]

Sockets or receptacle contacts

Tongues, termination, female, twin cantilever

V04-D02

Securing contact members to base

V04-D03

Bases; cases; covers

For insulating materials in general see X12-E codes.

Housing, body, seals, dust cap, moulding, hood, potting boot

V04-D03A [1992]

Materials

Includes materials for all types of connectors.

V04-D04

Fastenings; Guides

Includes means for enabling engagement or disengagement of coupling parts with ease or for holding them in engagement using bolt or threaded ferrule.

Latches, locks, securing, coupling nut or ring, bayonet, ZIF connector, zero insertion force, screw, locking lever

V04-D04A [1983]

Snap-action fastenings

V04-D05

Structural association with electrical component

Includes built-in fuse, switch, light bulbs, filter capacitors (see also V04-M08), etc. Details of electrical components are in relevant classes e.g. fuses in X13.

V04-D06

Protective and screening arrangements

Safety arrangements

V04-D06A [1983]

Preventing access to live parts

Involves use of shutters or cover plates, insulating terminals, lockable dummy plug.

V04-D06B [1983]

Earthing; Shielding

Screening, grounding

V04-D06C [1992]

Preventing incorrect coupling

Polarisation

V04-D06D [1992]

Cable strain-relief

Clamp

V04-D06X [1983]

Other details of protective and screening arrangements

V04-D09

Other connector details

Includes mounting of coupling parts to apparatus e.g. wall or panel, lockable housing for plug not in use, etc.

V04-E

Single-pole two-part connectors

V04-F

Two-pole two-part connectors

Includes coaxial connectors. Communication type connectors are in section W e.g. for cable TV see W02-F codes.

V04-G

Three or more-pole two-part connectors

V04-G01

With parallel sliding contacts

Includes D-type-, rectangular- and trapezoidal-shaped connectors.

V04-G02

For printed circuits

See also V04-M05.

PCB connector

V04-G02A

Edge connectors

V04-G02B

Surface connectors

V04-G09

Other details of three or more-pole two-part connectors

Includes jacks e.g. for telephone. See W01-C, W01-D codes also.

V04-G15 [2002]

USB connectors

Universal serial bus

V04-H

(Multiway) adaptors, including plug standards converters

Includes coupling parts adapted for simultaneous co-operation with two or more identical counterparts e.g. twin socket for distributing energy to two or more circuits. Also includes coupling parts adapted for co-operation with two or more dissimilar parts, coupling parts for co-operation with counterparts of different voltages.

V04-H01 [1992]

Rails or bus-bars

Includes arrangements allowing counterpart to be mounted either at any point or at discrete locations.

Low power

V04-J

Coupling supported connectors

Includes an intermediate part linking two coupling parts e.g. two male coupling parts interconnected by an intermediate part with two female parts; intermediate parts distributing energy to two or more parallel circuits. Also includes bridging contacts in a counter-part.

Shunt connector, three-part coupling

V04-K

Connectors with holders

V04-K01

Lamp holders

See also X26-F.

Lamp socket

V04-K02 [1983]

For semiconductor devices

(V04-K09)

See also U11-D01Q, and V04-B01 if holder is for PCB mounting.

LED holder, IC socket

V04-K03 [1983]

Fuse holders

(V04-K09)

See also X13-D01B.

Fuse clip

V04-K09

Other details of connectors with holders

Includes CRT sockets, valve holders. See also V05-D codes.

V04-L

Rotary current collectors, distributors, interrupters

V04-L01

Commutators, slip-rings, contact brushes

For electric machine application, see also V06-M12 or X11-J03.

V04-L01A [1983]

Commutators, slip-rings

V04-L01B [1983]

Brush arrangements

V04-L09

Other details of rotary current collectors, distributors and interrupters

Includes distributors and interrupters. For vehicles see also X22-A01C.

Distributor caps

V04-M

Connectors for specific applications

Normally used in conjunction with above types, as relevant.

V04-M01

High frequency and high speed connectors

Cable TV distribution, coaxial, antenna, RF, computer data, data communications

V04-M02

Mains connectors

Under-carpet cable connection

V04-M03 [1983]

Coaxial cables connectors

V04-M04 [1983]

Flat or ribbon cables connectors

Under-carpet flat cable connector

V04-M05 [1983]

Printed circuits connector

V04-M06 [1983]

Adverse environments (dusty, wet, hot) connector

V04-M07 [1987]

Insulation displacing connectors

IDC

V04-M08 [1987]

Filter connectors

V04-M09 [1992]

Hybrid or mixed signal connectors

Includes combination of e.g. optical and electrical signals, power and data signals.

V04-M10 [1992]

Crimped connectors

V04-M11 [1997]

Smart connectors

V04-M12	[1997]
Combination connectors; Stackable connectors	
V04-M15	[2002]
Hot plug connectors	
V04-M16	[2005]
ZIF connectors	
V04-M17	[2006]
Cable-connector combination	
Includes a combination of cable and connector where neither is, or both are, novel. See X12-D03Q also.	
V04-M20	[2002]
Microconnectors	
V04-M30	[1992]
Characterised by application to specific industry	
These codes are used together, if necessary, with other V04-M codes e.g. HF connector for communications is coded in V04-M01 and V04-M30G.	
V04-M30A	[1992]
Avionics/military/shipping	
V04-M30C	[1992]
Land vehicles	
V04-M30E	[1992]
Data processing	
V04-M30G	[1992]
Telecommunications	
V04-M30J	[1992]
Oil/petrochemical	
V04-M30L	[1992]
Consumer electronics	
V04-M30M	[1997]
Medical	
V04-M30N	[1992]
Domestic	
Includes connectors for irons, fridges, etc. Ordinary mains connectors are in V04-M02.	

V04-M30P	[1997]
Personal hygiene	
V04-M30Q	[2002]
Instrumentation	
V04-M30R	[2002]
Machine tools; Robotics	
V04-M30S	[2005]
Industrial machines	
V04-N	
Flexible/turnable/swivel connectors; Non-rotary current collectors	
Also includes flat cable arrangement for movable element, e.g. vehicle steering wheel. See also X22-C05, X22-X01.	
V04-P	
Apparatus and processes for connector manufacture, assembly, testing, repair	
Used in conjunction with V04-M. For testing of printed circuit board see V04-R06 instead. For general electric testing also see S01-G codes.	
V04-P01	
For crimping, wire wrapping, etc.	
V04-P01A	[1992]
Crimping	
See also X12-G01E for heavy crimping tools.	
V04-P01C	[1992]
Wire wrapping	
V04-P02	
For commutators, slip-rings, brushes	
See also V06-M11A or X11-J08A for application to electric machines.	
V04-P03	[1992]
Wire stripping	
(V04-P09)	
See also X12-G01B for heavy power cables.	
V04-P04	[1992]
Plating	
(V04-P09)	

V04-P05	[1992]
Connecting terminal to housing or moulding	
(V04-P09)	
V04-P06	[1992]
Contact	
(V04-P09)	
V04-P07	[1992]
Housing	
(V04-P09)	
V04-P08	[1992]
Soldering, riveting, welding	
(V04-P09)	
See also X24.	
V04-P09	
Other details of apparatus and processes for connector manufacture, assembly, testing and repair	
<i>Metal recovery</i>	
V04-P10	[1992]
Connecting superconducting wires	
(V04-P09)	
See also X12-G01X, X12-D06.	
V04-P11	[1992]
Terminating cable	
(V04-P09)	
V04-P12	[2006]
Testing	

V04-Q

Printed circuits

V04-Q01

Printed connections to printed circuit boards

Includes printed elements for providing electric connections to or between printed circuits (See also V04-M05).

V04-Q02

Printed circuits structurally associated with other circuits or non-printed components

Includes printed circuits/boards structurally associated with electronic, electric and 'mechanical' components.

Universal interface board

V04-Q02A [1992]

Association with other non-printed components

V04-Q02A1 [1992]

Switch

V04-Q02A2 [1992]

Multichip modules

See also U11-D01A6 and/or U14-H03A4 and U14-H03C3 codes. MCMs based on silicon substrates are in U11 and U14 only. Indeterminate substrate type MCMs are in sections U and V.

V04-Q02A3 [1992]

Smart cards

See also T01-H, T04-K, and U11-D01A codes for IC card packages. See also U14 codes if thin film aspects are relevant. Connectors for smart cards are coded according to claimed aspects e.g. V04-G02, V04-M05.

V04-Q02A3A [2002]

Contactless cards

V04-Q02A3B [2002]

Contact cards

V04-Q02A3C [2002]

Hybrid/twin cards

V04-Q02A4 [2005]

Non-electrical components

Includes structural association of PCB with non-electrical components, e.g. heat sink clamps, and optical components, such as lens holders, etc.

V04-Q02A5 [2005]

RFI/EMI (non-tracks) shields

Includes individual modules and whole PCB shielding cans/boxes. See also V04-U codes.

V04-Q02A6 [2005]

Buried (non-printed) components

Includes association with components such as capacitors, resistors or inductors buried within layers or under encapsulant. See V04-R03 for PCB encapsulation per se.

V04-Q02A7 [2005]

Semiconductor device association with PCB

V04-Q02A2 and V04-Q02A3 take precedence.

V04-Q02A9 [2006]

Other associated electrical components

Includes PCB association with other electrical components e.g. mountable type antenna.

V04-Q02B [1992]

Association with other circuits

V04-Q02B1 [1992]

Mother/daughter boards

See also V04-T02.

V04-Q02B1A [1992]

Hierarchical Interconnection Technology

See also V04-T02.

HIT

V04-Q03 [1992]

Hybrid circuits

(V04-Q02, V04-Q09)

Includes hybrid circuits per se. Manufacturing is in V04-R05G and relevant processes being claimed e.g. metallisation in V04-R02. All aspects of hybrid circuits are not covered here. For example, packaging and terminals are covered more fully in section U. See also U14-H03 and U14-H04 codes.

V04-Q04 [1992]

Printed resistor, capacitor, or inductor

(V04-Q09)

See also V01-A02, V01-B03, V02-F01 codes.

V04-Q04A [2006]

Printed resistor

V04-Q04B [2006]

Printed capacitor

V04-Q04C [2006]

Printed inductors; Printed coils

Also includes printed coils for transformers (see also V02-F/V02-G codes) and electric motors (see also V06-M08A1).

V04-Q04D [2006]

Composite printed components

Includes printed RC, RL, RLC or LC component combinations. Passive frequency-selective networks using structurally-associated components are also assigned U25-E02A.

V04-Q05 [1992]

Printed circuits per se

(V04-Q09)

Includes track layout, general description of PCB and its components. V04-Q02A takes precedence for specific component association with PCB.

V04-Q05A [2005]

Track layout design for EMI/RFI shielding or ESD protection

See V04-U codes for general EMI/RFI shielding.

V04-Q06 [2002]

Printed antenna

V04-Q08 [2005]

Probe cards

Use this code together with other V04-Q and V04-R codes if appropriate, e.g. V04-Q02A for novel structural association with electronic components, V04-Q02B for structural association with other PCBs within probe card assembly or test fixture, or V04-R codes for novel manufacturing aspects. See also V04-Q30Q, S01-G, S01-H and U11-F codes. V04-B01/M05 codes may be applied for highlighting novel features of terminals, pins, blades mounted on PCB.

V04-Q08A [2005]

Horizontal probe card

V04-Q08B [2005]

Vertical probe card

V04-Q09

Other details of printed circuits

V04-Q30	[2005]
Characterised by application to specific industry or equipment	
V04-Q30A	[2005]
Avionics/military/shipping	
V04-Q30B	[2005]
Land vehicles	
V04-Q30C	[2005]
Computers	
V04-Q30D	[2005]
Displays; projectors	
V04-Q30E	[2005]
Data storage	
V04-Q30F	[2005]
Printers; Scanners; Photocopiers; Fax machines	
V04-Q30G	[2005]
Telecommunication and broadcasting	
V04-Q30H	[2005]
Audio/video equipment	
V04-Q30J	[2005]
Cameras	
V04-Q30K	[2005]
Toys; Games; Sports	
V04-Q30L	[2005]
Power supplies	
V04-Q30M	[2005]
Medical equipment	
V04-Q30N	[2005]
Domestic appliances	
V04-Q30P	[2005]
Personal articles	
V04-Q30Q	[2005]
Instrumentation	

V04-Q30R	[2005]
Machine tools; Robotics	
V04-Q30S	[2005]
Industrial machines	
V04-Q30T	[2005]
Alarms; Signalling; Telecontrol	
V04-Q30U	[2010]
Lighting; Lamps	
Includes printed circuits used in illumination applications such as street lamps, table lamps and LED lamps.	
V04-Q30X	[2010]
Other specific applications of printed circuits	
Includes oil/petroleum application and chemical industry.	

V04-R	
Printed circuit manufacture	
V04-R01	
Removing conductive material; resists	
V04-R01A	[1983]
Resist	
Includes photoresist for use as solder mask. See also V04-R03, V04-R04A2.	
V04-R01A1	[1992]
Material	
V04-R01A2	[1992]
Stripping	
V04-R01A3	[1992]
Protector	
V04-R01A4	[1992]
Liquid	
V04-R01A5	[1992]
Dry	
V04-R01A5A	[1992]
Laminating	
V04-R01A6	[1992]
Developing	

V04-R01B [1992]

Phototool

Includes all etching resist exposure methods and apparatus. For all other types of PCB exposure methods and apparatus see V04-R12.

Photomask

V04-R01C [1992]

Metal removal

V04-R01C1 [1992]

Chemical etching

V04-R01C5 [1992]

Mechanical removal

Includes metal removal using e.g. laser.

V04-R02

Applying conductive material

Includes wire embedded onto substrate or encapsulated PCB (see also V04-T01), processes to improve adhesion between substrate and metal layer (see also V04-R07), bonding metal foil to substrate is in V04-R07P1.

Conductive ink, circuit pattern production, metallising, masking tape

V04-R02A [1987]

Electroless plating

Catalysts, chemical plating

V04-R02B [1987]

Electroplating

Includes electrolytic plating methods or baths. See X25-R04 also.

V04-R02C [1987]

Through-hole or via plating

Through-vias, blind vias, buried vias

V04-R02D [1992]

Sputtering

For general sputtering apparatus, see X25-A04.

V04-R02E [1992]

Evaporation

V04-R02F [1992]

Screen printing

V04-R02G [2005]

Adhesion aids

Includes arrangements or materials for improving adhesion between a conductor track and substrate. Materials related to additives incorporated within the conductive material (see also V04-R02P) and additives incorporated within a substrate material (see also V04-R07L). If the adhesion aid is particularly for either a track or metal foil/layer use either this code or V04-R07P5, respectively. For general cases, use both codes.

V04-R02P [1992]

Conductive materials

Conductive materials in general are covered by X12-D01 codes.

V04-R02Q [1992]

Baking conductor tracks

V04-R02R [1992]

Plating resists

V04-R02S [2006]

Ink-jet printing

Includes the forming of conductive tracks by using an ink-jet printer (see S06-G codes for printer details).

V04-R03

Secondary treatment

Includes polishing etc.

V04-R03A [1992]

Repairing conductive pattern faults

V04-R03C [1992]

Cleaning

Includes chemical and mechanical cleaning.

Defluxing

V04-R03C1 [1992]

Brush cleaning

V04-R03C2 [1992]

Vapour degreasing

V04-R03C3 [1992]

Wave cleaning

V04-R03C4 [1992]

Ultrasonic

V04-R03C9	[1992]
CFC-free cleaner	
V04-R03E	[1992]
Protective coatings	
Includes also solder mask left on PCB for protection.	
<i>Conformal coatings</i>	
V04-R03E1	[1992]
Applying coatings	
V04-R03G	[1992]
Drill smear removal	
V04-R03J	[1992]
Correcting soldering defects	
Includes de-soldering, resoldering components, removing excess solder. etc.	
V04-R03L	[1992]
Drying	
V04-R04	
Assembling with components	
Includes mounting of electric, electronic and mechanical components. Includes also component removal. V04-R04 codes are used in conjunction with each other as appropriate. For example, surface mounted components and their soldering is in V04-R04B and V04-R04A codes.	
V04-R04A	[1983]
Soldering	
Details of soldering methods and apparatus are also in X24-A. Unsoldering of components is also included here if precise method is not indicated.	
V04-R04A1	[1987]
Wave soldering	
<i>Soldering baths</i>	
V04-R04A2	[1987]
Solder mask and its application	
See also V04-R03.	
<i>Solder resist</i>	
V04-R04A2A	[1992]
Permanent	
<i>Screen printing, photoprint, thermal-, UV-curing</i>	
V04-R04A2F	[1992]
Temporary	
<i>Solvent, peelable, aqueous</i>	

V04-R04A3	[1992]
Reflow soldering	
V04-R04A3A	[1992]
Infrared	
V04-R04A3C	[1992]
Laser	
V04-R04A3G	[1992]
Thermal conduction	
V04-R04A3J	[1992]
Hot gas	
Includes vapour phase soldering also.	
V04-R04A3L	[1992]
Soldering iron	
Prior to 1992 soldering irons were coded in V04-V09. This is now discontinued.	
<i>Desoldering</i>	
V04-R04A4	[2010]
Ultrasonic soldering	
See also X24-A02X for general ultrasonic soldering.	
V04-R04A5	[1992]
Flux/solder material	
V04-R04A5A	[1992]
Flux, solder paste/cream application	
<i>Screen printer, stencil printer, pressure dispensing</i>	
V04-R04A5C	[1992]
'Clean flux'; Fluxless soldering	
Includes materials which need no secondary cleaning step.	
V04-R04A7	[1992]
Inspecting solder joint	
See also V04-R06D3.	
V04-R04B	[1987]
Surface mounting	
<i>Component onserters</i>	
V04-R04B1	[1992]
Adhesive application, drying and curing	
V04-R04B2	[1997]
Adhesive materials	

V04-R04C	[1987]
Wiring	
See also V04-V02 for records prior to 1992. From 1992 onwards, see V04-V02 only for general circuitry manufacture.	
V04-R04D	[1992]
Leaded component mounting	
V04-R04D1	[1992]
Lead clinching, cutting, shaping, etc.	
(V04-R04, V04-V01)	
V04-R04F	[1992]
Component placement machine	
(V04-R04, V04-R04B, V04-V01)	
Used in conjunction with V04-R04B or V04-R04D.	
V04-R04F1	[1992]
Robot	
V04-R04F3	[1992]
Pick-and-place	
V04-R04G	[1992]
Component feeding, orienting	
(V04-R04, V04-R01)	
See also V04-V01 for records prior to 1992. From 1992 onwards, see V04-V01 only for general circuit manufacture. For component handling within placement machine see only V04-R04F.	
<i>Positioning</i>	
V04-R04G1	[1992]
Component magazine or bandolier per se and its handling	
(V04-R04, V04-V01A)	
See also V04-V01A for records prior to 1992. From 1992 onwards see V04-V01A only for general circuit manufacture. See also U11-F codes.	
V04-R04J	[1992]
Checking for correct mounting and presence of component	
See also V04-R06D5.	
V04-R05	
Types of PCB	
This code is used in conjunction with other codes relating to PCBs/hybrids and their manufacture except in those cases where the type of PCB is evident from other claimed features e.g. multilayer substrate material is in V04-R07A and V04-R07L.	

V04-R05A	[1992]
Multilayer	
V04-R05A1	[1992]
Ceramic	
V04-R05B	[1992]
Double-sided	
(V04-R05)	
V04-R05C	[1992]
Rigid	
V04-R05D	[1992]
Flexible	
V04-R05E	[1992]
Three-dimensional	
V04-R05G	[1992]
Hybrid	
(V04-Q09)	
V04-R05H	[2005]
Flex-rigid	
V04-R06	[1983]
Testing	
(V04-R09)	
See also S01-G, S02-A, S03-E, T01-J, T04-D codes. The V04-R06 codes are used in conjunction with each other as appropriate e.g. method for conductivity testing of a bare board by using bed-of-nails contact probe is coded in V04-R06A3 and V04-R06G1A.	
<i>Detecting defects, inspecting, shorts, pinholes, open circuit, specks</i>	
V04-R06A	[1992]
Bare board	
V04-R06A1	[1992]
Isolation	
Includes testing of spacing between conductor tracks, short circuit between tracks etc.	
V04-R06A3	[1992]
Conductivity	
Includes testing of open circuit in conductor tracks.	

V04-R06D	[1992]
Loaded board	
(V04-R06, V04-V09)	
<i>In-circuit</i>	
V04-R06D1	[1992]
Functional	
V04-R06D3	[1992]
Soldering	
V04-R06D5	[1992]
Correct component position	
V04-R06G	[1992]
Test fixtures	
V04-R06G1	[1992]
Contact probes	
See S01-H and appropriate V04 codes also.	
<i>Spring-loaded probes</i>	
V04-R06G1A	[1992]
Bed-of-nails	
V04-R06G1B	[2002]
Flying-probes	
V04-R06G1C	[2002]
Generic probes	
V04-R06G2	[2005]
Non-contact probes	
V04-R06G3	[1992]
Automatic Test Equipment	
V04-R06G4	[2005]
Wireless fixture	
Includes fixture having wires replaced by PCB.	
V04-R06G5	[2005]
MEMS-based probes	
V04-R06J	[1992]
Techniques/types	
V04-R06J1	[1992]
Optical	
V04-R06J1A	[1992]
Visual inspection	

V04-R06J1C	[1992]
Image processing	
Includes electronic imaging using CCTV, pattern recognition. See also T01-J, T04-D, W02-F codes.	
V04-R06J2	[1997]
X-rays	
V04-R06J3	[2006]
Mechanical or thermal tests	
Includes e.g. vibration, structural, mechanical or thermal testing.	
V04-R06J9	[2006]
Other testing techniques	
V04-R06M	[1992]
Artwork	
Includes checking of traces, position of lands, photomasks/phototool, etc.	
V04-R07	[1983]
Substrates	
(V04-R09)	
Includes measures to improve adhesion of metal to substrates. See also V04-R02.	
V04-R07A	[1992]
Multilayer	
V04-R07A1	[1992]
Ceramic	
V04-R07B	[1992]
Metal-cored	
V04-R07C	[1992]
Flexible	
<i>Polyimide film, polyester film</i>	
V04-R07D	[1992]
Hybrid	
V04-R07E	[2005]
Metal-clad	
V04-R07E1	[2005]
Single-sided	
V04-R07E2	[2005]
Double-sided	

V04-R07F [2005]

Constructional details

V04-R07L [1992]

Material

Insulating materials per se are covered by X12-E codes.

LC polymer, epoxy glass laminate, thermoplastic resin, poly(aryl) ether, ceramic, epoxy resin, phenol resin, alumina, beryllia, glass-coated alumina, unsaturated polyester resin and glass or synthetic fiber, steel, steatite, aluminium nitride sintered

V04-R07P [1992]

Manufacturing

V04-R07P1 [1992]

Laminating metal foil to substrate

Selective lamination of metal to form tracks is in V04-R02. See V04-R07P5 for adhesion aids such as materials or arrangements for improving adhesion between a copper foil/layer and the substrate. See note for V04-R02G.

V04-R07P1A [1992]

Applying protective coatings

Includes for e.g. treatment to prevent oxidation of metal foils.

V04-R07P2 [2005]

Manufacturing metal foil

Includes manufacture of metal foil which will subsequently be laminated on insulating substrate.

V04-R07P3 [1992]

Laminating layers of multilayer PCB

V04-R07P4 [2005]

Depositing (un-patterned) metal layer

Includes depositing (un-patterned) metal layer directly onto substrate.

V04-R07P5 [2005]

Adhesion aids

Includes arrangements or materials for improving adhesion between a conductor foil or layer and substrate. Materials related to additives incorporated within the conductive material (see also V04-R02P) and additives incorporated within a substrate material (see also V04-R07L). If the adhesion aid is particularly for either a track or metal foil/layer use either this code or V04-R02G, respectively. For general cases, use both codes.

V04-R07P6 [2007]

Insulating layers of multilayer PCB

Includes application of insulating layers in manufacture of multilayer substrates.

V04-R08 [1987]

Drilling holes or vias

(V04-R09)

Drilling, punching, through-holes, through-vias, blind vias, buried vias

V04-R09

Other details of printed circuit manufacture

Includes static electricity neutralising, PCB holder/support etc.

V04-R10 [1987]

Mask registration

(V04-R09)

V04-R11 [1992]

CAD of wiring layout, component placement, etc.

(V04-R09)

See also T01-J15A2. Also includes general layout design.

V04-R12 [1992]

PCB exposure

(V04-R09)

Includes all non-etching resist exposure methods and apparatus. See V04-R01B for etching resist exposure. For lamp details see X26 codes.

V04-R13 [1992]

Blanking, shearing, and cutting

(V04-R09)

V04-R14 [1992]

Multistep processes

(V04-R09)

This code is used when several well-defined steps are claimed.

V04-R15 [1992]

Materials recovery; Recycling

V04-R15A [1992]

Etchant

(V04-R01)

V04-R15B [1992]

Conductive material
(V04-R02)

V04-R16 [1992]

Decontamination of wastes; Disposal
(V04-R09)

V04-R17 [1992]

Board conveying and handling between processing stages

See X12-H01E8 for holding board in optimized position for non-contact power transfer.
(V04-R09)

V04-R19 [2005]

EMI/RFI shielding tracks manufacture
Covers RFI/EMI shielding tracks manufacture. See V04-U for general shielding.

V04-R20 [2007]

Overstress indicators
(V04-R09)
Includes arrangements used to highlight areas of PCB with dangerously high stress levels. See also S02-F codes for mechanical stress and S03-B codes for thermal stress measurements.

V04-S

Electronic equipment casings/cabinets, and drawers

Includes casings for electronic equipment like computers, A-V apparatus, etc. Electrical equipment such as microwave ovens, etc are not included here. For insulating materials (see X12-E codes, too) designated for general electronic equipment or apparatus, see V04-S codes for records prior to 1997. From 1997 onwards, see V04-X01B codes.

Housing, cases, covers, bases, panels, castors, handle, lifting eye, adjustable feet, ventilation slots, louvres

V04-S01

Metal and hermetically sealed casings

V04-S01A [1987]

Hermetically sealed casings
Encapsulation of PCBs is in V04-R03 only and component encapsulation is coded in relevant code for the component e.g. resistors in V01.
Encapsulants, seals, epoxy resin

V04-S01C [2005]

Metal casing with insulative coating

V04-S02 [1987]

Insulating material casing
(V04-S09)
Polyphenylene oxide flame retardant, ABS, plastics

V04-S02A [1992]

Sealed or encapsulated

V04-S02B [2005]

Insulating casing with conductive coating

V04-S03 [1992]

Battery holder/compartment associated with electrical/electronic equipment
(V04-S09)
See also X16-F06.

V04-S04 [2005]

Conductive (non-metallic) material casing

V04-S09

Other details of electronic equipment casings/cabinets, and drawers
Includes casings of indeterminate material.
Brackets, clips, vibration dampers, nameplate details

V04-S10 [2002]

Manufacture

V04-S15 [2002]

Materials

V04-S20 [2005]

Transparent casing

V04-S22 [2005]

Fire-proof and explosion-proof casing

V04-S23 [2017]

Water-proof casing
Includes casings which are waterproof.

V04-S24 [2020]

Dust-proof casing
Includes dust proof casing for all electronic devices.

V04-S30 [2007]

Mechanical details

Includes inserts, hinges, handles and locks.

V04-T

General constructional details of electronic apparatus

This code is used only for electronic equipment such as computers, A-V apparatus, etc. Electrical equipment such as microwave ovens are not included here.

V04-T01

Arrangements of components and wiring

See also V04-V02 for wiring harnesses. Termination of wire harnesses is in V04-P11.

Panel mounting, breadboards

V04-T01A [1992]

Wiring

Grommets, wire harness, ties, cable sleeve/marker, wire embedding, wire tie tools, cable trough, duct, trunking, busbar

V04-T01C [1992]

Components

Component (de)mounting tool

V04-T01C1 [2002]

Modular components

V04-T02

Mounting supporting structure in casing or on rack; rack construction

See also V04-Q02 for PCB in association with other components, W01-B20 for telephone distribution frame.

Circuit modules, frames, supports, PCB (de)mounting tools, PCB or panel spacer elements, back panel interconnections, mother/daughter board arrangements, card ejector, divider, guides, chassis runner, locating strip

V04-T03

Cooling; Heating; Air filtering/cleaning; Dehumidifiers

Includes cooling of electronic apparatus, systems and devices. Individual component cooling is also coded in relevant classes, e.g. for ICs, see U11-D02 codes.

V04-T03A [1983]

Heat sinks, radiative cooling

Heat conducting plates

V04-T03B [1983]

Forced cooling

V04-T03B1 [2002]

Using fans

V04-T03B2 [2002]

Using pumps/compressors; Refrigeration

V04-T03B3 [2002]

Cryogenic cooling

V04-T03C [2002]

Thermoelectric cooling

Peltier, heat pumps, cooling, electrocaloric effect, thin film perovskite PZT

V04-T03F [2005]

MEMS-based cooling

V04-T03G [2005]

Hybrid cooling

V04-T03H [2002]

Heat pipes

V04-T03J [2002]

Heating arrangements

V04-T03K [2002]

Air filtering/cleaning

V04-T03L [2002]

Dehumidifiers

V04-T03P [2002]

Materials

Includes thermal materials and adhesives.

V04-T03Q [2002]

Manufacture; Testing; Monitoring

V04-T03X [2007]

Other cooling aspects

Includes cooling aspects not covered elsewhere e.g. involving the use of electro-caloric effects, heat sink mounts, etc.

V04-T04 [1992]

Hybrid electrical/optical board arrangements

V04-U

Electric and magnetic screening

Normally includes screening arrangements for an individual equipment and the room containing the equipment. See S01-G08B5 also for screened rooms for electrical equipment testing. For individual measuring instrument screening, see S01-J02 also. For suppressing the emission of interference from an equipment by means of a specific constructional feature of the equipment, see also W02-H01E.

EM shielding, EMI, RFI

V04-U01 [1992]

Material

V04-U01A [1992]

Superconducting materials

See also X12-D06B and U14-F01 for superconducting materials per se.

V04-U02 [1992]

Faraday cage

Includes arrangements for a room, or whole apparatus.

V04-U03 [1992]

EMI-proof casings

See also V04-S codes.

V04-U04 [2007]

EMI-proofing elements

Includes elements such as gaskets, panels (see V04-U03 too, if the panel is part of a casing), etc.

V04-U15 [2002]

Manufacture

V04-U20 [2002]

EMC testing

V04-U21 [2010]

Electrostatic protection casing

Includes electronic device protection from electrostatic effect.

V04-V

General circuit manufacture

(1) Excludes PCB and its manufacturing from 1992 onwards. Please search relevant V04-R codes.

(2) Includes general assemblages of electric components and their monitoring.

(3) Prior to 1992, please search V04-V codes also for PCB component mounting, PCB loaded board

testing and (de)soldering irons.

(4) From 1992 onwards, all PCB testing is covered by V04-R06 codes; V04-V09 is still valid for general circuit testing.

V04-V01

Feeding, orienting, mounting components

Robot assembler, automatic component insertion, positioning components, pick-and-place machine

V04-V01A [1987]

Component magazine or bandolier

For ICs, see also U11-F.

Cassettes, carrier tapes

V04-V02

Wiring

Includes manual and machine wiring. See also V04-T01.

Harness manufacture, automatic wiring, looms, wire tie tools

V04-V02A [1983]

Shaping component leads, cutting

(V04-V09)

Bending-, trimming-, clinching-, forming-leads

V04-V09

Other details of general circuit manufacture

Includes component value changing tool and general circuit testing.

Testing circuit, monitoring

V04-X

Miscellaneous

Component marking

V04-X01 [1997]

General electronic components packaging, materials, cleaning, manufacture and disposal

V04-X01A [1997]

Containers, packaging

Storage, shipping, transportation

V04-X01B [1997]

Materials

For insulating materials (see also X12-E codes) designated for general electronic equipment or apparatus, prior to 1997 see V04-S codes.

V04-X01B1 [2005]

Nanomaterials

Includes nanomaterials or nanoparticles for general electronic applications.

V04-X01C [1997]

Materials recovery and recycling

Includes material recovery and recycling of general electronic components.

V04-X01D [1997]

Cleaning

V04-X01E [2002]

Drying

V04-X01F [2005]

Manufacture and testing

Includes general electronic components manufacture and testing.

V04-X01G [2005]

Waste decontamination and disposal

Includes decontamination and disposal of general electronic components.

V05: Valves, Discharge Tubes and CRTs

Notes:

- (1) All aspects of discharge tubes for lighting (including manufacture) are covered by X26 and are not included in V05.
- (2) Manufacturing aspects of devices are normally only coded in V05-L. However, where important novelty or increased information can be conveyed by inclusion in device codes also, this is done.
- (3) In sections where separate codes for tube details are not included or are insufficient, codes from the general section (V05-M) should be used in conjunction with a device code.
- (4) From 1992 onwards, new codes were introduced to represent tube types which can be used whether the whole tube or just a component part is claimed. These codes can be applied if the particular tube type is specified and thus should be regarded as a means of limiting a search only, since the precise nature of a tube may be unspecified or unimportant in cases of wider application.

V05-A

Gas-filled tubes

Does not include plasma processing tubes - see V05-F05 codes. Prior to 1992, use V05-M in conjunction with V05-A codes for full coverage.

V05-A01

Plasma display panels and tubes

V05-A01A codes are used to describe the display type in conjunction with codes from V05-A01B to V05-A01G, which describe novel features.

Examples:

- (1) A novel barrier rib arrangement of a non-specific plasma display panel type, use V05-A01A3 and V05-A01D3 together.
- (2) A novel drive circuit for a plasma-addressed LCD would be coded in V05-A01A7 and V05-A01G, as well as U14 and relevant T04/W03 codes.
Flat panel, matrix, seven-segment, plasma, vessel, housing, electrodes, filling

V05-A01A [1992]

Characterised by type of display

V05-A01A1 [1992]

Segment type display tube

Prior to 2005, tubes limited to displaying characters only in matrix form were covered by V05-A01A3C.

V05-A01A3 [1992]

Plasma display panels

Includes display panels that directly emit the colour of the plasma discharge, as well as panels that use UV emission in order to excite a phosphor. Also includes plasma display panels of unspecified driving voltage type.

V05-A01A3A [1992]

DC display

Includes Self-scan® display panel with sequential discharge transfer.

V05-A01A3B [1992]

AC display

V05-A01A3C* [1992-2004]

For character display only

*This code is now discontinued but covered display panels for alphanumeric data only, i.e. where not all points on screen can be addressed. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

V05-A01A3D* [1992-2004]

For character and graphics display

*This code is now discontinued. Covers display with all points addressable. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

V05-A01A5* [1992-2004]

Multicolour display

*This code is now discontinued. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

V05-A01A5A* [1992-2004]

Full colour display

*This code is now discontinued. Covers display capable of full colour range with primary colours. From 2005, this code is no longer used. See V05-A01A9 for other plasma display types.

V05-A01A7 [1992]

Combined technology displays e.g. Plasma Addressed LCD

Covers displays where gas discharge is not the sole display mechanism, for example in combination with electroluminescent elements, LCD addressing, FED pixels etc. See also U14-K01A2C for plasma addressed LCD.

V05-A01A7A* [1992-2004]

Using phosphor directly excited by discharge

*This code is now discontinued. It is assumed that almost all plasma display panels operate using UV emission from the gas discharge in order to excite a phosphor, and thus are just coded in appropriate V05-A01A3 codes.

V05-A01A7B [1992]

Using plasma as source of electrons

V05-A01A9 [1992]

Other types of plasma display

V05-A01B [1992]

Light emitting arrangements; Phosphors

V05-A01B1 [1992]

Gas filling

V05-A01B1A [1992]

Gas filling additives

Includes additives to modify display colour or prolong life.

V05-A01B1C [1992]

With several separate gases

Covers display with gas filling differing between cells, e.g. to display different colours.

V05-A01B3 [2005]

Phosphor Compositions

(V05-M01A)

Includes manufacture of phosphor compositions. For coating of phosphors in plasma displays, see V05-L02 codes. Prior to 2005, coded in V05-M01A.

V05-A01B5 [2005]

Phosphor arrangements

(V05-A01B)

Prior to 2005 coded in V05-A01B.

V05-A01C [1992]

Electrode assemblies

Covers details of electrode construction including materials, supports, insulating coatings, and layout. Lead-in conductors are covered by V05-A01D5.

V05-A01C1 [1992]

Anodes

V05-A01C2 [1992]

Discharge triggering and maintaining electrodes

From 2002 the scope of this code is expanded to allow the inclusion of discharge maintaining or holding electrodes.

Control electrode, bus/address electrodes

V05-A01C2A [2002]

Discharge triggering electrodes

Covers electrodes specifically intended to initiate gas discharge.

V05-A01C2C [2002]

Discharge maintaining electrodes

Covers electrodes specifically intended to maintain an existing gas discharge.

Holding electrode

V05-A01C3 [1992]

Cathodes

V05-A01C3A [1992]

Heated cathode

Hot cathode

V05-A01C4 [1992]

Microfabricated electrodes

Covers electrodes produced by semiconductor device manufacturing techniques, (not screen printing).

V05-A01C5 [1992]

Electrode supports

V05-A01C7 [1992]

Dielectric coatings

Includes protective overcoats for electrode insulating layers.

V05-A01D [1992]

Vessels, spacers, cell construction

Includes novel shape or size of cells. Screens and filters not forming part of the vessel are covered by V05-A01F codes.

V05-A01D1 [1992]

Vessels per se

Covers materials and construction of front and back panels and sealing arrangements.

Casing, housing, front plate, back plate, glass

V05-A01D1A [1992]

Seals

Covers seals for main body of vessel and for lead-ins. Internal seals are covered by V05-A01D3A.

Frit

V05-A01D1C [1992]

Conductive coating

Covers coating e.g. for screening purposes. Electrodes are covered by V05-A01C codes.

V05-A01D1E [1992]

Optical coatings

Includes anti-glare coating. External filters (i.e. as part of a display module) are covered by V05-A01F1.

V05-A01D3 [1992]

Internal spacing elements and seals

Includes rib structures.

Cell spacers

V05-A01D3A [1992]

Internal seals

Covers seals between separate parts of vessel. Main vessel seals are covered by V05-A01D1A.

V05-A01D5 [1992]

Lead-in conductors

V05-A01D7 [1992]

Mounting of integral drive circuitry

Covers circuitry structurally associated with display. Actual circuit details are covered by V05-A01G and, in general, W03-A08D.

V05-A01E [1992]

Complete novel display device

This code is used when a complete novel display device is claimed without specific reference to a particular feature.

V05-A01F [1992]

Module aspects

Includes display device per se (not necessarily novel), with e.g. external filters, housing, and drive electronics. (Circuitry per se is covered by V05-A01G codes). Filters formed as coatings on the discharge vessel are covered by V05-A01D1 codes.

V05-A01F1 [1992]

Optical filter

V05-A01F3 [1992]

Housing, screening

Includes shielding.

V05-A01F5 [1992]

Drive circuitry PCB mounting; Connectors

Mounting of circuitry integral with display itself is covered by V05-A01D7.

V05-A01G [1992]

Drive circuitry (circuit details)

Includes circuitry which may be either integral with the display or external to it. Also includes driving methods. See also T04-H03 codes.

V05-A01G1 [1992]

Integral with display

V05-A01H [2006]

Tube cooling

Note that this only applies to cooling systems used to remove heat from the tube envelope. Drive circuitry cooling is not included per se, but may be included in V05-A01F3 or V05-A01F5 codes where relevant housing or PCB mounting details are required. Prior to 2006, coded in V05-M07 codes.

V05-A03 [1992]

Gas filled switching tubes

(V05-A09)

Details of switching tubes are covered by V05-A07 codes. See X13-A04H also for power switching tubes. Electronic switching in general is covered by U21-B codes.

Thyratron, cold cathode tube, TR tube

V05-A05 [1992]

Gas filled circuit protection devices

(V05-A09)

For device details see V05-A07 codes. Covers devices designed to limit excess voltage. See also U24-F02 and X13-C03 for low and high power over-voltage limiting in general, and also under application e.g. W01-C08A for telephone systems protection.

V05-A07 [1992]

Details of gas-filled tubes

(V05-M)

Codes in this section relate to devices in V05-A03, V05-A05, and V05-A09 codes.

V05-A07A [1992]

Electrodes

(V05-M03)

V05-A07A1 [1992]

Anodes

V05-A07A3 [1992]

Cathodes

V05-A07A3A [1992]

Heated cathodes

Hot, thermionic

V05-A07A5 [1992]

Grids, control electrodes

Trigger

V05-A07B [1992]

Vessels, seals, lead-ins

(V05-M05)

V05-A07C [1992]

Gas filling

(V05-M09)

V05-A07G [1992]

Complete novel device

This code is used when the complete device as a whole is claimed, without specific reference to a particular feature.

V05-A09

Other gas discharge tubes

V05-B

Classical and cold cathode vacuum tubes

V05-B01 [1992]

Classical thermionic vacuum tubes

Gas-filled tubes are covered by V05-A codes, transit time tubes by V05-C codes. See X13-A04H also for power types. V05-B01A codes are used to indicate the type of device without regard to novelty, which is indicated by V05-B01B codes.

V05-B01A [1992]

Tube type

V05-B01A1 [1992]

Diode

V05-B01A3 [1992]

Triode

V05-B01A5 [1992]

Tetrode

V05-B01A7 [1992]

Pentode

V05-B01A9 [1992]

Other thermionic tube

V05-B01B [1992]

Tube details (novel)

(V05-M)

V05-B01B1 [1992]

Cathodes

(V05-M02)

V05-B01B1A [1992]

Heater elements

(V05-M02)

V05-B01B3 [1992]

Grids

(V05-M03)

V05-B01B3A [1992]

Control grid

(V05-M03)

V05-B01B5 [1992]

Anodes

(V05-M03)

V05-B01B6 [1992]

Cooling

(V05-M09)

V05-B01B6A [1992]

Forced air

(V05-M09)

V05-B01B6B [1992]

Liquid

(V05-M09)

V05-B01B6C [1992]

Vapour
(V05-M09)

V05-B01B7 [1992]

Vessels, lead in conductors
(V05-M05)

V05-B01B8 [1992]

Complete novel tube

V05-B01B9 [1992]

Other thermionic tube details

V05-B03 [1992]

Cold cathode tubes

Covers tubes of similar construction to those of V05-B01. Microminiature cold cathode devices are covered by V05-B05 codes.

V05-B03B [1992]

Tube details (novel)
(V05-M)

V05-B03B1 [1992]

Cathodes

V05-B03B1A [1997]

Current limiting arrangements
(V05-B03B1)

V05-B03B3 [1992]

Grids

V05-B03B5 [1992]

Anodes

V05-B03B7 [1992]

Vessels, lead in conductors

V05-B03B8 [1992]

Complete novel tube

V05-B03B9 [1992]

Other cold cathode tube details

V05-B05 [1992]

Microminiature cold cathode devices

Codes in this section cover devices with analogous operation to those in V05-B03 but formed using semiconductor device fabrication techniques. See U11 codes for manufacture aspects (in addition to V05-L codes) and U12-B03D also for devices per se. Field emission electrodes using semiconductor fabrication techniques of general application and not forming part of a complete microfabricated device are coded in V05-M03A1. Microfabricated field emitters for cathode ray tubes are coded in V05-D05C5 codes, and for plasma display panels, in V05-A01C4.

V05-B05A [1992]

Characterised by nature of device

Codes in this section describe the nature of the device and do not necessarily indicate novel features, which are represented by the additional use of V05-B05B codes (see note in V05 class notes).

V05-B05A1 [1992]

Characterised by number of electrodes

V05-B05A1A [1992]

Diode

V05-B05A1B [1992]

Triode

Three-electrode, three terminal, controlled device

V05-B05A1X [1992]

Other number of electrodes

V05-B05A3 [1992]

Characterised by configuration

Codes in this section are used alone or in combination as appropriate.

V05-B05A3A [1992]

Single device

V05-B05A3B [1992]

Array of devices

V05-B05A3C [1992]

For integration with solid state semiconductor device

Covers incorporation with e.g. monolithic or film-type integrated circuit.

V05-B05A3E [1992]

For combination with other vacuum conduction devices

V05-B05A3X [1992]

Other configurations

Includes cold cathode heat pumps and analogous devices.

V05-B05A5 [1992]

Characterised by emitting element

Also coded in V05-B05B3 when emitting element per se is novel.

Field emission

V05-B05A5A [1992]

pn junction

Includes 'hot electron' emitting device, i.e. element imparting acceleration to electrons before field emission process.

V05-B05A5B [1992]

Film electrode

V05-B05A5C [2006]

Carbon nanotube

CNT, nanohorn

V05-B05A5X [1992]

Other emitting elements

V05-B05A8 [1992]

Characterised by semiconductor or other substrate

Codes in this section are applied to describe the type of substrate only. When the substrate is the novel aspect V05-B05B1 is also assigned. For inventions with unspecified semiconductor substrate V05-B05A8 is assigned. If the substrate is stated to be of dielectric material V05-B05A8X is assigned. For cases where no details of the substrate are disclosed, V05-B05A8 codes are not assigned.

V05-B05A8A [1992]

III - V compounds

Gallium arsenide

V05-B05A8C [1992]

II - VI compounds

V05-B05A8E [1992]

Characterised by silicon substrate

V05-B05A8X [1992]

Other substrate

Includes dielectric material substrates.

V05-B05B [1992]

Device details (novel)

Codes in this section are only applied to indicate novel features.

V05-B05B1 [1992]

Substrate

Use with V05-B05A8 codes to discriminate type of substrate.

V05-B05B3 [1992]

Emitting element i.e. cold cathode

Use with V05-B05A5 codes to discriminate type of emitter.

V05-B05B5 [1992]

Other electrodes (non-emitting electrodes)

Emitting electrodes are covered by V05-B05B3.

V05-B05B5A [1992]

Control electrodes

Covers 'grid' control electrodes.

V05-B05B5B [1992]

Collector electrode

Covers 'anode' electrodes.

V05-B05B5X [1992]

Other non-emitting electrodes

V05-B05B7 [1992]

Housing, interconnections, integral circuitry

V05-B05B7A [1992]

Housing, encapsulation

V05-B05B7B [1992]

Interconnections

V05-B05B7C [1992]

Connections to external circuitry

V05-B05B7D [1992]

Integral circuitry

Covers circuitry for driving, interfacing etc.

V05-B05B8 [1992]

Complete novel device

This code takes precedence over other V05-B05B (i.e. novel feature) codes and is used in conjunction with V05-B05A codes to describe device type when the complete device is claimed as novel.

V05-B05B9 [1992]

Other novel details

V05-C

Transit-time tubes

V05-C01

Tube types

Codes in this section e.g. V05-C01A are used when the tube as a complete device is claimed, otherwise the subdivision 'details' codes e.g. V05-C01A1 (introduced from 1992) are assigned together with appropriate codes from the 'details' (V05-C02) section. Prior to 1992, V05-C02 codes were used alone if only details of a tube were claimed.

Examples:

- (1) Novel magnetron: V05-C01A
- (2) Novel anode for magnetron: V05-C01A1 and V05-C02A1
- (3) Novel anode for any type of transit time tube: V05-C02A1.

V05-C01A [1983]

Magnetrons

Does not cover apparatus for magnetron sputtering or other workpiece processing, which is covered by V05-F05 codes, especially V05-F05C3A.

Multi-cavity

V05-C01A1 [1992]

Tube details

Search with V05-C02 codes for novel details of tube.

V05-C01B [1983]

Travelling-wave tubes

TWT, crossed-field tube, forward wave, backward wave, parametric, BWO

V05-C01B1 [1992]

Tube details

Search with V05-C02 codes for novel details of tube.

V05-C01C [1987]

Klystrons

(V05-C01X)

Reflex, interaction, beam, stream

V05-C01C1 [1992]

Tube details

Search with V05-C02 codes for novel details of tube.

V05-C01D [1992]

Gyrottron

(V05-C01X)

For quasi optical types see V08-B also. Includes gyro-klystron devices.

V05-C01D1 [1992]

Tube details

Search with V05-C02 codes for novel details of tube.

V05-C01E [2006]

Inductive output tubes

Prior to 2006, coded in V05-C01X

IOT

V05-C01E1 [2006]

Tube details

Search with V05-C02 codes for novel details of tube.

V05-C01X [1983]

Other tube types

Multipactor

V05-C02

General constructional details

To link to a particular type of tube use appropriate 'tube details' code from V05-C01 section.

V05-C02A [1983]

Electrodes, screens, magnetic control

V05-C02A1 [1992]

Anodes

See V05-C02C1 codes also when combined function as anode and resonator is significant. Note that slow-wave structures per se are treated as a distributed element, but for manufacture, as an electrode. (See note for V05-C02C3A).

Collector

V05-C02A3	[1992]
Cathodes	
<i>Thermionic, dispenser</i>	
V05-C02A3A	[1992]
Heaters	
V05-C02A5	[1992]
Electron guns	
Includes grid electrodes, and electrostatic focusing and beam path control. (Use V05-C02A7 codes for magnetic control of these functions).	
V05-C02A7	[1992]
Magnetic control	
<i>Magnet, electromagnet, coil, winding, solenoid</i>	
V05-C02A7A	[1992]
Focusing	
Focusing by electrodes is covered by V05-C02A5.	
V05-C02A7C	[1992]
Influencing beam path	
<i>Magnetron</i>	
V05-C02A9	[1992]
Other electrodes, screens	
Includes screens.	
V05-C02B	[1983]
Vessels, lead-ins, seals, RFI suppression	
Suppression of RFI other than by lead filtering is covered by V05-C02C codes. V05-C02B codes include cooling and coupling arrangements.	
<i>Housing, heat sink, window, filter, RFI suppressor</i>	
V05-C02B1	[1992]
Vessels	
V05-C02B1A	[1992]
Seals	
V05-C02B1C	[1992]
Coupling windows	
Covers part of vessel enabling transfer of RF energy. See V05-C02C5 for waveguide coupling arrangement.	
V05-C02B3	[1992]
Lead-ins	

V05-C02B3A	[1992]
Lead-in filters	
Includes filter devices preventing radiation of RF energy from e.g. heater power supply terminals, also assigned W02-H01 (RFI suppression at source in general). See U25-E02 codes also for details of filters per se. RFI suppression by internal means is covered by V05-C02C7.	
<i>Radio frequency interference, choke, feedthrough, capacitor, condenser</i>	
V05-C02B5	[1992]
Cooling	
See V05-M07 codes for cooling of tubes in general.	
<i>Heatsink, radiate, air, fan, blower, pump, fluid, liquid, vapour</i>	
V05-C02C	[1983]
Distributed elements	
Includes resonators, delays, etc. See W02-A codes for distributed-constant elements not forming part of tube. (These elements are not assigned W02-A codes when part of a tube, unless wider application is suggested).	
V05-C02C1	[1992]
Resonator structures	
<i>Cavity</i>	
V05-C02C1A	[1992]
Single resonator	
V05-C02C1B	[1992]
Multiple resonator	
<i>Interconnection, multicavity</i>	
V05-C02C1C	[1992]
Tunable resonator	
Includes mechanically- and electrically-tuneable structures.	
V05-C02C3	[1992]
Delay elements	
V05-C02C3A	[1992]
Slow wave structures	
Manufacture of slow wave structure is covered by V05-L01B7, i.e. for manufacturing purposes only, it is regarded as an electrode.	
<i>Helix</i>	

V05-C02C5 [1992]

Distributed coupling

Includes e.g. waveguide structure for coupling to tube. Window structures forming part of vessel are covered by V05-C02B1C.

V05-C02C7 [1992]

RFI and harmonic suppression

W02-H01, general code for RFI suppression at source, is not applied for arrangements internal to the tube per se. External filtering of lead-ins is covered by V05-C02B3A.

Damping

V05-C03 [1992]

Circuitry specific to transit time tubes

Codes in this section are only used for specific circuitry taking into account device characteristics, and where provision does not exist elsewhere. In general, see under application, e.g. W02-G01 codes for transmitters, U23-A02 for oscillators, U24-G04D for amplifiers, etc.

V05-C03A [1992]

Power supplies

HT, LT, anode supply, heater supply

V05-C03C [1992]

Control of tube operation

Output control, oscillation, pulse, magnet current

V05-D

Cathode-ray tubes; Electron beam tubes

This section relates to CRTs and similar tubes, chiefly for displays or for imaging purposes - video cameras for example. Tubes for beam processing of workpieces, electron microscopes etc. are not included and are covered by V05-F codes.

V05-D codes are divided into those relating to particular tube types (V05-D01 to V05-D04) and those for details of tubes and associated devices (V05-D05 to V05-D10).

Within V05-D, manufacture of all tube and device types is covered by V05-L codes only. Codes for the device per se are not used unless that aspect is also claimed. Prior to 1992 tube type codes were only assigned when the tube was presented as a complete novel device. From 1992 onwards, distinction is made between complete novel tubes and codes describing tube type and/or indicating novel details of the tube.

Note that novel display drive circuitry for CRTs is not included in V05 at all, as generally this is not part of the vacuum tube assembly itself and is instead covered by relevant W03 and T04 codes. However, Field Emission Display drive circuitry

(V05-D10) is included as often it is integral to the display substrate, as well as being covered by relevant W03 and T04 codes. Operating circuitry for image converters and intensifiers is also included in V05-D03H.

Examples

(1) Completely novel beam penetration CRT: V05-D01A and V05-D01B1C.

(2) Novel cold cathode for field emission display: V05-D01C3 and V05-D05C5.

V05-D01

Image display tubes

TV, VDU, VDT, video terminal, projection

V05-D01A [1992]

Complete novel tube

This code is used with other V05-D01 codes indicating type.

V05-D01B [1992]

Cathode ray tubes

Includes unspecified CRT display types.

Braun tube

V05-D01B1 [1992]

Single electron gun tubes

V05-D01B1A [1992]

Monochrome tubes

V05-D01B1C [1992]

Beam penetration tubes

V05-D01B1D [1992]

Single gun multibeam tubes

Includes tubes analogous to Trinitron® capable of colour display.

Aperture grill

V05-D01B1E [1992]

Flood gun tubes

Includes tube with e.g. three primary colour areas on screen usable as multicolour pixel in large display.

V05-D01B3 [1992]

Multiple electron gun tubes

This code is used if 'shadow mask CRT' specified with no indication of gun type.

V05-D01B3A [1992]

In-line gun tubes

V05-D01B3B [1992]

Delta gun tubes

Triad

V05-D01B3C [1992]

Matrix configuration multiple gun tubes

Covers tube with large number of electron beams, e.g. 'matrix drive with deflection' type. Prior to 2005 included field emission display matrices, now coded in V05-D06A codes.

V05-D01B3D [1992]

'Composite' tube with separate tube necks

Covers tube with e.g. three separate neck sections each with gun system, e.g. for large display area.

V05-D01B5 [1992]

Flat CRT

Includes tubes with electron gun not perpendicular to screen surface. Does not cover flat panel matrix-gun tubes, which are covered by V05-D01B3C.

V05-D01B6 [1992]

Beam index colour CRT

V05-D01B9 [1992]

Other CRT type

V05-D01C [1992]

Vacuum fluorescent display tubes

V05-D01C1 [1992]

For displaying character only

Includes seven segment type display.

V05-D01C3 [2002]

Field Emission Displays

Includes displays with field emission cathodes. For novel details of cold cathodes per se, see also V05-D05C5 codes. For novel emitter arrangements, see also V05-D06A codes.

Prior to 2002 field emission displays can be found in V05-D01C5 with V05-M03A to signify cathode type (if cathode is not novel) or in V05-D05C5 is cathode is novel.

Cold cathode, surface emission, surface emission electron conduction display, SED, FED

V05-D01C5 [1992]

Dot matrix displays

V05-D02

Image pick-up tubes

TV camera tube, vidicon, plumbicon

V05-D02A [1992]

Complete novel tube

V05-D02B [1992]

Tube details

Use with V05-D05 to V05-D09 codes as appropriate.

V05-D03

Image converters and intensifiers

Tubes for night vision equipment are assigned W07-G codes also.

Streak tube, x-ray imaging tube, infrared imaging tube

V05-D03A [1992]

Complete novel tube

For cases where particular detail of tube is the novel aspect, this code is not used. Search V05-D03B to V05-D03E with V05-D05 to V05-D09 codes as appropriate.

V05-D03B [1992]

Tubes with optical output

Covers tubes acting as both converters and intensifiers, which may be viewed directly, photographed, or used to generate visible image for another image pick-up device.

V05-D03B1 [1992]

Tube with non-light input

Includes image converters.

V05-D03B1A [1992]

For X-rays

Radiography

V05-D03B3 [1992]

Tubes with non-visible light input

Includes tube converting IR image to visible light output. Video cameras sensitive to IR are coded in W04-M01E1 codes.

Thermal imaging camera

V05-D03B5 [1992]

Tube with low level visible light input

Includes image intensifier.

V05-D03C [1992]

Tubes with electrical output

Covers camera tubes sensitive to radiation other than visible light. (Electrical output/visible light input tubes are covered by V05-D02 codes).

Note: does not include photomultiplier tubes, see V05-G and K codes as appropriate.

V05-D03E [1992]

Tubes for scientific analysis

Includes streak tube. See also appropriate codes in S02 or S03, e.g. S02-H, S03-A codes etc.

V05-D03H [1992]

Operating circuitry

Includes e.g. power supplies for scanning and non-video arrangements. See W04-M01 codes for video camera circuitry and W07-G codes for night vision equipment.

V05-D04

Other tubes (Including tubes for data storage, phase shifting)

V05-D04A [1992]

Complete novel tube

V05-D04B [1992]

Tube details

Use with V05-D05 to V05-D09 codes as appropriate.

V05-D05

Electrodes, screens

V05-D05A

Photoelectric and charge-storage screens

Target, photoconductive screen, photovoltaic screen

V05-D05A1 [1992]

Photoelectric screen

Photocathode

V05-D05A3 [2005]

Semiconductor diode arrays

(V05-D05A5A)

Includes e.g. Laser diode CRT screens. Prior to 2005, coded in V05-D05A5A.

Laser CRT

V05-D05A5 [1992]

Charge storage screen

V05-D05A5A* [1992-2004]

Screen with array of semiconductor diodes

*This code is now discontinued. See V05-D05A3.

V05-D05B

Luminescent screens

See V05-M01 also for compositions.

Phosphor screen, fluorescent material, aluminium coating, black matrix, dot, triad, stripe

V05-D05B1 [1992]

Phosphor compositions

Includes manufacture of phosphor materials per se. Also coded in V05-M01A if suitable for screens in general. (Prior to 1992, search V05-D05B and V05-M01).

Activator, host, killer, phosphorous, oxide, persistence

V05-D05B3 [1992]

Single phosphor screen

Monochrome

V05-D05B5 [1992]

Multiple phosphor screen

Covers screens for display of more than one colour. *RGB, red, green, blue*

V05-D05B5A [1992]

With phosphor arranged in dots of different colours

V05-D05B5B [1992]

With phosphors arranged in stripes of different colour

V05-D05B5C [1992]

With overlaid different colour phosphors

Includes screen for beam penetration type CRT. Also coded in V05-D01B1C.

V05-D05B7 [1992]

Non-phosphor aspects of screen

Covers non-luminous components of screen. *Binder, vehicle, black matrix*

V05-D05B7A [1992]

Protective metallic coatings

Covers metallic coatings applied over screen phosphors for protection.

Aluminum

V05-D05C [1987]

Cathodes

Coating, emission

V05-D05C1 [1992]

Thermionic cathodes

See V05-M02 codes for thermionic cathodes in general.

V05-D05C1A [1992]

Thermionic cathode composition

Includes composition of coatings.

Barium, scandium, strontium, thorium

V05-D05C1C [1992]

Heater element

Tungsten

V05-D05C5 [1992]

Cold cathodes

For field emission cathode arrays search with V05-D01B3C.

Field emission, FED, SED

V05-D05C5A [1992]

Microminiature cold cathodes

Covers e.g. carbon nanotube emitters. Also covers cold cathodes formed on semiconductor substrate. See V05-M03A1 and U12-B03D for such structures in general, and V05-B05 codes for complete microminiature devices.

V05-D05C5C [1997]

Current limiting arrangements

(V05-D05C5)

Includes ballast resistors.

V05-D05D [1987]

Shadow masks

Colour selection electrode, aperture mask, slot mask, foil mask, tensed-steel mask

V05-D05D1 [1992]

Mask construction

V05-D05D1A [1992]

Details of apertures

V05-D05D1C [1992]

Shape of mask

This code is used to describe novel shape of the mask as a whole and not apertures, which are covered by V05-D05D1A.

V05-D05D3 [1992]

Mask material

Covers material compositions of mask per se and also coatings.

Nickel, steel

V05-D05D5 [1992]

Mask mounting details

Also coded in V05-D07A3 if vessel aspects involved.

Frame

V05-D05D5A [1992]

For removal and alignment during exposure

Actual exposure process using colour selection electrode as a lithographic mask is covered by V05-L02E3.

V05-D05E [1992]

Internal shield

V05-D05E1 [1992]

Magnetic shield

V05-D05F [1992]

Fluorescent or field emission display screen electrodes

Includes field emission display screen anodes. Also includes beam index electrodes (search with V05-D01B6) and fluorescent screen tube anodes.

V05-D05X

Other electrode or screen details

V05-D06

Beam generating and controlling arrangements

Electron-optical arrangements in general are covered by V05-M04 codes.

V05-D06A

Electron guns, controlling beam cross-section or aberration, focusing arrangements

Grid, anode, electrode assembly, electrode supports, colour purity, convergence adjustment, electron lens, apertured disc

V05-D06A1 [1992]

Electron gun type

V05-D06A1A [1992]

Single gun

Also coded in appropriate V05-D01B1 code.

V05-D06A1B [1992]

In-line multiple gun

Also coded in V05-D01B3A.

V05-D06A1C [1992]

Delta multiple gun

Also coded in V05-D01B3B.

V05-D06A1E [1992]

Matrix of electron guns or field emission devices

See also V05-D01B3C for CRT matrices. See V05-D01C3 for FED matrices. Prior to 2005, coded in V05-D01B3C.

Matrix drive with deflection

V05-D06A1F [2005]

Field emission device

Includes novel complete emitter, gate and anode structure.

V05-D06A2 [1992]

Beam intensity control

Includes grid/gate electrodes stimulating field emission.

Acceleration electrode

V05-D06A3 [1992]

Focusing

Lens electrodes, quadrupole

V05-D06A5 [1992]

Beam cross-section and aberration correction

Halo correction

V05-D06A7 [1992]

Components associated with electron gun

Includes resistive potential divider structurally associated with gun. Current limiting arrangements associated with field emission cathodes are coded in V05-D05C5C only.

V05-D06B

Beam deflection arrangements

See also V02-F01A for inductive deflection components, and T04-H01 or W03-A08A1 codes as appropriate.

Horizontal, vertical, coil assembly

V05-D06B1 [1992]

Electromagnetic deflection

Includes convergence coils, also coded in W03-A08A5A.

V05-D06B1A [1992]

Deflection yoke assembly

Includes manufacture of deflection yokes. Also coded in V02-F01A and W03-A08A1B unless TV receiver displays are specifically excluded. Note, convergence coils are covered by V05-D06B1.

V05-D06B5 [1992]

Electrostatic deflection

X-plates, Y-plates

V05-D06B5A [1992]

With electrodes on tube surface

Also coded in V05-D07B3A. Includes e.g. deflection electrodes for image pick-up tube (also coded in V05-D02B).

V05-D06C [1992]

Post-deflection arrangements

Post deflection anode, PDA, post-acceleration

V05-D06E [1992]

Electron-multiplier arrangements

For electron multipliers in general, see V05-K01 codes. See V05-L01A5A for manufacture. (Prior to 1992 search V05-D06X and V05-K).

MCP, microchannel plate

V05-D06X

Other beam generating and controlling arrangements

Afterglow-preventing electron gun blocker, Internal beam reflecting surface

V05-D07 [1987]

Vessels, seals, cooling, combined optical arrangements etc.

V05-D07A [1987]

Vessels, seals, tension band

V05-D07A1 [1992]

Tension band

Includes e.g. attaching mechanism of t-band to envelope.

Anti-implosion band, t-band, reinforcing, adhesive tape

V05-D07A3	[1992]
Internal electrode supports	
V05-D07A5	[1992]
Vessel per se	
<i>Glass panel, funnel, neck</i>	
V05-D07A5A	[1992]
Shape	
Covers novel shape or contour e.g. for particular aspect ratio display.	
V05-D07A5C	[1992]
Composition	
V05-D07A5E	[1997]
Spacers	
(V05-D07A5)	
Covers internal spacers used to support vessel against atmospheric pressure. See V05-L03A1 for spacer manufacture.	
V05-D07A7	[1992]
Seals for vessel	
V05-D07A7A	[1992]
Vessel seal compositions	
V05-D07B	[1987]
Lead-ins, screening and antistatic coatings	
V05-D07B1	[1992]
Lead-in conductors	
<i>Connecting pins</i>	
V05-D07B3	[1992]
Antistatic, magnetic and EM shielding coatings	
Includes conductive coatings in general, where coating function or location (internal/external) is not disclosed or is irrelevant.	
<i>Discharge preventing coating, conductive coating, touchscreen, front panel RFI filter</i>	
V05-D07B3A	[1992]
Internal coating	
V05-D07B3C	[1992]
External coating	

V05-D07B3E	[2005]
EM shielding coatings	
(V05-D07B3)	
<i>X-ray, EMI</i>	
V05-D07B3M	[2005]
Magnetic coatings	
(V05-D07B3)	
V05-D07B3S	[2005]
Antistatic coatings	
(V05-D07B3)	
V05-D07B5	[1992]
Separate screening device	
Includes detachable radiation screen placed over tube faceplate, for e.g. EM radiation prevention. For detachable optical filters see V05-D07C5E. V05-D07B3 takes precedence over this code if 'screening device' is mentioned without further detail.	
V05-D07C	
Cooling, optical arrangements structurally combined with vessel	
V05-D07C1	[1992]
Tube cooling	
For projection TV tube use W04-Q01A also.	
<i>Liquid, fluid, faceplate, conduct</i>	
V05-D07C3	[1992]
Optical layer on tube surface	
Includes filters for e.g. antireflective purposes. For detachable types see V05-D07C5E which takes precedence if 'filter' only is mentioned.	
<i>Antiglare, faceplate</i>	
V05-D07C3A	[1997]
Internal optical layer	
(V05-D07C3)	
V05-D07C3C	[1997]
External optical layer	
(V05-D07C3)	
V05-D07C5	[1992]
Associated optics	
Codes in this section cover optical arrangements which are not part of the tube per se.	

V05-D07C5A	[1992]
Lens	
Includes lens assembly for e.g. projection TV (also coded in W04-Q01A and W04-Q01E).	
V05-D07C5C	[1992]
Fiber optics	
<i>OFT, FOT, optical fiber tube</i>	
V05-D07C5E	[1992]
Detachable optical filter	
Includes anti-reflective filters. This code takes precedence over V05-D07C3 (filter layer on tube surface) if 'optical filter' only is mentioned without further detail.	
V05-D07E	[1992]
Getters	
V05-D08	[1992]
Associated devices and circuitry	
Codes in this section deal with ancillary apparatus but not detachable conductive and optical filters which are coded in V05-D07B5 and V05-D07C5E respectively. See also relevant equipment codes in e.g. T04 or W03.	
V05-D08A	[1992]
Degaussing system	
Degaussing/demagnetising in general is covered by V02-D, which is also assigned here. Covers cancelling arrangements for terrestrial magnetism.	
V05-D08A1	[1992]
Circuitry	
Includes power supply, current control, etc. For use of thermistors to cause current decay search with V01-A02A7C.	
V05-D08A5	[1992]
Coil	
V05-D08B	[1992]
Radiation preventing coil	
Covers arrangements to cancel radiated fields from e.g. deflection system.	
V05-D08C	[1992]
Connectors	
See also appropriate code in V04.	
V05-D08C1	[1992]
For final anode	
<i>EHT connection, anode cap, HV, anode button</i>	

V05-D08C5	[1992]
For tube base	
Also coded in V04-K. <i>CRT Rose</i>	
V05-D08E	[1992]
External shield enclosure for CRT	
Includes external shields which can protect against effects either leaving or entering the body of the CRT other than through the faceplate. Shielding for electrical equipment in general is covered by V04-U codes.	
V05-D09	
Other details of cathode-ray tube; Electron beam tube	
Includes ion traps.	
V05-D10	[2005]
Field Emission and Fluorescent Display Drive Circuitry	
Includes drive circuitry integral with vacuum tube. Note that drive circuitry for Cathode Ray Tubes is not included in V05, and should be searched in appropriate T04/W03 classes.	
V05-E	
X-ray/Extreme UV tubes and techniques (general); Ion beam tubes	
Ion beam tubes for processing workpieces are not included -see V05-F05 codes, e.g. V05-F05A7C.	
V05-E01	
Electron beam target-impact X-ray tubes and generators	
Covers X-ray generators where operation is by impingement of electron beam on target. See V05-L05E for X-ray tube manufacture. <i>Medical therapy/diagnostic source, lithography/materials processing source</i>	
V05-E01A	[1992]
Anode electrode per se	
See V05-L01B3 for manufacture.	
V05-E01A1	[1992]
Material composition	
V05-E01A1A	[1992]
Of separate active target part	
V05-E01A3	[1992]
Shape and construction	

V05-E01A3A [1992]

Of separate target section

V05-E01B [1992]

Rotary anode system

Does not include details of anode electrode per se, which are covered by V05-E01A codes.

V05-E01B1 [1992]

Bearings, support shaft

V05-E01B1A [1992]

Bearings

V05-E01B3 [1992]

Rotary drive system

V05-E01B3A [1992]

With separate motor drive

V05-E01B3C [1992]

With anode assembly forming part of motor

V05-E01B5 [1992]

Anode cooling system

For non-rotary anode cooling see V05-E01F.

V05-E01C [1992]

Cathodes

Includes cathode supports.

V05-E01C1 [1992]

Heater

V05-E01C5 [1992]

Separate heating arrangement

Includes use of e.g. laser beam to heat thermionic cathode.

V05-E01C7 [2006]

Cold cathode

Note that prior to 2006, cold cathode electron emitters for X-ray generators were coded in V05-E01C combined with V05-M03A codes.

Field emission, FE

V05-E01C7A [2006]

Carbon nanotube based

Includes all microminiature semiconductor or nanotechnology-based field emitters. Prior to 2006, coded in V05-E01C and V05-M03A1.

CNT, nanotube, carbon nanofiber

V05-E01D [1992]

Electron guns and other electrodes

V05-E01D1 [1992]

Electron gun

Includes all X-ray tube electron-optical systems.

V05-E01E [1992]

Vessels, lead-ins, seals

V05-E01E1 [1992]

Vessel construction

V05-E01E1A [1992]

X-ray windows

V05-E01E3 [1992]

Seals

V05-E01E5 [1992]

Lead-in conductors

V05-E01F [1992]

Cooling system

See V05-E01B5 for cooling of rotary anode.

V05-E01H [1992]

X-ray tube type

Codes in this section are used to indicate the type of tube only, irrespective of novel features which are indicated by other V05-E01 codes.

V05-E01H1 [1992]

Rotary anode tube

V05-E01H1A [2006]

Multiple rotary anode tube

V05-E01H3 [1992]

Fixed anode tube

V05-E01H5 [1992]

Tube employing electron gun

V05-E01H5A [1992]

With circular electron beam path

Synchrotron X-ray generators are not included - see V05-E03A.

V05-E01H7 [1992]

Tube for 'flash' operation

Pulse operation

V05-E01H9 [1992]

Other target-impact type tube

Includes liquid metal target-impact tubes. For non-electron beam target-impact tubes (e.g. laser T-I), see V05-E03.

Gallium

V05-E01X [1992]

Other X-ray tube details

V05-E02

Controlling or protecting X-ray apparatus

See also S05-A03 and S05-D02A for medical therapy and diagnostic apparatus respectively.

V05-E02A [1992]

Power supply for X-ray equipment

See U24-D and X12-J codes for power supplies in general.

V05-E02C [1992]

Output control; Tube protection

Includes setting desired current/time exposure.

Exposure time control, dose control, measurement, monitoring

V05-E02C1 [1992]

For flash operation

Pulse operation

V05-E02C5 [1992]

Incorporating protection features

V05-E02C5A [1992]

Protection of tube per se

Includes monitoring excess current or temperature.

Measurement, monitoring

V05-E02C5C [1992]

Limiting output level

Includes control based on e.g. radiation dosage.

See also S05-A03 and S05-D02A3 codes for medical applications.

Dose control

V05-E03 [1992]

Non-standard X-ray generators

For tube details, see also V05-M codes.

V05-E03A [1992]

Synchrotron

See also X14-G02.

V05-E03B [2006]

Laser target impact sources

Prior to 2006, coded in V05-E03.

V05-E03C [2006]

X-ray laser sources

Includes tubes which produce coherent, monochromatic X-ray radiation. See also V08-B02.

Prior to 2006, coded in V05-E03.

V05-E04 [2005]

Laser plasma X-ray/EUV sources

For application to lithography systems, see also V05-F08C1 and V05-F05 codes. See also relevant V05-M codes for novelty not included below. Prior to 2005, coded in V05-E03. In 2005, V05-E04 covered all details of non-standard X-ray generators, but from 2006 V05-E04 specifically covers details of Laser plasma X-ray/EUV sources used in non-standard X-ray generators. Other details of non-standard X-ray generators are coded in V05-E03.

V05-E04A [2005]

Gas filling

Includes gas compositions.

V05-E04B [2005]

Ionising arrangements

V05-E05 [1992]

Ion beam tubes and devices

Tubes for processing objects are covered by V05-F codes.

Penning ion source, plasma imploding device, surface ionisation, photo-ionisation tube

V05-E05A [1992]

For propulsive effect

Includes ion thruster for e.g. satellite (also coded in W06-B03A).

Gas bottle, orient, pitch, yaw, turn, spacecraft

V05-E06 [2005]

Neutron sources and devices

(V05-E09)

Prior to 2005 neutron sources were coded in V05-E09.

V05-E08 [1992]

X-ray 'optical' elements

Includes EUV and X-ray lithography masks. See also U11-C04H2 and V05-F05 codes.

V05-E08A [2005]

'Optical' manipulation of X-rays

This code is intended to be used with X-ray optical elements that use wave effects or similar to alter e.g. the focus or direction of the radiation.

Molybdenum layered mirror, capillary optics, Kumakhov lens

V05-E08C [2005]

Absorption, blocking or anti-scatter X-ray optics

E.g. anti-scatter apparatus, grids and passive (i.e. non-"optical") collimators.

V05-E09

Other X-ray tubes and techniques

V05-E10 [2006]

Complete novel tube

See also V05-E01, E03, E04, E05 or E06 for individual tube/source where relevant.

V05-F

Tubes for processing/examining objects

This section deals with tubes and analogous devices for processing workpieces (including semiconductor devices) and for examining objects. From 1992, V05-F02 and V05-F03 codes are no longer used and the subject matter previously coded there has been reallocated. V05-F is divided into four main sections.

V05-F01 codes dealing with analysis devices such as electron microscopes, microanalysers, etc. and, from 1992 including X-ray microscopes. **V05-F05** codes dealing with equipment for processing workpieces e.g. by beam or plasma treatment.

V05-F04 codes dealing with novel details of both analysis and processing equipment. **V05-F08** codes dealing with the actual operation performed by the equipment and enabling a secondary function to be indicated.

Assignment of codes :

Codes from the V05-F01 or V05-F05 sections are assigned to describe apparatus type and to broadly indicate the novel aspect, e.g. details of the apparatus, complete novel apparatus, control circuitry, etc. V05-F04 codes are used to further highlight novel details e.g. electrodes, vessels, etc., and V05-F08 codes are routinely assigned to indicate the function of the equipment.

EXAMPLES

(1) Novel field emission electrode for scanning electron microscope: V05-F01A1B, V05-F01B3 and V05-F04A3

(2) Control circuit for SEM measuring dimensions V05-F01A1B, V05-F01B5A and V05-F08B (S02-A05A will also be assigned)

(3) Any novel aspect of plasma etching equipment using magnetron effect V05-F05C3A and V05-F08E1.

V05-F01

Microscopes and other analysing tubes

See S03-E06B1 also for microscopes. (Optical microscopes per se are coded in S02-J04B1, and see S03-E04R for microscopy).

Photon microscope, Transmission/scanning electron microscope, SEM, secondary emission detection, focusing deflection, electron/ion-optical system

V05-F01A [1992]

Device type

V05-F01A1 [1992]

Electron microscope

Includes electron diffraction tube.

V05-F01A1A [1992]

Transmission

TEM

V05-F01A1B [1992]

Scanning

SEM

V05-F01A1C [1992]

Combined transmission and scanning

STEM

V05-F01A2 [1992]

Ion microscope

Includes ion diffraction tube.

V05-F01A3 [1992]

X-ray microscope

(V05-E09, V05-F09)

X-ray source details are covered by V05-E01 or V05-E03 codes and not V05-F04 codes.

V05-F01A4 [1992]

Microanalysers

(V05-F09)

Spot analyser

V05-F01A5 [1992]

Tunnel current and analogous devices

Includes tunnel current microscopes and similar devices, e.g. atomic, magnetic force microscopes. For materials investigation see also S03-E02F codes and V05-F08B. For image-producing analysis search with S03-E02F codes and V05-F08A.

Prior to 2005, included processing and recording. After 2005, see V05-F05D, as well as relevant V05-F08C codes.

V05-F01A6 [2011]

X-ray spectrometer

V05-F01A9 [1992]

Other devices

V05-F01B [1992]

Novel details

V05-F01B1 [1992]

Complete device

This code is only used if the analysis device is presented as a completely novel piece of equipment. For cases where actual novelty can not be determined, V05-F01B codes will not be assigned.

V05-F01B3 [1992]

Device details

For specific features see also V05-F04 codes.

V05-F01B5 [1992]

Circuitry and operation of device

Includes power supplies (see appropriate U24 or X12 codes for power supplies in general).

V05-F01B5A [1992]

Control

V05-F01B9 [1992]

Other novel details

Includes cleaning and maintenance of analysing equipment.

V05-F02* [1980-1991]

Electron- or ion-beam tubes for localised treatment of object

*This code is now discontinued and from 1992 this subject matter is transferred to V05-F05A codes (device details now covered by V05-F04 codes). V05-F02 remains valid and searchable for records prior to 1992.

Electron beam cutting/welding/lithography patterning/inscribing/marking/focusing, deflection, electron/ion-optical system

V05-F03* [1980-1991]

Arrangements of electrodes

*This code is now discontinued and from 1992 this subject matter is transferred to V05-F04B codes and appropriate codes from V05-F04A and V05-F04C sections. V05-F03 remains valid and searchable for records prior to 1992.

Accelerating system, electron gun, electrostatic beam position/cross-section/intensity control electrodes

V05-F04 [1992]

Analysis and processing device details

Codes in this section are used with V05-F01 or V05-F05 codes as appropriate, for details of analysis and processing devices respectively.

V05-F04A [1992]

Emission source

Codes in this section relate to electron or ion sources. X-ray sources (including those for X-ray microscopes) are coded in V05-E01 or V05-E03 codes.

V05-F04A1 [1992]

Thermionic emitter

Cathode, oxide, coated

V05-F04A1A [1992]

Heated by non-electric means

Includes laser heating

V05-F04A3 [1992]

Field emission electrodes

Cold cathode

V05-F04A3A [1992]

Microfabricated field emission electrodes

Includes electrodes produced by semiconductor manufacturing techniques. See V05-M03A1 for microfabricated electrodes in general, and V05-B05 codes for complete microfabricated vacuum conduction devices.

V05-F04A3C [1997]

Current limiting arrangements
(V05-F04A3)

V05-F04A5 [1992]

Ion source

V05-F04A5A [1992]

With gas supply

V05-F04A9 [1992]

Other emission sources

V05-F04B [1992]

Electrodes and electrode systems
(V05-F03)

Covers all non-emitting electrodes. Electrodes are also assigned V05-F04C codes when electron/ion optical aspect is significant.

Electron gun

V05-F04B1 [1992]

For beam modulation

Grid, blanking

V05-F04B1A [1997]

Apertures

(V05-F04B1)

Etching mask, electron beam lithography

V05-F04B3 [1992]

For beam scanning

Only includes beam scanning arrangements inside e.g. electron gun structure. For post gun scanning/deflection arrangements see V05-F04C5.

X-Y, raster, deflection

V05-F04B5 [1992]

For gas discharge type apparatus

Use with V05-F05C codes.

Etching, coating, sputtering

V05-F04B5A [1992]

Anodes

V05-F04B5C [1992]

Cathodes

Sputtering target

V05-F04B6 [1992]

Probe electrodes

V05-F04B6A [1997]

Tunnel device probe or cantilever

(V05-F04B6)

See also S03-E02F codes and V05-F01A5.

Tunnel current, AFM, SPM, STM

V05-F04B8 [1992]

Electrode positioning

V05-F04B8A [1992]

Dynamic positioning system

Includes X-Y positioning system and scanning arrangement for tunnel current device.

AFM, SPM, STM

V05-F04B9 [1992]

Other electrode details

V05-F04C [1992]

Electron/ion-optical systems

(V05-F03, V05-M04)

Where electron gun electrodes are significant V05-F04B1 or V05-F04B3 codes are also applied.

V05-F04C1 [1992]

Characterised by type of system

V05-F04C1A [1992]

Magnetic, electromagnetic

See appropriate V02 codes for details of permanent magnets, electromagnets, coils, etc.

EM

V05-F04C1C [1992]

Combined electromagnetic and electrostatic

EM-ES

V05-F04C1E [1992]

Electrostatic

ES

V05-F04C3 [1992]

For focusing

Includes arrangements to correct for beam aberrations such as coma, astigmatism etc.

V05-F04C5 [1992]

For deflection

X-Y, raster

V05-F04C7 [1992]

For particle selection

Includes selection of desired ion species. Particle spectrometers are coded in V05-J.

V05-F04C8 [2005]

For confinement

V05-F04D [1992]

Vessels, seals, vacuum locks

(V05-F09, V05-M05)

V05-F04D1 [1992]

Vessels and seals

(V05-F09)

Includes material compositions of vessels and seals, vessel shape, etc.

V05-F04D3 [1992]

Vacuum locks, specimen/workpiece introduction

(V05-F09, V05-M05)

Includes evacuation apparatus.

V05-F04D3A [1992]

Arrangements for introducing specimen or workpiece

(V05-F09, V05-M05)

Includes e.g. carriage arrangements introducing specimen or workpiece into analysis or processing chamber. Actual holder is covered by V05-F04G. For semiconductor wafer applications search with U11-F02A1 also.

Window, viewport

V05-F04E [1992]

Gas filling

(V05-F09)

Includes compositions. (Chiefly for gas fillings used in plasma apparatus and similar, also coded in V05-F05 codes).

V05-F04G [1992]

Specimen/workpiece holder

Covers holder per se. For semiconductor wafer application search with U11-F02A2. Carriage and drive arrangements for introducing specimen or workpiece into equipment are covered by V05-F04D3A.

V05-F04H [1992]

Detectors

Includes optical types, secondary electron detectors, etc. (Systems forming an image are covered by V05-F04J). Also includes detectors used to monitor progress of an operation, e.g. etching (with V05-F08E1).

V05-F04H1 [2005]

Scanning probe or cantilever displacement detection system

Includes detectors for all tunnel current and analogous scanning probe type microscopy techniques. See also S02-A03 for optical techniques, and S03 codes.

V05-F04J [1992]

Imaging and display systems

Includes photographic, stimulable sheet recording, video systems and any other novel aspect of analysis equipment image presentation.

Microscope, microanalyser, screen, CRT, raster, scan, synchronise

V05-F04K [1992]

Cooling

(V05-F09, V05-M09)

Includes cooling for the apparatus itself, and also for specimens and workpieces.

V05-F04L [1997]

Antennae and waveguides

(V05-F04X)

E.g. for ICP reactor (See also V05-F05C1 codes).

V05-F04M [2006]

Vibration reduction, control and compensation

V05-F04X [1992]

Other process/analysis device details

Includes device heating and shielding.

Heater, deposition-limiting shield

V05-F05 [1992]

Tubes and devices for processing

(V05-F02, V05-F09)

Processing tubes and devices are also assigned codes based on application. For example, search with U11-C codes for relevance to semiconductor device fabrication, X25-A04 for cathodic sputtering, X25-Q02 for surface treatment in metallurgy, etc.

V05-F05A [1992]

Using beams

Prior to 1992 the code for localised treatment by beam equipment (V05-F02) was only used for focused beams. Flood effect devices were coded in V05-F09.

V05-F05A1 [1992]

With focused beam

(V05-F02)

Scan, raster, X-Y, focus, local

V05-F05A3 [2005]

With multiple beams

Includes e.g. field emission arrays for one-shot electron beam lithography or atomic resolution storage.

V05-F05A5 [1992]

With flood effect beam

(V05-F09)

V05-F05A7 [1992]

Characterised by beam type

(V05-F02, V05-F09)

Codes in this section are applied as appropriate either in conjunction with other V05-F05A codes, or alone.

V05-F05A7A [1992]

Electron beam

V05-F05A7C [1992]

Ion beam

V05-F05A7X [1992]

Other beam type

Includes use of X-ray and Extreme UV (EUV). X-ray/EUV sources per se are not coded in the V05-F04A section and are covered by V05-E01 or V05-E03 codes.

EUV

V05-F05C [1992]

Using plasma, gas-filled tubes

(V05-F09)

See X14-F codes also for general aspects of plasma technique.

Discharge, arc, glow

V05-F05C1 [1992]

With externally-applied ionising energy

(V05-F09)

Includes all ionising arrangements located outside tube envelope. For conductive RF coupling internal to the tube, see V05-F05C2.

V05-F05C1A [1992]

Microwave

(V05-F09)

RF, feed, waveguide, port, matching, stub, impedance

V05-F05C1C [1992]

Optical

(V05-F09)

Laser, UV, lamp, irradiate

V05-F05C1E [1997]

Inductively coupled

(V05-F05C1)

V05-F05C1G [1997]

Capacitively coupled

(V05-F05C1)

V05-F05C2 [2006]

With internally applied ionising energy

Includes e.g. conductive RF coupling. Prior to 2006, coded in V05-F05C.

RF, discharge, arc

V05-F05C3 [1992]

With confinement or manipulation of plasma

(V05-F09)

Includes electromagnetic and other confinement systems.

ECR, electron cyclotron resonance

V05-F05C3A [1992]

With magnetron effect

(V05-F09)

Equipment using magnetron discharge effect is not coded in V05-C01A.

V05-F05D	[2005]
Using scanning probe/tunnelling effects (V05-F01A5) Includes all analogous techniques, e.g. AFM. See V05-F08C codes for lithography or recording techniques. Does not include microscopy, see V05-F01A5. Prior to 2005, processing using scanning probe/tunnelling effects was coded in V05-F01A5 in combination with V05-F08C and V05-F05E codes. See U11-C11 for application to semiconductor wafer processing, or T03-C05 for recording or data storage applications.	
V05-F05E	[1992]
Novel details of processing devices Codes in this section describe in a general sense the novel aspects of equipment covered by V05-F05A and V05-F05C codes.	
V05-F05E1	[1992]
Complete device (V05-F09) This code is only assigned if the complete device is presented as novel. In cases where the precise novel aspect cannot be determined, no V05-F05E code will be assigned.	
V05-F05E3	[1992]
Device details For detailed information on novel aspects search with V05-F04 codes.	
V05-F05E5	[1992]
Circuitry and operation of device Includes power supplies. See also U24 and X12 codes for low and high power supplies respectively.	
V05-F05E5A	[1992]
Control and monitoring Includes control circuits to determine completion of e.g. etching or coating. (Search with V05-F08D1 or V05-F08E1 respectively).	
V05-F05E9	[1992]
Other novel details Includes all cleaning and maintenance of equipment.	
V05-F05X	[1992]
Other processing tubes	

V05-F08	[1992]
Equipment function These codes relate to the actual function of the inventive equipment, and not necessarily its primary function. Thus an electron microscope arrangement to measure voltage would be assigned V05-F08B and not V05-F08A (V05-F01A1 codes and S01-D01D7 would also be assigned).	
V05-F08A	[1992]
Imaging In general, S03-E06B codes are also assigned for this aspect.	
V05-F08B	[1992]
Measurement Includes measurement of voltage (see also e.g. S01-D01D7), dimensions (see also S02-A05A), and properties of materials (see also e.g. S03-E06 codes).	
V05-F08C	[1992]
Recording, storage	
V05-F08C1	[1992]
Lithography Also assigned U11-C04 codes where application is to semiconductor device lithography. <i>Semiconductor, wafer, image, pattern</i>	
V05-F08C3	[1992]
Recording See also T03-C codes for dynamic recording and U14-A codes for static stores. <i>Memory, store, high density</i>	
V05-F08D	[1992]
Coating, implanting ions, surface treatment	
V05-F08D1	[1992]
Coating <i>Surface, layer, coat, deposition</i>	
V05-F08D1A	[1992]
Sputtering <i>Cathodic, magnetron</i>	
V05-F08D3	[1992]
Ion implantation Also assigned U11-C02B codes where application is to semiconductor device manufacture. <i>Doping</i>	

V05-F08D5 [1992]

Surface treatment

Hardening, nitriding

V05-F08E [1992]

Removing material, cutting, machining and cleaning

Includes cleaning of specimen/workpiece, or e.g. resist ashing.

Ashing, stripping

V05-F08E1 [1992]

Etching

See also U11-C07 codes for application to semiconductor device fabrication.

V05-F08E3 [1992]

Cutting

Includes welding - also coded in X24-D02.

V05-F08E5 [1992]

Machining/milling

V05-F08F [2005]

Molecular decomposition and fluid processing

Includes fuel processing, e.g. Plasmatron™.

V05-F08G [2005]

Powder synthesis

Includes e.g. nanoparticulate production.

V05-F08X [1992]

Other equipment function

V05-F09

Other details of tubes for processing/examining objects

V05-G

Photoelectric discharge tubes not involving gas ionisation; Photomultiplier tube

See also V05-K01 codes where electron multiplier arrangements of PMT are novel.

PMT, PM, photomultiplier

V05-G01 [2005]

Photocathodes

Includes all novel photocathode materials, constructions etc. See also V05-D02/D03 codes for application to camera tubes/image converters or intensifiers.

V05-H

Radiation and particle detectors

Includes only radiation or particle detectors where incident radiation causes gas ionisation detected via breakdown voltage. See also S03-G codes.

Geiger-muller tube, Geiger counter, proportional counter tube, multi-wire proportional counters

V05-J

Particle spectrometer or separator tubes; Lenard tubes

See S03-E10A codes for more details of mass spectrometers.

Mass analyser, mass spectrometry, mass spectroscopy, static, dynamic, time-of-flight, energy spectrometer

V05-J01 [1992]

Particle spectrometer/separator tubes

V05-M codes are also assigned where aspect not covered in V05-J.

V05-J01A [1992]

Spectrometer type

Static, dynamic, quadrupole, time-of-flight, TOF

V05-J01A1 [1992]

Mass spectrometers

Secondary ion mass spectrometer, SIMS

V05-J01A5 [1992]

Energy spectrometers

V05-J01C [1992]

Sample introduction arrangement

Includes sample carriers. For vacuum locks search with V05-M05D codes.

Chamber, pressure, atomising, sample injection

V05-J01E [1992]

Ionising arrangement

Ionisation chamber, ion gun

V05-J01G [1992]

Ion-optical system

V05-M04 codes are also assigned.

Electrode, electromagnetic, solenoid, current, deflection, beam, path

V05-J01J [1992]

Detection system

V05-J01K [1992]

Interface with other equipment

Includes combination with e.g. chromatography apparatus, for which S03-E09C codes are also assigned.

V05-J01M [1992]

Control and monitoring

Includes operation of device.

V05-J01X [1992]

Other details of particle spectrometer/separators tubes

V05-J05 [1992]

Lenard tubes

Covers tubes emitting electrons or ions through the vessel. For details of window structures search with V05-M05E.

V05-K

Thermionic generators; Secondary-emission tubes; Electron multipliers; Ion pumps; Pressure measuring tubes

V05-K01 [1992]

Electron multiplier

For image intensifier application see V05-D03 codes also. Night vision equipment in general is coded in W07-G.

PMT, PM, photomultiplier

V05-K01A [1997]

Microchannel plates

(V05-K01)

V05-K01C [1997]

Dynodes

(V05-K01)

V05-K01X [1997]

Other electron multipliers

(V05-K01)

V05-K03 [1997]

Ionisation pressure gauges

(V05-K)

For novel aspects of gauges (e.g. cathodes), see V05-M codes. Pressure gauges in general are coded in S02-F04D1.

Penning

V05-L

Discharge tube manufacture

See note (1) of V05 class descriptor.

From 1992, codes from the V05-L05 section relating to the type of tube or device being manufactured are always assigned, except where the device is also claimed, resulting in the assignment of the code for that device also.

Manufacture of certain auxiliary devices for tubes, e.g. CRT deflection coils, are not regarded as manufacture of the tube per se, and hence not coded in V05-L. See also the appropriate codes for the auxiliary device and any relevant manufacturing codes in other sections, e.g. V02-H01 codes.

Also, novel manufacture of phosphor compositions is treated as a novel phosphor per se, and is coded under V05-M01 or other relevant V05 sections.

V05-L01

Electrodes

V05-L01A [1992]

Emitting electrodes

Electrodes, emission

V05-L01A1 [1992]

Thermionic cathodes

Tungsten, thorium, oxide, carbide, carburising, hydrocarbon, heating, cylinder, mesh, grille, grid

V05-L01A1A [1992]

Heaters

Indirectly heated cathode

V05-L01A3 [1992]

Cold cathodes

Field emission electrode

V05-L01A3A [1992]

Micro-fabricated cold cathodes

Also coded in V05-L05B5 when application is to complete vacuum conduction device. Includes use of semiconductor manufacturing techniques, see U11-C18B also for semiconductor manufacturing details.

V05-L01A5 [1992]

Secondary emission electrodes

V05-L01A5A [1992]

Electron multiplier

Also coded in V05-L05K.

V05-L01A5B [1992]

Photoelectric

V05-L01A5X [1992]

Other radiation-induced emission

V05-L01A9 [1992]

Other emitting electrodes

V05-L01B [1992]

Non-emitting electrodes

V05-L01B1 [1992]

Grids

Includes FED gate electrodes.

V05-L01B2 [1997]

Tunnelling device probe manufacture

(V05-L01B9)

See also V05-F04B6A. For tunnel current device manufacture, see V05-L05F1A. For novel device see V05-F01A5.

Cantilever

V05-L01B3 [1992]

Anodes

Includes FED screen electrodes. For FED gate electrodes, see V05-L01B1.

V05-L01B4 [1992]

Electron guns, electron-optical systems

Includes assembly of the electrode system. Mounting of assembly in vessel is covered by V05-L03C1.

V05-L01B4A [1992]

For deflection

V05-L01B5 [1992]

Shadow masks

Also coded in V05-L05D1.

V05-L01B6 [2005]

Plasma display panel electrodes

V05-L01B6A [2006]

Dielectric coatings

Includes manufacture of protective coatings for electrode insulating layers.

V05-L01B7 [1992]

Slow wave devices

Also coded in V05-L05C. (Slow wave devices per se are coded as transit time tube distributed elements).

V05-L01B8 [1992]

Screen electrode

Covers e.g. beam index CRT screen electrodes. For FED screen anodes, see only V05-L01B3.

Manufacture of image screens is covered by V05-L02 codes.

V05-L01B9 [1992]

Other non-emitting electrodes

V05-L02

Screens

Codes in this section cover the manufacture of screens for producing an image from, e.g. electron impact, and for converting an optical image into an electrical signal.

Image, pick-up, latent, electrostatic, discharge, scan, target, photoconductive, photovoltaic, display, light, fluorescent, phosphor, persistence

V05-L02A [1992]

Screen type

Codes indicating screen type are only used where a code cannot be assigned from the V05-L05 section or from the codes relating to the screen application tube per se. For example, if application to a specific tube type is not mentioned, or if the screen is stated to be applicable to several types of tube.

V05-L02A1 [1992]

Radiation-sensitive screen

V05-L02A5 [1992]

Radiation-emitting screen

V05-L02B [1992]

Substrate preparation

Includes washing, acid rinsing etc.

V05-L02C [1992]

Coating processes

See X25 codes for electrical aspects of coating processes.

V05-L02C1 [1992]

Liquid deposition by e.g. spraying

Spin coating

V05-L02C5 [1992]

Electrical method e.g. electrophoresis

V05-L02C7* [1992-2004]

Material deposited

*This code is now discontinued. See V05-L02M codes for general screen material types.

V05-L02C7 codes are used to describe the material being deposited in conjunction with a code relating to the actual deposition process. Codes in this section are not used if the material is unspecified or a complete manufacturing process is described.

V05-L02C7A* [1992-2004]

Visible radiation emitting material

*This code is now discontinued but prior to 2005 included e.g. use of phosphor in the case of a display tube, such as CRT. From 2005 see V05-L02M1.

Luminescent

V05-L02C7B* [1992-2004]

Radiation-sensitive material

*This code is now discontinued. From 2005 see V05-L02M2.

V05-L02C7C* [1992-2004]

Auxiliary materials

*This code is now discontinued. From 2005 see V05-L02M3.

Includes deposition of specific materials.

Black matrix

V05-L02D [2005]

Baking processes

V05-L02E [1992]

Exposure and development

V05-L02E1 [1992]

Exposure processes

V05-L02E1A [1992]

Multistep sequence of exposure and development

This code takes precedence over separate codes for exposure and development stages of screen manufacturing process.

V05-L02E3 [1992]

Using tube component as mask

Includes use of CRT shadow mask. For details of shadow mask per se see V05-D05D codes.

V05-L02E5 [1992]

Exposure apparatus e.g. lighthouse

V05-L02E5A [1992]

Optical system

Includes lenses, filters, etc.

V05-L02E5C [1992]

Light source

See X26 codes for details of novel lamps etc.

Bulb, discharge lamp, UV

V05-L02E7 [1992]

Development

V05-L02E1A takes precedence for combined exposure and development.

V05-L02E8 [1992]

Control of exposure method or apparatus

Includes general control aspects and also control of light source, sequential operation, etc.

Monitor, check, registration, time, duration

V05-L02F [1992]

Application of protective or other layers

Includes metallisation of screen internal surface.

Antireflective, aluminium

V05-L02H [1992]

Testing and inspection of screen

Testing of manufacturing process/apparatus in general is covered by V05-L07E codes. See appropriate codes in S03, e.g. S03-E04F2, for optical inspection of manufactured screen.

Pattern, defect, flaw, reject

V05-L02H1 [1992]

During manufacture

V05-L02H5 [1992]

Finished screen

V05-L02M [2005]

Screen material being processed

V05-L02M1 [2005]

Visible radiation emitting material

E.g. phosphor.

V05-L02M2 [2005]

Radiation sensitive materials

V05-L02M3 [2005]

Auxiliary materials

Includes e.g. black matrix.

V05-L03

Vessels, lead-ins, exhausting, filling

V05-L03A [1992]

Manufacture of vessels, spacers, ribs, lead-ins etc.

V05-L03A1 [1992]

Manufacture of internal ribs and spacing elements

Spacer

V05-L03A3 [1992]

Manufacture of electrode supports

V05-L03A5 [1992]

Manufacture of lead-in conductors

V05-L03A7 [2005]

Manufacturing of vessel per se

(V05-L03A)

Includes glass moulding, baking, toughening etc.

V05-L03B [1992]

Applying coatings or markings

Manufacturing of coating materials per se is not treated as tube manufacture; see appropriate devices codes where relevant.

Reflection prevention

V05-L03B1 [1992]

Conductive

Antistatic, graphite

V05-L03B3 [1992]

Optical

This code does not relate to screen manufacture, which is covered by V05-L02 codes, but to coatings acting as e.g. filters.

Anti-reflective, anti-glare

V05-L03B5 [1992]

Marking

Covers application of manufacturer's and product name etc., and also markings such as bar codes used for inventory or control purposes.

V05-L03C [1992]

Assembly

Covers assembly of tube from individual components and joining vessel parts.

V05-L03C1 [1992]

Inserting electrode system

Electron gun, support, spacing, mounting, shadow mask

V05-L03C1A [1992]

Inserting CRT gun

(V05-L03C1)

See also V05-D01B for CRT "per se" and V05-L05D1B for CRT manufacture.

V05-L03C3 [1992]

Pre-treatment of vessel surfaces

Cleaning, polishing, etching, machining

V05-L03C3A [1992]

To improve seal

Actual process of sealing is covered by V05-L03C5A.

V05-L03C5 [1992]

Joining vessel parts, sealing, evacuating, filling, alignment

V05-L03C5A [1992]

Sealing

V05-L03C5C [1992]

Evacuating

Includes methods and apparatus, e.g. vacuum pumps specifically for evacuating vessels. For electrical aspects of pumps see X25-L03A. Vacuum gauges in general are coded in S02-F04D1 and specifically ionisation-type gauges are additionally coded in V05-K03.

V05-L03C5E [1992]

Filling

Covers methods and apparatus for filling tubes with desired gas composition of mixture.

V05-L03C5G [2006]

Alignment

V05-L03C7 [1992]

Post sealing treatment

Washing

V05-L03C7A [1992]

To improve operation or lifetime

Includes e.g. getter flashing. (Getters per se are coded in V05-D07E, getter manufacture in V05-L06).

V05-L03C7C [1992]

To improve structural strength

Includes e.g. tension band fitting. Manufacture of band per se is covered by V05-L03D.

T-band

V05-L03D [1992]

Tension band manufacture

T-band

V05-L05 [1992]

Type of tube being manufactured

Codes in this section are only used for device-specific manufacturing details and generally follow the 'device' codes V05-A to V05-K. For further indication of scope, see the definitions accompanying those codes. For inventions involving significant aspects of a tube itself, as well as its manufacture, V05-A to V05-K codes take precedence to indicate tube type and are assigned instead of V05-L05 codes.

V05-L05A [1992]

Gas discharge

V05-L05A1 [1992]

Plasma display panel/segment type display

V05-L05A1A [2006]

DC Displays

V05-L05A1B [2006]

AC Displays

V05-L05A3 [2006]

Gas-filled switching/protection devices

Prior to 2006, coded in V05-L05A.

V05-L05B [2005]

Classical and cold cathode vacuum tubes

V05-L05B1 [1992]

Thermionic tube

V05-L05B3 [2005]

Cold cathode devices

V05-L05B5 [1992]

Micro cold cathode devices

V05-L05C [1992]

Transit time tube

V05-L05D [1992]

Cathode ray tubes; Electron beam tubes

V05-L05D1 [1992]

Display tubes

V05-L05D1A [2002]

Field emission display tubes

V05-L05D1B [1992]

Cathode ray display tubes

V05-L05D1C [1992]

Fluorescent display

V05-L05D2 [1992]

Camera tubes

V05-L05D3 [1992]

Image intensifiers and converters

V05-L05E [1992]

X-ray/EUV generators; Ion tubes

V05-L05F [1992]

Analysis and process tubes

V05-L05F1 [1992]

Analysis tubes

V05-L05F1A [1997]

Tunnel current devices

(V05-L05F1)

See V05-L01B2 for probe manufacture. See also V05-F01A5.

STM, SPM, AFM

V05-L05F5 [1992]

Processing tubes

V05-L05G [1992]

Photoelectric tube

V05-L05H [1992]

Radiation detector

V05-L05J [1992]

Spectrometer tubes

V05-L05K [1992]

Electron multiplier

V05-L05X	[2005]
Other types of tube being manufactured	
Includes e.g. manufacture of radiation image storage screens.	
V05-L06	[1992]
Getter manufacture	
(V05-L09)	
Getter flashing is covered by V05-L03C7A.	
V05-L07	[1992]
General aspects of manufacture	
(V05-L09)	
Codes in this section may be used alone, or with other V05-L codes.	
V05-L07A	[1992]
Multistep process for manufacturing whole device	
(V05-L09)	
V05-L07B	[2005]
Workpiece holder	
V05-L07C	[1992]
Transport equipment moving between processing stages	
(V05-L09)	
V05-L07D	[2005]
Workpiece positioning	
Covers positioning of workpiece with relation to manufacturing equipment.	
V05-L07E	[1992]
Testing, salvage and other general aspects of manufacture	
(V05-L09)	
V05-L07E1	[1992]
Testing	
(V05-L09)	
Where electrical characteristics are being measured relating to the tube per se, S01-G02A is also assigned.	
V05-L07E1A	[1992]
Of partially complete device	
(V05-L09)	

V05-L07E1B	[1992]
Of manufacturing process or apparatus	
(V05-L09)	
This code is used for monitoring the manufacturing process or apparatus only. For testing of tubes per se V05-L07E1A or V05-L07E1C are used.	
V05-L07E1C	[1992]
Of complete device	
V05-L07E3	[1992]
Ageing, soak testing, life testing	
(V05-L09)	
<i>Burn-in, oven, high temperature, accelerate</i>	
V05-L07E5	[1992]
Adjustment, rectification	
(V05-L09)	
<i>Correct, repair, re-gun, spot-knocking</i>	
V05-L07E6	[1992]
Salvage	
(V05-L09)	
Covers salvage of materials or tube parts for re-use or other purpose. This code is used with other V05-L codes as appropriate.	
V05-L07E7	[1992]
Packing, shipping	
(V05-L09)	
V05-L07E9	[1992]
Other general manufacturing aspects	
(V05-L09)	
Includes protection arrangement for tube to avoid damage during manufacture, e.g. dummy protective tube base.	
V05-L09	
Other details of discharge tube manufacture	

V05-M
General details
Codes in this section are used to describe details of tubes for cases of very general (or unstated) application, or in conjunction with tube type codes not having the appropriate subdivisions.

V05-M01

Image screens; Luminescent coatings

Radiation converting screens not necessarily part of a tube are included in V05-M01C codes.

Luminescent screen, fluorescent screen, radiation imaging screen

V05-M01A [1992]

Light emitting compositions

Phosphor, rare earth

V05-M01C [1992]

Separate screen not part of tube

Conversion screen, radiography, medical diagnosis

V05-M01C1 [1992]

Radiation image storage screen

Includes e.g. stimable phosphor. Recording and reproducing equipment for use with stimable phosphors is coded in S06-K99G and other S06-K codes as appropriate.

V05-M02

Solid thermionic cathodes

Coating, impregnated cathode, dispenser cathode, heater, filament, directly-heated

V05-M02A [1992]

Solid thermionic cathode compositions

V05-M03

Electrode assemblies; Other electrodes

Includes unspecified emitting electrode types.

Electrode support, mountings

V05-M03A [1992]

Emitting electrodes, i.e. cold cathodes

Field emitters, field emission, FE

V05-M03A1 [1992]

Micro-fabricated cold cathode

Includes carbon nanotube based field emitters.

Also covers cathode (or other electrode in conjunction with it) formed using semiconductor manufacturing techniques on e.g. silicon substrate.

CNT, carbon nanofiber, nano-emitter

V05-M03A3 [1997]

Current limiting arrangements

(V05-M03A)

V05-M03C [1992]

Grids

Control, modulation, intensity, screen, suppressor

V05-M03E [1992]

Anodes

V05-M03G [1992]

Electron/ion guns

Also coded in V05-M04A as an electron/ion optical arrangement.

Lens, focus, correct, beam

V05-M03X [1992]

Other electrodes

V05-M04

Electron- or ion-optical arrangements

Electron gun, lens, focusing, deflection, deflection coil, winding

V05-M04A [1992]

Electrostatic

Novel electron guns are also coded in V05-M03G.
ES

V05-M04B [1992]

Electromagnetic

EM

V05-M05

Vessels; Lead-in conductors; Seals

Insulator, support pins, conductive coatings

V05-M05A [1992]

Vessel

Glass composition, shape, form, housing, container

V05-M05B [1992]

Lead-ins

Pin, base, contact

V05-M05C [1992]

Seal

Frit

V05-M05D [1992]

Vacuum locks

V05-M05D1 [1992]

Sample/specimen introducing arrangement

V05-M05E [1992]

Vessel windows

Covers arrangement enabling emission or introduction of e.g. ions or electrons from the vessel. X-ray windows are covered by V05-E01E1A.

V05-M05F [1992]

Coatings applied to vessel

Includes optical or conductive coatings.

V05-M06 [1992]

Getters

V05-M07 [1992]

Tube cooling

(V05-M09)

Cooling of electronic equipment in general is covered by V04-T03 codes.

V05-M07A [1992]

Heat sink, radiative

(V05-M09)

Fin, extrusion, radiator

V05-M07B [1992]

Forced circulation

(V05-M09)

Liquid, vapour, gas, pump, heat exchanger, tank, reservoir, fan, blower, air

V05-M09

Other general tubes details (Including gas filling compositions)

Includes gas filling compositions. Compositions for gas-filled tubes covered by V05-A codes are assigned the appropriate subdivision code in that section.

V06: Electromechanical Transducers and Small Machines

V06-A* [1980-2006]

Loudspeakers

*This code is now discontinued and has been transferred to V06-V04A1 from 200701. It remains searchable for records prior to 2007.

V06-A01* [1980-2006]

Transducers

*This code is now discontinued and has been transferred to V06-V01 and V06-V04A1 from 200701. It remains searchable for records prior to 2007.

All loudspeaker transducers are also coded in V06-E.

Voice-coils, drivers, piezoelectric, moving coil

V06-A02* [1980-2006]

Cones/diaphragms

*This code is now discontinued and has been transferred to V06-V02A and V06-V04A1 from 200701. It remains searchable for records prior to 2007.

General use cones/diaphragms are in V06-F only.

Membranes, vibration plates

V06-B* [1983-2006]

Pick-ups, cutters, microphones; Sonar/ultrasonic transducers

*This code is now discontinued and has been transferred to V06-V from 200701. It remains searchable for records prior to 2007.

V06-B01* [1983-2006]

Gramophone pick-ups and cutters

*This code is now discontinued and has been transferred to V06-V04A3 from 200701. It remains searchable for records prior to 2007.

See also W04-A.

Stylus, Cartridges, Diamond, groove, mechanical recording

V06-B02* [1983-2006]

Microphones

*This code is now discontinued and has been transferred to V06-V04A2 from 200701. It remains searchable for records prior to 2007.

All microphone transducers are also coded in the relevant V06-E code.

Piezoelectric, electroacoustic, electret, condenser, diaphragms

V06-B03* [1983-2006]

Sonar/ultrasonic transducers

*This code is now discontinued and has been transferred to V06-V01N from 200701. It remains searchable for records prior to 2007.

For hydrophones and sonar systems, see also W02-C07 and W06-A05 codes.

Piezoelectric, underwater acoustic transducers

V06-C* [1980-2006]

Headphones; Telephone handsets

*This code is now discontinued and has been transferred to V06-V04A4 and V06-V04B1 from 200701. It remains searchable for records prior to 2007.

Telephone transducers per se are coded in W01-C01M also, and mounting details in W01-C01A3.

Earphones, earpieces, receivers, transmitters, mouthpieces

V06-D* [1980-2006]

Vibration generators for performing mechanical work

*This code is now discontinued and has been transferred to V06-V04C from 200701. It remains searchable for records prior to 2007.

Includes shock wave generators for e.g. lithotripsy which are also coded in S05-B02. For industrial scale vibration generators see X25-L.

Coil, electromechanical

V06-E* [1980-2006]

Transducers

*This code is now discontinued and has been transferred to V06-V01 from 200701. It remains searchable for records prior to 2007.

This code is in general only used for audio or communication-type transducers.

V06-E01* [1980-2006]

Moving coil/strip/wire

*This code is now discontinued and has been transferred to V06-V01A1 and V06-V04A3 from 200701. It remains searchable for records prior to 2007.

Ribbon

V06-E01A* [1987-2006]

Moving coil

*This code is now discontinued and has been transferred to V06-V01A1 from 200701. It remains searchable for records prior to 2007.

Bobbins, voice coils

V06-E02* [1980-2006]

Piezoelectric; Electrostrictive

*This code is now discontinued and has been transferred to V06-V01B from 200701. It remains searchable for records prior to 2007.

Acoustic, ceramic, ultrasonic, quartz, piezo-ceramic

V06-E03* [1980-2006]

Electrostatic

*This code is now discontinued and has been transferred to V06-V01C from 200701. It remains searchable for records prior to 2007.

Includes electrets and other capacitive-effect transducers.

Condenser

V06-E04* [1997-2006]

Digital transducers

*This code is now discontinued and has been transferred to V06-V01L from 200701. It remains searchable for records prior to 2007.

V06-E05* [1997-2006]

Wireless transducers

*This code is now discontinued and has been transferred to V06-V01M from 200701. It remains searchable for records prior to 2007.

V06-E06* [1997-2006]

Microtransducers; Nanotransducers

*This code is now discontinued and has been transferred to V06-V01K from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

V06-E06A* [2002-2006]

Nanotransducers

*This code is now discontinued and has been transferred to V06-V01K2 from 200701. It remains searchable for records prior to 2007.

V06-E07* [2005-2006]

Ultrasonic transducer

*This code is now discontinued and has been transferred to V06-V01N from 200701. It remains searchable for records prior to 2007.

Includes audio/communication type ultrasonic transducers.

V06-E08* [2005-2006]

Bone conduction transducer

*This code is now discontinued and has been transferred to V06-V01P from 200701. It remains searchable for records prior to 2007.

V06-E09* [1980-2006]

Other

*This code is now discontinued and has been transferred to V06-V01A2, V06-V01D, and V06-V01X from 200701. It remains searchable for records prior to 2007.

Includes moving armature, magnetostrictive and combined-principle transducers.

V06-F* [1980-2006]

Diaphragms; cones

*This code is now discontinued and has been transferred to V06-V02A from 200701. It remains searchable for records prior to 2007.

Membranes, vibration plates

V06-G* [1980-2006]

Transducer details

*This code is now discontinued and has been transferred to V06-V02 from 200701. It remains searchable for records prior to 2007.

V06-G01* [1980-2006]

Casings; Cabinets, mountings

*This code is now discontinued and has been transferred to V06-V02E and V06-V02F from 200701. It remains searchable for records prior to 2007.

Includes structural association of transducers with electric circuitry; throat mountings for microphones; lead-throughs for earphones; supports for music pick-ups. See also W04-S.

Enclosure, housings, chambers, holders

V06-G02* [1980-2006]

Obtaining desired frequency or directional characteristics

*This code is now discontinued and has been transferred to V06-V02G from 200701. It remains searchable for records prior to 2007.

Includes structural combinations and spatial arrangements of separate transducers responsive to two or more frequency ranges; enclosures modified by mechanical or acoustic dampers; use of horns; use of several identical transducers.

Dampers

V06-G09* [1980-2006]

Other

*This code is now discontinued and has been transferred to V06-V02H, V06-V02J and V06-V02X from 200701. It remains searchable for records prior to 2007.

Leads, mouthpieces, earpieces, sanitary devices

V06-H* [1980-2006]

Circuits for transducers

*This code is now discontinued and has been transferred to V06-V02S from 200701. It remains searchable for records prior to 2007.

Includes circuits for preventing acoustic reaction or correcting frequency response; cross-over networks for loudspeakers. Does not include volume control circuits. See W04-T also.

Frequency/amplitude control, delay circuits

V06-J* [1980-2006]

Transducer manufacture, testing, monitoring

*This code is now discontinued and has been transferred to V06-V03 from 200701. It remains searchable for records prior to 2007.

V06-J01* [1992-2006]

Manufacture

*This code is now discontinued and has been transferred to V06-V03A from 200701. It remains searchable for records prior to 2007.

V06-J01A* [1992-2006]

Diaphragm

*This code is now discontinued and has been transferred to V06-V03A1 from 200701. It remains searchable for records prior to 2007.

V06-J02* [1992-2006]

Testing, monitoring

*This code is now discontinued and has been transferred to V06-V03B from 200701. It remains searchable for records prior to 2007.

V06-J03* [2005-2006]

Micromachining process, method or apparatus

*This code is now discontinued and has been transferred to V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microtransducer, nanotransducer, silicon-machining, micromachining

V06-K* [1980-2006]

Electromechanical resonators and delay lines

*This code is now discontinued and has been transferred to V06-V01E and V06-V04D2 from 200701. It remains searchable for records prior to 2007.

For networks using resonators see U25-B codes also.

V06-K01* [1980-2006]

Delay lines

*This code is now discontinued and has been transferred to V06-V04D2 from 200701. It remains searchable for records prior to 2007.

V06-K02* [1980-2006]

Piezoelectric, electrostrictive and magnetostrictive resonators

*This code is now discontinued and has been transferred to V06-V01B, V06-V01D and V06-V01E from 200701. It remains searchable for records prior to 2007.

Includes crystal tuning forks.

Oscillator

V06-K03* [1980-2006]

Holders, electrodes, coils

*This code is now discontinued and has been transferred to V06-V02B, V06-V02C and V06-V02F from 200701. It remains searchable for records prior to 2007.

Mounts, seals, bases, housing, supports

V06-K03A* [1987-2006]

Electrodes

*This code is now discontinued and has been transferred to V06-V02B from 200701. It remains searchable for records prior to 2007.

Electrode arrays, forks, comb electrodes, interdigitated electrodes

V06-K04* [1987-2006]

Filters

(V06-K09)

*This code is now discontinued and has been transferred to V06-V04D1 from 200701. It remains searchable for records prior to 2007.

See U25-B also.

V06-K05* [1997-2006]

SAW resonators

*This code is now discontinued and has been transferred to V06-V01E1 and V06-V01E2 from 200701. It remains searchable for records prior to 2007.

See U14-G also.

Surface acoustic wave

V06-K06* [1997-2006]

MSW resonators

*This code is now discontinued and has been transferred to V06-V01E3 from 200701. It remains searchable for records prior to 2007.

Magnetostatic, surface wave, MSSW, forward volume, MSFVW, backward volume, MSBVW

V06-K07* [1997-2006]

Microresonators; Nanoresonators

*This code is now discontinued and has been transferred to V06-V01E and V06-V01K from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

V06-K07A* [2002-2006]

Nanoresonators

*This code is now discontinued and has been transferred to V06-V01E and V06-V01K2 from 200701. It remains searchable for records prior to 2007.

V06-K08* [1992-2006]

Manufacture and testing

(V06-K09)

*This code is now discontinued and has been transferred to V06-V03A and V06-V03B from 200701. It remains searchable for records prior to 2007.

V06-K08A* [2005-2006]

Micromachining process, method or apparatus

*This code is now discontinued and has been transferred to V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microresonator, nanoresonator, silicon-machining, micromachining

V06-K09* [1980-2006]

Other

*This code is now discontinued and has been transferred to V06-V01E and V06-V02S from 200701. It remains searchable for records prior to 2007.

Includes circuits; resonators not covered by previous codes.

V06-K10* [2005-2006]

Ultrasonic resonator

*This code is now discontinued and has been transferred to V06-V01E and V06-V01N from 200701. It remains searchable for records prior to 2007.

Includes ultrasonic delay lines and resonators.

V06-L* [1980-2006]

Measuring or general use type piezoelectric, electrostrictive, magnetostrictive or electromagnetic transducers

*This code is now discontinued and has been transferred to V06-V01A, V06-V01B, V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

See V06-M, V06-N and V06-U codes for motors and actuators. Vibration generators for performing mechanical work are in V06-V04C.

V06-L01* [1980-2006]

Piezoelectric, electrostrictive, magnetostrictive

*This code is now discontinued and has been transferred to V06-V01B, V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Materials are also in U11-A02.

Ultrasonic, acoustic, magnetostrictive, electrostrictive

V06-L01A* [1987-2006]

Piezoelectric

*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Piezoelectric composition, ceramic, ultrasonic, crystal, igniter, switch, micromechanism, sensor, buzzer

V06-L01A1* [1987-2006]

Medical applications

*This code is now discontinued and has been transferred to V06-V01B, V06-V02, V06-V04G and V06-V04K from 200701. It remains searchable for records prior to 2007.

See also S05-D.

Ultrasonic probes, acoustic transducers, ultrasonic diagnostics transducers

V06-L01A2* [1980-2006]

General measurements

*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

See also relevant S02, S03 codes.

Vibration, pressure, force

V06-L01A3* [1997-2006]

Piezoelectric transformers

*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

V06-L01A3A* [2002-2006]

Multilayer

*This code is now discontinued and has been transferred to V06-V01B1, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

V06-L01A3B* [2002-2006]

Rosen type

*This code is now discontinued and has been transferred to V06-V01B2, V06-V02 and V06-V04F from 200701. It remains searchable for records prior to 2007.

V06-L01A4* [1997-2006]

Piezoelectric (contactless) switches

*This code is now discontinued and has been transferred to V06-V01B, V06-V02 and V06-V04E from 200701. It remains searchable for records prior to 2007.

V06-L01B* [1997-2006]

Magnetostriuctive

(V06-L01)

*This code is now discontinued and has been transferred to V06-V01D, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

V06-L02* [1980-2006]

Manufacture, testing

*This code is now discontinued and has been transferred to V06-V01, V06-V03A and V06-V03B from 200701. It remains searchable for records prior to 2007.

Polarising, polymerising, coating, process, assembling

V06-L02A* [2005-2006]

Micromachining process, method or apparatus

*This code is now discontinued and has been transferred to V06-V01 and V06-V03A7 from 200701. It remains searchable for records prior to 2007.

See also U11-C and U12-B03F codes.

MEMS, microsensor, nanosensor, silicon-machining, micromachining

V06-L03* [1997-2006]

Microsensors; Nanosensors

*This code is now discontinued and has been transferred to V06-V01K, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Micromachining, micromechanical, microelectromechanical, micromechanism

V06-L03A* [2002-2006]

Nanosensors

*This code is now discontinued and has been transferred to V06-V01K2, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

V06-L04* [1997-2006]

Smart sensors

*This code is now discontinued and has been transferred to V06-V01Q, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Intelligent

V06-L05* [1992-2006]

Electromagnetic sensors

*This code is now discontinued and has been transferred to V06-V01A, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

V06-L06* [2005-2006]

Ultrasonic sensor

*This code is now discontinued and has been transferred to V06-V01N, V06-V02 and V06-V04G from 200701. It remains searchable for records prior to 2007.

Includes measurement type ultrasonic sensors.

V06-L10* [2002-2006]

Resonant sensors

*This code is now discontinued and has been transferred to V06-V02 and V06-V04G2 from 200701. It remains searchable for records prior to 2007.

V06-M

Small electric machines

Includes low power electric machines. Medium and large size machines and their controllers are in X11 and X13, respectively. Indeterminate size machines are in both V06 and X11 classes.

V06-M01

Synchronous machines

Motors, generators

V06-M01A

With permanent magnet

V06-M01A1 [2008]

Interior permanent magnet

IPM

V06-M01B

Without permanent magnet

V06-M01C [1997]

Hybrid synchronous machines

Includes combined permanent magnet and wound rotor type synchronous machines.

V06-M02

DC and induction machines

Includes universal machines.

V06-M02A [1987]

DC machines

Motors, generators, commutator motors, shunt motors

V06-M02B [1987]

AC machines

Induction-, squirrel cage-, asynchronous-, capacitor-start, split-phase-, AC commutator-machine

V06-M03

Non-mechanical commutator machines

Includes both AC and DC type brushless motors.

Brushless, electronic commutator

V06-M03A [1997]

Permanent magnet

PM DC/AC brushless

V06-M03B [1997]

Switched reluctance

SR DC/AC brushless

V06-M03C [1997]

Sensorless

BEMF

V06-M04

Machines with vibrating armatures or coils

Includes voice-coil type motors, solenoidal motors, vibration motors.

Reciprocating/oscillating magnet, polarised-armature, vibration motor

V06-M04A [1997]

Voice coil motors

V06-M05

Stepping motors

V06-M05A [1987]

Variable reluctance

V06-M05B [1987]

Permanent magnet

V06-M05C [1997]

Hybrid

V06-M06

Other electric machines

Includes 'perpetual motion' motors, torque motors.

Electrodynamic-clutches, -brakes, -gears

V06-M06A	[1987]
Synchros and selsyns	
<i>AC position motors</i>	
V06-M06B	[1987]
Linear motors	
V06-M06B1	[1997]
Asynchronous	
<i>Induction, AC, LIM</i>	
V06-M06B2	[1997]
Synchronous	
<i>AC, LSM</i>	
V06-M06B3	[1997]
Direct current	
<i>DC, linear</i>	
V06-M06B7	[1997]
Piezoelectric or electrostrictive	
<i>(V06-M06D)</i>	
V06-M06B8	[1997]
Electrostatic	
<i>(V06-M06F)</i>	
V06-M06B9	[1997]
Magnetostrictive	
<i>(V06-M06)</i>	
V06-M06C	[1987]
Tachogenerators	
Includes AC and DC type speed or rpm counters. See S02-G codes also.	
V06-M06D	[1987]
Piezoelectric or electrostrictive motors, actuators; Piezoelectric generators	
Includes piezoelectric elements placed in printheads of inkjet printers (see also S06-G codes for inkjet printers). Also includes surface acoustic wave actuators for which U14-G is also assigned.	
<i>Bimorph actuators, SAW actuators</i>	
V06-M06D1	[1992]
Ultrasonic motors	
V06-M06D2	[1997]
Generators	
V06-M06D3	[2002]
Laminated type	

V06-M06D4	[2002]
Bimorph type	
V06-M06E	[1987]
Servomotors	
V06-M06F	[1992]
Electrostatic motors, actuators, generators	
Also includes triboelectric motors or generators. <i>Triboelectric effect</i>	
V06-M06G	[1992]
Micromotors/microactuators; Nanomotors/nanoactuators	
See also U12-B03F. For mfg. see V06-M11 and U11-C18C codes. <i>Micromachine, micromachining, micromechanical, microelectromechanical, micromechanism</i>	
V06-M06G1	[1992]
Electrostatic excitation	
V06-M06G1A	[2002]
Comb motors	
V06-M06G1B	[2002]
Wobble motors	
V06-M06G2	[1992]
Magnetic excitation	
V06-M06G3	[2007]
Electro-thermal effect	
For non-MEMS type electro-thermal actuator see V06-M06M.	
V06-M06G8	[2005]
Microgenerators; Nanogenerators	
V06-M06G8A	[2005]
Nanogenerators	
V06-M06G9	[2002]
Nanomotors/nanoactuators	
V06-M06H	[1997]
Magnetostrictive motors, actuators; Generators	
<i>(V06-M06)</i>	
Includes magnetostrictive motors, actuators and generators	

V06-M06H1 [2005]
Motors; Actuators

V06-M06H2 [2005]
Generators

V06-M06J [1997]
Corona motors
(V06-M06)

V06-M06K [1997]
Magnetic-fluid motors, actuators
(V06-M06)
Includes electromagnetic pumps used for moving liquid metal or some other magnetic fluid using electromagnetic force. Electromagnetic pumps for high power applications are coded under X11-H03B only.

V06-M06M [1997]
Shape-memory alloy motors
(V06-M06)

V06-M06N [1997]
Printed-circuit or pancake motors
(V06-M06)

V06-M06P [1997]
Multidimensional motors
(V06-M06)

V06-M06Q [2002]
MHD generators
See X11-H03B for medium/high power machines.
Magneto-hydro-dynamics

V06-M06R [2005]
Ultrasonic motors
Includes non-piezoelectric type ultrasonic motors. See V06-M06D1 for piezoelectric ultrasonic motors.

V06-M06S [2007]
Electro-active polymer motors
Includes actuators/motors and generators having, for example, an electro-active polymer for electrical to mechanical, and vice-versa, energy conversion. See V06-M06D codes for piezoelectric actuators or motors. The actuator may have either a liquid or solid electrolyte.
EAP

V06-M06T [2008]
External rotor type motor
Includes motor with an outer or external rotor construction.

V06-M07
Magnetic circuits
Magnets, magnetic poles, cores, yokes, tooth, slots, laminations

V06-M07A [1987]
Stator
Includes insulation details of stator.

V06-M07B [1987]
Rotor
Includes insulation details of rotor.

V06-M08
Windings
Slot-closures, wedges, ties, fastening windings

V06-M08A [1987]
Conductor shape, form, construction or layout
Coils, disc, flat

V06-M08A1 [2002]
Printed coils/windings

V06-M08B [1987]
Insulation; Shielding; Protection
Corona protection

V06-M09
Casings; Supports
Includes enclosures, casings, bearing and brush supports, bearing shields or end plates. Also includes lubrication and insulation details of bearings, etc.
Housing, machine mountings, seals, explosion-proofing, vibration-damping, brush holders

V06-M09A [2002]
Connectors; Terminal boxes

V06-M10
Arrangements for handling mechanical energy
Shaft, clutches, brakes, gears, pulleys, mechanical starting, loads, flywheels, balancing arrangements, bearings, couplings

V06-M10A	[2002]
Microgears; Microtransmission	
V06-M11	
Manufacture, testing, repair and maintenance	
Includes recycling details (see also X25-W04).	
V06-M11A	[1983]
Commutators, slip-rings, brushes	
Includes wear indicators. See also V04-P02 for manufacture of general commutators, brushes, etc.	
V06-M11B	[1983]
Windings	
<i>Coiling, inserting wires, winding jigs, laying conductors, conductor bending</i>	
V06-M11C	[1987]
Insulation, balancing, centering	
Includes impregnating, insulating, heating or drying of windings, rotors or machines. Also includes centering/balancing details of motor.	
<i>Taping</i>	
V06-M11D	[1987]
Core	
For rotor or stator bodies.	
<i>Magnetic poles, casting, moulding, laminating, slotting, magnetic circuits</i>	
V06-M11E	[2016]
Casings and supports	
<i>Housing, enclosure</i>	
V06-M11G	[2005]
Micromachining process, method or apparatus	
See also U11-C and U12-B03F codes.	
<i>MEMS, micromotor, microactuator, nanomachine, nanoactuator, silicon-machining, micromachining</i>	
V06-M11M	[1997]
Testing, repair and maintenance	
Includes analysis, diagnosis, monitoring, fault detection. This code can be used in conjunction with other V06-M11 codes, e.g. together with V06-M11A, V06 M11B, V06-M11C and V06-M11D for testing of brushes, windings, insulation and cores, respectively.	

V06-M11P	[1997]
Characterised by use of microprocessors	
V06-M12	[1983]
Commutators, slip-rings, brushes	
Includes connections with windings, commutation improving arrangements. See also V04-L01.	
<i>Commutator segments, current collectors</i>	
V06-M13	[1992]
Cooling, ventilation	
This code covers cooling and/or ventilation of e.g. the motor itself, and not when the motor is part of the cooling/ventilation system for cooling another device.	
V06-M14	[1992]
Structural association with electric component	
Includes measuring and protecting electronic components e.g. resistors, switches or RFI suppressors.	
<i>Position/rotation/direction detectors</i>	
V06-M15	[2002]
Materials	
V06-M15A	[2002]
Conductive materials	
Includes details of materials for thermal or electrical conduction.	
V06-M15B	[2002]
Magnetic materials	
V06-M15C	[2002]
Insulative materials	
Includes details of materials for electrical insulation.	
V06-M16	[2008]
Non-electrodynamic motor details	
Includes details, such as electrodes, for piezoelectric, electrostatic, etc motors.	
V06-M20	
Other details of small electric machines	
This code includes details of model illustrating / demonstrating how an electric motor works. See also W04-W07C for demonstration of process or effect. Also includes machine simulation/design. Includes motor cable details.	
<i>Motor simulation, generator simulation, electric machine simulation, motor design, generator design, electric machine design</i>	

V06-N [1983]

Controlling small electric machines

Includes control of low power motors, actuators and generators. Protective circuits for low power motors are coded by U24-F codes.

V06-N01 [1983]

Stepping motors

Translation circuit, stepper, step-by-step motor

V06-N01A [2005]

Variable reluctance

V06-N01B [2005]

Permanent magnet

V06-N01C [2005]

Hybrid

V06-N02 [1983]

DC mechanical commutator motors

Shunt motor

V06-N03 [1983]

AC motors

V06-N03A [1997]

Asynchronous

Induction

V06-N03B [1997]

Synchronous

V06-N03B1 [2006]

With permanent magnet

V06-N03B2 [2006]

Without permanent magnet

V06-N04 [1987]

DC brushless motors

V06-N04A [1997]

Permanent magnet

PM DC brushless

V06-N04B [1997]

Switched reluctance

SR DC brushless

V06-N04C [1997]

Sensorless

BEMF

V06-N05 [1987]

Starting

V06-N06 [1987]

Braking; Stopping

Reversing, resistive-, regenerative-braking

V06-N07 [1992]

Piezoelectric or electrostrictive motors, actuators

Ultrasonic

V06-N08 [1997]

Electrostatic motors, actuators

V06-N09 [1997]

Magnetostrictive motors, actuators

V06-N10 [1997]

Servomotors

V06-N11 [1997]

Linear motors

V06-N11A [1997]

Asynchronous

Induction, AC, LIM

V06-N11B [1997]

Synchronous

AC, LSM

V06-N11C [1997]

Direct current

DC, linear

V06-N11D [1997]

Piezoelectric or electrostrictive

V06-N11E [1997]

Magnetostrictive

V06-N11F [1997]

Electrostatic

V06-N12	[1997]
Voice coil motors	
V06-N13	[1997]
Corona motors	
V06-N14	[1997]
Magnetic-fluid motors, actuators	
(V06-N)	
V06-N16	[1997]
Shape-memory alloy motors	
(V06-N)	
V06-N18	[1997]
Printed-circuit or pancake motors	
(V06-N)	
V06-N20	[1997]
Multidimensional motors	
(V06-N)	
V06-N21	[2018]
Machines with vibrating armatures or coils	
Control of ultrasonic motors are coded under V06-N36 only.	
<i>Vibration motor</i>	
V06-N22	[1997]
Micromotors/microactuators; Nanomotors/nanoactuators	
<i>Micromachine, micromachining, micromechanical, microelectromechanical, micromechanism</i>	
V06-N22A	[2002]
Nanomotors/nanoactuators	
V06-N24	[1997]
Smartpower IC controllers	
<i>Integrated circuit controller, integrated smart power circuit</i>	
V06-N26	[1997]
Microprocessor control	
Includes DSP, ECU, PLC.	
V06-N30	[1997]
Multimotor control	

V06-N35	[2002]
Remote motor control	
V06-N36	[2005]
Ultrasonic motors	
Use this code together with other V06-N codes if required for highlighting the type of motor being controlled.	
V06-N37	[2005]
Vector control	
<i>Field-oriented, flux-vector, direct-torque, control, regulation</i>	
V06-N40	[2005]
Low power generators	
For records prior to 2005, see X13-G02 codes. Medium and high power generator control is in X13-G02.	
V06-N40A	[2005]
Synchronous generators	
V06-N40B	[2005]
DC generators	
V06-N40C	[2005]
Induction generators	
V06-N40D	[2005]
Piezoelectric generators	
V06-N40E	[2005]
Magnetostrictive generators	
V06-N40F	[2005]
Electrostatic generators	
V06-N40G	[2005]
MHD generators	
V06-N40H	[2005]
Microgenerators; Nanogenerators	
V06-N40H1	[2005]
Nanogenerators	
V06-N45	[2005]
Speed control or regulation of electrical machines characterized by specific switching or control device	

V06-N45A	[2005]
Characterized by diodes	
V06-N45B	[2005]
Characterized by bipolar transistors	
V06-N45C	[2005]
Characterized by FETs	
V06-N45D	[2005]
Characterized by IGBTs	
V06-N45E	[2005]
Characterized by combination of switching devices	
V06-N45F	[2005]
Characterized by AC-to-DC converter	
V06-N45G	[2005]
Characterized by DC-to-AC converter	
V06-N45H	[2005]
Characterized by AC-to-AC converter	
V06-N45J	[2005]
Characterized by DC-to-DC converter	
V06-P	[2007]
Power generation plant	
Covers only very low power generation. Medium to large scale power generation is covered in X11, X14 and X15.	
V06-P01	[2007]
MEMS or chip-scale power plant	
Includes the implementation of whole power plants on a MEM device or chip. Covers micro-combustion of fuels to drive a micro steam- or gas- or other- turbine, which drives a micro-generator. Individual MEMS generators are in V06-M06G. See also U12-B03F codes.	
<i>Micro power generator</i>	
V06-P02	[2007]
Small scale power plant	
Includes low wattage power plants typically used for powering small electronic equipment.	

V06-U	[1997]
Electric machines characterised by applications	
V06-U01	[1997]
Domestic	
Includes motors used in domestic and household equipment such as washing machines, dishwashers, vacuum cleaners, office paper shredder etc. Personal items, such as toothbrushes, razors, etc, are coded under V06-U02 only. Domestic and household equipment are also coded under X27.	
<i>Household</i>	
V06-U02	[1997]
Personal	
Includes motors used in personal items such as toothbrushes, razors, hair dryers, etc. Domestic items are also coded under X27.	
<i>Toothbrush, razor, hair dryer</i>	
V06-U03	[1997]
Vehicles	
Includes land, sea and air vehicles.	
V06-U04	[1997]
Information equipment	
V06-U04A	[1997]
Disk drives; Tape drives	
V06-U04B	[1997]
Printers; Graph plotters; Scanners; Photocopiers	
V06-U04C	[1997]
Facsimile machines	
V06-U04D	[1997]
Ventilation; Cooling	
Also includes motor for cooling of electronic equipments, printed circuits etc.	
V06-U04E	[2002]
Telecommunication	
Includes mobile telephones.	
V06-U05	[1997]
Robotics	
V06-U06	[1997]
Machine tools	

V06-U07	[1997]
Dispensing / vending machines	
See T05-H codes for details of vending machines, and X25-F03B for details of dispenser, including food/drink dispensers.	
<i>ATM machine</i>	
V06-U08	[1997]
Toys; Games; Sports	
Includes exercise machines.	
V06-U09	[1997]
Audio, video equipment	
Includes motors for projectors, video recorders (VCR), DVD recorders and players, Hi-Fi systems, etc. Also includes motors for digital cameras, including cameras for mobile phones, laptops, etc. Non-digital cameras, or film cameras, are only coded under V06-U13. See also W04 codes for audio / video equipment.	
<i>CCD camera, digital camera, VCR, DVD player</i>	
V06-U10	[1997]
Medical	
V06-U11	[1997]
Electronic equipment manufacture	
Includes semiconductor manufacturing equipment.	
V06-U12	[1997]
Instrumentation	
Includes details of timepieces, e.g. chronograph timepiece.	
V06-U13	[2002]
Non-digital / film cameras	
Includes motor details for non-digital cameras, such as silver halide film cameras, 35 mm cameras, etc. Digital cameras are only coded under V06-U09. All video cameras are coded under V06-U09 only. See also S06-B for electrical details of film cameras.	
<i>Silver halide, 35 mm camera</i>	
V06-U14	[2002]
Optical switches	
V06-U15	[2002]
Industrial machines/components	
Includes industrial vehicles e.g. cranes, concrete mixing lorry, fork lift truck etc.	
V06-U99	[2006]
Other electric machine applications	

V06-V	[2007]
Electromechanical transducers	
This section covers all electromechanical transducers for audio/communication, resonators, sensors, vibrators (mechanical work) and general transducers not covered elsewhere.	
For records prior to 2007, see V06-A to V06-J codes for audio/communication type transducers and vibrators (mechanical work), V06-K codes for resonators and V06-L codes for sensors, and general transducers not covered elsewhere.	
See V06-M, V06-N and V06-U codes for small motors/actuators construction, manufacture, testing, monitoring, maintenance, control and applications. See U12-B01B for magnetoresistors, U12-B03E for piezoresistors.	
V06-V01	[2007]
Transducers characterised by mode, principle, scale or type	
These codes are used to highlight a specific transducer aspect such as mode (ultrasonic), principle (electrostriction), scale (micro) and type (moving coil). V06-V01 codes are used in conjunction with other relevant codes such as V06-V02 for details, V06-V03 for manufacture and V06-V04 for applications. For example, a novel electrode of a piezoelectric resonator for a delay line would be coded in V06-V01B, V06-V01E, V06-V02B and V06-V04D2.	
V06-V01A	[2007]
Electromagnetic induction	
(V06-E01, V06-E09 and V06-L05)	
See also V02-G01E for linear variable displacement transducers or transformers (LVDT)	
V06-V01A1	[2007]
Moving coil	
(V06-E01A)	
<i>Voice coil, bobbins</i>	
V06-V01A2	[2007]
Moving armature, core or magnet	
(V06-E09)	
<i>LVDT</i>	
V06-V01A3	[2007]
Moving wire or strip	
(V06-E01)	
<i>Ribbon</i>	

V06-V01B [2007]

Piezoelectric; Electrostrictive

(V06-E02, V06-K02, V06-L01A)

Details of piezoelectric or electrostrictive materials are covered by both V06-V01B and V06-V02R ('Materials').

Piezoceramic, quartz, ceramic, crystal resonator

V06-V01B1 [2007]

Multilayer

(V06-L01A3A)

V06-V01B2 [2007]

Rosen type

(V06-L01A3B)

V06-V01C [2007]

Electrostatic

(V06-E03)

Includes electrets and other capacitive-effect transducers (see also V01-B02 codes).

Condenser

V06-V01D [2007]

Magnetostrictive

(V06-E09, V06-L01B)

V06-V01E [2007]

Resonators

(V06-K02)

Includes electromechanical resonators. For networks using resonators, see U25-B codes also.

Oscillators, crystal resonators, elastic wave resonators

V06-V01E1 [2007]

Surface acoustic wave

(V06-K05)

SAW

V06-V01E2 [2007]

Bulk acoustic wave

(V06-K05)

BAW

V06-V01E3 [2007]

Magnetostatic acoustic wave

(V06-K06)

Magnetostatic surface wave, MSSW, magnetostatic forward volume wave, MSFVW, magnetostatic backward volume wave, MSBVW

V06-V01K [2007]

Microtransducers; Nanotransducers

V06-V01K1 [2007]

Microtransducers

(V06-E06, V06-K07, V06-L03)

MEMS, micromechanical, microelectromechanical, micromechanism

V06-V01K2 [2007]

Nanotransducers

(V06-E06A, V06-K07A, V06-L03A)

NEMS, nanomechanical, nanoelectromechanical, nanomechanism, (piezoelectric) nano-wire

V06-V01L [2007]

Digital transducers

(V06-E04)

V06-V01M [2007]

Wireless transducers

(V06-E05)

Bluetooth transducer

V06-V01N [2007]

Ultrasonic transducers

(V06-B03, V06-E07, V06-K10, V06-L06)

Includes details of supersonic transducers and ultrasonic/megasonic cleaning. Ultrasonic cleaning is also covered by V06-V04C and X25-H09A.

V06-V01P [2007]

Bone conduction transducers

(V06-E08)

Includes details of bone anchored hearing aids (BAHA). Hearing aids are also coded under V06-V04K for medical applications, and under W04-Y. If the hearing aid is implanted, see also S05-F01.

Hearing aid, bone anchored hearing aids, BAHA, bone conduction transducers

V06-V01Q [2007]

Smart transducers

(V06-L04)

Includes details of the processing unit and the communication interface.

IEEE1451, SensorML, TransducerML, Transducer Markup-Language

V06-V01X [2007]

Other transducers

(V06-E09, V06-K09, V06-L)

Includes electro-optical(audio), combined-principle and infrasonic transducers.

V06-V02 [2007]

Transducer details, circuits, materials

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil construction of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V02C, V06-V04A1 and V06-V04A5.

V06-V02A [2007]

Diaphragms; Cones

(V06-A02, V06-F)

Membranes, vibration plates

V06-V02B [2007]

Electrodes; Terminals

(V06-G09, V06-K03A)

V06-V02C [2007]

Coils; (electro)magnets

(V06-K03)

V06-V02D [2007]

Substrates; Layers

V06-V02E [2007]

Casings

(V06-G01, V06-K03)

Includes individual transducer housings. Also includes shield element to protect individual transducer. If the shield element is part of the cabinet, V06-V02F should be applied instead.

V06-V02F [2007]

Cabinets; Mountings; Supports

(V06-G01, V06-K03)

Includes cabinets, mountings, supports for the transducer(s) within a cabinet. Also includes mountings of circuit board.

Enclosure, chambers, holders

V06-V02G [2007]

Obtaining desired frequency or directional characteristics

(V06-G02)

Includes structural combinations and spatial arrangements of separate transducers responsive to two or more frequency ranges, enclosures modified by mechanical or acoustic dampers, use of horns, use of several identical transducers.

V06-V02H [2007]

Leads, connectors

(V06-G09)

Includes earphone jacks, cables for headphone/earphone, etc. Details of cables are also coded under X12-D.

V06-V02J [2007]

Sanitary devices

(V06-G09)

Includes details of waterproof filter protecting the mouthpiece of a microphone, etc.

V06-V02R [2007]

Materials

(V06-L01)

Manufacturing details of materials are covered by both V06-V02R and V06-V03A9 ('Other transducer manufacture'). Details of piezoelectric or electrostrictive materials are covered by V06-V02R and V06-V01B ('Piezoelectric; electrostrictive').

V06-V02S [2007]

Circuits

(V06-H, V06-K09)

Includes circuits for preventing acoustic reaction or correcting frequency response; cross-over networks for loudspeakers. Does not include volume control circuits. See W04-T also.

V06-V02X [2007]

Other transducer details

(V06-G09)

Includes transducer details not covered elsewhere. Also includes details of model illustrating / demonstrating how a transducer works. See also W04-W07C for demonstration of process or effect.

V06-V03 [2007]

Transducer manufacture, testing, monitoring

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil manufacture of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V03A3, V06-V04A1 and V06-V04A5.

V06-V03A [2007]

Manufacture

(V06-J01, V06-K08, V06-L02)

V06-V03A1 [2007]

Diaphragms; cones

(V06-J01A)

V06-V03A2 [2007]

Electrodes; terminals

(V06-J01, V06-K08, V06-L02)

V06-V03A3 [2007]

Coils; (electro)magnets

(V06-J01, V06-K08 and V06-L02)

V06-V03A4 [2007]

Substrates; Layers

(V06-J01, V06-K08, V06-L02)

V06-V03A5 [2007]

Casings

(V06-J01, V06-K08, V06-L02)

V06-V03A6 [2007]

Cabinets; Mountings; Supports

(V06-J01, V06-K08, V06-L02)

V06-V03A7 [2007]

Micromachining process, method or apparatus

(V06-J03, V06-K08A, V06-L02A)

Includes manufacture of MEMS and NEMS. See also U11-C and U12-B03F codes.

Micromechanical, microelectromechanical, micromechanism, microtransducer, nanomechanical, nanoelectromechanical, nanomechanism, nanotransducer

V06-V03A9 [2007]

Other transducer manufacture

(V06-J01, V06-K08, V06-L02)

Includes manufacture of transducer details not covered by the above codes. Includes manufacturing details of materials (see also V06-V02R).

V06-V03B [2007]

Testing, monitoring and calibration of transducers

(V06-J02, V06-L02, V06-K08)

This code includes testing and monitoring details of transducers, and not when the transducers are used as testing or sensing transducers, e.g. when the transducer is used to detect the tire pressure. Sensing, testing and imaging-type transducers are coded under V06-V04G.

V06-V04 [2007]

Transducer applications

These codes are used in conjunction with other V06-V codes as appropriate. For example, a novel coil of a moving coil type transducer for a loudspeaker in a PA system is coded in V06-V01A1, V06-V02C, V06-V04A1 and V06-V04A5. For applications in the communications and audio/video fields, see also W01, W02, W03 and W04 classes. For applications in the instrumentation and medical fields, see also S01, S02, S03 and S05 classes.

V06-V04A [2007]

Audio/video equipment

Includes details of microphone (V06-V04A2) and/or speaker arrangements (V06-V04A4) for non-implanted hearing aids. Bone anchored or implanted hearing aids are only coded under V06-V04K and V06-V01P. Hearing aids are also coded under W04-Y. Also includes musical instruments, such as electronic trumpet, and cameras. Details of digital cameras are also included by W04-M01 codes.

V06-V04A1 [2007]

Loudspeakers

(V06-A)

See also W04-S codes.

V06-V04A2 [2007]

Microphones

(V06-B02)

Pick-ups for musical instruments are coded in V06-V04A3. For microphones used for measurement purposes, see V06-V04G3.

V06-V04A3 [2007]

Pick-ups

(V06-B01)

Includes pick-ups for gramophones and musical instruments. General audio microphones are in V06-V04A2.

Stylus, cartridges, groove, mechanical recording, needle

V06-V04A4 [2007]

Headphones; Earphones

(V06-C)

Also includes hands-free kits, hearing aids. For hearing aids, also apply V06-V04K.

Earphones, earpieces, mouthpieces, hearing aids

V06-V04A5 [2007]

Public address systems

Includes equipment used in sound broadcasting during concerts, in public places such as train or underground stations, exhibition halls, etc. Includes details of long-line public address systems. Details of microphones and loudspeakers are coded under V04-V06A1 and V06-V04A2, respectively. See also W04-S codes.

PA system, loudhailer, concert, exhibition, conference, megaphone, LLPA

V06-V04B [2007]

Communication equipment

Also includes hydrophones used for audio/voice communications. For hydrophones used in instrumentation, see V06-V04G1. For sonar systems, see also W02-C07 and W06-A05 codes.

V06-V04B1 [2007]

Telephone handsets

(V06-C)

Telephone transducers, per se, are also coded in W01-C01M, and mounting details in W01-C01A3.

Receivers, transmitters

V06-V04B2 [2007]

Radio communication

V06-V04C [2007]

Vibrators (mechanical work)

(V06-D)

Includes transducers for performing mechanical work e.g. shock wave generator for lithotripsy. For industrial-scale vibration generators see X25-L codes. See V06-M codes for motors and actuators.

Buzzers, ultrasonic cleaning

V06-V04D [2007]

Filters; Delay lines

V06-V04D1 [2007]

Filters

(V06-K04)

V06-V04D2 [2007]

Delay lines

(V06-K01)

V06-V04E [2007]

Switching (contactless)

(V06-L01A4)

V06-V04F [2007]

Transformers

(V06-L01A3)

V06-V04G [2007]

Instrumentation

(V06-L01A2)

Includes sensing, detecting and imaging type transducers. Also includes transducers described as sensors. See also S02 and S03 codes for transducers used for general instrumentation.

V06-V04G1 [2007]

Sonar

(V06-B03, V06-E, V06-L)

Includes hydrophones for e.g. ranging. For audio/voice communications, see V06-V04B.

V06-V04G2 [2007]

Resonant sensor

(V06-L10)

V06-V04G3 [2007]

Measurement microphone

(V06-B02)

For audio/communication-type microphones, see V06-V04A2.

V06-V04H [2007]

Vehicles

Includes land, sea and air vehicles.

V06-V04J [2007]

Military

See also W07 codes for military applications of transducers.

V06-V04K [2007]

Medical

(V06-L01A1)

Includes details of transducers for hearing aids, including bone anchored or implanted hearing aids. Details of the bone conducting transducers are also coded under V06-V01P, and details of the microphone and/or speaker arrangements are also coded under V06-A04A codes. Hearing aids are also coded under W04-Y. See also S05 codes for transducers used in medical devices.

Hearing aid, veterinary, RIC (Receiver In Canal), in-ear canals

V06-V04L [2007]

Industrial

Includes machine tools, manipulators, etc.

Drilling, cutting, turning, lathe, robotics

V06-V04M [2008]

Information equipment

Includes details of transducers for computers, and computer peripheral devices e.g. mouse, disk drives, etc.

V06-V04N [2008]

Alarms; Signalling

V06-V04P [2008]

Personal

V06-V04Q [2008]

Displays

V06-V04R [2008]

Toys; Games; Sports

See also W04 codes.

Exercise machines, karaoke systems

V06-V04S [2008]

Domestic

V06-V04T [2013]

Purification; Sterilization

Includes details of transducers for purifying/sterilizing air in buildings, rooms, etc. Details of these air cleaners are also coded under X27-E01B2.

V06-V04X [2007]

Other transducer applications

Includes applications not covered elsewhere, e.g. igniters, vending machines, etc.

V07: Fiber-Optics and Light Control

The codes in this class were introduced at the start of 1983 and used to backlog code all basic abstracts to update 198018. Coverage is restricted to components for coupling, guiding, or performing operations - e.g. multiplexing - on IR, visible, or UV radiation. Individual radiation sources and receivers per se are not included, and are coded in U12 and V08. See W02-C04 codes for optical communications systems in general.

V07-F [1983]

Optical elements

V07-F01 [1983]

Light guides

V07-F01A [1983]

Guiding structures

Includes guiding structures e.g. rods, rectangular core waveguides. From 1992 for optical fiber bundles see V07-F01A1B.

V07-F01A1 [1983]

Optical fibers

Includes individual glass, plastics and high power air-clad optical fibers; core and cladding structures providing desired refractive index profile, e.g. concentric guiding structure; doping.

Matched, raised cladding, single mode, step-index, graded-index

V07-F01A1A [1992]

Light guides with polarisation-maintaining effect

(V07-F01A1)

V07-F01A1B [1992]

Optical fiber bundles

(V07-F01A)

Includes image transmission using fiber-optic face plates and imaging bundles, i.e. guides with same relative position of fibers at both ends.

Image inverters

V07-F01A1C [1997]

Optical fiber arrays

(V07-F01A1B)

Prior to 1997 coded in V07-F01A1B.

V07-F01A1D [1997]

Optical fiber tapes

(V07-F01A1B)

Prior to 1997, coded in V07-F01A1B. See V07-F01B4 for optical fiber cables.

Ribbon

V07-F01A1E [2007]

Dispersion compensation optical fibers

V07-F01A1F [2007]

Graded Index Fibers

(V07-F01A1B)

As opposed to step index fiber. Refractive index with quadratic profile. Graded index fibers are always multimode fibers

Graduated index, Graded index, Multimode

V07-F01A1X [2005]

Other novel optical fibers

Includes holey fibers, photonic fibers and micro/nano structured fibers. Dispersion compensating and slope compensating fibers may also be coded here. U13-B03F and V06 codes may also be added for micro/nano structured aspects. See V07-K10C for photonic materials, V07-F01A4 for photonic waveguides, and from 2006 see V07-F02D for all other photonic optical elements.

V07-F01A2 [1987]

Optical preform

Includes structure, with manufacture in V07-F01A3A. Also includes similar structures for other optical elements, e.g. GRIN lens, tapered waveguide.

Soot

V07-F01A3 [1987]

Manufacture, materials for optical fibers

V07-F01A3A [1992]

Manufacturing methods for optical fibers and waveguides

From year 2002, manufacturing equipment for optical fibers is coded in V07-F01A3C

V07-F01A3B [1992]

Materials for optical fibers and waveguides

For non-linear optical and electro-optical materials see V07-K10 codes. Details of materials for optical cables are coded under V07-F01B4C only.

Silica

V07-F01A3C [2002]

Manufacturing equipment

Covers equipment for the manufacture of optical fibers. Equipment for preparing fibers goes in V07-G01, and for light guides/cables go in V07-H01.

V07-F01A4 [2005]

Slab and Planar waveguides

Prior to 2005 see V07-F01A. Includes photonic waveguides with novel structure. For photonic materials see V07-K10C, for photonic fibers see V07-F01A1X, and from 2006 see V07-F02D for all other photonic optical elements.

V07-F01A5 [1983]

Integrated optical waveguides

Includes thin film waveguide and its manufacture. Connections, switches and modulators integrated onto waveguide are also included, but see also V07-G or V07-K codes. Thin film optical element e.g. filter or lens is additionally coded in V07-F02. Semiconductor waveguides are also coded in U12-A or U13-D04A but waveguides for lasers are not included.

Substrate, integrated optics

V07-F01A5A [1997]

Characterised by integrated optical waveguide manufacture

(V07-F01A5)

Includes film deposition, substitution of dopant atoms, etching, using polymerisation.

V07-F01A5S [2002]

Integrated optical waveguide sensors

Includes multilayered optical filters.

Fiber gratings, smart skin, smart structure

V07-F01A6 [1997]

Polarisation-independent light guides

V07-F01B [1983]

Light guide protection; Repair and maintenance; Optical cables

V07-F01B1 [1987]

Light guide protection

Includes materials, manufacture of covering layers (i.e. non-optical layers) coated on fiber after extrusion e.g. radiation curable layers and metal coatings.

Sheath

V07-F01B1A [2002]

Dust-proof and water-tight structures

Includes drainage and protection system for relay points of optical cables, communication cable terminations, and enclosures for protecting optical fiber connections from dust and humidity.

Dust-proofing, weather-proofing, environmental protection

V07-F01B2 [2005]

Optical fiber repair and maintenance methods and equipment

V07-F01B4 [1987]

Optical cable

Includes composite electrical and optical fibers cable for transmission line signalling and optical repeaters.

V07-F01B4A [1992]

Characterised by optical cable structure

Helical/S-Z winding, spacers

V07-F01B4B [1992]

Characterised by optical cable manufacture

Includes method and equipment for manufacturing optical cables.

V07-F01B4C [2023]

Characterised by optical cable materials

Includes optical cable materials. Details of materials for optical fibers and waveguides are coded under V07-F01A3B only.

Plastic, silica, glass

V07-F02 [1983]

Lenses, reflectors, other optical elements

Includes in general passive optical components associated with optical fibers and waveguides e.g. for coupling waveguides, sources and receivers; beam profile correction, etc. Also includes components manufactured from optical fiber e.g. filter, attenuator. For lens formed on fiber end, see V07-G04. Electro- and magneto-optic components are coded in V07-K.

V07-F02A [1987]

Lenses; Reflectors; Refractors

Includes prism; mirror (for scanning, see also V07-K05; incorporating electro-optic light shutter, see V07-K01A and for vehicle rear view/anti-dazzle mirror, see X22-J04).

V07-F02B [1987]

Gratings; Filters; Polarisers

Includes light retardation film, light diffusion film.

Diffraction

V07-F02C [1987]

Holograms

Excludes materials for holograms. For holograms used as optical components e.g. holographic diffraction grating, see also V07-F02B. Holography is in V07-M.

V07-F02D [2006]

Photonic optical elements

For waveguides see V07-F01A4. For fibers see V07-F01A1X. For novel band gap aspects of photonic materials, and novel photonic materials, see V07-K10C.

V07-F03 [1992]

Mode selectors/converters

(V07-F01A1)

Multi-mode

V07-G [1983]

Coupling light guides

Codes V07-G01 to V07-G04 are used in conjunction with V07-G10 to V07-G12.

V07-G01 [1983]

Preparing fiber

Includes cutting, polishing, stripping protective coating (see also V07-H01). Hand tools are also in V07-H01.

Cleaving, scoring

V07-G02 [1983]

Aligning with fiber or source

Includes alignment using e.g. ferrules or by injecting light into fiber and measuring maximum transmission.

V07-G02A [2005]

Optical ferrules

Includes all aspects of ferrule structure, manufacture, molding, methods and equipment

V07-G03 [1983]

Fixing separation, fastening

Includes plugs, screw-ins, lever locking, retainment against pulling force, spring-biasing, strain relief (see also V07-H codes), fixing gap between fiber ends, optical cement, etc.

V07-G04 [1983]

Beam shaping and focusing

Includes expanding of beam with lens, forming of e.g. elliptical lens on fiber, heating to alter refractive index distribution, mode, phase, and beam profile matching, anti-reflection coating.

V07-G05 [2005]

Optical components other than beam shaping and focusing

Includes filters, polarisers, gratings, mirrors etc. for coupling structures. Filters for beam shaping or lensing are covered in V07-G04, otherwise covered here. For novel optical element aspects see V07-F02 codes.

V07-G10 [1983]

2- port connections

Includes coaxial connections, e.g. simplex, duplex, ribbon cable to ribbon cable, bundle to bundle, fiber termination, coupling fiber to thin film waveguide, and connections on thin film waveguide (see also V07-F01A5). V07-G10 is used if it is unclear whether connection is detachable or permanent. When this code is used in combination with V07-F02 it indicates that connection has other optical function, e.g. as attenuator.

V07-G10A [1983]

Detachable connectors

Includes connections intended for repeated connection/disconnection e.g. plug type.

V07-G10B [1983]

Permanent connections

Includes splicing by fusing fiber ends or using heat shrinkable sleeve or using index matching adhesive.

V07-G10C [1983]

Coupling guide end to active source/detector

Includes connections to LED, laser diode, lamp, or photodiode, bi-directional coupling to source/detector. In general, use also V07-G10A if connection is detachable but not V07-G10B, if permanent. Also includes bare fiber inserted into source module package, e.g. as pigtail (see also U12-A01C).

V07-G10D [1987]

Optical coupling

Includes coupling between fibers using e.g. lens, fiber-thin film coupling.

V07-G10E [2002]

Orthogonal intersection of parallel fiber optic threads

Includes intersection of parallel woven fiber optic threads, orthogonal to another fiber optic thread.

Fabric panel, display, energy beam, internal reflection, light generating pixels

V07-G11 [1983]

3- or more port couplers

Includes coupling e.g. by splitting light path or removing cladding, (de)multiplexing (see also V07-K04); circulators, evanescent coupling, star couplers, bi-directional coupling using beam splitter, mode selector/converter (see also V07-F03).

Branching

V07-G12 [1983]

Rotary couplers

Slip-ring

V07-G13 [2005]

Optical fiber component packages/modules for optical communications

Includes optical line cards, optical backplanes and other passive optical component modules. Does not include electro-optical packages, which are coded in W02. Includes manufacture.

V07-G15 [1983]

Optical switching

Includes mechanical, electromechanical, electro/magneto-optic or thin film switches. Electromechanical or electro/magneto-optic switching is also in V07-K01. Rotary switches are also in V07-G12.

Shutter, fiber displacement

V07-H [1983]

Light guide installation

Covers installations analogous to W01-D, X12-G.

V07-H01 [1992]

Methods and equipment for installing light guides/cables

Includes hand tools for use in-field (see also V07-G01), stripping coating or cladding, dispensers, air blowing, pulling of guide through duct, splicing, cable marking.

Joining, terminating

V07-H02 [1992]

Fittings for optical guides/cables

Includes splice cases, distribution boxes, strain relief, heat shrinkable covers, clamps etc. For installation tools used with these fittings see also V07-H01.

V07-H03 [1992]

Installations for optical guides/cables

Includes details of optical fibers in underwater/underground/overhead power distribution network. For installation tools used on site see also V07-H01.

Conduit, ducting, feed-throughs, bushings

V07-H04 [2005]

Optical fiber excess management

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels. From 2006 see V07-H04A for excess fiber management for fiber in use, and V07-H04B for excess fiber management for fiber not in use. See also X12-G04A1 for reels for composite optical and electrical cables. Prior to 2005 see V07-H09.

Reels

V07-H04A [2006]

Optical fiber excess handling and management

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels for fiber-optics connected to communications/light transmitting system. Also includes protection of buried fiber optic nodes.

V07-H04B [2006]

Optical fiber storage and transporting aspects

Includes optical cable reels, trays, cable guides and supports for excess cable management, surface inlaid fiber optic installations and pre-assembled fiber-optic installation panels for excess/spare fiber not connected to anything, e.g. for storage in warehouse/ storage cabinet. Also includes storage space for jacketed fiber.

V07-H09 [1992]

Other aspects of light guide installations

Includes all other aspects of cable installation not covered anywhere else. From 2005 see V07-H04 codes for reels.

V07-J	[1983]
Measuring optical element parameters	
For measurements during waveguide manufacture, see also V07-F01A3A. Includes measuring/testing guide characteristics e.g. loss, dispersion (see also S02-J04A1); fault location/monitoring of transmission system e.g. breakage (see W02-C codes also). Excludes optical sensors i.e. measuring of non-optical parameter using optical fibers: these are coded in V07-K and in the relevant S01/S02/S03 codes.	
<i>Attenuation, intensity, optical time domain reflectometry, OTDR</i>	
V07-K	[1983]
Controlling light	
In general, includes modification of optical properties of medium electrically, magnetically, acoustically, and physically (i.e. force, stress, etc.), and by using light (i.e. non-linear optics). Also includes light switching and electro- or magneto-optic materials. For spatial light modulation, prior to 1997, see V07-K01 and V07-K05; from 1997 spatial light modulators are covered in V07-K01A2. For spatial phase correction, prior to 199701 see V07-K02 and V07-K05; from 1997 spatial phase correction is covered by V07-K02 and V07-K01A2. Excludes anti-dazzle electro-optic vehicle mirror (see X22-J), electro-optic spectacles (see X27-A02D), constructional details of electro-optic display (e.g. for liquid crystal, electrochromic displays, see U14-K codes).	
V07-K01	[1983]
Light intensity control, modulation	
Includes physically modifying fiber e.g. by stretching, bending; using acousto- or magneto-optic effects. Also covers optically activated liquid crystal devices.	
V07-K01A	[1987]
Light intensity control/modulation using electro-optical devices	
Includes control using liquid crystal devices; semiconductor light in-light out devices (see also U12-A02C3); MQWs (see also U12-E01B2). From 1992 for optical logic devices see V07-K06.	
<i>Multi-quantum well, Kerr, Pockells, Stark</i>	
V07-K01A1	[1997]
Single optical beam modulation	
(V07-K01A)	

V07-K01A2	[1997]
Area modulation	
(V07-K01, V07-K05)	
Prior to 1997 spatial modulation is covered by V07-K01 and V07-K05. For magneto-optic spatial modulation see also V07-K03.	
<i>Light valves, spatial, Spatial light Modulation (SLM), 3D Projecting light displays</i>	
V07-K01B	[1987]
Light control using shutters	
Includes e.g. electromechanical chopper, ferromagnetic fluid.	
V07-K01C	[1992]
Optical amplification	
(V07-K01, V07-K01A, V08-A04X)	
<i>Repeater</i>	
V07-K01C1	[1992]
Semiconductor optical amplifiers	
(V07-K01A)	
Includes amplifiers derived from conventional laser diodes. See also U12-A02B1, U12-A02C3 or V08-A04A.	
V07-K01C2	[1992]
Optical fiber amplifiers	
(V07-F01A1, V08-A4X)	
Includes fiber doped with rare earth metal (e.g. erbium) amplifier.	
V07-K02	[1983]
Phase	
Includes pulse shaping.	
<i>Sagnac, interferometer, delay, refractive index</i>	
V07-K03	[1983]
Polarisation	
Includes magneto-optic effect, and materials which exhibit this effect. For magnetometers using rotation of polarised light, see also S01-E01.	
<i>Faraday effect/rotator, Kerr, optical isolator, circulator</i>	

V07-K04 [1983]

Frequency, colour

Includes (de)multiplexing, heterodyning, frequency shifter e.g. using non-linear optics (for materials see V07-K10 codes), wave mixing or mode shifting in optical fiber and 3- or more pole multiplexing connectors (see also V07-G11).

Up/down converter, frequency doubling, second harmonic generation, SHG, optical harmonic generators

V07-K05 [1983]

Position or direction

Includes deflection, scanning using e.g. rotating mirror or acousto-optic devices. Scanners are also coded in S06-D and E, or W04-M01E depending on application, respectively, to copier, printer, facsimile, or opto-mechanical TV systems. Mirrors per se are coded in V07-F02A.

V07-K06 [1992]

Optical logic

(V07-K01A)

Includes bistable devices, optical computer elements, optical ADC. See also relevant codes in U12-A01, U12-E01, U14-A02, T01-E05A, T02-A03, U21-A03G, U21-C01G.

Self-electro-optic effect, SEED, binary optics

V07-K10 [1992]

Materials used for controlling light

(V07-K)

For materials with magneto-optic effect see V07-K03.

V07-K10A [1992]

Liquid crystals

See also U11-A03A.

V07-K10B [1992]

Nonlinear optical and electro-optical materials

Second harmonic generation, SHG

V07-K10B1 [1992]

Inorganic non-linear optical and electro-optical materials

Includes lithium niobate, potassium titanyl phosphate (KTP), beta-barium borate (BBO), ceramics e.g. lead lanthanum zirconium titanate (PLZT).

V07-K10B2 [1992]

Organic non-linear optical and electro-optical materials

Includes Langmuir-Blodgett thin films, polymers.

Steroidal ketone, organopolysiloxane

V07-K10C [2005]

Novel photonic crystals and materials

Covers all novel photonic materials, including e.g. new band-gap technology/arrangements. For photonic fibers see V07-F01A1X, for photonic waveguides see V07-F01A4, and from 2006 see V07-F02D for all other photonic optical elements.

V07-L [2006]

Manufacture, materials, equipment for optical elements other than optical fibers and waveguides

All manufacturing aspects of optical fibers and waveguides are coded in V07-F01A3 codes. Prior to 2006 all manufacturing aspects were coded under the relevant device. Post 2006 see both relevant device code and V07-L code to indicate the manufacturing aspect of the device in question.

V07-L01 [2006]

Manufacturing methods for optical elements other than optical fibers and waveguides

V07-L02 [2006]

Materials for manufacturing optical elements other than optical fibers and waveguides

For non-linear and electro-optical materials see V07-K10 codes.

V07-L03 [2006]

Equipment for manufacturing optical elements other than optical fibers and waveguides

V07-M [1983]

Holography

All aspects are included. Holograms per se are in V07-F02C.

Record, image, rainbow

V07-N [1987]

Applications of optical fibers

Applications other than those in V07-N01 to V07-N03 are coded in V07-N e.g. fiber-optic lasers using Raman/Stimulated Brillouin Scattering (see also V08-A codes). If fiber-optic laser is used as amplifier see V07-K01C2.

SBS

V07-N01 [1987]

Gyroscopes, interferometers, sensors

Sensing using optical fibers. If novelty covers control of light, see also V07-K. Semiconductor laser light source for gyroscopes are also coded in U12-A01B1 and V08-A04A. Gyroscopes are also coded in S02-B07 and W06-A07; for interferometers see also S02-A03

Rotating, angular, loop, Sagnac

V07-N02 [1987]

Endoscopes, fiberscopes

Medical and industrial endoscopes are also coded respectively in S05-D04 and S02-J04.

Camera, imaging

V07-N03 [1987]

Illumination

See X26-G also. Includes transmission of solar radiation from outside to interior of building, Christmas tree lighting, microscope slide illumination, use of lamp at one end of fiber for lighting.

V07-X [1983]

Miscellaneous aspects of light guides

Includes (chemical) optrodes, sacrificial/consumable non-waveguide sensors, etc.

V08: Lasers and Masers

Includes details of sources and amplifiers of coherent optical (i.e. IR, visible light and UV) and other EM waves.

V08-A

Lasers

For aspects directly involved with construction, operation, parameter control and monitoring of laser; and also for equipment, e.g. safety goggles, required for working with laser. For electrical aspects of laser used with weaponry and in laser surgery see W07, according to application, and S05-B01 codes respectively. For lidar see W06-A06 codes. For optical amplifier used in optical communication see also V07-K01C codes.

V08-A01

Construction/shape of optical resonators or active medium

From 1992 details of active medium are covered by V08-A01D.

V08-A01A [1983]

Optical resonators

Includes reflector details e.g. mirror, which is also coded in V08-A08 if it is unclear whether it forms part of resonator. Also includes external mirror for semiconductor laser.

V08-A01A1 [1992]

Ring lasers

(V08-A01A)

For gyroscopes see also S02-B07B and W06-A07.

V08-A01A2 [1992]

With passive optical components to control e.g. laser frequency

(V08-A01A, V08-A03)

Includes prism, diffraction grating, birefringent, non-linear materials placed inside optical resonator. For controlling laser parameters see also V08-A03 codes.

V08-A01A3 [1997]

External optical resonator

(V08-A01A)

External cavity, folded cavities

V08-A01B [1992]

Characterised by electrode details of laser

(V08-A01, V08-A02)

Includes material, structure of electrodes. See also V08-A04B code for arrangement of electrodes passing through discharge tube of gas laser.

V08-A01C [1992]

Gas management systems of laser

(V08-A01, V08-A04B)

Gettering, replenishing

V08-A01D [1992]

Characterised by active medium material of laser

This code is used in conjunction with V08-A04 codes to identify type of laser for which the active material is used. For semiconductor laser see also U12-A01B6 code for e.g. blue and green light emitting lasers.

V08-A01D1 [2002]

Preparation of active material

(V08-A01D)

Includes crystal growth and doping aspects. Does not include semiconductor laser formation (see U11/U12-A01B codes).

V08-A02

Pumping of active medium within laser

Includes thermal, chemical and electron beam pumping; expansion shock (e.g. compressed argon/xenon) excitation system; etc.

Excitation, population inversion

V08-A02A [1987]

Semiconductor laser drive circuit

Semiconductor laser drive circuits, are also coded in U12-A01B4. Control of drive circuit for stabilisation of laser is also in V08-A03A1 for amplitude stabilisation, or V08-A03C2 for frequency stabilisation.

V08-A02B [1987]

Optical pumping of laser

Includes flash-lamps, shining light on semiconductor laser.

V08-A02C [1992]

Pumping of gas laser

Includes pre-ionisation, gas discharge, capacitive or inductive excitation. Covers pumping by electrical discharge in gas laser, pulse drives.

Discharge electrode

V08-A03

Control of laser parameters

Includes control of beam parameters e.g. phase, frequency, mode. For use of feedback to monitor laser output and correct pumping conditions see also V08-A06A. Also includes varying position of optical components inside laser cavity. For control of components outside resonant cavity see also V08-A08, V07-F02, V07-K codes or under application. For stabilisation using temp. control involving cooling see also V08-A05. Also applied for laser using electro-optical device exhibiting Pockells- or Kerr- effect, etc.

Mirror positioning, direction, polarisation, non-linear optics, Brillouin/Raman scattering

V08-A03A [1987]

Control of laser intensity

Power

V08-A03A1 [1992]

Amplitude stabilisation of laser output

V08-A03B [1987]

Control of laser mode

Locking, suppression

V08-A03C [1987]

Control of laser frequency

Line width, tuning

V08-A03C1 [1992]

Frequency multiplication of laser output

(V08-A03)

See also V08-A01A2 if passive optical component is placed inside optical resonator.

V08-A03C2 [1992]

Frequency stabilisation of laser output

V08-A03D [1992]

Laser Q-switching

(V08-A03)

Includes electro-optic, magneto-optic, acousto-optic modulators, rotating mirror or prism, bleachable dye used for giant-pulse technique.

Q-spoiling

V08-A04

Laser types

This code is used in conjunction with other codes as applicable, e.g. gas laser optical resonator is coded in V08-A01A and V08-A04B. For materials or compositions for active medium see also V08-A01D.

V08-A04A

Semiconductor laser

See also U12-A01B codes for semiconductor laser body, package and manufacturing details. Includes DBR and DFB. For light-in/light-out modulators and logic gates see also V07-K codes and U12-A02C3. For testing of semiconductor laser see U11-F01C5 and V08-A06. For semiconductor laser drive circuits see U12-A01B4 and V08-A02A. For optical amplifier see V07-K01C1. For laser used to read optical disk or CD see also W04-C and T03-B codes.

Active, single-heterostructure, double-heterostructure, buried, stripe, surface emitting, electrode, distributed Bragg reflection, distributed feedback, current blocking layer, lateral current confinement, quantum well, cleaved-coupled cavity

V08-A04B [1983]

Gas laser

(V08-A04X)

Includes atomic, molecular, ion, excimer, metal vapour and chemical lasers. For controlling gas pressure see V08-A01C. For electrode details see also V08-A01B. For gas laser excitation see V08-A02C.

TEA, carbon dioxide, helium-neon, argon, krypton/fluoride, xenon chloride, oxygeniodine

V08-A04C [1983]

Solid-state laser

(V08-A04X)

Includes doped insulator, crystal, glass, etc. laser. Excludes semiconductor laser.

Rod, slab, neodymium, YAG, ruby, holmium

V08-A04C1 [1997]

Laser diode pumped solid state laser

(V08-A04C)

Includes solid state lasers pumped by laser diodes or laser diode arrays. For specific optical pumping details see V08-A02B code also.

V08-A04C2 [1997]

Optical fiber laser

(V08-A04X, V08-A04C)

See also V07 codes. For fiber-optic amplifier see V07-K01C2 only. Details of laser pumping of optical fiber are covered by V08-A02B. Prior to 1997 optical fiber lasers were covered by V08-A04X.

Waveguide laser

V08-A04D [1983]

Liquid or dye laser

(V08-A04X)

Rhodamine, crystal violet, coumarin

V08-A04E [1987]

Free electron laser

FEL, wiggler field

V08-A04F [2011]

Infrared lasers and UV lasers, non-visible light sources

Includes IR and UV lasers emitted from non visible light source, For illumination aspects see also X26-Q01 and X26-Q03

V08-A04X

Other laser types

Includes lasers using scattering effects. From 1997 for optical fiber lasers see V08-A04C2. For X-ray lasers and MASERs see V08-B codes.

Raman, Brillouin

V08-A05 [1987]

Cooling/heating aspects of laser

(V08-A09)

Includes cooling as part of gas recirculation system, heat sinks, temperature control and stabilisation. For laser parameter stabilisation and control see also appropriate V08-A03 code. For heat sinks for semiconductor lasers see also U12-A01B3A.

Circulate, coolant, pump, thermostat

V08-A06 [1987]

Measurements and testing of laser

(V08-A09)

Includes monitoring of laser output during operation e.g. arc discharge detection. For photodiode arrangement within laser diode package see also U12-A01B3. For measurements performed on laser beam see also S03-A codes. For testing of semiconductor laser see also U11-F01C5.

V08-A06A [1997]

Monitoring for direct active feedback control of laser parameter

(V08-A06)

For monitoring details of automatic laser parameter control using monitored laser output to stabilise parameter or control laser operation. For semiconductor laser diode drive circuit receiving parameter measurement from e.g. photodiode see U12-A01B4 and V08-A02A codes also. See also applicable V08-A03 code.

V08-A07 [1992]

Assemblies of lasers

Prior to 1992 laser diode arrays were coded in U12-A01B, U13-D04, V08-A04A. From 1992 they are covered by this code and U12-A01B1, V08-A04A.

V08-A07A [1992]

Injection locking within laser assembly

(V08-A01, V08-A03, V08-A04)

Includes master-slave arrangements for continuous wave lasers and, in case of pulsed laser, Master Oscillator-Power Amplifier configuration.

Seed oscillator, CW, MOPA

V08-A08 [1992]

Correcting laser beam parameters outside resonator

(V08-A09)

Includes components for correcting laser beam parameters e.g. profile/field patterns. See also V07 codes. Also includes homogenisation of beam.

V08-A09

Other laser related aspects

Includes packaging and enclosure details. For packages for semiconductor lasers see U12-A01B3, with semiconductor laser package manufacture covered in U11-D01 and E02 codes.

V08-A10 [1997]

Protection equipment for use with laser

Includes passive and active laser protection equipment preventing injury or blinding of person using laser or person upon which laser is operated. For direct active control of laser using parameter measurement feedback see V08-A06A and V08-A03 codes also. For goggles see also X27-A02D.

Goggles

V08-B

Other stimulated emission devices

For frequency standard aspects see U23-D codes, e.g. U23-D02, S04-C09. For atomic clock aspects see S04-B02X.

Atomic frequency standard

V08-B01 [1997]

Sub-IR frequency emitting device

Used for ultra-low frequency emitting device e.g. MASER.

Microwaves

V08-B02 [1997]

X-ray laser

(V08-B)

Prior to 199701 X-ray lasers were covered by V08-B. For ultra-high frequency laser see also V05-E03. For X-ray lithography in semiconductor manufacture see also U11-C04H1.

Section W: Communications

W01: TELEPHONE AND DATA TRANSMISSION SYSTEMS 624

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W05: ALARMS, SIGNALLING, TELEMETRY AND TELECONTROL 799

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W01: Telephone and Data Transmission Systems

W01-A

Digital information transmission

Codes in this group relate chiefly to novel aspects of digital transmission and to a lesser extent to its applications. Note that some communications or broadcast systems which are inherently digital, such as GSM or DAB, are not routinely coded here but are included for specific novel data communication aspects which can be usefully represented by the assignment of W01-A codes. (For systems aspects of GSM, see W01-B05A1A and W02-C03C1A; for DAB see W02-D05C1).

From 2002, it is intended to make a greater distinction between these aspects of novel digital transmission technology and applications which are better dealt with elsewhere. Thus, for example, inventions concerned merely with the **use** of the internet, such as for e-business purposes, or with software aspects of email, will **not** be included in W01, and are covered in class T01 (digital computing).

W01-A01

Error detection and prevention

Error correction coding in general is covered by U21-A06 codes.

Monitor, link, check, redundancy, BER

W01-A01A

By diversity, repeating or returning

Diversity radio systems are covered by W02-C03A codes and where an invention is concerned chiefly with radio aspects and data transmission details are not significant, those codes are assigned instead of W01-A01A. However, where radio aspects and data transmission aspects are significant both W01-A01A and W02-C03A codes may be assigned together.

ARQ, retransmission request, MIMO, return channel, Stop-and-wait protocols, Go-Back-N protocols, Selective-repeat protocols

W01-A01B

Using codes

Generally-applicable error detection using codes, i.e. not specific to data communications, is covered by U21-A06 codes.

Decode, encode, symbol, Reed, Forward Error Correction (FEC)

W01-A01B1 [1992]

Block codes

Covers coding where the final codeword is of fixed, finite length e.g. cyclic block coding.

Parity, cyclic, Hamming distance, BCH

W01-A01B1A [2005]

Using parity

Includes the use of odd and even checking bits.

W01-A01B1C [2002]

Reed Solomon coding

Note: Reed Solomon coding was incorrectly treated as a convolutional code from 2002 to 2004 and coded as W01-A01B2C. That code has now been deleted and the records to which it was assigned have been recoded as W01-A01B1C to place them in the correct block code hierarchy.

W01-A01B1E [2021]

Low Density Parity Check

Includes channel coding in a 5G system for which W02-C03C1L is also assigned.

LDPC

W01-A01B1G [2021]

Polar codes

Includes channel coding for control channels in 5G system for which W02-C03C1L is also assigned.

W01-A01B2 [1992]

Convolutional codes

Covers generation of a digit sequence from the informational digits in which no finite group of digits can be ascribed to one informational codeword. Includes max - likelihood or sequential algorithm for e.g. Viterbi, Fano, ZJ algorithms.

Trellis, punctured code

W01-A01B2A [2002]

Viterbi coding

W01-A01B2E [2002]

Turbo coding

Parallel concatenated convolutional codes

W01-A01B2G* [2002-2005]

Combined convolutional coding scheme

*This code is now discontinued. W01-A01B2G remains valid and searchable for records between 2002 and 2005 for combined convolutional coding schemes. From 2006, all aspects of hybrid or combined error correction coding schemes are covered in W01-A01B4.

W01-A01B2S [2002]

Novel algorithm or software aspects

Codes from class T01 are normally assigned for these aspects also, e.g. from the T01-S group.

W01-A01B2X [2002]

Other aspects of error correction based on convolutional codes

W01-A01B3 [1992]

Using format

Includes checking the format of received data for detection of errors, for example, system for checking complementary nature of received signals when complement of signal is also transmitted.

W01-A01B4 [2006]

Hybrid coding scheme

(W01-A01B2G)

This code covers error correction using either a combination of block and convolution codes or multiple block or convolutional codes. Other W01-A01B codes are assigned as appropriate to highlight the coding types being used. Prior to 2006, combined error correction coding using convolutional codes only was indicated by assignment of W01-A01B2G.

Concatenated, outer-inner coding

W01-A01B4A [2021]

Hybrid Automatic Repeat Request

This code indicates the use of HARQ in a 4G or 5G communication system for which W02-C03C1H or W02-C03C1L are also assigned.

HARQ

W01-A01B5 [2005]

Interleaving

Covers reduction in burst errors by re-organising data structure before transmission.

W01-A01C [1992]

Signal quality detection/testing correct operation

See also S01 and W02 codes. Includes jitter monitoring, using pseudo-errors and comparing transmitted test signals with locally generated replica.

Link quality estimation (LQE), jitter

W01-A01C1 [2002]

Signal quality detection based on measurement of bit error rate

This code is intended to be used when the emphasis is on BER measurement, for whatever purpose. Systems with the emphasis on overall link quality and testing for correct operation are covered by W01-A01C5. BER measurement for radio receivers is covered by W02-G03J5 codes.

W01-A01C1A [2002]

Novel hardware or software aspects for BER measurement

Codes from class T01 are normally assigned for software or algorithm-based aspects also, e.g. from the T01-S group.

W01-A01C1C [2002]

Applications of BER measurement

This code is intended for arrangements which make **use** of a BER measurement which is already available, and not itself the novel aspect. This code may be used with W01-A01C5 when the purpose is the establishment of a link quality value, QoS, etc.

W01-A01C5 [2002]

Testing correct operation

This code is intended to be used when the emphasis is on testing satisfactory link operation by investigating signal quality, making use of error detection and possibly involving other parameters also, and includes techniques such as eye pattern measurements. Systems with the emphasis on BER measurement, and novel methods or hardware for this, are covered by W01-A01C1 codes. Fault detection and monitoring of data networks is covered by W01-A06A codes and by W01-A07L for data transmission in general, which may be assigned in conjunction with this, and other W01-A01C codes, as necessary.

Eye diagram

W01-A01X [1992]

Other error correction and detection aspects

W01-A02

Code conversion

See also W01-A08A1A for synchronous start-stop systems characterised by code and U21-A05 codes for specific coding formats.

Modulation, trellis coding, biphasic level, Manchester coding, stochastic, parallel weight, NRZ

W01-A02A [1997]

Data compression

See also U21-A05A2 and T01-D02 codes as appropriate.

W01-A03

Multiple use of transmission path

The codes in this section relate to multiple access methods, duplex and multiplex transmission. Multiplex transmission in general is covered by W02-K codes.

Header, data, trailer, fixed-length, variable-length, STM (synch transfer mode), CBX (computerised branch exchange)

W01-A03A* [1987-2001]

Access control

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1 codes. W01-A03A remains valid and searchable for records between 1987 and 2001 and was assigned with W01-A06 codes for network aspects, e.g. with W01-A06B5A for access control in LANs. See also T01 codes, such as T01-H05 and T01-H07 codes.

Access right, protocol, arbitration, code division, CDMA, binding

W01-A03A1* [1987-2001]

Carrier sense multiple access (CSMA/CD and CA)

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1A. W01-A03A1 remains valid and searchable for records between 1987 and 2001. During this time W01-A03A1 was combined with W01-A06F to indicate Ethernet. Request handling for interconnection or data transfer in computer systems is covered by T01-H05 codes, e.g. T01-H05B3 for contention avoidance for access to common bus.

Collision detection, dc level shift, heterodyne, Ethernet®, timeout period, random delay, collision avoidance, contention

W01-A03A2* [1987-2001]

Time division multiple access (TDMA)

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1G. W01-A03A2 remains valid and searchable for records between 1987 and 2001. See W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio systems.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access)

W01-A03A3* [1987-2001]

Token pass

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06F1E. W01-A03A3 remains valid and searchable for records between 1987 and 2001.

Dynamic logical ring, priority token, address, FDDI

W01-A03B [1992]

Packet transmission

(W01-A06X)

Covers all systems where digital data cells or packets are transmitted to a selected destination by a terminal, computer applications program or other data handling device. The destination can be another data handling or data communication apparatus or system. Includes Packet Assembler/Disassembler (PAD). See W01-A06G2 for store and forward packet switching processors and W02-K03 for packet switching in general, e.g. voice packet switching.

Virtual circuit, VCI, Virtual path, VPI

W01-A03B1 [1992]

Asynchronous Transfer Mode (ATM)

(W01-A06X)

Cell, B-ISDN, PTM

W01-A03C [1992]

Time division multiplexing (TDM)

Pulse stuffing

W01-A03C1 [2005]

Time Division Multiple Access (TDMA)

See W01-A06F1G for network aspects of access control scheme and W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio system.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access)

W01-A03D [1992]

Duplex

Includes half and full duplex systems.

W01-A03D1 [2002]

Half duplex

W01-A03D5 [2002]

Full duplex

W01-A03E [2002]

WDM and FDM

W01-A03E1 [2002]

WDM

WDM in general is assigned W02-C04B4B and W02-K04. General aspects of optical data transmission are covered by W01-A07E, and those specific to data networks by W01-A06C1 (optical fiber-based) and W01-A06C3 (free-space transmission). Optical communication in general is covered by W02-C04 codes. Novel optical components are covered in V07, especially V07-K04.

W01-A03E5 [2002]

FDM

FDM in general is assigned W02-K01 codes.

W01-A04

Synchronising receiver with transmitter

See also W02-K02A codes for general aspects of synchronising in TDM and W02-K05B7 for synchronising in spread spectrum communications. Digital synchronising circuits in general are assigned U22-H and PLL circuits are covered by U23-D01 codes.

Clock, phase, synchronous, frame delay, lock, recover regenerate, bit stuffing

W01-A04A

Using synchronisation signals

W01-A04A1 [1992]

Using properties of error detecting/correcting codes or special codes

Includes parity, correlators, PN codes. (Data transmission with error detection/correction codes in general is covered by W01-A01B codes).

Pseudonoise

W01-A04A2 [1992]

Using cyclic recurring signals

See also W01-A01C for jitter monitoring and W01-B02X for clock distribution.

Clock generation

W01-A04A9 [1992]

Other systems using synchronising signals

Includes pulse stuffing. Search with W01-A03C for this aspect in TDM data transmission. See W02-K02A3 for pulse stuffing in TDM systems in general.

W01-A04B [1992]

Signals containing no special synchronisation information

(W01-A04X)

W01-A04B1 [1992]

Tracking or using signal transitions

(W01-A04X)

Includes use of equaliser output; tap values; decision values or transmission code rule.

PLL

W01-A04B2 [1992]

Extraction of synchronisation/clock signal from spectrum

(W01-A04X)

Includes using resonant or bandpass circuit with squaring loop or Costas loop. (See U23-D01C1 for Costas loop demodulation in general.)

W01-A04X

Other data synchronising aspects

Pattern

W01-A05

Secret communication

These codes are intended for secret and secure data transmission systems, including aspects such as authentication (covered in W01-A05B). From 2002, inventions involving the **application only** of these techniques are excluded when specific codes exist elsewhere, such as in T01 (e.g. T01-D01A, T01-J12C).

Secrecy or scrambling systems for digitised speech or video (e.g. with bit order rearrangement) are assigned W01-A05 codes for novel data transmission aspects, but are chiefly covered by W02-L05 for audio and W02-F05A or W02-F10N codes for video systems.

Algorithm, RSA

W01-A05A [1992]

Blockwise coding using registers and memories

Includes DES (Data encryption standard) and AES (Advance encryption standard) systems, and key distribution.

Cryptographic communication, public key, private key

W01-A05A1 [2005]

Wireless

Includes WEP (Wired equivalent privacy) and WPA (Wi-Fi protected access) systems. Prior to 2005, this topic was coded as W01-A05A and W01-A06C4X. From 2005 W01-A06 codes are only assigned for significant network aspects.

WEP, WPA-PSK, WPA-802.1x, WPA2

W01-A05B [1992]

Identity verification/access control

This code covers authentication and identity verification in which data encryption is involved in some way. Verifying entitlement to access data networks is covered by W01-A06E1C, and is not assigned W01-A05B also unless some encryption aspect exists. Applications such as password checking for computer access are not included, and are covered by T01-J12C codes for computer security in general, and from 2002, by T01-N02B1B.

Confidential mail password

W01-A05E [2006]

Quantum cryptography

This code covers the use of quantum physics to provide inherent detection of eavesdropping or interception of data communications. Where optical communications are involved, e.g. single-photon systems, W01-A07E, W01-A06C1, or W02-C04 codes are also assigned as appropriate.

Polarisation, filter

W01-A05L [2007]

Data interception and prevention of interception

This code covers the interception of data communications using any medium. Secret and secure data transmissions using either cryptographic encryption or quantum cryptography are covered by W01-A05A and W01-A05E respectively. Interception and prevention of interception of analogue communication system are covered by W02-L07 codes.

W01-A05L1 [2007]

Data interception

W01-A05L5 [2007]

Prevention of interception

Includes data concealment
Masking, steganography

W01-A05X [1992]

Other secret data communication

W01-A06

Exchanges, connections between exchanges, data networks and network switching

Subject matter covered here has considerable overlap with class T01, especially in the case of computer communication aspects. Searching appropriate T01 codes, e.g. T01-H05, T01-H07, or T01-N codes, in conjunction with W01-A06 codes enables these topics to be further discriminated. In

general, a 'network' is regarded here as an interconnection for data transfer of at least three stations, so that inventions involving data communication between only two stations are assigned W01-A07 codes instead. (Although note that W01-A07 codes may be used with W01-A06 codes to highlight a specific aspect, e.g. a power supply for a LAN is represented by W01-A06B5A and W01-A07K).

Note: As stated at the start of the W01-A code group, since 2002 inventions concerned purely with applications of data networks such as the internet, have not been covered in W01-A06 codes where specific T01 codes exist. Similarly, since 2002 electronic mail has been covered in T01-N01C only, unless specific novel data communications aspects are involved which require assignment of W01-A codes. (Prior to 2002 W01-A06E1, W01-A06G2, and W01-A06X, were routinely used, depending on details).

Due to convergence between wireless network and mobile telephone technologies analogous codes should also be considered in these areas when searching particular topics. For example, W01-A06C4 codes denoting wireless networks and W01-B05A1 codes for cellular phone systems may cover overlapping areas. From 2012 W01-E codes have been introduced for mobility-related aspects such as roaming and registration in wireless data networks and mobile phone networks. Prior to 2012 inventions concerned with roaming where the emphasis is on wireless data network access were assigned W01-A06E1R or W01-A06E1S (respectively roaming between same-standard and between different-standard networks) whilst roaming with emphasis on cellular mobile telephone systems was assigned W01-B05A1R. (These codes are now discontinued and replaced by W01-E01 codes).

Mode, outstations, gateway

W01-A06A

Testing and monitoring

W01-A06A1 [1992]

Failsafe and standby systems

Includes standby and back-up systems.

W01-A06A1A [1992]

Standby switching to powered up equipment

Includes hot standby systems. See W01-C02A1C for hot standby systems in telephone exchanges, W02-C01D3A for their use in general line communication and W02-G08A for application to radio equipment.

W01-A06A2 [1992]

Fault detection, isolation

Covers routines, equipment and isolation as part of fault location. Bridging/disconnecting arrangements for faulty equipment are covered in W01-A06A1 codes. See also S01 for measurement of specific electrical parameters. Fault detection in telephone exchanges is covered by W01-C02A1 codes. Communications system fault detection in general is covered by W02-C01D codes for line transmission, W02-C04C1 codes for optical transmission systems, and by W02-C05 codes in general.

W01-A06A2A [2012]

Network apparatus testing

This code covers testing of apparatus that is being used in a network with other codes assigned as appropriate, e.g. router testing is denoted by assignment of W01-A06A2A and W01-A06G5E. Testing of data communications hardware in a 'non-network' sense, i.e. 'bench testing' or otherwise testing the equipment in isolation, is covered by W01-A07L codes, which are also used for fault detection or testing of data communications equipment for general or unspecified application.

W01-A06A3 [2005]

Network usage and operation monitoring

Includes measurement of network activity and quality of service, and detection of overload/blocking condition. See T01-N02B2 for computer network aspects of monitoring. Analogous arrangements in telephone switching are covered by W01-C02A1A. Prior to 2012 this code was assigned with W01-A06E to indicate resource allocation in data networks. From 2012 the topic of network resource allocation is covered by W01-A06E1L but W01-A06A3 will still be assigned also when measurement of network performance is a significant part of an invention. From 2010 resource allocation in radio communication has been covered by W02-C03G1 and cognitive radio systems are covered by W02-C03G5 with W01-A06A3, W01-A06E codes and wireless network codes assigned as appropriate.

Inband/ outband control procedures, Load measuring, network forensics, QoS

W01-A06B [1987]

Characterised by structure

Structural codes are used where novelty exists and are also used with other W01-A06 codes as additional detail or a more general description, for example, W01-A06B2, W01-A06B5A and W01-A06E1 can be used to describe a ring LAN with a novel access or routing system.

Topology

W01-A06B1 [1987]

Bus

Linear network, daisy chain, DQDB

W01-A06B2 [1987]

Loop

Ring, FDDI, Cambridge loop

W01-A06B3 [1987]

Star

Dedicated link, hub, cluster, PBX

W01-A06B4 [1992]

Tree and mesh

From 2005, the title of this code is expanded to reflect the inclusion of mesh configuration networks, and subdivided.

W01-A06B4A [2005]

Tree

W01-A06B4C [2005]

Mesh

W01-A06B5 [1992]

Networks

These codes are intended to define the network by size, scale, or usage.

W01-A06B5A [1992]

Small scale (LAN)

VAN, vehicle area network, CAN, controller area network

W01-A06B5B [1992]

Large scale (WAN)

Public data networks, MAN

W01-A06B5C [1992]

ISDN

This code is intended to focus on data network aspects of ISDN. See also W01-C05B7 codes, which are assigned for all aspects.

W01-A06B7 [1997]

Internet and intranet

(W01-A06B9)

From 2002 this code has been subdivided to separately cover internet and intranet systems, and in the case of internet, for novel details and for applications. However, note that the applications code (W01-A06B7C) is only used when no other code is available elsewhere (e.g. in T01). In general, inventions concerned purely with the **use** of the internet without any communications novelty will not be covered in W01 from 2002.

W01-A06B7A [2002]

Novel internet system details

This code is used for novel aspects of internet systems, and may involve computing aspects represented by T01 codes, e.g. T01-N or T01-M02A codes. **Applications** of the internet are coded in W01-A06B7C when specific codes elsewhere are not appropriate.

W01-A06B7C [2002]

Applications of internet

This code is intended for applications which cannot be represented by codes elsewhere. Thus, it will not normally be used for inventions involving the application of the internet to e.g. email, e-commerce, chatrooms, etc., for which T01-N01 codes are assigned.

W01-A06B7E [2002]

Intranet system

W01-A06B7G [2005]

Virtual networks, including virtual private networks

The title of this code has been expanded to reflect its coverage of virtual networks in general as well as those with the emphasis on restricted access, such as private data networks that make use of public telecommunications infrastructure, e.g. maintaining privacy through the use of tunnelling protocol (see also W01-A06F7C for this aspect) and security procedures (for which W01-A06E1C is also assigned as appropriate). Virtual private telephone networks are covered by W01-C03A.

VPN, VLAN (virtual local area network)

W01-A06B8 [2005]

Data network operation and logical structure

Includes networks operating with a client/server or client/client relationship.

W01-A06B8A [2005]

Client-server network

See T01-N02A2C for computer communication using a client/server relationship.

W01-A06B8C [2005]

Peer-to-peer network

Prior to 2005, all aspects of peer-to-peer network were covered in W01-A06G3. See also T01-N02A2E for computer network aspects of peer-to-peer network.

P2P

W01-A06B8E [2007]

Ad-hoc network

Includes dynamic network where the device are part of the network only for the duration of a communication session or, in close proximity to the rest of the network. Computer aspects of Ad-hoc network are covered by T01-N02A1B.

MANET, Mobile Ad-hoc Network

W01-A06B9 [1992]

Other data network types

W01-A06C [1987]

Data networks characterised by medium

Radio link, free space, optical link, multi-media network, broadband system

W01-A06C1 [1987]

Optical fiber

Non-networked optical communication is covered by W01-A07E. Optical communication in general is covered by W02-C04 codes, optical fiber CATV networks are covered by W02-F03A3 and optical components are covered by V07 codes.

Fiber-optic network, optical coupler, optical modulator, FDDI (fiber distributed data interface), SONET

W01-A06C2 [1987]

Coaxial cable, twisted pair

See W02-F03A1 also for LAN using CATV system. Includes dedicated twisted pair system only - see W01-C05B3 codes for shared telephonic and data communication.

W01-A06C2A [1992]

Coaxial cable

Coaxial cables per se are covered by X12-D05, coaxial waveguides by W02-A01A2.

W01-A06C2B [1992]

Twisted pair

W01-A06C3 [1992]

Free-space optical link

Free-space optical interfaces not specifically for network communication between several stations are covered by W01-A07H3.

W01-A06C4 [1992]

Radio link

See W02-C03 codes for details of radio systems and W02-G codes for radio equipment itself. Short range systems e.g. Bluetooth®, are assigned W01-A06B5A (to denote LAN) as well. Interfaces of this kind not specifically for network communication between several stations are covered by W01-A07H2 codes. Specific aspects of protocol peculiar to the network types listed below are covered by additional assignment of W01-A06F codes, the intention of the W01-A06C4 codes being to characterize the network link from the radio viewpoint. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming and registration in wireless data networks (and mobile phone networks) and these codes will be assigned in preference to W01-A06C4 codes for these specific topics unless the use of W01-A06 codes is required to indicate other significant aspects of an invention, in which case W01-A06C4 codes will also be assigned.

W01-A06C4A [2002]

IEEE 802.15 radio link, including Bluetooth®

Radio systems for remote measurement and control are covered by W05-D codes, e.g. W05-D06A1A and W05-D08C1. Sensor networks are covered by W05-D06F and W05-D08E. W01-A06C4A is assigned when the wireless network aspect is significant.

ZigBee, WPAN, 802.15x

W01-A06C4C [2002]

DECT-based radio link

DECT systems for actual telephone usage are assigned W01-B05A1B and W02-C03C3 codes, with handsets covered by W01-C01D1 codes.

W01-A06C4E [2005]

IEEE 802.11 radio link

Includes systems using 802.11x standards e.g. 802.11p that uses 5.9 GHz frequency for communication between vehicles (Dedicated Short-Range Communications). See also X21-K. *DSRC*

W01-A06C4G [2006]

IEEE 802.16 radio link

This code covers long-range data communications by radio, including wireless MAN, etc.

WiMAX, WMAN, 802.16x

W01-A06C4K [2005]

UWB and impulse radio link

Covers carrier-free and carrier-based links using time hopping and similar techniques. Novel details of ultra-wideband systems are covered by W02-K05 codes, especially W02-K05A9 codes.

W01-A06C4L [2021]

Millimetre radio link

This code covers the use of millimetre waves, typically operating between 3GHz to 300GHz for communication e.g. in a 5G system for which W02-C03C1L is also assigned.

W01-A06C4N [2021]

Terahertz radio link

This code covers the use of electromagnetic waves with band of frequencies operating between 300GHz to 3THz.

W01-A06C4P [2021]

Long range radio link

For communication systems which operate in frequencies below 1GHz, possibly for long range and low power consumption.

LoRa, LPWAN, LoRa Gateway, LoRaWAN

W01-A06C4X [2002]

Other radio link for networks

W01-A06C6 [2006]

Power line data network

Covers network using power line carrier as the medium for data transmission, and not systems for supplying power via data network conductors, which are coded according to network type and in U24-H codes. Novel aspects of power line communication are covered in W02-C01A3. See also under application e.g. W05-D06P for remote control aspects and X12-H03E codes for power line carrier systems.

W01-A06C9 [1992]

Other transmission media for networks

W01-A06D [1992]

Network modelling

(W01-A06X)

Includes use of CAD (computer aided design) to design and test networks. Search with T01-J15A4 also.

W01-A06E [1992]

Network control and software

(W01-A06X)

Includes hardware and software for control of transmission and reception of messages and/or data across a network. See also T01-N02B1A code for network management software. Prior to 2012 this code was assigned with W01-A06A3 for network resource allocation, but from 2012 this topic is covered by W01-A06E1L. (W01-A06A3 is also assigned as necessary where actual network performance measurement is part of an invention).

W01-A06E1 [1992]

Access and routing

From 2024, network addressing is coded under W01-A06E1N. Network addressing as opposed to routing (i.e. for determining destination of packets, and not the route that they will travel) is covered in T01-N02A1A. From 2006, all aspects of routing are covered by W01-A06E1J and since 2002, routers per se have been covered by W01-A06G5E.

W01-A06E1A [1997]

Data conferencing and broadcasting

Includes transmission of messages to all users on a LAN, for example (with W01-A06B5A). Electronic mail in general is covered by T01-N01C. See W01-C02B1 for telephone conferencing system and W02-F08A codes for video conferencing system.

Message broadcasting, multi-casting

W01-A06E1C [2005]

User privileges/password system

Includes systems for granting or denying access to a network. (See T01-N02B1B for computer aspects of user privileges/password systems).

Security, login, permissions, access control list

W01-A06E1E [2005]

Metering and billing aspects

Covers billing and usage aspects of data network services. Analogous systems for telephone usage charging are covered by W01-C06 codes.

Internet-café, public wireless access point

W01-A06E1G [2005]

Graded service

This code covers the provision of different level/quality of service based on entitlement/agreement in a network context. Analogous arrangements for telephone service are covered by W01-C02B6 codes.

W01-A06E1J [2006]

Routing

(W01-A06E1)

This code covers determination of the appropriate path by which data should travel between two places.

W01-A06E1L [2012]

Data network resource allocation

Prior to 2012 this topic was covered by W01-A06A3 and W01-A06E. Where measurement of network performance is a significant part of an invention W01-A06A3 will also be assigned. From 2010 resource allocation in radio communication has been covered by W02-C03G1 and cognitive radio systems are covered by W02-C03G5 with W01-A06A3, W01-A06E codes and wireless network codes assigned as appropriate.

W01-A06E1N [2024]

Network addressing

Includes all addressing details in a network, like address mapping, address translation etc.

Media Access Control, MAC

W01-A06E1P [2024]

Network proxy

This code covers the use of proxy servers for accessing a website.

W01-A06E1R* [2006-2011]

Roaming between same-standard networks

*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A1. W01-A06E1R remains valid and searchable for records between 2006 and 2011 when it was used for roaming between networks, e.g. wireless LANs for which W01-A06B5A and W01-A06C4 codes were also assigned, it being assumed that the networks are operating on the same transmission standards. Roaming between different-standard networks was covered by W01-A06E1S, which took precedence over W01-A06E1R.

W01-A06E1S* [2006-2011]

Roaming between networks operating on different standards

*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A3. W01-A06E1S remains valid and searchable for records between 2006 and 2011 when it covered roaming between networks operating on different transmission standards, including switching between wireless data networks and mobile telephone networks when W01-B05A1R was also assigned. When used, W01-A06E1S took precedence over W01-A06E1R, which covered same-network type roaming.

W01-A06E2 [1992]

Network control characterised by mode

W01-A06E2A [1992]

Centralised control

Covers networks where the host exercises control over the tributary stations all of which are connected to it. The host may also act as a message-switching device between remote sites. See W01-A06G1 also for network circuit switching. Prior to 2002 W01-A06E2A was used to denote polling, with W01-A06F also assigned for significant protocol aspects. From 2002, the topic of polling will be covered by W01-A06F1C, with W01-A06E2A only assigned for specific 'centralised control' aspects.

W01-A06E2B [1992]

Decentralised control

Includes hierarchical and distributed systems. Covers networks where each station may be connected to several others in the network; giving the possibility to share resources and to distribute the database to the systems which access the data most frequently.

Random access

W01-A06F [1992]

Network protocol

(W01-A07G)

W01-A06F codes are assigned to highlight the protocol in use in a network without this being necessarily novel. When some aspect of protocol is novel, W01-A06F5 is also assigned. From 2002 access control topics previously covered by W01-A03A codes are transferred to these codes which will cover all the types of protocols. W01-A06F codes take precedence over W01-A07G codes which cover protocol aspects in a general or non-network sense.

CODEC, DQDB, OSI layer, bi-sync, SDLC, HDLC, SDH, PDH

W01-A06F1 [2002]

Access control

Search with W01-A06 codes for network aspects, e.g. with W01-A06B5A for access control in LANs. See also T01 codes, such as T01-H07B and T01-N02 codes.

Access right, protocol, arbitration, code division, CDMA, binding

W01-A06F1A [2002]

Contention protocols

(W01-A03A1, W01-A06F)

Includes Carrier Sense Multiple Access/Collision Detect (CSMA/CD and CA) and Ethernet®. Request handling for interconnection or data transfer in computer systems is covered by T01-H05 codes, e.g. T01-H05B3 for contention avoidance for access to common bus. W01-A06F1A is also used for network access aspects of cognitive radio (with W01-A06C4 codes) based on channel state sensing in which case W02-C03G5 is also assigned from 2010. Resource allocation in data networks in general is covered by W01-A06E1L. (From 2005 to 2012 resource allocation was covered by W01-A06A3 and W01-A06E).

Back-off, channel occupancy, collision avoidance, collision detection, contention, DC level shift, Ethernet®, heterodyne, random delay, timeout period, auto negotiation

W01-A06F1C [2002]

Polling protocols

(W01-A06E2A, W01-A06F)

Includes hub and roll call polling. Prior to 2002 polling was covered by W01-A06E2A with W01-A06F for protocol aspects.

W01-A06F1E [2002]

Token pass protocols

(W01-A03A3)

Token pass protocols for ring networks are also coded in W01-A06B2, and in W01-A06B1 for bus networks.

Dynamic logical ring, priority token, address, FDDI

W01-A06F1G [2002]

Time Division Multiple Access (TDMA)

(W01-A03A2)

See W01-A03C1 for non-network aspects of TDMA in data transmission and W02-C03B and W02-K codes, e.g. W02-C03B1D and W02-K02D, for TDMA aspects of satellite radio system.

Aloha, slotted, synchronous, frame, burst transmission, DQDB (distributed queue dual bus), CRMA (cyclic reservation multiple access)

W01-A06F2 [2002]

Network layer protocols

Routing, IP multicast

W01-A06F2A [2002]

IP

(W01-A06B7, W01-A06F)

Mobile IP

W01-A06F2C [2002]

TCP/IP

W01-A06F3 [2002]

Application layer protocols

*DNS/BIND, FTP, HTTP, Telnet, MIME, MQTT,
Network File System, NNTP, SMTP, SNMP, POP,
RTP, UDP, URI*

W01-A06F4 [2025]

Hybrid protocols

Includes the use of 2 or more different protocols.
Example includes a combination of TCP and UDP
protocol.

W01-A06F5 [2002]

Novel protocol

This code is used with other W01-A06F codes as
appropriate to denote that some aspect of the
protocol itself is novel.

XTP, Multichannel or Multilink protocol

W01-A06F6 [2025]

Protocol timers

This code includes the use of timing (timers)
mechanism in a protocol.

W01-A06F7 [2005]

**Network protocol conversion,
encapsulation, and tunnelling**

(W01-A06F9)

This code covers arrangements for handling
different protocols within a network, the topic
previously being covered in W01-A06F9.

W01-A06F7A [2005]

Network protocol conversion

W01-A06F7C [2005]

**Network protocol encapsulation and
tunnelling**

For protocol tunnelling in connection with VPNs
search with W01-A06B7G.

W01-A06F9 [2002]

Other network protocol aspects

*Multiprotocol handles, Protocol fault management,
Protocol engines*

W01-A06G [1992]

Network switching/connection

(W01-A06X)

W01-A06G1 [1992]

Circuit switching

Covers centralised switching method, with one
branch exchange (PBX), calls are centralised and
switched and distributed switching method with
hierarchical network, having a number of DSN's
(Distributed Switching Nodes) controlled so that
the entire system operates as one exchange. See
also W01-A06E2 for centralised and decentralised
network control. Includes stored program control
and use of time division.

*Clos network, fat tree, folded Clos network, fourth
generation PBX*

W01-A06G2 [1992]

Stored and forward switching

Includes packet routing (with W01-A03B codes),
using radio channel (with W01-A06C4), flow
control, bandwidth control and message switching
systems. For facsimile systems see S06-K07C2B
also.

W01-A06G3 [1992]

Network inter-connection

(W01-A06X)

Covers communication conducted between a
number of LANs using a MAC (media access
control) to connect them through a bridge
apparatus. Includes source routing and non-source
routing; bridging of networks; and interconnect
programs. See W01-A06E and T01 codes for
network software in general. Also includes network
interfacing. From 2005, all aspects of peer-to-peer
network are covered in W01-A06B8C.

*MAU (medium attachment units), BBN (backbone
network)*

W01-A06G5 [2002]

Network switching and interconnecting devices

These codes are intended to highlight particular devices used in networks for connection, switching, routing and repeating purposes. The codes may be used alone if of general application or in conjunction with other W01-A06 codes as appropriate.

W01-A06G5A [2002]

Cross-connect switch

W01-A06G5C [2002]

Gateway or bridge

Includes wireless access points (normally with W01-A06C4E), previously coded in W01-A06G5 or W01-A06G5E, depending on specific aspects, and in W01-A06C4X.

W01-A06G5E [2002]

Router

Routers were previously coded in W01-A06E1, which is still assigned for significant control aspects.

W01-A06G5G [2002]

Network repeaters

This code is intended to be used as a single reference for repeaters for data transmission in general, and replaces W01-A08A2 and W01-A08B1 (repeaters for baseband data transmission), which are discontinued from 2002. Network repeaters for which the baseband aspect is significant will from now on be assigned W01-A06G5G and an appropriate W01-A08 code, while for cases where broadband transmission is significant, W01-A09 codes will be used with W01-A06C5G. Repeaters for line communication in general are covered by W02-C01E codes, for radio by W02-G05C and W02-C03B codes, and for optical communication in general by W02-C04A5.

W01-A06G5X [2002]

Other network switching and interconnecting devices

Includes devices providing simple interconnection without any switching necessarily taking place, e.g. hubs.

W01-A06G9 [1992]

Other switching/connection of networks

W01-A06X

Other data exchange and network aspects

W01-A07

Standard code systems and general data transmission systems or equipment

W01-A07 codes are intended for inventions in the field of data transmission of a generally applicable nature. Although W01-A07 codes may be used with W01-A06 (network) codes to highlight a specific aspect, (e.g. a power supply for a LAN is represented by W01-A06B5A and W01-A07K), in general, inventions involving data communication between only two stations are assigned W01-A07 codes whilst those involving data transfer between three or more stations are regarded as networks and are assigned W01-A06 codes.

Signalling format, text

W01-A07A

Dot-and-dash code systems

Morse code, telegraphy, telegraph operator, training, mark, space

W01-A07B

Equal-length code element systems

Includes telex and analogous systems, also coded in W01-C05B3D.

Teleprinter

W01-A07C [1992]

Transmitter apparatus or circuits

W01-A07D [1992]

Receiver apparatus or circuits

W01-A07E [1992]

Optical communications

Prior to 2006 this code was used with W01-A07H1 to indicate optical fiber interfaces, now covered by W01-A07H4 alone. Data networks using fiber-optic and free-space optical links are respectively covered by W01-A06C1 or W01-A06C3. W02-C04 codes cover optical communication in general and are also assigned for novel details such as light source drive circuitry, photodiode current amplifiers, etc.

W01-A07F [1992]

Communication control and processing

Line termination

W01-A07F1 [1992]

For a number of communication lines

W01-A07G [1992]

Communication protocol

This code and its subdivision are intended for novel or significant aspects of data communication protocols in a general or non-network context. W01-A06F codes are assigned **instead** of W01-A07G codes for protocol aspects specific to networks. Computer communication protocols are covered by T01-N02A1.

W01-A07G1 [1992]

Transmission control procedure

Includes data link level control.

Time out detection, contention type

W01-A07G9 [1992]

Other general protocol aspects

W01-A07H [1992]

Characterised by interface or data terminal

W01-A07H1 [1997]

Wired interface

This code is intended for transmission of data through a wired medium, including serial and parallel interfaces. Prior to 2006 this code included optical fiber interfaces when used with W01-A07E. From 2006 interfaces of that type are covered by W01-A07H4.

C-type, Centronics®, Firewire®, IEEE1394, i-link®, parallel port, RS-232, RS-485, serial port, universal serial bus, USB

W01-A07H2 [1997]

Radio and near-field interface

From 2010 the title of this code has been changed to reflect the previous inclusion of near-field interfaces, now covered by W01-A07H2N. Prior to 2010 search W01-A07H2* with W02-C02 codes or with the terms 'near-field' or 'NFC' for interfaces based on near-field communication. See W02-C02 codes for novel details of near-field systems, W02-C03 codes for details of radio systems and W02-G codes for radio equipment itself. Specific aspects of protocol peculiar to the interface types listed below are covered by additional assignment of W01-A07G codes, the intention of the W01-A07H2 codes being to characterise the interface from the radio viewpoint. Radio links specifically for network communication between several stations (i.e. more than two) are covered by W01-A06C4 codes.

W01-A07H2A [2002]

Bluetooth® and ZigBee® radio interface

From 2010 the title of this code is changed to reflect the previous inclusion of ZigBee-based radio interfaces. Wireless network aspects of Bluetooth and ZigBee systems (i.e. more than two stations communicating using IEEE 802.15 standard) are covered by W01-A06C4A. Novel aspects of the frequency-hopping system are also assigned W02-K05A6 and other W02-K05 codes as appropriate.

W01-A07H2C [2002]

DECT-based radio interface

DECT systems for actual telephone usage are assigned W01-B05A1B and W02-C03C3 codes, with handsets covered by W01-C01D1 codes.

W01-A07H2K [2005]

UWB and impulse radio link

Covers carrier-free and carrier-based links using time hopping and similar techniques. Novel details of ultra-wideband systems are covered by W02-K05 codes, especially W02-K05A9 codes. UWB wireless links between three or more stations (regarded as a network) are covered by W01-A06C4K.

W01-A07H2N [2010]

Near-field interface

This code covers interfaces for transfer of digital data using near-field communication (NFC) systems based on inductive loops and magnetic or electric fields, and also those using antennas with deliberately enhanced near-field or suppressed far-field characteristics, including those operating at microwave frequencies. Interfaces using normal far-field radio communication are not included and are covered by other W01-A07H2 codes. Novel aspects of the near-field system are also assigned W02-C02 and W02-G codes as appropriate. Near-field interfaces for mobile phones are also assigned W01-C01D3C and W01-C01R codes. Use of a mobile phone as an electronic ticket or similar is covered by W01-C01D3C and W01-C01P9.

Coil, coupler, NFC interface, TransferJet™

W01-A07H2X [2002]

Other radio interface

W01-A07H3 [1997]

Free space optical interface

Free space optical communication specifically for data networks is covered by W01-A06C3, and in general by W02-C04B2 codes.

IrDA

W01-A07H4 [2006]

Optical fiber interface

Prior to 2006 this topic was covered by W01-A07E and W01-A07H1. Novel details of optical communications equipment are also assigned W02-C04 codes and those relating to novel fiber-optic technology are also assigned V07 codes.

W01-A07J [1997]

General construction details

See also V04-S or V04-T codes.

W01-A07K [1997]

Power supply

See also U24 codes, e.g. U24-D and U24-E for further details of power supplies.

W01-A07L [1997]

Fault detection and apparatus testing

From 2012 the title of this code has been changed to clarify its coverage of fault detection and testing of equipment for data communications in a general or 'non-network' application. Fault detection in a network environment, i.e. while the equipment is connected in the network, is covered by W01-A06A2 and from 2012 W01-A06A2A has been introduced specifically for network apparatus testing.

W01-A07L1 [2012]

Data communications equipment fault detection and apparatus testing

Fault detection in data networks is covered by W01-A06A2.

W01-A07L5 [2012]

Data communications equipment testing

Testing of equipment while it is connected in a network is covered by W01-A06A2A.

W01-A07X [1992]

Other general data transmission aspects

W01-A08

Baseband and DC data transmission systems

From 2002 the title of this code is expanded to better reflect its coverage of baseband data transmission systems. The codes in this section are used for any aspect of data transmission in which a DC or baseband aspect is significant, e.g. they may be applied to the post demodulation processing in a radio receiver. Data transmission in which **broadband**, modulated carrier, aspects are significant, are covered by W01-A09 codes.

Direct coupled

W01-A08A

Synchronous or start-stop systems

W01-A08A1 [1992]

Transmitting circuits/Receiving circuits

Distributors, repeaters

W01-A08A1A [1992]

Characterised by code

Includes predistortion, insertion, idle bit, using 3 or more amplitude levels, transition code and correlative code. See W01-A02 for data transmission characterised by use of code conversion, and U21-A05 codes for specific coding formats.

HDB3 code, Baudot code

W01-A08A1B [1992]

With storage before transmission or reception

W01-A08A2* [1992-2001]

Repeater, relay circuits

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06G5G. W01-A08A2 remains valid and searchable for records between 1992 and 2001. During this time W01-A08B1 was regarded as the general code for baseband data transmission repeaters.

W01-A08B

Shaping networks; Repeater and relay circuits

From 2002 data transmission repeaters are covered by W01-A06G5G.

W01-A08B1* [1992-2001]

Repeater and relay circuits

*This code is now discontinued and from 2002 the subject matter covered is transferred to W01-A06G5G. W01-A08B1 remains valid and searchable for records between 1992 and 2001. During this time W01-A08B1 was regarded as the general code for baseband data transmission repeaters and W01-A08A2 was assigned for repeaters specific to synchronous or start-stop systems. From 2002, repeaters specific to baseband data transmission will be indicated by W01-A06G5G and a W01-A08 code as appropriate.

Regenerator, single to double current, semiconductor, optical sensing, modulation

W01-A08B2 [1992]

Shaping networks

Includes decision feedback and transversal equalisers, and passive shaping networks. See W02-C01B2B for general line transmission equalisers and W02-C03E1B for radio receiver equalisers, also assigned W02-G03 codes, e.g. W02-G03B6.

Adaptive, DFE, coefficient, weighting, tap

W01-A08C [1992]

Non-synchronous systems

(W01-A08X)

Includes using 3 or more different amplitudes e.g. cable code.

Asynchronous

W01-A08D [2007]

Differential data transmission

This code covers differential data transmission and is assigned with other W01-A08 codes as appropriate. Novel logic circuits intended for use in differential serial bus systems are covered by U21-C02D1.

LVDS

W01-A08E [2007]

DC offset suppression or adjustment

This code covers the suppression or removal of DC offsets and the clamping of a signal to a desired DC level, primarily in baseband signals. Novel circuits for clamping the level of pulse signals in general to a desired DC level are covered by U22-D01A1A.

W01-A08X

Other baseband and DC data transmission aspects

Interface, coupling

W01-A09

Broadband and modulated carrier systems

From 2002 the title of this code has been changed (formerly 'AC systems') to better reflect its coverage of broadband data transmission systems, generally employing modulated carriers. Data transmission systems in which baseband data is directly transmitted ('DC systems') are covered by W01-A08 codes. Codes are generally assigned to highlight a particular mode of transmission, e.g. OOK, FSK, QAM, and where appropriate to focus on particular novel aspects of modulators or demodulators (W01-A09E codes).

Modulate, modem, demodulate, carrier systems, broadband systems, multilevel

W01-A09A

Amplitude and frequency modulated carrier systems

W01-A09A1 [1992]

AM carrier systems

On-off keying (OOK), single side band (SSB), vestigial side band (VSB), superheterodyne, carrier recovery

W01-A09A2 [1992]

FM carrier systems

FSK, TFM, using filters, oscillators, quadrature

W01-A09B [1987]

PSK

Includes suppressed carrier product modulation methods by means of a digital signal.

Phase shift keying, binary phase-shift keying (BPSK), differential phase shift keying (DPSK), Gaussian minimum shift keying (GMSK), minimum shift keying (MSK), quadrature phase-shift keying (QPSK)

W01-A09C [1987]

QAM and other hybrid modulation

Quadrature amplitude modulation, 16-QAM, constellation, signal points

W01-A09C1 [2005]

QAM

W01-A09C5 [2005]

Layered modulation

W01-A09D [1992]

Using multi-frequency codes

(W01-A09X)

Covers simultaneous transmission of different frequencies each representing one code element and systems where each code element is represented by a combination of frequencies. Multifrequency signalling for telephony is coded in W01-B09 only.

W01-A09E [1992]

Modems, modulators and demodulators

(W01-A09)

Search with other W01-A09 codes for specific modulation type. Telephone line modems are also assigned W01-C05B3A and novel modulator or demodulator circuitry is also assigned U23-P01J codes.

Frequency-multiplexing, microwave, QPSK, CPSPK, DPSK

W01-A09E1 [1992]

Modulator circuits

Search with U23 codes e.g. U23-P01J1 for digital aspects and U23-D01C codes for PLL aspects.

W01-A09E2 [1992]

Demodulator circuits

Search with U23 codes e.g. U23-P01J3 for digital aspects and U23-D01C codes for PLL aspects.

Carrier recovery, PLL, Costas loop

W01-A09E3 [1997]

Voice over data transmission

Includes modem, modulation or demodulation aspects only. Covers switching between voice and data transmission, compression, and out of band transmission. Search with U23 codes for modulation aspects as appropriate. Search W01-C05B3G for combination with telephone system or T01 codes for combination with computing system. Voice-over-IP telephone communication is covered by W01-C05B4C from 2002. (Prior to 2002, W01-A06B7, W01-A06F, and W01-C05B3 were used, in addition to T01-H07C5E).

SVD, voice span[®], VoiceView[®]

W01-A09X

Other broadband data transmission aspects

W01-A20

Other data transmission aspects

W01-B

Selecting

Includes selection (i.e. switching), for telephony (W01-C) and other signal applications. Mechanical switches per se are covered by V03, and electronic switching by U21-B codes.

W01-B01

Direct selection

W01-B02

Indirect selection

This code is used for novel signal switches per se, including optical switching. See also V03 codes or U21-B codes as appropriate, e.g. U21-B05E. RF waveguide technology switches are covered by W02-A4A code.

Space switching, optical switching, relay, electronic, switch, matrix

W01-B02A

Common control by centralised logic

Processor control

W01-B02A1 [1992]

Stored program control

See also T01 codes.

SPC, microprocessor, microprogram, microcomputer, computer

W01-B02X

Other indirect selection

Clock signal distribution, distributed control

W01-B03

Connecting to satellite or sub-exchange; Distribution; Caller identification

Inter-exchange link, concentrator, stacking

W01-B03A [1992]

Connecting to satellite or sub-exchange, distribution

(W01-B03)

W01-B03C [1992]

Caller identification

From 2002, transmission of caller ID, and its inhibition, as special subscriber services in an exchange are covered by W01-C02B3C and W01-C02B3E respectively. Prior to then, W01-B03C was assigned for these topics with W01-C02B9. From 2002 W01-B03C is used only for novel aspects of determining caller ID.

Call tracing

W01-B04

Party line selection

W01-B05

Connecting via radio, inductive or free-space optical links

The codes in this subgroup deal with connections that do not involve use of cables or optical fibers, the essential feature being a 'wireless' aspect. Further details are specified by co-assignment of 'transmission system' codes in the W02-C group as appropriate, e.g. W02-C03C codes when mobile radio is involved.

Selective calling, cellular radiotelephone, cordless telephone, paging

W01-B05A [1992]

Radio

This section relates to both base station apparatus and to overall radio systems, and should be used with W02-C03 and W02-G codes as appropriate for these aspects.

W01-B05A1 [1992]

For mobile radio telephone system

See W01-C01D codes for subscriber equipment. Includes multi-handset cordless telephones, see also W01-C01D1.

W01-B05A1A [1992]

Cellular

This code is normally assigned to indicate layout or design of a cellular telephone system, the arrangement of cells and base stations, or novel methods of operating the network involving signalling, paging, and the like. (Note that dedicated 'paging systems' are not coded here, being covered by W01-B05A5 for selective calling aspects). Novel base station details are also included, for which W02-C03C1B is also assigned. In general, other W02-C03C1 'cellular radio' codes are also assigned with W01-B05A1A as necessary when mobile radio system aspects are significant. When emphasis is on 'telephone exchange' and 'switching' aspects of cellular mobile phone systems W01-B05A1C is assigned instead of W01-B05A1A. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming and registration in mobile phone networks (and wireless data networks) and these codes will be assigned in preference to W01-B05A1 codes for these specific topics. If the use of W01-B05A1A is required to indicate other significant aspects of an invention the code will be assigned in addition to W01-E codes.

Microcellular, macrocellular, GSM, PCN, NADC, JDC, Qualcomm®, CDMA

W01-B05A1B [1992]

Cordless call-point phone system

Cordless telephones per se are covered by W01-C01D1 codes. Non-cellular mobile radio system aspects are indicated by use of W02-C03C3 codes. *CT2, CT3, DECT, PHS*

W01-B05A1C [1992]

Exchange details

This code is normally used instead of W01-B05A1A when focus is on 'telephone exchange' and 'switching' aspects of cellular mobile phone systems. W02-C03C1 codes are not normally required, but may be assigned when specifically required. From 2012 W01-E codes are introduced to cover mobility-related aspects such as roaming

and registration in mobile phone networks (and wireless data networks) and these codes will be assigned in preference to W01-B05A1C for these specific topics. If the use of W01-B05A1C is required to indicate other significant aspects of an invention the code will be assigned in addition to W01-E codes.

W01-B05A1D [1997]

Direct mode connection between telephones

Search with other W01-B codes for dual mode operation, e.g. W01-B05A1A or W01-B05A1B for switching between cellular or cordless call point systems and direct mode. Also includes Sidelink communications (connection between the devices without requiring the base station) used in 4G and 5G systems. Search with W02-C03R2 for resource selection by the terminal.

Digital short range radio system (DSRRS), Sidelink communication

W01-B05A1E [1997]

Satellite telephone connection

W02-C03B1 codes are assigned to indicate aspects of satellite radio relay systems. For the purpose of highlighting the 'mobile radio' aspect, satellite telephone systems are regarded as being of cellular type, i.e. W02-C03C1 codes are also assigned. Satellite telephone sets themselves are assigned W01-C01D3E, and other W01-C01 codes as appropriate.

TFTS, aeroplane telephone

W01-B05A1F [1997]

Short messaging service

This code covers exchange and 'system' aspects specific to mobile telephone networks. Prior to 2009 these aspects of MMS were also covered here (now assigned W01-B05A1H). 'Special subscriber service' aspects of SMS - i.e. aspects of the system as it appears to subscribers in terms of features offered by the service provider - are covered by W01-C02B7D instead. SMS telephones themselves are assigned W01-C01G6A (and W01-C01D3C when a mobile phone is involved).

W01-B05A1G [1997]

Fixed location radio telephone access

W02-C03D codes are also assigned to indicate the 'point-to-point' nature of the radio link.

W01-B05A1H [2009]

Multimedia messaging service

(W01-B05A1F)

This code covers exchange and 'system' aspects specific to mobile telephone networks. Prior to 2009 these aspects of MMS were assigned W01-B05A1F. 'Special subscriber service' aspects of MMS - i.e. aspects of the system as it appears to subscribers in terms of features offered by the service provider - are covered by W01-C02B7F instead. MMS telephones themselves are assigned W01-C01G6B (and W01-C01D3C when a mobile phone is involved).

W01-B05A1M [2006]

Network broadcasting

This code is intended for network broadcast messages for system management and information, and other broadcasting aspects, e.g. involving entertainment aspects with W01-C05 codes assigned as appropriate.

W01-B05A1N* [2006-2011]

Registration of mobile subscriber

*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01C3. W01-B05A1N remains valid and searchable for records between 2006 and 2011 when it covered registration of mobile subscribers in mobile telephone networks.

W01-B05A1Q* [2006-2011]

Location register details

*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01C1. W01-B05A1Q remains valid and searchable for records between 2006 and 2012 when it covered location register aspects of mobile telephone networks.

HLR, VLR

W01-B05A1R* [2006-2011]

Subscriber roaming aspects

*This code is now discontinued and from 2012 this subject matter will be covered by W01-E01A codes. W01-B05A1R remains valid and searchable for records between 2006 and 2011 when it covered roaming in mobile telephone networks and when assigned with W01-A06E1S, switching between wireless data networks and mobile telephone networks.

W01-B05A3 [1992]

Inter-exchange connection

See also W01-C03 for telephone system and W02-C03B codes for radio relay systems.

Trunked radio, TETRA

W01-B05A3A [1992]

Terrestrial

See also W02-C03B codes for radio relay systems and W02-C03D codes for point-to-point radio links.

W01-B05A3B [1992]

Satellite

See also W02-C03B codes.

W01-B05A5 [1992]

Paging system

This code covers selective calling aspects of traditional paging systems i.e. those normally operating over a dedicated mobile radio network in which text messages and the like are transmitted to dedicated portable receivers, frequently operating independently of mobile telephone systems. All aspects of paging systems and equipment are covered by W05-A05C codes and novel mobile radio system details by W02-C03C codes. Note that 'paging' in the sense of a base station transmitting a message to a mobile phone to set-up a call in a cellular telephone system is not included, being covered by W01-B05A1A.

ERMES, FLEX, ReFLEX, POCSAG, code, address

W01-B05A7 [1992]

For non-telephone mobile radio

Includes selective calling for private mobile radio.

Multichannel access, MCA, PMR

W01-B05A9 [1992]

Other radio link selection aspects

W01-B05B [1992]

Inductive

See W02-C02 codes for near field inductive systems also.

W01-B05C [1992]

Optical

See W02-C04 codes for optical transmission systems also.

W01-B05X [1992]

Other wireless telephone connection

W01-B06* [1980-2011]

Telecontrol and telemetry systems

*This code is now discontinued and from 2012 this subject matter will be covered by W05-D02 codes. W01-B06 remains valid and searchable for records between 1980 and 2011 when it was used for selection aspects only of telemetry and telecontrol, and was not regarded as the main code for this topic. All aspects of general-purpose telemetry or telecontrol are covered by W05-D codes which should be searched with application as appropriate. Exceptions to this are: general audio/video remote control, coded in W03-G05A codes; remote control for TV receivers coded in W03-A02C codes; remote control for recording equipment coded in W04-E04A; remote control for TV camera coded in W04-M01D1A.

W01-B07

Selection for multiplex systems

See W02-K codes for multiplex systems in general.
Time switch, time division multiplexing (TDM), frequency division multiplexing (FDM)

W01-B08

Testing equipment

This code is used either on its own or in conjunction with other codes from the W01-B group to indicate the type of switching system under test. W01-B08 is intended for testing of selection apparatus only, and **not** for testing of a whole exchange, which is covered by either W01-A06A or W01-C02A codes depending upon the exchange type.

Selection equipment test/maintenance

W01-B09

Signalling

See also appropriate codes for oscillators and tone generators, e.g. U23-F02.

Multi frequency, DTMF signalling, pushbutton dial signalling, MF, dual tone, PB

W01-B20

Other selecting details

Includes distribution frames, circuit card mountings and other constructional aspects. See V04-T02 for rack construction in general.

W01-C

Telephony

W01-C01

Subscriber equipment

Includes analogous equipment when used in conjunction with appropriate code.

W01-C01A

Construction (incl. cradle switch mechanical aspects)

Electroacoustic aspects of telephone handsets are assigned V06-V04B1 also.

Mechanical hook switch, mechanical telephone lock, hygiene attachment, disinfecting, cleaning

W01-C01A1 [1992]

Internal construction e.g. PCB Mounting

W01-C01A2 [1997]

Display

This code is intended for constructional aspects arising from the inclusion of a display and does not cover novel display devices such as LCDs themselves, which are covered by W01-C01B3E. Arrangements for display of incoming call number are covered by W01-C01F3. Constructional aspects relating to touch screens are also assigned W01-C01B8H.

W01-C01A2A [2002]

Back or edge lighting for telephone display

From 2007, these topics in general are covered by X26-U04A codes (now the main codes for backlighting and edge lighting) which are also assigned and in U14-K01A4C, assuming LCD. Prior to 2006, W05-E05B codes (now discontinued) were assigned in this role. During 2006 W05-E05B codes were also assigned when wider applications were stated but were not used with W01-C01A2A for cases specific to telephone displays alone.

W01-C01A2C [2006]

Multiple display aspects

Covers the use of more than one display and arrangements for viewing a display from e.g. both sides of a handset.

W01-C01A3 [1992]

Casing and hand set construction

Telephone handsets as casings for electroacoustic transducers are coded in V06-C also. To link the features represented by the following codes with portable mobile phones search with W01-C01D3C.

W01-C01A3A [2002]

Handset with movable portion

Includes 'folding' or 'flip' aspects, e.g. for mobile phones.

W01-C01A3C [2002]

Handset or casing with detachable fascia or similar portion

This code is intended for fascias and similar parts which can be changed by the user, e.g. for customising mobile phones.

W01-C01A3E [2002]

Handset or casing with novel shape or appearance

This code is intended for telephone sets or casings with unconventional shape, e.g. with some novelty or amusement aspect.

W01-C01A3G [2006]

Telephone set incorporated into clothing

Includes telephones, usually of portable type and hence also assigned W01-C01D3C, forming a permanent part of headgear or other clothing. Mountings for telephones which are **detachable** from clothing are covered by W01-C01A5. X27-A02B1 codes are also assigned in either case.

W01-C01A4 [1997]

Radiation exposure protection features

This code covers constructional arrangements, especially shielding and screening, for protecting the user of a mobile phone from RF radiation and is normally used with W01-C01D3C (for cellular handsets). See also V04-U, S05-A03 and W02 codes, especially W02-B08B5 when antenna details are relevant.

Radio telephone, handset, portable, SAR, specific absorption rate

W01-C01A5 [1992]

Support, mounting bracket

Includes arrangements for e.g. wall mounting, or vehicle dashboard installation (with W01-C01D3B) or attaching to belt etc.

W01-C01A6 [1997]

Telephone cover

This code is intended for hard or soft carrying cases for telephone sets, especially hand-held mobile phones for which W01-C01D3C is also assigned. Detachable covers in the form of coloured fascias which can be changed by the user are not included in W01-C01A6 and are assigned W01-C01A3C.

Mobile, radio, portable, case

W01-C01A7 [1992]

Acoustic constructional details

Includes loudspeaker enclosures external to telephone set per se, e.g. for loudspeaker, conference or car telephone. See W01-C01A1 or W01-C01A3 for mounting of loudspeaker or microphone in telephone. (Also assigned V06-V codes and W04-S01 codes).

W01-C01A8 [2009]

Telephone set cooling

(W01-C08X)

This code is intended for novel aspects of cooling for subscriber telephones and related equipment. Other codes are assigned as appropriate, e.g. battery cooling in a mobile phone is represented by W01-C01A8, W01-C01D3C and W01-C01E5B. Cooling of the transmitter part of a mobile phone is also coded as W02-G01H (e.g. with W02-C03C1C, assuming a cellphone). Cooling of telephone equipment in general is covered by W01-C08X. In all cases V04-T03 codes (for cooling electronic equipment in general) are assigned as appropriate.

W01-C01A9 [1992]

Other constructional details

Includes hygiene arrangements, (see also V06 codes) and mechanical locks (also assigned W01-C01B5D when designed to prevent dialling). Telephone cable connected to subscriber equipment is not included, being covered by W01-C01X.

W01-C01B

Subscriber calling devices

See W01-B09 also for MF tone generator.

Rotary dial, pushbutton, key, select, call

W01-C01B1 [1987]

Autodialers, repertory dialling

Number memory, card storage, last number re-dial, automatic dialler, alarm autodialer, modem autodialer

W01-C01B1A [1992]

Number storage, repertory

W01-C01B1B [1992]

Voice dialling, hands free dialling

See also W04-V codes, e.g. W04-V04A, for voice analysis details. For loudspeaker telephone search with W01-C01G2.

W01-C01B1C [1992]

With bar code, OCR input

Novel aspects of optical bar code readers are coded in T04-A03B1 also. Character and pattern recognition aspects are also assigned T04-D codes.

W01-C01B1D [1992]

With external module

Includes unit usable with any MF dialling telephone, e.g. by acoustic coupling to microphone.

Promotional, free gift, accessory, pager

W01-C01B1E [1997]

Reply dialling

(W01-C01B1, W01-C01F3)

See W01-C02B5A for exchange based system.

W01-C01B1F [2002]

Redialers

This code is intended for external boxes redirecting certain calls to secure more favourable tariff, and may be assigned with W01-C01B4 (for least cost routing aspects) depending on the novelty.

W01-C01B1X [1992]

Other automatic dialling

W01-C01B2 [1992]

Dial signal generator

(W01-B09, W01-C01B)

W01-C01B2A [1992]

Producing dial pulses

(W01-C01B)

DP

W01-C01B2C [1992]

Producing tones (includes MF tone generator)

(W01-B09, W01-C01B)

From 9201, tone generator per se is coded (in W01) as W01-C01B2C only. See also appropriate codes in e.g. U23-F.

Dual tone multifrequency, DTMF

W01-C01B3 [1992]

Dial and user interface display

The title of this code has been expanded from 2002 to better reflect its coverage of novel details of display circuitry and the typical additional uses of displays on telephone sets. Constructional details of displays are covered by W01-C01A2 and the display of caller ID by W01-C01F3.

Dial display

W01-C01B3A [2002]

Drive circuitry

Circuitry aspects specific to touch screen operation are covered by W01-C01B8H, which takes precedence over this code.

W01-C01B3C [2002]

Back lighting circuitry and control

Physical aspects of telephone display back- or edge-lighting, such as light sources, diffusers, etc. are covered by W01-C01A2A, and of displays in general by X26-U04A codes from 2007 (previously W05-E05B codes).

W01-C01B3E [2002]

Novel display for dialling and user interface

This code is intended to highlight telephone set applications for displays the novel details of which are coded elsewhere, e.g. U14-K01 codes in the case of LCDs.

W01-C01B4 [1997]

Least cost routing

(W01-C01B9)

See W01-C02A7 and W01-C06A for LCR system based at exchange.

LCR

W01-C01B5 [1987]

Security, restricted dialling

Codes in this section cover the use of both electronic and mechanical safeguards against unauthorised use.

W01-C01B5A [1992]

Security based on input code or card

Password, access code, enter, key, card reader

W01-C01B5B [1992]

Security based on voice recognition/input

Voice or other biometrics-based control of access to the phone as a whole is covered by W01-C01Q8C. W04-V codes, e.g. W04-V04A3, are also assigned for speech recognition aspects.

Designated user, voice print, voice pattern, speaker-dependent

W01-C01B5C [1992]

Preventing dialling of predetermined numbers

Long-distance dialling detector, leading-zero detector

W01-C01B5D [1992]

Using mechanical lock

See W01-C01A9 also.

W01-C01B5X [1992]

Other secure dialling arrangements

W01-C01B7 [1992]

Dial format detection

Covers circuitry automatically selecting appropriate dial signal generator to suit format of exchange.

DP, dial pulse, MF, DTMF, dual tone multifrequency

W01-C01B8 [1992]

Keyboard and other manual input arrangements

This code covers details of keyboards, pushbuttons, switches and other manual input arrangements for controlling a telephone. W01-C01B8 and its subdivisions are used with V03 codes if the novel aspect is an electromechanical switch or with U21-B codes for electronic switching.

W01-C01B8A [1992]

Layout of keyboard

Includes configuration of keys, provision of special function keys, etc. Special function keys themselves are covered by W01-C01B8K from 2002.

Braille

W01-C01B8C [1992]

Construction of keyboard per se

W01-C01B8E [1992]

Key switching element

This code is used for novel switching elements per se. For novel electronic switch details, U21-B codes are also assigned.

W01-C01B8G [1992]

Keyboard illumination

W01-C01B8H [2002]

Manual input devices based on absolute position, including touch screen

Covers devices such as touch pads and touchscreens. Prior to 2006 touch pads and similar 'absolute position' input arrangements not involving displays were covered by W01-C01B8K. Constructional aspects of touchscreens are also assigned W01-C01A2. This code takes precedence over W01-C01B3A (display drive circuitry). Touch screens in general are covered by T04-F02A2.

Stylus, tablet

W01-C01B8K [2002]

Special function keys per se

Details relating to the layout of keyboards on which special function keys or analogous controls are provided which are not themselves the novel aspect, are covered by W01-C01B8A. From 2006, trackballs, joysticks and the like are covered by W01-C01B8L.

W01-C01B8L [2006]

Manual input devices based on relative position

Covers trackball, joystick, or analogous arrangements for data input (previously coded in W01-C01B8K). See T04-F codes for further details.

Mouse, track pad, joystick, track ball

W01-C01B8M [2007]

Key circuitry and coding

See also U21-A05D codes for key coding aspects, e.g. U21-A05D1 for coding arrangements for handling different language character sets.

W01-C01B8N [2009]

External keyboard arrangements

This code is intended for arrangements for using an external keyboard with telephone equipment, including novel keyboards themselves and arrangements for connecting or interfacing them with e.g. a telephone set. Novel digital interfacing aspects of telephones are covered by W01-C01R, with W01-A07H codes assigned as appropriate to indicate the technology used.

W01-C01B9 [1992]

Other subscriber calling device details

W01-C01C

Automatic answering, speech amplifiers, anti-side-tone circuits

W01-C01C1 [1992]

Speech amplifier details

Amplifiers in general are coded in U24-G.

W01-C01C1A [1992]

For microphone

Microphone transducers per se are coded in W01-C01M and, in general, in V06-B02.

W01-C01C1B [1992]

For earphone or loudspeaker

Transducers per se are coded in W01-C01M. For loudspeaker telephone search with W01-C01G2A.

W01-C01C1C [1992]

Gain control

U24-C codes are also assigned for novel circuitry. Control of gain dependent on dominant transmission direction is covered by W01-C01C3A.

W01-C01C1D [1997]

Muting circuit

(U24-C05C, W01-C01C1C)

Includes muting on hold. See W01-C02B2A for exchange details of call holding.

Mute, hold

W01-C01C1X [1992]

Other speech amplifier details

W01-C01C3 [1992]

Anti-sidetone, noise and feedback suppression

W01-C01C3A [1992]

Control of transmit-receive gain

Includes gain control based on dominant transmission direction, e.g. for loudspeaker telephone, also coded in W01-C01G2A. Speech amplifier gain control in general is covered by W01-C01C1C.

W01-C01C3C [1992]

Local noise cancelling arrangements

Includes arrangement of transducers and/or circuitry to achieve cancellation or reduction of ambient noise level.

W01-C01C3E [1997]

Sidetone or feedback suppression

Includes echo suppression for speakerphone, also coded in W01-C01G2A. See also W01-C08E.

W01-C01C5 [1992]

Automatic answering

Centralised answering systems based within a telephone exchange are covered by W01-C02B4 codes.

W01-C01C5A [1992]

Using dynamic recording

See also T03/W04 for e.g. tape deck details.

W01-C01C5B [1992]

Using static recording (RAM etc.)

For storage of audio signals in general using solid-state memory, see W04-G01B codes.

W01-C01C5C [1992]

Date/time recording

Covers arrangements recording time at which message is received.

W01-C01C5D [1992]

Remote control of playback

W01-C01C5E [1992]

Outgoing message transmission

Includes automatic sending of pre-recorded message at preset time. See also W01-C01B1 codes for automatic dialling aspects.

OGM

W01-C01C5F [1997]

Privacy function

Includes password protection for message retrieval in shared device.

Password, PIN, ID

W01-C01C5G [1997]

Caller telephone number recording

(W01-C015X, W01-C01F3, W01-C01F9)

See W01-C01B1E for reply dialling.

W01-C01C5X [1992]

Other automatic answering details

W01-C01C7 [1992]

Digital speech processing

See U21-A and W04-V05 codes for specific processing and coding details.

PCM

W01-C01C7A [2002]

Comfort noise generation

W01-C01C7C [2002]

Novel coding scheme

W01-C01C7E [2002]

Novel speech coders and decoders

W01-C01C7L [2002]

Scrambling and speech coding for security

This code is intended for scrambling aspects within the telephone itself. Overall systems aspects of security are covered by W01-C08F1 codes. Scrambling for speech communication in general is covered by W02-L05, and secrecy aspects of data transmission by W01-A05 codes.

W01-C01C7X [2002]

Other digital speech processing aspects

Includes significant **novel** aspects of speech synthesis or recognition circuitry, e.g. used for voice dialling (W01-C01B1B or W01-C01B5B also assigned depending on purpose), or overall security (W01-C01Q8C). W04-V codes are also assigned.

W01-C01C9 [1992]

Other speech circuitry and systems

W01-C01D [1987]

Cordless, mobile radio telephone

(W01-C01X)

Use with other W01-C codes as appropriate. Cordless and mobile radio telephones are also coded in the appropriate section of W02 for radio equipment (e.g. W02-G02 for transceivers) if any RF aspect is involved. Inventions concerned purely with the telephone aspect are assigned W01-C01 codes only. Mobile radio telephone systems are assigned W01-B05 and W02-C03C codes.

Portable telephone

W01-C01D1 [1992]

Cordless telephone

Includes home-use, multi-user and call-point systems. Search with other W01-C01D codes for telephone which is capable of switching between operating systems e.g. DECT and cellular.

DECT

W01-C01D1A [1992]

Portable unit details

This code covers cordless telephone usable with one or multiple base stations at the subscriber location.

W01-C01D1B [1992]

Base unit details

See W01-C01E5A also for battery charging and mains power unit details.

W01-C01D1D [1992]

Security, ID

See also T04-K codes for SIM card aspects.

Personal identification number, PIN, subscriber identification module, SIM, ID

W01-C01D1E [1992]

Call-point cordless telephone

Covers personal cordless telephone usable with one or multiple distributed callpoints, solely provided by the service provider. See W01-C01D1A for cordless telephone handsets used with a base station at the subscriber location.

CT2, CT3, JCT, PHS, Personal handyphone

W01-C01D2 [1997]

Direct mode communication telephone

Search with other W01-C01D codes for dual mode operating telephones e.g. with W01-C01D3 for telephone that switches from cellular communication to direct mode when possible.

Digital short range radio system (DSRRS)

W01-C01D3 [1992]

Mobile radio telephone

From 1997 all mobile telephones are considered as cellular. For RF aspects of non-cellular mobile telephones search with W02-C03C3 codes. Search with other W01-C01D codes for telephone which is able to switch between communication systems, e.g. DECT and cellular.

GSM, PCN, NADC, JDC, Qualcomm®

W01-C01D3A* [1992-1996]

Cellular

*This code is now discontinued and since 1997 all mobile telephones have been considered to be cellular. This code is therefore no longer assigned, but remains valid and searchable for records prior to 1997.

W01-C01D3B [1992]

Vehicle telephone

The title of this code has been changed (from 2017) to clarify its previous coverage of mobile phones permanently-installed in a land, marine or air vehicle, and also hand-held phones (for which W01-C01D3C is also assigned) having some adaptation such as connection to an external antenna or vehicle interface, mounting cradles, and the like.

Airplane, aeroplane, automobile, bicycle, boat, car, GSM-R, helicopter, lorry, motorcycle, railway, scooter, train, van

W01-C01D3C [1992]

Portable; Hand-held

This code is assigned as a general reference for 'mobile phone', i.e. the terminology is assumed to refer to a hand-held phone unless there is evidence to the contrary. With the convergence of mobile telephone networks and wireless data networks, W01-C01D3C is also assigned for inventions relating to a 'portable terminal', unless there can clearly be no telephone aspect, with 'wireless network' codes (e.g. W01-A06C4 codes and other W01-A codes) being also assigned when appropriate.

W01-C01D3D [1992]

Telephone identification

From 2009 the title of this code is changed (formerly 'Security, ID') to reflect its main focus on identification aspects within the telephone itself. It includes use of e.g. International Mobile Equipment Identity (IMEI) number, and also Subscriber Identity Module (SIM) cards and the like, in the case of mobile phones for which W01-C01D3C is normally also assigned. (T04-K codes are also assigned for smart card aspects). Use of two or more cards is covered from 2010 by W01-C01D3K, which takes precedence over this code. Arrangements to transmit ID data for security and billing purposes which involve some novelty in the phone itself are included here, but novel telephone system aspects of checking ID and entitlement to access e.g. a mobile telephone network are covered by W01-C02B6A (with W01-B05A1A) and are not assigned W01-C01D3D. Subscriber registration (by the telephone network) is covered by W01-B05A1N. General aspects of telephone security such as preventing access, theft alarms and dialling restriction are not included here, being covered by W01-C01Q8 and W01-C01B5 codes respectively. Also includes software aspects of SIM card.

ID, IMEI, IMSI, MEID, PIN, SIM, USIM, USIMID, ESIM

W01-C01D3E [1997]

Satellite telephone

RF details of satellite phones are covered by W02-C03B1C and W02-C03C1C (i.e. they are regarded as cellular mobile satellite ground stations), with W02-G codes assigned as appropriate.

Satphone

W01-C01D3G [2002]

'Third generation' mobile phone

This code is assigned for so-called third generation mobile phones, intended to operate in a UMTS system, and for analogous types based on similar multiple access schemes, i.e. other than TDMA alone. For inventions involving some RF novelty W02 codes are also assigned, e.g. W02-C03C1C and W02-C03C1G, along with W02-G codes. Where the novelty resides in the spread-spectrum aspect, W02-K05 codes are also assigned, e.g. W02-K05A7, as appropriate. Systems based on OFDM are assigned W02-K07C as well as W01 and W02 telephone and 'mobile radio' codes. Other W01-C01 codes are assigned with W01-C01D3G as appropriate, depending on the aspect, e.g. W01-C01G6E for connecting to the internet on a 3G phone.

Universal mobile telephone system, 3G, fourth generation, 4G

W01-C01D3J [2002]

Dual or multi-band mobile phone

This code is assigned for phones capable of operating in two or more cellular bands, e.g. 900 and 1900 MHz. As such, it is likely to involve RF details and corresponding assignment of W02 codes. Prior to 2010 W01-C01D3J was assigned to indicate multiple SIM card aspects of mobile phones with W01-C01D3C and W01-C01D3D. From 2010, W01-C01D3K specifically covers the use of multiple SIM cards and W01-C01D3J will only be assigned for genuine multi-band aspects.

GSM, PCS

W01-C01D3K [2010]

Dual or multiple SIM-card mobile phone

This code takes precedence over W01-C01D3D and is assigned for phones capable of operating with two or more SIM cards or analogous devices, e.g. enabling use of different identities or different service providers. Dual or multi-band mobile phones are covered by W01-C01D3J which is also assigned as appropriate. Prior to 2010 W01-C01D3J was assigned for this topic with W01-C01D3D.

Dual SIM, Multi SIM

W01-C01D4 [1997]

Fixed location radiotelephone

This code is broader in scope than other W01-C01D codes and covers the whole subscriber installation, including antennas and 'outdoor units'. Novel aspects of these are highlighted using codes from W02-B (antennas) and W02-G (radio equipment details) groups, and also W02-C03D codes to highlight the 'point-to-point' radio link aspect. Base station or 'exchange-end' aspects are **not** assigned W01-C01D4, but are covered by W01-B05A1G and W02 codes as above.

Remote location, roadside emergency (radio), radio-in-the-loop, wireless local loop, WLL

W01-C01E [1992]

Power supply

(W01-C01X, W01-C07B)

Low-power power supplies in general are covered by U24 codes, which are also assigned as necessary to highlight novel aspects.

W01-C01E1 [1992]

Derived from subscriber line

W01-C01E5 [1992]

Power supply at subscriber location

W01-C01E5A [1992]

From mains including battery charging

See also X16-G01 for battery charger per se. Charging from e.g. a vehicle battery, is covered by W01-C01E5C.

W01-C01E5B [1992]

Battery per se, battery saving, battery supply

See X16 for novel battery detail.

W01-C01E5C [1997]

Charging from battery, or solar source

(W01-C01E5A)

E.g. charging from vehicle battery. See also X16-G02 codes for charger circuit per se.

W01-C01E5D [2005]

From generator including battery charging

Includes the use of mechanical generator, e.g. hand-operated types, for battery charging or short-term powering of a telephone. See V06 for novel generators per se and X16-G, e.g. X16-G02C for battery charging using generators.

W01-C01E5E [2017]

Non-contact charging

Includes wireless mobile phone charging. Non-contact battery charging in general is covered by X16-G03. Wireless transmission of electrical power in general is covered by U24-H02 for low-power systems and X12-H01E for higher power levels.

Non-contact, wireless charging, remote charging

W01-C01F [1992]

Ringling, call screening, call handling, identification of caller

(W01-C01X)

W01-C01F1 [1992]

Ringling

W01-C01F1A [1992]

Transducer per se

See also V06 codes for transducer details. Transducers for microphone or earphone use are **not** included. See W01-C01M.

W01-C01F1B [1992]

Volume setting, muting, drive circuitry

From 1997, volume control based on sensed ambient lighting is coded in W01-C01F1D only. For disconnection determined by actual time of day, see W01-C01F1C.

W01-C01F1C [1992]

Timed disconnection of ringer

W01-C01F1D [1997]

Disconnection or volume reduction based on ambient lighting

(W01-C01F1B, W01-C01F1C)

W01-C01F1E [1992]

Accessory ringer

(W01-C01X)

Includes unit which can be plugged into telephone socket to warn of incoming call only. Prior to 1992 search W01-C05A and W01-C01X.

W01-C01F1F [1997]

Mechanical ringer

Vibrating, silent alert

W01-C01F1G [1997]

Optical ringer

W01-C01F1K [2002]

Automatic switching between different ringer types

This code is intended for arrangements switching between different types of ringer, e.g. switching from mechanical to acoustic ringing if a call is not acknowledged. Arrangements for signalling different types of incoming call, e.g. by means of different tones or tone sequences, are covered by W01-C01F1M. Facilities for inputting ringing tone sounds or musical extracts to be stored as ringing tones are covered by W01-C01F1P.

W01-C01F1M [2002]

Signalling different incoming call types

Covers arrangements for signalling different types of incoming call, e.g. voice calls and text messages, by means of different tones or tone sequences. For aspects specific to SMS and similar telephones, search with W01-C01G6 codes.

W01-C01F1P [2002]

Memory storage input for ring tone generation

Covers arrangements for inputting, including downloading, of ringing tone sounds or musical extracts to be stored as ringing tones. Search with W01-C01Q2 codes for storage of ringing tones in memory. Sampling in electronic musical instruments is covered by W04-U01C1, and sequencer arrangements in W04-U06, these codes being assigned also as appropriate for genuine novel aspects. Waveform storage for tone generation in general is covered by U23-F codes.

W01-C01F3 [1992]

Display of caller number

Covers display of **incoming** calls originating number only. Display of dialled numbers is covered by W01-C01B3 codes.

W01-C01F5 [1992]

Call screening, password systems

(W01-C01X)

Includes automatic arrangements requiring receipt of additional code signal to actuate ringer, for example. Arrangements displaying calling subscriber's number enabling choice of answering only, are coded in W01-C01F3.

W01-C01F6 [1997]

Controlling built-in and external equipment in response to incoming call

(W01-C01F9, W01-C05B5A, W03-G05)

From 2006 the scope of this code has been expanded and subdivided to allow highlighting of control, e.g. muting or pausing, of built-in audio, video, or other equipment in response to an incoming call, in addition to the previous usage for transmitting control signals to external equipment.

W01-C01F6A [2006]

Controlling internal equipment in response to incoming call

This code covers the control of additional equipment built-in to a telephone, such as audio or video players, in response to an incoming call. W01-C01P6 codes are also assigned as appropriate.

W01-C01F6C [2006]

Controlling external equipment in response to incoming call

This code covers the control of equipment external to a telephone, such as audio or video players, in response to an incoming call.

W01-C01F8 [2005]

Call handling

Covers arrangements for call handling using a variety of methods, e.g. text message, ringing, voice message, etc. Exchange-based call handling systems are covered by W01-C02B codes, especially W01-C02B2 codes.

W01-C01F8A [2005]

Based on Caller ID

Covers handling of incoming calls based on CLI information, e.g. activating ringer for priority numbers, sending a voice or text message for others.

W01-C01F8C [2005]

Based on profile, e.g. Presence-Enhanced Contacts profile

Provides a dynamic profile of the user, visible to others, the user's availability, whereabouts and suitable methods of communication. System aspects of telephone call handling are covered by W01-C02B2N.

W01-C01F9 [1992]

Other incoming call alerting aspects

W01-C01G [1992]

Equipment type

Codes in this section do not necessarily indicate novel aspects and are assigned with other W01-C01 codes as appropriate. Cordless and mobile radio telephones are **not** coded here - see W01-C01D codes.

W01-C01G1 [1992]

Intercom

(W01-C01, W01-C04)

This code is used for an otherwise standard telephone with an intercom facility, and **not** an intercom of e.g. apartment block security type with no telephone aspect, which is coded in W01-C04. See W01-C01D2 for direct communication between radio telephones.

W01-C01G2 [1992]

Loudspeaker and hands-free telephone

(W01-C01, W01-C04)

The title of this code has been expanded from 2002 to better reflect its coverage of loudspeaker telephone and hands free telephone.

W01-C01G2A [2002]

Loudspeaker telephone

W01-C01G2C [2002]

Headset telephone

(W01-C01G9)

Includes 'hands-free kit' mobile phone, for which W01-C01D3C is also assigned. Telephone headset aspects were previously coded in W01-C01G9.

Hands free

W01-C01G3 [1992]

Pushbutton/key telephone

Prior to 1992, pushbutton and key telephone **systems** were coded in W01-B03, W01-C01X and W01-C02X. From 1992 see W01-C02G5C.

W01-C01G4 [1992]

Video telephone

(W01-C01X, W01-C05B1, W02-F09)

Also coded in W02-F08B3. For complete video telephone system see W01-C05B1 codes and W02-F08B1.

W01-C01G5 [1992]

Conference telephone

(W01-C01, W01-C04)

See W01-C02B1 for exchange details. For video conference telephone search with W01-C01G4. Prior to 1992 search W01-C05B1, W02-F09 and W01-C01X.

W01-C01G6 [1992]

Screen text and internet communication telephone

The title of this code has been expanded from 2002 to better reflect coverage of SMS, email and internet communication. Telephone network aspects of text-based communication in general are covered by W01-C05B1A.

W01-C01G6A [2002]

SMS

This code is intended for 'text messaging', primarily in mobile phones, for which W01-C01D3C is also assigned.

Short message service

W01-C01G6B [2005]

MMS

This code is intended for "multimedia messaging", primarily in mobile phones, for which W01-C01D3C is also assigned.

Multimedia messaging service, picture messaging, MMS

W01-C01G6C [2002]

Email

Email in general is covered by T01-N01C, which is also assigned here.

W01-C01G6E [2002]

Internet communication

This code is assigned with W01-C01D3 codes for WAP phone aspects, e.g. W01-C01D3G for '3G' or '4G' handsets, and with W01-C01P1 for multimedia aspects. W01-C01G6E includes telephone sets equipped for placing calls over the internet, e.g. using VoIP. (Systems aspects of VoIP are covered by W01-C05B4C). Phones using push to talk over packet network technology are covered by W01-C01G6H.

i-mode

W01-C01G6F [2005]

Instant messaging

This code covers phones with the provision of real time mobile communication using instant messaging.

W01-C01G6G [2002]

Data streaming and packet handling

This code is intended for telephones capable of data streaming and packet handling, e.g. for GPRS when used with W01-C01D3 codes.

GPRS, EDGE, packet

W01-C01G6H [2005]

Push to talk over packet network

This code covers phones providing direct one-to-one or one-to-many voice communication using 'push to talk' Voice over IP (VoIP) communication over packet-based networks. Telephone systems aspects are covered by W01-C05B4G. Phones using VoIP technology other than push to talk are covered by W01-C01G6E.

PoC

W01-C01G8 [1992]

Feature telephone and smartphone

Covers telephone set with several features, e.g. operated by special keys or additional software modules, including smart phones which from 2016 are covered by W01-C01G8S. (Prior to 2016 W01-C01G8 codes were assigned as appropriate for this topic together with W01-C01P2 for PDA aspects and W01-C01D3C to denote hand-held mobile phones). For program control and software aspects search with W01-C01Q3 codes, T01-F codes and T01-S codes.

W01-C01G8A [2002]

User interface management/menu-driven telephone set

Covers telephone, especially of mobile type (W01-C01D3 codes also assigned in that case), in which particular features are accessible via a menu system or via a special user interface, e.g. using a reduced number of keys. Special function keys themselves are covered by W01-C01B8K. Control circuitry in general for telephones is covered by W01-C01Q codes, which may also be assigned depending on novelty. GUI aspects are also covered by T01 codes, e.g. T01-J12 codes.

UI, pull down menu, window, split screen, icons

W01-C01G8C [2002]

Automatic selection of functions

Covers telephones, especially of mobile type (W01-C01D3 codes also assigned in that case), in which particular features are selected without direct action by the user, based on sensed conditions or environment.

W01-C01G8E [2007]

Haptic feedback control

This code covers sense of touch feedback control, including force and vibrating feedback. Signal processing aspects of feedback control are covered by W01-C01Q6E.

W01-C01G8S [2016]

Smartphone

This code is intended to represent phones (normally mobile for which W01-C01D3C is also assigned) having computing capability using a dedicated or adapted operating system with the ability to run application software that may be downloaded by the user. While it is recognized that the majority of mobile phones now fall into this category the code is intended as a search reference for this topic which prior to 2016 was represented by W01-C01G8 codes with W01-C01D3C and W01-C01P2 as necessary for 'PDA' aspects. For inventions concerned with software and program control aspects such as operating system details or mobile 'apps' search with W01-C01Q3 codes and T01-F codes.

Android®, BlackBerry®, Mozilla Firefox®, OS, iOS, Windows Phone®

W01-C01G9 [1992]

Other telephone set type

Prior to 2002, this code was used for telephone headsets which are now covered by W01-C01G2C.

W01-C01H [1992]

External devices switching interface

(W01-C01X)

This code is used for arrangements to interface with e.g. facsimile equipment (see S06-K07C2B also) and includes automatic switching on detection of type of call.

W01-C01J [1992]

Metering at subscriber equip. location

(W01-C01X, W01-C06)

From 1992 subscriber metering is coded in W01-C01J only, and not W01-C06.

W01-C01K [1992]

Subscriber equipment testing

This code is intended for testing using external apparatus. from 2002, self testing and monitoring as part of a telephone set control system is covered by W01-C01Q1. See W01-C08C codes for testing in general, which may also be assigned with W01-C01K when specifically relevant.

W01-C01L [1992]

Network interface aspects

(W01-C01X)

The title of this code has been expanded from 2002 to better reflect its coverage of ADSL aspects in addition to interfaces for ISDN. Connection of telephone sets with external equipment using a digital interface is covered by W01-C01R.

W01-C01L1 [2002]

ISDN interface

See W01-C05B7 codes for all aspects of ISDN.

W01-C01L3 [2002]

ADSL interface

ADSL is covered by W01-C05B8A.

W01-C01L5 [2002]

Splitter arrangements, e.g. POTS/ISDN splitter

W01-C01L7 [2002]

Standard, i.e. POTS line interface

(W01-C01X)

W01-C01L9 [2002]

Other network interface aspects

W01-C01M [1992]

Acoustic transducers (microphones and loudspeakers)

For full details of transducers search with appropriate codes in V06. (Ringing transducers are covered by W01-C01F1 codes only, e.g. W01-C01F1A for acoustic ringing and W01-C01F1F for vibrating types).

W01-C01N [1992]

Extension and line holding arrangements

Includes automatic arrangement to restore on-hook condition. See W01-C01D1 codes only for cordless telephones.

W01-C01P [1997]

Telephone apparatus integrated with other device

(W01-C01X, W01-C05B)

Covers telephone combined with other equipment (in the form of hardware or a software module), forming a single unit. See W01-C05B codes for combination of external devices with telephone equipment and systems.

W01-C01P1 [1997]

Multi media apparatus

See also T01-J30 codes and W01-C05B2 for system aspects. Prior to 2011 this code was also assigned for multimedia aspects of DMB receivers. From 2011 these are covered solely by W01-C01P6G and W03-A11G5.

W01-C01P2 [1997]

Personal digital assistant

See also T01-M06A1A and W01-C01D codes for mobile telephone aspects.

Personal digital organiser, PDA

W01-C01P3 [1997]

Telephone answering machine

(W01-C01C5)

See W01-C01C5 for answering machine details.

W01-C01P4 [1997]

Facsimile machine

See also S06- D to K codes. General telephone systems aspects of facsimile are covered by W01-C05B1C.

W01-C01P5 [1997]

Modem

General telephone system aspects of modems are covered by W01-C05B3A.

W01-C01P6 [2005]

Telephone with built-in entertainment device

Novel details of audio and video equipment are also assigned W03 or W04 codes as appropriate.

W01-C01P6A [2005]

Portable audio player/recorder

W04-G01B8 is also assigned for solid-state audio players such as MP3 types, with other W04 codes as necessary for novel aspects.

W01-C01P6C [2005]

Digital camera

W04-M01B1 codes are also assigned, and for novel details of digital cameras other W04-M01 codes are applied as necessary. Video phones are covered by W01-C01G4.

Camera phone

W01-C01P6E [2005]

Broadcast radio receiver

W03-B codes are also assigned for specific radio receiver aspects.

W01-C01P6G [2005]

Broadcast TV receiver and digital multimedia broadcast receiver

From 2011 the title of this code has been changed to reflect the inclusion of DMB receivers for which W03-A11G5 is also assigned, along with other W03-A codes as necessary. Prior to 2011 W01-C01P1 was also assigned to indicate multimedia aspects depending on novelty.

W01-C01P6J [2005]

Video player/recorder

From 2009 the title of this code has been expanded to reflect the previous inclusion of video players as well as recorders. Novel details of the video recorder/player are also assigned W04 codes, e.g. W04-P01C8 for solid-state types.

W01-C01P6L [2005]

Game player

See W04-X02 codes for gaming aspects in general and T01-J30B and T01-N01B1 for computer gaming.

W01-C01P6X [2005]

Other entertainment equipment built into a telephone set

W01-C01P7 [2005]

Navigational receiver

Covers telephones with integrated navigational receiver, e.g. a GPS receiver. See W06-A codes also for details of navigational systems, e.g. W06-A03A codes for GPS.

W01-C01P8 [2007]

Medical parameter monitoring equipment

This code includes arrangements for monitoring physiological parameters such as vital signs to determine the health status of a person, or in connection with sporting activity (in which case e.g. W04-X01A1 or other W04-X01 code is also assigned), using a built-in phone monitoring device. See also S05 codes, for medical monitoring equipment in general, to highlight specific measurements.

W01-C01P9 [1997]

Other equipment built into a telephone set

Includes 'alarm clock' (also assigned S04-B05), built-in smart card or similar (also assigned T04-K codes) for use with ticket gates (also assigned T05-D01A1), built-in OCR facility (also assigned T04-D codes), built-in torch (also assigned X26-E01 codes) or any other built-in equipment not covered by the above subdivisions.

W01-C01Q [2002]

General control circuitry for telephone sets

These codes are intended to cover general aspects of telephone set control and especially microprocessor-based aspects which are also assigned T01-J08A codes as appropriate. For aspects specific to menu-driven telephone sets, search with W01-C01G8A.

W01-C01Q1 [2002]

Self testing and monitoring

Testing of subscriber telephone using **external** equipment is covered by W01-C01K.

W01-C01Q1A [2002]

Checking remaining battery capacity

This code is assigned with W01-C01E5B. Checking battery charge state in general is covered by S01-G06A and X16-H01.

W01-C01Q2 [2005]

Memory storage

Covers memory storage facilities for data, including application programs, music and video files. See also W01-C01Q3A for software updating and modification and W01-C01B1A with W01-C01D3D (and e.g. W01-C01D3C) for storage of telephone numbers within a mobile phone SIM card.

W01-C01Q2A [2005]

Internal memory

Covers memory forming a fixed part of the phone.
RAM, flash memory

W01-C01Q2C [2005]

External memory

Covers user-changeable memory, e.g. cards. See also T01-H01B3A for memory cards per se.

Memory card, CF®, SD™, miniSD™, MMC™, reduced size MMC™, memory stick®, xD card™, smartmedia™

W01-C01Q3 [2002]

Program control aspects

From 2016 this code is further subdivided to differentiate between program control aspects relating to a phone's operating system (W01-C01Q3C) and those relating to installed or downloaded programs (W01-C01Q3E). Program control in computer and microprocessor systems is covered by T01-F codes, software development by T01-J20 codes and software content by T01-S codes, which are also assigned as appropriate. For application to smartphones search with W01-C01G8S (from 2016).

W01-C01Q3A [2002]

Software updating and modification

Includes arrangements for downloading or otherwise inputting data to modify the control program.

W01-C01Q3C [2016]

Program control aspects and software relating to operation of phone itself

This code covers any novel aspects of the operating system (OS), and also multiple OS phones.

W01-C01Q3E [2016]

Program control aspects and software relating to applications

Includes novel application software ('apps') and their development and also inventions relying on apps, whether pre-installed or downloaded by the user.

W01-C01Q4 [2005]

Voice activated control

Includes the use of voice to control the operational aspects of the telephone. See also W01-C01B1B for voice dialling per se and W01-C01B5B for restricted dialling based on voice recognition. Control of access to the phone as a whole based on voice or other biometric aspects is covered by W01-C01Q8C. W04-V codes, e.g. W04-V04A, are also assigned for speech recognition aspects.

Voice command

W01-C01Q5 [2002]

Sensing systems

Covers arrangements for determining particular conditions relating to the environment or usage of the telephone. Checking battery charge state is covered by W01-C01Q1A.

W01-C01Q5A [2002]

Sensing user proximity

Covers arrangements for determining that a telephone or handset is being held by the user, e.g. by proximity sensing, to control parameters such as loudspeaker volume. This relates especially to portable telephones, in which case W01-C01D3C is also assigned. Human presence detection in general is covered by S03-C06 codes. Arrangements for determining a quiescent state, i.e. non-usage of the telephone, and switching between this and an active state, are covered by W01-C01Q7A.

W01-C01Q5B [2007]

Sensing other users in the vicinity

This code includes arrangement for sensing/detecting other users in the vicinity. See also W01-C01R and W01-A07H codes for the type of medium being used.

Proximity Mail®

W01-C01Q5C [2002]

Sensing connection of external devices

This relates to sensing the connection of external headsets, car adapters for portable phones, PCs, and any other equipment whose connection requires some change in the operation of the telephone set.

W01-C01Q5G [2014]

Sensing acceleration, orientation and relative position

Covers arrangements for sensing movement or orientation of a phone, especially a mobile phone for which W01-C01D3C is also assigned, e.g. for auto-rotating display images, coming out of standby mode, or camera shake detection for which W01-C01Q6A, W01-C01Q7A or W01-C01P6C respectively are also assigned as necessary. Novel aspects such as transducers are also assigned S02 codes, e.g. S02-B07 codes for gyro-based sensors or S02-G03 for accelerometers. Sensing of direction or absolute position using e.g. a compass or navigational systems is not included and is covered by W01-C01P7.

Angle, landscape, portrait, rotate, turn

W01-C01Q5X [2002]

Other sensing systems for telephone sets

Includes fingerprint sensors.

W01-C01Q6 [2006]

Multimedia processing aspects

Covers processing aspects of the telephone, including graphics and display, audio, haptic and tactile and any general processing aspects.

Acceleration, rendering, GPU

W01-C01Q6A [2007]

Graphics and display processing

(W01-C01B3A, W01-C01Q6)

Previously coded in W01-C01Q6. Includes arrangements for processing graphical and display information that is not part of the display screen hardware. See also T01-C04D for computer display processing. Prior to 2006, all aspects of display/control circuitry were coded in W01-C01B3A.

Acceleration, rendering, GPU

W01-C01Q6C [2007]

Audio signal processing

Includes arrangements for processing audio signals other than for normal speech processing for communication, which is covered by W01-C01C7 codes. In all cases W04-V codes are also assigned for specific processing and coding details.

MIDI, Wave

W01-C01Q6E [2007]

Haptic and tactile processing

This code covers processing necessary for implementation of haptic functions, e.g. in connection with user interface aspects. Novel transducers and drive circuits for haptic features are covered by W01-C01G8E.

W01-C01Q6X [2007]

Other multimedia processing

W01-C01Q7 [2002]

Standby and related systems

This covers arrangements for disabling parts of a telephone, especially a portable type (with W01-C01D3C) as a power-saving measure.

W01-C01Q7A [2002]

Determining quiescent state

This covers arrangements for determining a quiescent state based on e.g. non-actuation of keys for a preset period.

W01-C01Q8 [2002]

Security aspects

This code is used for general security aspects of the telephone control system. SIM card aspects of mobile phones are covered by W01-C01D3D and security aspects involving dialling restrictions are covered by W01-C01B5 codes. From 2010 W01-C01Q8E is introduced for arrangements to prevent access to confidential data stored in a mobile phone.

W01-C01Q8A [2002]

Theft alarms

This code covers alarms warning of the possible theft, or leaving behind, of a telephone set itself, again usually of portable type (with W01-C01D3C). W05-B01 codes for theft alarms are also assigned as appropriate.

W01-C01Q8C [2005]

Security based on biometrics identification

Includes control of access to the phone as a whole based on fingerprint, eye or voice recognition. Restricted dialling alone based on voice recognition is covered by W01-C01B5B. W04-V codes, e.g. W04-V04A3, are also assigned for speech recognition aspects and S05-D01C5A for fingerprint and eye recognition aspects.

W01-C01Q8E [2010]

Preventing access to confidential data

This code is intended for arrangements with the emphasis on preventing access to confidential data stored in a mobile phone or similar. It includes arrangements for erasing data both locally and remotely (e.g. by the owner or service provider in the case of a stolen device), and also for preventing unauthorised access via a Bluetooth® or similar link. Aspects involving the digital interface itself are also assigned W01-C01R. Preventing access to, or use of, the phone as a whole is covered by other W01-C01Q8 codes or W01-C01B5 codes.

Anti-hacking, Bloover, bluejacking, bluesnarfing, intrusion, remote erasure

W01-C01Q9 [2002]

Other general telephone set control circuitry aspects

W01-C01R [2006]

Interfacing systems

(W01-C01X)

This code includes the interfacing of a telephone set (usually mobile, for which W01-C01D3C is also assigned) to a local external device via a digital connection. From 2011 it is subdivided to differentiate between novelty in the interface itself and applications where the **use** of the interface is significant. W01-A07H codes are also assigned to highlight the interface medium used when specific, e.g. W01-A07H2A for a Bluetooth® link. See also T01-C codes for interfacing with a computer. Circuits and components for interfacing with PSTN landlines are not included and covered by W01-C01L codes. 'User interface' aspects such as GUI or menus etc. are **not** included, being covered by W01-C01G8A.

Bluetooth®, Firewire®, IEEE1394, i-link®, infrared data association, IrDA, RS-232, RS-485, serial port, TransferJet™, USB, universal serial bus

W01-C01R1 [2011]

Novel details of telephone digital interface

This code is intended for novel details of digital interfaces for telephones, including software and also hardware aspects such as connectors and circuitry.

W01-C01R5 [2011]

Applications of telephone digital interface

This code is intended for significant applications of digital interfaces for telephones, e.g. where an invention relies on the use of the interface to connect a phone with an external system or equipment.

W01-C01V [2017]

Manufacturing subscriber equipment

Includes manufacturing of home telephones, mobile phones, smartphones, or other subscriber equipment, for which additional W01-C01 codes are assigned as necessary. This code covers assembly of subscriber equipment and also manufacture of items specific to the equipment itself, such as housings, PCBs and the like. Manufacture of bought-in components such as audio transducers, semiconductor devices or displays is not included and for these aspects see codes relating to the component itself, e.g. U14-K01A1J for LCD manufacture.

Assembly, fitting, molding

W01-C01W [2017]

Recycling subscriber equipment

Includes recycling of all kinds of subscriber apparatus including landline telephones, smartphones, and accessories. Other W01-C codes specific to the equipment being recycled are also assigned, e.g. W01-C01G8S for smartphones. Materials recovery and recycling of electronic components in general is covered by V04-X01C and electrical aspects of recycling in general are covered by X25-W04.

Environmentally-friendly, rare earth, recycle, reprocess, reuse

W01-C01W1 [2017]

Equipment design and components improving recyclability

Covers design features including use of recycled components and materials and selection of components and materials that facilitate the recycling of unwanted telephone equipment.

Recyclable

W01-C01W5 [2017]

Equipment and methods of recycling

Covers equipment and methods used in recycling of subscriber equipment, e.g. for disassembly, recovery of reusable components or valuable materials. Machines dispensing a payment in return for deposited recyclable items in general are covered by T05-H02E which is also assigned as appropriate.

Desoldering, dissolving, heating, kiosk, reverse-vend, separating, tools

W01-C01X

Other subscriber equipment

W01-C02

Automatic/semi-automatic exchanges

See W01-B codes for actual selection details. Data exchange e.g. for networks is covered by W01-A06 codes.

W01-C02A

Supervising, testing, indicating faults

See W01-B08 for selection system testing and W01-C08C codes for general aspects.

W01-C02A1 [1987]

Monitoring/testing exchange

Codes in this section are also used with W01-C08C5 for testing of an exchange from an external maintenance centre.

W01-C02A1A [1992]

Statistical metering

(W01-C02A, W01-C06)

Covers detection of overload/blocking condition and general measurements on telephone system usage and performance, including call centre operator call handling (with W01-C02G3 codes)

W01-C02A1C [1992]

Fault location, standby systems

Standby systems for data networks are covered by W01-A06A1 code, for line systems in general by W02-C01D3 codes, and for radio equipment by W02-G08 codes.

Redundancy, hot standby, back-up

W01-C02A5 [1987]

Testing external system incl. subscriber loop

Testing for line systems in general is covered by W02-C01D codes.

Continuity test

W01-C02A5A [1992]

Discriminating line fault from apparatus fault

Internal/external fault discrimination

W01-C02A7 [1992]

Control of exchange

Includes overall control of operation and functions such as least cost routing (also coded in W01-C06A). Network resource allocation is covered by W01-C02A7 and W01-C02A1A. Radio resource allocation in general is covered by W02-C03E7 and when relating to cellular mobile telephone systems W01-B05A1 and W02-C03C1 codes are also assigned as appropriate.

Stored program, control, SPC, computer, microprocessor, microprogram, LCR

W01-C02A7A [1997]

Intelligent network

(W01-C02A7, W01-C02B)

See also W01-C02B codes for special features and T01-J08C codes for communication control aspects.

W01-C02B

Special subscriber services

Codes in this section deal with services wholly provided by the exchange itself, and also those involving external services (W01-C02B7 codes).

Call interception

W01-C02B1 [1987]

Conference systems

See W01-C01G5 for subscriber conference equipment. TV conference systems are covered by W02-F08A, combine with W01-C codes as appropriate for any telephone aspects. For example, moving-picture TV conference system using the telephone network is coded as W01-C02B1, W01-C05B1E, W02-F08A1 and W02-F08B1.

Bridge, multiple subscriber connection

W01-C02B2 [1992]

Call forwarding, transfer and diversion

For topics below relating to automatic exchange functions W01-C02G5A is normally assigned as well.

W01-C02B2A [2002]

Direct-inward dialling

This code is intended for systems allowing direct dialling, e.g. by entering additional digits once a connection to an exchange is made.

W01-C02B2C [2002]

Simultaneous or successive ringing of extensions

This code is intended for arrangements to ring a number of extensions until a call is answered.

W01-C02B2E [2002]

Call diversion

This code is intended for the facility by which a subscriber can set up or cancel call diversion, and specify a number to which calls are to be routed **without** ringing of the subscriber's telephone. Call forwarding based on a call going **unanswered** is covered by W01-C02B2L. Time-dependent operation of this feature is indicated by assignment of W01-C02B2J also. Call barring is covered by W01-C02B2G.

Redial, redirect

W01-C02B2G [2002]

Call barring

This code is intended for the facility by which a subscriber can set up or cancel a call barring facility. Time-dependent operation of this feature is indicated by assignment of W01-C02B2J also. Call diversion is covered by W01-C02B2E.

W01-C02B2J [2002]

Time-dependent call handling

This code is intended for the facility by which a subscriber can establish time windows for operation of call handling features. It is used in conjunction with other W01-C02B2 codes as necessary.

W01-C02B2L [2005]

Call forwarding

This code is intended for the facility by which a subscriber can set up call forwarding, and specify a number to which unanswered calls are to be forwarded. Call diversion **without** ringing is covered by W01-C02B2E and call barring is covered by W01-C02B2G.

Redial, redirect

W01-C02B2M [2006]

Call transfer

This code is primarily intended for manual arrangements for re-directing a received call to another extension. Automatic arrangements for diversion of calls are covered by W01-C02B2E if no ringing of the dialled telephone occurs and W01-C02B2L if the call is forwarded only if unanswered.

Redial, redirect

W01-C02B2N [2006]

Based on profile, e.g. Presence-Enhanced Contacts profile

Provides a dynamic profile of the user, visible to others, the user's availability, whereabouts and suitable methods of communication. Subscriber telephone set aspects of profile-based call handling are covered in W01-C01F8C.

W01-C02B2X [2002]

Other incoming call handling functions

W01-C02B3 [1992]

Camp-on, call-back and caller ID system.

The title of this code has been expanded from 2002 to better reflect its coverage of caller ID systems. See also W01-B03C for **novel** aspects of caller ID systems and call tracing.

W01-C02B3A [2002]

Camp-on and call-back

W01-C02B3C [2002]

Caller ID transmission

(W01-B03C, W01-C02B9)

W01-C02B3E [2002]

Inhibiting ongoing transmission of caller ID

(W01-B03C, W01-C02B9)

This code includes the use of digit sequences entered by a calling subscriber before dialling, to inhibit the caller ID feature of the exchange.

Withheld Number

W01-C02B4 [1992]

Centralised call answering

Automatic answering equipment wholly at the subscriber location is covered by W01-C01C5 codes. Voice mail is covered by W01-C02B7C.

W01-C02B4A [1997]

Call holding

Search with W01-C05B5A for music on hold. Line holding circuits for subscriber telephones are covered by W01-C01N.

Music on hold, call waiting

W01-C02B5 [1992]

Number storage, centralised autodial

Subscriber-based autodial systems are covered by W01-C01B1 codes.

W01-C02B5A [1997]

Reply dialling

See W01-C01B1E for reply dialling based at subscriber apparatus only.

W01-C02B6 [1992]

Graded service

W01-C02B6A [1992]

Determining entitlement to level of service

Includes checking of ID in e.g. cellular telephone network (also coded as W01-B05A1A and W02-C03C1 codes).

W01-C02B6C [2002]

Denying access to telephone service based on non-entitlement

Includes inhibiting access using e.g. stolen mobile phone. Arrangements for inhibiting any mobile phone in a sensitive area are covered by W01-C08F5.

W01-C02B7 [1992]

Involving facilities external to exchange

Codes in this section are used with W01-C05 codes as appropriate to the external service provided. The concept of 'external' is intended to denote facilities not involved in the primary function of the exchange.

W01-C02B7A [1992]

Paging

See also W01-C05A and W05-A05C codes. Short messaging service is coded in W01-C02B7D only.

W01-C02B7B [1992]

Alarm monitoring systems

Covers exchange monitoring of external alarms, see also W01-C05A and W05-B05 codes. From 2002 alarm systems communicating via the telephone network **without** any novelty in the telephone aspect are covered by W05 codes only.

W01-C02B7C [1992]

Voice mail system

See also W01-C05B5E for recording aspects.

W01-C02B7D [1997]

Short messaging service

Covers transmission of paging message to radio telephone. See W01-B05A1F for switching details, and W01-C01G6A for SMS telephones themselves. See W01-C02B7A for telephone exchange aspects of paging systems.

W01-C02B7E [2002]

Automatic directory enquiry services

(W01-C02B7X, W01-C05B5C)

Automatic directory enquiry services are now only also assigned W01-C05B5C for specific details of the database or similar system, for which T01-J05B codes are likely to be used as well.

W01-C02B7F [2005]

Multimedia messaging service (MMS)

Covers transmission of messages to a (usually mobile) telephone including a combination of image, sound and text. Aspects specific to the telephone itself are covered by W01-C01G6B.

Multimedia messaging service, picture messaging, MMS

W01-C02B7G [2007]

Centralised storage of user profile

Includes arrangement of storing user profiles in a central place, and downloading the profile to the phone on power-up when connected to network.

W01-C02B7H [2007]

Transfer of personalised ringtone

Includes arrangements for sending a personalised ringtone to the called person.

W01-C02B7L [2007]

Location based service

Includes arrangement of providing a personalised service, based on the location of the mobile terminal. See also other W01-C02B and W01-C05 codes for the type of service being offered.

W01-C02B7X [1992]

Other external service provision

Prior to 2002, automatic directory enquiry services were coded here as well as in W01-C05B5C. (Now covered by W01-C02B7E)

W01-C02B8 [1992]

Alarm call systems

Includes 'early-morning-call' type system.
Automatic, select, key, dial

W01-C02B9 [1992]

Other subscriber services

Includes interactive voice response (IVR) systems for which W04-V04 codes are also assigned.
IVR

W01-C02C [1992]

Attendant desk, consoles

(W01-C02X)

W01-C02C1 [1997]

Automatic call distribution or call centre console

ACD

W01-C02D [1992]

Interfacing with external network

(W01-C02X)

Includes circuits and arrangements for connection to subscriber lines and inter-exchange trunks (also coded in W01-C03).

W01-C02D1 [1992]

Subscriber line interface circuit

See also W01-C08B for hybrid circuit details.
SLIC

W01-C02D3 [1992]

Transmission of ringing signals

Subscriber set ringers are covered by W01-C01F1 codes. See W01-C07B also where current supply aspects are involved.

W01-C02D5 [1992]

Reception of ringing signals, line state details

W01-C02E [1992]

Power supply details

See also W01-C07B for current supply details. Subscriber set aspects are covered by W01-C01E codes.

W01-C02G [1992]

Exchange type

Codes in this section are used to indicate exchange type only and do not necessarily represent novel aspects.

W01-C02G1 [1992]

Central office type

Attendant/operator system

W01-C02G3 [1997]

Automatic call distribution or call centre

(W01-B03, W01-C02B2)

W01-C02G3A [1997]

Automatic call distribution centre

(W01-B03, W01-C02B2)
ACD

W01-C02G3B [1997]

Call centre

(W01-B03, W01-C02B2)

W01-C02G5 [1992]

Private exchange

Search with W01-B05A1 codes for radio private exchange. Search with W01-C03 for centrex.

W01-C02G5A [1992]

Automatic, i.e. PABX

See W01-C02B2 for direct inward dialling details.

W01-C02G5B [1992]

PBX

(W01-C02X)

Attendant/operator system

W01-C02G5C [1992]

Key telephone system

Prior to 1992, key telephone systems were coded in W01-B03, W01-C01X and W01-C02X. For subscriber set aspects see W01-C01G3.

W01-C02X

Other telephone exchange aspects

From 1992, semi-automatic systems are coded in W01-C02G codes and other W01-C02 codes as appropriate.

W01-C03

Interconnection between switching centres

See also W01-B03A when emphasis is on switching aspects. See W01-B05A3 and W02-C03C3G for trunked radio telephone system.

Inter-exchange connection, telephone trunk, leased line

W01-C03A [1997]

Virtual private network

See W01-C02G5 codes for aspects of private networks. VPNs as data network, i.e. not specifically for telephone service, are covered by W01-A06B7G.

VPN

W01-C04

Interconnection without centralised switching

Includes party-line systems (see W01-B04 for selection aspects). See W01-B05A1D for direct communication between radio telephones. Prior to 1992 this code was also used for loudspeaker telephones, now coded in W01-C01G2.

Feedback suppression, transmission switching, call signal generator

W01-C04A [1997]

Intercom

Includes aircraft crew or mineshaft intercom. For intercom combined with subscriber apparatus see W01-C01G1.

W01-C04A1 [1997]

Entryphone

Search with W02-F01A1 for video entryphone.

W01-C05

Telephonic systems combined with other electrical systems

In general, from 2002 pure **applications** of the telephone network to alarm signalling, telemetry, telecontrol and similar topics are not covered here, the W01 codes being reserved for cases of genuine 'telephone novelty' or where no provision exists elsewhere to highlight the telephone aspect.

W01-C05A

With annunciator or alarm systems

See W05 codes also for application to e.g. selective calling systems or alarms (e.g. W05-B05 codes).

Central station alarm signalling, paging system

W01-C05A1 [2002]

Emergency call location determination systems

See W01-B03C also for call tracing and caller ID aspects, and W02-C03C1E for mobile location determination in cellular telephone systems.

Enhanced 911, E911, FCC

W01-C05B

With telegraphic, entertainment, video, or dictation systems

From 1992, all telephone aspects of ISDN are covered by W01-C05B7 codes. From 1997, multimedia systems are coded in W01-C05B2

W01-C05B1 [1987]

With video, incl. facsimile, videophone, screen text

Telephone ordering system for pay-per-view TV and telephone audience research systems are coded in W01-C05B5 codes.

Picture, video telephone, narrowband TV

W01-C05B1A [1992]

Screen text systems

Includes instant messaging system. Telephone line based screen text systems are also coded in W02-F05B1.

W01-C05B1C [1992]

Still-picture systems

Includes facsimile (see S06-D to K codes also) and still-picture video telephone systems (see W02-F08 codes also).

Video telephone

W01-C05B1E [1992]

Moving picture systems

Includes video telephone (see W02-F08B codes also). Still-picture types are coded in W01-C05B1C. See W01-C01G4 for apparatus details. Search with W01-C02B1 and W02-F08 codes for video conferencing system.

Narrowband TV, picture phone

W01-C05B2 [1997]

Multimedia system

See also T01, W03, W04 codes as appropriate, especially T01-J30 and W04-K10 codes. See W01-C01P1 for telephone subscriber apparatus details.

W01-C05B3 [1987]

Telegraphic telephone line communication

See T01 codes also for computer aspects. Prior to 2002 W01-C05B3 was routinely used to highlight computer telephony integration and internet telephony, now both covered by W01-C05B4 codes, and ADSL which is now covered by W01-C05B8A.

Telecontrol, telemetering, computer access, remote terminals

W01-C05B3A [1992]

Telephone line modem

Covers novel aspects of modem per se. See also W01-A09 codes for modulation/demodulation aspects. See W02-C04B2 or W01-A07H3 for free space optical link or W01-A07H2 or W02-G02 for radio link. See W01-C05B3G for voice over data modem.

W01-C05B3B [1992]

Communication with computer from remote terminal

Novel modems are coded in W01-C05B3A, W01-C05B3G or W01-C05B3H, depending on type. (See also T01 codes).

W01-C05B3C [1992]

Electronic funds transfer

Also coded in T05-L02, and T01-N01A1 from 2002. Note that from 2002, EFT and e-commerce inventions are **not** coded here unless some novel PSTN aspect is involved.

W01-C05B3D [1992]

Telex

W01-C05B3E [1992]

Remote control

See also W05-D06G codes.

W01-C05B3F [1992]

Remote monitoring

See also W05-D06G codes. Search W01-C05A only for monitoring in the context of alarm systems.

W01-C05B3G [1997]

Voice over data modem

(W01-C05B3A)

Voice-over-IP telephone communication is covered by W01-C05B4C from 2002. (Prior to 2002, W01-A06B7, W01-A06F, and W01-C05B3 were used, in addition to T01-H07C5E).

VoD

W01-C05B3H [1997]

Facsimile-modem

(W01-C05B1C, W01-C05B3A)

Fax-modem

W01-C05B3J [1997]

Data streaming

Telephone sets (as opposed to systems) with data streaming capability are covered by W01-C01G6G from 2002.

GPRS, EDGE, packet, radio

W01-C05B3L [1997]

PCMCIA / PC card

This code is intended for PC type interface cards, e.g. used to interface between a mobile phone and a lap top or palm top computer.

W01-C05B4 [2002]

CTI and telephone systems combined with internet system

(W01-C05B3)

Prior to 2002 W01-C05B3 was routinely used to highlight computer telephony integration. Voice over data modem aspects are covered by W01-A09E3, and W01-C05B3G when specifically intended for PSTN usage. Voice over IP transmission is covered by W01-C05B4C from 2002 (previously T01-H07C5E, W01-A06B7, W01-A06F, and W01-C05B3).

W01-C05B4A [2002]

CTI - (Computer Telephony Integration)

(W01-A06, W01-C05B3)

W01-C05B4C [2002]

Telephony via the internet and IP-based telephony

(T01-H07C5E, W01-A06B7, W01-A06F, W01-C05B3).

From 2012 the title of this code has been changed to reflect its existing coverage of IP-based telephony over other networks such as LANs, in addition to the use of the internet as a medium. This code takes precedence over W01-C05B4A and is intended for telephone systems using internet protocol to transfer voice information, over the internet and also private networks. Telephone apparatus equipped for VoIP-based communication is covered by W01-C01G6E, or W01-C01G6H in the case of 'push to talk' technology. Arrangements for access to the internet via the telephone network for general purposes are covered by W01-C05B4E. W01-A06B7A is also assigned where novel aspects of the internet itself are involved. Computer system aspects of the internet are assigned T01-N codes also.

Generic Area Network, GAN, Next Generation Public Switched Telephone Network, NPSTN, Unlicensed Mobile Access, UMA, Voice over internet protocol, VoIP

W01-C05B4E [2002]

Internet access via telephone system

This code is intended for arrangements for access, via the telephone system, to the internet for general purposes. Telephone systems using VoIP, i.e. using the internet as a medium for telephone traffic, are covered by W01-C05B4C. W01-A06B7A is also assigned where novel aspects of the internet itself are involved. Computer system aspects of the internet are assigned T01-N codes also.

W01-C05B4G [2006]

Push to talk over packet network system

(W01-C02B1, W01-C05B3J)

Providing direct one-to-one or one-to-many voice communication using Voice over IP (VoIP) over cellular packet network. Prior to 2006, this topic was covered in W01-C02B1 and W01-C05B3J. Telephone sets equipped for this mode are assigned W01-C01G6H. Internet telephony systems are covered by W01-C05B4C. Instant messaging systems using the telephone network are covered in W01-C05B1A, and telephone sets equipped for that mode are assigned W01-C01G6F. Telephone chatlines in general are covered by W01-C05B5A but internet chatroom systems are not included, being covered by T01 codes (e.g. T01-N03A1C).

PoC

W01-C05B5 [1987]

Entertainment, dictation

Value-added telephone services

W01-C05B5A [1992]

Entertainment systems

See also W02-F10 codes for interactive entertainment systems, and W04-X02 codes and W04-X03A3 respectively for games or karaoke aspects.

Subscription/cable TV, pay-per-view communication, karaoke, chatline

W01-C05B5C [1992]

Educational and information systems

Time announcement, speaking clock, recorded information, audience research

W01-C05B5E [1992]

Recording and storage systems

See W01-C02B7C for voice mail per se.

Centralised recording, voice mail

W01-C05B5G [2005]

Advertising and marketing

Covers transmission of advertising, promotional and marketing information to telephone users. Visual advertising in general is covered by W05-E03 codes, and advertising based solely on audible information by W05-F (from 2014), which are also assigned as appropriate. See T01-N01A2C for transmission of advertising and marketing information in computer networks.

Promotions, offers, adverts

W01-C05B6 [2005]

Mobile commerce

Covers buying and selling of goods and services e.g. financial and business services through wireless telephone systems. Novel aspects of PSTN electronic funds transfer are covered by W01-C05B3C. See T01-N01A2 for computer e-commerce and T01-N01A1 for on-line banking.
m-commerce, on-line shopping, mobile banking, wallet

W01-C05B7 [1992]

ISDN System

Used with other W01-C codes as appropriate.

W01-C05B7A [1992]

Subscriber apparatus

Also assigned W01-C01L1 for interface aspects.

W01-C05B7B [1992]

ISDN exchange

Data exchanges interfacing arrangements with ISDN are also coded in W01-A06B5C.

W01-C05B7C [1992]

Complete system (Architecture), signalling or method of operation

W01-C05B7D [1992]

Control

W01-C05B7E [1992]

Broadband ISDN (B-ISDN)

W01-C05B7X [1992]

Other ISDN aspects

W01-C05B8 [2002]

ADSL and other Digital subscriber line system

(W01-C05B3)

Prior to 2002 ADSL was assigned W01-C05B3.

HDSL, XDSL, SDSL

W01-C05B8A [2002]

ADSL

W01-C06

Metering; Time controlling and indicating

Prior to 1992, use with W01-C01X for meter at subscriber location, (from 1992 covered by W01-C01J only). See W01-C02A for exchange aspects. From 1992, statistical metering is covered by W01-C02A1A. Search with W01-C02A7 for least cost routing at exchange or W01-C01B4 only for system in subscriber apparatus.

Call charge calculation, exchange metering, call-logging system, least cost routing

W01-C06A [2002]

Least cost routing

W01-C06C [2002]

Time control and indication

W01-C06E [2002]

Billing

W01-C06G [2002]

Reduced rate and reverse charge systems

W01-C06G1 [2002]

Reduced rate charging systems

Includes arrangements for reduced rate charging band on e.g. keying in an access code with a pre-paid card. Prepayment telephones in general are covered by W01-C07A codes.

W01-C06G3 [2005]

Toll free calling

Includes arrangements providing free telephone calls through special dial access.

W01-C06G5 [2002]

Reverse call charging

Collect call

W01-C06J [2005]

Prepaid telephone services

Covers provision of telephone service without a contract being established with the service provider. See W01-C07A codes for prepayment public telephones.

Pay-as-you-go, pre-pay

W01-C06L [2005]

Call logging

Covers compilation and storage of telephone usage records, usually for a specific number, e.g. to monitor possible unauthorised calls.

- W01-C06X** [2002]
Other metering, time controlling and indicating aspects
- W01-C07**
Prepayment telephones; Current supplies
- W01-C07A** [1987]
Prepayment/public telephones
See T05-H05C and other T05-H codes also for coin/card-operated aspects.
Coin-operated, card-operated, telephone booth, kiosk
- W01-C07A1** [1992]
Constructional details
(W01-C01A, W01-C07A)
See W01-C01A also for construction of telephone set per se as far as analogous to subscriber telephone. From 1992, W01-C07A1 only is assigned for details of telephone kiosk, booth etc.
- W01-C07A3** [1992]
Anti-fraud measures
Includes alarms and arrangements to prevent interference with metering etc. Use with W01-C07A5 when coin/card aspects involved.
Security, pin-fraud, antitheft
- W01-C07A5** [1992]
Coin/card-freed aspects
See also T04-C, T04-K and T05-H codes, especially T05-H05C.
- W01-C07A5A** [1997]
Telephone card
See T04-C, T04-K and T05-H codes also.
Phone card
- W01-C07A7** [1992]
Control and signalling aspects
Includes arrangements for metering, indicating faults, full cash-box, etc.
- W01-C07A9** [1997]
Other details of prepayment/public telephones

- W01-C07B** [1987]
Current supplies
Prior to 1992, used with W01-C01X for subscriber set aspects which are now covered by W01-C01E codes.
Power supply, exchange battery, subscriber line feed, ringing current generator
- W01-C08** [1987]
General equipment details/circuits
(W01-C09)
- W01-C08A** [1987]
Protection, e.g. against lightning strike etc.
Protection systems in general are in U24-F and X13-C.
Surge protector, gas discharge tube, varistor, fuse
- W01-C08B** [1987]
Line hybrid (transformers and circuit equivalents)
See also W02-C01X for general (or non-telephone) application, V02 for inductive components, and U25 for impedance networks, (e.g. U25-C for impedance converters, and U25-D codes for matching, combining, etc.).
Two-wire/four-wire circuit, impedance matching/balancing, differential circuit
- W01-C08C** [1987]
Test equipment
Covers portable equipment and apparatus used in remote tests. Testing of subscriber devices using external equipment is covered by W01-C01K, which may be assigned with W01-C08C codes for specific cases where the subscriber equipment itself is being tested.
- W01-C08C1** [1992]
Portable test set
- W01-C08C3** [1992]
Remotely operated auxiliary test device
Includes device for discriminating line fault and subscriber set fault (see also W01-C01K for subscriber set testing generally and W01-C02A5 for exchange testing of subscriber lines).
- W01-C08C5** [1992]
Maintenance centre system
Includes system remotely monitoring telephone installations, e.g. monitoring several exchanges (with W01-C02A1).

W01-C08E [1992]

Equalisers, echo cancelling, noise reduction

See also appropriate code in W02-C01B or W02-C01C.

W01-C08F [1992]

Security aspects and telephone usage control

The title of this code has been expanded from 2002 to better reflect its coverage of telephone usage control. See also W02-L codes for secrecy aspects. Includes detection of eavesdropping, and scrambling systems.

Secrecy, wire-tap/eavesdropping detector

W01-C08F1 [2002]

Wiretapping and prevention of wiretapping

W01-C08F1A [2002]

Wiretapping

W01-C08F1C [2002]

Prevention and Detection of wiretapping

W01-C08F5 [2002]

Controlling or preventing use of telephone

This code is primarily intended for systems inhibiting the use of e.g. portable phones in a sensitive area, such as a theatre, hospital etc., e.g. by 'dummy' base stations or jamming techniques. It is assigned with mobile phone system codes as appropriate, e.g. W01-B05A1A and W02-C03C1B for base station aspects. Arrangements for determining entitlement, and denying access, to different levels of telephone service are covered by W01-C02B6A and W01-C02B6C respectively.

W01-C08G [1997]

Telephone line type

These codes are only assigned to highlight the significance of the line type to the particular invention, e.g. W01-C08G1 is **not** assigned for every invention relating to copper twisted pair telephone systems.

W01-C08G1 [1997]

Wire line

Twisted pair

W01-C08G2 [1997]

Optical fiber

(W01-C08X, W02-C04B1)

W01-C08G9 [1997]

Other telephone line type

W01-C08H [2005]

Application of telephone systems and apparatus

This code is generally used without other W01 codes, and is intended for inventions relying on use of the telephone systems or apparatus, while not involving novel aspects. The code is assigned only when the particular application cannot be coded elsewhere.

W01-C08X [1987]

Other general details of telephone equipment

Intermediate amplifier, equipment cooling/environmental control

W01-C09

Other (incl. manual exchanges)

From 1992, see W01-C02G and other W01-C02 codes for semi-automatic systems.

W01-D

Cable or line installation

W01-D covers novel aspects of cable installations for communications purposes, including telephone, data networks, CATV, alarm systems, and the like. Power line installations are not included and are covered by X12-G codes. See V07-H codes for optical fiber aspects.

W01-D01

Methods and equipment

Includes digging of trenches, erection of supporting poles, drilling through walls, drawing of cables through conduits or pipes, or their laying in trunking, cable trays, or the like.

Cable feeder, cable puller, cable locator, tools

W01-D02

Fittings

Includes devices such as plugs and sockets, junction boxes and splices fitted to the cable, rather than arrangements for supporting it or mounting it which are covered by W01-D03. Novel electrical connector aspects are also assigned V04 codes.

Terminal, Mounting, fixing, socket, junction box, connector

W01-D03

Installations

Includes physical aspects of mounting or positioning cables or cable fittings, rather than electrical connection aspects which are covered by W01-D02. Aspects of installations included are protective hardware such as conduits, grommets, cable trays, cable clamps, or trunking, and arrangements for routing cables through walls, under floors, under the ground, or overhead.

Underwater/underground/overhead installation, conduit, ducting

W01-D09

Other details of cable or line installations

This code covers any specific topic not fitting into the above subdivisions. Examples include cable reels and installations between two relatively-moving points which may be permanent or temporary arrangements such as a retractable telephone extension cable arrangement which can be wound around a reel or similar when not in use, or devices for shortening a long telephone set lead by winding it around a suitable retaining device.

Drum, elevator intercom, pressurised cable leak monitor

W01-E [2012]

General aspects of wireless data networks and mobile phone networks

This code and its subdivisions are intended to indicate aspects of wireless systems, normally operating on a cellular model, that may be equally applicable to data networks as covered by W01-A06C4 codes and mobile phone networks and systems as covered by W01-B05A1 and W01-C01D codes. The codes are intended for wireless networks in a general sense and may be used alone in general cases or with specific additional wireless network or mobile phone system codes as appropriate to provide more detail. When relevant, W02 codes are also assigned for radio system aspects, e.g. details of cellular mobile radio systems are indicated by assignment of W02-C03C1 codes and novelty in radio equipment by W02-C03C1 codes and W02-G codes, these codes being assigned in addition to W01-E codes as necessary.

W01-E01 [2012]

Mobility aspects of wireless data and mobile phone networks

This code and its subdivisions cover aspects arising from the movement of mobile phones or wireless terminals and stations in general, such as roaming and registration.

W01-E01A [2012]

Roaming

This code, or its subdivisions, replace W01-A06E1R, W01-A06E1S and W01-B05A1R and covers arrangements for allowing mobile phones or wireless terminals to move between home and other networks.

W01-E01A1 [2012]

Roaming between networks operating on the same standard

This code replaces W01-A06E1R and covers inventions for roaming between e.g. wireless local area networks of the same type, or between same-standard mobile phone networks. For roaming between wireless data networks and mobile phone networks W01-E01A3E is assigned instead of W01-E01A1 codes.

W01-E01A1A [2012]

Roaming between wireless data networks operating on the same standard

This code covers arrangements for roaming between wireless data networks, e.g. wireless LANs, which are operating using the same standards.

W01-E01A1C [2012]

Roaming between mobile telephone networks operating on the same standard.

This code replaces W01-B05A1R and covers inventions for roaming between same-standard mobile phone networks, e.g. between GSM networks.

W01-E01A3 [2012]

Roaming between networks operating on different standards

This code replaces W01-A06E1S.

W01-E01A3A [2012]

Roaming between wireless data networks operating on different standards

This code covers arrangements for roaming in which mobiles may obtain communications service with wireless data networks operating on different standards, e.g. IEEE 802.11 AND IEEE 802.16. W01-A06C4 codes denoting wireless network standards are assigned as appropriate.

W01-E01A3C [2012]

Roaming between mobile telephone networks operating on different standards

This code covers arrangements for roaming in which mobiles may obtain communications service with mobile phone networks operating on different standards, e.g. GSM, 3G, 4G, 5G.

W01-E01A3E [2012]

Roaming between mobile telephone networks and wireless data networks

This code covers roaming arrangements allowing mobiles to obtain communications service with mobile phone networks and wireless data networks depending on availability. This code is assigned in preference to W01-E01A1 codes. Prior to 2012 this topic was indicated by assignment of W01-A06E1S and W01-B05A1R.

W01-E01A5 [2012]

International roaming

This code covers arrangements for allowing mobile phones or wireless terminals to obtain communications services across national boundaries.

W01-E01C [2012]

Registration aspects

This code, or its subdivisions, replace W01-B05A1N and W01-B05A1Q and covers arrangements for registering mobile phones or wireless terminals with a network.

W01-E01C1 [2012]

Location register details

Prior to 2012 this topic was represented by W01-B05A1Q.

Home location register, HLR, visitor location register, VLR

W01-E01C3 [2012]

Registration of mobile user

Prior to 2012 this topic was represented by W01-B05A1N in the case of mobile phone networks.

W01-E01C5 [2012]

Transfer of registration information

This code covers the transfer of information between access points or base stations during roaming or as part of a hand-off procedure. Hand-off aspects are also assigned W02-C03C1D.

W01-E99 [2012]

Other wireless systems and apparatus common to data networks and mobile phone networks

W02: Broadcasting, Radio and Line Transmission Systems

W02-A

Waveguide devices

Includes specific devices and techniques for RF waveguide technology. Lumped-constant frequency-dependent circuits are in U25, optical waveguides are in V07.

W02-A01

Transmission lines of the waveguide type

Covers waveguides per se, i.e. shape, materials etc.

W02-A01A [1992]

Coplanar lines

Covers lines with two longitudinal conductors.

W02-A01A1 [1992]

Fin, slot lines

W02-A01A2 [1992]

Coaxial lines

For coaxial cables in general, see X12-D05, e.g. flexible coaxial cables which are coded in X12-D05 only.

W02-A01A3 [1992]

Microstrips; Striplines

See appropriate U14 codes for microstrip technology relevant to film circuits, e.g. U14-H03C2 codes for analogue circuitry, and V04-Q codes for printed circuit details.

W02-A01A9 [1992]

Other coplanar lines

W02-A01B [1992]

Waveguide conductor

Covers waveguides with single solid longitudinal conductor.

W02-A01B1 [1992]

Wire

W02-A01B2 [1992]

Hollow

W02-A01B2A [1992]

Ridged or grooved

W02-A01B2B [1992]

Circular

Includes elliptic and parabolic cross-section waveguides.

W02-A01B2C [1992]

Flexible

W02-A01B3 [1992]

Dielectric

Covers waveguides without a longitudinal conductor.

W02-A01B4 [1992]

With several layers

Increases operating surface by building-up from several layers e.g. alternate dielectric and conductive layers.

W02-A01C [1992]

Auxiliary devices

W02-A01C1 [1992]

Bends; Corners; Twists

Flange, seal, gasket

W02-A01C2 [1992]

Fixed joints

W02-A01C3 [1992]

Movable joints; Rotating joints

Includes hinged and rotary joints.

W02-A01C5 [1997]

Waveguide windows

Covers window arrangements, e.g. with dielectric material covering aperture in guide wall (see V05-F04L for such arrangements applied to plasma and similar processing equipment). Couplers in general are covered in W02-A02 codes. Dielectric waveguides are covered by W02-A01B3.

W02-A01D [1992]

Materials

Covers materials for waveguides per se only. Materials of general application to waveguide devices are covered by W02-A08C codes.

W02-A02

Couplers, combiners, impedance matching

Waveguide windows are covered by W02-A01C5. From 2002, couplers within distributed-constant-type filters, e.g. those providing coupling between resonators, are assigned W02-A05Q codes, and are **not** covered by W02-A02 codes unless of wider application.

Port, input, transition, probe

W02-A02A [1992]

Balanced/unbalanced line coupler; Coupling different types of waveguide

W02-A02A1 [1992]

Waveguide-to-coaxial line

W02-A02A2 [1992]

Waveguide-to-stripline

W02-A02A3 [1997]

Coaxial-to-stripline

W02-A02A5 [2007]

Balanced-to-unbalanced converter

See U25-D03 for lumped constant balanced-to-unbalanced converters.

W02-A02B [1992]

Active coupler with several ports

W02-A02B1 [1992]

Conjugate devices

Covers devices with at least one port decoupled from one other port. Isolators and circulators are covered by W02-A04E and W02-A04F codes respectively.

W02-A02B1A [1992]

Directional coupler

Includes couplers consisting of two coupled guides, being either hollow waveguides or arranged in parallel or being coaxial, stripline or microstrip. See W02-A01 codes for claimed waveguide transmission lines, and V04-Q codes for printed circuit details.

W02-A02B1C [1992]

Magic-T junction

W02-A02B1D [1992]

Hybrid ring junction

W02-A02C [1992]

Impedance transformation; Matching

Lumped constant impedance matching is covered by U25 codes.

W02-A02D [1992]

Power combiner, divider

W02-A03

Resonators; Delay lines

Electromechanical delay lines are in V06.

W02-A03A [1992]

Resonators

W02-A03A1 [1992]

Helical; Spiral

W02-A03A2 [1992]

Lecher; Coaxial

Coaxial resonators covered here include those comprising concentric electrodes with an air space between (W02-A03A2A) and those in which the space between electrodes is filled by a solid dielectric material (W02-A03A2C). Resonators termed 'dielectric' but having outer and inner electrodes are thus assigned the latter code. Resonators comprising a suitably-dimensioned piece of dielectric material without a pair of electrodes are coded in W02-A03A3C if forming part of a resonant cavity, and in W02-A03A5 otherwise.

W02-A03A2A [1997]

Coaxial resonator without solid dielectric

W02-A03A2C [1997]

Coaxial resonator with solid dielectric

W02-A03A3 [1992]

Cavity

W02-A03A3A [1997]

Without solid dielectric

W02-A03A3C [1997]

With solid dielectric

See note for W02-A03A2.

W02-A03A4 [1992]

Stripline; Microstrip

W02-A03A5 [1992]

Dielectric

Covers dielectric resonators with magnetic field coupling. Resonators with dielectric filled spaces are coded under W02-A03A2 or W02-A03A3.

W02-A03B [1992]

Delay lines

Includes helical and interdigital lines.

W02-A04

Attenuators; Terminations; Isolators; Circulators; Switches

W02-A04A [1992]

Switches

W02-A04A1 [1992]

Ferromagnetic; Mechanical

See also appropriate V03- codes for mechanical type switches.

Ferrite

W02-A04A3 [1992]

Using electrical discharge devices

See appropriate V05- codes also.

W02-A04A5 [1992]

Using semiconductor devices

See appropriate U21-B codes also for electronic switches, e.g. U21-B01A and U21-B05E.

W02-A04B [1992]

Absorber

Absorbers for antenna applications are covered by W02-B03D codes, which are also used as a general place for absorber materials.

W02-A04C [1992]

Attenuator

Attenuators using chiefly lumped-constant elements are covered by U25-D07.

W02-A04C1 [1992]

Using ferromagnetic material

W02-A04C5 [1997]

Attenuator using semiconductor devices

W02-A04C9 [1992]

Other distributed-constant attenuators

W02-A04D [1992]

Terminations

Includes dissipative terminations e.g. resistive, liquid.

Dummy load, water load

W02-A04E [1992]

Isolator

Includes resonance absorption and field displacement isolators.

W02-A04F [1992]

Circulator

Covers Y-circulators and hollow waveguide circulators.

W02-A04F1 [1992]

Stripline and microstrip circulators

W02-A05

Filters

From 1997, W02-A05K codes have been assigned to indicate filter function in conjunction with other W02-A05 codes. From 2002, coupling arrangements, e.g. between resonators, are covered by W02-A05Q codes, and are no longer assigned W02-A02 codes unless of wider application also.

Band pass, notch, high pass, low pass, adjustable, tunable

W02-A05A [1992]

Transverse electromagnetic filters

W02-A05A1 [1992]

Coaxial

From 1997, cascaded coaxial cavity filters are included in this category to simplify grouping based on physical structure, and are covered by W02-A05A1E.

W02-A05A1A [1997]

Without solid dielectric

W02-A05A1C [1997]

With solid dielectric

See note for W02-A03A2.

W02-A05A1E [1997]

Cascaded coaxial cavities

W02-A05A2 [1992]

Stripline; Microstrip

W02-A05A3 [1992]

Comb or interdigital

Prior to 1997, this code covered cascaded coaxial cavity filters which are now transferred to W02-A05A1E.

W02-A05B [1992]

Hollow waveguide filters

W02-A05B1 [1992]

Cavity

W02-A05B1A [1997]

Without solid dielectric

W02-A05B1C [1997]

With solid dielectric

See note for W02-A03A2.

W02-A05B1E [1997]

Cascaded cavities

Covers cascaded resonators inside hollow waveguide structure.

W02-A05B2 [1992]

Waffle-iron filters; Corrugated structure

W02-A05C* [1992-1996]

Suppressing or attenuating harmonic frequencies

*This code is now discontinued and from 1997 this subject matter is transferred to W02-A05K6. W02-A05C remains valid and searchable for records prior to 1997.

W02-A05D* [1992-1996]

Combining or separating several different frequencies

*This code is now discontinued and from 1997 this subject matter is transferred to W02-A05K7. W02-A05D remains valid and searchable for records prior to 1997.

W02-A05E [1992]

Ferromagnetic material; YIG

Prior to 1997, this code included magnetostatic wave elements used as non-linear noise-reducing devices (also assigned V06-V codes), which are now transferred to W02-A06E. W02-G03B9 ('Other radio receiver noise reduction') will continue to be applied in addition to indicate the noise-reduction aspect.

W02-A05F [1992]

Evanescent mode filter

W02-A05G [1992]

Active filters with distributed components

See U25-E01 codes for active filters using lumped circuit elements.

W02-A05K [1997]

Characterised by function and operation

Codes in this section are assigned with other codes relating to filter technology as appropriate.

W02-A05K1 [1997]

Lowpass filter

W02-A05K2 [1997]

Bandpass filter

W02-A05K3 [1997]

Highpass filter

W02-A05K4 [1997]

Notch filter

W02-A05K6 [1997]

Suppressing or attenuating harmonic frequencies

(W02-A05C)

Coded under W02-A05C prior to 1997.

W02-A05K7 [1997]

Combining or separating several different frequencies

(W02-A05D)

Coded under W02-A05D prior to 1997. This code includes duplexers and diplexers having a frequency band separation aspect based on filtering using waveguide technology. Duplexers for use in radio transceivers are also covered by W02-G02A5B. Frequency combining or separating using lumped-constant elements is covered by U25-E05K.

W02-A05K9 [1997]

Other filter function

W02-A05Q [2002]

Novel coupling arrangements for filters

(W02-A02, W02-A05)

This code is intended to highlight novel arrangements for providing coupling between filter sections, and may be used with other W02-A05 codes denoting filter technology. Novel coupling arrangements in general for waveguide devices are covered by W02-A02 codes, which from 2002 are **not** used for internal filter coupling arrangements unless of wider application also.

W02-A05Q1 [2002]

Variable coupling arrangements

This code is intended for filter coupling arrangements in which the coefficient of coupling may be adjusted **in normal use**. Arrangements for trimming or adjusting coupling during manufacture are covered by W02-A07 codes.

W02-A06

Mode selectors; Phase shifters; Polarizers

W02-A06A [1992]

Mode selectors

W02-A06A1 [1992]

Absorbing spurious modes of propagation

W02-A06B [1992]

Polarizer

See W02-B03C codes for antenna polarizers.

W02-A06B1 [1992]

Circular polarisation

W02-A06B3 [1992]

Using Faraday rotators

W02-A06C [1992]

Phase shifters

W02-A06C1 [1992]

Using active elements

Includes use of e.g. semiconductor devices.

W02-A06C2 [1992]

Using a ferromagnetic device

Includes ferromagnetic device having toroidal shape.

W02-A06E [1997]

Nonlinear noise reduction devices

Includes magnetostatic wave devices. See also V06 codes, e.g. V06-V06, and W02-G03B9 for radio receiver noise reduction aspect. Also assigned W03-A01A1 and W03-A01B codes as appropriate if forming part of DBS receiver tuner.

W02-A07

Manufacture, testing

See also S01 for measuring, e.g. S01-H05 for high-frequency measurements.

W02-A07A [1997]

Manufacture of waveguides and waveguide components

Machining, cutting, welding, coating, plating

W02-A07A1 [1997]

For integrated, hybrid, or film circuits

See U14 codes as appropriate, e.g. U14-H04 codes.

W02-A07B [1997]

Testing of waveguides and waveguide components

See also S01 codes for specific details of electrical testing, and S02/S03 codes for non-electrical testing, such as measuring dimensions, materials testing, etc.

W02-A07B1 [1997]

For integrated, hybrid, or film circuits

W02-A08 [1992]

General details

W02-A08A [1992]

Compensation of environmental effects

Includes protection against the effects of e.g. moisture, temperature.

W02-A08B [1992]

Non-specific circuitry

This code is used for circuitry associated with waveguide devices not catered for elsewhere in section W. See also U23-Q.

W02-A08C [1992]

Materials

Includes materials for waveguide devices in general. Materials for waveguides per se only are covered by W02-A01D.

W02-A08C1 [1992]

For millimetre wave

W02-A08G [1997]

Devices with variable parameters

W02-A08G1 [1997]

Adjustable resonant frequency

W02-A08J [2002]

Waveguides and waveguide devices using superconducting materials

This code is intended to highlight the **use** of superconducting materials, not novel themselves, necessarily. **Novel** superconducting materials are assigned U14-F and X12-D06 codes.

W02-A09

Other waveguide devices

W02-B

Aerials

Aerials per se are also coded under application.

W02-B01

Monopoles, dipoles, loop and rhombic aerials, etc.

W02-B01A [1992]

Loop

Includes circular loops and also rectangular, delta and similar shapes. Parasitic arrays formed from such elements (I.e. 'quad' or 'box kite' antennas) are covered by W02-B04D5. Folded dipole antennas are covered by B01B1A or W02-B01B2A. Includes loop conductor antennas for smart cards, which are also assigned T04-K01C and V04-Q codes for printed circuit details.

W02-B01A1 [1992]

With core e.g. ferrite rod

W02-B01B [1992]

Dipole

Yagi-Uda parasitic arrays formed from dipole elements are covered by W02-B04D1. Dipole arrays with separate feed to each element are covered by W02-B05B1, but note that log periodic types themselves are coded in W02-B01D1.

Folded dipole

W02-B01B1 [1992]

Linear dipole antenna

In 2002 the title of this code was changed to better reflect its actual coverage. Formerly entitled 'Center-fed' (dipoles), the title now refers to the linear arrangement of elements, e.g. as distinct from the ring form covered by W02-B01B2 codes. As before, although centre-fed dipoles constitute the majority of postings for this code, those with an offset feed, e.g. for impedance matching purposes (W02-B08E1 assigned as well) are also included.

W02-B01B1A [2002]

Folded dipole

This code is intended for dipoles which may be regarded as a half-wavelength transmission line pair with shorted ends, or a wavelength-long conductor in the form of a flattened loop. Impedance matching aspects are indicated by additional assignment of W02-B08E1.

W02-B01B2 [1992]

Ring dipole

From 2002 the title of this code has been changed to better distinguish it from spiral antennas as covered by W02-B01B3. It is intended for dipoles with the ends brought close together to form a ring.

Halo

W02-B01B2A [2002]

Folded ring dipole

This code is intended for folded dipoles with the ends brought into proximity so as to form a ring. Impedance matching aspects are indicated by additional assignment of W02-B08E1.

W02-B01B3 [1992]

Spiral dipole

From 2002 the title of this code has been changed to better reflect its intended coverage of spiral dipole antennas, as distinct from those essentially comprising a dipole with the ends brought together in the form of a ring.

W02-B01C [1992]

Unipole, monopole

W02-B01C1 [1992]

Whip, rod

Prior to 1997, telescopic aerials were excluded from this code, being covered by W02-B01X.

W02-B01C1A [1997]

Telescopic antenna

(W02-B01X)

Coded as W02-B01X prior to 1997. From 1997 collapsible antennas in general are covered by W02-B08K, and collapsible supports by W02-B07A5. The latter code was used for both types from 1992 to 1997.

W02-B01C1C [1997]

Whip antenna with loading coil

W02-B01C3 takes precedence for continuously-loaded aerials. See also W02-B08E for antenna impedance matching and tuning.

W02-B01C1G [2002]

Ground plane antenna

This code is intended for monopole arrangements with a associated groundplane in the form of separate elements or a metallic plate, which is part of the antenna itself and not provided by the surface on which it is mounted. Discone antennas are covered by W02-B01C5 (from 2002, formerly W02-B01C and W02-B01X).

W02-B01C3 [1992]

Helical

W02-B01C3A [2002]

Quadrifilar Helix

(W02-B01C3, W02-B05B)

This code is intended for antennas in the form of two bifilar helical loop sections. For use with satellite telephones search with W01-C01D3E (W02-C03C1C is also assigned for this application since satellite phone systems are regarded as being of cellular type) and W02-C03B1C for application to ground stations in general in a satellite radio system. Prior to 2002, antennas of this type were assigned W02-B01C3 and W02-B05B.

QFH, spacecraft, weather, satellite, APT, HRPT, GPS

W02-B01C5 [2002]

Discone and conical-skirt monopoles

(W02-B01C, W02-B01X)

This code is intended for antennas in the form of a cone and monopole combination, normally employed for reasons of wideband performance. Arrangements for increasing the bandwidth of antennas in general are covered by W02-B08P3 and multi-band antennas by W02-B08R1 codes.

Wideband, multi-octave, VHF, UHF, scanning, monitoring

W02-B01D [1992]

Electrically-long aerials

Includes resonant aerials e.g. travelling-wave and non-resonant antennas e.g. rhombic.

W02-B01D1 [1992]

Log-periodic

Arrays made up of several log periodic antennas are covered by W02-B05B5.

W02-B01F [1997]

Inverted-F antenna

(W02-B01X)

W02-B01R [2010]

Novel radiating element

This code is intended to indicate novelty in the radiating element of an antenna, e.g. its shape or configuration, and is used in conjunction with other W02-B01 codes as necessary to highlight novel aspects. Note that W02-B01R is **not** used to denote shape or configuration that is a standard feature of the antenna type, such as a helical antenna which is covered by W02-B01C3 codes alone.

W02-B01X [1992]

Other monopole or dipole antenna aspects

Prior to 1997 telescopic aerials were included. These are now coded under W02-B01C1A.

W02-B02

Waveguide and slot aerials

W02-B02A [1987]

Microstrip/stripline aerials

Printed circuit antennas are covered by W02-B07A3 and V04-Q codes

Conductor pattern, etched, patch, substrate

W02-B02B [1992]

Waveguide horns

W02-B02C [1992]

Resonant slot aerial

W02-B02C1 [1992]

Microstrip slot antenna

See also W02-B02A.

W02-B03

Reflectors, refractors, polarizers, absorbers

W02-B03A [1992]

Refractor, diffractor e.g. lens, prism

Dielectric lens

W02-B03B [1992]

Reflector

From 1997, for collapsible antenna reflector per se (e.g. for on-station deployment from communications satellite, i.e. 'umbrella' type antenna) search reflector type code with W02-B08K (collapsible antenna). Collapsible supports and mountings for non-collapsible antennas are covered by W02-B07A5, which was used for both aspects from 1992 to 1997.

Circular

W02-B03B1 [1992]

Characterised by shape

Form, contour

W02-B03B1A [1992]

Parabolic

Search with W02-B08K for collapsible reflectors per se from 1997. (Previously coded as W02-B03B1A and W02-B07A5).

W02-B03B1B [1992]

Having plane surface

W02-B03B2 [1992]

Passive reflectors

W02-B03B2A [1992]

Chaff

See also W06-A04E1A, which covers jamming of radar systems.

Window strip

W02-B03B3 [1992]

Having variable properties

W02-B03C [1992]

Polarizer

See W02-A06B codes for (waveguide) polarizers in general.

W02-B03C1 [1997]

Variable polarisation

W02-B03D [1992]

Absorber

This code is used for absorbers that are part of an antenna or antenna system and also as a general reference for radio frequency absorbers and absorber materials (in W02-B03D1). This includes the use of absorber materials on unrelated structures such as buildings or aircraft. Search with W06-A04X for radar signature reduction using absorbers. Absorbers that are part of an RF waveguide system are covered by W02-A04B. RF shielding is covered by V04-U codes.

W02-B03D1 [1992]

Materials

Includes e.g. metallic threads, ferrite powders and woven or wound filaments.

Rubber, polymer, binder, carbon

W02-B04

Active elements combined with reflectors, etc.

Reflector, director, boom, parabolic, dish

W02-B04A* [1992-2001]

Reducing undesirable effects, e.g. edge scattering, cross-polarisation

*This code is now discontinued and from 2002 is replaced by W02-B08P5E, with other W02-B04 codes assigned as appropriate.

W02-B04B [1992]

Using refractor or diffractor

W02-B04C [1992]

Feed or driven element

Use with other W02-B codes as appropriate to discriminate types of feed.

Horn feed, dipole feed

W02-B04D [1992]

Yagi and quad antennas

From 2002, the scope of this code is expanded to include 'quad' antennas. Log periodic antennas are covered by W02-B01D1. Arrays in which each element is driven are covered by W02-B05 codes.

Parasitic array

W02-B04D1 [2002]

Yagi antennas

Yagi-Uda

W02-B04D5 [2002]

Quad antenna

This code is intended for 'quad' or 'box kite' antennas with form analogous to Yagi aeriels, i.e. driven element arranged between reflector and one or more director elements, with elements typically approximately one wavelength long in total. Quadrifilar helix (QFH) antennas are covered by W02-B01C3A.

W02-B04E [1997]

Parabolic reflector antenna

Dish

W02-B05

Aerial arrays

Parasitic arrays such as Yagi antennas are covered by W02-B04D codes, log periodic types by W02-B01D1.

W02-B05A	[1992]
Novel feed system	
Includes stripline, modular, slotted waveguide, etc.	
W02-B05B	[1992]
Characterised by elements making up array	
Where a specific subdivision does not exist W02-B05B is assigned together with a code for the antenna type. For example, prior to 2006, an array of helical antennas was coded as W02-B01C3 and W02-B05B (now covered by W02-B05B6).	
W02-B05B1	[1992]
Dipole	
W02-B05B2	[1992]
Horn or slot	
W02-B05B3	[1992]
Microstrip, patch	
W02-B05B4	[1992]
Yagi	
W02-B05B5	[1992]
Log periodic	
W02-B05B6	[2006]
Helical antenna	
W02-B05B8*	[1992-2001]
Array radiating different polarisation	
*This code is now discontinued and from 2002 this topic is covered by assignment of a suitable W02-B05 code in conjunction with W02-B08R5 which represents antennas with multiple polarisation characteristics in general.	
W02-B05C	[1992]
Collinear arrangements	
W02-B05D	[1992]
Phased array	
W02-B06	
Varying directional pattern	
From 2005 W02-B06C is assigned for automatic tracking aspects. Prior to 2005 this topic was covered by assignment of W06-A02A1 with W02-B06 codes as appropriate.	
<i>Scanning antenna, direction control system, anti-roll positioning ship, vehicle</i>	

W02-B06A	[1992]
Using mechanical movement	
<i>Rotary support</i>	
W02-B06A1	[1992]
Between primary active elements and secondary devices of aerials	
Includes arrangement to rotate e.g. reflector only.	
W02-B06B	[1992]
Using non-mechanical means	
Includes electronic beam steering. Phased array antennas are covered by W02-B05D, which is also assigned as appropriate.	
<i>Electronic control</i>	
W02-B06B1	[1992]
Continuous	
Includes the use of continuous phase shifters.	
<i>Phase control</i>	
W02-B06B5	[1992]
Non-continuous	
Covers switched arrangement giving discrete variation of radiation diagram.	
W02-B06C	[2005]
Automatic directional control antenna systems	
(W02-B06, W06-A02A1)	
Covers use of either mechanical movement or electronic beam steering (with W02-B06A or W02-B06B codes as necessary) to automatically adjust directional characteristics to optimize communication with a particular station, e.g. based on maximum signal strength or minimum BER (W02-G03J codes are also assigned to highlight this aspect, e.g. W02-G03J1A or W02-G03J5A). Prior to 2005, this topic was indicated by the assignment of W06-A02A1 ('Automatic direction finding') in addition to W02-B06 codes. From 2005, W06-A02A1 is no longer assigned unless separate direction finding aspects are emphasized. Directional diversity systems are also assigned W02-C03A4 codes and BDMA or SDMA systems are also assigned W02-K10 (from 2017). MIMO systems are covered by W02-C03A5 codes. Antenna set-up, i.e. installation, based on optimum reception is not included, being covered by W02-B08A5A. For use of antenna beam direction control in '5G' mobile networks search with W02-C03C1L.	
<i>Angle of arrival, direction of arrival, pilot signal, RSSI, signal scanning</i>	

W02-B06E [2006]

Variable polarisation antenna

This code is assigned alone or with W02-B06A or W02-B06B codes as appropriate. Novel antenna polarizers are covered by W02-B03C codes.

W02-B07

Supports; Housings

W02-B07A [1992]

Supports

W02-B07A1 [1992]

Fixed e.g. tower, mast, pole, base

W02-B07A1A [2002]

Antenna masts and towers

This code is intended for supporting masts and towers, usually dedicated to the purpose of mounting antennas. For arrangement intended to conceal masts, or make them less conspicuous, search with W02-B08P8G.

W02-B07A1C [2002]

Antenna mounting hardware

This code is intended for mounting hardware such as stub masts, clamps, etc., normally designed for fixing an antenna to an existing structure.

W02-B07A3 [2002]

PCB and surface mount antennas

These codes are intended to cover antennas produced using printed circuit techniques and those intended for surface mounting **on** a PCB. Microstrip antennas are covered by W02-B02A, and those fabricated as a PCB **without** a parallel groundplane by W02-B07A3A. Antennas structurally combined with active components are also assigned W02-B08C3, which would be assigned for an antenna formed on the circuit board of a radio transceiver, for example (W02-G02 also). See V04 codes also for PCB details.

Etched circuit board, conductor, laminate, foil

W02-B07A3A [2002]

PCB antennas

This code covers antennas produced using PCB techniques, and is introduced to better distinguish between true 'waveguide' antennas such as those in microstrip form, which are covered by W02-B02A, and those fabricated as a PCB without a parallel groundplane, although both codes could be assigned for a PCB antenna operating in a genuine 'waveguide' mode. Surface mounted antennas are assigned W02-B07A3C, which takes precedence over this code. PCB antennas are also assigned V04-Q06.

Printed antenna

W02-B07A3C [2002]

Surface mount antenna

This code is intended for an antenna designed to be surface mounted on a PCB, and takes precedence over W02-B07A3A, the code for antennas actually fabricated using PCB techniques.

W02-B07A5 [1992]

Collapsible

From 1997 this code has been restricted to collapsible **mountings** for antennas only, and not antennas which are themselves collapsible (now covered by W02-B08K). Prior to 1997, W02-B07A5 was used for all aspects.

W02-B07A7 [1992]

Vibration damping, stabilising

W02-B07B [1992]

De-icing arrangement

W02-B07C [1992]

Radome; Protective cover

W02-B07C1 [1992]

Forming part of vehicle

Includes e.g. the radome cover as used on an aircraft nose or on a missile. See also the appropriate codes in W06 and W07.

W02-B07D [1992]

Vehicle antenna mount

This code and its subdivisions are used only for novel mounting aspects of the antenna, i.e. generally for mechanical details, and not simply to indicate that an antenna is used on a vehicle. Vehicle applications of antennas are indicated by W02-B08F codes which can be assigned for any antenna aspect and hence they can be used with W02-B07D codes as appropriate to indicate the type of vehicle on which the antenna mounting is employed. (Codes indicating electrical aspects of the vehicles concerned are also assigned, such as W06 or X22 codes for aircraft and ships, or land vehicles respectively). Details of the actual antenna will also be coded as usual in the appropriate W02-B section when useful information can be added.

W02-B07D1 [1992]

Whip

W02-B07D3 [1992]

Waveguide

W02-B07D5 [1992]

Slot

W02-B07D9 [1992]

Microstrip

W02-B08 [1992]

General details

W02-B08A [1992]

Measuring; testing

(W02-B09)

W02-B08A codes cover monitoring/testing of antenna performance in a general sense, measurement of specific antenna parameters, and antenna set-up and alignment. 'Electrical instrument' (S01) codes are also assigned as appropriate for testing and measuring aspects, especially S01-G08A5.

W02-B08A1 [1992]

Measuring of antenna parameters per se

(W02-B09)

W02-B08A1A [1997]

Polar diagrams

W02-B08A1C [1997]

VSWR

W02-B08A1E [1997]

Gain

W02-B08A1X [1997]

Other antenna parameter measurements

W02-B08A5 [1997]

Antenna set-up and alignment

Covers arrangements for set-up and alignment of antennas and antenna systems. W03-A16A is also assigned for satellite TV receiving antenna set-up aspects. Adjustment of antenna parameters such as directional characteristics during normal operation is not included, and is covered by W02-B06 codes.

W02-B08A5A [2005]

Antenna set-up based on optimum reception

Covers mechanical or electronic adjustment of antenna characteristics based on maximum signal strength or analogous indication during set-up.

Calibration

W02-B08A5C [2005]

Antenna set-up based on geographical position

This code covers arrangements for antenna set-up and alignment based on known position, e.g. using compasses or inclinometer (also assigned S02-B codes), or GPS information (W06-A03A5E is also assigned).

W02-B08A9 [1992]

Other antenna test or measurement aspects

(W02-B09)

Includes non-electrical tests.

W02-B08B [1992]

Isolation, overvoltage protection arrangements

W02-B08B1 [1992]

Lightning protection

See X13-C03 for lightning arresters.

W02-B08B3 [1992-2009]

Isolation between adjacent antennas*

*This code is now discontinued and from 2010 arrangements for improving isolation between adjacent antennas are covered by W02-B08P6. W02-B08B3 remains valid and searchable for records prior to 2010.

Separation, shield, repeater, receiver, desensitizing

W02-B08B5 [1997]

Protection against radiation

Covers arrangements to reduce irradiation of personnel, and also measures to reduce amount of radiation penetrating head of user of portable telephone (search with W01-C01D codes and W01-C01A4 for telephone applications and with W02-G02A1 for general hand-held transceivers).

W02-B08C [1992]

Active and structurally-associated aerials, mast-head and general RF preamplifiers

From 2006 the title of this code has been expanded to reflect the existing inclusion of amplifiers mounted in close proximity to e.g. a receiver, but external to it, covered by W02-B08C5C as a subdivision of the previously-existing code for mast-head amplifiers (W02-B08C5). Prior to 2006 search W02-B08C* with terms such as 'external amplifier' or 'antenna lead amplifier' for external amplifiers used at the receiver end of an antenna cable.

W02-B08C1 [1992]

Active aerials

W02-B08C3 [1997]

Aerials structurally associated with active components

This code is intended for arrangements having part of e.g. a receiver structurally associated with the antenna, such as a low-noise block for satellite TV reception (also coded in W03-A16A).

W02-B08C5 [1992]

Mast-head and general RF preamplifiers

From 2006 this code has been expanded in scope to include RF preamplifiers in general, e.g. connected into an antenna cable at the receiver end, as well as amplifiers used at the antenna. RF amplifiers within communications receivers are covered by W02-G03A3.

Booster, preamplifier, LNA, low-noise amplifier

W02-B08C5A [2006]

Mast-head amplifiers

Covers amplifiers mounted in close proximity to an antenna. Amplifiers used at the receiver end of an antenna cable are covered by W02-B08C5C.

W02-B08C5C [2006]

General RF preamplifiers

Covers amplifiers mounted in close proximity to a receiver, but external to it. Amplifiers used at the antenna end of an antenna cable, i.e. mast-head amplifiers, are covered by W02-B08C5A.

W02-B08D [1992]

Connections for antenna

From 1997, this code includes antenna switching, previously coded in W02-B08X. See also appropriate codes in U21 and V03 (electronic and electromechanical switches respectively) and in V04 for plugs and sockets, especially V04-M30G.

W02-B08D1 [1992]

Coaxial cable

See also V04-M03.

W02-B08D3 [1997]

Involving inductive, capacitive, or optical coupling

(W02-B08D, W02-B08E)

Prior to 1997 couplings of this type were coded under W02-B08D or W02-B08E. This code includes the use of optical fiber feed arrangements for antennas equipped with the necessary devices and circuitry to convert between optical and electric signals or vice-versa.

W02-B08D5 [1997]

Antenna switching arrangements

(W02-B08X)

W02-B08E [1992]

Impedance matching and tuning

See also the appropriate codes for tuning and impedance matching in U25. From 1997 inductive and capacitive couplings are covered by W02-B08D3.

From 1992 to 1997 these were coded under W02-B08D and W02-B08E.

W02-B08E1 [1997]

Impedance matching

See U25-D05 for lumped constant networks, and W02-A02C for distributed component aspects.

W02-B08E5 [1997]

Antenna tuning

W02-B08F [1992]

Antenna applications for vehicles

Previously coded as W02-B07, under supports and housings. From 1992 the novel mounting aspects of the antenna will be assigned the appropriate W02-B07D code for antenna type, and W02-B08F for the specific application. For antenna application only, use the appropriate W02-B08F code. From 2002, the title of this code has been expanded to emphasise the fact that the applications covered here are to antennas intended to be used on vehicles.

W02-B08F1 [1992]

Land vehicles; Automobiles

W02-B08F1A [1992]

Glass-mounted antenna

See X22-X02A3 also and X22-J02A, X25-B01C1C for claimed demister.

W02-B08F1B [1992]

Roof/body mounted

See X22-X02A1 also.

W02-B08F2 [1992]

Marine vehicles e.g. ship

See W06-C01B7 also.

W02-B08F5 [1992]

Aeroplane

See W06-B01B7 also.

W02-B08F6 [2006]

Missile or other projectile

Includes antennas on missiles, rockets, shells and the like, e.g. for guidance, target-seeking, or proximity fuzes. W06 and W07 codes are also assigned as appropriate.

W02-B08F7 [1992]

Space vehicle

See W06-B03C also.

W02-B08K [1997]

Collapsible antenna

(W02-B07A5)

Collapsible antenna supports are covered by W02-B07A5, which was assigned for all categories prior to 1997.

W02-B08K1 [1997]

Motor driven

W02-B08L [1997]

Antenna manufacture

(W02-B08X, W02-B09)

W02-B08L1 [2014]

Antenna design and modeling

Where testing is involved W02-B08A codes are also assigned. Computer-aided design (CAD) aspects are also assigned T01-J15A codes.

Simulation

W02-B08M [2002]

Antenna materials

This code is intended for **novel** materials with applications to antennas. It is assigned with other W02-B codes as appropriate. Antennas using materials with special properties, such as metamaterials, are covered by W02-B08Q codes, with W02-B08M codes also assigned if the materials are novel.

W02-B08P [2002]

Antenna improvements

These codes are used to highlight some specific stated improvement in an antenna design. They are assigned in conjunction with other W02-B codes as appropriate.

W02-B08P1 [2002]

Increased gain

W02-B08P3 [2002]

Increased bandwidth

Antenna or antenna systems with multi-band characteristics are covered by W02-B08R1 codes.

W02-B08P5 [2002]

Improved directivity, scattering reduction, and cross-polarisation immunity

Antenna systems specifically designed for multi-directional or multiple polarisation radiation are covered by W02-B08R codes. Prior to 2002, W02-B04A was assigned for these topics when antennas using reflectors or refractors were concerned. From 2002, this topic is indicated by assignment of a relevant W02-B04 code with a W02-B08P5 code for those antenna types.

W02-B08P5A [2002]

Improved directivity

W02-B08P5C [2002]

Improved cross-polarisation immunity

W02-B08P5E [2002]

Reduced scattering and edge effects

W02-B08P6 [2010]

Improved isolation between adjacent antennas

(W02-B08B3)

This code covers arrangements for reducing unwanted interaction between antennas and improving isolation between them. Arrays of antennas designed to operate together are covered by W02-B05 codes.

Blocking, cancellation, desensitizing, phase, screen, separation, shield, receiver, repeater

W02-B08P7 [2002]

Improved VSWR or impedance matching

See W02-B08E1 for impedance matching arrangements for antennas.

W02-B08P8 [2002]

Improved non-electrical properties

These codes are used to highlight some specific stated improvement in an antenna which is not **directly** linked to its RF performance.

W02-B08P8A [2002]

Improved mechanical strength

W02-B08P8C [2002]

Improved durability

W02-B08P8E [2002]

Improved weather resistance

W02-B08P8G [2002]

Improved appearance

This codes is used to highlight aesthetic aspects of antenna design, including concealment or blending in with surroundings.

W02-B08P8J [2005]

Reduced-size antennas

W02-B08P8L [2005]

Reduced-weight antennas

Includes use of lighter materials, novel aspects of which are covered in W02-B08M also.

W02-B08P9 [2002]

Other improvements to antenna performance

W02-B08Q [2012]

Antennas using materials with special properties

This code covers the use of materials with special-properties, such as those not relying on normal ohmic conductivity or those exhibiting a negative refractive index in terms of EM wave propagation. Where materials themselves are novel W02-B08M (general code for antenna materials) is also assigned.

W02-B08Q1 [2012]

Antennas using metamaterials

Includes use of composite RH and LH materials.

W02-B08Q5 [2012]

Antennas using superconductors

Waveguide devices using superconductive materials are assigned W02-A08J. Novel superconductors in general are covered by U14-F codes and X12-D06 codes.

W02-B08Q9 [2012]

Antennas using other materials with special properties

W02-B08R [2002]

Antenna or antenna systems with multi-band, multi-directional, or multiple polarisation characteristics

Individual antennas for which these characteristics are inherent, e.g. wide bandwidth in the case of disccone antennas (W02-B01C5), are not routinely assigned W02-B08R codes.

W02-B08R1 [2002]

Antenna or antenna systems with multi-band or wideband characteristics

From 2005 the title of this code is expanded to better reflect previous inclusion of wideband antennas, and is subdivided to differentiate between continuous wideband coverage and multi-band operation, e.g. in harmonic modes, in several possibly narrow, frequency bands.

W02-B08R1A [2005]

Antenna or antenna systems with multi-band characteristics

This code is intended to cover antennas operating in several frequency bands, harmonically-related or otherwise, the width of the bands not being the distinguishing aspect. Antennas operating over a continuous wide frequency range are covered by W02-B08R1C.

W02-B08R1C [2005]

Antenna or antenna systems with wideband characteristics

This code is intended to cover wideband antennas providing continuous coverage over a relatively wide frequency range. Antennas operating in several discrete frequency segments are covered by W02-B08R1A.

W02-B08R3 [2002]

Antenna or antenna systems with multi-directional characteristics

W02-B08R5 [2002]

Antenna or antenna systems with multiple polarisation characteristics

Antenna **arrays** with multiple polarisation radiating characteristics were coded in W02-B05B8 prior to 2002.

W02-B08X [1992]

Other general antenna details

W02-B09

Other antenna types

Bird repellent, plasma antenna, submerged antenna, subterranean antenna, underground antenna, underwater antenna, warning light

W02-B10 [2002]

Antenna for non-communications application

(W02-B09)

This code is intended to be used with any other W02-B code to indicate that an antenna is being used to launch or intercept RF energy for a purpose other than communications. For example, it is assigned for an antenna coupling RF energy into a discharge space in plasma processing apparatus (also assigned V05-F04L, V05-F05C1 codes, and other V05-F codes as appropriate). In general, codes relating to the specific application should also be included in a search, such as S05-B codes for surgery or X25-B02B codes for microwave heating. Note that any transmission and reception of radio signals is regarded as communication, so that applications such as radar, transponder systems, telemetry and remote control are **not** assigned W02-B10.

Applicator, diathermy, emitter, ISM, microwave heating, process chamber, rectenna, rectifying antenna, RF heating, surgery

W02-B12 [2005]

Antenna or antenna systems using existing structure or living body as radiator or radiation enhancer

W02-B12A [2005]

Using existing metallic structure or conductor system

This code covers the use of conductors whose primary function is not that of an aerial, e.g. use of power conductors, or a resonant slot antenna formed in the roof of a vehicle (W02-B02C, W02-B08F1, W02-B12A and X22-X02A1).

W02-B12C [2005]

Using living body, or part of body

This code includes arrangements for improving radiation in a hand-held transceiver such as a mobile phone (W01-C01D3C also assigned) by arranging for the user's body to serve as a ground plane, or similar, in conjunction with a monopole antenna.

W02-C

Transmission systems (general)

W02-C01

Line systems

Note: telephone systems are covered by W01-C and are coded in W02-C01 also only for common features e.g. equalising, echo suppression, and 'classical' transmission line measurements.

W02-C01A

Using power lines or wave guides

W02-C01A1 [1992]

Using waveguides

Waveguides per se are in W02-A

W02-C01A3 [1992]

Using power line

See also under application e.g. W05-D06P for remote control aspects, X12-H03 for power line carrier systems and W01-A06C6 for data communication network aspects.

Intercom, local area network, remote measurement, PLCC

W02-C01A9 [1992]

Other power line or waveguide systems

W02-C01B

Transmission control; Equalising

Transmit-receive switching, level control, amplitude-frequency compensation, phase frequency compensation, modem, passive network, transversal filter, switched capacitor filter

W02-C01B1 [1992]

Transmission control

Includes setting of transmission level, i.e. power control, and control of transmission direction. Systems aspects of power control in radio communication are covered by W02-C03E3.

W02-C01B2 [1992]

Equalising

W02-C01B2A [1992]

Equalising system

W02-C01B2B [1992]

Apparatus, i.e. equaliser per se

See U22-G03E3C for digital signal processing aspects of equalising.

W02-C01B2C [1992]

Training

Training signal transmission

W02-C01B9 [1992]

Other transmission control or equalising

W02-C01C

Reducing echo, cross-talk or interference

Double-talk detector, replica signal generator, decoupling

W02-C01C1 [1992]

Echo, singing reduction

W02-C01C1A [1992]

Using filters

W02-C01C1B [1992]

Echo canceller

This code takes precedence over W02-C01C1A for arrangements using filters in an echo-canceller using a replica of the original signal.

W02-C01C1X [1992]

Other echo reduction aspects

W02-C01C2 [1992]

Reducing cross-talk

See W02-C01C3B for correction of external interference.

W02-C01C2A [1992]

Compensating

W02-C01C2X [1992]

Other cross-talk reduction

W02-C01C3 [1992]

Reducing interference

Shielding

W02-C01C3A [1992]

Caused by currents induced in cable sheath or armour

W02-C01C3B [1992]

Caused by unbalanced current in normally balanced line

Crosstalk compensation is in W02-C01C2A.

W02-C01C3X [1992]

Other line interference reduction

W02-C01D

Monitoring; Testing

See S01 also for measurement of specific electrical parameters.

W02-C01D1 [1992]

Fault location

W02-C01D3 [1992]

Standby systems and redundancy networks

W02-C01D3A [1992]

With automatic switching to powered-up backup equipment e.g. hot-standby system

W02-C01D5 [1992]

Measurement of transmission line parameters

Used when emphasis is on actual line parameters. (For telephone subscriber loop testing see W01-C02A5). Includes RLGC values etc.

Attenuation, phase shift, characteristic impedance, return loss, noise/signal-to-noise ratio measurement, frequency response

W02-C01D9 [1992]

Other line measurement

W02-C01E [1992]

Repeater circuits

(W02-C01X)

Radio repeaters are coded in W02-G05C.

Regenerator

W02-C01E1 [1992]

Power supply details

(W01-C01X)

Includes remote power feeding arrangements.

Remote power feed

W02-C01E5 [1992]

Amplifier details

(W01-C01X)

See also U24-G codes.

Line amplifier

W02-C01E9 [1992]

Other line repeater aspects

(W01-C01X)

W02-C01F [2005]

Line hybrids, transformers and impedance matching

W02-F codes are also assigned for novel details of transformers and inductors for communications purposes.

W02-C01F1 [2005]

Line hybrids and transformers

Line hybrids specifically for telephone equipment are covered in W01-C08B, and are not assigned this code.

W02-C01F5 [2005]

Impedance matching

Impedance matching in general is covered by U25-D05 for lumped-constant circuits and by W02-A02C for distributed-constant circuits.

W02-C01X

Other line communication aspects

W02-C02

Near-field systems

Includes transmission over deliberately restricted area using predominately magnetic or electric fields, but not conventional radio systems of very low power. W02-C02A or W02-C02B are assigned to indicate system type and W02-C02G codes are assigned to indicate application. Near-field data interfaces are covered from 2010 by W01-A07H2N with W02-C02 codes only assigned for novel near-field aspects.

NFC

W02-C02A [1992]

Radiating/leaky cable

W02-C02B [1992]

Inductive loop systems

W02-C02G [1992]

Application

Used in conjunction with W02-C02A or W02-C02B.

W02-C02G1 [1992]

In tunnel or mine

W02-C02G3 [1992]

Entertainment, educational, and hearing aid systems

From 2002 the title of this code is expanded to recognise the use of W02-C02G3A for general applications of near-field systems to hearing aids.

Auditorium

W02-C02G3A [1992]

For operation with hearing aids

See also W04-Y, especially W04-Y03C5.

Across-counter communication aid, hearing-aid loop system

W02-C02G5 [1992]

For (selective) calling system

Also assigned W05-A05C codes, but note that conventional radio-based paging is **not** included here (see W02-C03 codes with W05-A05C codes).

W02-C02G7 [1997]

For smart card data transfer

(W02-C02G9)

See T04-K02 also and T05-H02C5C (card-freed services) as appropriate.

W02-C02G9 [1992]

Other near field system applications

W02-C02X [1992]

Other near field systems

W02-C03

Radio systems

Prior to 1992 codes in this section were chiefly used to denote 'systems' aspects of radio communication. From 1992, all aspects of radio communications (within the scope of W02) have been coded here, including apparatus which is also assigned W02-G codes.

From 2002, inventions relating to pure **applications** of radio communications in the field of alarm signalling and remote control or remote monitoring, are **not** assigned W02-C03 codes. For these applications the relevant 'transmission medium' codes from class W05 should be used in searching (e.g. W05-B05 or W05-D06 codes). Inventions in these fields for which there **is** some novelty in the radio communications sense will continue to be assigned W02-C03 and W02-G codes as appropriate.

W02-C03A

Diversity systems

Diversity aspects of data transmission are covered by W01-A01A, and also assigned W02-C03A codes for significant radio aspects. Radio receiver circuits to counter multipath effects are coded in W02-G03B6 codes also, e.g. W02-G03B6A for rake receiver configurations (from 2002). From 2006 hybrid diversity schemes, (e.g. MIMO and the like), are covered by W02-C03A5.

In general in the following codes, those denoted 'System' relate to a diversity radio system operating method, possibly involving signalling and control aspects in a general sense, or the application of diversity at a network level, **without any novel apparatus being involved**. Codes entitled 'Apparatus' relate to novel circuitry, methods, or software at the **equipment level**, whether involving antennas, receivers or transmitters or some combination of these.

Antenna combiner/switching circuit, phase shifter, phase stripping circuit, fading/noise/interference detector, linked AGC system, dual-antenna mobile installation

W02-C03A1 [1992]

Space diversity

W02-C03A1A [1992]

Space diversity system

W02-C03A1B [1992]

Space diversity apparatus

W02-C03A2 [1992]

Time diversity

W02-C03A2A [1992]

Time diversity system

W02-C03A2B [1992]

Time diversity apparatus

Rake receivers are covered by W02-G03B6A, with codes assigned to highlight spread spectrum aspects as necessary, e.g. W02-K05A7 for CDMA.

W02-C03A3 [1992]

Frequency diversity

W02-C03A3A [1992]

Frequency diversity system

W02-C03A3B [1992]

Frequency diversity apparatus

W02-C03A4 [1992]

Polarisation, direction diversity

Includes directional diversity aspects of BDMA and SDMA, which are covered by W02-K10 (from 2017) with antenna control details assigned W02-B06C.

W02-C03A4A [1992]

Polarisation or directional diversity system

W02-C03A4B [1992]

Polarisation or directional diversity apparatus

W02-C03A5 [2006]

Hybrid diversity schemes

Includes combined space and frequency diversity and systems, e.g. of MIMO and similar type, making use of propagation effects such as multipath to improve reliability, channel capacity, and the like. Rake receivers are covered by W02-G03B6A.

V-Blast, Alamouti, MIMO, precoding, vector

W02-C03A5A [2017]

Massive or large-scale MIMO systems

Covers use of a large number of antennas in a MIMO diversity scheme. For relevance to 5G cellular communications search with W02-C03C1L. Automatic antenna direction control is covered by W02-B06C and BDMA/SDMA systems (from 2017) by W02-K10.

Access point, AP, Argos, base station, beam forming, beam tracking, eNodeB, full-dimension MIMO, hyper MIMO, large-scale antenna systems, millimeter wave, mmWave, MU-MIMO, pilot, very large MIMO

W02-C03A5P [2017]

Precoding aspects of hybrid diversity

This code covers precoding in the sense of equalization. (Equalization in general is covered by W02-C03E1 codes). Coding for error correction and detection is covered by W01-A01 codes.

Channel state information, codebook, CSI, linear, matrix, nonlinear, vector

W02-C03A5S [2017]

Algorithms and software aspects of hybrid diversity

Covers algorithms and software aspects of hybrid diversity systems, especially of MIMO type. T01-S codes are also assigned as necessary.

W02-C03A9 [1992]

Other radio diversity schemes

W02-C03B

Relay systems

Covers terrestrial and satellite systems. Satellite TV transmission is covered by W02-F06A, and **not** coded here except for novel 'radio relay' aspects. Repeaters per se are covered by W02-G05C.

Frequency translation, on-frequency system, passive reflector, TDMA satellite communication

W02-C03B1 [1992]

Artificial satellite and airborne radio relay system

Covers use of satellites and 'atmospheric' relay systems using aircraft, balloons and the like for which W02-C03B1F is assigned in conjunction with other codes as appropriate for system and apparatus details. Satellite and airborne relay telephone systems are regarded as cellular types and thus W02-C03C1 codes are assigned in addition to W02-C03B1 codes.

W02-C03B1A [1992]

Artificial satellite and airborne radio relay system/operating method

W02-C03B1B [1992]

Satellite and airborne radio relay station details

Covers novel details, including constructional details when linked to the radio function, of satellites and also aircraft, balloons etc., for which W02-C03B1F is also assigned. The following codes may also be required: W02-B codes (especially W02-B08F5 and W02-B08F7) for antenna system details; W02-G codes (especially W02-G05C) for radio equipment; W06-B codes for details of airborne or space vehicles.

W02-C03B1C [1992]

Ground station

Search with W02-G02A codes for mobile or portable terminal aspects.

Earth station, very small aperture terminal, VSAT, SAT

W02-C03B1D [1992]

Multiple access

Search with W02-K codes to define access method. e.g. W02-K01A for FDMA, W02-K02D for TDMA, W02-K05 codes for spread-spectrum multiple access.

Time division, TDMA, frequency division

W02-C03B1F [2005]

Airborne relay

This code is used with other W02-C03B1 codes as appropriate to highlight the use of an atmospheric radio relay system, i.e. one using balloons, high-altitude aircraft, etc.

W02-C03B2 [1992]

Terrestrial relay system

(H04B-007/14-195)

W02-C03B2A [1992]

Terrestrial radio relay system/operating method

W02-C03B2B [1992]

Terrestrial radio relay apparatus

This code covers all radio-related aspects of repeaters used in terrestrial radio relay systems. Other codes are also assigned as appropriate, e.g. W02-B codes for repeater antennas, or W02-G05C plus other W02-G codes for actual novelty in radio circuitry. Equipment for extending the range or providing 'fill-in' coverage in a mobile phone system is also assigned W02-C03C1B (i.e. it is coded as a base station). Repeaters for extending coverage in a radio broadcast system are also assigned W02-D05 codes, e.g. W02-D05C1 for DAB and W02-F09 is also assigned for terrestrial TV relay stations.

Repeater

W02-C03C [1987]

Mobile radio, including cellular systems

(W02-C03X)

For mobile radio telephone system use with W01-B05A codes. For mobile telephones per se, (including 'non-RF' details not assigned W02-C03C codes), see W01-C01D codes. From 1997, all mobile **telephone** and system-related details have been regarded as cellular, unless specifically indicated as being otherwise, such as 'call-point' or other cordless types, which are covered by W02-C03C3 codes. Prior to 1997, W02-C03C3 codes were used as a 'general' or 'unspecified' area for mobile telephones not clearly of cellular type.

W02-C03C1 [1987]

Cellular

(W02-C03X)

Application to telephone systems is indicated by assignment of W01-B05A1A for systems (with W02-C03C1A) or base stations (with W02-C03C1B), and by W01-C01D3 codes for subscriber telephones themselves (with W02-C03C1C). Analogous cellular aspects for inventions with emphasis on wireless data networks are also assigned W02-C03C1 codes with W01-A06C4 codes and other W01-A06 codes as appropriate. From 2012 W01-E codes have been introduced to cover aspects of wireless systems, normally operating on a cellular model, that may be equally applicable to data networks and mobile phone networks. These codes cover topics such as roaming and registration, (previously indicated by assignment of W01-B05A1R and W01-B05A1N respectively in the case of mobile phone networks), and should be included in searches to provide more detail on specific cellular radio topics. Since 2002, non-TDMA access schemes, or systems not using that multiple access scheme alone, have been assigned W02-C03C1G, with other W02-C03C1 codes as appropriate. To discriminate these aspects, when the novelty lies in the multiple access technique used, W02-K codes are assigned as well. Thus for CDMA and W-CDMA W02-K05A7 is

assigned (e.g. for UMTS), and for use of OFDM (e.g. as the access scheme for '4G' telephones), W02-K07C is used. Does not include 'call-point' cordless telephone systems, which are covered by W02-C03C3 codes. Satellite telephone systems are regarded as cellular types and thus W02-C03C1 codes are assigned in addition to W02-C03B1 codes.

CA, carrier aggregation, cell, frequency re-use, radiotelephone, zone

W02-C03C1A [1992]

Cellular radio system/operating/method

This code is normally assigned along with W01-B05A1A to indicate layout or design of a cellular telephone system, the arrangement of cells and base stations, or novel methods of operating the network involving call set-up procedures, signalling, paging, and the like. This code is also applied for all communication between the network node and the user equipment. For example, beam management procedures such as beam sweeping, beam reporting, and beam failure recovery are covered here along with W02-C03C1L. Also includes control and shared data channels for 4G and 5G networks. Appropriate codes for 3G, 4G and 5G are also assigned to highlight the type of system.

Synchronization Signals, P-SS, S-SS, RACH, PDSCH, PDCCH, PUSCH, PUCCH, Beam Sweeping, Beam reporting, Beam failure recovery, Beam scheduling

W02-C03C1B [1992]

Base station apparatus

W02-C03C1C [1992]

Mobile apparatus

General and non-RF aspects of cellular telephones (which are not assigned W02-C03C1 codes) are covered by W01-C01 codes only, especially W01-C01D3 codes.

Mobile radiotelephone

W02-C03C1D [1992]

Cellular radio hand-off

Received signal strength indicators (RSSI) and signal quality measurements in radio receivers in general are covered by W02-G03J codes, which are also assigned for hand-off aspects as appropriate. Soft hand-off in CDMA systems is indicated by additional assignment of W02-K05A7, and since 2002, by W02-C03C1G. Hand-off for non-cellular mobile radio is covered by W02-C03C3D. From 2012 W01-E01 codes are also assigned for mobility-related aspects of wireless data networks and mobile phone networks such as roaming and registration, e.g. W01-E01C5 for transfer of registration information.

Hand-over, reselect, transfer

W02-C03C1E [1992]

Mobile location determination by the network

This code is intended for the determination of location for the purpose of operating the mobile radio system, and does not cover the provision of position information by a navigation receiver built into a mobile station for the benefit of the user only. It does not cover the provision of position information as a 'subscriber service' (e.g. using an unrelated system such as GPS), except when cellular system location register information is employed, in which case W02-C03C1J ('Cellular radio applications') is also assigned. From 2012 W01-E01 codes are also assigned for mobility-related aspects of cellular wireless data networks and mobile phone networks, such as location register details in W01-E01C1 (see W01-B05A1Q prior to 2012). For mobile location determination in non-cellular systems see W02-C03C3F.

W02-C03C1F [2017]

Distributed antenna system

This code covers systems in which multiple remote units are used as access points or base stations in a cellular or similar system, usually to provide coverage in localized areas not well-served by normal wireless infrastructure, such as within buildings, tunnels, or other areas underground. Use of optical fiber links such as 'radio-over-fiber' between a hub and remote units is indicated by co-assignment of W02-C04B1R.

Active, BDA, bidirectional amplifier, DAS, head end, hub, hybrid, passive, radio access unit, RAU, radio interface unit, RIU, radio-over-fiber

W02-C03C1G [2002]

Radio system or apparatus details of third generation or analogous mobile phone system

From 2012 the title of this code has been changed to clarify the way it is used. W02-C03C1G is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions involving the use of non-TDMA multi-access techniques, especially CDMA. For example, novel aspects of a 3G mobile phone system are represented by W02-C03C1A and W02-C03C1G, a novel 3G base station by W02-C03C1B and W02-C03C1G, and a novel 3G mobile station by W02-C03C1C and W02-C03C1G. Novel details of the spread spectrum aspect are also assigned W02-K05 codes, e.g. W02-K05A7, as appropriate. Systems based on other multiple access schemes are also covered here with access codes assigned as appropriate, but please note that from 2014 'Fourth generation' mobile phone systems (i.e. '4G' systems) are covered by W02-C03C1H.
3G, 3GPP

W02-C03C1H [2014]

Radio system or apparatus details of fourth generation or analogous mobile phone system

This code is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions concerned with 'Fourth generation' (i.e. '4G') mobile phone systems. For example, novel radio-based aspects of a 4G mobile phone system are represented by W02-C03C1A and W02-C03C1H, a novel 4G base station by W02-C03C1B and W02-C03C1H, and a novel 4G mobile station by W02-C03C1C and W02-C03C1H. Novel details of the multiple access aspect are also assigned W02-K codes as appropriate, e.g. W02-K07C for OFDM.
Long term evolution, LTE, WiMax

W02-C03C1J [2002]

Cellular radio applications

This code is generally used without other W02-C03C1 codes, and is intended for inventions making use of the cellular system, while not involving novel cellular aspects. It is used only when the particular application cannot be coded elsewhere, and for cases specific to e.g. alarms and remote monitoring, relevant W05-B or W05-D codes are used instead.

W02-C03C1K [2017]

Hierarchical cellular network aspects

Covers systems and details of cellular networks organized on a hierarchical basis, e.g. with conventional large cells and smaller cells. Includes the use of local millimeter wave access points to separately deliver high rate data streams, e.g. as proposed for 5G for which W02-C03C1L is also assigned. Distributed antenna systems are covered by W02-C03C1F and are not assigned W02-C03C1K unless specific relevance to hierarchical cellular systems is involved. Hand-off between cells operating at different levels is also assigned W02-C03C1D.

Femtocell, macrocell, microcell, millimeter wave cell, mmWave cell, picocell, small cell

W02-C03C1L [2016]

Radio system or apparatus details of fifth generation or analogous mobile phone system

This code is assigned with any other cellular (W02-C03C1) code as appropriate, for inventions concerned with 'Fifth generation' (i.e. '5G') mobile phone systems. For example, novel radio-based aspects of a 5G mobile phone system are represented by W02-C03C1A and W02-C03C1L, a novel 5G base station by W02-C03C1B and W02-C03C1L, and a novel 5G mobile station by W02-C03C1C and W02-C03C1L. Novel details of the

multiple access aspect are also assigned W02-K codes as appropriate, e.g. W02-K10 (from 2017) for BDMA.

BDMA, beam-division multiple access, SDMA, space-division multiple access, spatial-division

W02-C03C1M [2022]

Radio system or apparatus details of sixth-generation (6G) or analogous mobile phone system

This code is assigned as a tag with other codes as appropriate for inventions relating to sixth-generation (6G) communications technology.

6G

W02-C03C3 [1992]

Private mobile radio, MCA

Prior to 1997, W02-C03C3 codes were used (with W01-B05A or W01-C01D codes as appropriate) to indicate radio telephone systems which were not clearly cellular in nature. From 1997, all radio telephones are regarded as cellular (and thus assigned W02-C03C1 codes for RF aspects) unless recognisable as non-cellular type, such as 'call-point', or other cordless telephone system.

Multi-channel access, push-to-talk (PTT) system, CT2, CT3, DECT, PHS

W02-C03C3A [1992]

Private mobile radio system/operating method

W02-C03C3B [1992]

Base station details

W02-C03C3C [1992]

Mobile station details

W02-C03C3D [1997]

Mobile radio hand-off

Covers arrangements to transfer communication with mobile unit to another base station. Such arrangements for cellular mobile radio are covered by W02-C03C1D. Allocation of channels in trunked radio communication is covered by W02-C03C3G, and only coded in W02-C03C3D also if inter-base station transfer is involved.

W02-C03C3E [1992]

Characterised by mobile radio access method

Search with W02-K codes to define access method, e.g. W02-K01 codes for FDMA, W02-K02 codes for TDMA, W02-K05 codes for spread spectrum multiple access. Prior to 1997, W02-C03C3E was used to represent general aspects of trunked radio systems (now covered by W02-C03C3G) but will

now only be used as well for specific access-related inventions in this category.

W02-C03C3F [1997]

Mobile location determination

Includes use of existing navigation systems, such as GPS, (for which W06-A03A5 codes are also assigned), in conjunction with the mobile radio system. For mobile location determination in cellular systems, see W02-C03C1E.

W02-C03C3G [1997]

Trunked radio system

Prior to 1997, this aspect was chiefly indicated by W02-C03C3E. See W02-C03B2 codes also for land-based radio relay systems.

W02-C03C3H [2002]

Direct mode

This code is intended for mobile radio communication conducted directly between mobile stations, rather than via a base station, although the base station may be involved in setting up the link. When applicable to trunked radio systems W02-C03C3G is also assigned.

W02-C03D [1992]

Point-to-point radio link

(W02-C03X)

W02-C03D1 [1992]

Point-to-point radio link system/operation method

(W02-C03X)

W02-C03D2 [1992]

Point-to-point radio link apparatus

(W02-C03X)

W02-C03D5 [1997]

Characterised by access method

Search with W02-K codes to define access method. e.g. W02-K01 codes for FDMA, W02-K02 codes for TDMA, W02-K05 codes for spread-spectrum multiple access.

W02-C03E [1992]

General circuit details

(W02-C03X)

W02-C03E1 [1992]

Radio system equalising

(W02-C03X)

W02-C03E1A	[1992]
Radio system equalising method (W02-C03X)	
W02-C03E1B	[1992]
Radio system equalising apparatus (W02-C03X) See U22-G03E3C for digital signal processing aspects of equalising.	
W02-C03E2	[1992]
Radio system echo cancelling (W02-C03X)	
W02-C03E2A	[1992]
Radio system echo cancelling method (W02-C03X)	
W02-C03E2B	[1992]
Radio system echo cancelling apparatus (W02-C03X)	
W02-C03E3	[1992]
Power control (W02-C03X)	
W02-C03E3A	[2002]
Novel algorithms for power control Includes software aspects of power control for which T01-S codes should also be searched.	
W02-C03E3B	[2024]
Terminal power control Includes power saving at the user equipment side e.g by means of discontinuous reception (DRX).	
W02-C03E3C	[2024]
System power control Includes 'systems' aspects of power control e.g. based on signal transmitted from base station to mobile unit. Transmitter power control circuits per se are covered by W02-G01C codes.	
W02-C03E4	[1997]
Doppler shift compensation (W02-C03E9) Covers methods and equipment, such as receiver circuitry, for compensation of Doppler effects in e.g. mobile radio, communication with space vehicle, etc.	

W02-C03E5	[1997]
Simulation systems for radio communication (W02-C03E9, W02-C05A) Includes modelling and planning of radio links. See also T01-J15A codes for CAD aspects, e.g. T01-J15A4, and W02-C05A for system testing aspects. Search with W02-H01J1 for radio communication simulation during network design to minimise interference. <i>Path loss, attenuation, rain, fade, margin, signal-to-noise ratio, target</i>	
W02-C03E7	[2006-2009]
Resource allocation* *This code is discontinued from 2010 and the subject matter transferred to W02-C03G1. It included channel allocation and similar aspects of radio communication management. When interference avoidance is the aim W02-H01J5 is also assigned.	
W02-C03E9	[1992]
Other general radio circuit details (W02-C03X)	
W02-C03G	[2010]
Carrier aggregation, dual connectivity and cognitive radio	
W02-C03G1	[2010]
Carrier aggregation and dual connectivity From 2021, this code has sub-codes which cover carrier aggregation and dual connectivity in 4G and 5G networks.	
W02-C03G1A*	[2021-2022]
General resource allocation *This code is now discontinued and transferred to W02-C03R from 2023. It is still searchable and valid for records from 2021 and 2022.	
W02-C03G1C	[2021]
Carrier Aggregation Includes carrier aggregation for 4G and 5G systems for which W02-C03C1H or W02-C03C1L are also assigned. <i>CA, Supplementary uplink, Bandwidth Parts (BWP)</i>	
W02-C03G1E	[2021]
Dual Connectivity Appropriate codes for 4G and 5G i.e. W02-C03C1H and W02-C03C1L are also assigned to highlight the type of system. <i>DC</i>	

W02-C03G5 [2010]

Cognitive radio systems

This code covers cognitive radio systems, i.e. those making use of locally-unoccupied frequency allocations. Prior to 2010 this topic was chiefly covered by W01-A06F1A when wireless data networks were involved, which will continue to be assigned for channel occupancy sensing aspects.

Channel occupancy, Mitola radio, opportunistic network, primary user, white space

W02-C03H [2021]

Unlicensed radio network

This code is used to denote radio systems which use available unlicensed frequency bands such as 2.4GHz or 5-6GHz for communication.

LTE-U, NR-U

W02-C03R [2023]

Resource/Traffic Management

This code covers more precise details of resource allocation and prior 2023 the same is covered under W02-C03G1A. This is a broad level code and general resource allocation are covered under W02-C03R1.

W02-C03R1 [2023]

General resource allocation

W02-C03R1A [2023]

Allocation in time domain

W02-C03R1B [2023]

Allocation in frequency domain

W02-C03R1C [2023]

Allocation in variable band

W02-C03R1D [2023]

Semi-persistent scheduling (SPS)

W02-C03R1E [2023]

Grant-free scheduling

W02-C03R1F [2023]

Uplink management

This code is used along with other W02-C03R codes to tell that resource allocation is for uplink management.

W02-C03R1G [2023]

Downlink management

This code is used along with other W02-C03R codes to tell that resource allocation is for downlink management.

W02-C03R2 [2023]

Selection of wireless resources by user or terminal

W02-C03R3 [2023]

Traffic Management

Traffic/load control for data networks area covered under W01-A06A3.

W02-C03R4 [2023]

Resource management for control channels and signalling

W02-C03R5 [2023]

Resource management for broadcast services

W02-C03R6 [2023]

Resource management for direct mode communication

W02-C03X

Other radio systems

Ionospheric/tropospheric scatter communication

W02-C04

Light and infra-red systems

Covers free-space and optical fiber communication systems, but note that optical fibers and purely optical components per se are in V07. Electro-optical sources and detectors, and circuitry directly connected to them, are assigned codes in U12 also.

The following subject matter is not coded in W02-C04 unless of general application also, or unless specific novel details represented by W02-C04 codes are involved: General digital optical communication (W01-A07E), Optical fiber data network (W01-A06C1), TV optical remote control (W03-A02C), General optical remote control (W05-D06A3 or W05-D06C with W05-D08C), Optical 'radar' systems (W06-A06).

W02-C04A [1992]

Characterised by apparatus

W02-C04A1 [1992]

Transmitter circuits and apparatus

W02-C04A1A [1992]

Modulator

See also V07-K codes for optical modulators in general and V08 codes for laser source modulators.

W02-C04A1B [1992]

Amplifier, output stage

Includes source driving circuits.

W02-C04A1C [1992]

Power control

W02-C04A1D [1992]

Source

Semiconductor lasers are also assigned U12-A01B codes and V08-A04A codes.

W02-C04A1X [1992]

Other optical transmitter details

W02-C04A3 [1992]

Receiver circuits and apparatus

W02-C04A3A [1992]

Demodulator

W02-C04A3B [1992]

Amplifier, input stage

Includes circuit for photodiode and the like, also assigned U12-A02B4.

W02-C04A3C [1992]

AGC

See U24-C01 codes also.

W02-C04A3D [1992]

Optical detector

See U12 for photodiode details.

W02-C04A3X [1992]

Other optical receiver details

W02-C04A4 [1997]

Transceiver

Systems and circuitry specific to transmitters or receivers only are covered by W02-C04A1 or W02-C04A3 codes.

W02-C04A5 [1992]

Repeater circuits

W02-C04A5A [1997]

Optical amplifier arrangements

Prior to 1997, see W02-C04A1B, W02-C04A5, and W02-C04B1A. Optical amplifiers per se are covered by V07-K01C codes.

W02-C04A6 [2006]

Optical multiplexing and switching devices

This code covers novel aspects of optical switches and multiplexers for communications purposes, the core technology area for these topics being covered by V07 codes. Novel switching devices and systems for communications purposes are also assigned W01-B02 or W01-A06G5 codes, and novel multiplexers are covered by W02-C04B4B and W02-K04.

W02-C04A7 [1992]

Equalising, noise and distortion eliminating, diversity

From 1997, this code is subdivided to include noise reduction circuits, previously covered by W02-C04C7. See W02-C04B7 for inherently non-dispersive systems, such as transmission using solitons.

W02-C04A7A [1997]

Equaliser

Prior to 2002, this code was used with W02-C04A7 for dispersion compensation, which is now covered by W02-C04A7J.

W02-C04A7C [1997]

Noise reduction circuits

(W02-C04C7)

W02-C04A7E [1997]

Distortion reduction arrangement

Includes arrangements to reduce effects due to nonlinearities, such as four-wave mixing.

W02-C04A7G [1997]

Diversity and polarisation control arrangements

Includes polarisation diversity aspects. Control of polarisation in general (for communications and analogous purpose) is covered by V07-K03 and V07-F02B for gratings, filters and polarizers.

W02-C04A7J [2002]

Dispersion compensation

(W02-C04A7, W02-C04A7A)

This code is intended to cover apparatus or methods for the compensation of dispersion arising from e.g. optical fiber characteristics. (Previously covered in W02-C04A7 and W02-C04A7A). V07-K codes are also assigned as appropriate. Optical transmission systems using signals with an inherent resistance to dispersion, e.g. solitons, are covered by W02-C04B7.

W02-C04A8 [1997]

Optical alignment system

This code mainly relates to free-space communication apparatus (W02-C02B2 codes also assigned) and covers arrangements to optimise alignment of optical systems at transmitting or receiving stations. W06-A02C codes are also assigned as appropriate for systems detecting angle of incidence of incoming light signals.

W02-C04A8A [1997]

Tracking system

Covers dynamic arrangements for maintaining alignment. Analogous systems for radio antennas are covered by W02-B06C.

W02-C04A9 [1992]

Other optical communication apparatus

W02-C04B [1992]

Characterised by system type

W02-C04B codes are assigned to indicate system type, either alone or with W02-C04A codes.

W02-C04B1 [1992]

Fiber optic

W02-C04B1A [1992]

With coherent light i.e. laser source

Novel laser sources are assigned W02-C04A1D in conjunction with appropriate U12-A01B codes and V08-A codes.

W02-C04B1R [2017]

Radio-over-fiber

Covers systems in which radio frequency signals are directly modulated onto an optical carrier wave for transmission from a remote site over optical fibers. For use of this technology in distributed antenna systems for cellular communications search with W02-C03C1F.

DAS, distributed antenna system, remote unit

W02-C04B2 [1992]

Free space

W02-C04B2A [1992]

With coherent light i.e. laser source

W02-C04B3 [1992]

Mobile

W02-C04B4 [1992]

Multiplex optical communication systems

W02-C04B4A [1992]

With multiplexed baseband

See W02-K codes also.

W02-C04B4B [1992]

With optical multiplexing

Includes WDM, also coded in W01-A03E1 when data transmission aspects are significant. See W02-K04 and V07 codes, e.g. V07-K04, also for novel aspects of optical multiplexing.

W02-C04B7 [1992]

Anti-dispersive

Includes transmission using solitons.

W02-C04B9 [1992]

Other optical communication system

W02-C04C [1992]

General details

W02-C04C1 [1992]

Testing of optical communication apparatus/system

See also the appropriate codes in V07-J.

W02-C04C1A [1992]

Testing of apparatus

W02-C04C1C [1992]

Testing of system

W02-C04C7* [1992-1996]

Noise reduction circuits

*This code is now discontinued and the subject matter transferred to W02-C04A7C. W02-C04C7 remains valid and searchable for records prior to 1997.

W02-C05

Monitoring; Testing

See S01 also for measurement of specific electrical parameters. Includes monitoring/testing in general, except for measurements specific to line communication (W02-C01D). Since 1992 testing of optical communications is not included in W02-C05, and has been covered by W02-C04C1 codes.

Test equipment, spectrum analyser, RF power, harmonic radiation, signal-to-noise ratio, noise figure, field strength, propagation loss

W02-C05A [1992]

Testing of transmission system

W02-C05B [1992]

Testing of apparatus

For equipment test, search together with appropriate code e.g. W02-C05B and W02-G01 codes, for transmitter testing.

W02-C06 [1987]

PCM transmission systems (general)

(W02-C09)

See W02-F07 codes for pulse code modulation TV systems, which are **not** included here.

Pulse code modulation, pulse amplitude modulation, voice coding, telephony

W02-C06A [1997]

Novel PCM communication systems

This code is intended for communication systems in general using PCM, for which there is not a more specific code elsewhere.

W02-C06C [1997]

Novel coding scheme

For further details of coding systems, and for coder/decoders per se, see W04-V05G codes. Speech codecs and coding methods specifically for telephone communication are covered by W01-C01C7.

Coding in general is covered by U21-A05 codes, and for video signals, by W02-F07 (prior to 200101) and W04-P01A codes.

W02-C07 [1987]

Ultrasonic/sonic systems (including hydrophones)

(W02-C09)

Sonar systems are in W06-A05 as required. For transducers see also V06-B03 and other V06 codes as appropriate.

Underwater communication, diver communication system, passive sonar system, free space sonic/ultrasonic system

W02-C07A [1997]

Sonic or ultrasonic communication

This code is intended for actual communication systems, i.e. intentional transmission of information from one point to another. Passive arrangements such as hydrophones are covered by W02-C07C.

W02-C07C [1997]

Hydrophones

See V06 codes for actual transducer details, e.g. V06-B03. Sonar transducers are covered in W06-A05C7.

W02-C09

Other transmission system

Includes communication via other media, e.g. ground.

W02-D

Sound broadcast distribution systems

Codes in this group relate to the broadcast system as a whole and to studio / transmitter aspects, and are not assigned for receiver details. Broadcast radio receivers are covered by W03-B codes. For radio broadcast studio equipment see also W04-G08.

Broadcast sound studio, sound mixing, outside broadcast equipment

W02-D01 [1992]

Wired broadcast system

Line, wired system, line amplifier

W02-D02 [2011]

Stereophonic and multiple audio channels sound broadcasting

This code is assigned for digital stereophonic broadcasting when this is a significant aspect, e.g. with W02-D05C codes for digital radio broadcasting. Analog FM and AM stereophonic broadcasting is covered by W02-E codes.

W02-D04 [2010]

Monitoring; Testing

(W02-C05; W02-D)

Includes testing equipment and methods for complete sound broadcast systems (including those covered by W02-E codes) or broadcast systems in general. Monitoring of sound broadcast systems for audience research purposes is covered from 2010 by W02-D04B (formerly W02-D08). Note that testing and monitoring of audio recording equipment and (sound) broadcast radio receivers is not included and is covered by W04-J codes and W03-B10A codes respectively. Testing and monitoring of television systems for broadcasting and other purposes and of interactive broadcasting systems is covered by W02-F04 codes.

W02-D04A [2010]

Testing

W02-D04A1 [2010]

Signal testing

Includes checking of signal quality.

Bandwidth, bit rate, coverage, distortion, error, harmonic content, modulation depth, service area, sidebands, spectral regrowth, spurious content, THD

W02-D04A5 [2010]

Testing of apparatus

These codes cover the testing of equipment forming part of a sound broadcast system.

Switching centre

W02-D04A5A [2010]

Testing of apparatus in broadcast studio

Testing of audio processing related aspects such as sound mixing is also assigned W04-G codes.

Control desk, console, talkback

W02-D04A5B [2010]

Testing of apparatus at transmitter or repeater site

W02-G01 or W02-G05 codes are also assigned when radio equipment is involved.

Antenna, cooling, enclosure, generator, power amplifier, power supply, tower

W02-D04A5X [2010]

Other sound broadcast apparatus testing

W02-D04B [2010]

Audience research system

(W02-D08)

Analogous systems for TV broadcast audience monitoring are covered by W02-F04B. Systems analyzing listening habits for the purpose of building a profile used to select or suggest content in interactive broadcasting are not included and are covered by W02-F10Q codes.

Tuned frequency, selected channel monitoring system, listener data acquisition

W02-D04C [2010]

Station output monitoring

(W02-C05 ; W02-D)

Covers arrangements to enable verification of scheduled transmission. Analogous systems for TV station output monitoring are covered by W02-F04C.

FCC, monitor, log

W02-D04C1 [2010]

Monitoring programme output

(W02-C05 ; W02-D)

Includes checking adherence to schedule, timing, etc., and monitoring of automatic recorded programme transmission.

W02-D04C5 [2010]

Checking transmission of commercial message

(W02-C05 ; W02-D)

Sponsor, advertisement, commercial break

W02-D04X [2010]

Other sound broadcast system monitoring

W02-D05 [1992]

Radio broadcast system

W02-G codes are also assigned as appropriate for novel equipment, e.g. W02-G01 codes for transmitters and W02-G05 codes for repeaters. Novel antennas for radio broadcasting are also assigned W02-B codes. Broadcast radio **receivers** are not included and are covered by W03-B codes.

Radio network

W02-D05A [1992]

Satellite

W02-D05C [1997]

Digital broadcast system

For broadcasting (not necessarily for entertainment purposes) in cellular telephone or data networks see W01-B05A1M and W01-A06E1A respectively.

W02-D05C1 [1997]

Involving multiplex transmission

Includes OFDM systems. Prior to 1997, see W02-K01, W02-K09 in addition to W02-D05. From 1997, W02-K07C is assigned in addition to W02-D05C1.

DAB, packet

W02-D05C5 [2002]

Internet broadcasting

(T01-H07C5E, W01-A06B7, W02-D, W02-F10E)

See T01-N01D1A also. Interactive broadcasting aspects are covered by W02-F10E codes.

W02-D07 [2011]

Additional information transmitted with broadcast signals

These codes are assigned to highlight the transmission of additional information with a sound (e.g. radio) broadcast signal. Other codes relating to the additional information itself are also assigned as necessary. The transmission of additional information using analog FM or AM stereophonic broadcasting is covered by W02-E01 codes.

W02-D07A [2011]

Emergency sound broadcasting

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Emergency television broadcasting is covered by W02-F05D. Reception of emergency broadcast messages in radio receivers is covered by W03-B08C7 and in TV receivers by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano

W02-D07C [2011]

Traffic and public transport information

T07-G01 is also assigned for systems providing information to drivers designed to warn of, or reduce, traffic congestion.

W02-D07E [2011]

Electronic program guide (EPG) systems

Includes details of programming and also 'now playing' information. Broadcast radio receiver aspects are covered by W03-B08C5. Analog broadcast systems providing additional information on program content are covered by W02-E01B1. EPG systems for TV broadcasting are covered by W02-F10E5 and TV set aspects by W03-A13J.

W02-D07X [2011]

Other additional information in broadcast

W02-D08* [1997-2009]

Audience monitoring

(W02-C05, W02-D)

*This code is discontinued from 2010 and the subject matter transferred to W02-D04B. W02-D08 was used with W02-D01 or W02-D05 codes as appropriate. (Prior to 1997, W02-C05 was used with the relevant W02-D code.) Analogous arrangements for TV audience research are covered by W02-F04B.

W02-D09 [2022]

Other sound broadcast systems

Includes FM radio transmitters and repeaters (i.e. radio equipment) for which W02-G01 codes and W02-G05C are respectively assigned also. Includes mounting aspects of FM radio transmitting devices.

W02-E

Analog stereophonic broadcast systems

From 2011 codes in this group are only assigned for inventions specific to analog stereophonic sound broadcasting. Prior to 2011 W02-E codes were assigned for some inventions involving digital stereophonic broadcasting but from 2011 stereophonic broadcasting of digital or unspecified type is covered by W02-D02. TV stereophonic sound transmission is covered by W02-F06B only. See W03-A and W03-B codes for receiver aspects.

AM, FM multiplex systems, pilot tone, modulator, encoder

W02-E01 [1992]

Transmitting additional information

Includes use of additional subcarriers in a multiplexed analog stereophonic signal for providing subsidiary information channels. Transmission of additional information for digital or unspecified sound broadcasting is covered from 2011 by W02-D07 codes.

Subcarrier authorisation, SCA

W02-E01A [1992]

Carrying separate programme

Includes 'storecast' background music.

W02-E01B [1992]

Carrying separate information e.g. RDS

See W03-B codes for receiver details - W02-E01B codes are only used for novel aspects of the system as a whole, and the transmitting station per se (usually with W02-G01 codes).

From 1997, W03-B08 is assigned for all aspects of RDS-type receivers.

CCIR 634

W02-E01B1 [1992]

Relating to broadcast station

Includes station identification and radio broadcast program guides. Broadcast radio receiver aspects of program guides are covered by W03-B01C. EPG systems for TV broadcasting are covered by W02-F10E5 and TV set aspects by W03-A13J.

Programme identification, PI, alternative frequency, AF

W02-E01B5 [1992]

Unrelated to broadcast station

Includes road traffic information (e.g. ARI), financial information, and paging signal transmission (with W05-A05C codes).

W02-F

Television systems

TV receivers are covered in W03, studio equipment, cameras etc. in W04.

W02-F01

Closed circuit

The definition of 'closed circuit' intended here is that images are transmitted, usually to a single location, for viewing by humans, i.e. camera systems providing a video signal for image analysis only are not included, being covered by e.g. T04-D07 codes. Novel aspects of video cameras are also assigned W04-M01 codes.

W02-F01A [1992]

Closed circuit television for surveillance and security

See also W05-B01C5 for automatically-actuated alarm systems.

W02-F01A1 [1992]

Entry-phone with CCTV

See also W01-C04A1 for entry-phone.

W02-F01A5 [1997]

Combined with alarm or surveillance system

See also T01 and T04 image analysis codes and W05-B codes, e.g. W05-B01C5 codes for intruder detection, W05-B02 codes for fire detection and monitoring aspects.

W02-F01A9 [1992]

Other security CCTV systems

W02-F01B [1992]

Process control

W02-F01C [1992]

Component inspection during manufacture

Systems involving pattern recognition only, without a monitor display for an operator, are assigned T04-D codes and **not** covered here.

W02-F01D [1992]

Calibrated system for measuring dimensions

See also S02-A03 codes.

W02-F01E [1997]

Vehicle external-view CCTV system

(W02-F01X)

See also under application, e.g. X22-E09 for land vehicle, W06-B01B1 for aircraft.

W02-F01F [1992]

CCTV over non-wire (or fiber) link e.g. radio link

Includes near-field and low-power systems also.

W02-F01M [2006]

Medical CCTV systems

This code covers the use of CCTV systems and equipment with medical apparatus, normally for diagnosis, for which S05 codes are also assigned such as S05-D04B for endoscopes.

W02-F01X [1992]

Other closed circuit TV systems

W02-F02

Color

This code is only used for novel systems, e.g. modified PAL, NTSC etc., and relates to analogue color TV systems only.

W02-F03

Cable and stereoscopic TV systems

W02-F03A [1987]

Cable

W02-F03A codes are assigned for 'system' inventions, including cable hardware. W03-A codes are assigned for receiver details.

Community antenna TV (CATV), masthead amplifier TV

W02-F03A1 [1992]

Coaxial cable network

See X12-D05 for coaxial cable per se.

Cable installation

W02-F03A3 [1992]

Optical fiber network

W02-F03A5 [1992]

Head-end details, control aspects

W02-F03A7 [1997]

Microwave distribution system

(W02-F03A9)

Includes 'microwave cable' TV system providing local distribution of signals, usually in GHz frequency range.

Masthead

W02-F03A9 [1992]

Other cable TV aspects

Includes hardware aspects such as connectors (see W04 codes also), cable installations and fittings (see W01-D codes also) and repeaters (also assigned W02-C01E and W02-C04A5 codes as appropriate)

W02-F03B [1987]

Stereoscopic

Includes broadcast and industrial systems. Stereoscopic TV receivers are in W03-A12, signal generation is in W04-M09.

Three-dimensional TV

W02-F03B1 [1992]

Broadcast

W02-F03B3 [1992]

Industrial

W02-F03B9 [1992]

Other stereoscopic TV

Includes medical applications of stereoscopic TV - see S05 codes also.

W02-F04

Monitoring; Testing

Includes testing equipment and methods for whole system, or any component part in conjunction with that code, and also audience research systems. Note that monitoring and testing of sound broadcast systems and equipment is covered from 2010 by W02-D04 codes, and that video recording equipment monitoring/testing is covered by W04-J codes only.

Switching centre

W02-F04A [1992]

Testing

Production line test equipment, vectorscope, test pattern generator

W02-F04A1 [1992]

Signal testing

Covers measurements on analog or digital video signals. Measurement and testing of equipment used in video systems is covered by W02-F04A5 codes.

Artifact, BER, bit error rate, black level, color saturation, DC offset, differential gain, differential phase, hue, IRE unit, link quality, link testing, perceptual evaluation of video quality, PEVQ, picture quality, PSNR, SNR, SSIM, structural similarity, video quality

W02-F04A5 [1992]

Testing of apparatus

W02-F04A5A [1992]

In TV studio

W02-F04A5B [1992]

At transmitter or repeater

See also W02-G01 or W02-G05 codes.

W02-F04A5C [1992-2009]

In receiver*

*This code is now discontinued and from 2010 all aspects of TV receiver testing, including production line testing and internal self-monitoring are covered by W03-A18A codes. W02-F04A5C was assigned prior to 2010 for these aspects in addition to the W03 codes.

W02-F04A5X [1992]

Other TV or video apparatus testing

W02-F04B [1992]

Audience research system

This code covers arrangements for analyzing user opinions and/or determining viewing figures for audience research purposes. When equipment installed at the viewer location is involved W03-A18R is also assigned. Systems analyzing viewing habits for the purpose of building a profile used to select or suggest content in interactive broadcasting are not included and are covered by W02-F10Q codes. Analogous systems for audience research in broadcasting other than TV are covered by W02-D04B.

Selected channel monitoring system, viewing figure data acquisition

W02-F04C [1997]

Station output monitoring

(W02-F04X)

Covers arrangements to enable verification of scheduled transmission. Includes analogous arrangements for cable TV and similar distribution systems.

FCC, monitor, log

W02-F04C1 [1997]

Monitoring programme output

(W02-F04X)

Includes checking adherence to schedule, timing, etc., and monitoring of automatic recorded programme transmission.

W02-F04C5 [1997]

Checking transmission of commercial message

(W02-F04X)

Sponsor, advertisement, commercial break

W02-F04X [1992]

Other TV system monitoring

W02-F05

Secrecy, subscription, teletext

W02-F05A [1987]

Secrecy (scrambling), subscription

From 9701, interactive broadcasting, formerly covered in W02-F05A3C, is transferred to W02-F10 codes.

W02-F05A1 [1992]

Secrecy

(W02-F05A, W02-L)

See W02-F10N1 codes for scrambling and coding aspects of interactive broadcasting, which take precedence over W02-F05A1 codes.

Synchronising signal suppression, black-white inversion

W02-F05A1A [1992]

Video/audio scrambling system, jamming signal insertion

W02-F05A1B [1992]

Video/audio descrambling system

TV receiver aspects of descrambling are not included, being covered by W03-A16C3A.

W02-F05A3 [1992]

Subscription

From 1997, two-way aspects of subscription TV are covered in W02-F10 codes, especially W02-F10A.

W02-F05A3A* [1992-1996]

Billing system

*This code is now discontinued and from 1997 billing aspects of subscription TV are covered by W02-F10A codes and W02-F10N5. (These codes are assigned even in cases of non-interactive systems). W02-F05A3A is no longer assigned but remains valid for records prior to 1997.

W02-F05A3C* [1992-1996]

Two-way working

*This code is now discontinued and from 1997 subject matter previously coded here is transferred to W02-F10 codes, under the general heading of interactive broadcasting. W02-F05A3C remains valid and searchable, for two-way subscription TV and analogous arrangements, for records prior to 1997.

W02-F05A9 [1992]

Other TV secrecy and subscription aspects

W02-F05B [1987]

Teletext, screen text systems

Teletext TV receiver decoder is in W03-A10 only.

Character multiplex, videotext, off-air system, data base access, horizontal/vertical blanking interval data insertion, framing code, multiplex

W02-F05B1 [1992]

Telephone line-based system

(See also W01-C05B1) Includes e.g. CAPTAIN system.

W02-F05B5 [1992]

Transmitted as additional information with television signal

Includes teletext and analogous non-VBI systems as used in e.g. DVB, in which case W02-F07M1 is also assigned.

Burst-and-random error correction system for teletext (BEST)

W02-F05B9 [1992]

Other screen text systems

W02-F05C [1992]
Other additional (non-picture) information

Includes transmission of information for station ID or VPS, ghost control reference signals, URLs and the like. See W04-E04C5 codes for recording equipment aspects of off-air programming and W03-A04G for TV receiver ghost-cancelling circuitry. Teletext transmission systems for digital and analog TV broadcasting are covered in W02-F05B5.

Video programming system, GCR

W02-F05D [2011]
Transmission of emergency TV broadcast messages

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Emergency sound radio broadcasting is covered by W02-D07A. Reception of emergency broadcast messages in TV receivers is covered by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano

W02-F06 [1987]
Satellite TV; MAC systems; High definition TV; Stereophonic/bilingual sound
(W02-F09)

Radio relay systems for communications purposes are assigned W02-C03B codes.

W02-F06A [1992]
Satellite TV

Radio relay systems for communication purposes are coded in W02-C03B codes.

Direct broadcast by satellite (DBS)

W02-F06B [1992]
Stereophonic and multichannel sound TV

W02-F06B1 [1992]
Involving companding

Includes NICAM system.

W02-F06B3 [2006]
Surround sound TV

W02-F06B5 [1992]
For carrying separate sound channel

Includes e.g. bilingual broadcast.

Second audio programme, SAP

W02-F06C [1992]
High definition TV transmission systems

Covers non-compatible and compatible systems such as IDTV, EDTV, HDTV etc.

W02-F06C1 [1992]
Involving time-multiplexed transmission of TV signal components

Includes MAC system and variants.

W02-F06C3 [1992]
Involving distinct transmission of motion information

W02-F06C7 [1992]
Involving sub-sampling

W02-F06C8 [1992]
Increased definition

Includes compatible 'side panel' systems modifying e.g. NTSC or PAL (see W02-F02 also) including 'letterbox' format.

W02-F07* [1987-2001]
Bandwidth/bit-rate reduction, PCM systems

(W02-F09)

*This code is now discontinued from 2002, as are the W02-F07 subdivision codes up to W02-F07K. These discontinued codes are replaced by the single code W02-F07M - 'Digital image transmission'. W04-P01A codes are still assigned as before, and may be used to highlight the type of coding. (Prior to 2002, the W02-F07 codes were used for methods and complete systems for PCM TV).

See T01-J10D for computer-based image coding and compression, and U21-A codes for coding in general. (Bandwidth reduction for facsimile and analogous systems is covered by S06-K07A4D).

Compression, encoding, narrow band TV, block coding, predictive coding, motion detection

W02-F07A* [1992-1997]
Movement detection system

*This code is now discontinued and from 1997 its subject matter is covered by W04-P01A1.

W02-F07B* [1992-2001]
Transform coding

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A3 codes.

W02-F07C* [1992-2001]

Predictive coding

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5 codes.

W02-F07C1* [1992-2001]

Motion detection and compensation

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5 codes.
Interframe, difference, differential

W02-F07C1A* [1997-2001]

Motion detection

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5A.

W02-F07C1C* [1997-2001]

Motion compensation

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A5C.

W02-F07D* [1992-2001]

Subsampling

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A7.
Multiple sub-Nyquist sampling encoding, MUSE

W02-F07E* [1997-2001]

Hybrid coding

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes.

W02-F07E1* [1997-2001]

Combined transform and predictive coding

(W02-F07B, W02-F07C)

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes, which include MPEG system coding and variants.

W02-F07E5* [1997-2001]

Motion detection and compensation

(W02-F07B, W02-F07C1)

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4 codes.

W02-F07E5A* [1997-2001]

Motion detection system

(W02-F07B, W02-F07C1)

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4A.

W02-F07E5C* [1997-2001]

Motion compensation system

(W02-F07B, W02-F07C)

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A4C.

W02-F07K* [1997-2001]

Coding based on fractals

*This code is now discontinued and from 2002 its subject matter is covered by W04-P01A8.

W02-F07M [2002]

Digital image transmission

This code is intended to cover digital image transmission from a systems viewpoint, novel aspects of image coding are covered by W04-P01A codes.

W02-F07M1 [2005]

Digital video broadcasting

Includes DVB and similar systems. TV receivers for signals in this format are covered by W03-A11G. Includes non-interactive broadcasting of video via the internet, e.g. by streaming. Interactive broadcasting via the internet in general is covered by W02-F10E3.

W02-F07M1A [2008]

Mobile digital video broadcasting

This code is intended for transmission of digital TV broadcasts at a deliberately-reduced data rate, e.g. for handheld receivers with reduced processing and display capabilities.

DVB-H

W02-F07M5 [2005]

Digital video for non-broadcasting applications

Includes digital video transmission for conferencing, surveillance, equipment interconnection and the like.

W02-F08 [1992]

Two-way television systems

(W02-F09)

W02-F08A [1992]

TV conference system

(W02-F09)

W01-C05B1 or other W01-C codes are also assigned if telephone communication is involved.

W02-F08A1 [1992]

System

(W02-F09)

W02-F08A3 [1992]

Apparatus
(W02-F09)

W02-F08B [1992]

Video telephone
(W02-F09)

W02-F08B1 [1992]

System
(W02-F09)
Also assigned W01-C05B1 codes.

W02-F08B3 [1992]

Apparatus
(W02-F09)
Subscriber apparatus is also coded in W01-C01G4.

W02-F08X [1992]

Other two-way TV systems
(W02-F09)
Two-way TV systems.

W02-F09

Other television systems
Includes TV transmitters and repeaters (i.e. radio equipment) for which W02-G01 codes and W02-G05C are respectively assigned also. Also includes mounting aspects of television transmitting devices.

W02-F10 [1997]

Interactive broadcast systems
(W02-F05A3C)
Codes in this section cover subject matter chiefly coded, prior to 1997, in W02-F05A3, and include video, audio/video, sound-only, and information systems provided for access by entertainment equipment, usually of 'subscription' type. W02-F10 codes are used to represent 'head-end' and overall systems aspects. See W03-A16C codes for equipment based at a subscriber location.

W02-F10A [1997]

Video-on-demand, video-on-request and video-based systems
(W02-F05A3C)
Covers systems predominately of a video nature. Systems involving selection of predominately non-video programme material are covered by W02-F10C.
From 2002 the title of this code has been expanded to better reflect its content, and to separate actual video-on-demand systems from those in which some interactive facility is available

without the provision for causing the downstream transmission of a different programme.
The title of this code has been further expanded to allow the inclusion of video-on-request systems, covered from 2006 in W02-F10A1E.
VOD, pay-per-view

W02-F10A1 [2002]

Video-on-demand system
(W02-F05A3C)

W02-F10A1A [2002]

Full video-on-demand system
(W02-F05A3C)

W02-F10A1C [2002]

Near video-on-demand system
(W02-F05A3C)
NVOD

W02-F10A1E [2006]

Video-on-request system
Covers systems in which video programming is delivered for later viewing, e.g. taking advantage of unused network capacity overnight.

W02-F10A1G [2007]

Video-based systems with different-view facility
Covers interactive video-based systems including the facility to select a different viewing angle. Multiple camera systems for generating different views of a scene are covered by W04-M01V.

W02-F10A5 [2002]

TV broadcasting with interactive aspects
(W02-F05A3C)
This code is intended for largely standard TV broadcasting or video distribution with limited interactivity, e.g. the facility to respond to questionnaires, cast votes, etc. Systems enabling fuller control over programme content are covered by W02-F10A1 codes.

W02-F10C [1997]

Audio-on-demand system
(W02-F05A3C)
The title of this code was amended in 2005 to reflect its normal use for audio entertainment. Includes remote access of entertainment library system, e.g. of 'pay-per-play' type.
W02-F10A codes take precedence for interactive systems in which audio is transmitted as a normal accompaniment to video signals in interactive TV.

W02-F10E [1997]

For access to information system, programme guide systems, and internet

Database systems in general are covered by T01-J05B codes.

In 2002 the title of this code was expanded to reflect its use for internet aspects including WWW access provided as part of an interactive broadcast system and internet broadcasting itself of an interactive nature, and also programme guide systems. For internet aspects see T01-N codes also.

W02-F10E1 [2002]

For access to internet

(T01-H07C5E, W01-A06B7, W02-F10E)

This code is intended for internet access provided as a facility of interactive broadcasting.

W02-F10E3 [2002]

Interactive internet broadcasting

(T01-H07C5E, W01-A06B7, W02-F10E)

This code is intended for interactive broadcasting using the internet itself. Non-interactive internet radio is covered by W02-D05C5 and non-interactive transmission of video via the internet is included in W02-F07M1.

W02-F10E5 [2002]

Programme guide systems

(T01-H07C5E, W01-A06B7, W02-F10E)

TV receiver aspects of interactive programme guides are covered by W03-A16C5E and of programme guides in general by W03-A13J.

EPG

W02-F10F [2005]

Archival storage of content primarily submitted by user

Includes storage and retrieval of images accessed by digital camera via a communication link. (Digital camera details are covered by W04-M01B1 codes). Also covers storage of video footage and other information.

W02-F10G [1997]

For game playing, virtual reality, or karaoke

(W02-F05A3C, W04-X02C)

Video games in general are covered by W04-X02C. For virtual reality aspects, see also W04-W07E codes. Karaoke systems are also coded in W04-X03A3.

W02-F10H [2002]

For access to multimedia systems

(W02-F10X, W04-K10)

Audio/video aspects of multimedia systems in general are also assigned W04-K10.

W02-F10J [1997]

For access to financial network

(W02-F05A3C)

Includes monetary transaction and interactive shopping, also assigned T01-N01A1 or T01-N01A2 codes as appropriate for applications of computing.

W02-F10K [1997]

Storage systems and servers

(W02-F05A3C, W04-K05)

This code covers file servers and similar arrangements for general storage of programme material, and to enable playback operation simulating e.g. VTR functions, such as rewind, fast-forward, etc. Multiple recording unit arrangements are also assigned W04-K05A codes.

W02-F10N [1997]

Security aspects and access control

(W02-F05A1, W02-F05A3C)

W02-F10N1 [1997]

Scrambling, coding and copy marking aspects

(W02-F05A1, W02-F05A3C)

From 2009 the title of this code has been expanded to reflect previous inclusion of copy marking. W02-F10N1 codes take precedence over W02-F05A1 codes which cover secrecy and scrambling for non-interactive video systems. See W02-L05 for audio scrambling systems in general. Data encryption in general is covered by W01-A05A codes.

W02-F10N1A [2009]

Broadcast signal scrambling and coding

Covers scrambling and coding (i.e. encryption, especially of video signals) to prevent unauthorised viewing. Arrangements to prevent or restrict the making of copies are covered by W02-F10N1C. Coding for compression is not included, being covered by W04-P01A codes.

W02-F10N1C [2009]

Broadcast signal copy restriction and watermarking

Covers arrangements to prevent or restrict the making of copies. Signal processing involving scrambling and coding (especially of video signals) to prevent unauthorised viewing or listening is covered by W02-F10N1A. Signal processing aspects of copy restriction and watermarking within recording equipment are covered by W04-F01L codes or W04-G01L codes.

Digital rights management, DRM

W02-F10N3 [1997]

Access control

(W02-F05A1, W02-F05A3C)

Includes use of smart cards to authorise decoding (see W03-A16C3C also for subscriber-end aspects), and control of access from server. See W02-F10N7 also for arrangements temporarily increasing access rights.

W02-F10N5 [1997]

Billing arrangements

(W02-F05A3A)

Aspects of financial transactions **using** an entertainment network, for purposes unrelated to billing for the service itself, are covered by W02-F10J.

W02-F10N5A [2005]

According to user-determined level of commercial message provision

Overriding of systems which prevent the recording of commercial messages is covered in W04-E04C5E.

W02-F10N7 [1997]

Temporarily increasing access rights and request transmission

(W02-F05A1, W02-F05A3C)

Covers systems enabling 'impulse' decision to e.g. view programme, and associated communications aspects. See W01-C05B5A also where telephone-based link is involved.

W02-F10Q [2005]

User profiling; Content recommendation; Selective insertion of commercial messages

From 2011 the title of this code has been expanded to allow inclusion of user profiling and 'recommendation' or 'suggester' systems which offer content based on a user's profile. W02-F10Q codes relate to systems and equipment at the 'content distribution end' of the broadcast system

and do not cover self-contained analogous systems wholly based at the viewer or listener end which are part of e.g. a TV receiver and are not supplied by the content provider. Arrangements for analyzing user opinions and/or determining viewing figures for audience research purposes, rather than tailoring content, are covered by W02-F04B (TV broadcasting) and W02-D04B (sound broadcasting).

W02-F10Q1 [2011]

User profiling

This code covers the building of a user profile e.g. to be used to determine preferences in terms of content.

W02-F10Q1A [2011]

Learning aspects

This code covers novel aspects of monitoring user behaviour in terms of content that has been selected and includes automatic detection of patterns in viewing or listening habits.

W02-F10Q3 [2011]

Content recommendation

Covers 'recommendation' or 'suggester' systems for offering content based on the determined profile. Selective insertion of commercial messages is **not** included and is covered by W02-F10Q5.

W02-F10Q5 [2011]

Selective insertion of commercial messages

Covers equipment, methods and systems for selective insertion of commercial messages (CMs) presumed to be of interest based on the user profile or geographical region. Offering of content other than CMs is **not** included and is covered by W02-F10Q3.

W02-F10X [1997]

Other interactive broadcasting aspects

(W02-F05A3C)

W02-G

Radio transmission system details and equipment

Broadcast radio and TV receivers are in W03, sound studio equipment is in W04 and W02-D/E. Codes from the radio systems section (W02-C03) which denote apparatus are also assigned as appropriate.

W02-G01

Transmitters

Includes transmitters (for radio and TV) per se and those forming part of e.g. transceiver, where this aspect is the significant part of the disclosure.

W02-G01A [1992]

Oscillator and frequency conversion

W02-G01A1 [1992]

Oscillator

Includes oscillator circuits per se (see U23-A codes also).

W02-G01A3 [1992]

Frequency control

Include frequency control aspects such as PLL synthesisers (also assigned U23-D01B codes).

W02-G01A5 [1992]

Frequency translation

Includes frequency mixing. See U23-J codes for frequency changing and U23-B codes for frequency multiplying.

W02-G01B [1992]

Amplifier, output stage

Includes buffer amplifiers, driver stages, and output stages, e.g. power amplifiers.

W02-G01C [1992]

Power control, protection

W02-G01C1 [1992]

Power control

Overall systems aspects of power control are covered by W02-C03E3.

Output/level control

W02-G01C5 [1992]

Power limiting, protection

See S01-D05B5 for systems involving reflected power measurement, and U24-G03C for amplifier protection in general.

VSWR power limiting, thermal

W02-G01D [1992]

Modulator

See U23 codes for modulator circuits in general.

AM, FM, SSB, DSB, balanced modulator

W02-G01E [1992]

Tuning, matching, impedance networks

From 2012 the title of this code has been expanded to reflect the existing coverage of any impedance network forming part of transmitter RF amplifier input or output circuitry, such as filters, directional couplers, splitters and combiners. For lumped constant impedance networks U25 codes are also assigned as appropriate and for distributed constant circuits W02-A codes.

W02-G01H [1992]

Construction and cooling

W02-G01K [2002]

Transmitters with digital architecture

This code is intended for radio transmitters employing a digital architecture within the signal path, i.e. using DSP. See corresponding codes for transceivers and receivers also (W02-G02K and W02-G03K codes respectively).

W02-G01X [1992]

Other radio transmitter aspects

W02-G02

Transceivers

Covers fixed and mobile radio transceivers and also relevant RF aspects of e.g. cordless and cellular telephones where appropriate. (Non-RF aspects of mobile phones are not assigned W02-G02 codes and are covered by W01-C01D codes and other W01-C01 codes as necessary). Details specific to radio transmitters are covered by W02-G01 codes and to radio receivers (of non-broadcast or unspecified type) by W02-G03 codes. For transceivers other than radio type codes relating to the communications medium should be considered, such as W02-C04A4 for optical transceivers.

Radiotelephone, transmitter-receiver, two-way radio

W02-G02A [1992]

Portable and mobile transceiver

W02-G02A1 [1992]

Personal radio transceiver e.g. hand-held walkie-talkie

W02-G02A2 [1992]

Mobile radio transceiver

Covers transceivers installed in vehicles and generally of a higher power than normal hand-held walkie-talkie units.

W02-G02A3 [1992]
Selective calling e.g. answer-back pager
See also W05-A05C codes for paging details.

W02-G02A5 [1992]
Characterised by operation
See W02-G02C3A for novel transmit-receive switching.

W02-G02A5A [1992]
Push-to-talk
PTT

W02-G02A5B [1992]
Duplex
Includes aspects such as duplexers, for which filter codes are also assigned as appropriate (e.g. W02-A05K7 in the case of distributed constant types).

W02-G02A5C [1997]
Voice-operated switching
(W02-G02C, W04-V04A1)
Prior to 1997 see W02-G02C. See also W04-V04A1 which covers applications of speech recognition and speech/noise discrimination systems.
VOX

W02-G02A5X [1992]
Other radio transceiver operation

W02-G02A9 [1992]
Other radio transceiver details

W02-G02B [1992]
Base station

W02-G02C [1992]
Control and interfacing
Includes general processor control, see appropriate T01 code also. From 1997 voice actuated control is coded under W02-G02A5C.

W02-G02C1 [1997]
Controls per se
See also V01-A03 codes for potentiometers, and U21 or V03 codes respectively for electronic and electromechanical switches.

W02-G02C3 [1997]
General control circuitry

W02-G02C3A [1997]
Transmit-receive switching
Portable and mobile transceiver operating modes are covered by W02-G02A5 codes.

W02-G02C5 [1997]
Testing, monitoring

W02-G02C7 [1997]
Interfacing
Includes circuitry such as bus and network interface aspects, and connectors (also assigned V04 codes, especially V04-M30G).

W02-G02C9 [1997]
Other radio transceiver control

W02-G02H [1992]
Construction

W02-G02K [2002]
Transceivers with digital architecture
This code is intended for radio transceivers employing a digital architecture within the signal path, i.e. using DSP. See corresponding codes for transmitters and receivers also (W02-G01K and W02-G03K codes respectively).

W02-G03
Receivers
Used for receivers of 'professional' i.e. communications type and for application to receivers in general, or where application not disclosed. Broadcast radios are covered by W03-B codes, and not coded here except when used in conjunction with W02-G03B codes for noise/interference suppression or (from 2005) with W02-G03J codes for RSSI aspects. Since 2002, W02-G03K codes have been assigned for receivers with digital architecture.

W02-G03A
Tuners
The W02-G03A codes chiefly cover superheterodyne receivers, TRF types being assigned W02-G03A9. Since 2002 W02-G03A8 codes have been assigned for direct conversion and low-IF receivers.
Preset, step, continuous, variable capacitor, varicap diode, variable inductor, permeability, ganged, tracking, peaking

W02-G03A1 [1992]

Tuned circuits, input filters, and attenuators

Search with appropriate codes in U25 for lumped-constant tuned circuits and filters, and W02-A03 or W02-A05 for distributed-constant elements. The title of this code has been expanded from 2002 to allow the inclusion of attenuators, previously coded as W02-G03A9. See U25-D07 codes for lumped constant attenuators and W02-A04C codes for distributed constant types.

W02-G03A3 [1992]

RF amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W02-G03D3, previously coded as W02-G03A3 and W02-G03D.

W02-G03A5 [1992]

Mixer

Mixer circuits in general are covered by U23-J codes.

W02-G03A5A [2006]

Image rejection mixer

For application to low-IF receivers search with W02-G03A8C. Prior to 2006 image rejection mixers were represented (in W02) by W02-G03A5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

W02-G03A7 [1992]

Local oscillator

Includes frequency translation aspects e.g. multipliers, also assigned U23-B codes.

W02-G03A7A [1992]

Frequency control

Includes frequency synthesisers of general application to radio equipment, if specific purpose not disclosed. See U23-D01B codes for details of PLL implementations, and U23-F01 codes for 'direct' synthesisers. For AFC circuits, search with U25-J05.
AFC

W02-G03A8 [2002]

Direct conversion and low IF receivers

These codes are used, in conjunction with other W02-G03 codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in

digital architecture communications receivers is not included here, being covered by W02-G03K5. Direct conversion TV receivers are covered by W03-A01B6 codes and direct conversion broadcast receivers by W03-B01A6 codes.

W02-G03A8A [2002]

Zero-IF direct conversion receivers

This code is intended for direct conversion schemes in which the baseband information is centered on zero frequency.

W02-G03A8C [2002]

Low IF receivers

This code is intended for direct conversion schemes in which the baseband information is centered on a low frequency, e.g. of the same order as the baseband bandwidth itself.

W02-G03A9 [1992]

Other tuner circuitry, including non-superheterodyne tuners

TRF, superregenerative receiver

W02-G03B

Noise/interference suppression

Noise suppression at source is covered by W02-H codes.

W02-G03B1 [1987]

Squelch/muting arrangements

Search with W04-V04A1 for arrangements lifting squelch only on detection of valid speech signal. Muting of amplifiers in general is covered by U24-C05C.

Squelch, tone squelch, muting, inter-station, carrier-operated, noise-operated, noise filter, noise amplifier, comparator, squelch gate

W02-G03B2 [1997]

Noise reduction by variation of RF/IF passband

(W02-G03B9)

Noise reduction by control of signal bandwidth at baseband is covered by W02-G03B8.

W02-G03B2A [1997]

Based on bandwidth modification

(W02-G03B9)

Includes use of highpass, lowpass, or other input filter (coded in W02-G03A1 also) and also reduction of IF bandwidth (also coded in W02-G03C1). 'IF-shift' techniques are covered by W02-G03B2C. FM threshold extension is covered by W02-G03B7.

W02-G03B2C [1997]

Based on change in centre-frequency
(W02-G03B9)

Covers arrangements with emphasis on changing centre frequency of passband, rather than changing its width, such as 'IF-shift' techniques (also assigned W02-G03C codes when appropriate).

W02-G03B3 [1992]

Thermal noise reduction

For RF amplifier noise reduction aspects search with W02-G03A3 also. Amplifier noise reduction in general is covered by U24-G03D1.

Search with V04-T03 codes for arrangements involving cooling of circuitry.

W02-G03B3A [1997]

Based on circuit configuration

W02-G03B3C [1997]

Based on low-noise components

Covers choice of devices with low noise figure. Search with codes relating to semiconductor devices per se, e.g. U12-D codes for bipolar transistors and FETs, and U14-F02 codes for superconductive elements.

W02-G03B4 [1992]

Reducing internal unwanted signals

W02-G03B4A [1992]

Reducing image response

W02-G03B4C [1992]

Reducing spurious signals

Includes reduction in level of oscillator harmonics in dual-conversion receiver, and avoidance of instability (also assigned U24-G01D and U24-G03L when involving HF amplifiers). Also includes arrangements reducing noise due to e.g. CPU clock oscillator harmonics by spread-spectrum techniques, also assigned W02-H01 and W02-K05A1 codes.

W02-G03B4E [1992]

Reducing effects due to device transfer characteristic

Includes effects due to non-linear or non-square law characteristic e.g. cross-modulation, inter-modulation. For further details of amplifier or mixer circuit improvements to increase strong-signal handling, search with W02-G03A3 and W02-G03A5 respectively. Such arrangements for high frequency (small-signal) amplifiers in general are assigned U24-G01D and U24-G03D5 codes.

RF amplifier, mixer, overload, blocking, desensitising

W02-G03B4G [2002]

Reducing offset effects

This code relates to the reduction of offsets arising from limitations in receiver performance, especially DC offsets due to e.g. LO leakage in a direct conversion receiver, for which W02-G03A8A is also assigned. Correction of offsets, e.g. by AFC, arising from mistuning are **not** included, and are covered by W02-G03A7A and e.g. U25-J05.

W02-G03B5 [1987]

Impulse noise suppression, noise blanker

Automatic noise limiter, peak limiter, noise silencer, blanking signal generator, wideband noise receiver, pulse stretching

W02-G03B6 [1992]

Multipath reception compensation

Prior to 1997 this code included television receiver ghost signal canceller, also assigned W03-A04G. Since 1997 this topic is **not** included in W02-G03B6 unless wider applications are also stated.

W02-G03B6A [2002]

Rake receiver

Search with W02-K05 codes for spread spectrum aspects, especially W02-K05A7 for CDMA. Time diversity radio reception equipment is covered by W02-C03A2B which from 2002 will not be routinely assigned for rake receiver configurations.

Delay, finger

W02-G03B7 [1992]

Threshold extension, frequency compressive feedback

Frequency demodulators are coded in U23-L also. Noise reduction by baseband bandwidth reduction is covered by W02-G03B8, and RF/IF bandwidth reduction in W02-G03B2A.

W02-G03B8 [1992]

Noise reduction by demodulated baseband bandwidth control

See also U25-F05A codes. Includes dynamic variation of e.g. audio passband dependent on signal strength. Arrangements involving variation of RF or IF passband are covered by W02-G03B2 codes.

Variable de-emphasis

W02-G03B9 [1987]

Other noise reduction and S/N ratio improving circuits

Includes use of non-linear element such as magnetostatic wave device to improve signal-to-noise ratio (also code in W02-A06E as a distributed constant element, and in V06-V).

W02-G03C [1992]

IF system

(W02-G03X)

From 2006, W02-G03C5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W02-G03D5 (previously coded as W02-G03C and W02-G03D).

W02-G03C1 [1997]

IF filter

For specific analogue filter types search with codes in e.g. V06-V, U14-G, U25-B, U25-E, or W02-A05 codes. Digital filters are covered in U22-G01 codes. Includes 'IF-shift' techniques (also coded in general in W02-G03B2C).

W02-G03C5 [2006]

IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, IF AGC is covered by W02-G03D5, previously coded as W02-G03C and W02-G03D.

W02-G03D [1992]

AGC

(W02-G03X)

Also assigned U24-C01 codes. Prior to 2006 this code was used with W02-G03A3 for RF AGC and W02-G03C for IF AGC. These topics are now covered solely by the subdivision codes below.

W02-G03D1 [2006]

Novel AGC characteristic

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic.

W02-G03D3 [2006]

RF AGC

Prior to 2006 this topic was covered by W02-G03A3 and W02-G03D.

W02-G03D5 [2006]

IF AGC

Prior to 2006 this topic was covered by W02-G03C and W02-G03D.

W02-G03D9 [2006]

Other communications receiver AGC aspects

W02-G03E [1992]

Demodulator

(W02-G03X)

See U23 codes for demodulators also.

W02-G03F [1992]

Audio amplifier

(W02-G03X)

See U24-G and W03-C codes for audio amplifiers in general.

W02-G03H [1992]

Construction

(W02-G03X)

W02-G03J [1997]

Received signal strength indicator

(W02-G03E, W02-G03X)

Includes arrangements to display signal strength (e.g. 'S-meter') and also to provide a signal for control of an associated transmitter (see W02-G01C1 also).

Since 2005 W02-G03J codes have also been assigned for RSSI aspects of TV and radio receivers, with W03-A and W03-B codes as appropriate.

RSSI

W02-G03J1 [1997]

Based on signal level per se

(W02-G03E, W02-G03X)

Implies use of signal rectifier to generate level-responsive output. Signal level detection purely as part of a receiver AGC system is covered in W02-G03D, but use of existing AGC voltage or current to provide level indication is included. Signal rectifiers in general are covered by U24-C03 codes.

W02-G03J1A [2002]

Application of signal strength measurement

(W02-G03E, W02-G03X)

This code is intended for applications of RSSI measurements which are already available. From 2002 novel RSSI measurement circuits are covered by W02-G03J1C.

W02-G03J1C [2002]

Novel signal strength measurement arrangements

(W02-G03E, W02-G03X)

This code is intended for novel arrangements or circuits for RSSI measurement. From 2002 applications of RSSI measurement are covered by W02-G03J1A.

W02-G03J3 [2002]

Compensation arrangements for RSSI and BER measurements

(W02-G03E, W02-G03X)

This code is intended for arrangements to compensate for the effects of external factors, such as temperature, on signal strength and signal-to-noise ratio measurements in radio receivers.

W02-G03J5 [1997]

Based on signal-to-noise ratio or BER

(W02-G03E, W02-G03X)

Includes arrangements to measure S/N ratio by detection of noise accompanying signal, and measurement of bit error rate, or similar, which is also coded in W01-A01C.

W02-G03J5A [2002]

Application of signal-to-noise ratio or BER measurement

(W02-G03E, W02-G03X)

This code is intended for applications of measurements which are already available. From 2002 novel BER measurement arrangements are covered by W02-G03J5C.

W02-G03J5C [2002]

Novel signal-to-noise ratio or BER measurement

(W02-G03E, W02-G03X)

This code is intended for novel arrangements or circuits for BER or signal-to-noise ratio measurement. From 2002 applications of these measurements are covered by W02-G03J5A.

W02-G03J7 [2021]

Based on power level per se

Includes arrangements to measure the received power

RSRP, SS RSRP, CSI RSRP

W02-G03J7A [2021]

Applications of power level measurement

W02-G03J7C [2021]

Novel power measurement

W02-G03K [2002]

Digital and hybrid receiver architecture

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other W02-G03 codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for broadcast radio receivers are covered by W03-B07 codes and for TV receivers by W03-A11K codes.

W02-G03K1 [2002]

Characterised by usage of DSP

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W02-G03K codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

W02-G03K1A [2002]

With baseband digital signal processing only

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

W02-G03K1C [2002]

With baseband and IF digital signal processing only

This code covers receivers with DSP in IF, demodulator, and baseband stages.

W02-G03K1E [2002]

With digitising of RF spectrum

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analog RF amplifiers.

W02-G03K1X [2002]

Other use of DSP

W02-G03K3 [2002]

AD conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

W02-G03K5 [2002]

Digital mixing and direct digital conversion

W02-G03K6 [2002]

Filtering

Novel digital filters are also assigned U22-G01 codes and T01-J08B when the emphasis is on computing aspects.

W02-G03K7 [2006]

Transform implementation

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

Fourier, Hilbert, Walsh

W02-G03K8 [2006]

DA conversion

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

W02-G03K9 [2002]

Other digital receiver aspects

W02-G03P [2017]

Radio receiver power supply and power management

Covers novel details of power supplies and also power management for battery saving and the like in portable equipment.

W02-G03P1 [2017]

Radio receiver power supply

Covers novel aspects of power supplies for communications-type radio receivers. Novel details of power supplies are covered in U24, such as U24-D codes for power converters and U24-E codes for voltage regulation.

W02-G03P5 [2017]

Radio receiver power management

Covers power management to reduce drain on the supply, e.g. for battery saving and the like in portable equipment by modifying circuit operation or disabling circuitry when idle. U24-H04 and U24-K are also assigned as necessary for power management techniques and modifying PSU operation.

W02-G03X

Other communications radio receiver aspects

W02-G04

Bandwidth reduction; Signal predistortion

Used for RF and other systems, including e.g. audio compander arrangements for recording and communications. (See U24-C02 codes for companders/amplitude limiters in general).

Speech processing, dynamic range limiter, automatic level control, non-linearity correction, feed-forward

W02-G04A [1992]

Bandwidth reduction

W02-G04A1 [1992]

Time compression or expansion

W02-G04A9 [1992]

Other bandwidth reduction

W02-G04B [1992]

Signal predistortion

See U24-G03B1 also for feedforward amplifier circuits.

W02-G04B1 [1992]

Volume compression or expansion

PAPR, peak-to-average power ratio

W02-G04B9 [1992]

Other signal predistortion

W02-G04C [1992]

Single-side band

Includes vestigial sideband transmission.
SSB, DSB, VSB

W02-G05 [1992]

Transponder, responder, repeater

(W02-G09)

From 2008 transponders and interrogation systems for RFID application are respectively covered by W02-G05A and W02-G05B and in W06-A04B codes only when there is some RF novelty. T04-K codes, e.g. T04-K03B, can be assigned for any aspect, including memory storage and the like. Transponder-based telemetry or telecontrol is covered by W05-D08G and other W05-D codes as appropriate. Satellite 'transponders', i.e. 'repeaters', are coded in W02-G05C.

W02-G05A [1992]

Transponder

(W02-G09)

From 1997, the scope of this code is expanded to cover all aspects of transponders per se. Interrogation equipment and system details are covered in W02-G05B. Search with application codes also, e.g. T04-K01 for smart cards, T05-G02B1A for workpiece tags, W05-B01A2C for antitheft tags, W05-D06A1 codes with W05-D08G for telemetry systems, and W06-A04B codes for identification systems.

W02-G05B [1992]

Interrogation system

(W02-G09)

From 1997, transponders per se are covered by W02-G05A. This code is intended to represent all other aspects of transponder systems as a whole.

W02-G05C [1992]

Satellite transponder, terrestrial repeaters

(W02-G09)

To discriminate between satellite and terrestrial repeaters, search with W02-C03B codes for radio relay systems. Details of satellites per se, other than 'internal' details of telecomms equipment carried on space vehicles, are covered by W06-B03 codes.

Duplex, circulator, isolation, filtering

W02-G05X [1992]

Other transponder or repeater details

(W02-G09)

W02-G06 [1992]

Construction; Equipment rack; Casing

(W02-G09)

This code is used for radio equipment construction in general only.

W02-G08 [1992]

Standby systems and redundancy networks

(W02-G09)

Fail-safe communications

W02-G08A [1992]

With automatic switching to powered-up backup equipment e.g. hot-standby system

(W02-G09)

W02-G09

Other radio equipment details

W02-H

Noise suppression at source

See W02-G03B codes for radio receiver circuits. W02-H codes are normally assigned together with codes for the apparatus in which noise is being suppressed.

Feedthrough filter, composite LC component, ferrite bead

W02-H01 [1992]

RFI suppression at source

IC engine ignition interference suppression, motor commutation, parasitic oscillation prevention

W02-H01A [2002]

RFI suppression of non-communications equipment

This code is intended to cater for the suppression of radiated RF energy from equipment whose primary function is not that of communication, e.g. electric motors, IC engine ignition systems, microwave ovens.

W02-H01C [2002]

RFI suppression in communications equipment

This code is intended to cater for the suppression of radiated RF energy from communications equipment, e.g. transmitters, receivers, etc.

W02-H01C1 [2002]

Suppression or avoidance of interference within communications equipment

This code is intended to cater for the suppression of interference generated by one part of communications equipment with another part of the same equipment, or a group of similar units assembled together, e.g. prevention **at the transmitter**, of interference with an associated receiver. Arrangements for avoiding interference by modifying the operation of the equipment, including software changes only, are also assigned W02-H01G (or a subdivision).

Self-interference

W02-H01C5 [2002]

Suppression of interference caused to separate communications systems

This code is intended to cater for the suppression of radiated RF energy from equipment, especially transmitters, which could interfere with other communication systems, e.g. reducing harmonic radiation.

W02-H01E [2002]

Suppression or avoidance of interference based on constructional features

Covers screening, siting of modules, etc. and thus V04-S, V04-T or V04-U codes are normally assigned also, as well as constructional details codes specific to the equipment involved.

W02-H01G [2002]

Suppression or avoidance of interference based on circuitry or operation

This code is intended to focus on aspects of circuit design or equipment operation (including software modifications) resulting in a reduction in the level or effect of unwanted radiated RF energy from equipment, or parts of equipment.

W02-H01G1 [2002]

Suppression or avoidance of interference based on reduction in harmonic energy

W02-H01G3 [2002]

Suppression or avoidance of interference based on energy dispersal

These codes are intended for arrangements reducing the effect of a potentially interfering signal by dispersing its energy, usually over a range of frequencies.

W02-H01G3A [2002]

Based on use of FM

Novel frequency modulators are assigned U23-H if intended for analogue signals, U23-P01 and W01-A09A2 with W01-A09E1 if modulated by digital data.

W02-H01G3C [2002]

Based on use of frequency hopping

Frequency hopping in general is covered by W02-K05A6, which is **not** assigned here unless specific novel aspects are to be conveyed, or more general applications are cited.

W02-H01G3E [2002]

Based on direct sequence spectral spreading

Direct sequence spread spectrum systems in general, such as CDMA, are covered by W02-K05A7, which is **not** assigned here unless specific novel aspects are to be conveyed, or more general applications are cited.

W02-H01G5 [2007]

Interference avoidance based on selection of operating frequency

This code involves avoidance of interference by changing frequency, e.g. selecting an alternative second local oscillator, clock, or PWM audio amplifier switching frequency depending on the channel selected in a radio receiver. Avoidance of interference based on frequency allocation in radio networks is covered by W02-H01J5.

W02-H01J [2002]

Interference avoidance in radio systems based on frequency allocation and network operation or planning

This code is intended for prophylactic measures, e.g. at the network planning phase or during normal operation, to reduce the likelihood of interference between communications systems. Simulation systems for radio communication are assigned W02-C03E5 also.

W02-H01J1 [2005]

Interference avoidance at radio network planning stage

Includes use of CAD (see W02-C03E5 and T01-J15A4 also). Interference avoidance as a normal part of network operation is covered by W02-H01J5.

W02-H01J5 [2005]

Interference avoidance based on frequency allocation and network operation

This code is intended to cover interference avoidance during normal network operation, and may involve channel allocation which is also assigned W02-C03G1 (W02-C03E7 prior to 2010) and interference avoidance aspects of cognitive radio systems which are also assigned W02-C03G5. Avoidance of interference at a network design stage is covered by W02-H01J1, and avoidance of interference by changing frequency, e.g. of a clock signal, in equipment is covered by W02-H01G5.

W02-H01J9 [2005]

Other aspects of interference avoidance based on frequency allocation and network operation

W02-H03 [1992]

Supply line noise suppression e.g. mains filter

W02-J*	[1980-2009]
Facsimile	
*This code is now discontinued, see S06-D to K. Includes analogous systems for still picture information. See also under application e.g. S06-C02B for electronic color separation systems. Note that digital cameras are not included, and are covered by W04-M01B1 codes.	
<i>Copy, print, scan, sheet, image, document, line, satellite weather picture system</i>	
W02-J01*	[1980-2009]
Scanning arrangements	
*This code is now discontinued, see S06-D. Includes optical system, lens etc. and scanning drive (See also V07-K05), but not read/write components such as sensors, print heads, and light sources.	
<i>Beam, laser, expose, slit, optical magnifications</i>	
W02-J01A*	[1992-2009]
Optics e.g. lenses and mirrors	
*This code is now discontinued, see S06-D03.	
<i>Polygonal</i>	
W02-J01B*	[1992-2009]
Scanning drive system	
*This code is now discontinued, see S06-D04.	
<i>Raster</i>	
W02-J01C*	[1992-2009]
Synchronising, position detection and adjustment	
*This code is now discontinued, see S06-D04A. Includes control and error compensation of scanning velocity and position.	
W02-J01X*	[1992-2009]
Other scanning arrangements	
*This code is now discontinued, see S06-D. Includes scanner construction.	
W02-J02*	[1980-2009]
Recording and reproducing arrangements	
*This code is now discontinued, see S06 codes. Covers methods and recording and reproducing components per se.	
W02-J02A*	[1987-2009]
Recording i.e. line image sensor, CCD etc.	
*This code is now discontinued, see S06-D. See also U14-H01B for thin film image sensor, U13-A01 and U13-A02 for circuitry and CCD.	
<i>Reader, monolithic</i>	

W02-J02A1*	[1992-2009]
Sensors	
*This code is now discontinued, see S06-D05.	
<i>Photoelectric detector, thin film image sensor, multi-element array</i>	
W02-J02A1A*	[1992-2009]
Integral reading circuitry	
*This code is now discontinued, see S06-D05A.	
W02-J02B*	[1987-2009]
Reproducing i.e. printing	
*This code is now discontinued, see S06 codes.	
<i>Dot matrix, pressure sensitive, magnetic printing</i>	
W02-J02B1*	[1987-2009]
Thermal	
*This code is now discontinued, see S06-H.	
<i>Head, resistive elements, thermal transfer ink ribbon</i>	
W02-J02B2*	[1987-2009]
Optical	
*This code is now discontinued, see S06-E. See also V07-K01 codes for optical modulator per se.	
<i>Light valve, shutter, modulator</i>	
W02-J02B2A*	[1992-2009]
LED	
*This code is now discontinued, see S06-E03A2.	
<i>Array</i>	
W02-J02B2B*	[1992-2009]
Laser	
*This code is now discontinued, see S06-E03A3.	
W02-J02B2X*	[1992-2009]
Other optical printing	
*This code is now discontinued, see S06-E03.	
W02-J02B3*	[1992-2009]
Ink jet	
*This code is now discontinued, see S06-G.	
W02-J02B5*	[1992-2009]
Integral drive circuitry for printhead	
*This code is now discontinued, see S06-G03.	
W02-J03*	[1980-2009]
Picture signal circuits, bandwidth reduction, blanking, transmission control	
*This code is now discontinued, see S06-K07.	

W02-J03A* [1987-2009]

Control circuits, monitoring circuits

*This code is now discontinued, see S06-K07. Used for general picture signal processing and control, including electronic magnification and blanking. Also includes color processing. For picture processing see also T01-J10B codes.

Drive circuits

W02-J03A1* [1992-2009]

Image acquisition

*This code is now discontinued, see S06-K07A4.

Scan, read, shading compensation

W02-J03A1A* [1992-2009]

Compensating for sensor characteristics

*This code is now discontinued, see S06-K07A4A.

Shading compensation

W02-J03A2* [1992-2009]

Image and data processing

*This code is now discontinued, see S06-K07A4.

Picture signal amplifier, halftone screening, edge enhancement, noise or error suppression

W02-J03A2A* [1992-2009]

Changing magnification

*This code is now discontinued, see S06-K04A4B.

W02-J03A2B* [1992-2009]

Composing and electronic layout control

*This code is now discontinued, see S06-K04A4B.

W02-J03A3* [1992-2009]

Image output

*This code is now discontinued, see S06-K04A4C.

Write, print, display

W02-J03A4* [1992-2009]

User interface i.e. control input, displays

*This code is now discontinued, see S06-K07A1.

Operator warning device, mode setting

W02-J03A5* [1992-2009]

Monitoring

*This code is now discontinued, see S06-K07B. Includes self-testing, error correcting and resetting, maintenance.

Fault indication

W02-J03A7* [1992-2009]

Control of operation

*This code is now discontinued, see S06-K07A.

Includes general control system details and external control e.g. by personal computer. Use with corresponding interface code.

Mode control, non-image memory, start up, standby

W02-J03A7A* [1992-2009]

Copy sheet counting

*This code is now discontinued, see S06-K07A5.

W02-J03A9* [1992-2009]

Other facsimile circuits

*This code is now discontinued, see S06-K07.

W02-J03B* [1987-2009]

Bandwidth reduction, encoding e.g. MH, run-length etc.

*This code is now discontinued, see S06-K07A4D.

See U21-A05 codes for coding in general, W04-P01A codes for TV signal compression, and W02-G04A codes for bandwidth reduction in general.

W02-J03B1* [1992-2009]

Encoding

*This code is now discontinued, see S06-K07A4D.

Compression, data reduction, white block skipping

W02-J03B2* [1992-2009]

Decoding

*This code is now discontinued, see S06-K07A4D.

Regenerate

W02-J03C* [1987-2009]

Transmission details

*This code is now discontinued, see S06-K07C.

Includes input-output arrangements, telephone interface and secrecy systems (with W02-L). Search W01-C05B1 and W01-C01H for telephone aspects also. For ISDN aspects see W01-C05B7. For LAN aspects see W01-A06 codes.

Synchronising, privacy, transmission standards (e.g. G2, G3, G4 etc.)

W02-J03C1* [1992-2009]

Signal processing, preparing data for transmission, modulation, and coding

*This code is now discontinued, see S06-K07C3.

Scrambling

W02-J03C2* [1992-2009]

Determining and setting type of transmission link, mode, and priority

*This code is discontinued, see S06-K07C4.
Includes detecting type of receiving station (e.g. G3, G4).

Autodialer, modem

W02-J03C3* [1992-2009]

Monitoring, error checking

*This code is now discontinued, see S06-K07C6.

W02-J03C4* [2006-2009]

Remote control/monitoring of a facsimile

*This code is now discontinued, see S06-K07C6.
E.g. monitoring from host over network, etc.

W02-J03C5* [1992-2009]

Reception details

*This code is now discontinued, see S06-K07C5.
Automatic answering

W02-J03C6* [1992-2009]

Secrecy

*This code is now discontinued, see S06-K07C7.
Encoding transmission date, password, data encryption.
password, data encryption

W02-J03C6A* [1992-2009]

Scrambling of signals, etc.

*This code is now discontinued, see S06-K07C8.

W02-J03C6B* [1992-2009]

Document handling

*This code is now discontinued, see S06-K07A3/K07C9. Includes sealing of received documents in envelopes.

W02-J03C7* [1992-2009]

Interface with telephone

*This code is now discontinued, see S06-K07C2A.
Also includes combined facsimile-telephone. See W01-C01P4. Also W01-C05B3H.

W02-J03C8* [1997-2009]

Interface with computer

*This code is now discontinued, see S06-K07C2D.
See also T01-C03B.

W02-J03C9* [1992-2009]

Other transmission details

*This code is now discontinued, see S06-K07C.
Includes interface to other independent device e.g. copier, but not composite.

Multimedia

W02-J03D* [1992-2009]

Image memory

*This code is now discontinued, see S06-K07A4.
Refers to image memory only, but not external memory e.g. computer memory. See also T01-J10A2 for image memory management.

Stores

W02-J04* [1980-2009]

Color systems

*This code is now discontinued, see S06-K01. Used for any aspect of color system, with other codes as appropriate.

W02-J05* [1980-2009]

Constructional details

*This code is now discontinued, see S06-K03.
Housing, casing, cooling/ventilating arrangements, transport system drive, cutter

W02-J05A* [1980-2009]

Sheet feeding

*This code is now discontinued, see S06-K02.
Includes original document and recording/copy sheets. Also includes page turning mechanism.
Paper roll, paper tray, document holder

W02-J05B* [1980-2009]

Finishing apparatus

*This code is now discontinued, see S06-K05.
Includes stapling, binding, laminating, and cutting, etc. of output sheets.

W02-J05C* [1980-2009]

Connectors, physical aspects of circuits

*This code is now discontinued, see S06-K03F.

W02-J05D* [1980-2009]

Recycling systems

*This code is now discontinued, see S06-K04. See also X25-W04 for electrical aspects of recycling system in general.

W02-J06* [1980-2009]

Power supplies

*This code is now discontinued, see S06-K03/K07A2. Includes mains and battery supplies for all types of units including portable systems. Also includes protection circuits. See U24-D, U24-E, U24-F and U24-X codes.

W02-J07* [1980-2009]

Combined unit with facsimile, copier, and/or printer functions

*This code is now discontinued, see S06-K99F1.

W02-J08* [1992-2009]

Facsimile communication systems

*This code is now discontinued, see S06-K07C.

W02-J08A* [1992-2009]

Store and forward exchange

*This code is now discontinued, see S06-K07C2B.

W02-J08C* [1992-2009]

ISDN interface

*This code is now discontinued, see S06-K07C2C. See also W01-C05B7 codes for general aspects of ISDN.

W02-J09* [1980-2009]

Other facsimile details

*This code is now discontinued, see S06-K. Includes sheet marking and stamping.
Multiple facsimile system, exchange, coin freed

W02-J10* [1992-2009]

Analogous systems

*This code is now discontinued, see S06-K99G. For medical stimuable sheet phosphor systems see also S05-D02A5C. For electronic blackboard (previously coded in W02-J09) see also W04-W05.
Radiation imaging

W02-J11* [2006-2009]

Prevention of illegal photocopy transmission/reception

*This code is now discontinued, see S06-K07A3. See S06-A14F for prevention of illegal photocopying.

W02-K

Multiplex systems

For multiplex data transmission see W01-A03 also, multiplex telemetry/telecontrol is in W05-D02.

W02-K01

Frequency division multiplex

FDM, carrier generator, baseband signal, modulator, telephony transmission, group, supergroup

W02-K01A [1992]

For satellite system

Includes SCPC (single channel per carrier). (See also W02-C03B1D).

W02-K01C [1997]

Frequency division duplex

For mobile radio aspects use with W02-C03C codes or W02-G02A5B.
FDD

W02-K02

Time division multiplex

TDM, frame, burst

W02-K02A

Synchronising

Synchronisation, word detection

W02-K02A1 [1992]

Framing, aligning, multiframe

W02-K02A3 [1992]

Pulse stuffing

W02-K02A9 [1992]

Other synchronising details

W02-K02B

Calling signals; Branching; Monitoring

Testing, error detection, addressing

W02-K02B1 [1992]

Calling signals

W02-K02B3 [1992]

Branching

W02-K02B5 [1992]

Monitoring

W02-K02B5A [1992]

Error detection

W02-K02B5B [1992]

Testing

W02-K02B5X	[1992]
Other monitoring details	
W02-K02C	[1997]
Time division duplex	
For mobile radio aspects use with W02-C03C codes or W02-G02A5B.	
<i>TDD</i>	
W02-K02D	[1992]
Satellite TDMA system	
See W02-C03B for transmission system details.	
W02-K02E	[1992]
Statistical multiplexing	
(W02-K02X)	
W02-K02X	
Other time division multiplex details	
W02-K03	[1992]
Packet switching (general)	
Includes e.g. voice packet systems. For data transmission system see W01-A03B codes, and W01-A06G2.	
W02-K04	[1992]
Optical multiplex system	
(W02-K09)	
Includes wavelength-division multiplexing, see W02-C04B4B also.	
W02-K05	[1987]
Spread-spectrum, frequency hopping, time hopping and UWB systems	
(W02-K09)	
W02-K05A codes define system type while W02-K05B codes indicate novelty at the system level, or in apparatus. From 2005 W02-K05A9 codes are introduced for ultra-wideband and time hopping systems. Where the use of spread spectrum technique is inherent to a particular technology (e.g. Bluetooth or 3G mobile phones), W02-K05 codes are only assigned when the novelty lies in the SS aspect. Novel details of radio systems are also assigned W02-C03 codes and novel radio equipment is also assigned W02-G codes.	
<i>Pseudo-random, synchronisation, frequency step, synthesiser control, radio system, data transmission, power line carrier communication</i>	

W02-K05A	[1992]
Systems type	
W02-K05A1	[1992]
Non-deliberate interference immunity system; Increased reliability	
W02-K05A5	[1992]
System providing secrecy or anti-jamming capability	
Note secret transmission per se is coded in W02-L05.	
W02-K05A6	[1997]
Frequency hopping spread spectrum	
W02-K05A7	[1997]
Direct sequence spread spectrum	
Includes CDMA. Prior to 1997 see W02-K08 with W02-K05 codes as appropriate.	
W02-K05A8	[1997]
Hybrid spread spectrum system	
Covers e.g. combined frequency hopping and CDMA system.	
W02-K05A9	[2005]
Ultra wideband and time-hopping systems	
This code is used with other W02-K05 codes as appropriate, e.g. with W02-K05B7 for synchronising aspects of UWB communication. Wireless data interfaces between two points using this technology are covered by W01-A07H2K and network communication by W01-A06C4K.	
W02-K05A9A	[2005]
Carrier-free impulse communication	
W02-K05A9C	[2005]
Carrier-based impulse communication	
Includes spectrally-filtered systems.	
W02-K05B	[1992]
System or apparatus details	
W02-K05B1	[1992]
Operating method/system	
W02-K05B3	[1992]
Apparatus	

W02-K05B5 [1992]

Pseudonoise code details for direct sequence, frequency hopping codes and time hopping codes

Covers details of noise-like codes used in CDMA, frequency hopping and time hopping communication systems. W02-K05A codes are also assigned to differentiate system type, e.g. W02-K05A9A for hopping codes used in a carrier-free impulse communication system.

W02-K05B7 [1992]

Synchronising

W02-K05B9 [1992]

Other spread-spectrum system details

W02-K06 [1992]

Time assigned speech interpolation (TASI)

(W02-K09)

See also W04-V04A1 for application of speech recognition systems to detection of voice presence in speech interpolation multiplexing systems.

DSI

W02-K07 [1992]

Hybrid and orthogonal multiplex systems

(W02-K01, W02-K02, W02-K09)

From 1997, the scope of this code is widened to include orthogonal multiplexing, previously coded in W02-K09.

W02-K07A [1997]

Mixed FDM-TDM system

W02-K07C [1997]

Orthogonal frequency division multiplexing

(W02-K01, W02-K09)

This code covers the use of OFDM for communication e.g. in a 5G system for which W02-C03C1L is also assigned. See also W02-C03D5 for access methods, e.g. OFDMA is denoted by W02-K07C along with W02-C03D5 code. Pre-1997 this topic was covered by W02-D05, W02-K01 and W02-K09. Receivers for DAB are covered in W03-B codes.

OFDM, CP-OFDM, DFT-S-OFDM, SC-FDMA

W02-K07E [1997]

Orthogonal multiplexing

(W02-K09)

Search with W02-C03B1 codes, especially W02-C03B1D, for satellite communication aspects of orthogonal multiplexing.

OTFM, Orthogonal Time-Frequency Multiplexing, OTFS, Orthogonal Time Frequency Space

W02-K07X [1997]

Other hybrid multiplexing systems

Hybrid spread-spectrum systems are **not** covered here - see W02-K05A8.

W02-K08 [1992]

Code division multiplexing

Prior to 1997 this code was used for all aspects of CDMA, which is now transferred to W02-K05A7.

From 1997 W02-K08 will be assigned for code division multiplexing not specific to spread spectrum communication.

W02-K09

Other multiplexing

Prior to 2017 this code included beam division and spatial division multiple access (i.e. BDMA and SDMA), e.g. as used at a cellular base station (W02-C03C1B also with W02-C03C1H or W02-C03C1L for '4G' or '5G' respectively) but from 2017 this topic is covered by W02-K10. Prior to 1997 this code included orthogonal multiplexing which is now coded under W02-K07.

W02-K10 [2017]

Beam division multiple access: Space division multiple access

Covers BDMA and SDMA, especially in radio communications. For application to millimeter wave data transmission in 5G cellular systems search with W02-C03C1L. Directional diversity is covered by W02-C03A4 and MIMO systems by W02-C03A5 codes. For antenna beam control aspects see W02-B06 codes. Prior to 2017 BDMA and SDMA were covered by W02-K09.

BDMA, SDMA

W02-L

Secret communication; Jamming and anti-jamming; Eavesdropping and anti-eavesdropping

Note secret data transmission is covered in W01-A05. For digitised speech/video (e.g. with bit order rearrangement) search with W01-A05 codes. See W02-F05A codes for video systems.

Secrecy, privacy, anti-eavesdropping system, telephone 'wire-tap' detection

W02-L01 [1992]

Jamming and anti-jamming

Jamming/anti-jamming for radar is covered by W06-A04E1 codes only and for GPS by W06-A03A5M only.

W02-L01A [2005]

Jamming

W02-L01C [2005]

Anti-jamming

W02-L05 [1992]

Scrambling

Scrambled audio/video communication

W02-L07 [2005]

Eavesdropping on communications and anti-eavesdropping

This code covers the interception of communications using any medium, bugging of conversations using hidden microphones, laser reflection from windows etc., and also countermeasures to these techniques. For systems specific to telephone communications (wired or wireless) see W01-C08F1 codes.

W02-L07A [2005]

Eavesdropping

Covers systems, methods and equipment for intercepting communications and also use of covert listening devices.

W02-L07C [2005]

Anti-eavesdropping

Covers arrangements to detect or prevent interception of communications by a third party, other than purely by scrambling or encryption, which in general is covered by W02-L05, and also detection of listening devices, e.g. by 'sweeping' for bugs and similar techniques.

W03: TV and Broadcast Radio Receivers

This class covers general audio/video equipment for entertainment purposes, including interconnection aspects, and radio receivers of broadcast type.

Prior to 2007 displays for non-TV receiver applications and associated signal processing circuitry were not coded in W03-A ('TV receivers') being covered under T04 (for computer monitors), or W05 (general display details). From 2007, due to the increasing convergence of TV and general purpose displays all relevant aspects of video displays will be coded in W03, including: signal processing (W03-A04 and W03-A05 codes); synchronizing (W03-A06 codes); power supplies (W03-A07 codes); display aspects (W03-A08 codes); constructional details (W03-A09 codes); stereoscopic aspects (W03-A12 codes); and audio details (W03-A15 codes).

Please note that W03 only covers displays capable of presenting video information. For displays of a general nature (e.g. segment displays), or where there is no particular emphasis on displaying video information (e.g. public information displays) see W05-E codes (W05-E05G for details of construction).

Where a novel display is for a specified non-TV receiver application, W03-A21 (Video display for non-TV receiver application) is also applied along with relevant application codes from other classes (e.g. T04).

Novel module and manufacturing details of liquid crystal, plasma, electroluminescent and field transmission displays for general applications, as well as display driving and interfacing circuitry are not coded in W03. (See U14 and W05 for these topics).

Radio receivers of communications or unspecified type are covered by W02-G03 codes, but note that in addition to appropriate W03 codes, the topic of broadcast TV or radio receiver noise reduction is assigned W02-G03B codes, and from 2005, received signal strength indicating circuits and their applications are also assigned W02-G03J codes. Audio and video recording equipment is covered in class W04.

W03-A

TV receivers

Since 2002 W03-A11K codes have been assigned for TV receivers with digital architecture. From 2005, TV receivers for digital signals (e.g. DVB-T) are covered by W03-A11G, and set-top boxes by W03-A16E codes. Video signal processing for applications other than TV receivers is covered in W04.

W03-A01

Tuners; Tuning displays

RF amplifier/mixer, local oscillator, tuning band - switching, preset, step, continuous, variable capacitance, tracking, tuning scale, channel number digital display, on-screen display

W03-A01A [1987]

Satellite TV/cable TV converter

Search with W03-A01B codes for specific tuner details.

W03-A01A1 [1992]

Satellite converter

For other aspects of satellite TV reception see W03-A16A.

DBS, LNA, LNB, low noise amplifier, low noise block, down converter

W03-A01A5 [1992]

Cable TV converter

Prior to 1992 search W03-A01A and W02-F03A (W02-F03A no longer assigned). This code covers RF/IF tuner circuitry. For general (including non-RF) aspects of cable converters and all other ancillary aspects of home installation see W03-A16C codes.

CATV, subscription, wide-band, super-band, set-top box

W03-A01B [1992]

Tuner circuitry and construction

W03-A01B codes are used to describe actual tuner circuitry in conjunction with W03-A01A codes or alone for standard TV tuners, as appropriate. Communications receiver tuners are covered by W02-G03A codes.

Superheterodyne, single-conversion, double-conversion, homodyne

W03-A01B1 [1992]

Tuned circuits, input filters

Includes input attenuators. See U25 codes for details of lumped constant circuits. Waveguide technology filters and resonators are covered by W02-A codes.

Inductor, capacitor, varicap, varactor diode, block filter

W03-A01B3 [1992]

RF amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W03-A03A3, previously coded as W03-A01B3 and W03-A03A. Amplifiers external to the receiver itself are covered by W02-B08C5 codes.

FET, MOSFET, MESFET, IGFET, dual-gate, bipolar, transistor

W03-A01B5 [1992]

Mixer

Novel mixer details are also assigned U23-J01 codes.

FET, MOSFET, IGFET, dual-gate, bipolar, transistor, diode, ring

W03-A01B5A [2006]

Image rejection mixer

Prior to 2006 this topic was represented by W03-A01B5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

W03-A01B6 [2002]

Direct conversion and low-IF receivers

These codes are used, in conjunction with other W03-A01B codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in digital architecture TV receivers is not included here, being covered by W03-A11K5. Direct conversion communications receivers are covered by W02-G03A8 codes and broadcast receivers of this type by W03-B01A6 codes.

Homodyne, synchrodyne, zero-IF

W03-A01B6A [2006]

Zero-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on zero frequency.

W03-A01B6C [2006]

Low-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on a low frequency, e.g. of the same order as the baseband bandwidth itself.

W03-A01B7 [1992]

Local oscillator

Novel oscillator circuits are also assigned U23-A codes. Control of oscillator frequency is covered by W03-A02 codes.

W03-A01B8 [1997]

Tuner constructional details

(W03-A01B9, W03-A09A5)

Covers construction of tuner per se, general internal constructional details of receiver being covered by W03-A09A5, which was previously assigned in addition to W03-A01B9 to indicate the construction aspect. Since 1997, W03-A09A5 has only be added for details affecting the design of the receiver, such as mountings, etc.

Shield, screen, housing, PCB, circuit board

W03-A01B9 [1992]

Other tuner details

Includes testing and alignment (with W03-A18A codes) and diversity arrangements involving tuner or aerial circuitry - see also W02-C03A codes and W03-G08 if receiver is vehicle-mounted.

Trimming

W03-A01C [1992]

Tuning display

Includes on-screen display of e.g. channel number. See W03-A10C1 for character generator circuits and W03-A13G for on-screen display systems in general.

OSD, scale, dial

W03-A01D [2008]

Multiple tuner aspects

This code is assigned with other W03-A codes as appropriate and is intended to highlight the use of two or more tuners in a TV receiver, set-top box, and the like. For novel tuner circuitry W03-A01B codes are also assigned and for novel frequency or channel control aspects W03-A02A or W03-A02B codes. For use in connection with PIP or POP display W03-A13B is also assigned.

Dual

W03-A02

Automatic frequency control; Band scanning; Remote control

W03-A02A [1992]

AFC and synthesis control

AFC circuits are also coded in U25-J05. PLL synthesisers are also assigned U23-D01B codes. 'Direct' type synthesisers are covered by U23-F03 codes.

Automatic frequency control, automatic fine tuning, AFT, frequency synthesiser

W03-A02B [1992]

Bandscanning, channel switching and channel number storage

Band scanning is also assigned U25-J01 codes and step tuning U25-H03 codes.

Seek, search, sweep, stop, store, preset, priority, local, station

W03-A02B1 [1997]

Channel storage

Search with U25-H03A for setting up presettable channels, or U25-J01A1 where bandscanning is involved.

W03-A02B1A [1997]

Based on stations received off-air

Search with U25-J01 codes for bandscanning aspects, e.g. U25-J01A1 for storing channels while scanning.

W03-A02B1C [1997]

Based on channel listing

Includes in-built memory and channel-guide systems. For channel presetting based on location, W03-A02B1E takes precedence.

W03-A02B1E [1997]

Based on receiver location

For automatic arrangements search with codes for navigation systems, e.g. W06-A03A5E for use of GPS. Memory systems with pre-loaded station information without regard for receiver location, are covered by W03-A02B1C.

W03-A02B1G [2006]

User control of channel storage

Includes re-ordering stored channels, deleting channels, forming 'favorites' lists and the like. For security aspects, e.g. parental control, PIN control etc. search with W03-A18A6 and W03-A18A7.

W03-A02B3 [2007]

Channel switching arrangements

This code covers arrangements for changing the channel to which a TV set is tuned, either under user control or automatically.

Auto-zap, zapping, channel surfing

W03-A02C [1992]

Remote control

Remote control for recording apparatus is coded in W04-E04A, for audio/video equipment in general in W03-G05A codes, and for general or unspecified applications in W05-D codes. For TV remote control by 'Universal' or 'Learning' type controller search W03-A02C codes with W03-G05A1A. For general TV receiver control aspects see W03-A18A. *Ultrasonic, optical, IR, transducer, LED, photodiode, APD*

W03-A02C1 [1997]

Remote control unit

Covers details of portable controller. Overall system aspects and circuitry within the receiver itself are covered by W03-A02C5.

W03-A02C1A [1997]

Novel circuitry and components

Includes IR LEDs and drive circuits, etc. (see U12-A codes also for aspects relating to LEDs) together with coding aspects.

W03-A02C1C [1997]

Construction and layout

(W03-A02C, W03-A09A)

Includes shape, style and format of control keys etc., and also protective covers and stands (also coded in W03-A09C).

W03-A02C5 [1997]

Remote control system

Includes circuitry and components internal to the receiver and overall system aspects.

W03-A02C5A [1997]

Involving on-screen display

(W03-A02C, W03-A13G)

Includes application of GUI techniques to control of TV receivers and video displays, such as manipulation of a cursor, menu navigation and virtual keyboard aspects. For use of remote controller in connection with other interactive systems making use of a TV set search with W03-A16C5 codes also. OSD in general is coded in W03-A13G.

W03-A02C5C [1997]

Remote control location system

Covers transponder-type arrangements providing e.g. audible tone as aid to locating remote unit, in response to signal transmitted from TV set itself.

W03-A02C5E [2005]

Combined with additional features

This code covers the provision of features beyond the basic remote control function and generally refers to extra facilities being provided to the user on the remote control handset. Examples include a dedicated display, e.g. for indicating control functions, viewing alternative channel or electronic programme guide (for which W03-A13J is also assigned), or the provision of a separate loudspeaker or headphone socket (also assigned W03-A15 codes).

W03-A02C5G [2006]

Receiver-based remote control circuitry, components and construction

This code is assigned with other codes as appropriate, e.g. W03-A09A5 for internal receiver constructional aspects, W02-C04A3 codes for IR receiver circuitry, U12-A01A codes for LEDs or U12-A02B2A for photodiodes.

W03-A02C5J [2011]

Image recognition-based remote control

This code covers the use of image recognition technology as part of a remote control system for TV sets and video displays. It includes recognition of gestures, movement of hands or head, etc. to derive control information. For use in conjunction with virtual keyboards or other on-screen display aspects W03-A02C5A is also assigned. Image-based recognition of individual users, e.g. for parental control or selecting a 'favorites' list, is covered by W03-A18A6. Novel aspects of image recognition are covered by T01-J10B2A and applications are also assigned T04-D07 codes.

W03-A02C5L [2011]

Voice recognition-based remote control

This code covers the use of voice recognition to provide a 'remote control' facility, with or without a remote control handset unit being used, in which spoken commands are used to control the functions of a TV set or video display. The general 'speech recognition application' code, W04-V04A5 is also assigned (with other W04-V codes in case of novel aspects). Voice-based recognition of individual users, e.g. for parental control or selecting a 'favorites' list, is covered by W03-A18A6.

W03-A03

IF amplifiers; Automatic gain control; Sound and vision detectors

W03-A03A [1992]

TV receiver AGC

Prior to 2006 this code was used with W03-A01B3 for RF AGC and W03-A03B for IF AGC. These topics are now covered solely by the subdivisions below.

Keyed-AGC, synchronizing signal, burst, level control

W03-A03A1 [2006]

Novel AGC characteristic

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic

W03-A03A3 [2006]

RF AGC

Prior to 2006 this topic was covered by W03-A01B3 and W03-A03A.

W03-A03A5 [2006]

IF AGC

Prior to 2006 this topic was covered by W03-A03A and W03-A03B.

W03-A03A9 [2006]

Other TV receiver AGC aspects

W03-A03B [1992]

TV receiver IF system

From 2006, W03-A03B5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W03-A03A5 (previously coded as W03-A03A and W03-A03B).

Integrated circuit, multistage, cascade, interstage coupling, sound, picture, vision, video, trap circuit, IF-based ghost suppression circuit

W03-A03B1 [1992]

IF filter

For specific filter types, see appropriate codes in e.g. V06-V and U14-G for electromechanical filters, U25-E for analogue lumped constant types, and U22-G01 codes for digital filters.

SAW, surface acoustic wave, ceramic, LC, tuned circuit, passband, ripple

W03-A03B5 [2006]

IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes.

W03-A03C [1992]

Sound and vision detectors

Demodulation circuits in general are coded in U23.

W03-A03C1 [1992]

Sound detector

For stereophonic decoder search with W03-A12B1. (Also coded in U23-P05).

Intercarrier sound, FM discriminator

W03-A03C5 [1992]

Vision detector

For stereoscopic receiver aspects search with W03-A12A.

FM, AM, picture, video

W03-A04

Video signal processing

Includes general processing for black/white signals and where nature of signals is unimportant. See W04-P codes for general non-receiver application, and W04-F codes for processing specific to video recording.

W03-A04A [1992]

Gamma control

Gamma control/correction in general is coded in W04-P01E1.

W03-A04B [1992]

Bandwidth control

Control of bandwidth in general is covered by U25-F codes which are also assigned as appropriate.

W03-A04B1 [1992]

Peaking, aperture correction

Aperture correction in general is coded in W04-P01E5.

Response, accentuate, HF

W03-A04C [1992]

Clamping circuits, DC restoration

Clamping circuits of general application are coded in U24-C02A5 also. (Prior to 1992 search W03-A04 and U24-C02A for TV receiver clamp circuits.)

W03-A04D [1992]

Contrast and brightness control

Includes automatic arrangements and circuitry responding to manual control or remote control operation.

W03-A04D1 [1997]

Based on display drive aspects

Includes CRT beam current limiting when combined with W03-A08A8A.

W03-A04D5 [1997]

Based on ambient lighting

Prior to 1997, see U24-C01C and W03-A04D.

W03-A04F* [1992-2005]

Display interface circuit

*This code is now discontinued. From 2006 this topic is covered by W03-A08S codes.

W03-A04G [1992]

Ghost suppression and equalising

The title of this code has been expanded to reflect the previous inclusion of equalising circuits, even when ghost suppression has not been explicitly mentioned. Prior to 1997, ghost cancelling was also coded in W02-G03B6, which covers compensation for multipath reception in general. From 1997, W03-A04G only has been used for this topic in TV receivers. See also U22-G01 codes for digital filters, especially U22-G01A5 codes which relate to adaptive types and U22-G03E3C for application of DSP to equalising in general. Transmission of ghost control reference signals (GCR) is covered by W02-F05C.

Reflection, pulse, delay, transversal filter

W03-A04H [1992]

Noise reduction

For details relevant to the radio receiving aspect W02-G03B codes are also assigned.

W03-A04H1 [1997]

Reducing noise generated outside receiver

Covers suppression within the receiver of external interference such as impulse noise (also coded in W02-G03B5) and interference to terrestrial digital TV signals from analogue transmissions, or vice-versa. Ghost signal suppression is covered by W03-A04G.

W03-A04H5	[1997]
Reducing noise generated in receiver	
Includes arrangements to reduce noise and aberrations on picture, except that arising from luminance/chrominance separation, which is covered by W03-A05B5.	
W03-A05	
Color signal processing	
W03-A05 codes covers demodulators, luminance-chrominance separation, etc., chiefly for analogue color TV. (Color modulators/encoders are covered by W04-Q05).	
W03-A05A	[1992]
Color synchronization	
W03-A05A1	[1992]
Color subcarrier recovery	
W03-A05A3	[1992]
Separation of color burst signal	
W03-A05B	[1992]
Luminance-chrominance separation	
<i>Luma, chroma, Y-C</i>	
W03-A05B1	[1992]
Using comb filter, using digital filter	
Comb filters per se are covered by U22-G01B5 (digital) and U25-A03 (analogue).	
<i>Delay, line, period</i>	
W03-A05B5	[1992]
Suppressing interference	
Includes suppression of cross-color, 'hanging dots' interference, etc. Reduction in the visible effect of radio interference is covered by W03-A04H1.	
W03-A05B7	[1992]
Adaptive luminance-chrominance separation	
Includes movement-responsive control of separation. W03-A11C, which covers detection of picture motion content in general, is also assigned where this aspect is significant.	
<i>Scene, change, HF, interframe</i>	
W03-A05C	[1992]
Control circuit details	
Covers automatic and manually/remotely adjustable control.	

W03-A05C1	[1992]
Automatic chroma control	
W03-A05C3	[1992]
Color killer circuit	
W03-A05C5	[1992]
White balance control	
W03-A05C7	[1992]
Hue and intensity control	
W03-A05D	[1992]
Demodulation circuits	
<i>NTSC, PAL, SECAM, MAC</i>	
W03-A05D1	[1992]
With recognition of standard	
See also W03-A11 codes for multistandard receiver details, especially W03-A11B codes for standard recognition.	
W03-A05E	[1992]
Matrix circuit	
W03-A05F*	[1992-2005]
Display interface circuit	
*This code is now discontinued. From 2006 this topic is covered by W03-A08S codes.	
W03-A05X	[1992]
Other color signal processing	
Includes clamping/DC restoration specifically for color video when W03-A04C is also applied, and noise reduction (other than that due to luminance-chrominance separation) with W03-A04H codes.	
<i>Dithering</i>	
W03-A06	
Synchronizing	
<i>Separation circuit, vertical/horizontal signal separation, clock recovery, deflection/blanking generator control</i>	
W03-A06A	[1992]
Extracting synchronizing information	
Covers separation of synchronizing signal information from composite video signal. Separation of horizontal and vertical synchronizing information from extracted 'sync' pulses is covered by W03-A06C.	
W03-A06A1	[1992]
Detecting presence of signals	

W03-A06A5 [1992]

Recognising type of signals

See W03-A11B codes also for multistandard receiver aspects.

W03-A06C [1992]

Separation of vertical and horizontal information

Also coded in U22-D05 if of general application to pulse circuitry. Prior to 1992 search U22-D05 with W03-A06.

Vertical, horizontal, frame, field, line

W03-A06E [1992]

Synchronizing signal distribution and control of other equipment

Covers use of synchronizing signals within receiver.

W03-A07

Power supplies

See U24 for (low power) power supplies in general.

W03-A07A [1992]

Mains or battery power supply

Transformer, rectifier, smoothing, filter, voltage regulator, converter, AC-DC

W03-A07A1 [1992]

Standby arrangements, timed disconnection

W03-A07C [1992]

EHT power supply

Includes discharge protection circuits. Also coded in W03-A08A1C. See also V02-F02A for flyback transformers.

Rectifier, voltage multiplier, tripler, ultor, final anode

W03-A08

Display arrangements

W03-A08 codes cover display aspects of TV receivers and (since 2007) video displays in general. The following codes are assigned to indicate application of the particular display device to TV sets and video displays only : W03-A08A codes, W03-A08B, W03-A08C, W03-A08D, W03-A08G and W03-A08J. Novel details of these display devices are covered in the respective codes for the particular technology, in either V05 or U14 class.

W03-A08A

Cathode ray tube display

CRTs per se are assigned V05-D codes, especially V05-D01B codes.

W03-A08A1

Deflection circuits

W03-A08A1A [1992]

Deflection signal generator and control

Prior to 1997, this code included picture width and height control which is now transferred to W03-A08A1F. See U22-C codes also for details of sawtooth waveform generators.

Line oscillator, frame oscillator, horizontal, vertical

W03-A08A1B [1992]

Deflection yoke

Also coded in V02-F01A and V05-D06B1A (and V05-D01B codes depending on tube type).

Coil, winding, core, connections

W03-A08A1C [1992]

Deflection system with power supply

Also coded in W03-A07C. Includes line output transformer (also coded in V02-F02A).

W03-A08A1D [1992]

Distortion and linearity correction

Includes pincushion distortion correction.

S-correction, capacitor, coil, barrel, ringing

W03-A08A1E [1992]

Centering of picture on screen

W03-A08A1F [1997]

Controlling picture width or height

(W03-A08A1A)

See W03-A08A1A prior to 1997.

W03-A08A1G [1992]

Deflection with non-uniform speed

Includes velocity modulation systems.

W03-A08A1H [1992]

Progressive scanning

Covers non-interlaced systems. For HDTV receiver aspects search with W03-A11 codes.

W03-A08A1J [1992]

Non-raster scanning

Covers scanning systems not following normal sequential raster pattern, such as fractal scanning. Progressive scanning is covered by W03-A08A1H.

Peano

W03-A08A1X [1992]

Other deflection system details

W03-A08A3 [1992]

Focusing arrangement

(W03-A08A9)

Includes coils (also coded in V02-D), power supply aspects, focus potentiometer, etc.

W03-A08A3A [1997]

Dynamic focusing

See U22-D01A codes also for pulse-shaping aspects.

W03-A08A3C [1997]

Focusing system components

Includes high-voltage potentiometers, bias resistor networks, etc. which are covered in V01-A codes, e.g. V01-A03D2 for preset variable resistors.

W03-A08A4 [1992]

Degaussing arrangements

(W03-A08A9)

For demagnetising in general see V02-D, which is also assigned here.

W03-A08A4A [1992]

Degaussing coil

(W03-A08A9)

W03-A08A4C [1992]

Control circuitry

(W03-A08A9)

Includes automatic control aspects, e.g. causing current decay by PTC resistance (also coded in V01-A02A7C where the resistance element per se is novel).

W03-A08A5 [1992]

Convergence and beam control

(W03-A08A9)

Beam landing error, misconvergence

W03-A08A5A [1992]

Components e.g. magnets, coils

(W03-A08A9)

W03-A08A5C [1992]

Automatic control

(W03-A08A9)

W03-A08A5E [1992]

Beam index control

(W03-A08A9)

Includes circuitry and electro-optical or other detection system.

W03-A08A6 [1992]

Radiated field suppression

(W03-A08A9)

Covers suppression of magnetic, electromagnetic, or electric fields for EMC or health and safety considerations. See W03-A09 codes also for constructional aspects. Compensation for effects of external magnetic fields is covered by W03-A08A4 for de-magnetising and by W03-A08A1D for distortion correction in deflection circuits.

W03-A08A7 [1992]

Blanking circuits

Beam cut-off, bias, grid

W03-A08A7A [1992]

Responsive to scan failure

(W03-A08A9)

Includes arrangements to protect screen from damage.

Spot killer

W03-A08A7C [1992]

Blanking selective part of screen area

(W03-A08A9, W03-A11)

See W03-A11B1A also for control of display area in multi-standard receiver.

Aspect ratio, widescreen, letterbox, HDTV, IDTV, EDTV, border, edge

W03-A08A8 [1992]

Tube drive circuitry

(W03-A08A9)

Includes cathode drive circuits, and also matrix drive circuitry. See U24-G codes for amplifiers in general.

W03-A08A8A [1992]

Limiting excess beam current

(W03-A08A9)

Also coded in U24-C02A when based on limiting excessive brightness level of video. (See also W03-A04D1)

ABL

W03-A08A8C [1997]

Drive circuitry for matrix-type tube

Covers matrix drive with deflection type tube arrangements. Cathode ray tubes of this type are covered by V05-D01B3C. Interface arrangements for matrix displays other than CRTs are covered by W03-A08S5.

MDWD

W03-A08A9

Other CRT display aspects

W03-A08B [1987]

Liquid crystal display

(W03-A08X)

This code is used to denote the use of an LCD in a TV set or video display, and includes novel LCDs (full details of which are covered by U14-K01 codes). W03-A08B is assigned for drive circuitry integral with the LCD (in U14, U14-K01A3 is assigned for this), external circuitry forming part of the TV set or video display is assigned W03-A08B3. Backlighting components and arrangements are covered by W03-A08B1 and control of backlighting by W03-A08B3. From 2007 backlighting and analogous arrangements are also assigned X26-U04A codes (formerly W05-E05B codes and X26-U04).

W03-A08B1 [1997]

Module and constructional details

This code covers module aspects and constructional details associated with the incorporation of the display device itself, including backlighting light sources, filters, diffusers, etc. Control of backlighting is not included being covered by W03-A08B3. From 2007 backlighting and analogous arrangements are also coded in X26-U04A and other X26 codes depending on novelty.

Back lighting, CCFL, lamp, display module connector

W03-A08B3 [1997]

Drive circuitry

This code is intended for drive circuitry forming part of the TV set or video display, i.e. it does not include circuitry that is part of the LCD which is coded as W03-A08B. Drive circuitry for backlighting sources is also included.

Matrix drive circuitry, scan signal generator, lamp drive, inverter

W03-A08C [1997]

Display using LEDs

This code is used to denote the use of inorganic or organic light emitting diodes in a TV set or video display, either as an array of individually-encapsulated LEDs for a large-scale display or as an integrated circuit. LEDs themselves are covered by U12-A01A codes. Note that in the case of 'LED' displays, 'light emitting diode' displays **are** covered here but 'light emitting device' displays not using LEDs are regarded as being electroluminescent displays and are therefore covered by W03-A08J instead. The use of LEDs for backlighting of liquid crystal displays is **not** regarded as an 'LED display' and is covered by W03-A08B1 for module and constructional aspects and by W03-A08B3 for drive circuitry and control aspects.

W03-A08D [1992]

Plasma display

Plasma displays themselves are covered by V05-A01 codes.

W03-A08E [1987]

Optical aspects, incl. head-mounted display

Note that optical elements covered by W03-A08E codes are **not** part of display devices themselves, such as CRTs, FEDs, LCDs, OLEDs, or PDPs, but are separate elements used with the display device. Projection TV in general is covered by W04-Q01 codes and only coded in W03 when relevance to receivers is disclosed, such as in a self-contained projection receiver, or for video circuitry details, e.g. light valve driving.

Anti-reflection coating, lens, color filter, projection display, stereoscopic display shutter control, polarisation control

W03-A08E1 [1997]

Filters

This code includes color-separation filters, polarising filters, antiglare filters and the like which are separate from the display device itself. Thus a color-separation filter within an LCD for example cannot be assigned this code, and being regarded as an aspect of the display itself, would be coded as W03-A08B only. Display filters of general or unspecified application are covered by W05-E05A.

W03-A08E3 [1997]

Lens systems

W03-A08E5 [1997]

Mirror

W03-A08E7 [1997]

Head-mounted displays and electronic shutter arrangements for 3D displays

From 2013 this code is subdivided to distinguish video head-mounted displays (now covered by W03-A08E7A) from shutter arrangements for use with stereoscopic displays (now covered by W03-A08E7C).

W03-A08E7A [2013]

Head-mounted display

This code covers head-mounted displays for presenting visual information to the user from video signals. Head-mounted displays using retinal-projection are also assigned W04-Q01L. Application to augmented reality or virtual reality systems is indicated by assignment of W04-W07E1A. Head-mounted displays in general, including those not capable of presenting video, are covered by W05-E07.

W03-A08E7C [2013]

Shutter arrangement for stereoscopic display

This code covers arrangements in the form of spectacles with e.g. electro-optical shutters to alternately transmit or block light from a display to left and right eyes of the viewer. W03-A12A, the general code for stereoscopic or '3D' TV receivers and video displays is also assigned and novel aspects of electro-optical shutters are covered by V07-K01A.

3D glasses

W03-A08E7E [2013]

Spectacles using filters for stereoscopic display

This code covers arrangements in the form of **passive** spectacles with e.g. different colour filters or different polarization for each eye to produce a stereoscopic display effect. W03-A12A, the general code for stereoscopic or '3D' TV receivers and video displays is also assigned. Electro-optical shutters to alternately transmit or block light from a display to left and right eyes of the viewer are **not** included and are covered by W03-A08E7C.

Anaglyph, 3D glasses, blue filter, green filter, red filter

W03-A08E8 [2014]

Parallax and different-view displays

This code covers optical and electro-optical aspects of displays in which parallax or similar effects are used to enable different images to be perceived depending on the viewer's position. For autostereoscopic displays (i.e. those not requiring the wearing of spectacles with LC shutters, polarized filters, etc.) W03-A12A is also assigned.

Where the object is privacy, e.g. deliberately creating a narrow viewing angle so that someone sitting next to the user of a portable device cannot view displayed content, W03-A08L is also assigned.

Confidential, diffraction, diffuser, grating, overlay, refraction, restricted view

W03-A08F [1992]

Optomechanical and electro-optical scanning display

Light beam scanning is covered by V07-K05.

W03-A08F1 [1992]

With laser light source

For details of lasers per se see V08 codes. Projection TV with laser light source is coded in W04-Q01B1.

W03-A08G [2002]

Field emission display

(W03-A08X)

This code is intended for non-CRT field emission display arrangements for TV receivers. CRT TV displays using field emission are covered by W03-A08A codes. Novel aspects of field emission displays are covered by V05-D01C3 and other V05-D codes as appropriate.

FED

W03-A08J [2002]

Electroluminescent display

(W03-A08X)

Novel aspects of electroluminescent displays are covered by U14-J codes. Note that 'LED displays', in the sense of 'light emitting diode displays' are **not** included here and are covered by W03-A08C. When 'LED' refers to 'light emitting devices' which are **not** LEDs, W03-A08J is assigned.

EL

W03-A08L [2013]

Display arrangements preventing direct recording by camera and display privacy

This code covers arrangements to prevent direct off-screen recording of still or moving images using e.g. a digital camera, camera phone or camcorder or to perform watermarking on images recorded, and also arrangements to maintain confidentiality or privacy of displayed information, e.g. by deliberately restricting viewing angle.

Arrangements using infra red light within an LCD backlighting system are also covered in W03-A08B codes. The use of similar techniques for projection displays is not included and is covered by W04-Q01J5. Copy protection involving signal processing is covered by W04-F01L1.

Camera blinding, flooding, IR, over-expose, secrecy

W03-A08S [2006]

Display interfacing

Covers circuitry for interfacing between the receiver and displays that may be integral with it or external. This topic was previously covered in W03-A04F for general interfacing aspects and in W03-A05F for interfacing and display driving specifically related to color video signals. Other W03-A04 or W03-A05 codes are assigned in addition to W03-A08S codes as necessary.

W03-A08S1 [2006]

Digital display interfacing

This code covers aspects specific to the digital nature of the display, such as digitizing and signalling the type of display or resolution. Specific details relating to matrix display driving are covered by W03-A08S5.

DisplayID, EDID, extended display identification data, E-EDID, enhanced EDID

W03-A08S5 [2006]

Matrix drive details

(W03-A08X)

For driving e.g. LCD, plasma displays with native resolution. Color matrix circuits for converting color-difference signals into color drive signals are not coded here, being covered by W03-A05E instead.

W03-A08X

Other TV receiver display aspects

Includes display arrangements using discharge tubes forming a matrix, etc. From 2002 electroluminescent displays for TV receivers are assigned W03-A08J. Also includes touchscreens which are also assigned T04-F02A2 and W03-A13G when OSD aspects are significant.

W03-A09

Constructional details

Constructional details of electronic equipment in general are covered by V04-S and V04-T codes.

W03-A09A [1992]

Receiver constructional details

W03-A09A1 [1992]

Cabinet

W03-A09A5 [1992]

Internal construction

Cooling

W03-A09C [1992]

Stands and supports

Includes stands for flat-screen TVs, furniture aspects such as stacks for audio/video equipment (see W03-G codes also for general application) and mounting brackets for walls, etc.

W03-A10 [1983]

Teletext and related systems

(W03-A20)

Teletext transmission system aspects are covered by W02-F05B codes. Non-television text equipment (e.g. receiving text information over telephone line) is **not** coded here, unless interfacing equipment such as a modulator is being used to insert the text in e.g. the field blanking interval (in which case W03-A18C would be assigned also). For non VBI-based systems used in digital TV search along with W03-A11G.

Character multiplex

W03-A10A [1992]

Decoder

Framing code detector

W03-A10A1 [1992]

Error protection

Ghost-cancelling circuits are covered by W03-A04G.

Burst-and-random error correction system for teletext, BEST

W03-A10C [1992]

Character generator

Character generators for computer peripheral CRT VDUs are covered by T04-H01A1.

W03-A10C1* [1992-2005]

For other on screen display

*This code is now discontinued. From 2006 it is assumed that all character generators are for a range of purposes, including teletext type systems, on screen menus and interactive information provision such as Internet TV.

W03-A10C5 [2006]

Character sets and fonts

Includes use of particular character sets for different languages. Character set encoding is also covered in U21-A05D1.

Cyrillic, Kanji, Kana, Hangul, Arabic, shift JIS

W03-A10E* [1992-2011]

Memory aspects

*This code is now discontinued and from 2012 this subject matter will be covered by W03-A11M5. W03-A10E remains valid and searchable for records prior to 2012 when it was assigned for the use of memory to increase apparent speed of retrieval or other purposes in text and subtitle display arrangements. Prior to 2012 memory circuits for OSD and PIP applications were covered by W03-A13A (now W03-A11M3) and for digital/high definition receivers by W03-A11M.

Buffer, page memory

W03-A10G [1997]

'Closed caption' and subtitle systems

(W03-A10X, W03-A13G)

Search with S05-K for 'closed caption' systems.

W03-A10J [1997]

Processing additional information signals

Includes use of VPS data and extraction circuitry (only) for ghost-control reference signals. See W03-A04G for all aspects of ghost signal suppression in receivers.

W03-A10X [1992]

Other text system details

Includes the use of text-to-speech conversion (also assigned W04-V04C1) to provide an audible version of text-based information.

W03-A11 [1987]

High-definition, multi-standard, and digital architecture receiver

(W03-A20)

HDTV transmission systems are covered by W02-F06C codes. Codes in this section are used with W03-A05 codes for color demodulation, and with W03-A08 codes for display aspects.

From 2002 W03-A11K codes have been assigned for digital architecture TV receivers, i.e. those using DSP. Prior to 2002 this aspect was covered by W03-A11X.

HDTV, IDTV, EDTV, MUSE, dual-standard, video signal interpolation

W03-A11A [1992]

Receiver standards-conversion circuit

TV standards conversion equipment for studio/broadcast use is covered by W04-N05A, and for recording equipment by W04-F01H3.

W03-A11A1 [2005]

Transcoding

Covers conversion of standard of received digital TV signals including changing the coding format used.

W03-A11A5 [2010]

TV display upscaling and resolution improvement

This code covers arrangements for upscaling a signal to improve resolution, e.g. to provide a 100 Hz field rate from an original 50 Hz rate in the received signal, or to increase the effective number of pixels. Upscaling for video recording and reproducing equipment is covered by W04-F01H3C.

Flicker reduction, interpolation, pixel displacement, pixel shaping

W03-A11B [1992]

Standard recognition circuits and switching

Includes recognition based on color signal characteristic (see W03-A05D1 also), synchronizing signal type (see W03-A06A5 also) or e.g. bandwidth of received signal. From 2006 novel standard recognition circuits are covered by W03-A11B5.

W03-A11B1 [1992]

Automatically switching receiver circuitry

Covers control aspects to select appropriate demodulator, or other signal processing stage. Includes use of standard recognition circuits in switching receiver circuitry.

W03-A11B1A [1992]

Controlling display area or scanning format

See W03-A08A7C for arrangements to selectively blank e.g. border area of CRT display. For similar system using physical masking of screen see W03-A08X.

Progressive scan, interlaced, non-interlaced, aspect ratio, letterbox, pan-and-scan, 4:3, 16:9

W03-A11B5 [2006]

Novel standard recognition circuits

W03-A11C [1992]

Picture signal motion detector

This code is not used routinely for decoding predictively encoded video data. Covers novel methods and circuitry for determining motion content of picture, e.g. in adaptive circuitry such as luminance - chrominance separator (also coded in W03-A05B7) as well as in predictive decoding. Motion detector circuits in general are coded in W04-P01A1.

Inter-frame, correlation, difference, H

W03-A11D [1992]

Decoder

Includes decoder for digital TV, e.g. DVB-T signals. Descrambling of encrypted signals is **not** included and is covered by W03-A16C3A.

Decoders/demodulators for 'standard' analogue color TV signals are covered by W03-A05D codes.
DVB, ATSC

W03-A11D1 [2007]

Error detection and correction

See W01-A01B codes for general error correction in data transmission systems, which were previously assigned with W03-A11D to indicate this topic.

W03-A11G [2005]

TV receiver for digital broadcasts and digital multimedia broadcast receiver

From 2011 the title of this code is expanded to reflect the previous inclusion of receivers for digital multimedia broadcast (DMB - now covered by W03-A11G5) as well as receivers of digital TV signals such as DVB-T, irrespective of analogue or digital receiver architecture. Set-top box receivers are also assigned W03-A16E. Digital TV receiver architecture details (for analogue or digital signals) are covered by W03-A11K codes.

W03-A11G1 [2006]

Combined with analogue receiver

W03-A11G5 [2011]

Digital multimedia broadcast receiver

For receivers built-into mobile phones search with W01-C01D3C and W01-C01P6G.

DMB

W03-A11K [2002]

Digital and hybrid TV receiver architecture (W03-A11X)

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other

W03-A codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for communications and broadcast radio receivers are covered by W02-G03K and W03-B07 codes.

W03-A11K1 [2002]

Characterised by usage of DSP

(W03-A11X)

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W03-A11K codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

W03-A11K1A [2002]

With baseband digital signal processing only

(W03-A11X)

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

W03-A11K1C [2002]

With baseband and IF digital signal processing only

(W03-A11X)

This code covers receivers with DSP in IF, demodulator, and baseband stages.

W03-A11K1E [2002]

With digitising of RF spectrum

(W03-A11X)

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analogue RF amplifiers.

W03-A11K1X [2002]

Other use of DSP in digital TV receivers

(W03-A11X)

W03-A11K3 [2002]

AD conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

W03-A11K5 [2002]

Digital mixing and direct digital conversion

(W03-A11X)

DDC

W03-A11K6 [2002]

Filtering

(W03-A11X)

Novel digital filters are also assigned U22-G01 codes, and T01-J08B when the emphasis is on computing aspects.

W03-A11K7 [2006]

Transform implementation

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

W03-A11K8 [2006]

DA conversion

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

W03-A11K9 [2002]

Other digital TV receiver aspects

(W03-A11X)

W03-A11M [2005]

TV receiver memory

From 2012 the scope of this code is expanded to enable it to be used as a single reference for 'TV receiver memory' in the sense of memory for images or text. Subdivisions have been introduced to cover the use of memory in video decoding (W03-A11M1), for onscreen display and related topics (W03-A11M3), for text and subtitle display (W03-A11M5) and novel memory itself (W03-A11M7). Prior to 2012 memory circuitry used in TV receivers for applications such as PIP and OSD was covered by W03-A13A, and for teletext by W03-A10E. For memory circuits used for general video applications see W04-P01C codes. For memory circuits used in dynamic recording of video signals (e.g. as a buffer) see W04-F01M codes. Memory used for storing operational settings such as stored channels or for general receiver control aspects is not included, being covered respectively by W03-A02B1 codes and W03-A18A codes.

W03-A11M1 [2012]

TV receiver memory used in decoders and other signal processing

This code covers the use of memory in a TV receiver in connection with video decoding or other signal processing, such as upscaling, standards conversion, noise reduction etc. Codes for these topics are also assigned as necessary

W03-A11M3 [2012]

TV receiver memory for on-screen display and image manipulation

This code replaces W03-A13A and covers the use of memory in a TV receiver in 'image manipulation' applications as covered by W03-A13 codes, such as picture-in-picture, freeze-frame, zoom etc. and also on-screen display (OSD). Where the use of memory is specific to a particular type of image manipulation the corresponding W03-A13 code is also assigned, e.g. W03-A13B for PIP.

W03-A11M5 [2012]

TV receiver memory for text display and subtitles

This code replaces W03-A10E and covers the use of memory in a TV receiver in text or subtitle applications as covered by W03-A10 codes, such as teletext, MHEG text, or closed caption display. W03-A10 codes are also assigned as necessary to provide more information, e.g. W03-A10G is also assigned for inventions specific to the presentation of closed caption information.

Buffer, page memory

W03-A11M7 [2012]

Novel memory and memory circuits for TV receivers

This code covers novel memory and memory circuits and as such is likely to be assigned for inventions which are also assigned U14-A codes for memories and/or T01-H01 codes for use of memory in a computing context. W03-A11M7 is intended to indicate application to TV receivers (when specific) for novel memories or memory circuits.

W03-A11M9 [2012]

Other TV receiver memory aspects

W03-A11X [1992]

Other HDTV/dual standard details

Includes multiple analogue standard reception. Receivers for both digital and analogue reception are coded in W03-A11G1.

W03-A12 [1987]

Stereoscopic, stereophonic, and multichannel sound receiver

(W03-A20)

W03-A12A [1992]

Stereoscopic and three-dimensional display TV receiver

Covers all aspects of stereoscopic and autostereoscopic TV receivers, such as decoding circuitry and display aspects (see W03-A08 codes also, e.g. W03-A08E7C for LC shutter spectacles) including 3-dimensional displays. For autostereoscopic displays and displays which can present different programme images when viewed from different angles based on optical gratings, grids and the like placed in front of a display panel search with W03-A08E8 (from 2014).

Left, right, image, shutter synchronization

W03-A12B [1992]

Stereophonic and multichannel sound TV receiver

Left, right, bilingual sound, separate/second audio programme, SAP, NICAM

W03-A12B1 [1992]

Stereophonic decoder

See W03-A03C1 also. (Coded in U23-P05 also).

W03-A12B1A [1997]

With separate sound channel

Covers arrangements enabling output of audio signals in different language. TV transmission systems of this type are covered by W02-F06B5.

Separate audio programme, SAP, bilingual

W03-A12B3 [2005]

Surround sound aspects

This code is used with W03-A12B1 or W03-A12B5 as appropriate. General aspects of surround sound systems are covered by W04-R01C5.

W03-A12B5 [1992]

Audio aspects

Includes amplifiers, loudspeaker systems, etc. Search with W03-A15 codes.

W03-A13 [1987]

Picture-in-picture, image manipulation, EPG and OSD

(W03-A20)

From 2012 the title of this code has been changed to reflect the transfer of memory circuits to W03-A11M codes (from W03-A13A). W03-A13 codes cover special display modes under control of the viewer, including picture-in-picture, freeze frame, zooming and image manipulation. Special effect generation for general video applications, including its use in TV studio equipment, is covered by W04-N05C codes. On-screen display forming

part of teletext information is covered by W03-A10 codes (see note for W03-A13G).

W03-A13A* [1992-2011]

Memory circuitry and control

*This code is now discontinued and from 2012 this subject matter will be covered by W03-A11M3. W03-A13A remains valid and searchable for records between 1992 and 2011 when it was assigned for memory aspects of functions described by W03-A13 codes only, such as PIP or OSD applications, and included novel memory itself and memory addressing. Memory circuits and applications specific to digital and high definition TV receivers, such as memory used in standards conversion or decoding, are covered by W03-A11M1 from 2012. Memory circuits specifically for VBI and digital text reception (e.g. to increase apparent retrieval rate) are coded in W03-A11M5 from 2012. Frame stores for general video applications are covered by W04-P01C codes and the use of memory in video recording signal processing by W04-F01M codes.

W03-A13B [1992]

Picture-in-picture display function

Includes picture-outside-picture arrangements. For display of inset picture of different aspect ratio and/or standard, search with W03-A11B1A. Picture inlay for TV special effects in general is covered by W04-N05C5.

PIP, POP

W03-A13B1 [1992]

Displaying external video source in sub-image

See W03-A18C also for peripheral connection aspects.

Peripheral, CCTV, monitor, security, video, intercom, door-phone, entry

W03-A13C [1992]

Still-picture display facility

Includes 'freeze-frame' facility. For use to hold picture during low S-N conditions search with W02-G03B1.

Hold, action, video, squelch

W03-A13E [1997]

Zoom facility and image manipulation

The title of this code has been expanded to reflect the previous inclusion of image manipulation, for which W03-A13X was also assigned as appropriate and W04-N05C codes for inventions of wider application. The code has also been subdivided to separate image zooming and manipulation when the distinction can be made. Image manipulation in general, and for TV studio special effects, is

covered by W04-N05C3 codes and in T01-J10B3A when computer processing aspects are emphasised.

W03-A13E1 [2005]

Zoom facility

Covers zooming to enlarge displayed image, or a portion of it. Other special effects such as re-positioning, rotating, and altering the shape of the picture are covered by W03-A13E5.

W03-A13E5 [2005]

Image manipulation

Covers use of special effects such as resizing, re-positioning and altering shape of picture. Zooming is covered by W03-A13E1. Prior to 2005 image manipulation was covered by W03-A13E and/or W03-A13X as appropriate, depending on novel aspects.

W03-A13G [1992]

General on-screen display

From 2006 character generation aspects are covered by W03-A10C codes. Includes OSD aspects of touch screens (also assigned W03-A08X and T04-F02A2).

Digit, pattern, ramp, monitoring, self-test

W03-A13J [2002]

Electronic programme guide systems

(W03-A13G, W03-A16C5E)

This code is regarded as the main one for EPG aspects in receivers and set top boxes. See W03-A13G also for specific OSD aspects of programme guide systems in TV receivers (this code was used more generally for this topic prior to 2002). Interactive aspects of guide systems will continue to be assigned W03-A16C5E as appropriate. Systems or 'head-end' aspects are covered by W02-F10E5. Display of program guide information in radio receivers is covered by W03-B01C.

W03-A13X [1992]

Other special display mode aspects

W03-A15 [1992]

Audio system aspects

(W03-A20)

Includes loudspeakers, audio amplifier, and connection to e.g. external Hi-Fi system (with W03-A18C). Search with W03-G05C5A for cordless headphone arrangements. (Prior to 1997, see W03-A15, W03-A18C, and W03-G05).

W03-A15A [1992]

Audio amplifiers, volume and tone control

(W03-A20)

W03-A15C [1992]

Loudspeakers and loudspeaker enclosures

(W03-A20)

See also V06-A codes for loudspeakers per se, and V06-G/W04-S01 codes for enclosures of general application. (Prior to 1992, W04-S was assigned even for self-contained enclosure aspects). From 2005, wireless loudspeaker systems are also assigned W03-G05C5C.

W03-A16 [1992]

Ancillary equipment for cable, satellite or subscription TV

(W03-A20)

This code mainly covers equipment external to actual receiver e.g. decoders or converters. (Converter RF circuitry is covered by W03-A01 codes). Search with W02-F03A or W02-F05A codes for wider cable/subscription aspects.

W03-A16A [1992]

Satellite TV

(W03-A20)

Search with W02-B codes for aerial aspects, and W03-A16C3 codes for security and decoding. Satellite TV transmission systems are covered by W02-F06A.

W03-A16C [1992]

Cable, subscription, and interactive TV

(W03-A20)

Systems aspects of cable, interactive and satellite TV (i.e. broadcast infrastructure) are covered by W02-F codes.

W03-A16C1 [1997]

Cable TV receiver

The title of this code has been changed to better reflect its coverage. From 2005, cable TV set-top box aspects are highlighted by co-assignment of W03-A16E. Prior to 2005, W03-A16C1 was used more generally for set-top box details.

W03-A16C3 [1997]

Security and decoding aspects

See also W02-F05A1 codes for secrecy/scrambling aspects of TV systems in general.

W03-A16C3A [1997]

Descrambling circuitry

Also coded in W02-F05A1B.

W03-A16C3C [1997]

Access control, including card systems

Includes smart cards used to authorise decoding of encrypted broadcast. Access control details relating to e.g. cable head-end are covered by W02-F05A1 codes and W02-F10N3.

W03-A16C5 [1997]

Interactive TV aspects

Covers details of (subscriber) systems interacting with rest of two-way network, e.g. to request a programme, carry out a transaction, etc.

W03-A16C5A [1997]

For video-on-demand system

Includes pay-per-view systems for temporarily increasing access rights, and arrangements enabling viewer to influence sequence of events within programme. For systems involving selection of predominantly non-video programme material W03-A16C5C takes precedence.

W03-A16C5C [1997]

For audio-on-demand system

The title of this code has been changed to reflect its actual coverage of audio-based on-demand receiving systems. As before, it includes remote access of entertainment library systems, e.g. of 'pay-per-play' type, using an interactive TV installation or other equipment as an interface.

W03-A16C5E [1997]

For access to information system

This code covers interactive aspects of programme guide systems in receivers, which from 2002 are covered for all aspects by W03-A13J. Prior to 2002, W03-A16C5E was also used for aspects of internet access (now W03-A16C5K).

W03-A16C5G [1997]

For game playing, virtual reality, or karaoke

In 2006 the title of this code was amended to reflect its coverage (since 1997) of virtual reality and karaoke interactive broadcast reception in addition to game playing. Video games in general are covered by W04-X02C and virtual reality in general is covered by T01-J40 codes and W04-W07E codes).

W03-A16C5H [2005]

For access to multimedia system

W03-A16C5J [1997]

For access to financial network

Includes use of TV receiver for online banking or purchasing goods, including 'TV commerce'. Systems involving use of the internet are also assigned W03-A16C5K.

W03-A16C5K [2002]

For access to internet and receiving internet broadcasts, including 'Smart TV'

(T01-H07C5E, W01-A06B7, W03-A16C5E)

This code covers arrangements for internet access as a facility of an interactive broadcast system, and also reception of content on an interactive basis over the internet, such as internet TV, which is also assigned W03-A16C5A.

IPTV, streaming

W03-A16C5X [1997]

For interfacing interactive broadcast terminals with other systems

W03-A16E [2005]

Set top box

(W03-A16C1)

This code is used with others as necessary to highlight specific applications, e.g. with W03-A11G for a set-top box DVB receiver, with W03-A16A for a satellite TV receiver, and with W03-A16C1 for a cable TV receiver.

W03-A16E1 [2005]

Personal video recorder

Covers personal video recorder aspects that relate to receiver, e.g. programming recording using programme guide. This code is used in conjunction with W04 codes, e.g. W04-B14C3 for hard disk recorders, and other W03 codes to denote novel aspects as appropriate.

PVR, TIVO, ReplayTV, SonicBlue, Digital Video Recorder, DVR

W03-A16G [2006]

Local storage of commercial messages

Production of and arrangements for displaying commercial messages for TV are also covered in W05-E03C. Local storage of AV content in home networks is covered by W03-G05C1A (from 2013) which can also be assigned with W03-A16G when locally-stored TV commercials are accessible over a home network.

W03-A18 [1992]

General control and peripheral connection systems

(W03-A20)

W03-A18A [1992]

General aspects of receiver control and monitoring

(W03-A20)

Includes self-checking systems. For microprocessor control aspects, see T01-J08A. Arrangements specific to remote control, not involving overall control aspects, are assigned W03-A02C codes only.

Function display, time programming

W03-A18A1 [1992]

Testing/monitoring with external equipment

(W03-A20)

This code covers any aspect of testing or monitoring of TV receivers or video displays using external equipment, including production line testing or testing subsequently for e.g. fault-finding or repair. Self-testing or self-monitoring arrangements are covered by W03-A18A2.

W03-A18A2 [2006]

Self-testing, monitoring and calibration of TV receiver

This code covers control aspects within the receiver itself for test and diagnosis and also internal calibration. Testing or monitoring of TV receivers and video displays using **external** equipment is covered by W03-A18A1.

W03-A18A3 [1997]

Preventing viewing below minimum distance; Locating viewer

See also S03-C, W06-A02, W06-A05, and W06-A06 codes for detection system details. From 2010 the scope of this code is enlarged to include determination of viewer direction or location. Arrangements for orienting a receiver or display based on this determination are also assigned W03-A18A9. Viewer or user identification is covered by W03-A18A6.

W03-A18A5 [1997]

Time programming, channel control and programme guide control

Covers use of programme guide to present suitable channels for viewing to user. Note that the 'time programming' referred to for this code, W03-A18A5A and W03-A18A5C relates to programming of the TV receiver itself, e.g. to switch-on and tune to a desired channel at a particular time, and not programming of recording, which is covered by W04-E04C codes in conjunction with the appropriate W04-B, W04-C and/or W04-F codes.

W03-A18A5A [2002]

Time programming with manual input

W03-A18A5C [2002]

Time programming, channel and programme guide control with learning function

This code covers automatic time programming arrangements based on learned user preferences, e.g. through monitoring of manual time programming operations or manual channel selection. For analogous arrangements for programming of video recorders see W04-E04C7 along with other relevant W04 recording equipment codes.

Suggester

W03-A18A5G [2006]

Detecting commercial messages

Includes arrangements to change channels when commercials are detected. Video recorder-based systems for preventing recording of commercial messages are covered by W04-E04C5C, and for overriding of this feature by W04-E04C5E.

W03-A18A5J [2007]

Detecting emergency broadcast messages

Includes arrangements to change channels or switch on TV receiver when emergency broadcast messages are detected. See W02-F05D for transmission of emergency TV broadcasts and W05-B08 codes which are assigned for all aspects of emergency broadcasts and disaster warning alarms. Emergency broadcast radio receivers are covered by W03-B08C7.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano.

W03-A18A6 [2005]

Identifying user

Covers arrangements to control presented programme content or settings, e.g. brightness, volume, according to individual user. Use in conjunction with W03-A18A7 for arrangements to identify child user and prevent access to certain programming content. Recognition based on biometrics such as fingerprint, palm-print, and similar parameters is also assigned T04-D07F codes, and that based on voice recognition by W04-V04A3. Recognition of user gestures or spoken commands for remote control purposes is not included and is covered by W03-A02C5J and W03-A02C5L respectively.

W03-A18A7 [1997]

Security and child-lock systems

V-chip

W03-A18A8 [2005]

Program control aspects, software updating methods

T01-F codes (computer program control) are also assigned as necessary.

W03-A18A8A [2010]

Software updating

This code covers arrangements for downloading or otherwise inputting data to modify the program controlling operation of a TV receiver or analogous equipment.

OTA, over the air

W03-A18A9 [1997]

Other TV receiver general control

W03-A18C [1992]

Peripheral connection system

(W03-A20)

Includes SCART socket per se and details of interconnection with any external equipment.

Euroconnector, peritelevision, HDMI, interface, RGB, direct video, baseband

W03-A18C1 [2005]

Interfacing hardware

Includes cables, connectors, and other hardware aspects.

W03-A18C5 [2005]

Interfacing with other systems

W03-A18C5A [2005]

Interfacing with stand-alone systems

W03-A18C5C [2005]

Interfacing with local network

W03-G05C1 (for general AV bus systems) is also assigned as necessary, and significant network aspects are also covered by W01-A06 codes, especially W01-A06B5A.

W03-A18R [2007]

Audience research aspects

Search in conjunction with W03-A18A6 for monitoring viewing of a particular user. Previously coded in W03-A18A1 for devices separate to subscriber equipment itself, along with W02-F04B for system aspects of audience research.

W03-A19 [2006]

Manufacturing, recycling and packaging of TV receiver

See W03-G10 codes for manufacture, recycling and packaging of general audio/video equipment.

W03-A19A [2006]

Manufacturing TV receiver

Includes assembly of component parts into TV receiver. Manufacture of displays and other TV receiver components is covered in V05, U14 etc. as appropriate, along with relevant W03 codes.

W03-A19C [2006]

Recycling TV receiver

Recycling of CRTs themselves is not included, being covered by V05-L05D1B and V05-L07E6 (these codes relating especially to tube manufacture).

Scrapping

W03-A19G [2006]

Packaging TV receiver

Carton, packing

W03-A20

Other TV receiver details

Includes antenna details.

Input isolation

W03-A21 [2007]

Video display for non-TV receiver application

This code is only assigned in conjunction with other W03-A codes used to indicate novel aspects of video displays that are **analogous** to TV receivers but are intended for other applications. For example, a display for radar equipment (also W06-A04C) with a novel gamma control circuit would be assigned W03-A04A and W03-A21. Note that video displays that are suitable for other applications **and** for TV receivers are **not** assigned.W03-A21.

W03-B

Broadcast radio receivers

Communications receivers and general receiver circuitry are covered by W02-G03 codes, TV receivers by W03-A codes. Where noise reduction aspects of broadcast receivers are involved, W02-G03B codes are **also** assigned.

From 2002, W03-B06 codes are introduced for receivers of digital broadcasts, and W03-B07 codes for digital and hybrid broadcast receiver architecture.

W03-B01

Tuners; Tuning displays

RF amplifier, mixer, local oscillator, synthesiser tuning, step tuning, continuous tuning, variable capacitance, permeability, tracking, pushbutton tuner, tuning scale, digital display

W03-B01A [1992]

RF tuner circuitry and construction

W03-B01A1 [1992]

Tuned circuits, input filters

See U25.

W03-B01A3 [1992]

RF amplifier

Novel RF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, RF AGC is covered by W03-B02A3, previously coded as W03-B01A3 and W03-B02A. Amplifiers external to the receiver itself are covered by W02-B08C5 codes.

W03-B01A5 [1992]

Mixer

Novel mixer details are also assigned U23-J01 codes.

W03-B01A5A [2006]

Image rejection mixer

Prior to 2006 this topic was represented by W03-B01A5 and W02-G03B4A (receiver image signal suppression in general). From 2006 W02-G03B4A will only be assigned for specific novelty in the image rejection aspect.

W03-B01A6 [2002]

Direct conversion and low-IF receivers

In 2006, the title of this code was amended to better describe the inclusion of 'low-IF' receivers as well as 'direct conversion' types. The subdivisions of this code are used, in conjunction with other W03-B01A codes as necessary, to represent receivers of homodyne, synchrodyne, 'zero-IF', or 'low-IF' type. Arrangements for suppression of offsets at the output of the mixer are also assigned W02-G03B4G. Direct digital conversion (DDC) in digital architecture broadcast receivers is not included here, being covered by W03-B07E. Direct conversion communications receivers are covered by W02-G03A8 codes and TV receivers of this type by W03-A01B6 codes.

W03-B01A6A [2006]

Zero-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on zero frequency.

W03-B01A6C [2006]

Low-IF receivers

This code is intended for direct conversion schemes in which the baseband information is centred on a low frequency, e.g. of the same order as the baseband bandwidth itself.

W03-B01A7 [1992]

Local oscillator

See U23-A codes also for oscillator circuits.

W03-B01A8 [1997]

Tuner constructional details

(W03-B01A9, W03-B05B)

Covers construction of tuner per se, general internal constructional details of receiver being covered by W03-B05B, which was previously assigned in addition to W03-B01A9 to indicate the construction aspect. From 1997, W03-B05B has only been used for details affecting the design of the receiver, such as mountings, etc.

W03-B01A9 [1992]

Other broadcast radio receiver tuner circuitry

Includes non-superheterodyne tuners.
TRF, homodyne

W03-B01B [1992]

Band scanning, synthesiser tuning, AFC

See also U25-J01 codes for band scanning, U25-J05 for AFC, U23-D01B codes for PLL synthesisers, and U23-F01 codes for 'direct types'.

W03-B01B1 [1997]

Channel-storing arrangements

W03-B01B1A [1997]

Based on stations receivable off-air

Signal strength, level

W03-B01B1C [1997]

Based on channel listing

Includes use of information derived from RDS signals (search with W03-B08 for this aspect). Prior to 1997 see W03-B01B and W03-B02C5.

Alternative frequency, AF, program identification, PI

W03-B01B1E [1997]

Based on determined location

Covers use of position information, e.g. input manually, or derived from navigation system data. Search with W06-A03A5 codes for use of GPS.

W03-B01B1G [2006]

User control of channel storage

Includes re-ordering stored channels, deleting channels, forming 'favorites' lists and the like.

W03-B01B3 [2007]

Channel switching arrangements

W03-B01B5 [1997]

Frequency control system per se

W03-B01C [1992]

Tuning and related displays

Includes scales, illumination etc., and digital read-out of received frequency. The use only of the tuning display to present other information is also included, e.g. for RDS or radio text (also assigned W03-B08 codes) or for DAB program guide (EPG) aspects (also assigned W03-B06). From 2011 novel aspects of broadcast radio receiver program guide reception and data handling are covered by W03-B08C5. (For EPG in TV receivers see W03-A13J).

W03-B01D [2008]

Multiple tuner aspects

This code is assigned with other W03-B codes as appropriate and is intended to highlight the use of two or more tuners in a broadcast radio receiver. For novel tuner circuitry W03-B01A codes are also assigned, and for novel frequency or channel control aspects, W03-B01B codes.

Dual

W03-B02

IF amplifiers; Detectors; Stereo decoders

W03-B02A [1992]

Automatic gain control

Prior to 2006 this code was used with W03-B01A3 for RF AGC and W03-B02B for IF AGC. These topics are now covered solely by the subdivisions below.

IF, RF, AGC

W03-B02A1 [2006]

Novel AGC characteristic

Covers delayed AGC, or other specific characteristic. See U24-C01C1 for signal processing aspects to obtain a particular AGC characteristic.

W03-B02A3 [2006]

RF AGC

Prior to 2006 this topic was covered by W03-B01A3 and W03-B02A.

W03-B02A5 [2006]

IF AGC

Prior to 2006 this topic was covered by W03-B02A and W03-B02B.

W03-B02A9 [2006]

Other broadcast radio receiver AGC aspects

W03-B02B [1992]

Broadcast receiver IF system

From 2006, W03-B02B5 is introduced to separately highlight IF amplifiers, and IF AGC is covered by W03-B02A5 (previously coded as W03-B02A and W03-B02B).

W03-B02B1 [1992]

IF filter

See U25 codes for LC and active filters. Crystal, SAW, and ceramic filters are also coded in V06 (and U14-G for SAW devices).

W03-B02B5 [2006]

IF amplifier

Novel IF amplifier details are also assigned U24-G01D and other relevant amplifier codes. From 2006, IF AGC is covered by W03-B02A5, previously coded as W03-B02A and W03-B02B.

W03-B02C [1992]

Demodulators, decoders

W03-B02C1 [1992]

AM/FM demodulators

See U23 codes for demodulator circuits also.

W03-B02C3 [1992]

Stereophonic decoders and stereo separation control

From 2006, the title of this code is expanded to distinguish novel stereo decoders and automatic control of separation, e.g. by blending, whether performed within the decoder or in a subsequent stage. Where noise reduction is involved W02-G03B codes are also assigned.

Phase-lock loop, PLL, pilot tone detector, matrix circuit

W03-B02C3A [1992]

Automatic stereo switching and stereo separation control

This code covers switching between stereo and mono modes, e.g. in response to low signal strength, and automatic control of separation, e.g. by blending, whether performed within the decoder or in a subsequent stage including audio amplifiers. Receiver noise reduction aspects are also assigned W02-G03B codes, e.g. W02-G03B8. *Separation control, mixing*

W03-B02C3C [2006]

Novel stereophonic decoder

U23-P05 is also assigned.

W03-B02C5 [1992]

Decoder for additional information

Includes decoder e.g. for RDS signals, which is also assigned W03-B08 (assigned for all aspects of RDS and similar-system receivers). Prior to 1997, W03-B02C5 codes were used for inventions involving RDS-type decoders and their use in a broad sense. From 1997 only inventions strictly relating to the decoder per se and its operation have been coded in W03-B02C5. In all other cases, W03-B08 is assigned, together with other W03-B codes as appropriate.

Radio data system, station ID, traffic information, ARI, radio teletext

W03-B02C5A* [1992-2005]

With storage function

*This code is now discontinued. From 2006 this code is no longer assigned, the subject matter being transferred to W03-B08A1. W03-B02C5A remains valid for records prior to 2006, when it was assigned for arrangements to store received bulletins and the like, whether the storage facility was part of the decoder or external to it, additional codes in W04 being also applied depending on storage technology, such as W04-B12 codes for magnetic tape based storage, and W04-G01B codes for storage of audio information in e.g. RAM.

W03-B03

Car radios

Used in conjunction with other W03-B codes for specific features. For aerial preamplifiers search with W02-B08C5. (Previously coded in W02-B09, W03-B01 and W03-B03). In-car entertainment systems are covered by W03-G08 and systems including car radios in which the radio is not itself linked with the novel aspect are not assigned W03-B03.

Traffic information detector, diversity receiver, antitheft system

W03-B03A [1992]

Antitheft arrangements

Includes mechanical aspects such as removable fascias, W03-B05 codes (for constructional details) being assigned as necessary.

W03-B03A1 [1992]

Electronic

Includes radio forming part of vehicle alarm system which is also coded in X22-D and W05-B01 codes. Also coded in X22-X03 for general antitheft measures. For 'password' aspects search with T01-J08A and T01-J12C.

W03-B04 [1992]

Audio amplifier and audio circuitry

This code covers audio stages of a broadcast radio receiver and includes details of audio amplifiers and associated circuitry, such as volume and tone controls, auxiliary inputs, and muting arrangements when used with W02-G03B1. Novel amplifier muting circuits are also coded in U24-C05C and gain control in general by U24-C codes. Audio amplifiers in general are covered by W03-C01 codes, and amplifiers in general by U24-G codes. These codes are also assigned as appropriate along with other W03-C codes such as W03-C03C for volume control and W03-C05 codes for tone control and equalizers.

W03-B05 [1992]

Constructional details

(W03-B09)

Constructional details of electronic equipment in general are covered by V04-S and V04-T codes.

W03-B05A [1992]

Casing, housing, mounting kit

(W03-B09)

Cabinet, sleeve, escutcheon, bracket, support

W03-B05B [1992]

Internal construction

(W03-B09)

Includes e.g. PCB or component mounting, etc.

W03-B06 [2002]

Receiver for digital broadcasts

(W02-K07C, W03-B09)

These codes are intended for broadcast receivers of digital radio signal formats such as DAB, DRM, and analogous systems. Systems aspects of DAB are covered by W02-D05C1 and W02-K07C for the OFDM aspect. Receivers employing digital architecture – for analogue or digital broadcast reception – are covered by W03-B07 codes, which may be assigned as well for digital broadcast receivers with digital architecture.

Digital audio broadcast, digital radio mondiale, digital AM, QAM

W03-B06A [2002]

Satellite radio broadcast receiver

(W03-A16A, W03-B09)

Prior to 2002, satellite receivers were assigned W03-A16A as well as W03-B09. W03-A16A will continue to be used for satellite radio reception from 'TV' satellites, but from 2002 will not be used for 'pure' radio satellite reception. Systems aspects of satellite radio are covered by W02-D05A and satellite TV by W02-F06A.

W03-B06C [2002]

Internet broadcast receiver

(T01-H07C5E, W01-A06B7, W03-B09)

This code is intended for 'internet radio' receiving arrangements, which may be part of a receiver, accessory equipment, or wholly contained within a PC as hardware or software.

W03-B06E [2012]

Terrestrial digital broadcast radio receiver

This code covers receivers of digital radio broadcasts from terrestrial transmitters, such as digital audio broadcast (DAB) or digital radio mondiale (DRM) receivers. Note that 'DRM' in the sense of 'digital rights management' is not included and is covered by W03-B06J. Prior to 2012 W03-B06 was assigned for terrestrial digital radio broadcast receivers. Receivers for digital satellite radio are covered by W03-B06A.

W03-B06E1 [2012]

Terrestrial digital broadcast radio receiver with analog reception capability

This code covers receivers of digital radio broadcasts from terrestrial transmitters, such as DAB or DRM, which are also capable of receiving analog broadcasts, e.g. in AM or FM bands. TV receivers capable of receiving analog and digital broadcasts are covered by W03-A11G1.

W03-B06J [2012]

Digital rights management, copy protection and access control

This code covers digital rights management aspects of digital sound broadcast receivers, including copy protection and access-restriction. Note that when these topics arise in interactive systems, e.g. 'audio on demand', W03-A16C3 codes take precedence and are assigned instead of W03-B06J (with W03-A16C5C in the case of audio-based systems).

W03-B07 [2002]

Digital and hybrid broadcast receiver architecture

(W03-B09)

This code is assigned for receivers - of signals with analogue or digital modulation - which are implemented using DSP techniques in whole or in part. The codes are used in conjunction with other W03-B codes as necessary where there are direct equivalents in analogue receivers, in particular for RF amplifiers, oscillators, IF stages and demodulators. Corresponding digital techniques for communications and TV receivers are covered by W02-G03K and W03-A11K codes. Receivers for digital broadcasts, such as DAB, are covered by W03-B06 codes, and may also be assigned W03-B07 codes if the receiver itself employs a digital, or part digital, architecture.

W03-B07A [2002]

Characterised by usage of DSP

(W03-B09)

These codes are used to distinguish between different levels of DSP being applied to the signal path in the receiver. As such, they do not normally represent novel digital processing aspects, which are conveyed by use of other W03-B07 codes. DSP in general is covered by T01-J08A2, T01-J08B and U22-G codes depending on specific aspects.

W03-B07A1 [2002]

With baseband digital signal processing only

(W03-B09)

This code covers receivers with a digital signal processing path **after** the conversion to baseband.

W03-B07A3 [2002]

With baseband and IF digital signal processing only

(W03-B09)

This code covers receivers with DSP in IF, demodulator, and baseband stages.

W03-B07A5 [2002]

With digitising of RF spectrum

(W03-B09)

This code covers receivers with digitising of the whole signal processing path, except for the possible use of analogue RF amplifiers.

W03-B07A9 [2002]

Other use of DSP in digital broadcast radio receivers

(W03-B09)

W03-B07C [2002]

AD conversion

Novel aspects of AD converters and AD conversion are covered by U21-A03 codes.

W03-B07E [2002]

Digital mixing and direct digital conversion

(W03-B09)

DDC

W03-B07G [2002]

Filtering

(W03-B09)

Novel digital filters are also assigned U22-G01 codes, and T01-J08B when the emphasis is on computing aspects.

W03-B07J [2006]

Transform implementation

(W03-B09)

DSP-based transform implementation is covered by U22-G03E1A and computer data processing aspects in general by T01-J04B1.

W03-B07L [2006]

DA conversion

(W03-B09)

Novel aspects of DA converters and DA conversion are covered by U21-A02 codes.

W03-B07X [2002]

Other digital broadcast radio receiver aspects

(W03-B09)

W03-B08 [1997]

Receiving additional information

(W03-B02C5, W03-B09)

From 2011, the title of this code has been changed and its scope expanded to include arrangements for receiving 'additional information' such as text and electronic program guide (EPG) information transmitted with digital audio broadcast (DAB) signals, RDS information and emergency broadcast messages. Between 1997 and 2010 this code was used for all aspects of receivers for RDS and similar text-based systems with W03-B02C5 codes being assigned for inventions involving RDS-type decoders. Before 1997 W03-B02C5 was assigned in a broader sense to indicate receivers for RDS and similar systems. In all cases other W03-B codes are also assigned as appropriate.

W03-B08A [2006]

Storage for additional information and programme content

(W03-B02C5A)

This code, which replaced W03-B02C5A in 2006, is intended for buffer storage of either additional information (as defined above) for subsequent replay, or programme content, e.g. content missed by the reproduction of a traffic message, or due to channel changing. W03-B08A1 and W03-B08A5 indicate what is stored while W03-B08A7 is assigned when the storage arrangement itself is novel. The storage of messages or content may occur within the broadcast receiver, or within external equipment which is connected to it. For both of the specific subdivisions below, W04 codes are also assigned as appropriate for the technology used to store the information. Full-scale recording within a receiver - e.g. of an extended section of a broadcast program - is not included, and is regarded as a 'radio-recorder' combination and covered by W03-B codes, W03-G03A and W04 codes as appropriate.

W03-B08A1 [2006]

Storage for additional information

(W03-B02C5, W03-B09)

Covers arrangements for storing traffic bulletins (e.g. TMC announcements, emergency broadcasts, or other information) in text, audio or other form, for replay as desired.

W03-B08A5 [2006]

Storage for programme content

(W03-B02C5, W03-B09)

Covers arrangements for storing a limited amount of program content. Includes arrangement for storing e.g. the part of a radio program interrupted by a traffic announcement in RDS or similar systems, so that listening can resume from the time of the interruption. The content stored may be a radio programme received by the broadcast receiver itself, or external sources such as a CD or DVD player, a TV receiver, etc.

W03-B08A7 [2011]

Novel aspects of storage and memory

(W03-B02C5, W03-B09)

Covers novel arrangements such as memory circuits etc.

W03-B08C [2011]

Characterised by type of additional information

These codes are assigned to indicate the type of additional information as it is actually received. W03-B08C8 is assigned to denote the conversion of the information into another form.

W03-B08C1 [2011]

Visual information

Program guide reception is covered by W03-B08C5 which takes precedence over W03-B08C1 codes as EPG information is assumed to be in the form of text and/or graphics unless other codes indicate another method of presenting it. Prior to 2011 W03-B01C was used to denote EPG presentation but from 2011 will only be assigned for novel display-related aspects.

W03-B08C1A [2011]

Text

W03-B08C1C [2011]

Visual information

This code covers the reception of still or moving images only as 'additional information' transmitted with a radio broadcast. Reception of normal TV signals is covered by W03-A codes and is not included here.

W03-B08C3 [2011]

Audio information

Includes reception of additional information in the form of spoken announcements.

W03-B08C4 [2012]

Weather information

This code covers reception of meteorological information. When disaster warning or emergency aspects are involved W03-B08C7 ('Emergency broadcasts') is also assigned.

W03-B08C5 [2011]

Program guide systems (EPG) and content descriptions

This code covers program guide information and also 'now playing' information describing e.g. a musical piece being played, or other associated information. This code takes precedence over W03-B08C1A, i.e. the information is assumed to be in text form unless other codes indicate another method of presenting it. EPG aspects of DAB receivers are indicated by assignment of W03-B06 also.

W03-B08C6 [2012]

Transport-related information

This code covers reception of information related to transport, including road traffic information concerning congestion.

W03-B08C7 [2011]

Emergency broadcasts

Codes indicating 'disaster-related' alarms in W05-B08 are also assigned as appropriate. Reception of emergency broadcast messages in TV receivers is covered by W03-A18A5J.

Adverse weather, avalanche, bush fire, earthquake, eruption, flooding, forest fire, hurricane, landslide, landslip, mudslide, terrorist attack, tidal wave, tornado, tsunami, typhoon, volcano.

W03-B08C8 [2011]

Transforming information type

This code is used with other W03-B08C codes indicating the original form of additional information and denotes its conversion into another form, e.g. from text to audible form or vice versa. W04-V04A6 and W04-V04C1 are also respectively assigned for speech-to-text or text-to-speech conversion when necessary.

W03-B08C9 [2011]

Other information type

W03-B09

Other broadcast radio receiver aspects

This code was used for digital receivers prior to 2002, now assigned W03-B07 codes, and for testing, control and interfacing aspects until 2010, which are now assigned W03-B10 codes.

Power supply

W03-B10 [2010]
Broadcast radio receiver testing, control and interfacing
(W02-C05B ; W03-B)
These codes cover testing of broadcast radio receivers and also control in a general sense, rather than control of a specific parameter as part of normal receiver operation.

W03-B10A [2010]
Broadcast radio receiver testing
(W02-C05B ; W03-B)
Testing of a specific part of a broadcast receiver is indicated by co-assignment of the appropriate W03-B code. Testing of broadcast radio **systems** is covered by W02-D04 codes.

W03-B10A1 [2010]
Broadcast radio receiver self-testing
(W02-C05B; W03-B)
Includes monitoring arrangements for detecting e.g. low battery or fault condition.

W03-B10A5 [2010]
Broadcast radio receiver testing using external equipment
(W02-C05B ; W03-B)
Includes monitoring and testing using external test equipment, e.g. for production line testing or repair.

W03-B10C [2010]
Broadcast radio receiver control
(W03-B09)
This code covers control of broadcast radio receivers in a general sense, and not control of a specific parameter as part of normal receiver operation, such as automatic frequency control (W03-B01B5) or automatic gain control (W03-B02A).

W03-B10E [2010]
Broadcast radio receiver interfacing
(W03-B09)
This code covers arrangements for interfacing with broadcast radio receivers including hardware and software aspects. Interfacing with TV receivers is covered by W03-A18C codes and with AV equipment in general by W03-G05C codes.

W03-B10R [2012]
Broadcast radio receiver audience research details
Broadcast system aspects of audience research are covered by W02-D04B. TV receiver audience research aspects are covered by W03-A18R.

W03-B10X [2010]
Other broadcast radio receiver control and interfacing aspects
(W03-B09)

W03-C
Audio amplifiers; Tone and volume control; Balancing
Monaural, stereophonic amplifier, preamplifier power amplifier, output stage

W03-C01 [1992]
Audio amplifier per se
See U24-G codes for circuitry details.

W03-C01A [1992]
Preamplifier
Also coded in U24-G01C.

W03-C01C [1992]
Power amplifier
Also coded in U24-G01B1.

W03-C01C1 [2005]
Amplifier integrated with loudspeaker(s)
For wireless loudspeaker systems W03-G05C5C is also assigned.
Powered speaker

W03-C01G [2005]
Digital amplifier
Covers amplifiers generally of class-D type, for which U24-G01B1 and U24-G02E are assigned also.

W03-C01G1 [2005]
Digital input

W03-C01G3 [2005]
Digital input and output

W03-C03 [1992]
Volume and balance control

W03-C03A [1992]

Balance control

See W04-R01C codes also for stereophonic systems.

W03-C03C [2005]

Volume control

U24-C codes are also assigned for novel aspects of automatic and manual gain control.
AGC

W03-C05 [1992]

Tone controls and equalisers

See U25-F05 and U24-C05D codes for further circuit details.
Fader

W03-C05A [1992]

Tone controls

W03-C05C [1992]

Analogue equalizer circuits

This code includes analogue graphic equalizers. Prior to 1992, audio equalizing was also routinely coded in W04-G, which is now only assigned for general applications.

W03-C05E [2005]

Digital EQ

U22-G codes are also assigned for details of digital filters and DSP.

W03-C05E1 [2005]

Adaptive EQ

Includes sensing and matching character of speakers. Adaptive digital filters are also assigned U22-G01A5 codes.

W03-C07 [1992]

Constructional details

See V04-S and V04T codes also.

W03-C09 [1992]

Other audio amplifier details

W03-G [1992]

General aspects of audio-video equipment

(W03-X)

Codes in this section are used for general aspects only, and not for instances for which a **single** specific code exists elsewhere (e.g. in W03 or W04).

W03-G01 [1992]

Constructional details

(W03-X)

W03-G01A [1992]

Constructional details of equipment per se

(W03-X)

W03-G01A1 [1992]

Internal construction

(W03-X)

W03-G01A5 [1992]

Casings/housings

(W03-X)

Front panel, marking, legend

W03-G01C [1992]

Mountings, supports, stands

(W03-X)

W03-G02 [1992]

Power supplies

(W03-X)

See U24 codes also as appropriate.

W03-G02A [2005]

Battery power supply

W03-G02A1 [2005]

Battery per se

Novel details of batteries are covered by X16 codes.

W03-G02A3 [2005]

Battery supply circuitry

W03-G02A5 [2005]

Battery charging

W03-G02C [2005]

Mains power supply

W03-G03 [1992]

Combination equipment

(W03-X)

W03-G03A [1992]

Contained in one housing

(W03-X)

Radio-cassette player, radio-TV receiver, clock-radio

W03-G03A1 [2006]

Media centre PC and related equipment

This code is assigned for multimedia PC systems designed to perform the functions of several AV equipment units, e.g. TV set, CD/DVD recorder/player, radio receiver, etc. See also T01 codes for specific computing aspects, such as multimedia computer systems in T01-J30 codes.

W03-G03C [1992]

Mountable in rack, interlocking apparatus

(W03-X)

Stacked combination hi-fi system

W03-G03H [2007]

Home theatre equipment

Covers home theatre applications. Novel details of audio processing circuitry, surround sound and interfacing are assigned e.g. W03-C, W04-R and W03-G05C codes respectively.

W03-G04 [2006]

Portable AV equipment

W03-G05 [1992]

Remote control, general control, general displays and interconnection

(W03-X)

From 2006 the title and scope of this code is expanded to include control and display aspects of AV equipment in general, these topics being respectively covered in W03-G05E and W03-G05G codes.

W03-G05A [1992]

Remote control for audio video apparatus

(W03-X)

Remote control specific to TV receivers is covered by W03-A02C codes, and for recording equipment by W04-E04A. W05-D codes cover remote control in general.

W03-G05A1 [1997]

Coding and transmission format

W03-G05A1A [1997]

Universal type remote controller

Includes 'learning' types.

W03-G05A5 [1997]

Combined with additional features

Includes combination with e.g. telephone (see W01-C codes also, e.g. W01-C05B5A, or W01-C01P codes), and remote audio or video display facility. Includes provision of dedicated display, e.g. for indicating control functions.

W03-G05A6 [2006]

In conjunction with on-screen display

This code includes the application of GUI techniques to control of AV equipment in general. When specific to remote control of a TV set W03-A02C5A is assigned instead.

W03-G05A7 [1997]

Locator system

Covers 'transponder' arrangement producing e.g. audible tone in response to signal emitted from main equipment.

W03-G05A8 [2009]

AV equipment remote control repeaters and extenders

This code covers arrangements for extending the range of remote control signals transmitted to AV equipment such as 'remote control extenders', usually based on repeaters. Novel aspects of repeaters are also assigned codes depending on technology, e.g. W02-C04A5 for optical repeaters and W02-G05C for radio types. Similar arrangements for remote control applications other than AV equipment are covered by W05-D08R.

Free-space, IR, relay, RF, room

W03-G05C [1997]

Interconnection of audio/video equipment

See also appropriate codes for communication system, e.g. W01-A06 codes for networks.

HAVI, Home Audio Video Interface, HDMI

W03-G05C1 [1997]

AV home network

Novel network aspects are also assigned W01-A06 codes.

DLNA, HANA, Universal Plug and Play, UPnP

W03-G05C1A [2013]

Networked media storage

Covers centralised storage of e.g. audio or video content that can be accessed over a home AV network. Novel recording equipment aspects are covered in T03 and W04 as appropriate. Remote servers for content storage in on-demand broadcast systems are not included and are covered by W02-F10K.

Home AV server, network drive

W03-G05C1C [2013]

Network communication aspects

Covers novel aspects of communication between AV equipment units over a home network. Novel aspects of network communication are also assigned W01-A06 codes. Home automation (HA) networks for control of heating, lighting and domestic appliances are covered by W05-D07A but that code may be assigned with W03-G05C1 when both AV equipment and other equipment in the home are connected to the same network.

W03-G05C3 [2012]

High definition multimedia interface (HDMI)

This code covers interfacing using high definition multimedia interface (HDMI) standard and is subdivided into novel aspects of HDMI (W03-G05C5A), such as circuitry, cables or connectors, and inventions where the use of HDMI is significant (W03-G05C5C).

W03-G05C3A [2012]

Novel aspects of HDMI

This code covers novel aspects of HDMI, such as circuitry, cables or connectors. Specific details of the novelty are indicated by assignment of additional codes, e.g. W03-G07A for a novel HDMI cable.

W03-G05C3C [2012]

Applications of HDMI

This code covers inventions where the use of HDMI is significant. It is not assigned in cases where a number of other types of interface are equally applicable.

W03-G05C5 [1997]

'Dedicated link' systems

W03-G05C5A [1997]

Cordless headphones

W03-G05C5C [2005]

Wireless speaker systems

W03-G05E [2006]

General AV equipment control

This code covers control systems of general application to AV equipment, but not remote control, which is covered by W03-G05A codes.

W03-G05E1 [2006]

Menu-based AV equipment control

W03-G05G [2006]

General AV equipment operation display

These codes are intended for display aspects applicable to AV equipment in general. For display aspects specific to TV sets and recording equipment see W03-A and W04-J03 codes respectively.

W03-G05G1 [2006]

Dedicated display for AV equipment

Dedicated displays forming part of recording and playback equipment are covered by W04-J03A.

W03-G05G5 [2006]

On-screen display for AV equipment

OSD generated within a TV set is covered by W03-A13G and within recording equipment by W04-J03C.

W03-G06 [2006]

AV equipment requiring operation with PC

Includes sound, TV and video recording/editing cards installed in a PC or external devices with e.g. USB interface which operate using a PC processor. See also T01 for computing aspects.

W03-G07 [1992]

Connectors, leads, plugs, sockets, components in general

W03-G07A [1992]

Leads and cables, connectors

(W03-X)

W03-G07C [1992]

Components in general

(W03-X)

W03-G08 [1992]

AV equipment used in a vehicle

(W03-X)

The title of this code has been changed to better reflect its actual use. W03-G08 includes in-car entertainment systems, for which X22-J13 is also assigned, and AV equipment used in any other kind of vehicle for which other codes are also assigned as appropriate, such as W06-B01C7 for aircraft in-flight entertainment. Specific W03 and W04 codes are also assigned depending on equipment type. Note that car radios with no other aspect are not included here and are covered by W03-B03 codes.

W03-G09 [1992]

Other general audio-video equipment aspects

(W03-X)

Prior to 2006 this code included recycling and packaging aspects. This topic is now covered in W03-G10.

W03-G10 [2006]

Manufacturing, recycling and packaging of AV equipment

(W03-X)

Covers all general audio-video equipment, including recording equipment (see W04 for other aspects). Manufacturing, recycling and packaging specifically for TV receivers is covered in W03-A19. For manufacturing, recycling and packaging aspects of general electrical equipment see V04-X01 codes.

W03-G10A [2006]

Manufacturing AV equipment

W03-G10C [2006]

Recycling AV equipment

W03-G10G [2006]

Packaging for AV equipment

W03-X

Other audio and video equipment details

W04: Audio/Visual Recording and Systems

Prior to 2002 this class covered all aspects of audio/visual recording and reproduction (covered chiefly by W04-A to W04-L codes). Signal processing aspects were generally coded in W04 only while details of record carriers and head-carrier drive systems were coded in both T03 (Data recording) and W04. From 2002, with the exception of mechanical recording methods (W04-A), W04 will only cover applications, formatting, signal processing and constructional aspects specific to audio/visual recording. All carrier and mechanical aspects of recording and reproduction are coded in T03 only. Accordingly from 2002 a large number of codes in W04-B, W04-C, W04-D, W04-E, and W04-L have been discontinued. Additionally, from 2006 a number of general aspects of audio-video equipment are covered in W03-G, such as manufacturing, recycling and packaging in W03-G10 and portable equipment in W03-G04. As well as the above, W04 covers the following material:-

- (1) General audio signal processing and sound mixing (W04-G codes)
- (2) Video cameras, TV studio and special effects equipment (W04-M/N codes)
- (3) General video signal processing (W04-P codes)
- (4) Projection TV and analogous systems (W04-Q codes)
- (5) Stereophonic systems, loudspeaker enclosures, public address (W04-R/S/T codes)
- (6) Electronic musical instruments (W04-U codes)
- (7) Sound analysis, synthesis, speech coding, audio coding, and antiphase sound cancelling (W04-V codes)
- (8) Educational and sports equipment, games, amusements (W04-W/X codes)
- (9) Audio and video aspects of multimedia
- (10) Hearing aids (W04-Y codes)

From 1997 W04-E20 codes were introduced to highlight recording equipment operating mode. These codes are intended to be used in conjunction with any other W04 codes relating to recording, to indicate aspects such as time lapse, reverse playback, etc.

W04-A

Recording using mechanical methods

Gramophone

W04-A01

Record carriers; Cleaning

Brush, fluid, liquid, cleaning pad, anti-static 'gun', groove, vinyl

W04-A02

Heads; Record carrier positioning

See V06-B01 also for head details.

Pick-up, cartridge, magnetic, moving coil, piezoelectric, stylus, diamond, turntable, mat, motor drive, speed selector/control, autochanger

W04-A03

Head positioning, i.e. tone arms

Parallel, tangential, radial, tracking, cueing arm, raising, lowering, track selection

W04-A09

Other mechanical recording aspects

Includes integral 'loudspeaker' cone for pre-recorded message reproduction in e.g. toy or warning device.

W04-B

Recording using magnetic record carriers

Prior to 2002 record carrier materials and carrier manufacture were **not** included, and were assigned T03-A codes only. From 2002 **only** applications, formatting, and signal processing aspects of audio/visual magnetic recording are included in W04-B.

Equalising

W04-B01

Recording formats; Re-recording

For recording format, emphasis is on physical disposition of tracks, see W04-F01 and W04-G01 for signal transformation aspects.

W04-B01A [1992]

Recording formats

Channel, helical, slant, slope, parallel, guard band, track

W04-B01C* [1992-2005]

Re-recording, anti-copying

*This code is now discontinued. Since 2006 hardware aspects of anti-copying have been covered in T03-H07 while signal processing aspects are covered in W04-F01L.

W04-B01C1* [1992-2005]

Preventing re-recording of signal

*This code is now discontinued.

W04-B01C1A* [1992-2005]

By signal modification or additional recorded data

*This code is now discontinued.

Guard

W04-B01C3* [1992-2004]

Re-recording

*This code is now discontinued and since 2005 all duplication for production of pre-recorded tapes or disks is covered in T03-B07B. See W04-H05A for dubbing.

Copy

W04-B02* [1980-2001]

Audio/video heads and head cleaning

*This code is now discontinued and since 2002 this subject matter is assigned T03-A03 and T03-A04 codes only. The codes W04-B02A and W04-B02C remain valid and fully searchable for records prior to 2002.

Core, gap, thin-film, ferromagnetic, ferrite, glass, coil

W04-B02A* [1992-2001]

Audio/video head

*This code is now discontinued and since 2002 magnetic heads have been assigned T03-A03 codes only, and head manufacture has been covered by T03-A04A codes.

W04-B02C* [1992-2001]

Cleaning and demagnetisation of heads

*This code is now discontinued. Prior to 2002, search with T03-A04B codes to discriminate particular aspects e.g. T03-A04B1 for demagnetising (also coded in V02-D); T03-A04B3B and T03-N03 for cleaning cassette.

W04-B03* [1980-2001]

Head positioning

*This code is now discontinued and since 2002 the subject matter previously coded here has been covered by T03-A05 codes only. The codes in this sub-group remain valid and fully searchable for records prior to 2002.

Drive, motor, angle, step, track selecting/aligning

W04-B03A* [1980-2001]

For disks or drums

*This code is now discontinued.

W04-B03B* [1980-2001]

For tape

*This code is now discontinued. Prior to 2002 synchronisation with tape movement was indicated by co-assignment of W04-E10.

W04-B03B1* [1992-2001]

For helical scan

*This code is now discontinued. Prior to 1992, this topic was indicated by assignment of W04-E01A with W04-B03B. From 2002, T03-A05D codes alone are assigned for helical scan head positioning, including details of the head drum itself.

Rotating drum

W04-B03B1A* [1992-2001]

Dynamic adjustment of head position

*This code is now discontinued. Prior to 2002 T03-A05A1 codes were also assigned for this topic which includes speed control, track following, alignment, and also adjusting elements themselves. (See V06-M06D for piezoelectric elements). Since 2002 T03-A05A1 codes have been assigned exclusively for this subject matter.

Tracking, bimorph

W04-B03B1C* [1992-2001]

Head rotary drive per se

*This code is now discontinued, but prior to 2002 it included the motor itself and drive components.

W04-B04* [1980-2001]

Record carrier positioning

*This code is now discontinued and from 2002 the subject matter previously coded in this sub-group is covered by T03 codes only. W04-B04 codes remain valid and fully searchable for records prior to 2002.

Cassette, cartridge, load, eject, motor, drive

W04-B04A* [1980-2001]

For disks or drums

*This code is now discontinued and from 2002 this subject matter is covered by T03-F codes only. W04-B04A remains valid and fully searchable for records prior to 2002 and included housings in which the carrier is driven during normal operation. W04-E02A codes were also assigned for this topic between 1992 and 2001.

W04-B04B* [1980-2001]

For tape

*This code is now discontinued and since 2002 this subject matter has been coded in T03-E only. The codes W04-B04B1 to W04-B04B7A remain valid and fully searchable for records prior to 2002. For synchronization with head movement, W04-E10 was also assigned.

W04-B04B1* [1992-2001]

Tape containers

*This code is now discontinued. For cassettes it was assigned with W04-E02B1 codes and T03-H01B codes but since 2002 only T03-H01B codes have been used to denote this subject matter.

W04-B04B3* [1992-2001]

Tape drive system

*This code is now discontinued. Tape drive systems were also assigned T03-E codes which are now used alone for this topic.

W04-B04B3A* [1992-2001]

Tape drive components

*This code is now discontinued.

W04-B04B3C* [1992-2001]

Tape speed control

*This code is now discontinued. Prior to 2002, combined head/tape speed control was also assigned W04-B03B1A and W04-E10.

W04-B04B5* [1992-2001]

Tape drive mode control

*This code is now discontinued.

W04-B04B5A* [1992-2001]

Automatic control of operating mode*

*This code is now discontinued and from 2002 this subject matter is coded in T03-E05A or its subdivisions only.

Autostop, blank, space, gap, leader

W04-B04B5C* [1992-2001]

Manual control of operating mode

*This code is now discontinued and since 2002 this subject matter, which includes switches, operating keys etc., is covered by T03-E05B alone.

W04-B04B6* [1992-2001]

Tape cassette loading and changing

*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01B or its subdivisions only.

W04-B04B7* [1992-2001]

Tape looping and threading

*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01C only.

W04-B04B7A* [1992-2001]

Looping/threading for helical-scan tape

*This code is now discontinued and since 2002 this subject matter has been covered by T03-E01C1 and T03-N02.

W04-B10 [1987]

Video tape recorder

Prior to 1992, this code was only used for VTR details which were not completely covered by other W04-B codes. Since 1992 W04-B10 codes have been applied to **all** aspects of VTRs, and are intended to provide broad groupings of subject matter. Other W04 codes should be used in conjunction to provide more detail.

W04-B10A [1992]

Heads, head and tape transport

Includes recording formats, for which W04-B01A is also assigned. (Prior to 2002 all W04-B01 to W04-B04 codes were assigned with W04-B10A). Since 2002 this code has been used in conjunction with T03-A and T03-E codes to denote the VTR application for inventions relating to heads, head movement, and tape transport.

W04-B10B [1992]

Signal processing

For full details of signal processing see W04-F codes also. (for audio signal processing aspects, search with W04-G01 codes).

W04-B10C [1992]

Control, power supplies, interfacing

For remote control or control or programming search with W04-E04 codes. For editing and indexing aspects search with W04-H codes, and for testing/monitoring, W04-J codes).

W04-B10D [1992]

Construction

Also assigned W04-L05 codes.

W04-B10G [1992]

Digital video tape recorder

DVTR

W04-B10K [1992]

Dual cassette deck VTR

W04-B12 [1992]

Audio tape recorder

Codes in this section are assigned for **all** aspects of audio tape recorders, in conjunction with other W04 codes as appropriate.

W04-B12A [1992]

Heads, head and tape transport

Includes recording formats (i.e. scope of this code is that of W04-B01 to W04-B04 codes).

W04-B12B [1992]

Signal processing

W04-B12C [1992]

Control, power supplies, interfacing

For remote control or programming see W04-E04 codes also. For editing and indexing aspects search with W04-H codes and for testing monitoring, W04-J codes.

W04-B12D [1992]

Construction

Also assigned W04-L05 codes.

W04-B12G [1992]

Digital audio tape recorder

DAT, R-DAT

W04-B12H [1992]

Miniature audio tape recorder

Includes 'personal stereo' type of equipment - with or without recording facility.

W04-B12J [1992]

Dictation recorder

W04-B12K [1992]

Dual cassette-deck audio tape recorder

W04-B14 [1992]

Magnetic audio and video disk equipment

From 1997 the scope of this code is expanded to encompass magnetic disk systems for audio recording also, and hard disk systems for both audio and video.

W04-B14A [1992]

Flexible disk system

For use within electronic still picture camera see also W04-M01B1A. Digital cameras using hard disks for picture storage are assigned W04-B14C3.

W04-B14B* [1992-2004]

Playback unit for recorded disk

*This code is now discontinued and since 2005 systems for playback of flexible disks used for storing pictures from digital cameras are covered in W04-B14A.

W04-B14C [1997]

Hard disk system

Hard disk systems purely for computer data storage are covered in T03 only, e.g. T03-A08A1C or T03-A08A5. For hard disk system storing information in an on-demand entertainment system, see W04-K05A and W02-F10K also. For editing aspects, search with W04-H05 codes.

W04-B14C1 [1997]

Audio hard disk system

W04-B14C3 [1997]

Video hard disk system

W04-B16 [1992]

Cassette library system

Also coded in T03-N03 and T03-Q01.

W04-C

Recording using optical methods

W04-C10 codes are assigned as appropriate to indicate equipment type.

From 2002 **only** applications, formatting, and signal processing aspects of audio/visual optical recording are included in W04-C. From 2002, optical record carriers and head/record carrier drive arrangements are assigned T03-B codes **only**. Magneto-optical recording is **not** included and is covered by W04-D codes.

Disk, compact, digital, laser

W04-C01* [1980-2001]

Record carriers

*This code is now discontinued and since 2002 this subject matter has been covered in T03-B01 only. W04-C01A to W04-C01E remain valid and fully searchable for records prior to 2002.

WORM, DRAW

W04-C01A* [1992-2001]

Record carrier substrate

*This code is now discontinued.

Mould, transparent resin, PMMA

W04-C01B* [1992-2001]

Light-sensitive layers

*This code is now discontinued.

Photochromic, ablation, deformation, interaction, phase transition, combination, reversible, multilevel, segregation

W04-C01C* [1992-2001]

Protective and (anti-) reflective layers

*This code is now discontinued.

W04-C01E* [1992-2001]

Record carrier manufacture

*This code is now discontinued.

W04-C01F* [1992-2006]

Physical recording format aspects

*This code is now discontinued. Since 2007 this topic can be searched using T03-B01F codes in conjunction with T03-B01D1A, T03-B01D3A or T03-B01D5A as appropriate. See W04-C05 for signal aspects of recording formats.

W04-C02* [1980-2001]

Heads

*This code is now discontinued. From 2002 this subject matter is covered by T03-B02B codes only. W04-C02 and its subdivisions remain valid and fully searchable for records prior to 2002.

W04-C02A* [1992-2001]

Light source and photodetector

*This code is now discontinued.

W04-C02A1* [1992-2001]

Light source

*This code is now discontinued. Prior to 2002 it included semiconductor lasers, full details of which are highlighted by U12-A01B codes and corresponding codes in V08, which also includes other laser types.

W04-C02A5* [1992-2001]

Photodetector

*This code is now discontinued. Prior to 2002 it included photodetectors for reading from a carrier and for focus detection. U12-A02B codes, e.g. U12-A02B2A for APD and other types of photodiode, are assigned for this topic.

W04-C02B* [1992-2001]

Lens and optical system

*This code is now discontinued.

Objective, beam splitter, polarizer

W04-C02C* [1992-2001]

Head cleaning

*This code is now discontinued and this topic, including use of dummy cleaning carriers, is covered by T03-B02B8 only.

W04-C03* [1980-2001]

Head positioning (incl. focusing)

*This code is now discontinued and from 2002 this subject matter is now covered by T03-B02A codes only. The codes W04-C03A to W04-C03H remain valid and fully searchable for records prior to 2002 when W04-C10 codes enabled a distinction to be made between head positioning for disks, tapes, etc.

W04-C03A* [1992-2001]

For focusing

*This code is now discontinued.

Focus detection, servo, objective positioning, voice coil motor, VCM

W04-C03B* [1992-2001]

For track selection and alignment

*This code is now discontinued. Prior to 2002 it included topics such as linear motors (see V06-M codes also), and track access/tracking servo systems.

W04-C03D* [1992-2001]

Control circuit for light source

*This code is now discontinued and from 2002 is covered by T03-B02A7 only. Laser diode bias control is also assigned U12-A01B4 and corresponding codes in V08.

W04-C03H* [1997-2001]

Head positioning for double-sided disk

*This code is now discontinued but prior to 2002 it included dual-head systems and arrangements for moving a single head to the other side of a disk.

W04-C04* [1980-2001]

Record carrier positioning

*This code is now discontinued. From 2002 – 2004 this subject matter was assigned T03-B03 codes, while since 2005 T03-B10 codes have been used, in all cases T03-E and T03-F codes being also assigned as appropriate. The codes W04-C04A to W04-C04B remain valid and fully searchable for records prior to 2002.

Turntable, loading device, drive, motor

W04-C04A* [1992-2001]

Record carrier container

*This code is now discontinued but prior to 2002 it covered containers in which carriers are driven, for which W04-E02 codes were also assigned to indicate further details. Storage containers are covered by W04-L01 codes.

W04-C04B* [1992-2001]

Record carrier drive

*This code is now discontinued. Prior to 2002 it was assigned with W04-E02 codes for further details, e.g. W04-E02A5 codes for disk changing.

W04-C05 [1992]

Signal recording format and methods

From 2002 this code is only used for recording formats and methods specific to audio/video. General optical recording formats and methods are coded in T03-B05. Covers arrangement of data only, physical aspects such as hard sectoring of data, are covered by T03-B01F from 2007. Prior to 2007 this topic was coded in W04-C01F.

W04-C06 [1992]

Reading and writing circuitry

From 2002 this code is only used for reading and writing circuitry with aspects relevant to audio/video recording. General optical reading and writing circuitry is coded in T03-B06.

This code is used with W04-F or W04-G01 codes if audio/video processing is significant.

W04-C10 [1992]

Optical recorder/player

Codes in this section are applied for **any** aspect of optical recording/playing equipment.

W04-C10A [1992]

Disk

CD, CDi, interactive

W04-C10A1 [1992]

Audio e.g. 'CD player'

W04-C10A1K [2005]

Dual deck optical disk player/recorder

W04-C10A2* [2002-2004]

Multilayer, e.g. 'DVD player'

*This code is now discontinued. From 2002 to 2004 it was used to denote multilayer optical disk player/recorders used for non-specified audio/video/data storage. Since 2005 this topic has been covered in T03-B10A1, and for storage of audio/video information along with additional data formats, in W04-C10A3A. Prior to 2002 digital versatile disk or digital video disk player/recorders were coded in W04-C10A3.

W04-C10A3 [1992]

Optical video players and recorders

Includes e.g. DVD, Blu-ray disk equipment.

W04-C10A3A [2005]

Combined with additional data formats

Covers provision of computer program data and surround sound tracks in disk used primarily for storing video information.

W04-C10A5 [1992]

Jukebox system

See W04-C04C and W04-E02A5 codes for disk feeding aspects.

W04-C10B [1992]

Tape

W04-C10C [1992]

Card

W04-D

Magneto-optical and other recording methods

From 2002 only audio/visual applications of magneto-optical and other types of recording are included in W04-D. Head, head positioning and carrier positioning aspects are coded **only** in T03-C and T03-D.

Includes capacitive recording and combination methods. For magneto-optical recording W04-D20 codes are assigned in the case of equipment. Record carriers and head/carrier drive systems are assigned T03-C and T03-D codes also.

W04-D01* [1983-2001]

Record carriers

*This code is now discontinued and since 2002 this subject matter now being coded in T03-C and T03-D01A. W04-D01 codes remain valid and fully searchable for records prior to 2002, and covered mainly capacitive record carriers, now assigned T03-C01 codes only.

PVC, carbon, conductive, dielectric, lubricant

W04-D01A* [1987-2001]

For 'combination' recording e.g. magneto-optical

*This code is now discontinued and the subject matter covered by T03-D01A codes.

Photomagnetic, Kerr effect, substrate, film, light-sensitive layer, reflective/antireflective layer, magnetic layer, reference layer, rare earth material, amorphous, protective coating

W04-D01A1* [1992-2001]

Carrier manufacture

*This code is now discontinued. Since 2002 this topic has been covered by T03-D01A8 codes only.

W04-D02* [1983-2001]

Heads

*This code is now discontinued, the subject matter now being coded in T03-C, and in T03-D01C (for optical heads) and T03-D01F1 (for magnetic heads) when magneto-optical recording is involved. W04-D02 remains valid and fully searchable for records prior to 2002.

Stylus, diamond, shank, lens, objective, beam splitter, polarizer, laser, photodetector, magnet, bias, erase

W04-D03* [1983-2001]

Head positioning

*This code is now discontinued and since 2002 this subject matter has been coded in T03-C, T03-D01D and T03-D01F1A. W04-D03 remains valid and fully searchable for records prior to 2002.

Prior to 2002, for magneto-optical recording this code included focusing (now only assigned T03-D01D1 codes) and track selection/alignment (now only assigned T03-D01D3 and T03-D01D5 codes).

Track selection, kick-pulse, linear motor, voice coil motor, VCM, focusing

W04-D04* [1983-2001]

Record carrier positioning

*This code is now discontinued and since 2002 this subject matter has been coded in T03-C and T03-D01B, T03-E and T03-F. W04-D04 remains valid and fully searchable for records prior to 2002, when W04-E02 codes were also assigned to provide a more detailed breakdown of subject matter.

Turntable, drive, carriage, load, motor

W04-D10 [1987]

Hard-copy video arrangements

See S06 codes also for non-standard video applications. Includes photographic methods and use of e.g. line printer. (See also S06-B codes, e.g. S06-B04A, and S06-D to K codes respectively).

Photographic reproduction, optical system, thermal/ink jet/impact/optical printer, electronic still-picture camera hard copy unit

W04-D20 [1992]

Magneto-optical recorder/player

W04-D20 codes are used with other codes in W04 as appropriate.

W04-D20A [1992]

Magneto-optical disk recorder/player

Includes mini-disk recorder/players

W04-D20B [1992]

Magneto-optical tape recorder/player

W04-E [1983]

Recording in general

From 2002 head positioning, carrier positioning and head record carrier motion synchronisation aspects of audio/visual recording are no longer coded in W04-E, the subject matter being covered in T03-E, T03-F, T03-G, T03-H and T03-J. Consequently the title of this code has been amended.

W04-E01* [1983-2001]

Head positioning

*This code is now discontinued, the subject matter now being coded in T03-G only. The codes W04-E01A to W04-E01C remain valid and fully searchable for records prior to 2002.

These codes were assigned for generally applicable cases. See appropriate codes in W04-B, W04-C or W04-D which took precedence.

W04-E01A* [1983-2001]

Helical scan

*This code is now discontinued.

Drum, cylinder

W04-E01B* [1983-2001]

For longitudinally scanned tape

*This code is now discontinued.

W04-E01C* [1983-2001]

For disks

*This code is now discontinued.

W04-E02* [1983-2001]

Record carrier positioning

*This code is now discontinued and from 2002 this subject matter is covered by T03-E, T03-F and T03-H codes only. W04-E02 codes remain valid and fully searchable for records prior to 2002.

For motor and other position transducer aspects see V06 codes. Includes housings in which carriers are driven during normal operation.

W04-E02A* [1983-2001]

For disks

*This code is now discontinued.

W04-E02A1* [1992-2001]

Disk cassettes per se

*This code is now discontinued.

W04-E02A1A* [1992-2001]

Disk cassette manufacture

*This code is now discontinued.

W04-E02A1C* [1992-2001]

Disk cassette construction

*This code is now discontinued.

W04-E02A3* [1992-2001]

Disk driving arrangement

*This code is now discontinued and from 2002 T03-F02 (and T03-N01) codes are assigned for this topic.

W04-E02A3A* [1992-2001]

Disk drive components

*This code is now discontinued. Prior to 2002 it included motors (see V06-M codes also), turntables, spindle brakes, etc.

W04-E02A3C* [1992-2001]

Disk drive speed control

*This code is now discontinued. Motor control circuits are also assigned V06-N codes.

W04-E02A5* [1992-2001]

Disk changing systems

*This code is now discontinued and from 2002 the subject matter is covered by T03-F01 and T03-N01 codes (previously assigned as well as W04-E02A5). For general aspects of optical disk 'jukebox' systems, see W04-C10A5. See also T03-Q codes for library systems in general.

W04-E02A5A* [1992-2001]

Single feeding of manually-loaded disk

*This code is now discontinued.

W04-E02A5C* [1992-2001]

Selecting from simultaneously-loaded disks

*This code is now discontinued but previously included carousel-type arrangements enabling initial loading of several disks for playing sequentially or in a selected order. Arrangements to feed one disk at a time into recording/playing equipment from a library of carriers were covered by W04-E02A5E.

W04-E02A5E* [1992-2001]

Automatic feeding from library of disks

*This code is now discontinued and the subject matter covered by T03-Q05 codes and in T03-F01F5 (and T03-N01).

W04-E02B* [1983-2001]

For tape

*This code is now discontinued.

Reel, spool

W04-E02B1* [1983-2001]

Cassettes

*This code is now discontinued. Prior to 2002 the code was assigned only for cassettes themselves, not all cassette recording related aspects. For magnetic tape cassettes W04-B04B1 was also assigned. These topics are now covered by T03-H01B codes (or T03-H01C for loop-type cassette) and T03-N03.

Housing, casing, mould plastics, audio/video cassette, protective cover

W04-E02B1A* [1992-2001]

Cassette manufacture

*This code is now discontinued and the subject matter is now coded in T03-H01B8 codes alone.

W04-E02B1C* [1992-2001]

Cassette constructional details

*This code is now discontinued.

W04-E02B1E* [1992-2001]

Cassette for helical-scan tape

*This code is now discontinued but was previously only assigned for cassettes where the helical-scan aspect impacts on the design to a significant extent. T03-N02 is assigned for all aspects of helical scan equipment and carrier cases.

VHS, VTR, DAT, protective cover

W04-E02B3* [1983-2001]

Drive

*This code is now discontinued. W04-B04B3 codes were assigned in preference for magnetic tape recorders.

Control, capstan, roller, pulley, belt, gear

W04-E02B5* [1983-2001]

Operating mode control

*This code is now discontinued.

Select, switch, function, play, record, position, fast forward, rewind, pause, stop, autostop

W04-E02B5A* [1992-2001]

Automatic control

*This code is now discontinued. For magnetic tape recorders, W04-B04B5A was assigned from 1992.

W04-E02B5C* [1992-2001]

Manual control

*This code is now discontinued. For magnetic tape recorders W04-B04B5C was assigned between 1992 and 2001.

W04-E02B5E* [1992-1996]

Special reproduction mode

*This code is now discontinued but was used for topics such as arrangements for replay at differing speeds. Since 1997, that subject matter has been covered by W04-E20 codes, applicable to all recorder types (rather than just tape recorders). W04-E02B5E remains valid and searchable for records between 1992 and 1996.

W04-E02B7* [1983-2001]

Helical scan

*This code is now discontinued.

Head drum, guide, rotating cylinder, tape looping

W04-E03* [1983-2001]

Record carriers

*This code is now discontinued and from 2002 this subject matter is now covered by codes in T03-H only. The codes in this subgroup remain valid and fully searchable for records prior to 2002 and covered general aspects of record carriers.

Disk, compact, tape, manufacture, clean

W04-E03A* [1997-2001]

Labels and authentication marks

*This code is now discontinued.

W04-E03A1* [1997-2001]

Labels

*This code is now discontinued but prior to 2002 it included labels applied to the carrier itself and to housings such as a cassette case or jewel box.

W04-E03A5* [1997-2001]

Authentication markings for record carrier

*This code is now discontinued but covered both human-readable and machine-readable markings, such as bar coding (see T04-A and T04-C codes also). Identification of counterfeit audio or video recordings by added signals is included in W04-G01L3 and W04-F01L3 respectively.

Code, serial number, hologram, pressing plant

W04-E04 [1987]

Remote control, time programming

See S04-C for timer aspects. Prior to 2002 see W04-B04B5 and T03-E05 codes also for tape recorder operating mode control. From 2002 W04-B04B5 is no longer used.

W04-E04A [1992]

Remote control

For general aspects of audio/video remote control see W03-G05A codes, and for remote control specific to TV receivers, W03-A02C codes. Remote control in general is covered by W05-D codes.

W04-E04C [1992]

Time programming

Time programming devices in general are covered by S04-C, e.g. S04-C02.

W04-E04C1 [1992]

Programming from record carriers or programming codes

Includes input of timer information by e.g. bar code reading, (reading of bar codes is also coded in T04-A03B1), and 'universal' programming devices learning function of normal remote control unit (from 1997, also assigned W03-G05A1A). From 2005 use of electronic programme guides and GUIs is covered in W04-E04C8.

Video Plus

W04-E04C5 [1992]

Programming and control based on off-air signals

For signal processing aspects, such as extraction of control signals, use with W04-F01K. Prior to 1997, this code was used for arrangements to prevent recording of commercial messages in conjunction with W04-J05. From 1997 this topic is wholly covered by W04-E04C5C.

W04-E04C5A [1997]

Involving transmitted programme identification

Includes systems such as VPS. Transmission of such signals is covered by W02-F05C.

W04-E04C5C [1997]

Preventing recording of commercial messages

(W04-E04C5, W04-J05)

This code covers arrangements, usually relating to the recorder itself only, for pausing recording when a commercial message is being transmitted and continuing recording once the programme resumes.

Blank screen, cue

W04-E04C5E [2005]

Overriding prevention of recording of commercial messages

See W02-F10N for variation of subscription fees based on choice of whether or not to receive commercial messages.

Blank screen, cue

W04-E04C7 [2002]

With learning function

This code covers automatic time programming arrangements based on learned user preferences, e.g. through monitoring of manual time programming operations or manual channel selection. For analogous arrangements for channel selection in TV receivers see W03-A18A5C.

W04-E04C7A [2006]

Determining recording priority

Deciding between conflicting time programming settings, searching for repeat showings etc.

W04-E04C8 [2005]

Using programme guides

Includes use of EPG data transmitted with TV signal or interfacing with PC receiving programme guide information from e.g. Internet.

W04-E10* [1992-2001]

Head-record carrier motion synchronisation

*This code is now discontinued. Since 2002 this subject matter has been covered by T03-A05, T03-E, T03-F, T03-G and T03-J03 codes only. W04-E10 remains valid and fully searchable for records prior to 2002

Tape track, magnetic, speed, rotating VTR/DAT head, drum, position, scan, motor pulse synchronisation, phase, servo drive, dynamic tracking arrangement

W04-E20 [1997]

Recorder operation mode

The codes in this section, which replace W04-E02B5E used with tape equipment only, are assigned together with other W04 codes to indicate operating mode for any recorder type. W04-E20A and W04-E20C codes include arrangements with differing recording and reproduction speeds.

W04-E20J is assigned as appropriate when recording is involved, and W04-E20R for reverse operation (normal forward operation being otherwise assumed).

W04-E20A [1997]

High speed

W04-E20C [1997]

Slow speed, time-lapse, freeze-frame

W04-E20C1 [1997]

Slow speed

W04-E20C3 [1997]

Time-lapse

W04-E20C5 [1997]

Freeze frame and still picture

Use with W04-E20R for recording of still pictures. Electronic still picture cameras only capable of still-picture recording are not included here – see W04-M01B1 codes.

W04-E20E [1997]

Search mode

For arrangements linked to the use of indexing signals or carrier travel, see W04-H codes.

W04-E20G [2007]

Erasing

(W04-E20X)

W04-E20J [1997]

Recording

This code is assigned with other W04-E20 codes as appropriate, e.g. with W04-E20A for high-speed recording.

W04-E20K [2007]

Multiple viewing angle and foveation aspects

(W04-E20X)

Covers general aspects of multiple-viewing angle systems. Multi-view displays are covered in W03-A12A and/or W04-Q01S while encoding systems are covered in W04-P01A2.

W04-E20M [2002]

Simultaneous playing and recording

Covers arrangements to allow playback of one section of carrier while recording onto another section, e.g. to allow playing from start of recorded programme before recording is finished.

W04-E20P [2008]

Playlist management

This code covers the creation and selection of playlists, either manually or automatically. Indexing aspects are covered by W04-H01C codes. Automatic selection of playlists based on sensed emotional or mental state is also assigned S05-D01X (and other S05-D codes as appropriate). For determination of such states based on voice analysis, W04-V04A4 is also assigned and if based on image analysis T04-D07F codes are also assigned.

Favorite, top-rated, star-rated, daytime, evening, weekend, jazz, classical, rock, pop, tempo, rhythm

W04-E20R [1997]

Reverse mode

Covers e.g. reverse playback.

W04-E20S [2005]

Changing recording quality

Covers arrangements to allow switching from SP to LP mode during recording and automatic adjusting of recording quality to fit programme within available capacity of recording medium.

W04-E20T [2005]

Multiple operation modes

This code is used for inventions concerned with several modes of operation with no particular emphasis on any given one.

Trick play

W04-E20V [2005]

Time shift recording

Covers arrangements to allow viewer to select recording from start of current programme even when this programme is part-way through by use of buffer to continuously record a given channel or set of channels. For arrangements to allow pausing of programme while viewing and then continue recording programme from pause point search in conjunction with W04-E20M.

W04-E20X [1997]

Other recording equipment mode

W04-E30 [2013]

General audio and video (AV) recording and playing equipment

These codes are intended to indicate equipment for audio or video recording and playing in general, including 'media players' which are also covered by T01-J30C. The codes do not take account of storage technology (e.g. hard disk, solid-state memory etc.) and are not applied for specific equipment that is covered elsewhere in W04.

W04-E30A [2013]

General AV recording and playing equipment characterised by content

W04-E30A1 [2013]

Multimedia and media players and recorders

This code takes precedence over W04-E30A3 and W04-E30A5. Prior to 2013 this topic was chiefly covered by W04-P01C8 when solid-state storage was involved. Media players in a computer context are also covered by T01-J30C and AV equipment in general requiring operation with a PC is also covered by W03-G06.

W04-E30A3 [2013]

Audio players and recorders

Prior to 2013 this topic was chiefly covered by W04-G01B8 when solid-state storage was involved and that code can also be assigned for novel aspects specific to recording in solid-state memory. This code is assigned for 'MP3 players'.

W04-E30A5 [2013]

Video players and recorders

Prior to 2013 this topic was chiefly covered by W04-P01C8 and that code can also be assigned for novel aspects specific to recording in solid-state memory.

W04-E30A5A [2013]

Digital photo frames and viewers

This code is assumed to refer to portable equipment so W04-E30C1A is not also assigned.

W04-E30C [2013]

General AV recording and playing equipment characterised by form

W04-E30C1 [2013]

Self-contained AV recording and playing equipment

Includes players and recorders as separate equipment.

W04-E30C1A [2013]

Portable AV recording and playing equipment

Portable AV equipment in general is covered by W03-G04.

W04-E30C5 [2013]

General AV recording and playing equipment incorporated in other equipment

Includes players and recorders incorporated into a PC, mobile phone, or similar equipment. AV equipment in general combined with other equipment in a single housing is assigned W03-G03A.

W04-F

General video signal recording

This code is used merely to highlight video recording or reproduction in a general sense. It relates to recording and reproduction using dynamic methods such as tape, disk, etc. but excluding static storage in e.g. flash memory which is covered by W04-P01C codes (except in the case of dynamic video recorders/players in which solid-state memory is also used for signal processing, this being covered by W04-F01M codes). W04-F can be used alone or with other codes. Its subdivision codes (all W04-F01 and W04-F02 codes) are applied for novel signal processing details either alone or with technology-specific codes such as W04-B, W04-C or W04-D codes as necessary.

Signal processing for dynamic recording in general or recording and reproduction of non-audio or non-video information is covered by T03-P codes.
Video, tape, disk, drum, colour, digital, frame, field

W04-F01

Video signal processing for recording

Frequency band translation, AM/FM recording, compression, noise reduction

W04-F01A [1992]

Signal transformation, frequency changing, demodulation

Includes e.g. 'colour-under' system.

W04-F01A1 [1992]

Signal transformation and frequency changing

Folding

W04-F01A1A [1992]

Modulation and demodulation aspects

See U23 codes for novel demodulator circuits.

W04-F01A5 [1992]

Dynamic range control, amplitude compression, AGC

Compression by coding is covered by W04-F01F codes. See also U24-C01 and U24-C02 codes for AGC and compression respectively.

W04-F01B [1992]

Equalising and peaking circuits

See W04-B for equalising specific to magnetic recording.

W04-F01B1 [1992]

Peaking, crispening

Crispening for general video processing is covered by W04-P01E3.

W04-F01C [1992]

Synchronising signal processing

W04-F01D [1992]

Signal processing specific to colour video (W02-F06)

W04-F01D1 [1992]

Luminance/chrominance separation

Luma-chroma, Y-C, comb filter, digital filter

W04-F01D3 [1992]

Colour synchronising

Signal processing of TV synchronising information in general is covered by W04-F01C.
Colour burst, subcarrier

W04-F01E [1992]

Noise reduction

W04-F01E1 [1992]

Head switching noise suppression

W04-F01F [1992]

Signal coding and compression

Covers compression as part of signal coding. Compression of dynamic range without coding is covered by W04-F01A5. Prior to 1997, video coding aspects specifically for recording were covered by W04-F01F codes only, but from 1997 codes are also be assigned from the general W04-P01A section to indicate the nature of the coding involved.

W04-F01F1* [1992-2006]

Movement-responsive compression

*This code is now discontinued. Since 2007 all predictive motion-based coding systems have been covered in W04-P01A codes.

W04-F01F5 [1997]

Error detection and correction

See T03-P01A for error detection in recording in general.

W04-F01H [1992]

Multistandard and HDTV signal processing

(W02-F06, W04-F01)

W04-F01H1 [1992]

Recognition of standard, automatic switching

W04-F01H3 [1992]

Standards conversion

(W04-F01, W04-N)

Standards conversion in video recording is **not** assigned the general code W04-N05A. Prior to 1992 search W04-F01 and W04-N.

W04-F01H3A [2005]

Transcoding

This code covers the conversion of one form of video coding to another, e.g. MPEG-2 to MPEG-4, or changing the sample rate without changing the type of coding, during the recording or reproduction of video signals. Transcoding of video in general is covered by W04-N05A1.

W04-F01H3C [2010]

Upscaling of video signals

This code covers upscaling, especially of reproduced video, to provide e.g. improved resolution on an HD display device. Codes for recording and reproducing equipment are also assigned as appropriate, e.g. W04-C10A3 for DVD video players.

W04-F01H5 [1992]

HDTV signal processing

W04-F01K [1992]

Signal processing for additional picture information

Includes arrangements to enable recording of data contained in blanking periods, e.g. teletext signals (prior to 1992 see W02-F05B and W04-F01), or in connection with VPS data. Also covers recording of other supplementary signals received off-air. All aspects of control of recorder by off-air signals are coded in W04-E04C5.

Closed caption, region code

W04-F01L [1992]

Copy restriction, copy marking and scrambling

From 1997 the title of this code is expanded to reflect the inclusion of arrangements to enable identification of copy recordings (now assigned W04-F01L3).

W04-F01L1 [1997]

Signal processing to prevent or restrict recording or viewing

Includes arrangements either preventing copying completely, or producing unacceptable quality copy. For signal processing aspects specific to magnetic recording W04-B01C1A is also assigned. Similar inventions for audio recording are assigned W04-G01L1, but W04-F01L1 takes precedence for combined audio and video recording.

W04-F01L3 [1997]

Signal processing to indicate occurrence of copying

Includes arrangement to insert a signal, in general not visibly affecting reproduction, but enabling subsequent identification of copy or recording source. Similar systems for audio recording are coded in W04-G01L3, but W04-F01L3 takes precedence for combined recording of audio and video information. Distinguishing legitimate from illegitimate copies based on other marking methods is covered by T03-H02A1C.

Watermarking

W04-F01M [1992]

Processing involving memory

(W04-F01, W04-P01C)

This code is used for circuits employing memories as part of the recording signal processing system, and is **not** used for frame stores per se or frame store processing system of general application as covered by W04-P01C codes.

Freeze-frame, still picture

W04-F01M1 [1997]

For storing still picture

See also W04-D10 for use of memory in video hard copy systems. Electronic still picture cameras using memory card storage are not included here - see W04-M01B1C and W04-P01C5.

W04-F01M5 [1997]

In connection with signal processing

Search with other W04-F codes as appropriate, e.g. with W04-F01F for coding involving use of memory circuitry, or W04-F02B for timebase error correction.

W04-F01P [2006]

Multiple channel recording

Covers simultaneous recording of separate video streams. For simultaneous recording of multiple camera outputs search in conjunction with W04-M01V.

W04-F01X [1992]

Other recording signal processing

W04-F02

Drop-out and time-base error compensation

W04-F02A [1992]

Drop-out compensation

Noise reduction for video recording other than due to drop-out is covered by W04-F01E codes, error correction is covered by W04-F01F5.

Correct, error, concealment

W04-F02B [1992]

Timebase error compensation

For skew correction in general see T03-A06H.

Phase, TBC

W04-G

Audio signal processing; Mixing and studio equipment

W03-C and W03-G codes are used as appropriate to convey additional information regarding audio equipment.

W04-G01 [1987]

General audio recording and audio processing for recording

W04-G01A [1992]

For dynamic recording

This code is used for signal processing irrespective for record media, (see T03-P codes also).

W04-G01B [1992]

For static recording

Covers recording in solid-state memory.

W04-G01B3 [1992]

Signal processing aspects

W04-G01B5 [1992]

Memory addressing and control

W04-G01B7 [1992]

Static recording applications

This code is used merely to highlight the use of static recording and is generally assigned when no significant details are given of the audio recording or playback device used. Solid-state audio recorders and players with novel details described are covered by W04-G01B8.

W04-G01B8 [2002]

Solid state digital audio player/recorder

This code is assigned for novel details of solid-state audio recorders and players. Applications of such devices without any significant novel details being described are covered by W04-G01B7.

MP3 player

W04-G01B9 [1992]

Other static recording aspects

W04-G01D [1992]

Noise and distortion reduction

W04-G01F [1992]

Audio signal coding and decoding

Includes sampling, digitising, etc. See W04-V05G for speech coding for non-recording applications, and U21-A codes for coding in general. See also W04-V10 for general audio coding.

W04-G01F1 [1992]

Error detection and correction

Also coded in T03-P01A.

Bit error rate, BER, Reed-Solomon, cross interleave

W04-G01L [1997]

Copy restriction, copy marking and scrambling

W04-G01L1 [1997]

Signal processing to prevent or restrict recording or listening

Includes arrangements either preventing copying completely, or producing unacceptable quality copy. For signal processing aspects specific to magnetic recording W04-B01C1A is also assigned. Similar inventions for video recording are assigned W04-F01L1, which takes precedence for combined audio and video recording.

W04-G01L3 [1997]

Signal processing to identify occurrence of copying

Includes arrangement to insert a signal, in general not audibly affecting reproduction, but enabling subsequent identification of copy or recording source. Similar inventions relating to video recording are coded in W04-F01L3, which takes precedence for combined recording of audio and video information. Distinguishing legitimate from illegitimate copies based on other marking methods is covered by T03-H02A1C.

W04-G01M [2005]

Multiple channel recording

W04-G01M1 [2005]

Stereo and surround sound recording

W04-G01M3 [2005]

Recording of separate audio track

Covers arrangements to record alternative language versions of soundtrack.

W04-G01M5 [2005]

Multitrack recording

W04-G03 [1992]

Audio noise reduction

For audio recording noise reduction see W04-G01D.

W04-G03A [1992]

Improving signal-to-noise ratio

W04-G03C [1992]

Reducing acoustic feedback

Use with W04-S05 codes for public address application.

Howl-round, howling, Larsen effect, squealing

W04-G04 [1992]

Audio signal dynamic range and frequency control, other effects

W04-G04A [2005]

Audio signal dynamic range control

Includes AGC, compression, expansion, limiting and companding schemes. See also U24 codes. Note that audio signal compression in the sense of coding is not included, being covered by W04-V05G codes or speech and W04-V10 codes for audio signals in general.

W04-G04E [2005]

Frequency enhancement and addition of harmonics

Includes exciters, enhancers, bass expanders etc. See W04-U03E for delay-based effects, e.g. reverberation, flanging, phasing.

W04-G05 [1992]

Sound mixing and switching

Blending, mixing console, multichannel sound system

W04-G05A [1992]

Control aspects

Includes circuitry and control elements per se, e.g. slider potentiometers.

W04-G05B [1992]

Interfacing

Includes connection to MIDI systems. For musical instrument aspects see W04-U05 also.

W04-G05C [1992]

Mixer circuitry

For amplifier circuitry see U24-G01C and other U24-G codes as appropriate.

W04-G05E [2007]
Switching and routing of audio sources

W04-G08 [2006]
Sound recording studio equipment
Use in conjunction with W03-C, W04-U03E, W04-S and other W04-G codes as necessary. Includes all professional audio equipment for use in recording or audio broadcast studio.

W04-H
Editing; Indexing
Except for audio/video signal processing aspects, also coded in T03-J, T03-K codes.

W04-H01 [1992]
Index signal recording and detection

W04-H01A [1992]
Time code system
SMPTE

W04-H01C [1997]
Indexing information relating to recorded contents
Includes 'table of contents' information, recorded separately or interleaved with main recorded information, but usually by same recording process in either case. For records prior to 2002 labels providing such information in human-readable form are covered by W04-E03A1. From 2002 these are covered by T03-H02A1A only.
Metadata

W04-H01C1 [1997]
User-recordable contents index information
Includes 'user table of contents' information, and thus implies use of recordable, rather than 'read-only' carriers.
UTO C

W04-H01C5 [2006]
Automatic content indexing
Includes thumbnail indexing, and use of EPG data to generate searchable indexing information.

W04-H01C8 [2006]
Differentiating between different data types
Music photo video (MPV)

W04-H01E [2006]
Error management information

W04-H03 [1992]
Measuring travel of carrier
See also T03-J05 codes.

W04-H05 [1992]
Editing, dubbing, splicing tape

W04-H05A [1992]
Dubbing

W04-H05A1 [2007]
User controlled dubbing

W04-H05A5 [2007]
Automatic dubbing
Includes automated back-up and archival operations.

W04-H05C [1992]
Splicing

W04-H05E [1997]
Editing

W04-H05E1 [2006]
User controlled editing

W04-H05E5 [2006]
Automatic editing

W04-J
Monitoring/testing recording equipment

W04-J01 [1992]
Theft alarms, security system, access control
See W05-B01 codes also for theft alarms.
Antitheft, disconnection-detector

W04-J01A [2005]
Access control
Includes child lock systems, user authentication and user interfacing aspects of region control.

W04-J01C [2005]
Theft alarms

W04-J03 [1992]
Recording equipment operation displays

W04-J03A [1997]
Dedicated display

W04-J03C [1997]

On-screen display

For such arrangements in TV receivers see W03-A13G. Includes menus etc. on digital camera display.
OSD

W04-J05 [1992]

Recording equipment controls and circuits (general)

Automatic level control, gain control, intensity control, feedback, compensate, correct, jog wheel

W04-J07 [1992]

Recording equipment testing

Codes in this section are used together with the appropriate code for the function being tested.

W04-J07A [1992]

Testing during manufacture

Includes testing complete and partially complete equipment.
Production line testing

W04-J07C [1992]

Post-manufacture equipment testing and monitoring

Includes self-testing apparatus.
Signal-to-noise ratio, distortion, head alignment, in-built testing circuit

W04-K

Synchronising, co-operation with other equipment, and interfacing

The title of this code has been changed to reflect the fact that audio/video recording and reproduction aspects of multimedia systems (coded in W04-K05 until 1997, and in W04-K10 between 1997 and 2004) are no longer included. Computing aspects of multimedia are covered by T01-J30 codes. Codes in this group are used with the appropriate code for the type of recording equipment involved or alone if the type is not specified. To indicate co-operation of W04 equipment with other types of equipment or systems in a general sense W04-K itself may be assigned (i.e. without subdivision).

W04-K01

Synchronisation between recording units

Includes synchronisation of e.g. photographic and audio equipment and also general arrangements with the emphasis on timing to enable recording or playback equipment to work together.
'Blip' detector for slide projector, re-recording synchronisation, synchronous dubbing

W04-K05 [1987]

Recording equipment systems

Includes use of several recording/playback units e.g. for picture file, and recording equipment used as a 'functional block' in a larger system. Prior to 1997, this code included audio/video recording and reproduction aspects of multimedia systems.
Combination recording, home entertainment system, animated objects control, video game, simulator

W04-K05A [1997]

Multiple recording equipment systems

Includes audio/video file server arrangements, e.g. for on-demand entertainment systems (see W02-F10K also).

W04-K05C [1997]

Recording/reproducing unit as 'functional block'

This code covers arrangements involving interconnection of a recording equipment with some other system, e.g. self-contained VTR used to store surveillance camera image (with W04-B10C and W02-F01A5 or W05-B01C5 codes).

W04-K06 [1992]

Modulator/demodulator

Includes arrangements to interface recording equipment with e.g. TV receiver (for VTR search with W04-B10C).

W04-K07 [1992]

Interfacing arrangements e.g. cables, plugs, etc.

See V04 codes for plug and connector details.

W04-K08 [2002]

Interfacing with PC

Includes arrangements to allow control of recording equipment by PC or downloading of recorded material.

W04-K10* [1997-2004]

Audio/video aspects of multimedia

*This code is now discontinued. Prior to 2005 it was used to indicate audio/video aspects only of multimedia, but due to the ubiquity of that term the code was discontinued. Since 2005 audio and video aspects of personal computers have been assigned the relevant W04 code in conjunction with T01 codes. (Multimedia computer systems are covered by T01-J30 codes).

W04-L

Recording housings

From 2002 this group no longer includes containers for record carriers. Constructional details specific to audio/video recording equipment are still coded in W04-L05 but any non-specific constructional aspects are coded in T03-L05 only.

For records prior to 2002 codes in this section cover housings for storing record carriers, and housings and constructional details of audio/video recording equipment. Corresponding codes in the T03-L section are also applied, (additional information may be gained by use of T03-N codes where W04-L codes are not specific).

W04-L01* [1987-2001]

For record carriers

*This code is now discontinued and from 2002 this subject matter is assigned T03-L01 codes only. W04-L01 codes remain valid and fully searchable for records prior to 2002. W04-L01 covered cassette boxes, racks, record cases, etc., but **not** casings in which carriers are driven during the recording or playback process.

W04-L01A* [1992-2001]

Record carrier container

*This code is now discontinued but prior to 2002 covered containers for individual carriers. Storage racks were covered by W04-L01C codes.

W04-L01A1* [1992-2001]

For disks

*This code is now discontinued.
CD, compact disk case

W04-L01A3* [1992-2001]

For tape

*This code is now discontinued.
Cassette case, spool/reel box

W04-L01C* [1992-2001]

Storage racks, boxes, cases

*This code is now discontinued. It covered racks and similar structures used for storage only, from which a carrier is removed **with** its individual container. (Individual containers were covered by W04-L01A codes). This code was also used for display arrangements in retail stores.

W04-L01C1* [1992-2001]

For disks

*This code is now discontinued.
Floppy disk box, file box, record case

W04-L01C3* [1992-2001]

For tape

*This code is now discontinued.
Cassette rack

W04-L05 [1987]

Housings and constructional details of recording equipment

W04-L05A [1987]

Cabinets, casings, stands

See V04-S codes for casings in general.

W04-L05B [1987]

Construction e.g. mounting of PCBs, components

See V04-T codes for these details for electronic equipment in general.

W04-M

Video and synchronising signal generators

W04-M01

Video cameras

Electrical aspects of photographic cameras are covered by S06-B codes. Features common to both photographic and video cameras are coded in both sections. Novel imaging and camera aspects of endoscopes are included here. See also S05-D codes and W02-F01M for this topic.

Imager, image pick-up, electronic imaging

W04-M01A

Camera tube arrangements

Image pick-up tubes per se are coded in V05-D codes only, but details such as tube/coil assemblies are included.

Tube biasing, power supplies, deflection signal generators, deflection coil, focusing, astigmatism correction, screening, vidicon, plumbicon, image-orthicon camera

W04-M01B

Solid state pick-up device arrangements

CCD Camera

W04-M01B1 [1987]

Digital camera

This code is used for solid-state video cameras used predominantly for recording single frames in e.g. RAM, hard disk or optical disk. W04-M01B1 codes are used for **any** aspect of the camera. For still-picture recording facility in camera designed primarily for video recording see W04-E20C together with W04-M01B and W04-M01K.

Shutter release control, disk drive control, disk loading/unloading system, interface for hard copy

W04-M01B1A [1992]

Dynamic recording type

W04-B14 and W04-C10A3 codes are also assigned for recording on magnetic and optical disks respectively.

W04-M01B1C [1992]

Static recording type

Includes camera storing image in solid state memory.

Digital still-picture camera, digital camera

W04-M01B1E [2005]

Video recording aspects

W04-M01B1S [2013]

Digital single lens reflex camera

This code is assigned for **all** aspects of digital SLR cameras. For specific novel optical details search with W04-M01C codes as appropriate, e.g. W04-M01C5 for mirror arrangements.

DSLR

W04-M01B5 [1992]

Solid state image pick-up element

Covers image pick-up per se which is also assigned U13-A codes.

W04-M01B5A [1992]

Reading methods

Covers methods of read-out and operation circuitry integral with the pick-up element. For 'electronic-shutter' arrangements based on e.g. limiting charge accumulation time, search with W04-M01D5C. (Electro-optical shutters separate from the image sensor and based on e.g. liquid crystal devices are not included and are covered by W04-M01C7A from 2014).

Shift register

W04-M01B7 [1992]

External circuitry

Covers drive circuitry external to pickup per se. Includes circuitry linked to CCD.

W04-M01B8 [2009]

Image sensor movement arrangements

This code and its subdivisions cover devices imparting mechanical movement to the image sensor for focusing or other purposes. Similar arrangements acting on optical system components are covered by W04-M01C1 codes or W04-M01C9 as appropriate. Details of actuators and the like are indicated by assignment of V06 codes.

Displacement

W04-M01B8A [2009]

Image sensor movement for enhancing imaging

This code covers arrangements for imparting mechanical movement to the image sensor for enhanced imaging, such as resolution improvement (previously treated as optomechanical scanning by assignment of W04-M01E5) or as an anti-shake measure with W04-M01D7.

Dithering

W04-M01B8B [2009]

Image sensor movement for focusing

This code covers arrangements for imparting mechanical movement to the image sensor for focusing purposes, e.g. where the lens system is fixed. Arrangements for moving lenses for focusing are covered by W04-M01C1B. Manual focusing is indicated by assignment of W04-M01D1 and automatic focusing with W04-M01D5D.

W04-M01B8C [2009]

Image sensor movement for cleaning

This code covers arrangements for imparting mechanical movement to the image sensor for cleaning purposes, e.g. the use of ultrasonic vibration to remove dust from a sensor window.

Particle, speck, foreign body, detachable lens.

W04-M01B8X [2009]

Other image sensor movement

W04-M01C [1987]

(Auto)focusing, zooming, lenses for TV camera, shutters, filters

Single lens reflex (SLR), optical system, beam splitter, iris, aperture

W04-M01C1 [1992]

Lens system

Search with W04-M01G1B for constructional details of lens systems.

W04-M01C1A [1992]

Novel lens details

Covers novel aspects only of single lenses and lens groups such as zoom lenses. Search with W04-M01B5 for lens or lens array integral with image pick-up element which from 2018 is also specifically covered by W04-M01C1G. Since 2011 the use of variable lenses, including those with electrically-controlled variable parameters has been indicated by W04-M01C1E. If the variable lens is novel W04-M01C1A is also assigned. Note that 'lens systems', 'lens barrels' and 'lens tubes' without any novelty in lenses themselves are not included and are covered by W04-M01C1 with W04-M01G1B for constructional details such as lens mounting arrangements.

Abbe number, aberration, concave, convex, chromatic, coating, focal length, glass, material composition, plano-concave, plano-convex, plastics, power, refractive power, V number

W04-M01C1B [1992]

Motor drive for focusing

See V06-M codes for details of motors or actuators themselves, and V06-N codes for novel drive circuitry for motor control. This code is used with W04-M01D5D (focus control) for control of focus involving novel motor drive aspects, or position feedback, only, for all other aspects of automatic focusing, W04-M01D5D is used alone. W04-M01C1B is assigned with W04-M01D1 codes for manual control of focus. From 2009, focusing by movement of the image sensor alone is not included, being covered by W04-M01B8B.

Stepper, piezoelectric, shift, HF content, hill-climbing, servo, automatic

W04-M01C1C [1992]

Motor drive for zooming

See V06-M codes for details of motor per se, and V06-N codes for novel drive circuitry for motor control. This code is used with W04-M01D5E (magnification control) for control involving novel motor drive aspects, or position feedback, only, for all other aspects of magnification control, W04-M01D5E is used alone.

Stepper, shift, automatic

W04-M01C1D [2014]

Detachable/interchangeable lens

This code covers lens units that can be removed from or fitted to a camera body. For interfacing and electrical connection details W04-M01D8A is also assigned.

Interchangeable, long focus lens, long lens, telephoto

W04-M01C1E [2011]

Variable lenses

This code covers the use of lenses with variable properties, e.g. where the lens is physically deformed to change its refractive power. If the variable lens is novel W04-M01C1A is also assigned. (V07 codes are also assigned for lenses with electrically-controlled variable parameters). W04-M01C1E does not cover lens systems in which magnification or focus is changed by changing the distance between lenses or between a lens and an image sensor.

Liquid crystal lens, ring electrodes, variable optical power lens element

W04-M01C1G [2018]

Lens or lens system integral with image sensor

This code covers lenses or lens systems that are integral with an image sensor. When novel lenses are involved W04-M01C1A is also assigned.

Optical elements that are part of an integrated circuit image sensor are also assigned U13-A01F.

Microlens, wafer level optics

W04-M01C3 [1992]

Filters

Neutral density

W04-M01C3A [1992]

For colour separation

Covers RGB matrix-type filters.

W04-M01C3C [1992]

For removing specific wavelengths

This code covers filters designed to block transmission of specific wavelengths, e.g. optical high-pass filters such as IR-cut filters. Video cameras intended for imaging in the infrared spectrum are covered by W04-M01E1 codes.

W04-M01C3D [2011]

Neutral density filter

This code covers filters designed to reduce the intensity of light, normally independent of wavelength, e.g. to allow use of different exposure settings.

ND filter, optical all-pass

W04-M01C3E [1992]

Integral with pick-up device

W04-M01C3G [2011]

Polarizing filter

This code covers filters designed to block or reduce the intensity of light with a particular polarization, e.g. to reduce the effect of reflections.

W04-M01C5 [1992]

Beam splitter, mirror

Includes beam splitter or movable mirror for viewfinder of SLR camera.

W04-M01C6 [1992]

Connection with external optical system

Includes connection with e.g. endoscope, which is also coded in S05-D04.

Coupler, fiber-optic, beam splitter

W04-M01C7 [1992]

Electro-optical shutter, (electro)mechanical shutter and shutter drive

This code includes electromechanical or electro-optical shutters and from 2014 it is subdivided to distinguish these from motors and actuators for driving an electromechanical shutter which are specifically covered by W04-M01C7E. See V02-E02 for electromagnetic actuation and V06-M codes for motors. Electro-optical shutters are covered by W04-M01C7A. Electronic control of shutters is not included and is covered by W04-M01D5C. Electronic shutter action using controlled read-out of solid state imager is not included and is covered by W04-M01B5A and W04-M01D5C.

W04-M01C7A [2014]

Electro-optical shutter

This code covers electro-optical shutter arrangements without moving parts, e.g. using liquid crystal devices. (Note that U14 or V07 codes are not assigned for this topic). 'Electronic shutter' arrangements based solely on controlling the image sensor itself, e.g. by limiting charge accumulation time, are not included and are covered by W04-M01B5A and W04-M01D5C.

LC, light valve

W04-M01C7C [2014]

(Electro)mechanical shutter

This code covers novelty in the shutter itself. Novel aspects of motors or actuators driving the shutter are covered by W04-M01C7E.

Blade, curtain, focal plane, leaf

W04-M01C7E [2014]

(Electro)mechanical shutter drive

See also V02-E02 for electromagnetic actuators and V06-M codes for motors.

Solenoid

W04-M01C8 [1992]

Electro-optical iris diaphragm, (electro)mechanical iris diaphragm, and iris drive

This code includes mechanical, electromechanical or electro-optical iris diaphragms and from 2014 it is subdivided to distinguish these from motors and actuators for driving an electromechanical iris which are specifically covered by W04-M01C8E. See V02-E02 for electromagnetic actuation and V06-M codes for motors. Electro-optical iris diaphragms are covered by W04-M01C8A. Electronic control of irises is not included and is covered by W04-M01D5C.

W04-M01C8A [2014]

Electro-optical iris diaphragm

This code covers electro-optical iris diaphragm arrangements without moving parts, e.g. using liquid crystal devices. The general code for electro-optical area modulation, V07-K01A2, is also assigned.

LC, light valve

W04-M01C8C [2014]

(Electro)mechanical aperture/iris

This code covers novelty in the iris diaphragm itself. Novel aspects of motors or actuators driving the iris are covered by W04-M01C8E.

Aperture, stop

W04-M01C8E [2014]

(Electro)mechanical aperture/iris drive

See also V02-E02 for electromagnetic actuators and V06-M codes for motors.

Solenoid

W04-M01C9 [1992]

Other optical aspects of video cameras

Includes white balance reference plate, optical arrangements compensating camera shake (with W04-M01D7), lens cap, and arrangements for cleaning the optical system including 'windscreen

wiper' devices and ultrasonic vibration devices for dust removal. From 2009 ultrasonic and other vibration devices acting on the image sensor itself are covered by W04-M01B8 codes. Prior to 2009 W04-M01C9 was assigned for any aspect of correcting for optical system distortions, including those using image processing (with W04-N05C3). From now on W04-M01C9 will only be assigned for systems acting directly on the optical system itself. From 2009 compensation by means of image manipulation processing for optical system geometry distortions, e.g. arising from use of wide-angle lenses, is covered by W04-N05C3E. W04-M01D6 or W04-M01D6A will continue to be assigned also when the processing is performed within the camera, but not when performed subsequently.

W04-M01D [1987]

Control circuits, monitoring, displays, viewfinders

Codes in this section are used for general control circuits and with other codes for specific purposes. Studio aspects for control of several cameras, mixing, etc. are covered by W04-N codes.

W04-M01D1 [1992]

Operator controls and warning devices

Covers controls actually operated by user and devices signalling state of camera. Use with W04-M01D3 for warning as part of viewfinder display.

Switch, key, knob, setting, display, indicator

W04-M01D1A [1992]

Remote control

When remote control of camera combined with recording equipment is involved, W04-E04A codes are also used, otherwise see W05-D codes when remote control signal transfer aspect is significant.

W04-M01D1C [2011]

GUI control aspects of cameras

This code covers the use of graphic user interfaces for controlling a camera and employing the camera display, including the use of touchscreens. Novel aspects of displays for cameras are covered by W04-M01D3A and of touchscreens by W04-M01D3E.

W04-M01D2 [1992]

General control and monitoring circuits

Prior to 1997 this code included generation and distribution of synchronising signals within camera, (also coded in W04-M05). From 1997 see W04-M01D2M.

W04-M01D2A [1992]

Light metering

Photometry in general is covered by S03-A01 codes, which are not assigned here unless broader application is indicated. Thus, methods involving determination of scene brightness from the video signal itself (rather than a separate photosensitive device) would not normally be assigned S03 codes.

W04-M01D2C [1992]

Range finding and subject location/tracking

Includes rangefinding for setting focus. Focus detection by video signal characteristics (e.g. HF content) is covered by W04-M01D2E. Includes tracking using 'beacon' transmitter, and automatic systems using movement/position detection, which are also coded in e.g. W06-A02C1. Prior to 1997 this code included identification of subject or region of interest by eye-gaze direction determination, when used with S05-D01C5A. From 1997, see W04-M01D2G, which is used alone to represent the gaze-direction aspect. (Similar systems for photographic cameras are covered by S06-B01E). This code also included detection of faces and facial expression but from 2011 this topic is covered by W04-M01D2F instead.

W04-M01D2E [1992]

Focus detection

Covers determination of focusing state by video signal characteristics, such as HF content. Control of optical system is covered by W04-M01D5D.

W04-M01D2F [2011]

Face and facial expression detection

This code covers the detection and identification of faces, parts of faces and facial expression of subjects to be photographed, e.g. to determine a region of interest or to control shutter actuation. Prior to 2011 this topic was covered by W04-M01D2C. Determination of eye gaze direction of the camera user is **not** included and is covered by W04-M01D2G. Facial recognition and detection as an application of image recognition is covered by T04-D07F1 which is also assigned as appropriate.

W04-M01D2G [1997]

Eye-gaze direction determination

This code covers the determination of gaze direction of the camera user for purposes such as control of exposure parameters. Prior to 1997, see W04-M01D2C and S05-D01C5A, which was used to discriminate the eye-gaze aspect. See also W04-M01D3 codes for aspects involving viewfinders, e.g. IR LEDs, dedicated image sensor, special optics, etc. Analogous systems for photographic cameras are covered by S06-B01E. Detection and identification of faces, facial features, or expressions of **subjects** to be photographed is **not** included, and is covered by W04-M01D2F

W04-M01D2J [1992]

Camera condition monitoring and testing

Includes calibration arrangements and self-checking circuits e.g. for low battery state in portable cameras (also assigned S01-G06 and X16-H codes).

W04-M01D2M [1997]

Synchronising signal generation and distribution

Synchronising signal generators and 'studio' aspects are covered by W04-M05, which was assigned for this topic, with W04-M01D2, prior to 1997.

W04-M01D2R [2007]

Controlling use of camera in restricted area

(W04-M01D9)

See W01-C01P6C for camera phones.

W04-M01D2S [2014]

Software version control

This code covers software updating and version control for cameras. Software version management in general is covered by T01-F05F, which is also assigned for camera inventions as necessary

Download, firmware

W04-M01D2X [1992]

Other general control and monitoring circuits for cameras

This code covers control or sensing arrangements for video or still cameras not provided for in the above subdivisions. It includes accelerometers and the like (see e.g. S02-G03 or S02-H also) for use in detection of camera shake or vibration, for which W04-M01D7 is also assigned when part of a compensation system and the use of navigation information from e.g. GPS receivers, for which W06-A03A5 codes are also assigned.

W04-M01D3 [1992]

Viewfinders

For display of menus etc. see W04-J03C.

W04-M01D3A [1992]

Display device

This code is intended to indicate novelty in the actual display device itself, such as an LCD for which U14-K01 codes are assigned to indicate the specific novel aspects. W04-M01D3A is **not** assigned for novelty in the camera or camera circuitry for which W04-M01D3C is used when specific display drive aspects are involved, or W04-M01D3 for more general details. Novel aspects of touchscreens are covered by W04-M01D3E which is assigned with this code when the display itself is also novel.

W04-M01D3C [1992]

Display drive circuitry

Covers matrix addressing, drive circuits, etc.

W04-M01D3E [2011]

Touchscreens for digital or video cameras

This code covers novel aspects of touchscreens for cameras. The use of touchscreens and graphic user interfaces for controlling a camera is covered by W04-M01D1C. When the display device itself is novel W04-M01D3A is also assigned.

W04-M01D4 [1992]

Character/subtitle generators

Subtitle generators for TV studio/video production use are coded in W04-N05C1A.

W04-M01D5 [1992]

Exposure control

Includes evaluation of scene condition information (provided by devices covered by W04-M01D2 codes), and control of function to optimise imaging.

W04-M01D5A [1992]

Evaluation of exposure conditions

W04-M01D5B [1992]

Back-light compensation

W04-M01D5C [1992]

Control of aperture and/or shutter time

For electronic shutter action (simulating mechanical shutter) search with W04-M01B5A.

Iris, stop, diaphragm

W04-M01D5D [1992]

Automatic focus control

Mechanical aspects of focus adjustment are covered by W01-M01C1B for lens movement and W04-M01B8B for image sensor movement. Detection of focus state is covered by W04-M01D2E. Manual setting of focus is covered by W04-M01D1 with W04-M01C1B or W04-M01B8B. For automatic control, W04-M01C1B or W04-M01B8B are not assigned unless significant aspects of actuator driving are involved.

Closed loop, hill-climbing, servo, feedback, optimize

W04-M01D5E [1992]

Zooming and magnification control

This code is normally used alone unless specific aspects of control and interaction with the motor circuit per se are involved.

W04-M01D5H [1997]

Light source control

Search with W04-M01H1 for control of continuous lighting units and W04-M01H5 for control of flash units. Drive circuit for discharge-tube type flash lamps are covered by X26-C01A.

W04-M01D5X [1992]

Other exposure control aspects

W04-M01D6 [1992]

Image processing and function control

Used with W04-P and W04-N codes as appropriate, e.g. W04-P01D1 for white balance control, W04-N05C5E for red-eye removal (see T04-D07F1A for eye detection). From 2009 compensation by means of image manipulation processing for optical system geometry distortions, such as those arising from use of wide-angle lenses, is covered by W04-N05C3E. W04-M01D6 or W04-M01D6A is also assigned when the processing is performed **within** the camera, but **not** when performed subsequently. Prior to 2009 W04-M01C9 was also applied for this topic but from 2010 is only assigned for systems acting directly on the optical system itself.

W04-M01D6A [1997]

Image acquisition aspects

Covers processing associated with e.g. read-out of image sensor, such as compensation for imager characteristics. Use in conjunction with W04-P01H1 (and W04-M01B7) for solid state circuit imager dark current compensation.

W04-M01D6C [2006]

Multi-standard processing

Includes arrangements for changing resolution of still pictures (see also W04-M01B1) and standards conversion (see also W04-N05A).

W04-M01D7 [1992]

Motion compensation

This code covers arrangements for countering the effects of unwanted motion, such as camera shake. See W04-P01 and W04-M01G codes respectively for electronic and (electro-) mechanical movement compensation systems. Compensation involving movement of the image sensor is also assigned W04-M01B8A or W04-M01C9 if achieved optically.

W04-M01D8 [2002]

Video and digital camera interfacing

(W04-M01D9)

This code covers arrangements for interfacing of video and digital cameras with other equipment and systems. From 2014 the code is subdivided to distinguish between interfacing with separate parts of the camera or accessories, e.g. detachable lenses (W04-M01D8A) and interfacing with equipment or systems that are not part of the camera or camera system (W04-M01D8C). Search with W04-K codes for specific aspects of interfacing, e.g. W04-K07 for novel connectors or cables.

W04-M01D8A [2014]

Interfacing with separate part of camera or camera system

This code covers interfacing with separate parts of a camera or accessories that may be detachable from the main camera body, such as lenses (for which W04-M01C1D is also assigned) or electronic flash units (for which W04-M01H5 is also applied).

W04-M01D8C [2014]

Interfacing with separate equipment or system

This code covers novel aspects of interfacing with equipment or systems that do not form part of the camera or camera system. It includes interfacing with equipment such as computers, for which W04-K08 is also assigned and also interfacing with printers, other cameras and data networks.

W04-M01D9 [1992]

Other camera control

W04-M01E [1987]
For IR imaging, optomechanical scanning
(W04-M01X)

Includes 'staring' and scanning types. Non-video night vision systems are covered by W07-G codes, (tubes per se are coded in V05-D03 codes).

W04-M01E1 [1992]
IR imager
FLIR imager, pyroelectric camera, heat sensing camera

W04-M01E1A [1992]
IR-sensitive pick-up device
See also appropriate code for solid-state pick-up element e.g. U14-E01, or U13-A codes.

W04-M01E5 [1992]
Optomechanical scanning systems
See V07-K05 also. Prior to 2009 this code was also used to indicate arrangements for increasing imaging resolution by imparting movement to an image sensor, e.g. to achieve dithering. This topic is now covered by W04-M01B8A.
Galvanometer mirror, polygonal mirror, motor driven scanning

W04-M01E5A [1992]
With single scanning direction
Includes systems with subscanning action provided by motion of subject or imaging platform.
Satellite, missile, push-broom, vehicle, traffic, rail, train

W04-M01E5C [1992]
With main- and sub-scanning
Includes optomechanical/electromechanical arrangements to provide simultaneous line and field scanning.

W04-M01F [1987]
For X-ray and other non-light imaging
(W04-M01X)
Includes medical diagnostic imaging (see S05-D02 or S05-D03 codes also), but **not** systems where the primary means of 'imaging' uses visible radiation. Medical ultrasound systems are **not** routinely covered in W04-M01F.
Image converter, image intensifier

W04-M01F1 [1992]
X-ray imaging

W04-M01F3 [1992]
Nuclear imaging
Gamma camera

W04-M01F5 [1992]
Ultrasonic imaging

W04-M01G [1987]
Constructional details
Includes mounting, tripod, housing etc., and constructional features of cameras per se.

W04-M01G1 [1992]
Camera construction
Cooling, condensation prevention, heating

W04-M01G1A [1992]
Camera housing
Casing, cabinet

W04-M01G1B [1992]
Internal constructional details
Card, circuit board, cooling, fan, layout, PCB, screening, shield

W04-M01G5 [1992]
Carrying case for portable camera
Includes shoulder straps, etc.

W04-M01G7 [1992]
Tripods, supports
Includes collapsible supports and permanent mountings e.g. for surveillance camera (also assigned W02-F01 codes).

W04-M01G7A [1997]
Fixed mounting

W04-M01G7C [1997]
Movable mounting
Includes motor-driven positioning system. Search with W04-M01D2C for arrangements tracking a subject by moving the camera.

W04-M01H [1992]
Light sources
(W04-M01X)
See X26 codes for details of light sources per se and fittings. Includes lighting integral with, or detachable from, portable cameras. TV studio lighting is covered by W04-N01. Prior to 1997, light source control was covered in W04-M01D9, but is now transferred to W04-M01D5H.

W04-M01H1 [1997]

Continuous illumination

W04-M01H5 [1997]

Flash light

Electronic still-picture cameras are assigned W04-M01B1 codes. Recording of single pictures with other types of recording equipment, e.g. VTRs, is covered by W04-E20C5 and W04-B10 codes. See S06-B03 codes for details of photographic camera flash circuits.

Stroboscope

W04-M01H5A [2007]

Pre-light emission/Red eye reduction

Includes use of separate light source for pre-light emission before main flash to prevent red eye. Light source control aspects are covered in W04-M01D5H. See S06-B03A1 for non-digital camera.

W04-M01J [1992]

Camera systems for imaging still pictures

(W04-M01X)

Covers the use of video cameras to image static objects such as slides and photographs, e.g. for video slide viewer (also coded in S06-B06B). 'Digital' ('electronic still picture') cameras are covered by W04-M01B1 codes, and telecine machines by W04-M02. Facsimile systems are not included and are covered by S06-D to K codes.

Document camera, rostrum camera

W04-M01K [1992]

Camera-recorder

(W04-M01X)

Codes indicating the recording technology used are also assigned when significant, e.g. W04-B10G for DV tape, W04-B14C3 for hard disk, W04-C10A3 for optical disk, or W04-P01C8 for solid-state types. For a video recording facility in a digital camera W04-M01B1E takes precedence.

W04-M01L [1992]

Stereoscopic image generating camera system

Complete stereoscopic TV systems are covered by W02-F03B codes, stereoscopic TV receivers are assigned W03-A12A and other W03-A codes as appropriate. Search with W04-M01V for stereoscopic imaging systems employing two or more video cameras.

W04-M01M [2005]

Audio aspects

Covers all audio aspects of video cameras. Prior to 2005 this topic was included in W04-M01X.

W04-M01P [1992]

Power supplies

W04-M01P1 [1992]

Mains power

W04-M01P5 [1992]

Battery power supply

Includes battery per se. See X16 codes also.

W04-M01P5A [1992]

Battery charging

W04-M01S [2005]

Panoramic camera

(W04-M01X)

Use in conjunction with W04-M01C6 for optical arrangements and with W04-N05C5 for 'stitch mode'. For moving platforms see also W04-M01G7C.

W04-M01V [2006]

Multiple camera systems

(W04-M01X)

Search along with W04-F01P and W02-F01A for CCTV security systems recording multiple camera outputs. Search with W04-M01L for stereoscopic imaging systems employing e.g. two video cameras.

W04-M01V1 [2014]

Multiple cameras within same equipment housing

This code covers the use of two or more digital or video cameras or image sensor arrangements that are contained within the same housing and are therefore part of the same equipment, e.g. for stereoscopic imaging with W04-M01L or in a mobile phone with front and rear-facing cameras used at the same time, for which W01-C01D3C and W01-C01P6C are also assigned.

W04-M01V5 [2014]

Multiple cameras in separate housings

This code is assigned for inventions depending on the use of two or more digital or video cameras that are contained within separate housings and therefore are not part of the same equipment. For stereoscopic imaging search with W04-M01L and for multiple-camera aspects of CCTV surveillance systems with W02-F01A5.

W04-M01W [2011]

Internal wiring of camera

This code is intended to highlight **internal** wiring details, including wires, cables and flexible PCB wiring arrangements, but **not** wiring within an integrated circuit. It includes both novel wires and cables (for which X12-D codes are also assigned) and constructional aspects such as the arrangement of wiring for which W04-M01G1B is also assigned. Arrangement of wiring within equipment in general is covered by V04-T01A.

W04-M01X

Other video camera aspects

This code covers aspects of electronic imaging cameras not covered by the above subdivisions, including industrial inspection applications where the use of the camera is significant and linked to the novelty in some way. S02 or S03 codes, (e.g. S02-J04 or S03-E04 codes) are applied for these topics as appropriate. Also included are additional devices built-into a camera, for which codes for the particular device should also be employed when searching.

W04-M02

Telecine

See W04-M01 codes for image pick-up details and S06-B05 codes (cinematography) also.

Film, scan, frame, intermittent, gate, pull, continuous, photograph, cine

W04-M05 [1992]

Synchronising and blanking signal generators

(W04-M09)

TV receiver synchronising circuitry is covered by W03-A06.

W04-M07 [1992]

Video pattern generators

Includes generation of test patterns (see also W02-F04A).

W04-M09

Other video source aspects

W04-N

Video special effects and manipulation, TV studio equipment

Codes in W04-N relate to equipment for use in TV studios or for analogous purposes. W04-N05G codes are used to indicate application but only if this is stated or implied.

Video mixing desk, special effects generator, picture inlay, chromakeying, delay compensation, lighting control desk

W04-N01 [1992]

Studio and outside broadcast equipment

Includes e.g. lighting, camera control consoles (also coded in W04-N05B codes for video mixing and switching aspects, but not cameras per se, (covered by W04-M01 codes), or telecine, (covered by W04-M02)). For video processing see W04-N05 codes which cover such aspects as standards conversion, chroma keying, etc.

TV opaque projection, telop, teleprompter, autocue, intercom, talkback

W04-N05 [1992]

Equipment with video processing function

See also W04-P codes as appropriate for video processing. Where computer data processing is involved, T01-J10 codes are also assigned.

W04-N05A [1992]

Standards conversion equipment

Standards conversion in TV receivers is covered by W03-A11A, in recording equipment by W04-F01H3.

W04-N05A1 [2005]

Transcoding

W04-N05B [1992]

Video mixing and switching equipment

Includes equipment for CCTV monitoring. (See also W02-F01 codes. W04-N05G5 is also assigned).

W04-N05B1 [1992]

Video mixing equipment

Fade, blend, wipe, merge, combine, channel

W04-N05B5 [1992]

Video switching equipment

Where actual switching details are involved, W01-B codes may be assigned also.

W04-N05C [1992]

Image generation and manipulation, including special effects equipment

These codes cover the generation and manipulation of images for special effects or other purposes, such as image correction. Generation of images by video cameras is not included, being covered by W04-M01 codes. Manipulation of images in TV receivers is not included and is covered by W03-A13E codes. For computer-based image processing aspects search with T01-J10 codes.

W04-N05C1 [1992]

Image generation system

This code covers the generation of images electronically, e.g. using computer graphics techniques, and **not** the generation of images of real-world scenes using e.g. a camera.

W04-N05C1A [1992]

Subtitle and text generator

Crawling text

W04-N05C3 [1992]

Image manipulation systems

This code covers the application of image processing techniques to the manipulation of images, including moving, enlarging/reducing, correcting geometry and image cropping (as represented by W04-N05C3G from 2014). T01-J10 codes for computer-based image processing are also assigned as appropriate.

W04-N05C3A [1997]

Moving image, or part of image

W04-N05C3C [1997]

Enlarging or reducing image

W04-N05C3E [2009]

Correcting image geometry

This code covers the application of image manipulation processing to the correction of faults in image geometry. Examples include 'keystone' correction in video projectors (with W04-Q01J) and compensation for camera optical system distortions (with W04-M01D6 codes as appropriate if carried out in the camera itself). Prior to 2009 W04-M01C9 ('Other optical aspects of video cameras') was assigned to indicate that optical system defects were being compensated for. From 2009 W04-M01C9 is no longer applied for this topic and would only be assigned for systems acting directly on the optical system itself.

Screen angle, perpendicular, normal, trapezium, fisheye, wide angle, lens, aberration.

W04-N05C3G [2014]

Image cropping

Covers selection of a desired area of an image and deleting the remainder.

Border, edge, trim, remove frame

W04-N05C5 [1992]

Picture inlay or overlay system

For combining real-world and computer generated images for augmented reality search with W04-W07E1. Picture inlay circuitry for TV receivers is covered by W03-A13 codes.

Inset, superimpose

W04-N05C5A [1992]

By chroma keying

Colour, blue, background, video switch

W04-N05C5E [1997]

Replacing designated part of image

Includes arrangements e.g. using recognition techniques to detect text in an image, or 'coding' a region of an image in some way, to substitute text in another language, or alternative images. For application to inserting 'domestic' advertisements in e.g. a sporting event broadcast from overseas, search with W05-E03C (TV with advertising) from 2002, W05-E03 prior to that.

W04-N05C7 [2014]

Image manipulation for stereoscopic or depth imaging

This code covers arrangements for creating stereoscopic or pseudo-stereoscopic images, e.g. from separate still images or video sources, and also for modifying the perceived depth of such images, both previously covered by W04-N05C9. W04-N05C7 is not assigned for normal stereoscopic video cameras, which are covered by W04-M01L, unless image processing to vary the depth characteristic of images produced is also involved.

Blend, merge, offset, parallax

W04-N05C9 [1992]

Other special effect equipment

Prior to 2014 this code included simulation of 3-D images and also modification of the perceived depth of such images, both of which are now covered by W04-N05C7. Stereoscopic video camera arrangements are covered by W04-M01L, stereoscopic TV systems in general by W02-F03B codes and computer graphics aspects of three dimensional image generation are covered by T01-J10C4.

W04-N05G [1992]

Characterised by application

Codes in this section are intended to discriminate between broadcast and video production applications, and those performing analogous functions for use in e.g. industry. The codes are only applied when an application is stated.

W04-N05G1 [1992]

For TV studio or video production facility

W04-N05G3 [2007]

For digital cinematography

W04-N05G5 [1992]

For industrial or commercial application

W04-P

Video signal processing

See W03-A codes for TV receiver details, W04-F codes for application to recording. Where computer data processing of video is involved, T01-J10 codes are also assigned.

Image, camera, television, chrominance, luminance, code, encode, picture, memory

W04-P01 [1987]

Video processing type and applications

For application to video cameras (i.e. circuitry forming part of camera), search with W04-M01D6.

W04-P01A [1987]

Encoding

Includes encoding and decoding apparatus and methods e.g. for compression, bandwidth reduction, etc. See T01-J10D for computer-based image compression and coding, U21-A codes for encoding in general, W04-V05 codes for speech signal encoding, W04-V10 codes for audio coding, and W02-G04 codes for bandwidth reduction in non-video systems.

From 2002 the corresponding W02-F07 codes which covered 'systems' aspects of PCM and narrow band TV have been discontinued and are replaced by the general code W02-F07M 'Digital image transmission'. Thus, W04-P01A codes should be used to discriminate types of coding. Compression of still-picture information, e.g. in facsimile, is covered by S06-K07 codes.

Motion detection, vector quantisation, digitising, fractal, transformation

W04-P01A1 [1992]

Movement detection system

This code is used as a general code for detection and estimation of movement and may thus be used for applications such as automatic alarm actuation. (See also W02-F01, W05-B01C codes). When specific to hybrid or predictive video coding W04-P01A4A and W04-P01A5A are respectively assigned instead of W04-P01A1.

W04-P01A2 [2007]

Multiple video stream encoding, using foveation zones

Includes compression techniques using redundant data across multiple video streams or viewing angles.

W04-P01A3 [1992]

Transform coding

This code is intended for transform video and image coding methods, e.g. JPEG and its variants. Combined transform and predictive coding is covered by W04-P01A4 codes which take precedence over this code.

W04-P01A3A [2005]

Novel transform aspects

DCT, Wavelet

W04-P01A3C [2005]

Quantisation

W04-P01A3E [2005]

Run length, variable length encoding

Entropy coding

W04-P01A3F [2014]

Converting between variable and fixed rate transform encoding

This code is intended to highlight fixed and variable rate aspects of transform-based video encoding. Fixed and variable rate aspects of hybrid video encoding are covered by W04-P01A4F, which takes precedence over this code.

W04-P01A3G [2012]

Transform coding motion detection and estimation

Motion detection or estimation for hybrid coding is covered by W04-P01A4A, for purely predictive coding by W04-P01A5A, and for general and non-coding purposes by W04-P01A1.

W04-P01A3J [2012]

Transform coding motion compensation

Motion compensation for hybrid coding is covered by W04-P01A4C and for purely predictive coding by W04-P01A5C.

W04-P01A4 [1997]

Hybrid coding

(W04-P01A3, W04-P01A5)

This code is chiefly intended for combined transform and predictive coding, e.g. MPEG coding, H.263, H.264 and variants. From 2014, all coding for the purposes of broadcasting and streaming is assumed to be of this type unless specific details indicate otherwise.

AVC, CABAC, HEVC

W04-P01A4A [1997]

Hybrid coding motion detection and estimation

(W04-P01A3, W04-P01A5A)

Motion detection or estimation for purely predictive coding is covered by W04-P01A5A and for general and non-coding purposes by W04-P01A1.

W04-P01A4C [1997]

Motion compensation

(W04-P01A3, W04-P01A5A)

Motion compensation for predictive coding is covered by W04-P01A5C (prior to 1997 see W04-P01A5A).

W04-P01A4E [2005]

Novel transform aspects

Novel transform aspects for pure transform coding are covered by W04-P01A3A.

DCT, MDDT, Mode Dependent Directional Transformation, wavelet

W04-P01A4F [2008]

Converting between variable and fixed rate encoding

This code is intended to highlight fixed and variable rate aspects of video encoding.

W04-P01A4G [2005]

Quantisation

W04-P01A4J [2005]

Run length, variable length encoding

Entropy coding

W04-P01A4L [2005]

Reducing artefacts

Reduction of noise and errors in video signals in general is covered by W04-P01F codes.

W04-P01A4N [2005]

3-dimensional transforms

W04-P01A4S [2005]

Scalability arrangements

Covers arrangements to allow change in bandwidth according to conditions or capability of receiver.

W04-P01A5 [1992]

Predictive coding

W04-P01A5A [1992]

Motion detection and estimation

Motion detection or estimation for hybrid coding is covered by W04-P01A4A and for general and non-coding purposes by W04-P01A1.

W04-P01A5C [1997]

Motion compensation

W04-P01A5G [2011]

Quantization for predictive video coding

Quantization for hybrid coding is covered by W04-P01A4G which takes precedence over this code.

W04-P01A6 [2014]

Detecting and correcting errors

This code is intended to highlight inventions concerned with detection and/or correction of errors in video encoding. It includes arrangements for dealing with errors arising from corrupted image data and also problems with recognizing type of coding, start codes, or other ancillary data. Error detection and correction in digital data transmission in general is covered by W01-A01B codes and for digital data in general by U21-A06 codes.

W04-P01A7 [1992]

Subsampling

Involves methods for discarding sampled values, e.g. by considering values of adjacent sample points.

Multiple sub-Nyquist sampling encoding, MUSE, phase alternate sub-Nyquist sampling, PASS, sample dropping, merging

W04-P01A8 [1997]

Coding based on fractals

Covers image coding using algorithms to generate fractal codes

Fractional dimension, graftal, pattern, shape, irregularity

W04-P01B [1987]

For non-visible spectrum imaging

Includes video processing specific to IR, X-ray etc., e.g. in medical systems, (see S05-D codes also, such as S05-D02A).

Digital subtractive imaging, angiography, DSA

W04-P01C [1987]

Frame stores, video memory and solid-state video recorder/player

See W04-N05C codes also for TV special effects application.

W04-P01C1 [1992]

Novel frame stores and video memory This code is assigned for novel aspects of solid-state memories intended to store still images or video. Circuitry for reading from or writing into memories of this type is covered by W04-P01C5. Use of solid-state memory in computer systems is covered by T01-H01B3 codes and novel memories in general are covered by U14-A codes.

W04-P01C5 [1992]

Memory addressing and control

Variable readout control, scan conversion, scan reversal

W04-P01C8 [2005]

Solid state video recorder/player

Includes devices storing and reproducing video and also still pictures, e.g. in an electronic photoframe.

Digital photo frame, digital picture frame.

W04-P01D [1987]

White balance and colour temperature control

W04-P01D1 [1992]

White balance control

W04-P01D3 [1992]

Colour balance and colour temperature control

W04-P01E [1987]

Gamma and aperture correction

Contour

W04-P01E1 [1992]

Gamma control

Correction for unequal amplitude response is covered by W04-P01H1.

W04-P01E3 [1992]

Edge correction, crispening

Peaking, emphasis circuit

W04-P01E5 [1992]

Aperture correction

W04-P01E7 [1992]

Compensating phase shift in signal processing

Includes correction of phase errors in colour separation from single image pick-up device.

W04-P01E8 [1992]

Dynamic range control, amplitude compression

See U24-C02B for amplitude compression in general.

W04-P01F [1992]

Noise reduction, error concealment

(W04-P01X)

Codes in this section are used to indicate arrangements for improving signal-to-noise ratio of a video signal, which may include compensating for noise-introducing defects in, for example, imaging devices. Compensation for imperfect imaging device characteristics in general is covered by W04-P01H codes. Noise reduction in connection with video recording is covered by W04-F01E codes and specifically for received radio signals, by W02-G03B codes.

W04-P01F1 [1992]

Noise reduction

(W04-P01X)

W04-P01F3 [1992]

Error concealment

(W04-P01X)

Includes interpolation with adjacent pixel values.

W04-P01H [1992]

Compensation processing for imager characteristics

(W04-P01X)

Gamma and aperture correction is covered by W04-P01E codes. See W04-P01F codes for particular noise reduction or error concealment. Specifically, use W04-P01H with W04-P01F3 for systems concealing defective pixels. For video camera application see e.g. W04-M01B7 and W04-M01D6A.

W04-P01H1 [1992]

Non-uniform amplitude response correction

(W04-P01X)

Includes correction for dark current and varying sensitivity of imager photosites.

W04-P01H3 [1992]

Correcting for 'charge-leakage' phenomena

(W04-P01X)

Includes correction for blooming.

W04-P01K [1992]

Clamping circuits

(W04-P01X)

Covers circuits establishing DC level of video signal. For such circuitry in TV receivers, see W03-A04C and, in general, U24-C02A5.

W04-P01L [1992]

Luminance/chrominance separation

This code covers processing of color video signals involving the separation of luminance and chrominance components. For application to color TV receivers or color video displays see W03-A05B codes.

Luma-chroma, Y-C

W04-P01N [1992]

Time shifting

(W04-P01X)

Includes delay circuits and compensation for delays e.g. to equalise signal paths, for timebase correction etc. (For recording see W04-F02B).

W04-P01X [1987]

Other video signal processing

W04-Q

Colour coders; TV projection

W04-Q01 [1987]

Video projectors and projection displays

This code and its subdivisions cover displays using projection of video or similar information on a screen. Codes relating to application are also assigned, e.g. for projection TV receivers search with W03 codes, for computer displays search with T04-H03E. Also included are special-purpose projection displays such as head-up displays projecting video information (covered by W04-Q01K) and direct retinal projection displays (covered by W04-Q01L).

Projection screen, transmission screen, optical system, laser projection system

W04-Q01A [1987]

Using CRT

For optical and cooling aspects of tubes see V05-D07C codes also.

Colour filter, liquid filter, tube face cooling, alignment/convergence adjustment

W04-Q01B [1987]

Using light valve, e.g. LCD, laser sources

See V07-K01A2 for area modulation of light in general.

Liquid crystal, light source, cooling

W04-Q01B1 [1992]

With laser light source

W04-Q01B2 [2007]

With LED light source

W04-Q01B3 [1997]

Using mirror-array device

W04-Q01B5 [1992]

Novel light valve

Search with W04-Q01B3 for novel mirror-array devices.

W04-Q01B7 [1992]

Light source

Laser aspects are covered by W04-Q01B1. See also appropriate codes in X26 for light sources, reflectors, etc. For light source testing and monitoring search in conjunction with W04-Q01J.

W04-Q01E	[1992]
Optical system	
Includes lenses and filters, but not light valves, which are covered by W04-Q01B. For systems specific to the type of projection system e.g. using a CRT, see also the appropriate W04-Q01 code. Screens are covered by W04-Q01F.	
W04-Q01E1	[1997]
Lens system	
W04-Q01E1A	[1997]
Focus adjustment	
W04-Q01E1C	[1997]
Novel lens details	
W04-Q01E3	[1997]
Filter	
W04-Q01E3A	[1997]
Colour filter, colour separation filter	
W04-Q01E3C	[1997]
Removing specific wavelength	
Includes IR cut filters.	
W04-Q01E5	[1997]
Reflection systems	
Includes static mirrors and prisms. Optomechanical and electro-reflective scanning systems are covered in W04-Q01-E07S	
W04-Q01E7	[2005]
Beam splitter, polarizer and other optical arrangements	
W04-Q01E7A	[2005]
Beam splitter	
W04-Q01E7C	[2005]
Polarising, diffraction gratings, polarising filters	
Prior to 2007 polarisation filters are covered in W04-Q01E3.	
<i>Quarter wave plate</i>	
W04-Q01E7S	[2007]
Scanning arrangements	
Includes optomechanical and electro-reflective scanning systems	

W04-Q01E7X	[2007]
Other optical elements	
W04-Q01F	[1992]
Screens	
W04-Q01F1	[1992]
Transmission screens	
W04-Q01F3	[1992]
Reflective screens	
W04-Q01F5	[2005]
Volumetric, non-planar projection screens or media	
From 2014 video projectors specifically intended for use with screens of this type are covered by W04-Q01P.	
W04-Q01H	[1992]
Constructional details, cooling	
See V04-S and V04-T03 codes respectively for construction and cooling of electrical equipment in general.	
W04-Q01H1	[1997]
Casing, cabinet, mountings	
W04-Q01H5	[1997]
Internal construction and cooling	
W04-Q01J	[2002]
Projection display circuitry and control systems	
Covers circuitry for controlling the output of a projection display and includes auto-focusing and arrangements to correct distortion of the projected image when the screen is not normal to the projection axis. W04-N05C3E (W04-N05C3 prior to 2009) is also assigned for this topic when compensating pre-distortion of image geometry is used.	
W04-Q01J1	[2005]
Monitoring display output	
Covers use of sensors or CCD.	
W04-Q01J3	[2011]
Video projector remote control	
Remote control for TV receivers is covered by W03-A02C codes and for AV equipment in general by W03-G05A codes.	

W04-Q01J5 [2006]

Copy protection systems

Includes arrangements for projecting UV or IR light onto screen in order to prevent recording by video camera. Copy protection involving signal processing is covered in W04-F01L1.

W04-Q01J7 [2011]

Power supplies and power saving

Novel aspects of power supplies are also assigned U24-D, -E or -F codes as appropriate. Power supplies for TV receivers are covered by W03-A07 codes and for AV equipment in general by W03-G02 codes, which were also assigned with W04-Q01 codes for projector PSU inventions prior to 2011.

W04-Q01K [1992]

Head-up display application

See also under application, e.g. W06-B01B for aircraft, X22-E for automobiles.

W04-Q01L [2002]

Direct retinal projection display

This code is intended for displays which directly project an image onto the retina of the viewer, and thus is likely to be in the form of a head-mounted display. For application to such displays the following codes are also assigned: W03-A08E7A for TV receiver HMD, W04-W07E1A for virtual reality HMD, and W05-E07 for HMD of general application.

W04-Q01P [2014]

Panoramic and volumetric projection

This code covers video and electronic image projectors which form images on non-planar screens, such as adjoining walls of a room or curved or annular screens. Novel screens for use with this kind of projector are covered by W04-Q01F5. Image processing systems to adapt image geometry to the projection screen surface are covered by W04-N05C3E. When applied to virtual reality systems W04-W07E1 is also assigned while for simulators other codes are assigned as necessary, e.g. W06-B04 for aircraft, W06-C04 for ship and W04-W07A and X22-X for land vehicle driving simulators.

W04-Q01S [2005]

Stereoscopic, 3-dimensional projection & holographic displays

W04-Q05 [1992]

Colour coder

Modulator, subcarrier generator

W04-R

Stereo- and quadraphonic systems

Left, right channel, stereophonic, amplifier

W04-R01 [1992]

System type

W04-R01A [1992]

Pseudo-stereophonic

Frequency separation

W04-R01C [1992]

Stereophonic

W04-R01C1 [1992]

Binaural

Dummy head, recording, sound source location

W04-R01C5 [1992]

Surround sound system

W04-R01E [1992]

Quadraphonic

W04-R05 [1992]

Sound field control

Parametric audio systems are covered in W04-S05P and are not coded here.

W04-R05A [1992]

Responsive to e.g. sensed location of listener

W04-S

Loudspeaker enclosures; Public address systems

W04-S01 [1992]

Loudspeaker enclosures and leads

W04-S01A [1992]

Mountings for enclosure

W04-S01C [1992]

Connectors, leads

Plug, socket, wiring

W04-S01E [1992]

Enclosure

Speaker, acoustic, box, housing, cabinet baffle, reflex enclosure, acoustic wadding, port, grille, dust cover

W04-S01E1 [1992]

Loudspeaker mounting

Also coded in V06-A and V06-G01.

W04-S01E5 [1992]

Achieving desired directional effect or frequency response

Also coded in V06-A and V06-G02.

W04-S05 [1992]

Public address and stage equipment

Includes analogous equipment used in sound broadcasting and recording apart from mixing desks which are coded in W04-G05.

Loudhailer, PA system, concert, exhibition, conference, monitor loudspeakers, acoustic feedback suppression, phase/frequency shifter

W04-S05A [1992]

Amplifiers, mixing desk

Details of mixing desks are covered by W04-G05 codes.

W04-S05C [1992]

Microphones, stands

Microphones in general are covered by V06-B02.

W04-S05C1 [1992]

Cordless/wireless microphone

W04-S05P [2005]

Parametric audio systems

Covers use of separate ultrasound sources providing highly directional beams that interfere at precise location. Includes non-public address application of parametric audio systems.

W04-T

Circuits for transducers

See also V06-H. This code is used for circuits through which the transducer current flows, e.g. for impedance matching. It is **not** intended for circuitry preceding an amplifier which drives the transducer, for example.

Loudspeaker, microphone, amplify, feedback, impedance matching, crossover network, bridge network, motional feedback, motion pick-up transducer, MFB

W04-T01 [1997]

Impedance matching

Impedance matching in general, using lumped constant circuit elements, is covered by U25-D05.

W04-T03 [1997]

Motional feedback (MFB)

This code is assigned for audio reproduction systems in which the output transducer, e.g. a loudspeaker, is incorporated into a feedback loop so that any non-linearity in its characteristics can be compensated for. Includes use of an additional transducer such as a microphone or accelerometer and also networks to isolate a signal such as back EMF that corresponds to motion of e.g. a diaphragm or voice coil.

W04-T05 [1997]

Frequency selective networks

Includes crossover networks.

W04-U

Electrical musical instruments

W04-U01

Electronic tone generation

See also U23 codes for novel tone-generating circuits, e.g. reading sine wave values from memory, covered by U23-F codes.

Memory-storage, waveform generator, read-out circuit, variable clock, master oscillator, sample, synthesis

W04-U01A [1997]

Tone generators

Includes oscillators used in additive and subtractive synthesisers (see W04-U03C) and waveform generators using acoustic modelling.

W04-U01C [1997]

Memory access

Covers use of stored values (using ROM or RAM) to produce periodic waveforms, e.g. in 'wavetable' synthesis.

W04-U01C1 [1997]

Sampling

(W04-U01, W04-U04D)

See also W04-U03 codes for control aspects and synthesisers, and W04-U04D for input-output aspects.

W04-U02

Electromechanical tone generation; Instruments using pick-ups

W04-U02A [1992]

Instruments using pick-ups

Electric guitar, violin, transducer, string, bridge, fret

W04-U02A1 [1992]

Pick-up per se

See V06 codes for transducer detail.

W04-U02C [1992]

Electromechanical tone or sound generation

Player piano, solenoid actuation, drum, percussion

W04-U03

Controlling tone frequencies; Producing special effects

Level control, tone mixing, waveform shaping

W04-U03A [1992]

Controlling generation or combination of tones

W04-U03C [1992]

Synthesis

Includes use of time varying filters and amplifiers, FM etc.

Additive, subtractive

W04-U03E [1992]

Special effects

Includes delay effects, e.g. reverberation. Also covers novel special effect processing for amplified or recorded acoustic instruments or voice, e.g. in karaoke device.

W04-U04

Other electrophonic instrument details

Includes selection circuits, accompaniment, keyboards, I/O, and construction.

W04-U04A [1992]

Keyboards, pedals, and circuitry

Key switch, electronic switch, stop, voice, pedals

W04-U04C [1992]

Accompaniment systems

Automatic rhythm generator

W04-U04D [1992]

Input/output arrangements

Includes arrangements for interfacing with other equipment. See W04-U05 for MIDI aspect.

W04-U04G [1992]

Constructional details

W04-U04J [1997]

Other electronic musical instruments

Covers non-keyboard instruments with electronic actuators, e.g. guitar synthesizers, electronic drum pads.

W04-U05 [1992]

Musical equipment interfacing standards, MIDI

(W04-U09)

Includes general aspects. See also W04-U04D for specific circuitry or operation details for instrument per se, and W04-G05B for sound mixing interface aspects.

W04-U06 [1997]

Sequencers and composition systems

(W04-U07)

Includes transcription systems. Prior to 1997 these were coded under W04-U07.

W04-U07 [1992]

Musical training system

(W04-U09)

Includes practice equipment. From 1992 to 1997 electronic music transcription systems were included. These are now coded under W04-U06.

Practice equipment, keyboard order/position display

W04-U08 [1992]

Sound-to-light conversion equipment

Colour organ

W04-U09

Other electrical music aspects

Includes metronome (see S04-C09 also).

Electric bell, gong, chimes, sound-to-light converter

W04-V

Analysis, synthesis and processing of sound waves

Includes acoustic noise reduction system using antiphase sound, which is covered by W04-V07 codes. Novel aspects of speech recognition or synthesis are respectively assigned W04-V01 and W04-V02. Inventions involving the use of these techniques only, without any novelty being involved, are covered by W04-V04 codes. General audio signal processing aspects, including sound mixing and switching are covered in W04-G.

Digital, speaker, word, code, memory, model, pattern reference, encode, allophonic, formant, phoneme, linear predictive coding (LPC)

W04-V01 [1987]

Novel aspects of analysis or recognition

Parsing, segmentation, speaker-dependent, speaker-independent

W04-V02 [1987]

Novel aspects of synthesis or generation

W04-V04 [1992]

Applications of speech analysis and synthesis

Includes systems where method of analysis or synthesis is not necessarily novel. Previously coded in W04-V (no subdivision) if substantial disclosure of details. From 2002, W04-V04A7 is introduced to specifically cover the analysis of non-speech sound waves.

W04-V04A [1992]

Analysis systems

Voice-input, hands-free

W04-V04A1 [1992]

Determining presence of speech only

Covers systems intended to discriminate speech from e.g. noise or other signals, without recognition of words, phrases, etc.

Automatic telephone dialler, call progress tone detector

W04-V04A3 [2002]

Determining speaker characteristics

From 2014 the title of this code has been changed to reflect the previous inclusion of arrangements for determining the gender of a speaker, now covered by the specific subdivision W04-V04A3C.

Inventions described by the original title of this code - i.e. 'Determining identity of speaker' - are now covered by W04-V04A3A.

W04-V04A3A [2014]

Identifying individual

This code covers biometric identification of a speaker based on their unique vocal characteristics and should be searched with other codes for specific applications, e.g. with W01-C01D3C and W01-C01Q8C for control of access to a mobile phone based on recognizing a speaker.

W04-V04A3C [2014]

Discriminating gender of speaker

This code covers discrimination between male and female speakers, e.g. based on fundamental frequencies, without necessarily involving identification of the speaker themselves.

W04-V04A4 [2008]

Determining emotional status of speaker

For determining the emotional status of a speaker by analysing characteristics e.g. volume level, pitch of the speaker's voice, and/or words used by the speaker.

Tremor

W04-V04A5 [2005]

Voice-actuated control of equipment or machines

See also W05-D codes for general applications of remote control using speech recognition.

W04-V04A6 [2005]

Speech-to-text

W04-V04A7 [2002]

Non-speech audio analysis applications

This code covers the analysis and recognition of non-speech (i.e. non-human) sound sources, such as musical sequences, machine noise, and animal sounds, including their analysis to discriminate or identify different species of animals or birds. Application to the testing of machines is indicated by assignment of S02 or S03 codes also, such as S02-J03A for bearings or S03-F02B for determining resistance to wear.

Amphibian, avian, bearing noise, bee, bird, cat, cattle, diagnosis, dog, eagle, elephant, engine noise, fox, horse, insect, Korotkov, mammal, note, pest, pitch, rattle, termite, tuning

W04-V04A8 [2014]

Comparing speech or singing with reference

Covers arrangements for determining the degree of matching of sounds made by an individual with a reference. It includes evaluating the correctness of pronunciation of spoken words in language learning (with W04-W codes) and of pitch, tempo etc. of singing (with W04-U07). Evaluation of pitch and other qualities of musical instruments using analysis of sounds is not included and is covered by W04-V04A7 and W04-U codes.

Accent, expression, intonation, judge, karaoke, performance, score

W04-V04C [1992]

Synthesis systems

W04-V04C1 [2005]

Text-to-speech

W04-V04E	[2005]
Novel circuitry for speech analysis or synthesis	
Includes novel features of signal processing circuitry, e.g. automatic gain control, noise reduction, used for speech analysis/synthesis applications. Applied in conjunction with U24, W04-G and W04-V05 codes as appropriate to indicate type of novel signal processing.	
W04-V05	[1992]
General speech signal processing and representation	
Includes details of signal processing applicable to analysis or synthesis and also coding of speech or similar signals.	
W04-V05A	[1992]
Filtering	
W04-V05C	[1992]
Correlation	
W04-V05E	[1992]
Noise reduction	
W04-V05G	[1992]
Coding systems	
From 2002 see W04-V10 codes for non-speech audio coding. See U21-A codes for coding in general, and W02-C06 for PCM transmission systems in general (including systems without novel coding aspects).	
<i>Quantisation</i>	
W04-V05G1	[1992]
Involving simulation of e.g. vocal tract	
Includes channel vocoder and use of bank of bandpass filters.	
W04-V05G3	[1992]
Predictive coding systems	
<i>Vector</i>	
W04-V05G3A	[1992]
Code excited linear predictive coding	
<i>CELP, sequential optimisation, simultaneous optimisation, excitation codebook, dynamic codebook, long term predictor filter</i>	

W04-V05G5	[1992]
Transform coding systems	
<i>Orthogonal</i>	
W04-V05G6	[2002]
Comfort noise	
This code covers systems introducing so-called comfort noise into a communications channel, e.g. to avoid disturbing silence periods. Systems of this type for use in telephone speech signal processing are assigned W01-C01C7A.	
W04-V05G8	[1992]
Dynamic coding	
W04-V05J	[1997]
Pitch, rate change	
<i>(W04-V05, W04-V09)</i>	
Search with S05-K for systems aiding e.g. hearing-impaired persons, and W04-Y codes where forming part of a hearing aid.	
W04-V05J1	[1997]
Pitch change	
<i>(W04-V05, W04-V09)</i>	
W04-V05J5	[1997]
Rate change	
<i>(W04-V05, W04-V09)</i>	
Prior to 2002 this code was used for sample rate conversion of digital audio signals. From 2002 this topic is covered in W04-V10A.	
W04-V07	[1992]
Noise cancelling systems	
Covers systems using a sensor such as a microphone and suitable signal processing to cancel or reduce the level of unwanted sound. This can be achieved either by means of destructive interference using antiphase sound emitted by e.g. a loudspeaker, or by electronic signal subtraction which from 2019 is covered specifically by W04-V07C1.	
<i>Active noise control, air conditioning, ANC, channel, duct, machine, vehicle</i>	
W04-V07A	[1992]
Installations	
Includes physical detail of e.g. transducer per se, transducer mounting, description of complete installation not involving circuitry or control.	

W04-V07C [1992]

Control system, circuitry

This code covers signal processing aspects of sound cancelling systems, normally involving a microphone to sense ambient noise sounds. It includes systems using acoustic cancellation based on antiphase sound waves emitted from a loudspeaker and systems in which electronic cancellation is performed using audio signals alone, which from 2018 are covered by W04-V07C1. See U22-G codes also, e.g. U22-G01A5 for adaptive filters, and U22-G03 codes for details of DSP in general (also assigned codes in T01-J08).

W04-V07C1 [2019]

Cancellation using electronic signal subtraction

This code covers arrangements for cancelling or reducing unwanted sounds based on electronic subtraction of corresponding unwanted signals from a wanted audio signal, rather than generation of antiphase sound waves. For application to noise-cancelling headphones search with V06-V04A4.

W04-V09 [1992]

Other sound signal details

W04-V10 [2002]

Audio coding

Includes general audio encoding methods and apparatus e.g. for compression, bandwidth reduction etc., chiefly in entertainment applications. Coding methods and apparatus specifically for speech signals, generally involving lower bandwidth, data rate and quality for communications applications, are covered by W04-V05G.

W04-V10A [2002]

Standards conversion

Includes sample rate conversion.

W04-V10C [2002]

Nonuniform coding

Includes floating point and nonuniform companding systems.

W04-V10E [2002]

Predictive coding

Includes differential, adaptive and companded predictive systems.

DPCM, ADM, CVDSM, CPDM, ADPCM, NICAM, time domain

W04-V10G [2002]

Perceptual coding

Covers data reduction methods which use psychoacoustic models to reduce bit rate while retaining acceptable perceived audio quality, e.g. assigning higher quantisation errors to exploit masking properties of human hearing.

W04-V10G1 [2002]

Frequency domain coding

W04-V10G1A [2002]

Subband coding

Covers arrangements to feed input signal into filter bank for analysis and comparison with psychoacoustic model. Includes MPEG-1, Layers I and II, and Precision Adaptive Subband Coding (PASC).

Filter bank

W04-V10G1C [2002]

Transform coding

Covers arrangements using e.g. discrete Fourier Transform (DFT), discrete cosine transform (DCT) and modified discrete cosine transform (MDCT). Includes AC-2 and perceptual audio coding (PAC). Also includes AAC coding used in MPEG2 and MPEG4 standards (also coded in W04-V10G1J).

Adaptive transform coding, ATC, dynamic bit allocation

W04-V10G1G [2002]

Hybrid coding

Covers arrangements using a combination of subband and transform methods. Includes adaptive transform acoustic coding (ATRAC) and MPEG-1 Layer III.

Hybrid filter bank

W04-V10G1J [2002]

Multichannel coding

Covers arrangements to reduce redundancy and irrelevancy of multichannel signals in order to reduce overall bit rate. Includes AC-3, MPEG-2 multichannel coding and AAC (see also W04-V10G1C).

W04-V10G7 [2002]

Reducing artefacts

Coded in conjunction with other W04-V10G codes to indicate type of perceptual coding system. Reduction of noise and other unwanted signals for speech coding is covered by W04-V05E with an appropriate W04-V05G code.

W04-V10G9 [2002]
Other perceptual coding systems

W04-W

Educational equipment (electrical)

Teach, student, tape, visual, monitor, play, learn, train

W04-W01

Question and answer apparatus

Respond, test, correct multiple choice, keyboard, stylus, interactive

W04-W05 [1992]

Educational and conference equipment

Includes e.g. electronic blackboards.

Audio-visual aid, classroom equipment

W04-W05A [1997]

Educational equipment in general

This code is intended for systems and equipment used in a formal educational setting, e.g. a classroom. Electrical aspects of educational equipment used by individuals, e.g. at home, is covered by W04-W09.

W04-W05C [1997]

Conference equipment

Includes electrical aspects of presentation equipment, including speaker aids, such as prompting systems, public address aspects (see W04-S05 codes also) etc.

W04-W07 [1992]

Simulation systems, training and demonstration

See also under application. The following are **not** included:

- (1) Flight simulator - W06-B04
- (2) Ship simulator - W06-C04
- (3) Military training equipment - W07-D codes
- (4) Sports training - W04-X01A codes
- (5) Musical training - W04-U07

W04-W07A [1992]

Training simulator

Includes land vehicle driving simulators, also coded in X22-X.

Machine/control system operator training, telegraph operator training

W04-W07C [1992]

Demonstration of process or effect

Includes system for demonstrating physical phenomena which is also coded in S01 to S03 according to nature of phenomenon being modelled.

Physics, chemistry, mechanics, electrical, electronic

W04-W07E [1997]

Virtual and augmented reality

See T01-J40 codes for computing aspects of virtual and augmented reality systems. Video-based augmented and virtual reality is covered by W04-W07E1 codes.

AR, VR

W04-W07E1 [1997]

Video aspects

Includes image generation (also coded in T01-J10C) and image displays.

W04-W07E1A [1997]

Head mounted display

See W03-A08E7 for head mounted displays primarily for TV receiver applications, W05-E07 in general, and T04-H03C9 for claimed computer aspects. Displays employing direct retinal projection techniques are also assigned W04-Q01L.

HMD

W04-W07E3 [1997]

Acoustic aspects

W04-W07E5 [1997]

Tactile or mechanical aspects

For example shaking of seat.

W04-W07E9 [1997]

Other aspects of virtual reality

W04-W09

Other educational equipment

This code is intended for electrical aspects of educational equipment used outside a classroom environment, e.g. by individuals at home, and includes language learning aids, individual study aids, electronic dictionaries and e-books, including software enabling reading of e-books

W04-X

Sports, games, toys

Electrical aspects only are included. Non-electrical details are coded by P36 codes.

Leisure, recreation, pastime

W04-X01 [1983]

Sports and leisure

The title of this code has been changed to indicate the existing coverage of leisure activities in addition to organized sports. W04-X01 codes cover sports and leisure activities with some electrical aspect. From 2011 W04-X01K codes are introduced to indicate, where significant, the kind of sport or leisure activity involved and are assigned in addition to existing W04-X01 codes. For example, an alerting device to warn an angler of a fish biting would be assigned W04-X01E and W04-X01H to indicate sports equipment with a warning function and W04-X01K7A to denote fishing.

Fish, line, rod, reel, alarm, ski, pitch, court, lane, race, starter, ball, archery, athletics, ball-games, fencing, fishing, golf, gymnastics, hunting, racing, running, shooting

W04-X01A [1983]

Training equipment

W04-X01A1 [1992]

Performance monitors

This code covers arrangements for general measurement during sports training, such as lap timing, speed, or distance covered, and also measurements on the individual performing the training, such as medical and physiological parameter monitoring, e.g. of pulse rate. For medical monitoring equipment in general and to highlight specific performance measurements, see also S05. See also W01-C01P8 for using software or devices incorporated in a telephone e.g. smartphone, to measure medical parameters. Measurements relating to actual playing of competitive sports are covered by W04-X01C.

Exercise, time, practice, stopwatch, strength testing, ergometer, pedometer

W04-X01A3 [1992]

Simulators

Includes golf swing trainer, and simulation of game playing.

W04-X01A5 [1992]

Fitness training equipment

Includes exercise bikes, rowing machines, treadmills and similar equipment. Analogous equipment for medical purposes, e.g. physiotherapy, is covered by S05-A05.

Brake, Mechanical resistance, Weights, Rehabilitation equipment

W04-X01A5A [2011]

Exercise bicycle

Covers static exercise bicycle. Cycling on or off roads as a sport or leisure activity is covered by W04-X01K3C which is **not** assigned for exercise bicycles.

W04-X01A5C [2011]

Exercise treadmill

Covers static arrangements for 'on-the-spot' running. Running in the sense of athletics, jogging or cross-country running is covered by W04-X01K3A which is **not** assigned for treadmills and the like.

W04-X01A9 [1992]

Other sports training equipment

W04-X01C [1992]

Counting, timing, measuring, scoring

W04-X01C1 [1992]

Counting, timing, measuring, scoring detection

From 2011 this code is subdivided to separately indicate measurement or timing aspects from the 'yes/no' aspects of determining that a point or goal has been scored, or that a foul or fault condition exists.

W04-X01C1A [2011]

Counting, timing, measuring

See also S02 codes for measurement of length or distance and S04 codes and T05-G03 for timing aspects.

Lap, recording, start, finish, measure, photo-finish

W04-X01C1C [2011]

Detection of scoring or fault condition

Includes detection of scoring such as 'goal line' technology in football (soccer) or determining that a ball is out of play in e.g. a tennis match.

VAR

W04-X01C3 [1992]

Scoring, score display

See T04-H and W05-E codes for display details.

W04-X01D [1992]

Locators and guiding systems

Includes arrangements for retrieving lost equipment, and guiding systems for e.g. golf courses.

W04-X01E [1992]

Sports equipment per se

Covers equipment used by players. Includes electrical aspects of fishing rods, bats, skis, trampolines, hunting rifles and paintball guns. For electrical aspects of firearms, see also W07. Includes walking sticks for hiking (see also X27-A02E). General details of sport equipment are coded under P36-A08A.

W04-X01F [1992]

Sports grounds, stadia, courses, installations

Includes bowling alleys and equipment provided by administrators of sports facility e.g. golf carts, buggies, etc.

W04-X01H [1992]

Warning systems, alarms, protection

Includes systems warning of dangerous and non-dangerous conditions. See W05-A codes also for signalling aspects.

W04-X01K [2011]

Type of sport or leisure activity

These codes are assigned, normally in addition to codes indicating novel aspects, to denote the main application of a sports or leisure-based invention with electrical content. If an invention is applicable to a large number of categories, or no application is given, W04-X01K codes are **not** assigned. In the descriptions below the terms 'sport' and 'leisure activity' are used interchangeably.

W04-X01K1 [2011]

Sports using ball, puck, or shuttlecock

W04-X01K1 codes do not include sports involving measuring the distance over which a projectile, e.g. a javelin, is thrown which are covered by W04-X01K3A, or the launching or throwing of projectiles at a target which are covered by W04-X01K5 codes.

Bowling, curling

W04-X01K1A [2011]

Baseball

W04-X01K1C [2011]

Basketball

W04-X01K1E [2011]

Billiards, pool, snooker

W04-X01K1G [2011]

Cricket

W04-X01K1J [2011]

Football (soccer)

W04-X01K1L [2011]

Golf

W04-X01K1N [2011]

Hockey

Includes ice hockey.

W04-X01K1P [2011]

Racquet sports

Includes badminton, tennis, squash, etc.

W04-X01K1R [2011]

Rugby, American football

W04-X01K1T [2011]

Table tennis

W04-X01K1V [2011]

Volleyball

Includes beach volleyball.

W04-X01K1X [2011]

Other sports played with ball or similar projectile

W04-X01K3 [2011]

Athletics, cycling, racing, air and water-based sports

W04-X01K3A [2011]

Athletics and running

Includes running on track, cross-country, or marathons, and sports based on jumping and throwing, e.g. high jump, javelin, shot-put etc. (Darts is not included and is covered by W04-X01K5C).

W04-X01K3C [2011]

Cycling

Electrical aspects of cycles are covered by X22 codes. Static exercise bicycles are not included and are covered by W04-X01A5A.

Velodrome

W04-X01K3E [2011]

Horseracing

W04-X01K3G [2011]

Motor racing

Electrical aspects of vehicles are covered by X22 codes.

W04-X01K3J [2011]

Swimming

Swimming pools per se are not included (see X25-X06) unless the invention concerns some sports aspect, e.g. related to competition or performance measurement.

W04-X01K3L [2011]

Watercraft-based racing and water skiing

Includes rowing, sailing and power boat racing. Electrical aspects of watercraft are covered by W06-C codes. Skiing on snow, or dry slopes, is covered by W04-X01K3P.

W04-X01K3N [2011]

Air sports

Includes flying, gliding, hang gliding, parachuting etc.

W04-X01K3P [2012]

Skiing, snowboarding, curling

(W04-X01K3X)

Electrical aspects of skis are also assigned W04-X01E and testing of ski binding release force is also assigned S02-F03A and W04-X01H.

W04-X01K3X [2011]

Other racing

W04-X01K4 [2011]

Combat-based sports

W04-X01K4A [2011]

Boxing and martial arts

Wrestling is covered by W04-X01K4G.

W04-X01K4C [2011]

Fencing

Épée, foil, sabre

W04-X01K4E [2011]

Paintball, laser-simulated shooting

Shooting at targets is covered by W04-X01K5E and at animals for hunting by W04-X01K7C.

W04-X01K4G [2011]

Wrestling

Boxing and martial arts are covered by W04-X01K4A.

W04-X01K4X [2011]

Other combat-based sports

W04-X01K5 [2011]

Archery, darts, shooting

W04-X01K5A [2011]

Archery

Covers shooting at targets using longbow, crossbow, etc. Shooting animals for hunting is covered by W04-X01K7C.

W04-X01K5C [2011]

Darts

Prior to 2011 darts was coded as a sport or as a game (in W04-X02B) depending on emphasis. From 2011 W04-X01K5C will be assigned instead for all aspects of darts.

W04-X01K5E [2011]

Shooting

Covers shooting at e.g. paper targets, or 'clay pigeons'. Simulated shooting at 'war game' opponents using e.g. light beams and paintball shooting is covered by W04-X01K4E. Shooting animals for hunting is covered by W04-X01K7C. Electrical aspects of weapons are covered by W07 codes.

W04-X01K5X [2011]

Other sports involving launching projectiles at a target

W04-X01K7 [2011]

Fishing, hunting

W04-X01K7A [2011]

Fishing

Covers fishing for sport or leisure purposes only, e.g. angling. Commercial fishing is covered by X25-N02.

W04-X01K7C [2011]

Hunting

Includes shooting with e.g. rifle or bow and arrow. The use of these weapons to shoot at targets is covered by W04-X01K5E and W04-X01K5A respectively. Electrical aspects of weapons are covered by W07 codes.

W04-X01K9 [2011]

Other kinds of sport

W04-X01X [1992]

Other sports

Includes animal training.

Horse, racing, stable, fishing boat, trolling, water ski, tow

W04-X02 [1983]

Games

Play, target, ball, number, score

W04-X02A [1983]

Arcade games

Non-electrical aspects are coded in T05-H codes only, (assuming G07 IPC).

Motor, token, drive, change, arcade game

W04-X02A1 [1997]

Pinball and pachinko machines

Launch, solenoid, trap

W04-X02A3 [1997]

Amusement-with-prizes gambling machine

Fruit, symbol, reel, token

W04-X02A5 [2005]

Games with physical interaction

Grapple, whack-a-mole

W04-X02A8 [1997]

Arcade security, management, multimachine control

Includes overall control, and security aspects (see W02-F01A codes for CCTV, W05-B codes for alarms).

W04-X02B [1983]

Board and card game equipment; Dice games

From 2011 W04-X02B7 is introduced for electrical aspects of dice games and is assigned alone or in addition to W04-X02B1 or W04-X02B5 as necessary if the dice aspect is significant. Dice games with an electrical aspect that are played in a casino are also assigned W04-X02E.

Electronic card dealing, chess, draughts, roulette, 'battleships'

W04-X02B1 [1997]

Board games

Checkers, chess, draughts

W04-X02B5 [1997]

Card game equipment

Includes dealing equipment.

W04-X02B7 [2011]

Dice games

Includes electrical aspects of dice-based games and electronic representations of dice. Board or card games are covered by W02-X02B1 and W04-X02B5 respectively and W04-X02B7 is only assigned as well as those codes when the dice aspect is novel.

W04-X02C [1983]

Video games

For 'arcade' game aspect search with W04-X02A. For control of visual display units see T04-H and W03 codes also. For manual control arrangements, such as joystick, see T04-F codes and for computer aspects, including networked games, see T01-J and T01-N codes.

Program, image, memory, memory card, screen, arcade game, home video game, console, controller, sound effect generator, software, computer games, online games

W04-X02E [1997]

Casino games and equipment

W04-X02G [1997]

Betting, Lottery equipment and Bingo

W04-X03 [1983]

Amusements, toys

W04-X03A [1992]

Music based entertainment apparatus

See codes relating to recording/playing equipment where this is involved.

W04-X03A1 [1992]

Juke box

Disk, select, play, sequence

W04-X03A3 [1992]

Karaoke

Sing, perform, screen, cue, lyrics, microphone

W04-X03C [1992]

Ornaments, mobiles, household items, novelties

Includes animated ornaments, musical greetings cards, etc. See also X27.

Dancing flower, motor drive, sound responsive, animated dummy, robot

W04-X03E [1992]

Toys

From 2002 W04-X03E8 is applied to indicate use of remote control. For **novel** remote control aspects W05-D codes are also assigned, e.g. W05-D06A1A and W05-D08C for radio control.

Doll, robot, speech synthesiser

W04-X03E1 [1992]

Model vehicles

Car, train, boat, ship, aircraft, sound generator

W04-X03E1A [2002]

Model aircraft

Includes spacecraft.

W04-X03E1B [2002]

Model boat

W04-X03E1C [2002]

Model wheeled vehicle, e.g. car, truck

W04-X03E1D [2002]

Model racing track

Includes arrangements to drive wheeled vehicles on model road track.

W04-X03E1E [2002]

Model train and train set

W04-X03E1M [2002]

Model vehicle used for commercial or industrial purpose

W04-X03E2 [1992]

Outdoor toys and playing equipment

Includes electrical aspects of skateboards, balls, slides, swings, playground equipment etc.

W04-X03E5 [1997]

Dolls, stuffed toys

W04-X03E6 [2002]

Animated toys

Covers moving toys of a non-humanoid or non-vehicle form. Includes robots, virtual pets and gyroscope toys.

W04-X03E8 [2002]

Remote control

W04-X03E9 [1992]

Other toys

W04-X03G [1992]

Entertainment venues

Screen, stage, special effects, box office, amusement park, merry-go-round, Ferris wheel

W04-X03G1

Theatre, auditorium, concert equipment

W04-X03G3 [1997]

Fairground, theme parks, etc.

W04-X03G4 [2002]

Disco, night club, bar, restaurant, etc.

Includes personal calling arrangements to facilitate human interaction.

W04-X03G5 [1997]

Cinema equipment

For photographic aspects see S06-B codes also.

W04-X03G7 [2005]

Museums, exhibitions

Prior to 2005 electrical equipment for museums was coded in W04-W09.

W04-X03G8 [2005]

Information provision, guiding devices

Apply in conjunction with other W04-X03G codes.

W04-X03X [1992]

Other amusements

Electronic aid, puzzle solving

W04-Y**Hearing aids**

Ear, speech, acoustic, adjust, frequency response, receiver, deaf, implant, transducer, auditory, coil, nerve, medical prosthesis, amplifier, level/tone/bandwidth control, filtering, remote control, construction, casing, battery housing

W04-Y01 [1992]**Constructional details**

Includes constructional details of aid per se, and ancillary equipment.

W04-Y01A [1992]**Casing, housing**

Includes 'hygiene' arrangements, e.g. to prevent accumulation of cerumen.

W04-Y01A1 [1992]**Arrangements to reduce unwanted coupling**

Includes design of housing, acoustic tube, etc. to minimise acoustic feedback. Gain control for this purpose is covered by W04-Y03A1A and feedback or noise reduction in DSP-based hearing aids (from 2014) by W04-Y03G7.

W04-Y01B [1992]**Internal details, e.g. PCB mounting.**

Includes disposition of components, etc.

W04-Y02 [1992]**Electroacoustic transducers for hearing aids**

This code covers novel details of electroacoustic transducers used in hearing aids, such as microphones and earphones. V06 codes are also assigned as necessary to highlight novel details of the transducer.

W04-Y03 [1992]**Circuitry****W04-Y03A [1992]****Audio amplifier**

See U24-G codes for further details of amplifier per se.

W04-Y03A1 [1992]**Gain control**

See U24-C codes for control of gain in general.

W04-Y03A1A [1992]**Feedback reducing arrangement**

For design of e.g. housing to minimise feedback see W04-Y01A1. Feedback reduction in DSP-based hearing aids is covered (from 2014) by W04-Y03G7.

W04-Y03A3 [1992]**Tone and bandwidth control**

From 2005 digital signal processing is covered in W04-Y03G. See W03-C05 codes for audio amplifier control other than for hearing aids, and U25-F codes for bandwidth control in general.

W04-Y03C [1992]**Interfacing arrangements**

For systems involving near-field link, such as inductive loop, see W02-C02 codes also especially W02-C02G3A.

Couple, induce, transfer

W04-Y03C1 [1992]**With separate part of hearing aid**

Equipment to set-up a hearing aid as a programming exercise by e.g. a technician, is not regarded as part of the hearing aid itself, and thus not coded here - see W04-Y03C5.

W04-Y03C1A [1992]**For signal transfer**

Includes transcutaneous transfer of audio information for implanted type aid.

W04-Y03C1C [1992]**For remote control****W04-Y03C5 [1992]****With separate apparatus or system**

This code covers interfacing with separate equipment, e.g. for programming, such as setting-up characteristics by technician, rather than by intended wearer, and also arrangements for operation with e.g. TV receiver, telephone, or across-counter communication system. Prior to 2014 it was also used (with W04-Y20) for programming in a general sense but this topic is now covered by W04-Y03P.

W04-Y03D [2006]**Self-testing and diagnostic systems****W04-Y03E [1992]****Power supply circuitry**

Includes details of battery per se (see X16 codes also).

W04-Y03G [2005]

Digital signal processing

Analogue filtering and tone control is covered in W04-Y03A3.

W04-Y03G1 [2005]

Frequency domain manipulation

Includes digital filtering and use of transforms etc. for frequency shifting portions of the audio spectrum.

W04-Y03G3 [2005]

Spatial localisation

Includes use of direction finding algorithms to pinpoint location of speaker and amplify relevant frequencies.

W04-Y03G5 [2005]

Using digital speech processing

Covers coding input signal as speech and manipulating parameters to enhance intelligibility. Also coded in W04-V as appropriate.

W04-Y03G7 [2014]

Noise and feedback suppression

This code covers arrangements in hearing aids using digital signal processing specifically to suppress or reduce internally-generated noise, external noise, or acoustic feedback. Suppression of acoustic feedback by acoustic design of the hearing aid (e.g. the shape of the housing) is covered by W04-Y01A1 and by gain reduction in analog hearing aids is covered by W04-Y03A1A.

Background noise, cellphone noise, cellular phone noise, digital filter, howling, Larsen effect, multiplex noise, notch filter, pulse noise, TDMA noise, whistling

W04-Y03P [2014]

Hearing aid programming and setting-up

This code covers programming, e.g. setting-up characteristics by a technician. When interfacing aspects are novel W04-Y03C5 is also assigned. Prior to 2014 W04-Y03C5 and W04-Y20 were assigned for programming aspects in general. When audiometry is involved S05-D01D2 is also assigned.

Compensate, computer, frequency response, hearing test, PC

W04-Y05 [1992]

Characterised by type

Codes in this section are applied irrespective of claimed novelty to indicate the type of hearing aid only.

W04-Y05A [1992]

External

W04-Y05A1 [1992]

Carried within auditory meatus

Includes 'in-the-ear' type hearing aid.

W04-Y05A3 [1992]

Carried outside auditory meatus

Includes e.g. 'behind-the-ear' type.

W04-Y05A5 [1992]

Combined with other apparatus, e.g. spectacles

Electrical aspects of spectacles are coded in X27-A02D.

W04-Y05C [1992]

Implanted

See S05-F01 also for implanted hearing aids.

W04-Y05C1 [1992]

With external apparatus e.g. for control

Includes e.g. inductive link system transferring signals from external unit.

W04-Y20 [1992]

Other hearing aid details

W05: Alarms, Signalling, Telemetry and Telecontrol

This class covers the following topics :

- [1] alerting and personal calling (W05-A codes)
- [2] alarms (W05-B codes);
- [3] monitoring and testing of alerting systems and alarms (W05-C codes);
- [4] remote control and remote monitoring (W05-D codes); and
- [5] general displays and advertising (W05-E codes).

Note that inventions are assigned W05-B codes if they relate to alarms with some 'emergency' or 'urgency' aspect. Condition-responsive signalling arrangements e.g. 'status alarms' which indicate non-hazardous conditions such as incorrect posture, need for diaper changing, a fault condition in a machine etc. are **not** regarded as alarms in the sense of W05-B codes and are covered by W05-A codes instead. When alerting specifically involves audible signalling W05-A02 codes are assigned and if specifically visual signalling is involved W05-A03 codes are assigned. If the type of signalling is not disclosed or is unimportant a general W05-A code is assigned.

W05-A

Signalling and personal calling arrangements

Covers signalling and warning systems characterised by either the means of attracting attention or the transmission medium. For personal alarm or alerting device attached to clothing see X27-A02B1 codes as well as appropriate W05 codes.

W05-A01

Using mechanical, hydraulic, pneumatic, or electric transmission

W05-A01A [1997]

Using mechanical, hydraulic, or pneumatic transmission

W05-A01A1 [1997]

Vibration based annunciator

See also W05-A05C1A for pager application. Mechanical ringers specifically for telephones are assigned W01-C01F1F. See also V06 codes for details of vibration transducers per se e.g. V06-L or V06-M codes, especially V06-M10.

Vibration transmitter

W05-A01C [1997]

Using electric transmission

W05-A01C1 [1997]

Telephone line signalling

For annunciator systems combined with telephone equipment see W01-C05A.

W05-A01C3 [1997]

Power line signalling

Use of power lines to transmit control or measurement signals is covered by W05-D06P. See also W02-C01A3 and X12-H03E for power line communication in general.

W05-A02

With audible alerting

From 2002 this code is subdivided to distinguish novel audible alerting devices from systems **using** audible signalling. For cases in which these aspects cannot be determined W05-A02 will continue to be assigned. Codes relating to applications should be considered also, e.g. doorbells in X27-X also, fire or police vehicle siren in X22-B03 and X22-P10.

Tone generator, oscillator, bell, buzzer, recorded speech, synthesised speech, explosive device

W05-A02A [2002]

Novel audible alerting device

This code is intended for novel audible signal generators themselves. Electroacoustic transducers are assigned V06 codes also.

Tone generator, oscillator, bell, buzzer, recorded speech, synthesised speech, explosive device

W05-A02C [2002]

Alerting system using audible indication

This code is intended for systems characterised by the use of audible alerting in which the means of producing the signal is not novel. For example, it may be used to indicate that a warning system employs audible signalling, the means of producing it being unspecified or unimportant.

W05-A03

With visible indication

From 2002 W05-A03E is assigned with W05-A03A or W05-A03X to indicate that the means of visual signalling is itself novel. W05-A03C is also introduced to highlight alerting aspects using a display. Thus, for example, a paging receiver with some novelty in the use of a display would be assigned W05-A03E and W05-A05C1A.

W05-A03A

Using visible light sources

From 2002 W05-A03C is introduced for display devices and takes precedence over this code for active displays, i.e. self-luminous ones which are covered by W05-A03C1. For passive displays in which e.g. backlighting colour or intensity is used as a means of alerting W05-A03A will be assigned with W05-A03C, the backlighting aspect being conveyed by X26-U04A codes also.

Flashing light, lamp

W05-A03C [2002]

Using display devices

(W05-A03X)

This code takes precedence over other W05-A03 codes and is intended for arrangements using displays, e.g. in matrix or seven-segment form. W05-A03A may be assigned as well where the alerting novelty involves backlighting, in which case W05-E05B codes are also used. Novel displays themselves are also assigned W05-A03E, and codes from other classes as appropriate, e.g. U14-K01 codes for LCDs.

Back-lit display

W05-A03C1 [2002]

Using self-luminous display devices

(W05-A03A, W05-A03X)

This code takes precedence over W05-A03A and is intended for arrangements using displays which are light emitting, e.g. those using an array of LEDs or electroluminescent elements, or a 7-segment LED display. Visual alerting using a light source such as one or more LEDs which are not part of a display that can present variable information is covered by W05-A03A.

W05-A03E [2002]

Novel visual indication device

This code is used with other W05-A03 codes as appropriate to indicate that a visual indicator is itself novel.

W05-A03X

Other visible indication aspects

Includes electromagnetically-operated indicators. From 2002 display-based signalling, e.g. matrix or seven-segment type, is covered by W05-A03C.

Flag, semaphore signal, smoke, chemical dye

W05-A04

With audible and visible indication; Order telegraphs

From 2002 this code is subdivided to separate the above topics.

W05-A04A [2002]

Alerting with audible and visible indication

This code is intended for alerting systems in which audible and visible signalling are used **together**. Arrangements in which these modes are employed separately are covered by W05-A02 and W05-A03 codes.

Simultaneous audible/visible signalling

W05-A04C [2002]

Order telegraphs and menu-based signalling

This code is used for signalling systems in which selection from a number of options is transmitted. It includes 'ship's telegraphs', for which W06-C01B codes are assigned, e.g. W06-C01B7, and also arrangements in e.g. a restaurant for transmitting orders. Where a radio link is involved W05-A05A is also assigned, along with W02 codes as necessary, for novel 'RF' details.

W05-A05 [1983]

Electromagnetic transmission; Pagers

These codes relate to the use of an EM transmission medium to convey an alerting signal, rather than the form of the alerting signal once received. To discriminate this aspect other W05-A codes should be used in conjunction with W05-A05 codes if necessary.

W05-A05A [1992]

Using radio transmission

Includes emergency broadcast receivers, for which W02-G03 or W03-B codes are also assigned, depending on receiver type.

W05-A05B [1992]

Using UV or IR transmission

W05-A05C [1992]

Paging

Systems linked to the telephone network are assigned W01-C05A also. Mobile radio systems in general are covered by W02-C03C codes.

Selective calling, ERMES, FLEX®, MBS, POCSAG, RDS, TAP, TDP, TNPP, WCTP

W05-A05C1 [1992]

Apparatus

W05-A05C1A [2002]

Receiver details

Covers details of the pager itself. Used alone or in conjunction with W05-A05C1C for constructional details. See W02-G03 and W02-C03C codes for RF aspects. Vibrators for silent alerting are also assigned W05-A01A1.

W05-A05C1C [2002]

Constructional details

Constructional details of electronic equipment in general are assigned V04-S or V04-T codes, which are used here in addition as appropriate.

W05-A05C1E [2002]

Paging center details

This code may be used with W05-A05C1C for constructional details. See W02 codes for RF aspects.

Transmitters, aerials, control desks

W05-A05C2 [1992]

System/method

This code is intended to cover a complete paging system e.g. from a mobile radio, protocol, or operating system perspective. For novelty in selective calling search with W01-B05A5 and for radio system details with W02-C03C codes.

W05-A05D [1992]

Tone decoder

W05-A05X [1992]

Other EM signalling aspects

W05-A10 [2013]

Condition-responsive alerting in general (W05-A)

These codes are intended to indicate arrangements for signaling a condition, e.g. to remind a person to do something or to indicate the state of a machine, including malfunctions. They do not cover conditions involving emergencies, hazards to personal safety, etc. which are covered by W05-B alarm codes. W05-A10 codes may be assigned with other W05-A codes indicating audible or visual signaling if this is important or claimed but the codes can be used alone to indicate non-urgent or non-emergency 'alarm' conditions when the means of alerting is not stated or is unimportant. Other codes outside W05 are also assigned as necessary, e.g. W04 codes for use with educational or sports-related inventions.

W05-A10A [2013]

Alerting relating to human activity or human status

Includes alerting to modify human behavior such as reminding a person to do or not do something and alerting a person to non-urgent conditions such as incontinence detection (see also X27-A02A) or the need for changing a baby (see also X27-X01). Inventions concerned with warning related to personal safety are not included and are covered by W05-B07 codes instead. Note that arrangements for avoiding loss or forgetting of personal items are included but that those intended as theft alarms are not assigned W05-A10A and are covered by W05-B01 codes, e.g. W05-B01A5C.

Bed-wetting detector, computer usage warning, diaper alarm, leaving behind alarm, nappy alarm, posture alarm, reminder alarm, workstation alarm

W05-A10C [2013]

Alerting relating to equipment, machine or vehicle operation and status

Includes warning or indicating operational state, such as fault conditions or the need for maintenance or replenishment of consumable items.

Battery indicator, malfunction, mode, overheat, refill, service indicator, temperature, wear indicator

W05-A10X [2013]

Other general condition-responsive alerting

W05-B

Alarms

Since 1997 this code group has been expanded to cover 'disaster' alarms (W05-B08 codes), including alarms indicating failure in utility systems at source, in the distribution system, or at the point of consumption. Otherwise, condition-responsive circuitry relating to e.g. abnormal state of a machine, electrical equipment, etc. is not included and is coded in the appropriate place for the monitored equipment (See T05-E also) but may also be assigned W05-A codes if the signalling or alerting aspect is significant. From 2005, new code subgroups are introduced for personal safety alarms (W05-B07 codes) and general equipment details of alarm systems (W05-B10 codes).

W05-B01

Burglar/intruder alarms; Scaring thieves

Search with X22-D03 also to distinguish inventions relating to vehicle theft alarms. Antitheft systems for vehicles, or other applications, not including alarms are excluded from W05-B01 codes. Includes alarm aspects of weapons detection (from 2011 also specifically covered by W07-F05C), e.g. at an airport or entrance to a building, for which technology-specific codes are assigned as appropriate, e.g. W05-B01A for detection based on electric or magnetic field systems (also covered by S03-C02 codes and S03-C06).

Personnel presence detection, restricted area monitoring, patient/detainee absconding detection

W05-B01A

Electrical/magnetic field disturbance

Includes actuation by sensed variation of capacitance and inductance, and e.g. Doppler radar systems (see W06-A04A2 also).

Cable, electrodes, coil, antenna, interrogation loop, resonant circuit

W05-B01A1 [1992]

Intrusion detection system

Includes interference with field distribution and proximity sensor(see U21-B02C codes for proximity switch circuits). Includes variation in circuit capacitance or inductance.

W05-B01A2 [1992]

Theft detection system using tags

These codes relate to theft detection systems based on sensing the presence of a tag associated with the item to be protected.

W05-B01A2A [1992]

Ferromagnetic tag

Includes systems using non-linear magnetic properties, e.g. to generate harmonics from an applied magnetic field. For novel magnetic materials V02-A01 codes are also assigned.

W05-B01A2B [1992]

Inductive tag

Includes LC resonant circuits, also coded in U25-E05B1, in arrangements in which energy is 'sucked out' by the tuned circuit causing a detectable drop in field strength. Tags including electrical devices to generate harmonics, e.g. a diode, are regarded as simple transponders, and are thus covered by W05-B01A2C.

W05-B01A2C [1992]

RF transponder tag

See W02-G05A for transponder tags per se. Includes simple arrangements to generate harmonics, e.g. using diodes, for which U23-B01 is also assigned to indicate an analogue frequency multiplier. Transponders based on a passive tuned circuit arrangement **without** any active device to modify the interrogating signal are covered by W05-B01A2B.

W05-B01A2E [1997]

Manufacture of theft detection tag.

This code is used with other W05-B01A2 codes to define the type of tag being manufactured.

W05-B01A5 [1997]

Theft detection and human separation alarms based on signal level or response

The title of this code has been expanded from 2002 to better reflect its coverage of alarm systems triggered by signal falling below threshold or non-response in a transponder interrogation system. This may be applied to the detection of child or elderly person wandering off, or the removal of, or separation from, an object of value. Novel RF details are assigned W02-C03 and W02-G codes as appropriate, e.g. W02-G03J1C for novel radio receiver signal strength determining circuitry.

W05-B01A5A [2002]

Detecting separation of child or supervised person

This code is used either alone, or with W05-B01A5B in the case of transponder-based systems, and may be applied to the monitoring of a single person or a group such as children on a school trip, in which case W04-W codes are also assigned.

W05-B01A5B [2002]

Transponder-based systems

This code is normally used with W05-B01A5A or W05-B01A5C, depending on the nature of the protection involved. Transponder-based systems for determining presence or for recognition in general are covered by W06-A04B codes, e.g. W06-A04B5 codes for object and human identification, and W02-G05 codes. From 2002, these W02 and W06 codes are not normally assigned for protection systems of the W05-B01A5 type unless specific 'RF' novelty is involved. Transponder-based remote measurement and control systems are covered by W05-D08G (from 2002 - formerly W05-D04G).

W05-B01A5C [2002]

Protected object theft detection and separation alarms

This code is used either alone, or with W05-B01A5B in the case of transponder-based systems, and concerns monitoring to determine that an item to be protected is within a desired range of an individual or specified point. Analogous systems for protection of a person or a group of people are covered by W05-B01A5A. Tracking systems for locating luggage in an airport or similar are covered by W06-B02A5.

W05-B01B

Mechanical actuation intrusion or theft alarms

The title of this code has been expanded from 2002 to better reflect its coverage of alarms actuated as a consequence of physical action involving contact, e.g. the opening of a door or window, or the lifting of an article which results in the making or breaking of an electrical circuit. The emphasis is on mechanical contact with the sensing arrangement, thus an arrangement involving an optical fiber in which light transmission is modified by e.g. the weight of an intruder, is regarded as fitting into this category. (W05-B01B1 in the case of intruder sensing).

Loop continuity/attitude detection for shoplifting prevention, pressure mats, reed switches, limit switches, lock tampering detection, incorrect keyed-in password/code detection

W05-B01B1 [2002]

Mechanically-actuated intrusion alarms

Covers intruder and burglar alarms.

W05-B01B2 [2002]

Mechanically-actuated theft alarms

Covers theft alarms triggered by lifting of articles, or similar.

W05-B01C [1987]

Optical, ultrasonic actuation

(W05-B01X)

W05-B01C1 [1992]

Ultrasonic actuation

This code has been subdivided from 2002 to cover separately intruder / burglar alarms and theft alarms. The codes include actuation by interference with sonic waves. See W06-A05 codes also for systems analogous to radar.

Ultrasonic transmitter/receiver, Doppler detector

W05-B01C1A [2002]

Ultrasonically-actuated intrusion alarms

Covers intruder and burglar alarms involving ultrasonic sensing.

W05-B01C1B [2002]

Ultrasonically-actuated theft alarms

Covers theft alarms involving ultrasonic sensing.

W05-B01C2 [1992]

Optically actuated alarm

The scope note of this code has been modified from 2002 to cover intruder / burglar alarms and theft alarms. Arrangements involving 'lidar' techniques are also assigned W06-A06 codes while 'light barrier' aspects are also assigned S03-C08 codes.

Light beam, light barrier, optical transmitter/receiver

W05-B01C2A [2002]

Optically-actuated intrusion alarms

Covers intruder and burglar alarms involving optical sensing.

W05-B01C2B [2002]

Optically-actuated theft alarms

Covers theft alarms involving optical sensing.

W05-B01C5 [1992]

Image scanning and comparing system scanner or motion detection; CCTV

W05-B01C5A [1997]

Image scanning and comparing system scanner or motion detection

See also W02-F01A5 for CCTV surveillance, W04-M01G codes for camera mounting details, and T04-D07D codes for pattern recognition aspects. Novel video signal movement detectors in general are coded in W04-P01A1, used computer image processing aspects in T01-J10B2 codes.

CCTV surveillance automatic alarm actuation

W05-B01C5C [1997]

CCTV triggered upon intruder detection by other means

This code covers alarm systems in which the presence of an intruder is sensed by a detection arrangement distinct from the CCTV system, which then actuates it to enable a protected area to be monitored. See also W02-F01A5 for CCTV surveillance aspects.

W05-B01D [1987]

Scaring thief or attacker and personal defensive alarms

From 2002 this code is subdivided to separately cover arrangements for preventing robbery from e.g. banks, and for personal defence of private individuals, e.g. anti-mugging alarms.

W05-B01D1 [2002]

Scaring thief or attacker

This code covers the use of dyes to stain currency, gas or similar for incapacitation, and arrangements for trapping criminals, e.g. in a bank or cash machine lobby. Other codes which may also be assigned include T05-D codes for entry/exit registers, access control and automatic road blocks, T05-L05A for strongboxes, and T05-L03 codes for ATMs. Anti-mugging alarms for public use are covered by W05-B01D5.

Dye, smoke, trigger

W05-B01D5 [2002]

Personal defence alarms

This code includes arrangements for deterring an assailant and attracting attention, normally using acoustic signalling, for which W05-A02 codes are assigned as appropriate. Arrangements for self defence in a military or law enforcement context are covered by W07-F01A.

Siren, whistle, spray

W05-B01E [2005]

Passive acoustic intrusion detection

(W05-B01X)

Covers sensing of intrusion, e.g. using microphones to detect sound produced. Intruder alarms using e.g. reflection of ultrasonic waves are covered by W05-B01C1A. Acoustic detection of glass breakage for alarm purposes is covered by W05-B01G5.

W05-B01G [1997]

Glass breakage detector

(W05-B01B, W05-B01X)

W05-B01G1 [1997]

Based on electrical 'switching' action

W05-B01G5 [1997]

Based on acoustic signal detection and analysis

W04-V04A7 is also assigned for the acoustic signal analysis aspect from 2002. Passive acoustic sensing of intrusion, not specifically for detection of glass breaking sounds, is covered by W05-B01E.

W05-B01X

Other intruder or theft alarm aspects

Includes apparatus for detecting a change in breathing of criminal, and change in physiological parameters of victims, e.g. pulse rate (see also S05-D01 codes).

W05-B02

Fire alarms

Electrical aspects of fire-fighting systems, e.g. using sprinklers or other extinguishing methods, are coded in X25-X.

W05-B02A

Responsive to smoke or gas

For detectors per se search S03 also. Includes detection of inflammable gas as a fire hazard. Alarms indicating failure in gas supply are assigned W05-B08J.

HV generator, shield

W05-B02A1 [1992]

Using light-emitting and receiving device

Includes optical scattering type, see S03-E04C codes also.

Light source, photodetector

W05-B02A3 [1992]

Using ionisation chamber

See S03-E10 for detector details.

W05-B02A5 [1992]

Detecting specific combustion products e.g. gas, produced by the fire

See appropriate S03 codes for gas analysis. Carbon monoxide alarms are covered by W05-B07L1 as a personal safety alarm, e.g. for detecting a malfunctioning heating appliance. When a fire alarm incorporates the sensing of a build-up of carbon monoxide or some other toxic combustion product, W05-B02A5 and W05-B07L1 may be assigned together.

W05-B02B [1992]

Radiation actuation e.g. from fire

(W05-B02X)

Flame detection for controlled combustion, is covered by X27-G02.

Temp. measurement, thermal trip, fire-type discrimination for automatic fire-fighting system

W05-B02B1 [1992]

Infrared radiation detection

IR radiation detector, photodetector, filter

W05-B02B5 [1992]

Ultra-violet flame detection

Photodetector, filter

W05-B02C [1992]

Mechanically actuated alarm

Covers fire alarm actuation by breaking glass, or conductors.

W05-B02D [1992]

Electric actuation of alarm

Covers fire alarm actuation by thermally-responsive switch, or similar.

W05-B02X

Other fire alarm aspects

W05-B03

Alarms responsive to two or more different conditions

Covers alarm sensor inventions, e.g. an IR sensor responsive to body heat for an intruder alarm and to heat radiation from a fire for a fire alarm, and not connection of a common alarm transducer (e.g. a klaxon, bell, or flashing light) to a number of separate sensors.

W05-B04

Alarms responsive to unspecified condition

W05-B05

Alarms with signalling to central station and alarm signal transmission

These codes includes alarms connected (electrically or by e.g. EM transmission) to a police or fire station, i.e. 'central station' alarms. They describe the transmission medium and mode between any alarm sensor and alarm reproducing transducer. Other W05-B codes are assigned as appropriate where alarms of a specific type are involved, e.g. W05-B01 codes for intruder alarms. From 2008, W05-B05A7 is introduced for 'reverse' transmission, i.e. to highlight novel aspects of alarm signalling from a central station to sensors or alarm substations.

W05-B05A [1992]

Alarm signalling mode

These codes define the mode of communication between sensors and central station. From 2008 the title of this code has been changed to reflect the inclusion of 'reverse' transmission, i.e. to highlight novel aspects of alarm signalling from a central station to sensors or alarm substations, for which W05-B05A7 has been introduced.

W05-B05A1 [1992]

With sensor signalling to central station

W05-B05A5 [1992]

With cyclic interrogation or polling from central station

Polling protocol in data networks is covered by W01-A06F1C and centralised control aspects in general by W01-A06E2A.

W05-B05A7 [2008]

With central station signalling to alarm sensors or substations

This code covers 'reverse' transmission, i.e. alarm signalling from a central station to sensors or alarm substations.

W05-B05B [1992]

Transmission medium

These codes define the medium used for communication between sensors and central station. W01 or W02 codes are also assigned as necessary to highlight particular **novel** aspects from a communications viewpoint, but from 2002, W05-B05B codes are used **without** W01 or W02 codes where there is no specific novelty in the communication system or equipment. **Note that from 2002, transmission via the telephone network (landline and radio) is transferred to W05-B05G and that W05-B05B3 is therefore discontinued.**

W05-B05B1 [1992]

Using power transmission lines

Also assigned W02-C01A3 and in X12-H03 for **novel** aspects of power line transmission. (Prior to 2002, these codes were routinely assigned also)

W05-B05B2 [1992]

Using radio transmission system

See appropriate W02-C03 codes for transmission details. From 2002, W02 codes are only assigned for **novel** aspects. Prior to 2002 mobile telephone networks used for alarm signal transmission were coded for the radio aspect, i.e. W05-B05B2 was assigned. From 2002, where radio systems are part of a **telephone network** W05-B05G5 codes take precedence.

W05-B05B3* [1992-2001]

Using telephone transmission

*This code is now discontinued and from 2002 this subject matter is transferred to W05-B05G1. W05-B05B3 remains valid and searchable for records between 1992 and 2001. Prior to 2002, W01-C05A was routinely assigned also for inventions making use of the telephone network for alarm transmission.

W05-B05B4 [1992]

Using optical link

Includes fiber and free-space links.

W05-B05B5 [2002]

Using internet

(W01-A06B7, W05-B05B3, W05-B05B9)

This code covers the **use** of the internet as an alarm signal transmission medium. As such, 'internet' codes in W01-A06B7 are **not** normally used, unless some novel aspect from a data communications viewpoint is involved. Use of other, e.g. private, data transmission network is covered by W05-B05B6, but note that W05-B05B5 takes precedence over W05-B05B6 for systems involving joint use of internet and other data networks.

W05-B05B6 [2006]

Using data network

This code covers the use of data networks as an alarm signal transmission medium, other than internet-based systems which are covered by W05-B05B5 which takes precedence for use of the internet and systems involving joint use of internet and other data networks e.g. a local area network. W01-A06 codes are also assigned for novel data network aspects.

W05-B05B9 [1992]

Other alarm signal transmission medium

W05-B05G [2002]

Using telephone transmission

This code and its subdivisions cover all aspects of telephone network transmission of alarm signals and from 2002 are used for this topic in place of W05-B05B2 or W05-B05B3 as appropriate. The breakdown of the codes is based on that used for telemetry and telecontrol signal transmission medium, as represented by W05-D06G codes. In the event that an invention concerns both alarm signal transmission **and** telemetry or telecontrol aspects, **W05-D06G** codes will be used in preference. From 2002, pure applications of telephone networks to alarm signal transmission are not covered in W01 (e.g. W01-C05A) or W02, these codes now being used only in cases of genuine 'communications' novelty.

W05-B05G1 [2002]

Landline

(W05-B05B3)

W05-B05G5 [2002]

Radio telephone

(W05-B05B4)

W05-B05G5A [2002]

Cordless telephone transmission

(W05-B05B2)

W05-B05G5C [2002]

Cellular telephone transmission

(W05-B05B2)

This code is intended for cellular systems of the 'TDMA' kind, especially GSM. Alarm signal transmission over UMTS or similar networks is assigned W05-B05B5G, which takes precedence.

W05-B05G5G [2002]

UMTS transmission

(W05-B05B2)

This code is intended for alarm signalling over a 'third generation' or similar network, such as '4G', and takes precedence over W05-B05G5C which is intended for use of cellular systems of the 'TDMA' kind, especially GSM. **Novel** multiple access aspects are highlighted by assignment of W02-K05 codes, especially W02-K05A7 for CDMA, and W02-K07C for OFDM.

W05-B05G5J [2002]

WLL transmission

(W05-B05B2)

This code is intended for alarm signalling over a fixed radio telephone link of 'wireless local loop' or similar type. Novel details of the radio system are highlighted by additional assignment of W02-C03D codes for the 'point-to-point' aspect.

W05-B05G5X [2002]

Other telephone network alarm signal transmission

W05-B07 [2005]

Personal safety alarms

(W05-B09)

Anti-mugging and personal defence alarms are covered by W05-B01D5. Alarms warning of abduction or separation from children based on transponders or received signal level are covered by W05-B01A5A.

W05-B07A	[2005]
Industrial worker protection alarm	
W05-B07C	[2005]
Aged or infirm persons protection alarm	
Monitoring of patients in hospital is also assigned S05-G02B codes.	
W05-B07E	[2005]
Driver or pilot protection alarm	
X22-E04 is also assigned for road vehicle driver alertness alarms.	
W05-B07G	[2005]
Protection alarm triggering condition	
These codes are assigned with W05-B07A, W05-B07C, W05-B07E or W05-B07X as appropriate to indicate the condition being sensed, which in general involves measurement or observation of some aspect of the individual or their activity.	
W05-B07G1	[2005]
Based on body position or attitude	
W05-B07G3	[2005]
Based on lack of activity	
Includes detection of an alarm condition directly based on lack of movement or indirectly based on non-use of lighting, water supply, toilet etc.	
W05-B07G5	[2005]
Based on medical parameter or medical equipment failure	
From 2012 the title of this code has been revised to reflect the previous inclusion of alarms related to the malfunctioning of medical equipment in addition to its original main scope of alarms based on a 'medical parameter' meaning a measurement or observation of some aspect of an individual. These two topics are now covered separately by the subdivisions below, the codes being normally assigned with W05-B07C. S05 codes as also assigned appropriate.	
W05-B07G5A	[2012]
Alarm based on medical parameter	
This code covers alarms triggered by a measurement or observation of some aspect of the individual, e.g. by sensing abnormal cardiac rhythms. S05-D codes are also assigned as appropriate for the condition sensed, e.g. S05-D01A1 for an alarm triggered by ECG measurements. Alarms indicating a problem with equipment used to treat a patient are not included and are covered by W05-B07G5C.	

W05-B07G5C	[2012]
Alarm based on medical equipment failure	
This code covers alarms generated by a malfunction in medical equipment that represents a danger or risk to a patient, such as an alarm indicating a problem with infusion apparatus or a ventilator. S05 codes are also assigned as appropriate for the type of equipment, e.g. S05-J01A for an alarm indicating a problem with an infusion device. Alarms which are triggered by a measurement on the patient themselves are not included and are covered by W05-B07G5A.	
W05-B07G9	[2005]
Based on other parameter	
W05-B07J	[2005]
Accidental falling into water alarm	
W05-B07J1	[2005]
Swimming pool alarm	
X25-X06 is also assigned for electrical aspects of swimming pools.	
W05-B07J3	[2005]
Person overboard alarm	
See W06-C01B codes also for details of on-board aspects of ship or boat systems.	
W05-B07J9	[2005]
Other accidental falling into water alarm	
W05-B07K	[2006]
Detecting presence of person in hazardous area	
Covers alarms indicating the presence of a person in a hazardous area, (other than in water as covered by W05-B07J codes), e.g. a person fallen onto a railway track (see X23-A09A3 also) or a highway (see T07 codes also). Industrial safety systems in general are covered by X25-X12. For specific details of the detection system, see S03-C06 and other S03-C codes as appropriate.	
W05-B07L	[2005]
Dangerous gas alarms	
Covers detection of the presence of explosive, toxic, or other gases hazardous to life. Smoke detectors are covered by W05-B02A codes.	

W05-B07L1 [2005]

Sensing poisonous combustion products

This code is intended for detecting the presence of toxic combustion products, e.g. carbon monoxide, or other dangerous gases. Carbon monoxide alarms in association with combustion monitors for gas heaters and the like are also assigned X27-G02, and those for use with a fire alarm system are also assigned W05-B02A5.

W05-B07N [2011]

Electrical safety alarm

This code covers alarms warning of electrical hazards, e.g. using a detector to warn an electrician that power lines, switchgear or other electrical equipment is 'live', or failure of safety measures such as residual current circuit breakers or earthing. To denote industrial applications of electrical safety alarms W05-B07A is also assigned and for inventions specific to the electrical supply industry X12 and X13 codes are also assigned as appropriate, e.g. X12-G01D for power line maintenance. W05-B07N is not assigned for mains supply failure alarms which are covered by W05-B08J codes (i.e. as 'Utility-based alarms').

Earth current, leakage, live, RCCB, residual current circuit breaker.

W05-B07X [2005]

Other personal safety alarm

W05-B08 [1997]

Disaster, terrorist attack and utility failure warning and alarm systems

In 2005, the title of this code was expanded to better reflect its coverage. S03-C05 is also assigned for novel aspects of geophysical natural disaster prediction and detection. Emergency broadcast radio receivers are assigned W05-A05A, which may be searched in conjunction with W05-B08 codes as appropriate.

W05-B08A [1997]

Earthquake alarm

W05-B08C [1997]

Adverse weather-related disaster alarm

Includes flooding, landslide, avalanche.

W05-B08G [2005]

Terrorist attack alarm

Includes systems, manually or automatically actuated, e.g. for warning of an attack in progress.

W05-B08J [1997]

Utility-based alarm

Covers alarms indicating failure of supply interruption of utilities, e.g. due to adverse weather or faults at the point of generation or consumption.

W05-B08J1 [2005]

Domestic consumer utility alarm

Covers alarm at domestic customer premises.

W05-B08J3 [2005]

Industrial consumer utility alarm

Covers alarm at industrial customer premises.

W05-B08J5 [2005]

Commercial consumer utility alarm

Covers alarm installed on commercial premises, e.g. in a shop or hotel.

W05-B08J7 [2005]

Utility supply producer alarm

Covers alarms relating to safety issues and the like affecting plant and distribution systems of a utility provider.

W05-B08X [2005]

Other disaster or public information warning and alarm systems

W05-B09

Other alarm system details

See general note for W05-B code group.

W05-B10 [2005]

General details of alarm systems

(W05-B09)

Codes in this subgroup cover equipment details of alarm systems. When specific to a particular alarm type, other W05-B codes are assigned as appropriate.

W05-B10A [2005]

Alarm switches

(W05-B09)

Novel details of electromechanical switches are covered by V03 codes and electronic switches by U21-B codes.

W05-B10C [2005]

Alarm constructional details

(W05-B09)

Covers external aspects such as housings and internal details such as PCB mounting. See V04-S and V04-T codes for further details.

W05-B10E [2005]

Alarm power supplies

(W05-B09)

Power supplies in general are covered by U24 codes, (assuming low-power types), which are also assigned as appropriate to indicate novel aspects.

W05-B10X [2005]

Other general alarm system details

(W05-B09)

W05-C

Monitoring and testing of signalling or alarm systems

This code group relates to monitoring and testing of equipment and systems covered by W05-A and W05-B.

Redundancy, standby supplies

W05-C01 [1992]

Testing of signalling or alarm systems

Includes checking for power disruptions etc.

Fail-safe

W05-C01A [1992]

Sensor fault

Covers apparatus/system for checking that fault lies within sensor itself. Includes self-testing sensors, (with W05-C01C from 2002).

Sensor checking, faulty sensor identification

W05-C01B [1992]

Line fault

Covers apparatus/system for checking if fault lies within line.

Loop continuity checking

W05-C01C [2002]

Self testing systems

Includes arrangements for testing on switch-on or start-up. Self-testing sensors are also assigned W05-C01A.

W05-C01J [2005]

Detection of tampering with alarm systems

Covers sensing of deliberate tampering or unauthorised access to alarm equipment, e.g. through opening of housing.

W05-C02 [1992]

Monitoring of signalling or alarm systems

From 2009, the scope of this code has been extended to include protection against false alarms, previously covered by W05-C05, and new subdivisions are introduced to distinguish this topic from other 'processing' and hardware aspects.

Alarm condition simulation, alarm acceptance

W05-C02A [2009]

Control desk, indicators, displays and other hardware

This code is intended for hardware aspects of alarm monitoring centers and the like.

W05-C02C [2009]

Alarm interpretation, prediction and false alarm discrimination

This code is intended for control aspects, including software, involved with the determination that an alarm condition exists.

W05-C02C1 [2009]

Alarm interpretation and processing

This code covers arrangements for determining that an alarm condition exists, e.g. based on outputs of several sensors, and extracting relevant data such as time, location, etc. When emphasis is on predicting an alarm condition W05-C02C3 is assigned and when emphasis is on disregarding of false alarms W05-C02C5 codes take precedence.

W05-C02C3 [2009]

Alarm prediction

This code covers arrangements for predicting an alarm condition based on e.g. trend in change of measured values from sensors, etc.

Alarm condition, threshold value, time length

W05-C02C5 [2009]

False alarm prevention

(W05-C05)

This code covers arrangements for preventing or reducing the incidence of false alarms, including compensating for noise or other spurious effects.

W05-C02C5A [2009]

False alarm prevention involving sensor features

(W05-C05)

This code covers arrangements which are **part of the alarm sensor** for preventing or reducing false alarms

W05-C02C5C [2009]

False alarm prevention involving features external to sensors

(W05-C05)

This code covers arrangements which are **external to the alarm sensor** for preventing or reducing false alarms, e.g. by corroborating the output from several sensors.

W05-C03 [1992]

Arming/disarming of alarms

This code covers enabling and disabling of alarms by an authorized person, e.g. by use of an input security code. It includes temporary and permanent disabling of EAS tags at point-of-sale, for which W05-B01A2 codes are also assigned as appropriate.

W05-C05* [1992-2008]

False alarm protection

*This code is now discontinued and from 2009 the topic of false alarm prevention is covered by W05-C02C5 codes to place it in the same hierarchy as alarm interpretation and prediction. W05-C05 remains valid and searchable for records prior to 2009.

W05-D

Transmission systems for measurement or control signals

The codes in this group relate to telemetry and telecontrol systems and specifically inventions concerned with actual measurement or control signal transmission. In 2002 the codes were revised to better distinguish between the concepts of transmission medium (represented by W05-D06 codes), application (W05-D07 codes), and function or mode (covered by W05-D08 codes). The W05-D01, W05-D03 and W05-D04 subgroups used pre-2002 are still valid for records from 1980-2001. W05-D codes are intended to be used in combination to represent particular topics. For example, a wireless sensor network can be represented by W05-D06F1 (use of wireless data networks) with W05-D08E (code indicating remote measurement). Similarly, an infrared link used in a home automation system for remote control is coded as W05-D06A3, W05-D07A and W05-D08C. Note that applications of remote control to audio/video (AV) equipment such as TV receiver remote control (W03-A02C codes), recording equipment remote control (W04-E04A), and general audio-video equipment remote control (W03-G05A codes), are not covered by W05-D codes unless of general application also. In 2018 W05-D06E1 codes were introduced to denote use of the internet as a transmission medium for IoT communication. These codes should also be

considered for signal transmission aspects of Industry 4.0 systems, for which W05-D07B (for factory automation applications) is also likely to be relevant.

Remote actuation, control, remote operation, remote monitoring, process-variable transmission systems

W05-D01* [1980-2001]

Digital encoders

*This code is now discontinued. From 2002 W05-D01 and its subdivisions are no longer used, the idea of 'absolute' position encoders being conveyed by a new U21 code, U21-A03J5, with other U21-A03J codes being assigned also to specify the technology used. W05-D01 codes remain valid and searchable for records prior to 2002, and were used for rotary or linear encoders giving unique digital representation of position (see U21-A03 codes also) but not systems determining speed or position by counting pulses generated by movement (covered by S02-G01 codes).

W05-D01A* [1980-2001]

Magnetic or inductive

*This code is now discontinued.

Magnet, magnetic field, winding, coil, resolver

W05-D01B* [1980-2001]

Photoelectric

*This code is now discontinued.

Light source, detector, shield, opaque/transparent sections, step-variable transmission, pattern

W05-D01X* [1980-2001]

Other digital encoders

*This code is now discontinued.

Electrode, brush, wiping contact, contact pattern capacitance

W05-D02

Multiplex systems and multiple access

This code covers multiplexing and multiple-access schemes, especially as used in data networks. To highlight novel aspects of such systems, W01-A and W02-K codes are also assigned as appropriate, e.g. W01-A06F1 codes which highlight access control protocols. Within W05-D, novelty in signal format or protocol other than for multiple access purposes is indicated by assignment of W05-D08J. Prior to 2012 W01-B06 was assigned for selection (i.e. switching) aspects of telemetry and telecontrol systems in addition to relevant W05-D02 codes but from 2012 that code is discontinued and the topic is covered by appropriate W05-D02 codes only.

Cyclic sensor interrogation, sequential monitoring

W05-D02A	[2002]
Time division	
<i>TDM</i>	
W05-D02A1	[2002]
TDMA	
W05-D02C	[2002]
Frequency division	
<i>FDM</i>	
W05-D02E	[2002]
Spread spectrum	
Transmission of measurement and control signals via UMTS is assigned W05-D06G5G, and as an inherent SS system is not assigned W05-D02E codes. Spread spectrum communication in general is assigned W02-K05 codes. For transmission systems for measurement or control W02-K05 codes are only assigned for actual novelty in the spread spectrum aspect.	
W05-D02E1	[2002]
Hybrid spread spectrum system	
W05-D02E6	[2002]
Frequency hopping spread spectrum	
W05-D02E7	[2002]
Direct sequence spread spectrum	
<i>CDMA, code division multiple access</i>	
W05-D02E9	[2002]
Other spread spectrum type	
W05-D02J	[2007]
Sensor or actuator addressing	
This code involves addressing for a multiplex or multi-access scheme and may be used alone or with other W05-D02 codes defining the scheme.	
W05-D02X	[2002]
Other multiplex and multiple access systems	
<i>Wavelength division multiplexing, WDM</i>	

W05-D03*	[1980-2001]
Electric signal transmission	
*This code is now discontinued. From 2002 W05-D03 and its subdivisions are no longer used, the subject matter being covered by new subgroups for 'Transmission medium' (W05-D06) and 'Function and mode' (W05-D08). W05-D03 codes remain valid and searchable for records between 1980 and 2001. W05-D06 'medium' codes are assigned on the basis that pure applications with no novelty in the communications are not coded in W01 or W02. Prior to 2002, codes from those classes were routinely assigned in addition to W05-D03 codes.	
W05-D03A*	[1980-2001]
Using pulses	
*This code is now discontinued.	
<i>Digital data transmission, pulse modulator/demodulator, pulse code/width/amplitude/repetition rate/position modulation</i>	
W05-D03B*	[1980-2001]
Using frequency, phase, current or voltage magnitude	
*This code is now discontinued. From 2002 analogue measurement or control signal transmission is indicated by W05-D08A.	
<i>Continuous</i>	
W05-D03C*	[1992-2001]
Telephone line	
*This code is now discontinued. From 2002, telephone line transmission for measurement and control signals is covered by W05-D06G1. Prior to 2002 W01-C05B3E or W01-C05B3F were assigned for all aspects of telephone line transmission in telemetry and telecontrol but from 2002 are only assigned for novelty in the telephone system or equipment.	
<i>Modem, public line</i>	
W05-D03D*	[1992-2001]
Power line	
*This code is now discontinued but prior to 2002 was assigned with W02-C01A3 and X12-H03 codes. From 2002, power line transmission for measurement and control signals is covered by W05-D06P.	
<i>Power line carrier communication, PLCC, mains</i>	

W05-D03E* [1992-2001]

Wired system; Dedicated wiring

*This code is now discontinued. See W01-A06 codes for networks e.g. LAN, WAN, etc. From 2002, dedicated wired systems for transmission of measurement and control signals are covered by W05-D06R and the use of data networks by W05-D06F.

W05-D03X* [1980-2001]

Other electric signal transmission aspects

*This code is now discontinued but included inductive systems of e.g. rotary transformer type, with W05-D04. and V02 codes assigned as appropriate. From 2002 these aspects are covered by W05-D06T1.

Dynamo-electric devices, rotating/stationary part transmission using coils

W05-D04* [1980-2001]

Using radio link; Non-electric systems

*This code is now discontinued. From 2002 W05-D04 and its subdivisions are no longer assigned, the subject matter being covered by new subgroups for 'Transmission medium' (W05-D06) and 'Function and mode' (W05-D08). W05-D04 codes remain valid and searchable for records between 1980 and 2001. W05-D06 'medium' codes are assigned on the basis that pure applications with no novelty in the communications aspect are **not** coded in W01 or W02. Prior to 2002, codes from those classes were routinely assigned in addition to W05-D04 codes.

W05-D04A* [1987-2001]

Radio link

*This code is now discontinued. From 2002 see W05-D06A1A for radio systems or W05-D06G5 codes for radio telephone systems as appropriate.

Radio-link remote vehicle locking, garage door opening, radio control of models, robot vehicles etc.

W05-D04A1* [1987-2001]

Remote control

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08C (remote control) with W05-D06A1A for general radio systems or W05-D06G5 codes for radio telephone systems as appropriate.

Telecontrol

W05-D04A5* [1980-2001]

Remote monitoring

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08E (remote monitoring) with W05-D06A1A for general radio systems or W05-D06G5 codes for radio telephone systems as appropriate.

Telemetry moving object

W05-D04B* [1992-2001]

Optical link

*This code is now discontinued. See W02-C04 codes for optical transmission in general.

Light, IR, UV

W05-D04B1* [1992-2001]

Optical fiber

*This code is now discontinued. From 2002 this subject matter is transferred to W05-D06C.

Fiber-optic

W05-D04B3* [1992-2001]

Free space transmission

*This code is now discontinued. From 2002 this subject matter is transferred to W05-D06A3.

Line-of-sight link

W05-D04B5* [1992-2001]

Remote control

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08C (remote control) with W05-D06A3 for free space optical systems or W05-D06C for optical fiber-based systems as appropriate.

Telecontrol

W05-D04B7* [1992-2001]

Remote monitoring

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D08E (remote monitoring) with W05-D06A3 for free space optical systems or W05-D06C for optical fiber-based systems as appropriate.

Telemetry

W05-D04B9* [1992-2001]

Other optical system details

*This code is now discontinued.

W05-D04C* [1992-2001]

Ultrasonic link

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06A5.

Sound transmission, telemetry, telecontrol

W05-D04D* [1992-2001]

Pneumatic, hydraulic, mechanical transmission

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06M.

W05-D04D1* [1992-2001]

Mud-pulse telemetry

*This code is now discontinued. From 2002, this topic is represented by assignment of W05-D06M1. See also X25-E02A1 for well logging.

W05-D04G* [1997-2001]

Using transponders

*This code is now discontinued. It was used with other W05-D04 codes as appropriate. From 2002, this topic is represented by assignment of W05-D08G. RF transponder systems are also assigned W02-G05 codes.

W05-D05

**Preventing or correcting errors;
Monitoring**

W05-D05A [1992]

Noise suppression/compensation

Spread spectrum systems with inherent resistance to interference are covered by W05-D02E codes (or W02-K05 codes prior to 2002), and only assigned W05-D05A when this resistance is part of the novelty.

Filtering, redundancy

W05-D05A1 [2002]

Based on error detection or correction

See U21-A06 for digital signal error detection in general and W01-A01B codes for specific application to data transmission.

W05-D05B [1992]

Security

This code is intended for novel aspects of remote measurement and remote control systems that relate to security in the sense of preventing or detecting unauthorized access, or other tampering with the system such as a remote locking/unlocking system for a vehicle (see W05-D07D and X22-D01A also). It is **not** intended as a code to indicate 'security' as an application and so is only used for specific aspects relating to **improving** the security of the telemetry or telecontrol system itself.

Access restriction, signal coding

W05-D05B1 [2009]

Security based on use of codes

This code is intended for novel aspects of code-based security in remote control or monitoring systems. The term 'code' is intended to encompass the use of encryption and also generated pseudorandom digital words and digital passwords, but signal coding for error correction purposes is not included, being covered by W05-D05A1. For inventions involving the prevention or detection of interception of transmitted coded signals which are not themselves novel, W05-D05B5 codes take precedence.

W05-D05B5 [2009]

Security based on preventing or detecting interception, malicious software, or unauthorized access

From 2012, the scope of this code has been widened to include arrangements for protecting against malicious software and preventing unauthorized access to a remote control or monitoring systems, e.g. via a network, in addition to its previous coverage of methods or apparatus for the detection and/or prevention of interception and retransmission of control or measurement signals, now covered by W05-D05B5A. W05-D05B5 codes take precedence over W05-D05B1 when coded signal interception or modification is to be avoided but both codes may be assigned together if the form of the coded signals themselves is also novel. Inventions relating to factory automation (FA) systems are also assigned W05-D07B.

W05-D05B5A [2012]

Security based on preventing or detecting interception

This code is intended for security arrangements based on the detection and/or prevention of interception and retransmission of control or measurement signals. Where novel communications aspects are involved other telecommunications codes such as W01-A05L5 are also assigned as appropriate. W05-D05B5C takes precedence over this code for arrangements protecting against modification of software, e.g. by viruses, and W05-D05B5E takes precedence for preventing unauthorized access to a network-based control system.

Eavesdropping, intercept, relay attack

W05-D05B5C [2012]

Security based on protecting against malicious software or modification of control programs.

This code is intended for security arrangements based on the detection and/or protection against malicious software, such as viruses, trojans, worms etc., or other unauthorized modification of control programs. T01-N02B3 is also assigned for malicious software protection. W05-D05B5E takes precedence for protection of network-based control systems against unauthorized access.

W05-D05B5E [2012]

Security based on preventing or detecting unauthorized network access

This code is intended for security arrangements based on the detection and/or prevention of unauthorized access to a networked control system. As such it is likely to be assigned with W05-D06E for remote control or measurement systems connected to the internet or W05-D06F for data network-based systems in general. Control of access to data networks in general is covered by W01-A06E1C and firewall aspects are also assigned T01-N02B1D.

W05-D05B9 [2009]

Other security aspects of remote control or remote monitoring systems

W05-D05C [1992]

Testing/monitoring of system

Includes setting up and commissioning. See W02-C01D codes for line system testing, W02-C04C1 codes for optical system testing, and W02-C05 codes for monitoring of transmission systems in general. S01 codes may also be assigned for specific electrical testing.

Fail-safe, sensor/actuator monitoring, continuity testing, loopback

W05-D06 [2002]

Transmission medium

The codes in this subgroup are intended to allow the transmission medium for remote measurement or control signals to be separately highlighted, and replace the codes previously used which related to media in W05-D03 and W05-D04. To specify telemetry, telecontrol, or mode, W05-D08 codes are assigned as well as appropriate. W01 or W02 codes are also assigned as necessary to highlight particular **novel** aspects from a communications viewpoint, but W05-D06 codes are used **without** W01 or W02 where there is no specific novelty in the communication system or equipment. Note that part of the code structure below (W05-D06G codes in particular) is also used to define telephone

network signalling for 'central station' type alarms (W05-B05G codes). In the event that an invention concerns both telemetry or telecontrol **and** alarm signal transmission aspects, **W05-D06G** codes will be used in preference.

W05-D06A [2002]

Non-contact transmission media

(W05-D04)

These codes are intended to include 'wireless' or 'cordless' transmission systems, and thus encompass free-space optical, radio, and similar technologies.

W05-D06A1 [2002]

Radio and near-field

Includes RF or near field systems using electric, or more commonly, magnetic field transfer as used for rotary couplings, 'smart card' or 'tag' type coupling where ends of link can be separated by variable (short) distance.

W05-D06A1A [2002]

Radio

(W05-D04A)

This code is mainly intended for dedicated radio systems - transmission over radio telephone networks is covered by W05-D06G5 codes and transmission over wireless data networks is covered by W05-D06F1, **both of which take precedence over this code.** Radio systems in general are covered by W02-C03 codes, and radio equipment by W02-G codes, which are also assigned for **novel** aspects.

W05-D06A1B [2002]

Near-field

(W02-C02, W05-D03X, W05-D04)

Near-field systems in general are covered by W02-C02 codes, which are also assigned for novel aspects. This code is intended for near-field communication **without** a mechanical connection, i.e. it does **not** include capacitive or inductive couplings, e.g. of rotary type, which are covered by W05-D06T codes.

W05-D06A3 [2002]

Free space optical

(W05-D04B3)

This code covers arrangements for transmitting remote control or measurement signals over a free-space optical path, using infrared, visible, or ultraviolet light. Optical fiber and light guide systems involving a mechanical connection are covered by W05-D06C. Novel optical communication system aspects are represented by W02-C04 codes, especially W02-C04B2 codes for free-space transmission, these being also assigned

where application to other systems as well as remote control or monitoring are indicated.

IR, UV

W05-D06A5 [2002]

Sonic or ultrasonic link

This code is primarily intended for transmission of remote monitoring or control signals through air or similar gaseous medium. Systems involving sonic or ultrasonic transmission with a mechanical connection - including transmission through water - are covered by W05-D06M codes. Sonic or ultrasonic communication in general is covered by W02-C07 codes.

W05-D06C [2002]

Optical fiber and light guide system

(W05-D04B1)

This code covers arrangements for transmitting remote control or measurement signals over a fiber-optic path, using infrared, visible, or ultraviolet light. Free space optical transmission is covered by W05-D06A3. **Novel** optical communication system aspects are represented by W02-C04 codes, especially W02-C04B1 codes for fiber-based transmission, these being also assigned where application to other systems as well as remote control or monitoring are indicated.

IR, UV

W05-D06E [2002]

Internet-based transmission

(W01-A06B7)

This code covers the use of the internet as a medium for measurement or control signal transmission, including use in 'internet of things' (IoT) applications. From 2018 specific subdivisions for this topic are introduced (W05-D06E1 codes). W01-A06 (data network) codes are not normally assigned for internet-based remote control and monitoring unless some novel aspect from a data communications viewpoint is involved but T01-N codes may also be assigned for significant computing aspects, especially T01-N01F. The use of data networks other than the internet for telemetry and/or telecontrol signal transmission is covered by W05-D06F codes and use of telephone networks by W05-D06G codes.

Web-based control, web-based monitoring

W05-D06E1 [2018]

Internet-based transmission for IoT communication

This code covers the use of the internet as a measurement or control signal transmission medium specifically for 'internet of things' (IoT) applications. Please note that W05-D06E1 codes are assigned for inventions where some aspect of control or measurement signal transmission is significant and not for all aspects of equipment that may be capable of operating in such a system for which codes for the equipment itself should be used. Additional W05-D06 codes are assigned for significant details such as intermediate arrangements for connecting to the internet but please note that use of wireless data networks is indicated by W05-D06E1A and use of cellular communications networks by W05-D06E1C. Search with W05-D07 codes for specific applications, e.g. with W05-D07A for home automation systems using IoT technology or with W05-D07B for use in factory automation including Industry 4.0 applications.

W05-D06E1A [2018]

Wireless network-based transmission for IoT communication

This code represents the use of wireless networks which form a significant part of IoT systems with the exception of cellular radio networks which are represented by W05-D06E1C. The use of wireless data networks in general for carrying remote control and measurement signals is covered by W05-D06F1.

6LoWPAN, BLE, Bluetooth®, LoRaWAN, Thread, wireless LAN, SigFox, WLAN, Z-wave, Zigbee®

W05-D06E1C [2018]

Cellular network-based transmission for IoT communication

This code represents the use of cellular radio networks as wireless wide-area networks (WANs) for handling remote measurement and control signals for IoT purposes. The use of cellular radio networks for non-IoT remote control and monitoring purposes is covered by W05-D06G5 codes.

5G IoT, CIoT, LTE Cat 0, LTE Cat 1, LTE Cat 3, LTE IoT, LTE-M1, massive IoT, narrow band IoT, NB-IoT

W05-D06F [2005]

Data network-based transmission

This code covers the use of data networks as a transmission medium, other than internet-based systems which are covered by W05-D06E. W01-A06 codes are also assigned for novel data network aspects.

CAN, controller area network, EIB, European installation bus, field bus, FlexRay, KNX, LAN, local area network, profibus, VAN, vehicle area network

W05-D06F1 [2016]

Wireless network

Covers use of a wireless (radio) based data network excluding networks used for internet of things applications which are covered by W05-D06E1 codes. Novel details of data networks are covered by W01-A06 codes. This code takes precedence over W05-D06A1A which covers the use of non-network radio communication for remote control or remote measurement. For wireless sensor networks search with W05-D08E. Radio systems in general are covered by W02-C03 codes and radio equipment by W02-G codes, which are also assigned when these aspects are novel.

Bluetooth®, wireless LAN, WLAN, Zigbee®

W05-D06G [2002]

Telephone

(W01-C05B3E, W01-C05B3F)

In addition to the **previously used** codes indicated below, W01-C05B3E or W01-C05B3F were routinely assigned depending on the remote control or remote monitoring aspect. Where some **novel** aspect of the telephone system itself is involved these W01 codes will also be assigned.

W05-D06G1 [2002]

Landline

(W05-D03C)

W05-D06G5 [2002]

Radio telephone

(W01-B05A1, W02-C03)

W05-D06G5A [2002]

Cordless telephone transmission

(W01-B05A1B, W02-C03C3)

W05-D06G5C [2002]

Cellular telephone transmission

(W01-B05A1A, W02-C03C1)

Use of 3G, 4G, 5G or similar non-TDMA mobile telephone systems is covered by W05-D06G5G, which takes precedence over this code. Novel radio system aspects of cellular networks are represented by W02-C03C1 codes. From 2018 cellular 'internet of things' (CloT) systems are not coded here and are covered by W05-D06E1C.

W05-D06G5G [2002]

Third, fourth or fifth-generation mobile phone system

The title of this code is amended (2018) to better reflect its coverage. Novel radio system aspects of cellular networks are represented by W02-C03C1 codes. This code is intended for measurement or control signaling over a 3G, 4G, 5G or similar network, and takes precedence over W05-D06G5C which is intended for use of cellular systems of the 'TDMA' kind, especially GSM. Significant multiple access aspects are highlighted by assignment of W05-D02 codes, novel aspects of these being assigned W02-K codes also, such as W02-K05A7 for CDMA, and W02-K07C for OFDM. Please note that from 2018 cellular 'internet of things' (CloT) systems are not coded here and are covered by W05-D06E1C.

W05-D06G5J [2002]

WLL and fixed access systems

(W01-B05A1G, W02-C03D)

This code is intended for measurement or control signalling over a fixed radio telephone link of 'wireless local loop' or similar type. Novel details of the radio system are highlighted by additional assignment of W02-C03D codes for the 'point-to-point' aspect.

W05-D06G5X [2002]

Other telephone network measurement or control signal transmission

W05-D06M [2002]

Pneumatic, hydraulic, mechanical

This code covers the transmission of measurement or control signals through water or other liquids. Systems involving sonic or ultrasonic transmission **without** a mechanical connection, e.g. via the air, are covered by W05-D06A5.

W05-D06M1 [2002]

Mud pulse telemetry

W05-D06P [2002]

Power line communication

(W05-D03D)

W05-D06R [2002]

Dedicated wired system

(W05-D03E)

This code is intended for electric signal transmission over wires specifically installed for the purpose. Fiber-optic systems of this type are covered by W05-D06C.

W05-D06T [2002]

Inductive or capacitive coupling

(W05-D03X, W05-D04)

These codes are intended for mechanically-associated inductive or capacitive coupling, e.g. of rotary type between fixed and moving parts of a machine. Arrangements using near-field transmission **without** mechanical association, i.e. in a 'cordless' sense, are covered by W05-D06A1B.

W05-D06T1 [2002]

Inductive coupling

(W05-D03X, W05-D04)

Search with V02 codes for specific novel aspects, e.g. V02-F02D for rotary transformers.

W05-D06T5 [2002]

Capacitive coupling

(W05-D03X, W05-D04)

W05-D06X [2002]

Other medium

W05-D07 [1992]

Transmission of control or measurement signals for specific systems

These codes are intended to highlight application and are used with other W05-D codes as appropriate for details of e.g. transmission mode or medium.

W05-D07A [1992]

For home automation

includes home bus systems. See also X27-V for home automation.

Heating, ventilating, air conditioning, water heater, lighting, intelligent home

W05-D07B [1992]

For factory automation

This code covers transmission of measurement and control signals for factory automation applications. When internet-of-things (IoT) aspects are significant, e.g. in connection with Industry 4.0 data communications, W05-D06E1 codes are also assigned. Control systems-related data communications arrangements in general are also assigned T06-A11. Total factory control in general is covered by T06-A04A2A when based on numerical control and for non-NC systems by T06-A04B7.

Cyber-physical systems, digital manufacturing, FA, fieldbus, IEC 61158, inventory, process control, process monitoring, production line, smart factory, total factory control

W05-D07C [1992]

For building control

Includes systems for intelligent buildings.

HVAC, heating, ventilating, air conditioning, environment control, computer, sensor interrogation, alarm

W05-D07D [1992]

For vehicles

This application code is assigned for remote measurement and/or control of any vehicle equipment or systems. Codes relating to the specific type of vehicle and on-board equipment or system should also be searched. See also X21, X22 and X23 for land vehicles and W06 for aircraft, space vehicles or marine craft. Search with W05-D02 codes for multiplex systems and with W05-D06F for data network aspects (e.g. CAN bus).

W05-D07E [1997]

For office automation

See S06 section for printer, facsimile and photocopier.

W05-D07F [1997]

For power generation and distribution

Includes power plant and systems control. See also X12-H codes.

W05-D07G [1997]

For utility meters i.e. electricity, gas, water

See also S01-B01 and X12-H04A for remote reading of electricity meters, and S02-K08A for remote meter reading in general.

W05-D07H [2006]

For earth drilling and well logging

(W05-D07X)

Prior to 2006 this topic was covered by W05-D07X. For mud pulse telemetry W05-D06M1 and W05-D08E are also assigned. See S03-C codes and X25-E02 codes for well logging in general, and class H01 for all aspects of oil and gas production.

W05-D07M [2011]

For medical systems and equipment

S05 codes are also assigned to indicate specific details.

W05-D07N [2018]

For agricultural systems and equipment; Farming

This code covers applications of remote measurement and control to agriculture and farming, including livestock aspects. X25-N codes are also assigned and should be included in searches for specific topics, e.g. X25-N01B for control or monitoring of irrigation and X25-N02A for animal feeding.

Automatic feeder, culture, fertilizing, harvesting, greenhouse, hen-house, milking, soil erosion

W05-D07P [2022]

Scientific analysis systems

Includes control or measurement signalling, for application systems such as weather measuring equipment, pollution level measurement, Chemical reaction or hazardous substance measurement, radiation measurement etc.

Pollution, weather, chemical reactions

W05-D07X [1992]

Other application of telemetry and telecontrol systems

From 2006 oil rig and drilling applications are transferred to W05-D07H.

W05-D08 [2002]

Function and mode

These codes are intended to indicate, irrespective of transmission medium or application (respectively conveyed by use of W05-D06 and W05-D07 codes) the purpose of the system in terms of remote control or remote monitoring. They are also used to flag an analogue system, on the basis that the majority of inventions are likely to relate to switching or digital transmission, signal format and that transponders are involved.

W05-D08A [2002]

Analogue system

W05-D08C [2002]

Remote control

Prior to 2002, see W05-D04A1 for radio-based remote control and W05-D04B5 for optical systems.

W05-D08C1 [2002]

Remote control and monitoring

This code takes precedence over W05-D08E when transmission of telecontrol **and** telemetry signals are involved.

W05-D08E [2002]

Remote monitoring

For systems involving transmission of both telecontrol and telemetry signals, W05-D08C1 takes precedence over W05-D08E. For sensor networks search with W05-D06F codes, e.g. W05-D06F1 is assigned with W05-D08E to denote wireless sensor networks. (Prior to 2016 see W05-D06F and W05-D08E).

W05-D08G [2002]

Using transponders

(W05-D04G)

RF transponder-based systems in general are assigned W02-G05 codes, which are also used here for **novel** aspects of radio-based systems.

Transponder systems for identification purposes are assigned W06-A04B for radio signal systems, W06-A05B for sonar-type systems, and W06-A06B for optical systems.

W05-D08J [2002]

Novel signal format or protocol

This code is intended to highlight that the nature of signals used in a telemetry or telecontrol system is novel in some way. These aspects could include novelty in waveforms, voltage levels, modulation, protocols or the like, and are further highlighted by the assignment of codes in e.g. U21 or W01 as appropriate where their use conveys additional information. Systems involving multiplex and multiple access schemes are covered by W05-D02 codes, and signal coding for security by W05-D05B1. W05-D08J will not normally be assigned for these cases unless a specific signal format or protocol novelty exists.

W05-D08L [2005]

'Learning' and 'universal' type remote controllers

(W05-D08X)

Covers remote controls capable of controlling different equipment types, e.g. after 'training' in signal format. Remote controllers for general audio or video entertainment systems with this property are covered by W03-G05A1A.

W05-D08N [2005]

Constructional details of telemetry / telecontrol equipment

(W05-D08X)

Covers external aspects such as housings and internal details such as PCB mounting. See V04-S and V04-T codes for further details.

W05-D08P [2009]

Power supply for telemetry / telecontrol equipment

(W05-D08X)

This code covers power supplies specifically for remote measurement or remote control systems. Novel details of power supplies are also assigned relevant codes in U24, e.g. U24-D and U24-E codes.

W05-D08R [2009]

Repeaters and extenders for remote control and remote monitoring

(W05-D08X)

This code covers arrangements for extending the range of remote control or remote monitoring systems, including devices such as 'remote control extenders', usually based on repeaters. Novel aspects of repeaters are also assigned codes depending on technology, e.g. W02-C04A5 for optical repeaters and W02-G05C for radio types. W05-D08R is intended for arrangements permitting increased separation between e.g. controller and controlled device. Modifications to codes or command sets to increase the scope of the controlled functions and the like are **not** included, being covered by W05-D08J. Remote control extenders specifically for use with AV equipment are covered by W03-G05A8.

W05-D08X [2002]

Other function or mode aspects

W05-D09

Other transmission systems for measurement or control signals

This code covers systems for transmitting or receiving remote control or remote measurement signals not fitting into any other W05-D subdivision code.

W05-E

Display arrangements

W05-E codes include, in general, display aspects not catered for elsewhere and for specific applications and device technology relevant codes in other classes should be considered, such as T04 codes for computer monitors and W03 codes for television displays. However, note that from 2007, certain W03-A codes (nominally for TV receivers) are used in a general sense for application to displays capable of presenting video information. (See the note at the start of W03 class for further details). Therefore, those searching with W05-E codes are advised to also consider use of W03-A codes for equipment capable of video display where that aspect is significant. From 2007 W05-E10 is introduced for 'electronic paper'.

W05-E01

Forming character by selecting elements

Includes seven-segment types.

Matrix, row, column

W05-E01A

Drive circuitry

Addressing, row/column/segment selection, decoder, driver, switching

W05-E01B

Element arrangements

Matrix, cell, alphanumeric display, filament, lamp, gas discharge, fluorescent, LED, LCD, Shutter, flap, electromagnetic actuator

W05-E02

Arrays or layers of characters

Includes displays where characters are permanently fixed to e.g. moving band, or selectively uncovered, back-lit, etc.

Moving drum, disc, band, motor drive

W05-E03

Advertising displays and systems

This code covers displays used for advertising and similar commercial purposes (in W05-E03A codes), e.g. building signs with company logos and the like, and also advertising via other media such as TV broadcasts and the internet, provided that some visual aspect is involved. These codes may be used alone, or in conjunction with W05-E01 to W05-E05 codes. Signs for indicating emergency exits and the like in buildings are not assigned W05-E03 codes and are covered by W05-A03 codes and other W05-E codes as appropriate.

Lighting control, sequencer, discharge tube, incandescent lamp, LED, animated mobile, rotating display

W05-E03A

Advertising displays

These codes are assigned when some novelty in the actual means of presentation itself, is involved.

W05-E03A1 [2002]

Static illuminated signs and billboards

W05-E03A3 [2002]

Signs and billboards with moving parts

Covers arrangements for bringing a different advertisement into view and for moving part of an advertisement, e.g. animation.

W05-E03A5 [2002]

Addressable or switchable advertising displays

These codes cover displays, generally using switched light sources or addressable back-lit elements, without physical movement of the display itself being involved. Codes specific to the display technology or elements involved are assigned as necessary from e.g. U12, U14, V05, or X26.

W05-E03A5A [2002]

With separately controllable or addressable display elements

This code covers displays with some electrically controllable or addressable aspect, e.g. to allow the appearance of limited movement of a portion of the display. W05-E03A5C takes precedence for matrix-type displays of video type in which there is no restriction on the information presented.

W05-E03A5C [2002]

Novel matrix-type display for advertising

This code takes precedence over W05-E03A5A and covers novel aspects of displays of video or analogous type allowing all display points in a matrix to be addressed as desired.

W05-E03A5E [2002]

Video advertising using standard display

This code includes the use of standard video terminals, of 'TV set' or 'VDU' type arranged to present advertising messages, e.g. to persons in a queue or similar situation in a public area.

W05-E03A6 [2014]

Advertising displays including additional information aspect

This code and its subdivisions cover display arrangements or signs for advertising or similar commercial purpose which include an additional, non-visual aspect.

W05-E03A6A [2014]

Advertising displays including audio aspects

This code covers display arrangements, billboards, or signs for advertising or similar commercial purpose which include an audio aspect, e.g. using recordings. See also W04-E30A3 for audio players in general. W05-E03A6A is not assigned for advertising using standard video displays, as covered by W05-E03A5E which are normally expected to include an audio aspect. Audible advertising without any visual element is covered (from 2014) by W05-F.

W05-E03A6X [2014]

Advertising displays including other additional information aspect

W05-E03A7 [2002]

Advertising displays involving synchronisation with movement of an observer

This code includes arrangements for presenting sequences of video or film type images so as to be viewable by an observer in a vehicle, e.g. a passenger on a train. Systems based on cine film or analogous methods are also assigned S06-B codes (e.g. S06-B05), and those using video projection are also assigned W04-Q01 codes.

W05-E03A9 [2002]

Other advertising display aspects

W05-E03C [2002]

TV advertising

This code covers novel aspects of the creation and transmission of television advertising. For systems checking that commercial messages are actually transmitted, e.g. at a designated time, see W02-F04C5.

W05-E03E [2002]

Internet advertising

Novel aspects of internet communication are covered by W01-A06B7 codes as appropriate, and internet advertising applications in general by T01-N01A2C.

W05-E03G [2002]

Telephone network advertising

This code covers text-based and similar systems involving visual presentation, and does **not** include purely audio messages.

W05-E03M [2015]

Mobile Advertising

Includes advertising mounted on, or carried by vehicles and portable advertising displays and devices.

Advertising

W05-E05 [1987]

General display details

W05-E05 codes may be used alone, in conjunction with other W05-E codes or to highlight display aspects in conjunction with other classes. Note that from 2007, provision has been made to use W03-A codes (nominally for TV receivers) in a wider sense for displays capable of presenting video, thus the use of W03-A codes in a search in addition to W05-E05 codes should be considered for such displays.

W05-E05A [1987]

Filters

From 2007, filters specifically for video displays are covered by W03-A08E1. W05-E05A will continue to be assigned to general or non-video cases.

Polarizer, anti-glare filter, diffuser, lens, fiber-optic

W05-E05B* [1987-2006]

Back lighting and analogous systems

*This code is now discontinued. From 2007, the topics of back and edge lighting for displays are covered by new X26 codes, X26-U04A and its subdivisions, which are used in conjunction with other X26-D codes as appropriate. W05-E05B codes remain valid and searchable for records prior to 2007, and covered back and edge lighting of displays, especially LCDs, in which U14-K01A4C is also assigned, but also the lighting of any translucent or transparent information source, such as advertisements, also assigned W05-E03A1. Note that back lighting or similar for computer monitors or telephone displays was not included, being covered by T04-H03D and W01-C01A2A respectively. X26 codes were also assigned as appropriate for light sources and optical components for illumination.

Passive display, liquid crystal display module, illumination, lamp, light fitting

W05-E05B1* [2002-2006]

Back lighting

*This code is now discontinued.

W05-E05B3* [2002-2006]

Edge lighting

*This code is now discontinued.

W05-E05B5* [2002-2006]

Diffusers and light source filters

*This code is now discontinued. X26-D01E1 is assigned for diffusers and X26-D01C for filters.

W05-E05B6* [2005-2006]

Light guide

*This code is now discontinued. X26-D01F is assigned for this topic.

W05-E05B7* [2002-2006]

Novel light sources

*This code is now discontinued but was normally used with a code specific to the light source itself, e.g. in X26.

W05-E05B9* [2002-2006]

Other back lighting and analogous system details

*This code is now discontinued.

W05-E05C [1987]

Composite display i.e. made up of several individual displays

Multiple CRT, discharge tube, matrix display, large screen, sports ground, stock market, truck-mounted display, passenger information, video wall

W05-E05F [2020]

Flexible/foldable/bendable displays

Includes the structural details of flexible or foldable displays as used in mobile phones and other portable display devices. See also U14 for liquid crystal and electroluminescent displays, and U12 for light emitting diode (LED) displays. Flexible display monitors for computers are coded under T04-H03N.

W05-E05G [2006]

General constructional details

This code is used with other W05-E codes or alone, as appropriate. It is not assigned for single applications covered elsewhere, such as for construction of a TV set display. From 2007, constructional details specific to video displays are covered by W03-A09 codes. W05-E05G will continue to be assigned to general or non-video cases.

W05-E07 [1997]

Head-mounted display

This code is used for general or unspecified applications only, and not when a specific code exists elsewhere. Head mounted displays specifically for TV receiver and similar applications are coded in W03-A08E7, and for virtual reality in W04-W07E1A.

W05-E08 [2002]

Display technologies not covered elsewhere

This code is intended for electrical displays not covered elsewhere, and is normally used with codes from other sections as appropriate, e.g. with S06-A codes for electrophotographic displays. Specific display technologies such as EL, LED, LCD, PDP, CRT are not included, and are covered in U12, U14, or V05 as appropriate. Novel technology aspects of electronic paper which cannot be coded elsewhere are covered here, and from 2007 W05-E10 is also assigned.

W05-E10 [2007]

Electronic paper

This code is intended as a general reference for 'electronic paper', interpreted as the use of mainly flexible electronic displays to provide a re-writable medium for presenting information in a form resembling normal printed matter, no power supply being required once data is written. Novel technology aspects will continue to be covered in e.g. U14 codes or in W05-E08.

W05-F [2014]

Audible advertising

This code covers advertising involving audible communication only. Advertising involving audible and visual aspects is not included and is covered by W05-E03A5E for video advertising using a standard display, W05-E03A6A for other visual advertising displays that include audible information and in W05-E03C for TV advertising. W05-F includes audible advertising via the telephone network which is also assigned W01-C05B5G.

Audio Advertisement

W06: Aviation, Marine and Radar Systems

W06-A

Radar, navigation, etc.

Includes analogous systems where principles are applicable to radar, sonar, etc. See also under application, e.g. for aircraft and ships where systems are specific.

W06-A01

Beacon systems

Includes aerials, receivers and transmitters, but see W02-B and W02-G codes also for specific features of RF systems.

W06-A01A [1992]

Fixed beacon providing navigational reference

From 1992, airport/landing strip systems are also coded in W06-B02E.

Hyperbolic, Loran-C, Omega, aircraft landing aid, ILS, microwave landing system, MLS, optical, sonic, ultrasonic system

W06-A01C [1992]

Portable or vehicle-borne beacon for location

Survival craft, liferaft, distress

W06-A02

Direction finders

Bearing measurement, incident radiation angle measurement, DF

W06-A02A

Using radio waves

Antenna direction pattern changing is also covered by W02-B06 codes.

RDF, rotary antenna, antenna array, electronic beam steering, phase comparison, tracking

W06-A02A1 [1992]

Automatic direction finder

Includes systems resolving relative phases of signals from different antennae.

W06-A02C [1992]

Using light

(W06-A02X)

IR, UV, visible, light source location

W06-A02C1 [1992]

Tracking object with electronic imaging

See T04-D codes also, e.g. T04-D07D for detecting movement or position. Includes warehouse monitoring aspects.

Pattern recognition

W06-A02E [1992]

Using sonic or ultrasonic waves

Sound source location, gunfire location

W06-A02X

Other details of direction finders

Nuclear radiation, Geiger counter

W06-A03

Position fixing

Use with W06-A02 codes if direction finding aspect is present.

Multiple direction finding

W06-A03A [1992]

Satellite based system e.g. GPS

See W02-K05 codes for pseudonoise aspects.

Global positioning system, NAVSTAR, coarse, fine, secure, military

W06-A03A1 [1997]

Novel aspects of GPS

Includes novel details concerning the overall GPS infrastructure. Novel GPS receivers are not included here and are coded in W06-A03A5R.

Infrastructure

W06-A03A5 [1997]

GPS applications

Includes **use** of GPS information without necessarily any novel aspect of GPS per se.

W06-A03A5A [2002]

Differential and assisted GPS

Includes systems using ground based transmitter of known accurate position to correct for GPS timing errors, e.g. due to ionospheric conditions, to provide more accurate positioning. Also includes use of pseudolites that transmit GPS format signals when line of sight to sufficient orbiting GPS satellites is restricted.

W06-A03A5C [2002]

Absolute position determination

Includes use of GPS purely as a navigation tool.

W06-A03A5E [2002]

Position determination for secondary purpose

Includes use of GPS position information for control of e.g. setting up of television channels, local information services accessing, etc., without necessarily presenting the geographical information to the equipment user.

W06-A03A5G [2002]

Use of GPS as a time standard

Includes use of GPS timing information, e.g. for time-stamping transmitted data.

W06-A03A5J [2002]

Use of GPS as a frequency standard

W06-A03A5M [2007]

GPS Jamming/anti-jamming

Includes arrangements for protecting GPS receiver from radio frequency (RF) interference to prevent GPS receiver code and carrier tracking from being effected, resulting in poor navigation performance, e.g. in weapons fire and control systems (see also W07 codes). See W02-L01 codes instead for jamming/anti-jamming of (non-GPS) communications in general.

W06-A03A5R [2002]

Novel GPS receiver

Includes novel hand-held or vehicle-borne GPS receiver. This code is normally applied when there is some novelty in the receiver construction itself such as a novel housing or display. For general use of a GPS receiver for position fixing, see W06-A03A5C instead. W02-G03 codes (for communications receivers) are also assigned as appropriate.

W06-A03A5X [2002]

Other GPS applications

W06-A03B [2005]

Using radio waves

Includes the use of a number of radio receivers to determine the position of a transmitted radio signal, e.g. by triangulation, and also determination of own position based on reception of broadcast signals, or other transmissions, from known locations. The use of dedicated beacons transmitting special signals is covered by W06-A01A.

Base station, cell site, cellular, radio station, time-of-arrival, TOA, TV station

W06-A03D [2005]

Using light waves

W06-A03F [2005]

Using sonic or ultrasonic waves

Includes use of omni-directional hydrophones to determine sound source location. See also W02-C07C for hydrophones per se

W06-A04

Radar systems

W06-A04A

Primary radar systems

Includes primary or passive target radar systems where a radar/radio signal is transmitted towards a target and the reflected signal is detected.

Non-cooperating/passive target systems

W06-A04A1

Determining target position

Includes radar based rangefinding (see also S02-B01) and position determination.

Monopulse, distance, height measurement, tracking system, aircraft radio altimeter, level sensing, ground penetrating radar

W06-A04A2

Using relative movement

Clutter suppression is covered by W06-A04E5. For Doppler intruder detector see W05-B01A codes also.

Frequency measurement, target discrimination/classification, MTI, velocity measurement, clutter suppression

W06-A04B

Secondary radar systems

Includes secondary or active radar systems where a radar/radio signal is transmitted towards a target and then a reply signal is actively re-transmitted by the target back towards the originating transmitter/receiver. From 1997 remote reading of e.g. meters, etc., is excluded - see W05-D08G, W05-D08E and W05-D07G codes. All RFID transponder details and interrogation systems are also covered by T04-K codes, such as T04-K03B for novel RFID tags and T04-K02 codes for reading and writing aspects. See also W02-G05 codes for novel RF details such as antenna (W06-A04G7 also), associated with RFID systems. Analogous systems using other than radio waves are coded in the appropriate sections: e.g. W06-A05B codes for sonic/ultrasonic systems, and W06-A06B codes for light based systems.

Interrogation, response, reply, ID, code, sequence, security

W06-A04B1 [1992]

For vehicle or aircraft identification

Includes radio frequency identification of vehicles and aircraft or parts of them, e.g. identification of tyres on a motor vehicle so that a specific deflated tyre can be identified. Also see T04-K03B for RFID transponders per se and T04-K02 codes for reading/writing aspects. See also W02-G05 codes for novel radio/RF details of RF transponders/tags such as antennae. See also W06-A04H1 for anticollision radar and W06-A04H7 for aircraft control aspects. Aircraft on-board navigation systems are also coded in W06-B01B1.

RFID, transponder, IFF, identification of friend or foe, air traffic control, ATC, flight identification

W06-A04B3 [1992]

Security and coding aspects

Includes coding to prevent errors, suppress interference, or for military security.

Squawk

W06-A04B5 [1992]

For object identification

Includes analogous industrial systems for monitoring livestock, people, workpieces, etc.

W06-A04B5A [2002]

Animals and livestock

Includes monitoring of livestock, pets and other animals. See also X25-N02 for monitoring livestock. See also X27-H03 for RF transponders used in pet access control collars and pet monitoring.

Dog, cat, pet, cattle, cow, sheep, horse, pig

W06-A04B5C [2002]

People

For monitoring and identifying people. Also includes monitoring of passport, business cards ID.

W06-A04B5E [2002]

Workpieces

For monitoring industrial workpieces such as bottles on production line. See also T05-G02B1A for systems interrogating transponders attached to workpieces.

W06-A04B5G [2007]

Goods/cargo

Includes monitoring or identifying of goods or cargo, e.g. during shipment/transportation. See also X25-F11 for tracking of goods in e.g. warehouse. See also T04-K03B for transponder tags/labels, T04-K02 for reading and writing aspects, and T01-N01A2E for Internet based tracking. Also see W02-G05 codes for novel RF aspects of transponder tags/interrogation. Monitoring/identifying of goods/articles during their manufacture is covered by W06-A04B5E and T05-G02B1A instead.

Cold chain, logistics

W06-A04B7 [2005]

Using different response medium

Includes secondary radar systems where transmitted and received signals take different forms, for example, when the transmitted signal is radio but the re-radiated signal received is e.g. acoustic.

W06-A04C

Display arrangements

Cathode ray tube, CRT, LCD, liquid crystal, solid-state, PPI, sector, Cartesian, selective brightening, electronic cursor, character generator, MTI

W06-A04D

Pulse system details

See U22 for pulse generation and processing in general. TR switching is coded in W06-A04G5 also. Continuous wave radar systems are covered by W06-A04F.

Pulse generator, pulse shaping

W06-A04D1 [1992]

Pulse generators

W06-A04D3 [1992]

Pulse compression, 'chirping'

W06-A04E

Jamming; Anti-jamming; Monitoring; Transforming co-ordinates; Processing

Codes in this section are used for signal processing aspects of radar systems, either alone or with other codes in W06-A04 as appropriate.

W06-A04E1 [1987]

Jamming; Anti-jamming, including 'passive' systems

Includes e.g. 'passive' chaff systems. Jamming/anti-jamming in general is covered by W02-L codes. Passive reflectors and absorbers are coded in W02-B03 codes also. Signature modification and camouflage aspects, such as radar absorbing coating on aircraft, are coded in W06-A04X only (and in W07-F codes as appropriate).

Noise generator, pulse insertion, window dispersion system, steerable antenna, nulling, notching, cancelling, EW, electronic warfare

W06-A04E1A [1992]

Jamming of radar

Includes electronic countermeasures for 'actively' jamming a radar signal. Passive countermeasures are coded in W06-A04E1 only.

W06-A04E1C [1992]

Anti-jamming and countermeasures to jamming

Includes systems for overcoming an enemy's attempts to actively jam radar signal. Noise and clutter suppression in general is covered by W06-A04E5.

W06-A04E3 [1987]

Monitoring, testing, transforming coordinates

W06-A04E3A [1992]

Monitoring, testing, target simulation, calibration

Includes operator training.

Maintenance, repair, fault, monitor

W06-A04E3C [1992]

Detecting existence, type, or position of radar

Hostile radar monitoring, police speed trap warning receiver, instantaneous frequency measurement receiver, IFM

W06-A04E3E [1992]

Coordinate transformation

Display systems per se are covered by W06-A04C. Video standards conversion in general is covered by W04-N05A.

Cartesian, polar

W06-A04E5 [1987]

Noise/clutter suppression

Moving target discrimination in general is covered by W06-A04A2. Suppression of deliberate interference for anti-jamming is covered by W06-A04E1C. See W06-A04E9 also for correlation signal processing. Noise reduction for receivers in general is covered by W02-G03B codes.

Signal-to-noise ratio improvement, S-N, SNR, velocity discrimination, anti-clutter gain control, ACG, selective blanking, Constant false alarm rate, CFAR

W06-A04E9 [1987]

Other jamming; Anti-jamming; Monitoring; Transforming co-ordinates and processing aspects

Includes transformation and correlation processing. See T01-J04B1 for FFT and T01-J04B2 for data processing implementations of correlators.

Signal processing, angle correction, motion compensation, convolution

W06-A04F [1992]

Continuous wave radar

See U23-A codes for oscillators per se and U23-D codes for phase/frequency control.

CW, carrier, oscillator, FM, ramp, STALO, feedback, linearise

W06-A04G [1992]

General details of radar equipment

Codes in this section are used alone or with other W06-A04 codes as appropriate.

W06-A04G1 [1992]

Transmitter circuitry

Transmitters in general are covered by W02-G01 codes.

W06-A04G3 [1992]

Receiver circuitry

Receivers in general are covered by W02-G03 codes.

W06-A04G5 [1992]

Transmit/receive switching

See also W06-A04D for pulse system aspects. Gas filled switching tubes are covered by V05-A03, electronic switching in general by U21-B codes.

TR

W06-A04G7 [1992]

Antennae and antenna control

See W02-B codes for details of antenna systems.
Beam steering, phased array, active array, scanning, rotary mount, motor drive

W06-A04G9 [1992]

Other radar equipment details

W06-A04H [1992]

Radar systems and applications

Codes in this section are used with other W06-A04 codes or alone, as appropriate.

W06-A04H1 [1992]

Vehicle applications

From 2005 radar anticollision systems have been transferred to W06-A04H1K. Prior to 2005, anticollision systems remain searchable in W06-A04H1.

W06-A04H1A [2005]

Land vehicles

Includes radar systems used on-board motor vehicles and trains.

W06-A04H1B [2005]

Aircraft

Includes planes and helicopters.

W06-A04H1C [2005]

Ships

Includes marine vessels, boats and submarines.

W06-A04H1K [2005]

Anticollision

Can be used in conjunction with above W06-A04H1 codes. Search with W06-B01B1 for aircraft based systems, and X22-J05A for motor vehicles. See W06-A04H1 for anticollision systems prior to 2005.

W06-A04H2 [1992]

Weather radar

Includes on-board aircraft weather radar when used with W06-B01B1. See also S03-D05 for meteorology.
Meteorological

W06-A04H3 [1992]

Mapping/imaging

Synthetic aperture radar per se is coded in W06-A04J.

W06-A04H5 [1992]

Tracking, target seeking

See also W07-A01C for missile radar target-seeking system.

W06-A04H7 [1992]

Traffic control and monitoring

Includes air traffic control, also coded in W06-B02E when based at airport. (Prior to 1992 not coded in W06-B02). See W06-A04B codes also for aircraft automatic ID systems.

ATC

W06-A04H8 [1992]

Industrial radar system

This code is used chiefly in conjunction with other W06-A04 codes to indicate an analogous system used in an industrial environment. For example, use with W06-A04A1 for monitoring levels in a container (also coded in S02-C06D5).

W06-A04H9 [1992]

Other radar applications

W06-A04J [1992]

Synthetic aperture radar

See also W06-A04H3 for mapping.
SAR

W06-A04L [2005]

Bistatic/Multistatic/Passive radar systems

(W06-A04X)

Covers radar systems where the transmitter and receiver(s) are positioned in different locations and includes multistatic radar. See also W06-A04H2 (and S03-D codes) for bistatic weather radar. Also includes passive radar systems that utilize third party signals from commercial broadcast or communications transmitters to detect and track objects based on e.g. time-of-arrival difference of direct and reflected signal paths, or measurement of the bistatic Doppler shift and direction of arrival of the echo.

Passive coherent location, passive covert radar

W06-A04X

Other radar system aspects

Includes signature modification by e.g. absorber materials. For absorber materials per se, see W02-B03D. Includes radar absorbing coatings and paints.

W06-A05 [1983]

Sonar systems

Does not include ultrasound equipment used purely for medical application. See appropriate codes in S05 and S03 only. Does not also include low range systems e.g. for determining material properties or flaws. See appropriate S03 codes only.

Ultrasonic/sonic measurement, object presence/size/thickness determination, Doppler measurement, transponder, locator

W06-A05A* [1983-2001]

For air, sea, land vehicles

*This code is now discontinued and transferred to W06-A05H codes from 2002 onwards. It remains searchable for 1983 to 2001. For **specific** cases, codes for vehicle type are also assigned. See W02-C07 for hydrophone systems. See also W06-C01B1 and X25-N02 for fish-locating equipment used in commercial fishing.

Depth measurement, contact/target detection and classification, echo detection, ultrasonic transmitter/receiver, piezoelectric transducer, fish finding equipment

W06-A05B [1997]

Secondary sonar systems

Includes secondary or active sonar transponders for identification. From 1997 remote reading of measured values is excluded - see W05-D08G, W05-D08E, E05-D07G and W05-D06A5 codes.

Interrogation, response, reply, ID, code, sequence, security

W06-A05B1 [2005]

For vehicle or marine craft identification

W06-A05B3 [2005]

Security and coding aspects

Includes control of sonar/ultrasound signal to prevent detection by unauthorised persons.

ID, code, sequence, security

W06-A05B5 [2005]

For object identification

Includes identification of persons, objects, workpieces etc.

W06-A05B7 [2005]

Using different response medium

Includes secondary sonar systems where transmitted and received signals take different forms, for example, when the transmitted signal is ultrasound but the re-radiated signal received is e.g. radio.

W06-A05C [1992]

Details of sonar systems and equipment

W06-A05C1 [1992]

Transmitter circuits

W06-A05C3 [1992]

Receiver circuits

W06-A05C3A [1992]

Display arrangements

W06-A05C5 [1992]

Sonobuoys

Repeater

W06-A05C6 [2011]

Testing, monitoring, calibrating

W06-A05C7 [1992]

Transducers

Includes transducers per se, beam forming, and mounting arrangements. See V06-V01N and other V06 codes as appropriate.

Piezoelectric, casing, mounting

W06-A05C8 [2002]

Sonar jamming/anti-jamming

Includes equipment and methods.

W06-A05C9 [2002]

Other sonar equipment details

W06-A05D [2005]

Primary sonar systems

Includes primary or passive target sonar systems where a sonar signal is transmitted towards a target and a reflected signal is detected. This code is only applied when no specific sonar application or novel aspect is mentioned. For example, a novel primary sonar receiver will only be coded in W06-A05C3, with the fact that it is used in a primary sonar application, capable of being determined by the omission of any secondary sonar (W06-A05B) codes.

W06-A05D1 [2005]

Determining target position

Includes sonar distance or height sensing.

W06-A05D2 [2005]

Using relative movement

Includes sonar velocity sensing.

Doppler measurement, speed, velocity

W06-A05H	[2002]
Sonar systems and applications	
W06-A05H1	[2002]
Vehicle applications	
W06-A05H1A	[2002]
Land vehicles	
Also see X22 codes for further vehicle details.	
W06-A05H1B	[2002]
Aircraft	
W06-A05H1C	[2002]
Ships	
See W02-C07 for hydrophone systems. See W06-C01B1 and X25-N02 for fish locating equipment used in commercial fishing.	
<i>Depth measurement, fish finding equipment</i>	
W06-A05H1K	[2002]
Anticollision	
Can be used in conjunction with above W06-A05H1 codes. Search with X22-J05B for motor vehicle anticollision systems.	
<i>Anticollision</i>	
W06-A05H3	[2005]
Mapping/imaging	
Includes sonar imaging of seabed (see also S03-C codes).	
W06-A05H5	[2002]
Tracking, target seeking	
<i>Contact/target detection and classification, echo detection</i>	
W06-A05H8	[2002]
Industrial sonar systems	
W06-A05H9	[2002]
Other sonar applications	
W06-A05J	[2007]
Synthetic aperture sonar	
See also W06-A05H3 for mapping/imaging. Includes improving the spatial resolution of an active sonar array by combining data coherently between pings (acoustic pulses) to synthesize a longer effective array.	

W06-A06	[1983]
Non-radio e.m. wave, e.g. light, systems	
Optical communication in general is covered by W02-C04 codes.	
<i>Lidar, distance measuring equipment, DME, transmitter/receiver, light beam modulation</i>	
W06-A06A*	[1983-2001]
For air, sea, land vehicles	
*This code is now discontinued and is transferred to W06-A06H codes from 2002 onwards. It remains searchable for records between 1983 and 2001. For specific systems, appropriate vehicle code is also assigned.	
<i>Anticollision system, target detection</i>	
W06-A06B	[1997]
Secondary light-based systems	
Includes secondary or active optical radar/LIDAR systems. Includes use of optical transponders for identification. From 1997 remote reading of measured values is excluded - see W05-D08G, W05-D08E, W05-D07G and W05-D06A3 codes.	
<i>Interrogation, response, reply, ID, code, sequence, security</i>	
W06-A06B1	[2005]
For vehicle or aircraft identification	
W06-A06B3	[2005]
Security and coding aspects	
<i>ID, code, sequence, security</i>	
W06-A06B5	[2005]
For object identification	
Includes secondary light-based systems for identifying and monitoring of people, objects, workpieces etc.	
W06-A06B7	[2005]
Using different response medium	
Includes secondary light-based systems where transmitted and received signals take different forms, for example, when the transmitted signal is optical but the re-radiated signal received is e.g. ultrasonic.	
W06-A06C	[2005]
Details of non-radio e.m. wave, e.g. light, systems and equipment	
Can be used alone or in conjunction with other W06-A06 codes as appropriate.	
W06-A06C1	[2012]
Transmitter circuits	

W06-A06C2 [2012]

Receiver circuits

W06-A06C3 [2006]

Display arrangements

Cathode ray tube, CRT, LCD, liquid crystal

W06-A06C5 [2006]

Monitoring; Testing; Calibrating

W06-A06C8 [2006]

Jamming/anti-jamming

Includes countermeasures and counter-counter measures for optical targeting systems, such as laser designed to illuminate and confuse missile optical targeting sensor. See also W07-F03.

W06-A06D [2005]

Primary light-based systems

Includes primary or passive target optical radar or LIDAR (light detection and ranging) where a lidar/laser signal is transmitted towards a target and a reflected signal is detected. This code is only applied when no specific optical radar application or novel aspect is mentioned. For example, a novel primary LIDAR receiver will only be coded in W06-A06C, with the fact that it is used in a primary LIDAR application, capable of being determined by the omission of any secondary LIDAR (W06-A06B) codes.

W06-A06D1 [2005]

Determining target position

Includes light-based distance and height sensing. Prior to 2005 indeterminate-application distance sensing was covered in W06-A06.

W06-A06D2 [2005]

Using relative movement

Includes light-based velocity sensing.

W06-A06H [2002]

Non radio e.m. wave, e.g. light, system applications

W06-A06H1 [2002]

Vehicle applications

W06-A06H1A [2002]

Land vehicles

Also see X22 codes for further vehicle details.

W06-A06H1B [2002]

Aircraft

W06-A06H1C [2002]

Ships

W06-A06H1K [2002]

Anticollision

Can be used in conjunction with above W06-A06H1 codes. Search with X22-J05C for motor vehicle anticollision systems.

Anticollision

W06-A06H2 [2006]

Weather lidar

Includes laser radar systems designed for meteorological use. See also S03-D codes for meteorology.

W06-A06H3 [2005]

Mapping/imaging

Includes LIDAR mapping of e.g. rain forest canopy. See S02-B04 only for photographic imaging/surveying.

W06-A06H5 [2002]

Tracking, target seeking

See W07-A01C only for missile heat seeking system.

Target detection, tracking, optical, IR

W06-A06H8 [2002]

Industrial non-radio e.m. wave systems

Includes detecting presence of e.g. bottles to be filled on production line.

W06-A06H9 [2002]

Other non-radio e.m. wave, e.g. light, systems

W06-A06J [2017]

Continuous wave Lidar

W06-A06K [2017]

Synthetic aperture Lidar

W06-A07

Gyroscopes; Inertial navigation systems

From 2007 this code has been expanded to include inertial navigation systems (INS) using e.g. on-board linear accelerometers and rate gyroscopes to determine position/attitude of e.g. missile (see also W07 codes). Includes electrical aspects of gyroscopes used for navigational applications. Includes laser types (see V07 and V08 also). Non-electrical and non-electro-optical types are coded in S02-B07 only.

Optical, fiber, motor driven

W06-A08 [1992]

General or combination system for land navigation

See S02-B08. See T07-A05 also for roadside aspects. See X22-E06D only for on-board vehicles aspects. For purely satellite navigation see W06-A03A5 only.

Vehicle, guidance, beacon, satellite, dead-reckoning

W06-A09

Other (incl. compasses)

Non-electrical aspects of compasses are coded in S02-B06 only.

Magnetic field measurement, heading/course indication

W06-B

Aviation and aerospace systems

W06-B01

Aircraft

W06-B01A

Control systems for power plant, control surfaces, etc; Auto-pilots

Braking control, anti-skid system

W06-B01A1 [1983]

For power plant

Speed, power, flow, starting

W06-B01A1A [2006]

IC engine power plant

Includes control of internal combustion engines e.g. driving propellers.

Propeller, IC

W06-B01A1C [2006]

Gas turbine/jet engine power plant

Includes control of gas turbine jet engines such as turboprop, turbofan, turboshaft, RAMjet, SCRAM jet engines and pulse detonation engines. Also includes control of small gas turbines used as auxiliary power units (APUs) e.g. to generate power when aircraft is on the ground (see also X11-C01 for gas turbine driven electricity generation plant).

Gas turbine engine control, Supersonic Combustion RAMJET

W06-B01A1X [2006]

Other power plant

Includes control of aircraft power plant not already provided for.

W06-B01A5 [1983]

Affecting flight path, e.g. autopilots, control surfaces

See T06-B01 for course/attitude control in general.

Flap/aileron/rudder controls, trim adjustment, course correction

W06-B01B [1997]

Instrumentation; Communications

W06-B01B1 [1983]

For navigation

See W06-A04H1 for anticollision radar systems, and W06-A04H2 for weather radar.

Instrument landing system, ILS, microwave landing system, MLS, beacon homing systems, radar navigation, collision-avoidance, course, heading attitude, altitude, air-speed, ground-speed measurement, stall warning devices, wind shear warning, turbulence detection

W06-B01B3 [2002]

Head-up displays/head mounted displays

Includes displays built into pilot's helmet or goggles. See X27-A02B1A for electrical aspects of helmets and goggles.

W06-B01B5 [1983]

For vehicle/engine parameters

Engine speed, temperature, fuel gauges, cabin pressure, outside temperature/ pressure, ice build-up, weight on landing gear detector

W06-B01B6 [1992]

Black box recorder

See T03/W04 for dynamic recording aspects also.

W06-B01B7 [1992]

Communications equipment; Antennae

See W02-B codes for antennae, W02-G codes for communication equipment such as transceivers, receivers, etc., and W01-C04 for intercoms. For (radio)telephone for use by passengers, search with W01-C07 codes. Public address systems are covered by W06-B01C7.

Aerial mounting, cabling, crew headsets, radio telephone installation

W06-B01B8 [1992]

Data bus systems

See appropriate codes in T01, W01, and W05 (e.g. W05-D codes). This code is used for data bus aspects in general whether for control or instrumentation, (W06-B01A codes also assigned for specific control aspects).

W06-B01C

Electrical equipment (incl. de-icing, lighting)

W06-B01C1 [1992]

Electrical installations

Includes connectors, fittings, and wiring for general application to on-board electrical systems. (See V04 and X12-G codes also). Non-hardware aspects of data bus systems are covered by W06-B01B8.

W06-B01C2 [2002]

External lighting for signalling or navigational reference

W06-B01C3 [1992]

Electrical power generation, distribution and control

See X11, X12, X13 and X16 also.

Alternator, generator, inverter, battery, circuit-breaker

W06-B01C4 [1992]

De-icing equipment

Includes thermal and electromechanical systems.

W06-B01C5 [1992]

Environmental control and internal lighting

Includes pressurisation system, heating, etc.

W06-B01C6 [2007]

Electric propulsion

See also X11 codes for high power electric motors per se and X13-F/G codes for high power electric motor control systems.

W06-B01C7 [1992]

Public address and in-flight entertainment

PA, loudspeaker, amplifier, tape recorder, video, VTR, projection

W06-B01C8 [2005]

On-board security systems

Includes anti-hijack systems and arrangements to subdue attackers. Use with W06-B01A5 for systems preventing attackers from piloting aircraft, e.g. into building, and W06-B02E for systems enabling remote flying of aircraft from the ground.

Terrorism, hijack

W06-B01C9 [1992]

Other aircraft electrical equipment

Includes emergency escape equipment, food preparation equipment, toilets, etc. Also includes aircraft-mounted weather influencing systems, (see also X25-X20), camera arrangements for aerial imaging/photography and passenger accommodations, such as seat or furniture.

Oxygen mask, escape hatch

W06-B02

Airport control systems and equipment

Passenger handling, security, ground equipment

W06-B02A [1992]

Security systems

W06-B02A1 [1992]

For personnel

Includes detection of concealed weapons, suspicious behavior and detection of infectious diseases in people (see also S05-D codes) at airport. For passport checking see W06-B02R instead.

Magnetic, electromagnetic

W06-B02A5 [1992]

For baggage inspection or tracking

Includes use of transponder tags or bar-code reader. See S03-C03 and S03-E06B codes also for inspection.

X-ray, neutron, image, tracking, inspection, monitoring, smuggling

W06-B02A5A [2006]

Baggage inspection

Includes detection of concealed articles such as guns and explosives or other illegal substances, e.g. using x-rays or neutron sensors. See S03-C03 and S03-E06B codes also for inspection.

Image, drugs, narcotics, guns

W06-B02A5E [2006]

Baggage tracking and monitoring

Includes all aspects of tracking and monitoring of location of baggage within airport, e.g. using transponder tags (see also W06-A04B5 and W02-G05 codes) or bar-code reader (see also T04).

W06-B02C [1992]

Passenger information equipment

Includes displays (see W05-E codes also), public address (see W04-S05 codes), passenger guidance robot, etc.

W06-B02D [1992]

Ground equipment for servicing aircraft

Truck, empty, fill, refuel, power line, luggage, baggage

W06-B02E [1992]

Ground based navigation and communication equipment

See W06-A codes for details of beacons etc. Includes runway lights. Only coded here if specific to airports.

Air traffic control, runway lighting, approach lighting, ILS marker, outer marker, beacon

W06-B02L [2014]

Aircraft launching/towing, landing, arresting and mooring

Includes catapult for launching military aircraft (Q25-P13) from aircraft carrier (Q24-P13) or launching/winch arrangements for gliders (see also Q25-P05). See Q25-R07 for mechanical details. Also includes arrangements for inflating, launching and mooring hot air balloons. Also includes electrical aspects of landing areas such as helipads that can't be covered elsewhere. See Q25-R02 for runways and helipads per se and W06-B02E for navigation-aiding markers and lights.

W06-B02R [2007]

Check-in/reservation

Includes on-line seat reservation of booking of flights (see also T01-N01A2 codes), and check-in via e.g. mobile phone. See W06-B02C also for airport based information terminals/displays. Also includes ticket purchase authentication method for airport, and passport checking/control

W06-B02S [2011]

Airport safety

(W06-B02X)

Includes fire-fighting (see also X25-X05) and evacuation equipment. Also includes electrical details of bird and animal scaring equipment (see also X25-X02).

Fire fighting, sprinkler, evacuation, smoke alarm

W06-B02T [2011]

Airport terminal equipment

Includes airport specific equipment such as environmental controls including heating, air-conditioning and internal terminal lighting. Includes transportation of passengers and baggage within terminal, such as travelators and bridges/gangways, baggage conveying/sorting. For baggage conveyors used to load aircraft see W06-B02D instead. Also includes general Wi-Fi and internet access terminals provided within airport (also see T01 codes and W06-B02R for terminals used for check-in/reservation).

Lift, escalator, travelator, baggage conveyor, lighting, heating, air conditioning, transportation, wi-fi

W06-B02X [1992]

Other airport systems

Only coded here if specific to airports. Includes electrical airport terminal equipment not covered elsewhere. For mechanical details of airport terminals see Q25-R instead. Includes airport taxi service priority scheduling arrangement.

W06-B03

Space vehicles

Satellites, electrical system, solar panels, cooling, foldable antenna reflectors, space exploration vehicles, space suits, protection systems

W06-B03A [1992]

Propulsion systems

Search with V05-E05A for ion beam thrusters. See also X14-F04 for plasma generators.

W06-B03A1 [2017]

Engine/propulsion system control

Engine fuel supply control.

W06-B03B [1992]

Power supplies

Includes solar power installations, also coded in X15-A codes, e.g. X15-A02 codes for solar panels.

W06-B03C [1992]

Space vehicle communications and connectivity

Includes antennae, antennae mountings, transceivers etc. - but not internal circuitry or general systems aspects of satellite repeaters which are covered by W02-G05 codes. Includes all space vehicle/space station and control center communications and data bus and network arrangements.

W06-B03D [1992]

Life support systems

Includes spacesuits.

Anti-G suit, cooling, heating, oxygen

W06-B03E [1992]

Electrical systems for on-board experimentation or manufacture

W06-B03F [2002]

Navigation and position control

Includes attitude control of satellite or space craft. See also T06-B01 codes for position, attitude and altitude control.

Attitude control, navigation

W06-B03H [2002]

Electrical installations

Includes connectors, fittings and wiring.

Electrical systems

W06-B03J [2002]

Instrumentation

Includes on-board electrical instrumentation, and system status monitoring, testing and reporting.

Monitor, test, status, instrumentation

W06-B03L [2021]

Spacecraft launching systems

W06-B03M [2022]

Space vehicle docking and coupling arrangements

W06-B03X [1992]

Other space vehicle aspects

Includes space exploration vehicles. Can be used to imply e.g. satellite-based aspect, e.g. to imply photographic imaging (S02-B04) takes place from satellite-mounted camera. See W06-B09 for aircraft based aerial photography.

W06-B04 [1983]

Training equipment, simulators

(W06-B09)

See W04-W07 codes for training and educational equipment in general, and W04-W07A for simulators other than for aircraft or space vehicles.

W06-B05 [1992]

Testing of aircraft or space vehicles

See appropriate codes in section S. For in-flight testing also see W06-B01 codes for aircraft and W06-B03 for space vehicles.

W06-B06 [2008]

Design of aircraft and spacecraft

Includes all electrical details of aircraft/spacecraft design. Also see T01-J15 codes for computer aided design (CAD) per se.

W06-B08 [1997]

Manufacture and maintenance of aircraft or space vehicle

Includes manufacturing process of electrical components only or substantial electrical equipment for manufacture or maintenance of any part of vehicle.

W06-B09

Other aviation and aerospace systems

Includes other aircraft and space craft systems not covered elsewhere, such as antistatic or RF screening. From 2006, aircraft types are covered by W06-B15 codes, though other aircraft types such as balloons, airships, and gliders remain searchable in W06-B09 prior to 2006. Also includes aerial refuelling arrangements.

Protective coating for antistatic or RF screening purposes, aerial refuelling

W06-B10 [2020]

Salvaging, recycling and recovery of aircraft and space vehicles or equipment

Including salvaging, recovery and recycling of aircraft and space vehicles. Includes recovery of space vehicle propulsion systems such as reusable booster rockets (also see W06-B03A). Also includes systems for removal of space debris.

W06-B15 [2006]

Specific aircraft types

(W06-B09)

W06-B15A [2006]

Lighter-than-air craft

Includes balloons and airships.

Blimp, dirigible

W06-B15B [2006]

Helicopter; Rotorcraft

W06-B15C [2006]

Glider

W06-B15D [2006]

Commercial and civil aircraft

Only applied if specific to commercial or civil aircraft. Can be used in conjunction with other W06-B15 codes.

W06-B15E [2006]

Military aircraft

Only applied if specific to military aircraft. Can also be used in conjunction with other W06-B15 codes. See W07 also for military equipment per se.

W06-B15F [2006]

Microlight

W06-B15G [2006]

VTOL (Vertical Take-Off and Landing) aircraft

W06-B15H [2021]

Emergency services aircraft

Includes fire fighting and disaster response aircraft and helicopters; police, law enforcement and border security helicopters and drones; and coastguard search and rescue helicopters (see also W06-B15B for helicopters and W06-B15U for drones and UAV).

W06-B15P [2024]

Personal flying aids

Includes jet packs and flying suits worn by user. Use with other codes as appropriate such as W06-B15G for VTOL. Also see Q25-X01 for flying suits.

Flying hoverboard

W06-B15U [2007]

Unmanned aerial vehicles

Includes UAVs and micro UAVs used for geophysical surveying, imaging, military reconnaissance (see also W07-F04), logistics such as food and commodity delivery (see X25-F12), etc.

W06-B15X [2006]

Other aircraft types

(W06-B09)

Includes sea planes, motor vehicles convertible into aircraft, agricultural and crop dusting aircraft (see X25-N01 for insecticide and pesticide spraying per se) and electrical aspects of other aircraft such as hang gliders, ornithopters or parachutes.

W06-C

Shipping

W06-C01

Marine-craft

W06-C01A

Control systems

Steering equipment, automatic pilot, bridge, helm

W06-C01A1 [1992]

Engine control

See W06-C01C9 for engine related hardware such as fuel pumps or ignition systems. Includes IC engine and gas turbine engine control, exhaust gas emissions reduction.

Power control, speed control, pollution control

W06-C01A5 [1992]

Steering, course control

See T06-B01A for course control in general.

Automatic pilot, heading, rudder, trim

W06-C01B

Instrumentation; Communications

Includes aerials (search with W02-B codes) and radio communication equipment (with W02-G codes).

W06-C01B1 [1992]

Instrumentation for navigation

See X25-N02 and W06-A05D1 for fish locating using sonar. See W06-A03A5 and S02-B08 codes for GPS navigation per se. See W04-X01D for sports fishing.

Navigation, compass, satellite, radar, sonar installations, speed, course, depth measurement, chart recorders, fish finding equipment, anticollision

W06-C01B5 [1992]

Instrumentation for monitoring ship condition

Includes engine monitoring. See also relevant S01-S03 codes.

W06-C01B7 [1992]

Communications equipment

Includes equipment for communication on-board and with other vessels or shore stations. See also W01 and W02 codes for telephone and radio communications per se.

W06-C01B8 [1992]

Data bus systems

See appropriate codes in T01, W01, and W05 (e.g. W05-D codes). This code is used for data bus aspects in general, whether for control or instrumentation. (W06-C01A codes also assigned for specific control aspects).

W06-C01C

Electrical equipment (incl. lighting)

Includes external lighting for general illumination of navigational reference (see also X26). See W06-C01C5 only for internal lighting.

W06-C01C1 [1992]

Electrical installations

Includes wiring, connectors, etc. of general application to on-board systems. V04 and X12 codes are also assigned as appropriate.

Switch, plug, duct, trunking, cables, junction box, fittings

W06-C01C3 [1992]

Electrical power generation and distribution

See also U24/X12 for power generation/distribution, X15 for solar/wind power generation and X16 for battery/fuel cell aspects.

W06-C01C5 [1992]

Environmental control and internal lighting

Includes heating, air-conditioning and demisting / defrosting of ship windows. Also includes internal ship lighting (see also X26 codes for illumination per se). For external lighting see W06-C01C.

Climate control

W06-C01C6 [2006]

Public address and on-board entertainment

See also W04 codes for public address and gaming systems per se.

PA, loudspeaker, amplifier, tape recorder, video, VTR, projection, television, game

W06-C01C7 [1992]

Electric propulsion

See X11 codes also for motors per se, and X13 for motor control.

W06-C01C9 [1992]

Other electrical marine vessel equipment

Includes specific equipment such as electric fuel pump or ignition system, e.g. for outboard motor, and passenger accommodations, such as seat or furniture.

W06-C01S [2019]

Ship emergency/safety equipment

Includes all aspects of ship safety such as roll-over prevention, ballast control to improve stability etc. Navigational equipment that can prevent grounding or collision can be covered in W06-C01B1. Also see Q24-B09 for mechanical details of ship emergency/safety equipment. See W06-C10 and Q24-X01 codes instead for lifesaving in water equipment.

W06-C04 [1992]

Simulators and training equipment

(W06-C09)

Simulators and training equipment in general are covered by W04-W07 codes.

W06-C05 [1992]

Testing of ships or ship equipment

W06-C06 [2008]

Design of marine vessels

Includes all electrical details of ship and marine craft design. Also see T01-J15 codes for computer aided design (CAD) per se.

W06-C07 [1992]

Port equipment, buoys, beacons

Prior to 2016 buoys intended for use in a port, harbor, estuary, river or other waterway were covered by W06-C07 while those intended for use in open sea were covered by W06-C09. From 2016 electrical aspects of buoys for all applications are covered by W06-C07C.

W06-C07A [2016]

Port and mooring equipment

Includes electrical aspects of maintenance and dry dock facilities and also loading and unloading equipment such as cranes, hoists and the like, also covered by X25-F05 codes. Mechanical aspects of port equipment are covered by Q24-R codes and of cranes and other lifting equipment by Q38-B. Includes electrical details of onshore and offshore mooring equipment.

Cleaning, renovating, repairing

W06-C07C [2016]

Buoys and beacons

This code covers electrical aspects of buoys and beacons irrespective of their location, i.e. open sea, harbour, inland waterway etc. (Previously buoys intended for use in a port, harbour, estuary, river or other waterway were covered by W06-C07 while those intended for use in open sea were covered by W06-C09, but now W06-C07C covers them all). Buoys in general (including those with no electrical aspects) are covered by Q24-P18. Beacon navigation systems are covered by W06-A01 codes.

Marker buoy, lighthouse, lightship, navigation marker, radio beacon

W06-C07E [2016]

Marine traffic control

Includes offboard/port equipment for controlling marine vessels. Also includes communications between port/shore and vessels or between vessels for traffic control or prioritization purposes.

Marine traffic lights, sign, priority

W06-C08 [2002]

Marine vessel manufacture / assembly / dismantling

Includes electrical aspects of ship or boat manufacture, assembly or dismantling for recycling or disposal. For ship maintenance see W06-C07A.

Shipbuilding, recycle, dismantle

W06-C09

Other shipping details

Includes electrical aspects of diving equipment which in general is covered by Q24-X04. Pre-2016 this code covered buoys intended for use in open sea. From 2016 electrical aspects of buoys for all applications are covered by W06-C07C. Includes marine salvage systems (see also W06-C15F for environmental and salvage vessels per se).

Diving equipment, diver communication systems

W06-C10 [2006]

Life saving equipment

Includes life jackets. See W06-C15C code scope note instead for emergency or survival craft per se.

Buoyancy aid, life vest, light, alarm, beacon, distress

W06-C15 [2006]

Specific marine vessel types

W06-C15A [2006]

Personal/recreational watercraft

Includes jet-skis, kayaks and canoes. See W04-X codes for electrical aspects of sports equipment such as water skis.

W06-C15B [2006]

Submarines; Submersible craft

W06-C15C [2006]

Emergency/rescue craft

Includes life boats and life rafts. See W06-C10 instead for life saving accessories such as life jackets.

Survival craft, inflatable craft

W06-C15D [2006]

Commercial vessels

Only applied if specific to commercial vessels. Can be used in conjunction with other W06-C15 codes.

W06-C15D1 [2006]

Fishing boats; Trawlers

Includes electrical cranes, hoists, winches etc. for handling fish and whales.

W06-C15D3 [2006]

Tankers

Includes oil tankers.

W06-C15E [2006]

Military vessels

Includes aircraft carriers, destroyers, frigates etc. Use with W06-C15B for military specific submarines or W06-C15F for military specific hovercraft. See also W07 for military equipment per se.

W06-C15F [2012]

Environmental and salvage vessels

Includes vessels for collecting pollution/rubbish from open water or any other vessel helping to maintain the environment. Also includes salvage vessels in general (see also W06-C09 for salvage systems per se).

Oil spill, oil slick, salvage, floating refuse collection

W06-C15G [2017]

Floating buildings, drilling platforms, workshops

Includes electrical aspects of floating vessels, towers, houses and buildings normally designed to be static at a fixed location.

W06-C15H [2006]

Hovercraft

See also W06-C15D or W06-C15E for commercial or military specific hovercraft respectively.

W06-C15U [2014]

Unmanned vessels

W06-C15X [2006]

Other marine craft types

Includes amphibious vessels and swamp boats.
Includes marine vessels not already provided for.

W06-T [2008]

Other transportation systems

Includes all aspects of teleportation and time travel.
Includes all transportation aspects not able to be covered by any other of the transport related EPI codes.

Time machine, space-time, theoretical

W07: Electrical Military Equipment and Weapons

See W04-X01 codes for analogous equipment (e.g. for sports) corresponding to W07-B or W07-D codes.

W07-A

Missile guidance, navigation and propulsion control

See T06-B01B for target-seeking control in general, and T01-J07D for data processing aspects.

Projectile/shell/torpedo target seeking, heat seeking, radar guidance, image/pattern recognition, aerials, radomes, sensors, optomechanical scanning, remote guidance by radio/light/wire/ optical fiber

W07-A01 [1992]

Guidance and target seeking system

From 1997 propulsion control is covered by W07-A01G code.

W07-A01A [1992]

Navigational aspects

Covers position determination without reference to target, e.g. by dead reckoning, use of GPS (also coded in W06-A03A5), star recognition etc.

W07-A01C [1992]

Target-seeking/tracking system

Includes heat-seeking and radar (or analogous). Use with W07-A01E1 for laser tracking. Also see W06-A codes for target tracking.

Target seeking, tracking, radar, IR, heat

W07-A01C1 [2002]

Laser targeting

Includes use of laser to mark target so that missile can home in on target using reflected light. Use of laser beam containing positional information about target, see W07-A01E1 only.

Laser marking, laser pointing, target designation

W07-A01E [1992]

Remotely guided

Covers control by e.g. ground based operator. Remote control aspects are also coded in W05-D codes.

W07-A01E1 [1992]

By non-wire links

Includes radio and free-space optical systems.
Beam-rider

W07-A01E3 [1992]

By electric cable or optical fiber

See also appropriate codes in V07 for fiber-optic aspects, e.g. V07-H codes.

Reel, dispense, pay-out, tension, control

W07-A01G [1997]

Propulsion control

Prior to 1997 propulsion control was coded in W07-A01.

W07-A01H [2002]

Missile stability/flight control

Includes control of fins e.g. to stabilise missile flight, control missile rotation or act as air brake to control missile range. For course correction see other W07-A01 codes.

W07-A03 [1992]

Details of sensing systems per se

Includes on-board sensors normally associated with navigation/targetting. Codes in this section are used with W07-A01 codes or alone as appropriate.

W07-A03A [1992]

Antennae

Includes antenna on-board missile and not ground based antennae. Radomes are covered by W07-A03D. For full details of radio antennae see W02-B codes.

W07-A03B [1992]

Optical sensors and elements

Includes optical detectors, lenses, filters, video cameras, etc. For solid-state sensor details see appropriate codes in U12, U13, or U14. Video cameras are also coded in W04.

W07-A03D [1992]

Radomes, protective enclosures

Includes covers transparent to RF and also optical range, e.g. IR.

W07-B

Weapon sights; Aiming

Includes mountings e.g. for fixing flashlight to barrel of rifle. See also X26 for torch per se.

Laser range finding

W07-B01 [1992]

Weapon sights

Illuminated sights, image processing, laser sighting

W07-B05 [1992]

Weapon aiming systems

Includes electrical systems for correcting weapon aim. Also includes electrical aspects of munitions such as rearward facing LED for tracer bullet used to covertly illuminate bullet trajectory to enable aim adjustment.

Aiming control, correction, compensation

W07-C

Fuzes, arming

Detonate, mine, charge, explosive, missile

W07-C01 [1992]

Fuzes

Fuzes for non-military application, e.g. blasting, are coded in X25-D codes. Includes detonator elements per se.

W07-C03 [1992]

Fuze actuation system

The codes in this section relate to the actual means of actuating the fuze.

Ignition, impact switch

W07-C03A [1992]

Responsive to sensed vibration

Includes 'seismic' detection system for e.g. landmine.

W07-C03C [1992]

Responsive to sensed proximity

Includes proximity fuzes working by e.g. radar or analogous system, also assigned W06-A codes as appropriate.

W07-C03E [1992]

Time delay actuation

Electronic time delay circuits are also coded in U21-B02A codes.

W07-C05 [1992]

Arming/disarming systems

Covers electrical details of arming and disarming systems, including safety/security arrangements.

Safing

W07-D [1983]

Training equipment

Training equipment in general is coded in W04-W codes. Simulators for aircraft are coded in W06-B04, for ships in W06-C04.

W07-D01 [1992]

Target practice systems

W07-D05 [1992]

Simulation systems

W07-E [1992]

Electrically operated weapons

W07-E01 [1992]

Electrical firing

Includes electrically activated trigger for hand gun, or electric actuation of firing charge.

W07-E05 [1992]

Weapon launching systems

Rocket, grenade, launcher

W07-E05A [1992]

With electrical propulsion

Includes rail guns, also coded as electrical machines in X11, e.g. X11-H09.

W07-E06 [2007]

Munitions

Includes electrical aspects of munitions such as projectiles, bullets, missiles, grenades that cannot be coded elsewhere. Also see K03-A codes for physical and mechanical aspects of explosives and ammunition. Includes e.g. arrangements for electronic interrogation and identification of artillery projectiles inside gun before firing.

W07-E07 [2002]

Laser weapons

See V08 for novel laser details.

W07-E08 [2005]

Non-lethal electric weapons

Includes stun guns and electrical aspects of other non-lethal weapons. Also see W07-F codes for self-defence systems. Also includes electromagnetic weapons or EMP (electromagnetic pulse) weapons for disabling electronic circuitry in hostile weapons systems or degrading explosives.

W07-E09 [2002]

Other electrically operated weapons

W07-F [1992]

Protection for weapons, personnel or equipment

Includes camouflage aspects. For radar signature modification search with W06-A04X.

W07-F01 [1992]

Protection for personnel

Includes fingerprint recognition e.g. for hand gun.

W07-F01A [1992]

Self defence equipment

Includes analogous system for use by e.g. law enforcement officer. Includes e.g. electrical aspects of mace/pepper spray or e.g. combined flashlight/spray. Anti-mugging alarms are coded in W05-B01D.

W07-F01B [2012]

Military specific clothing

Includes clothing, shoes and helmets with electrical content specifically for use by military personnel. Includes IoT sensors inserted in soldier's uniform to monitor physical and mental well-being. Also see X27-A02B1 codes for clothing and S05-D01 codes for monitoring health parameters such as heartbeat, body temperature etc.

Wearables, health, sensor, remote monitoring

W07-F03 [1992]

Protection for weapons or equipment

Includes launching of countermeasures to protect aircraft from seeker missile or use of laser to confuse IR sensor on hostile missile. See also W06-A04E1 codes and W06-A06C8 respectively for radar and lidar jamming and countermeasures. Also includes measures to defend against military cyber attacks.

Decoy, flare, anti-radar chaff, jamming, stealth, cyber warfare

W07-F04 [2002]

Early warning and reconnaissance systems

Includes early detection of incoming missiles, and e.g. remote controlled unmanned vehicles for gathering front line video reconnaissance information about enemy forces. See also W02-F01 codes for CCTV aspects.

UAV, unmanned aerial vehicle, MAV, micro aerial vehicle, drone, autonomous

W07-F05 [1992]

Mine sweeping; Weapon/bomb detection

From 2011 this code has been expanded to include all aspects of explosives and weapons detection, as well as systems for making explosives safe or clearing mines or depth charges. See W06-C01 codes for on-board ship aspects. Degaussing is covered by V02-D.

W07-F05A [2011]

Mine sweeping; Bomb detection

Includes all aspects of explosives detection and making safe. Includes detection of roadside improvised explosive devices or mine or depth charge detection and clearing. See W06-C01 codes for on-board ship aspects. Degaussing is covered by V02-D, W07-F03 and W06-C09. See S03 codes for novel sensing arrangements per se.

W07-F05C [2011]

Weapon detection

(W07-F01)

Includes detecting the presence of weapons e.g. during security check at an airport (see also W06-B02A codes), school, hospital etc. See S03 codes for e.g. X-ray sensing per se.

Arms detector, metal detector, knife, gun, X-ray

W07-G [1992]

Assisted/night vision equipment

From 2010 this code has been expanded to include all assisted vision systems as well as all night vision applications. See also V05 for image intensifier tube aspects. This code can be applied for vision enhancement systems such as daytime image enhancement and thermal or IR imaging (see also W04-M01E codes for thermal imaging camera details per se).

W07-G01 [1992]

Goggles

W07-H [1992]

Military equipment testing, inspection and measurement

Includes evaluation of weapons and weapon systems, measurement of muzzle or projectile velocity, military equipment/installation inspection, etc. See also appropriate codes in e.g. S02 or S03 depending on the nature of test involved. See W07-A03 codes for on-board munitions measuring/sensing systems.

W07-J	[1992]
General aspects of military electrical equipment	
W07-J01	[1992]
Electrical installations, cables, connectors	
See V04 and X12 codes for full details of cables, connectors, and electrical fittings.	
W07-J03	[1992]
Power generation and distribution	
Includes generators, battery power supplies, fuel cells and batteries per se, etc. See also U24, X12, and X16 codes as appropriate.	
W07-J05	[1992]
Electrical equipment constructional details	
See V04-S and V04-T codes also for casings and constructional details of electrical equipment in general.	
W07-J07	[2011]
Manufacture of military equipment	
(W07-X)	
Includes all manufacturing aspects of weapons and equipment.	
W07-J09	[1992]
Other military electrical equipment details	
W07-X	
Other military equipment	
Includes equipment and systems with specific military application not covered elsewhere.	
W07-X01	[2002]
Military vehicles; Military vehicle systems	
Includes electric equipment specifically for military vehicle. See also X22 if the electrical aspect relates to normal vehicle operation, e.g. ignition system, lighting, steering, braking. Also includes unmanned autonomous or remote-controlled land vehicles (see also X21-A01L and X22-P15) as well as unmanned drones, boats and aircraft (see also W06-B15U/W06-B15E and W06-C15U/W06-C15E) used in offensive or defensive military operations.	
<i>Tank, personnel carrier, drone, UAV</i>	

W07-X03	[2007]
Military/battlefield communications	
Includes all communications equipment (but not radar - see W06-A codes instead) with specific military application. Includes all aspects of communications between troops on the battlefield and between troops and command centre. See also W01/W02 for telephone/radio communications per se.	
W07-X05	[2012]
Military equipment management/maintenance	
Includes management and tracking of military assets. Also includes use of AI and predictive analytics to monitor military vehicles and equipment to reduce malfunctions during operations and allow pre-emptive maintenance.	
<i>Inventory, tracking, record keeping, servicing, telematics</i>	
W07-X07	[2007]
Soldier aids	
Includes robotic exoskeletons to assist infantry in carrying heavy loads, and robotic "mules" (see also X25-F05A codes) controlled by soldier to carry military equipment or weapons.	
W07-X09	[2025]
Military strategy and planning	
Includes use of AI for planning optimal military operations and to allow military commanders to determine the optimal strategy to deal with different conflict situations. Also see T01-J16P7 for AI used in military applications.	
<i>Plan, strategic, art of war, military decisions, command</i>	

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X11: Power Generation and High Power Machines

X11-A

Steam turbine plant

Coal-fired power plant

X11-A01

Turbines

Impulse, reaction

X11-A01A

Rotors

Shaft, groove

X11-A01A1

Blades

Includes constructional details, including materials, of blades per se. Constructional details of rotors other than blades are coded under X11-A01A2.

X11-A01A2

Materials and mounting

Includes constructional details, including materials, of rotors, excluding constructional details of blades (which are coded under X11-A01A1). Also includes anti-vibration arrangements and mountings/supports of rotors, blade carriers, etc.

Anti-vibration, mounting, blade carrier

X11-A01B

Stators; Seals

Nozzles, blades, fluid guide conduit, sealing fluid

X11-A01C

Cooling; Bearings; Mountings; Casings

Includes details of cooling and de-icing arrangements, anti-vibrations and lubricating arrangements. Also includes details of bearings, mountings and supports, collection of condensation water and drainage.

Anti-vibrations arrangements and mountings/supports for rotors (including for the blades) are only coded under X11-A01A2.

X11-A01D* [1980-2010]

Regulation by flow control

*From 2011 this code is transferred to X11-A10A, but remains searchable for records from 2010-2011.

Valve control

X11-A01E* [1980-2010]

Starting; Shutting down

*From 2011 this code is transferred to X11-A10B, but remains searchable for records from 2010-2011.

Control systems, overspeed protection

X11-A01X

Other turbine details

Includes manufacture.

X11-A08 [2010]

Environmental protection

Includes arrangements for reducing carbon footprint and improving emissions, such as chimney smoke filters and scrubbers for capturing sulphur emissions from coal fired power stations, e.g. carbon capture arrangements.

Flue gas desulphurisation, carbon capture, waste gas scrubbing

X11-A09 [1983]

Other plant details

Includes plant layout and electrical aspects of steam generators. Also includes details of power plant boiler, condenser, feedwater pumps.

Coal-conveyor, chimney smoke-filter, steam generator

X11-A10 [2011]

Monitoring, operation and control

Includes general monitoring, operation and control details. Also includes testing.

X11-A10A [2011]

Regulation by flow control

(X11-A01D)

Valve control

X11-A10B [2011]

Starting, shutting down

(X11-A01E)

Control systems, overspeed protection

X11-B

Hydroelectric plant

Electric power generation produced from sea power, including wave power and tidal energy, is coded under X15-C codes instead.

Hydel

X11-B01

Turbines, Pelton wheels, water wheels

Vanes, buckets, nozzle, blades, rotors, stator, casing

X11-B05 [1997]

Mini and micro plants

(X11-B09)

Run-of-river, streams

X11-B06 [1997]

Pumped storage plant

(X11-B09)

X11-B09

Other details

Includes details of osmotic power or salinity gradient power (also covered by X15-C). From 2005, tidal flow base electric power generation is covered by X15-C codes.

X11-B10 [1997]

Monitoring, operation and control

(X11-B09)

X11-C

Gas turbine; IC engine, Combined cycle and cogeneration plants; Other plants

For aircraft and ships see W06-B and W06-C codes, respectively.

X11-C01 [1997]

Gas turbine plant

(X11-C)

Includes electrical details of gas turbines and external combustion engines used for electric power generation.

X11-C02 [1997]

IC engine plant

(X11-C)

Includes electrical details of IC engine power plant.

X11-C03 [1997]

Combined cycle plant

(X11-A09, X11-C)

Includes electric power generation by combinations of gas turbine and steam turbine cycles, as well as gas and/or steam turbine cycles operating in combination with fuel cells, solar systems or any other power generation equipment.

Electric power generation using combinations of fossil and non-fossil fuel sources are also coded under X15-J.

Details of fuel cells are covered by X16-C codes, and solar systems and other systems using non-fossil fuel sources are covered by X15 codes.

Hybrid

X11-C04 [1997]

Cogeneration plant

(X11-A09, X11-C)

Includes combined heat and electric power generation. Combined heat and electric power generation using non fossil fuel sources are coded under X15-K.

CHP

X11-C05 [2007]

Rankine cycle plant

Involves the generation of electricity by heat-evaporation of a working fluid that drives a turbine. For water/steam working fluids, see X11-A01 codes. Heat input sources include waste heat, solar (see also X15-A codes), etc.

X11-C08 [2010]

Environmental protection

Includes arrangements for reducing carbon footprint and improving emissions, e.g. catalytic converters for exhaust gases.

Catalytic converter

X11-C10 [1997]

Monitoring, operation and control

Includes maintenance and repair of power plant.

X11-C15 [2002]

Microturbine plant

Note: Small machines are in V06.

X11-D

Synchronous machines

See also X11-H02B for details of linear synchronous motors.

Generator, motor, alternator

X11-D01 [1992]

Salient-pole rotor

X11-D02 [1992]

Cylindrical rotor

X11-D03 [1992]

Rotary exciter

X11-D03A [1992]

Brushless exciter

Rotary rectifier

X11-D04 [1992]

Static exciter

Static rectifier

X11-D05 [1997]

Hybrid synchronous machines

(X11-D)

Includes combined permanent magnet and wound rotor type synchronous machines.

X11-E

Asynchronous induction machines

See also X11-H02A for details of linear induction motors.

X11-E01 [1987]

Wound rotor

Includes slip ring and pole-change winding type motors.

X11-E05 [1997]

Induction generator

(X11-E)

Inductor alternator

X11-F

DC mechanical-commutator and universal machines

Motors, generators, series-, shunt-, compound-excitation

X11-G

Permanent magnet synchronous machines

Motors, generators

X11-G01 [2008]

Interior permanent magnet

X11-H

Other electric machines

X11-H01

Non-mechanical-commutator machines

Includes both AC/DC brushless motors.

Electronically-commutated, brushless

X11-H01A [1997]

Permanent magnet

(X11-H01)

For details of speed and torque regulation/control, see also X13-F03C1 and X13-G01C1.

PM AC/DC brushless

X11-H01B [1997]

Switched reluctance

For details of speed and torque regulation/control, see also X13-F03C2 and X13-G01C2.

SR AC/DC brushless

X11-H01C [1997]

Sensorless

(X11-H01)

For details of speed and torque regulation/control, see also X13-F03C3 and X13-G01C3.

BEMF

X11-H02

Linear, sectional and rolling motors

X11-H02A [1997]

Asynchronous

(X11-H02)

See X11-E for details of non-linear induction motors.

Induction, LIM, AC

X11-H02B [1997]

Synchronous

(X11-H02)

See X11-D for details of non-linear synchronous motors.

LSM, AC

X11-H02C [1997]

Direct current

(X11-H02)

DC

X11-H03

Clutches, brakes, gears; MHD generators and electrodynamic pumps

X11-H03A [1987]

Clutches, brakes, gears

This code covers electrodynamic type devices only.
Electric or magnetic clutches, brakes and gears are in X25-L02.

X11-H03B [1987]

MHD generators and electrodynamic pumps

Includes details of electromagnetic pumps for high/medium power applications. Electromagnetic pumps for low power applications are coded under V06-M06K.

X11-H03B1 [1997]

MHD generators

(X11-H03B)

Magneto-hydro-dynamic

X11-H04

Non-dynamo-electric machines

Includes electrostatic generators, motors, clutches or holding devices and thermal effect motors.

X11-H05 [1987]

Superconducting machines

(X11-H09)

See X12-D06 for superconductors per se.

Cryogenic, heat insulation

X11-H09

Other details of electric machines

Includes more than one rotor or stator-, DC interrupter-, AC mechanical commutator-, perpetual motion dynamoelectric- and acyclic-machines, and dynamoelectric converters, etc.

Torque motors, Schrage motors, motor-generator sets, amplidynes, metadynes

X11-H20 [2002]

Starter-generator/motor-generator

X11-J

Constructional details of electric machines

This code is used either alone or in conjunction with the different types of machines listed above. Magnetic materials are in V02-A02.

X11-J01

Magnetic circuits

X11-J01A

Stationary parts

Includes means for mounting magnetic stationary parts to stator structure.

Slots, magnetic poles, cores, laminations, magnetic wedges, magnets, tooth, yokes

X11-J01B

Rotating parts

Includes spider to mount or fasten magnetic part to rotor structure.

Cores, slots, magnets, magnetic poles laminations, magnetic wedges, tooth, yokes

X11-J01X

Other magnetic circuits

X11-J02

Windings

X11-J02A

Conductor shape, form, construction or layout

Includes twisted- or hollow-conductors; provision of cooling fluid ducts.

Coils, double-layer, strip or rectangular section

X11-J02B

Insulation; Shielding; Protection

Includes coil-, slot-insulation and materials, preventing or reducing eddy current losses, protecting against moisture or chemicals.

Corona protection

X11-J02C

Fastening windings

Includes wedges, end turn ties.

X11-J02X

Other windings

From 2013, details of windings layout are coded under X11-J02A.

X11-J03

Current collection arrangements

Includes commutators, slip-rings, brushes and their connections to windings, commutation improving arrangements (see also V04-L01).

Commutator segments

X11-J04

Association with electric components

Includes devices for measuring or protecting machine, resistors, switches or RFI suppressor (see W02-H also), etc.

Direction/rotation detectors

X11-J05

Mechanical energy handling arrangements (Structural association with)

X11-J05A

Clutches, brakes, gears, pulleys, mechanical starters

X11-J05B

Mechanical loads, driving or auxiliary machines

X11-J05X

Other mechanical energy handling arrangements

Bearings, flywheels, balancing, shaft

X11-J06

Cooling or ventilating systems

X11-J06A

Using liquid or solid cooling medium

Includes cryogenic coolers.

X11-J06X

Other cooling or ventilating systems

Includes ambient air flow through the machine and use of fans.

Hydrogen cooling

X11-J07

Casings, enclosures, supports

X11-J07A

Supporting brushes or bearings

Includes bearing shield mounting arrangement or end shield. Also includes cooling and greasing of bearings.

X11-J07X

Other casings, enclosures, supports

Includes casings, enclosures, seals, ribs or fins to improve heat dissipation, noise/vibration reduction.

Machine mountings, housings, explosion-proofing, vibration-damping

X11-J07X1

[2002]

Connectors; Terminal boxes; Junction boxes

X11-J08

Manufacture, testing, repair and maintenance

See also S01-G07 for electrical tests, and T01-J15 for simulation and design of motors and generators.

X11-J08A

Stator/rotor bodies; Commutators; Brushes; Slip-rings

Includes brush wear indicator. See also V04-P02 for general commutators, brushes etc.

Cores, laminating, slotting, magnetic poles, magnetic circuits, casting, moulding

X11-J08B

Windings

Includes direct winding of stator/rotor coils and laying of pre-wound coils.

Winding jigs, inserting wires, conductor bending, coiling

X11-J08C

Insulating, impregnating, centring, balancing

Includes insulating of windings or core laminations and heating or drying of windings, rotors or machines.

Taping

X11-J08M

[1997]

Testing, repair and maintenance

(X11-J08)

Includes analysis, diagnosis, monitoring, fault detection.

X11-J08P

[1997]

Characterised by use of microprocessors

(X11-J08)

X11-J08X

Other manufacture, testing, repair and maintenance

Castings, enclosures, supports, end shields, bearings

X11-J15	[2002]
Materials	
X11-J15A	[2002]
Conductive materials	
Includes details of materials for thermal or electrical conduction.	
X11-J15B	[2002]
Magnetic materials	
X11-J15C	[2002]
Insulative materials	
Includes details of materials for thermal or electrical insulation.	
X11-U	[1997]
Electric machines characterised by applications	
These codes are used in conjunction with other X11 codes as appropriate.	
X11-U01	[1997]
Electric power generation	
X11-U01A	[1997]
Steam turbine generator	
See X11-A codes for details of steam turbine plants, and X11-J codes for constructional details.	
<i>Turbogenerator</i>	
X11-U01B	[1997]
Hydrogenerator	
See X11-B codes for details of water power generation, and X11-J codes for constructional details of generator.	
X11-U01C	[1997]
Gas turbine generator	
See X11-C01 for details of gas turbine generator, and X11-J codes for constructional details.	
X11-U01D	[1997]
IC engine generator	
See X11-C02 for details of IC engine plant, and X11-J codes for constructional details.	
X11-U01E	[1997]
Wind turbine generator	
See X15-B codes for details of wind power generation, and X11-J codes for constructional details of generator.	

X11-U01M	[2002]
Microturbine generator	
See X11-C15 for details of microturbine plants, and X11-J codes for constructional details.	
X11-U02	[1997]
Road vehicles	
X11-U03	[1997]
Railways	
X11-U04	[1997]
Aviation and aerospace	
X11-U05	[1997]
Ships and boats	
X11-U06	[1997]
Military	
X11-U07	[1997]
Industrial machines	

X12: Power Distribution / Components / Converters

X12-A

Power resistors

Covers all high power resistors e.g. for lightning arrestors, electric motor loading, etc. Low power resistors are in V01-A. Also includes manufacture.
Voltage-, surge-arrestors, varistors, varistor stack

X12-B

Power capacitors

Includes capacitors generally of the type used for power factor improvement, transmission/distribution reactance compensation, super- or double layer-types for e.g. electric vehicle (see also X21-B04). Low power capacitors are in V01-B. V01-B codes can also be assigned in conjunction with X12-B to highlight the type and novel aspect of the power capacitor, including manufacture. See also X16-L02 for capacitive energy storage in general.
CVT, capacitor bank, ultra-capacitor

X12-C

Power transformers, reactors

X12-C01

Cores, coils, connections, bushings and terminals; Manufacture

X12-C01A [1987]

Cores

Includes magnetic circuit for transformer or reactor e.g. laminations, cores made from strips or sheets, yokes.
Core clamping plates, amorphous cores

X12-C01B [1987]

Coils, windings, connections

Foil windings, insulation spacers, conductors, disc-, poloidal-, spiral-, toroidal-coils

X12-C01B1 [1987]

For reactor

X12-C01B2 [1987]

For transformer

X12-C01B2A [2002]

Using cables as windings

X12-C01C [1987]

Bushings and terminals

Glands, grommets, bulk heads

X12-C01D [1987]

Manufacture; Maintenance

Includes methods and apparatus.

X12-C01D1 [1992]

Cores

X12-C01D2 [1992]

Coils

Includes winding, insulating and connecting leads of coils for power transformers and reactors. Manufacture of insulating materials themselves when not part of the process of manufacturing windings is covered by X12-C01B codes and appropriate X12-E codes.

X12-C01D3 [1992]

Testing

X12-C01D4 [1992]

Superconducting coils/magnets

X12-C01D5 [1992]

Bushings and terminals

X12-C01D6 [1992]

Casing

Also includes transportation packaging.

X12-C01D7 [2002]

Maintenance

(X12-C09)

Includes all aspects of repairs and maintenance, e.g. oil change, polychlorinated biphenyl disposal (see also X12-E02A).

X12-C01E [1992]

Power and distribution transformers

(X12-C, X12-C01)

Also includes transformers for welding, electric furnaces, transmission lines, etc.

X12-C01F [1992]

Power reactors

(X12-C, X12-C01)

Also includes short circuit current limiting-, saturable- reactors.

X12-C01G [1992]

Instrument transformers

(X12-C, X12-C01)

Includes voltage and current transformers. For capacitive voltage transformers see X12-B. For electrical instrumentation see S01-D01 codes.

CT, PT, VT, IT

X12-C01H [2005]

Induction heating coils

See also X25-B02A codes.

X12-C01X [1992]

Other transformer/reactor aspects

Includes other details of transformer or reactor not covered elsewhere.

X12-C02

Cooling, fault detection, control, and tap changing

X12-C02A [1987]

Cooling

Includes fans, gas cooling, evaporative cooling.

Cooling channels or ducts, heat pipes

X12-C02A1 [1987]

Oil-cooling

Includes conservators, expansion chambers.

X12-C02A2 [1987]

Water cooling

X12-C02A3 [1992]

Superconducting device/equipment cooling

Includes all superconducting-related cooling aspects.

X12-C02A3A [2005]

Cryostats

Cryogenics, cryogenics

X12-C02A3C [2005]

Other details of superconducting device/equipment cooling

Includes, for example, thermoelectric cooling.

X12-C02B [1987]

Fault detection, monitoring, control

Constructional details of controllers are also included here. Includes for example moving a slider along a winding, etc to vary the output. Also includes transformer oil level monitoring.

X12-C02B1 [1987]

Tap changing

Tap switches, no-load-, on-load-tap changer

X12-C03 [1987]

Casing, mounting, supporting or suspending transformers or reactors

(X12-C09)

Also includes noise/vibration reduction.

Tanks, containers, noise damper

X12-C04 [1987]

Preventing or reducing unwanted electric/magnetic effects

(X12-C09)

Includes electric or magnetic screens or shields, using auxiliary coils or cores.

X12-C05 [1987]

Superconducting coil

(X12-C01, X12-C09)

Includes coil for transformer or reactor. See X12-D06 for superconductors per se.

X12-C05A [1987]

For magnets

(X12-C09)

X12-C06 [1992]

High power or large (electro) magnets

(X12-C09)

Includes magnets of the types typically used e.g. for lifting device (see X25-F05 also), accelerators (see X14-G also), magnetic levitation etc.

X12-C09

Other general transformer/reactor details

Includes oil cleaners, pressure relief, etc.

Corrosion protection, structural association with built-in electric component

X12-D

Cables, conductors, conductive materials

Covers high power and low power cables/conductors, fibers and other structures.

X12-D01

Materials

Superconducting materials are in U14-F01 and X12-D06B.

X12-D01A

Metals or alloys

X12-D01B

Oxides or sulphides

X12-D01C

Carbon, silicon, or other non-metallic material; Conductive polymers

X12-D01C1 [1992]

Conductive polymers

X12-D01D [2005]

Nano-materials

Includes conductive materials of small dimensions. This code is used in conjunction with the other X12-D codes as appropriate.

Nanotube, carbon nanotube, single wall nanotube, multiwall nanotube, double wall nanotube, SWNT, DWNT, MWNT

X12-D01E [2005]

Ion/proton conductors

To be used in conjunction with other X12-D codes, as appropriate.

X12-D01F [2005]

Conductive dispersions

Generally used when a conductive material is within a dispersion.

X12-D01F1 [2005]

Organic vehicle

X12-D01F2 [2005]

Inorganic vehicle

X12-D01X

Other materials

Includes conductive materials not covered elsewhere.

X12-D02

Non-insulated conductors; Conductive films and structures

X12-D02A

Conductive layers on insulating supports

X12-D02A1 [1992]

Transparent conductive film or electrodes

See also U14-K01A1 for application to LCDs.

ITO, indium titanium oxide

X12-D02A2 [2005]

Anisotropic film

For application to connectors, see V04-A11.

X12-D02C [2005]

Non-insulated conductors

Includes only aspects of conductive part of wires and cables. For other details, such as sheaths, see X12-D03 codes. For manufacture of non-insulated conductors, per se, or forming part of insulated cables, see X12-D07E.

Conductors, wires, stranded conductors, bundled conductors

X12-D02C1 [2005]

High power conductors

Includes conductive part of an insulated wire or cable, non-insulated overhead power line, etc. designed to carry high currents.

X12-D02C1A [2005]

Bus bars

Bus bars, per se; installations are in X12-G03.

X12-D02C2 [2005]

Low power conductors

(X12-D02X, X12-D05)

Includes conductive part of an insulated wire or cable or non-insulated wires designed to carry low currents

X12-D02C2A [2005]

Communication

X12-D02C2B [2005]

Audio/video

X12-D02C2C [2005]

Control and instrumentation

X12-D02C2D [2005]

Conducting nanostructures

Includes nanowires, nanotubes and nanofibers for general use. Specific applications to, for example, battery electrodes are also covered by X16-E codes. For normal size fibers, see X12-D02C2E.

DWNT, SWNT, MWNT, carbon nanotube, CNT

X12-D02C2E [2005]

Fibers

For nanofibers, see X12-D02C2D.

X12-D02X

Other details of non-insulated conductors, conductive films and structures

Includes other conductive structures, such as, within a poorly conductive structure.

X12-D03

Insulated conductor construction

X12-D03A

Flexible, extensible or flat cables

X12-D03A1 [1992]

Flat or ribbon cables

X12-D03A2 [1992]

Flexible and extensible cables

X12-D03B

Sheaths, armouring; Reducing losses; Indicating defects

X12-D03B1 [1992]

Sheaths and armouring

Includes repair of sheaths for which the general 'cable repair' code X12-G01D is also assigned. Repair of a cable sheath in the sense of rectification during manufacture is covered by X12-D07A.

Jacket

X12-D03B2 [1992]

Indicating defects

Includes sensors incorporated within the cable structure to indicate temperature rise, water ingress, etc.

X12-D03B3 [1992]

Reducing losses

Includes arrangements to reduce losses in conductors, sheaths and armourings.

X12-D03C

Cable markings and heat protection

For flame retardants, see also X12-D03X for records prior to 1992.

X12-D03C1 [2007]

Heat protection

Includes measures for improved heat dissipation, shielding or conduction from cables to, for example, operate within rated thermal limits. Also includes flame retardants.

X12-D03C1A [2013]

Cooling

Includes all aspects of cable cooling such as cables per se with integral cooling channels, as well as installations for actively cooling cables and conductors.

Heat dissipation, fan, coolant, air cooling, liquid cooling

X12-D03C2 [2007]

Cable markings

Includes printed markings, use of different color insulation, integral RF tags (also assigned T04-K and W02-G05 codes), and the like, to provide ratings and identification information and to distinguish wires and cables. Markings for security purposes and for deterring theft are also assigned X12-D10.

X12-D03D [1992]

Insulation and its disposition, materials

(X12-D03X)

See also X12-E01, X12-E02 codes.

X12-D03E [1992]

Screens

(X12-D03X)

Includes screens to avoid potential gradients, and to reduce interference. Covers both electrostatic and electromagnetic fields' shielding.

X12-D03F* [1992-2004]

Composite optical fiber- and electric- cable

(X12-D03X)

*This code is now discontinued. It has been transferred to X12-D08 from 2005 but remains searchable for records between 1992 and 2004.

X12-D03G [1992]

Lubricating layers

(X12-D03X)

X12-D03H [1992]

Protection

(X12-D03A, X12-D03X)

Includes protection against e.g. corrosion, termites, chemical attack, etc. Mechanical protection is in X12-D03B1.

X12-D03J [1997]

Contact cable

(X12-D03,X12-D03X)

Sensor cable

X12-D03K [1997]

Floating and submarine cables

(X12-D03,X12-D03X)

X12-D03L [1997]

Rigid-tube cable

(X12-D03,X12-D03X)

X12-D03M [2002]

Wire harness

(X12-D03,X12-D03X)

Includes harnesses per se, and is used in conjunction with other X12-D03 codes as appropriate.

X12-D03N [2006]

Drain wire

(X12-D03X)

Includes the uninsulated wire located beneath, and in contact with, a grounded shield.

X12-D03P [2006]

Cable-strengthening core

(X12-D03X)

Includes, for example, steel wire or core located within cable covering to impart strength.

X12-D03Q [2006]

Cable-connector combination

Includes a combination of cable and connector where neither is, or both are, novel. See V04-M17 also.

X12-D03R [2011]

Stranded conductors

X12-D03X

Other insulated conductor aspects

X12-D04

High power and low power cables

X12-D04A [2006]

High power

Includes cables carrying power beyond the level of 110/220V mains. Also includes high power DC cables and charging cables for electric vehicles (see also X21-B01A1C for off-board vehicle charging systems and X16-G01 for battery charging per se).

X12-D04C [2006]

Low power

Includes cables carrying power up to and below the level of 110/220V mains. Also includes low power DC cables.

X12-D05

Low power cables or wires

Conductive parts of cables are covered by X12-D02C codes. Other details are covered by X12-D03 codes. The codes in this subsection are used in conjunction with each other as appropriate. For example, a coaxial, RF communication cable would be coded in X12-D05A, X12-D05J and X12-D05M. A loudspeaker cable would be coded in X12-D05B and X12-D05K.

X12-D05A [2005]

Communication

X12-D05B [2005]

Audio/video

X12-D05C [2005]

Control and instrumentation

X12-D05J [2005]

HF

X12-D05K [2005]

LF

X12-D05L [2005]

High speed data

X12-D05M [2005]

Coaxial

X12-D05N [2005]

Twisted pair

Includes twisted pairs of both shielded and unshielded type.

STP, UTP

X12-D06

Superconducting cable/materials

Superconducting wire and line manufacture is covered by X12-D07E1C. Details of superconducting cables, such as sheaths, are covered by X12-D03 codes. Superconducting machines and reactive components are covered, respectively, in X11 and by X12-C codes.

X12-D06A [1992]

Cables or lines

X12-D06A1* [1992-2005]

Manufacturing

*This code is now discontinued and has been transferred to X12-D07 from 2006. It remains searchable for records prior to 2006.

X12-D06B [1992]

Materials

Includes all aspects of materials (see also U14-F01 codes).

X12-D06B1 [1992]

Metal Alloys

X12-D06B1A [1992]

Manufacturing and processing

X12-D06B2 [1992]

Oxide Materials

X12-D06B2A [1992]

Manufacturing and processing

X12-D07

Manufacture, salvaging

X12-D07A

Sheathing, armouring, screening, etc.

Also includes impervious material coating.

X12-D07B

Insulating conductors or cables

X12-D07B1

By extrusion, by liquid bath, by spraying

X12-D07B9

Other (including winding on tape)

X12-D07C [1992]

Stranding-up

(X12-D07X)

X12-D07D [1997]

Cable harness manufacture

(X12-D07X)

See also V04-V02 code.

Wiring harness, wiring loom

X12-D07E [2002]

Non-insulated conductor or conductive part of insulated cable

(X12-D02X)

Includes manufacture and testing of non-insulated conductors. Other cable testing aspects are covered by X12-D07F.

X12-D07E1 [2005]

High power conductors

X12-D07E1A [2005]

Bus bars

X12-D07E1C [2006]

Superconducting line/wire

(X12-D06A1)

X12-D07E2 [2005]

Low power conductors

X12-D07E2A [2005]

Nano-wires; Nanotubes

X12-D07E2C [2005]

Fibers

X12-D07E3 [2006]

Conductive films

(X12-D07X)

X12-D07F [2007]

Cable testing

(X12-D07X)

Includes testing of insulated conductors. Testing of non-insulated conductors is covered by X12-D07E codes. See also S01-G14 for electrical tests on wires and cables. For non-electrical tests, see S02 and S03 classes.

Simulation

X12-D07X

Other cable manufacturing aspects

Cable marking machine, cable reels, bobbins, spools, salvaging

X12-D08 [2005]
Composite optical fiber- and electric- cable
See also V07-F01B4 for optical fiber cables.

X12-D09 [2005]
Composite power- and signal- cable
Includes cables having a common outer covering that encloses low and high power cables.

X12-D10 [2014]
Cable security
This code includes arrangements for preventing or deterring theft of cables, e.g. due to monetary value of conductor materials, based on features of the cable itself, and not features of fittings or installations which are covered by X12-G11. Other X12-D codes are also assigned as appropriate, such as X12-D01 codes for novelty in conductor materials or X12-D03C2 when markings applied to insulated cables enable identification of them after cable theft. Cables incorporating special features to trigger an alarm indicating attempted theft, e.g. by cutting, are also assigned W05-B01 codes.
Code, compound, etch, jacket, laser, marker, signature, trace, unique

X12-E
Insulators
For insulating materials used in general electronic equipment/device, see also V04-X01B from 1997 onwards. Prior to 1997, see also V04-S02. Materials for general electrical equipment are also coded here.

X12-E01
Inorganic substances

X12-E01A
Ceramics

X12-E01B
Mica, asbestos, metallic oxides, cements, gases

X12-E01C [2005]
Inorganic material within organic vehicle
Includes a mixture where the inorganic material is a major constituent.

X12-E01D [2005]
Inorganic nanomaterials
Includes insulating materials of small dimensions. This code is used in conjunction with the other X12-E codes as appropriate.

X12-E01X
Other inorganic insulating substances
Includes glass.

X12-E02
Organic substances

X12-E02A
Liquids, asphalts, bitumens, pitches, natural rubbers

X12-E02B
Resins, waxes, synthetic polymers

X12-E02C [2005]
Organic material within an inorganic vehicle
Includes a mixture where the organic material is a major constituent.

X12-E02D [2005]
Organic nanomaterials
Includes insulating materials of small dimensions. This code is used in conjunction with the other X12-E codes as appropriate.

X12-E02X
Other organic insulating substances
Includes gases, fibrous materials, paper.

X12-E03
Insulators

X12-E03A
Suspension-, supporting-, pin-, lead-through insulators

X12-E03C [1997]
Insulating bodies
(X12-E03A,X12-E03X)

X12-E03C1 [2005]
Tapes, sleeves, tubes
Bead, bobbin

X12-E03C3 [2005]
Grommets
See also X12-G04A3 for use of a grommet within an electrical installation.

X12-E03D [2005]

Insulating nanostructures

Includes nanotubes and nanofibers.

DWNT, SWNT, MWNT, carbon nanotube, CNT

X12-E03X

Other insulators

Includes e.g. measures for improving voltage distribution, composite insulators.

X12-E04

Manufacturing, testing and recycling of insulators

Also includes electrical and mechanical testing of insulators. See also S01-G codes for electrical tests.

X12-F

Spark gaps; Circuits

Does not include spark plugs which are covered by the relevant codes for the motor, X22-A01E1 for land based vehicle motors and W06 for water based vehicle motors.

X12-F01

Spark gaps

Electrodes, voltage-, surge- or lightning protectors/arrestors

X12-F01A [1992]

Overvoltage protection

Includes arcing horns. See also X13-C03.

X12-F02

Circuits

X12-F03 [1992]

Ioniser, ozoniser

(X12-F09)

See also X27-E01B codes for domestic applications.

X12-F04 [1992]

Corona discharge

Includes rings and pointed electrodes. See S06-A02 codes for copiers.

X12-F09

Other spark gap aspects

Includes manufacture.

X12-G

Cable or line installation and maintenance

See W01-D codes for telecommunications cable installation. Low power connectors are in V04.

X12-G01

Methods and equipment

X12-G01A

For installing lines or cables

Maintenance and repair of cable installations is covered by X12-G01D which can be assigned along with X12-G01A codes as necessary. X12-G01A codes are also assigned as appropriate for removal of previously-installed cables.

Laying cables, cable puller

X12-G01A1 [1992]

Overhead installation

Includes transposing of conductors and stringing-up lines and cables etc.

X12-G01A7 [1992]

Underground, building, and water installations

X12-G01A7A [1992]

Digging trenches

X12-G01A7D [1992]

Installing cables in ducts, ground

Ducts per se are in X12-G04A1. This code also covers removal of buried cables.

X12-G01A7E [2022]

Installing cables on vehicles

Includes laying of cables on land/air/water vehicles.

X12-G01A7G [1992]

Submarine

X12-G01A7J [1992]

Cable marking for circuit identification

X12-G01B

For removing cable insulation or armouring

See V04-P03 for electronic circuit application.

Wire stripping

X12-G01C [1983]

Cable and fault locating; Cable/line installation measuring/testing

(X12-G01X)

See S01-G05 also for electrical fault location determination, and S03-C02 codes for cable location by, for example, magnetic fields. Also includes indicators/detectors/recorders for line/cable breaks, lightning strikes, line strain, tripped breaker, etc

X12-G01D [1992]

Maintenance/repair

(X12-G01X)

Includes the use of unmanned vehicles, e.g. radio controlled helicopter for inspecting overhead transmission lines (see also W06-B15U), cleaning of insulators, de-icers, etc.

X12-G01E [1992]

Joining or terminating

(X12-G01X)

Connections per se are in X12-G02.

Crimping tools

X12-G01E1 [1992]

Superconducting wires/cables

(X12-G01X)

X12-G01F [1992]

Safety arrangements

(X12-G01X)

Includes lightning protection, earthing arrangements.

Earth wire, ground wire, earthing grids, lightning-conductors, lightning-rods

X12-G01X

Other cable/line installing aspects

X12-G02

Cable or line connectors or fittings

X12-G02A

Cable or line connectors

X12-G02B

Cable terminations

End connection, terminals, crimping, ferrules, cable glands

X12-G02C

Cable junctions

Joints, splices, protective tubes

X12-G02C1 [1992]

Cold and Heat-shrinkable covers

From 2014 this code is expanded to cover cold-shrinkable covers (previously coded as X12-G02C and now specifically covered by X12-G02C1C) as well as heat-shrinkable covers (now specifically covered by X12-G02C1A).

Sleeve

X12-G02C1A [2014]

Heat-shrinkable covers

(X12-G02C1)

This code is intended for insulation sleeves which shrink around a cable junction on application of heat.

Elastomer, heat gun, thermoplastic

X12-G02C1C [2014]

Cold-shrinkable covers

(X12-G02C)

This code is intended for insulation sleeves which shrink around a cable junction without application of heat, e.g. due to pre-stressing of the sleeve material.

Core, elastomer, rubber, support

X12-G02D [2005]

Grounding connector

For low power earthing connectors, see V04-A05.

X12-G02E [2005]

Sliding connector

Includes, for example, pantograph collectors for a train. Brushes, slip rings for electric motors are covered by V04-L, V06-M and X11-J codes.

X12-G02F [2005]

Vibration dampers

Includes dampers for an overhead line.

X12-G02G [2007]

Superconductor cable connector/fitting

(X12-G02X)

High power superconducting cable connectors only are covered here. For low power superconducting wire connector, see V04-A10.

X12-G02X

Other cable/line connectors or fittings

Includes connectors or fittings for gas- or oil-filled cables.

Seals, clamps, cooling

X12-G03

Installations of bus-bars

Power rail

X12-G04

For buildings, in ground etc.

Vehicle installations from 1992 onwards are coded exclusively in X22-X01. However, individual items like wire or cable clamps or grommets, which are more generally applicable to other installations are also coded here and, if relevant, elsewhere in X12-E or W01-D or X22-X01. Also, floor structures especially designed to carry cabling is included in X12-G04A or X12-G04A1 depending on whether space between floors is left for cables or concrete ducting is incorporated.

X12-G04A

In, on, or through walls, floors or ceilings, e.g. conduit

Wire harness

X12-G04A1 [1992]

Ducts, ladders, trays, conduits

Includes manufacture.

X12-G04A1A [2007]

Rigid

X12-G04A1C [2007]

Flexible

X12-G04A1E [2007]

Fittings

Includes fittings for joining ducts and distribution boxes, brackets, etc.

X12-G04A2 [1992]

Clamps

Includes cable ties, clips and hooks and their manufacture. Cable ties for low-power cables used in e.g. electronic equipment are covered by V04-T01A.

X12-G04A3 [1992]

Grommets, bushings

Includes arrangements for leading cables through walls and manufacture.

X12-G04B

Distribution and junction boxes

Ceiling roses and junction boxes are also coded in V04-B09, provided they are of low voltage and low power types. Distribution boxes are also in X13-E02 for industrial switchgear.

X12-G05

Overhead installations

Supports, suspensions, reinforced towers, pylons

X12-G08 [1992]

Cable or line for supplying relatively movable parts

(X12-G09)

X12-G09

Other general cable/line installation aspects

Includes labels, signs and tapes warning of e.g. high voltage cable installations, or the presence of cables within a wall or below ground for which X12-G04A codes are also assigned.

X12-G10 [2007]

Cable dispensing reel

(X12-G09)

Includes details of automatic cord winders for headsets.

Cable drums, reels

X12-G11 [2014]

Cable or line installation security

This code includes arrangements for preventing or deterring theft of cables, e.g. due to monetary value of conductor materials, based on features of fittings or installations and not features (e.g. markings) of the cable itself which are covered by X12-D10. Other X12-G codes are also assigned as appropriate, such as X12-G04 codes for underground cable installations. Installations incorporating special features to trigger an alarm indicating attempted theft are also assigned W05-B01 codes.

X12-H

Power supply or distribution

For installations and constructional details of substations see X12-G and X13-E codes, respectively. Note: X13-E is used for constructional details only of switchyards, switchboards etc. X12-H is used for all aspects of load monitoring, control, fault diagnosis, etc.

X12-H01

Circuit arrangements for supply or distribution

X12-H01A

Adjusting, compensating, balancing

Power control

X12-H01A1	[1992]
Voltage control	
X12-H01A1A	[1992]
By load shedding	
X12-H01A1C	[1992]
By reactive power control	
X12-H01A1E	[2006]
By using tap-changing transformer	
See X12-C02B1 for tap changers per se.	
X12-H01A2	[1992]
(Re)active power compensation	
From 2011 this code will cover both active and reactive compensation types.	
<i>Power factor controller, PFC, VAR compensation</i>	
X12-H01A2A	[1992]
On transmission/distribution side	
X12-H01A2B	[1992]
On load side	
X12-H01A2C	[2002]
Compensation implemented by series capacitors and shunt reactors	
Also includes series/parallel capacitor banks, and synchronous capacitors. This code is used in conjunction with X12-H01A2A or X12-H01A2B whenever possible.	
<i>Saturable reactor, synchronous compensator, shunt capacitor</i>	
X12-H01A2D	[2002]
Static VAR compensation	
Includes compensation obtained by the use of capacitors and reactors, respectively, to generate and absorb vars with at least one of them being variable. The variable capacitor or reactor may involve the use of, respectively, thyristor-switched capacitor compensator or thyristor-controlled reactor compensator. This code is used in conjunction with X12-H01A2A or X12-H01A2B whenever possible.	
<i>SVC, TCR, TSC</i>	
X12-H01A2E	[2006]
Power converter	
Involves the use of static converters to compensate for system reactance. See also X12-J for converters.	

X12-H01A3	[1992]
Short circuit current or in-rush current limiter and over voltage limiter	
Includes the use of series reactors/superconducting coils (see also X12-C codes), etc. Applicable only to power lines.	
X12-H01A4	[1992]
Harmonics and ripple reduction	
Filters in general are covered by U25-E codes. The use of this code is restricted for power lines. Filtering in converter systems is covered by X12-J01E. Also includes suppression of electromagnetic interference for which W02-H codes are also assigned.	
X12-H01A5	[1992]
Reducing or preventing power oscillations	
X12-H01A6	[1992]
Eliminating or reducing asymmetry in polyphase networks	
X12-H01A7	[1992]
Balancing network load by energy storage	
(X12-H01A, X12-H09)	
For general storage of electric energy, see X12-H06. This code involves the use of e.g. flywheels, batteries, pumped storage hydroelectric plants (see X11-B06, too).	
X12-H01A8	[2006]
Frequency regulation	
X12-H01A9	[2006]
Load-shedding	
Includes load shedding to maintain the balance between generated power and load demand. Also includes shedding to regulate system frequency (see also X12-H01A8). For load shedding to regulate voltage, see X12-H01A1A.	
X12-H01B	
Multisource systems, system inter-connections, power transfer	
<i>Generator synchronising, load sharing</i>	
X12-H01B1	[1997]
Distributed power generation system	
(X12-H01B)	
Includes connection to the utility mains of geographically-distributed solar power, wind power, fuel cell power, gas microturbines, etc. See also U24-J or X12-J codes for power converter details.	

X12-H01B2 [2005]

Bulk power transfer/interconnection

Includes arrangements for parallel feeding of a single network by two or more generators, converters, or transformers and also controlling the sharing of output among them.

X12-H01B2A [2008]

Synchronising generator(s) with network

Includes arrangements to synchronise frequency, phase sequence, etc.

X12-H01B3 [2005]

Interconnection of networks operating at different frequencies

X12-H01B4 [2005]

Aircraft and ships

See also W06-B/C codes.

X12-H01B5 [2006]

Electric traction vehicles

Includes high level power distribution system onboard a train, tram, electric vehicle, hybrid electric vehicle. Generally applicable to voltage buses in excess of 42V. Also includes on-board charging and charging control of vehicles. IC engine-driven vehicle systems are covered by U24-H and X22-F codes.

X12-H01C [1992]

High power supply

(X12-H01X, X12-J)

Includes supplies for e.g. welding, induction heaters, etc. Static converters and their controllers are covered by X12-J and X13-G03 codes.

X12-H01D [1992]

HVDC, DC systems

(X12-H01X)

Converter stations, rectifiers, inverters

X12-H01E [2007]

Non-contact power distribution

(X12-H01X)

Includes distribution of energy by electromagnetic waves (See X12-H09 for records prior to 1992). See X21-B01A1C and X16-G03 for non-contact electric vehicle battery charging. Low power non-contact power distribution is coded in U24-H02 codes.

WPT, near-field

X12-H01E1 [2021]

Using capacitive coupling

X12-H01E2 [2021]

Using inductive coupling

See also X12-C codes for novel high power inductive components.

X12-H01E3 [2021]

Using radio waves or microwaves

See also W02 codes for novel RF details such as directional array or Yagi antennae.

X12-H01E4 [2021]

Using light

Includes use of off-board mains supply. See X16-G01 for mains battery charging.

X12-H01E5 [2021]

Using ultrasonic waves

See also V06 codes for novel ultrasonic transducers.

X12-H01E8 [2021]

Wireless power transmission control, monitoring and optimization

Includes optimizing position for non-contact power transfer, reducing electric, magnetic or electromagnetic leakage/interference, detecting foreign objects, as well as transmitting data during power transfer.

X12-H01X

Other circuit arrangements for supply or distribution - including unspecified systems

X12-H02

Emergency or auxiliary supplies

Low power UPS systems are in U24-J.

Standby supplies

X12-H02A [1992]

Diesel-generator rotary UPS

X12-H02B [1992]

Static UPS

X12-H02C [1992]

Rotary UPS

X12-H03 [1983]

Remote control and monitoring; Power system communications

(X12-H09)

X12-H03A [1992]

Remote control and monitoring

Includes network state monitoring, breaker tripping, relay/breaker tripping display. Also includes supervisory display of various system parameters. Constructional details of supervisory desks are in X13-E01. See also W05-D codes for transmission systems for measurement or control signals.

Remote load switching, mains-based switching

X12-H03A1 [2005]

Economics-driven inter-tie or multi-source control

Includes control of network power transfer based on generation costs and tariffs offered for buying and selling of energy. Also includes provision for considering pollution-related costs and setting off of pollution credits. See also X12-H07 and T01-J codes.

X12-H03A3 [2007]

Switching control for equipment connected to mains supply

Includes remotely generated signals to switch domestic equipment, e.g. air conditioner, fridge etc., on and off. For load shedding-related switching see X12-H01A codes. See also W05-D codes.

X12-H03E [1992]

Power systems communications

Includes e.g. power line carrier communications (PLCC) (see W02-C01A), mains-based load control signalling. Also includes pilot relaying (see X13-C01 codes).

X12-H03E1 [2005]

High power transmission/distribution networks

Typically includes communication/control signals sent over high power lines.

X12-H03E1A [2005]

Economics-driven inter-tie or multi-source communication

Includes control of network communication based on tariffs offered for buying and selling of energy. See also X12-H07 and T01-J codes.

X12-H03E3 [2005]

Low power mains network

Typically includes communication/control signals sent over mains wires to switch appliances.

X12-H03E5 [2005]

Radio network

X12-H03E7 [2005]

Internet/intranet

X12-H04 [1992]

Utility load measurements

(X12-H09)

Includes meters and metering/measuring arrangements relating only to electrical power systems covering generation, transmission and distribution. Also covers such measurements for domestic, commercial and industrial premises. See also S01 codes for all electrical measurements. Also includes prepaid energy meters (see also T05-H06 and S01-B codes).

X12-H04A [1992]

Remote metering

(X12-H09)

Includes arrangements for obtaining meter readings from the customer premises-based meters. Customers, in this context, include domestic, commercial and industrial users. Does not cover arrangements for metering/measuring power line electrical values for display at, for example, a load control centre. Such items are in X12-H04D. See also W05-D codes for transmission of measured values.

X12-H04B [2005]

Internet/intranet metering

X12-H04C [2006]

Individual transmission/distribution/mains line meters

Includes current, voltage, power, energy, frequency, etc. meters, per se. Does not include meters not designed for the purpose of generation, transmission/distribution. Where the meter has the facility to be interrogated by a central station or electricity provider, see also X12-H04A.

X12-H04D [2006]

Metering/measurement systems

Includes arrangements/circuitry for obtaining measures of voltage, current, etc for power systems. Individual current/voltage transformers are covered by X12-C codes. By their nature, these are 'remote' measurements but are not coded in X12-H04A.

X12-H04E [2006]

Other metering/measurement systems

Includes recording of transients, harmonics, over voltages/current data, line fault parameters, lightning strikes, etc.

X12-H04U [2005]

Applications

To be used in conjunction with other H04 codes.

X12-H04U1 [2005]

Protection

Includes metering arrangements for use with protection devices. See also S01, X12-C01G and X13-C for electrical instrumentation, instrument transformers and protection circuits.

X12-H04U2 [2005]

Network control

See also X12-H03A codes for control and monitoring of networks.

X12-H05 [1992]

Network simulators

(X12-H09)

Includes not only network simulation but also modelling of the system to manage load demand/generation, predicting power consumption and outcomes of operational parameter changes, etc. T01-J15 codes for computer-aided design and simulation are also assigned as appropriate. See also T01-J16P10 when AI techniques are used to predict energy demand, etc.

X12-H06 [1992]

Electric energy storage

(X12-H09)

For pumped storage hydroelectric systems, see also X11-B06 and X12-H01A7 codes. This code includes systems using superconducting coils, etc. See also X16-L. Storage for load-balancing purposes is in X12-H01A7.

X12-H07 [2005]

Power trading across separate networks/generators

Includes computerised trading of power based on varying tariffs and pollution costs and credits. See also T01-J codes. To be used with other X12-H03 codes for communication and control aspects.

X12-H08 [2013]

Smart grids

Includes smart grids used for power transmission and management. Use with other X12-H codes as appropriate, such as X12-H03 codes for remote control and monitoring, X12-H04 codes for smart metering of power usage, X12-H01B codes for distributed power supply/control and X15-A08 and X15-B05 for solar/wind power control/monitoring. Also see other codes such as X27-V for home automation e.g. where smart grid automatically turns off household equipment, or manages use of off-peak power for domestic equipment. See also T01-J16P10 when AI techniques are used to e.g. improve energy efficiency, etc.

Intelligent

X12-H09

Other power supply/distribution aspects

X12-J

Power converters

See U24-D for low power converters.

X12-J01

General converter details

X12-J01A

Generation of control voltages

See U21-B01 and U21-B05 codes for electronic switching.

X12-J01A1 [1992]

For bipolar transistor

X12-J01A1A [1992]

For IGBTs

X12-J01A3 [1992]

For FETs

X12-J01A5 [1992]

For thyristors

X12-J01A7 [1992]

For control of other devices

X12-J01A9 [1992]

Characterised by PWM

See U22-E for PWM in general.

X12-J01B [1983]

Circuit protection

(X12-J01X)

See also X13-C04D.

X12-J01C [2012]

Power factor correction

X12-J01E [1992]

Reducing harmonics and ripples

(X12-J01X)

See U25-E for filters in general.

X12-J01E1 [2006]

Harmonics reduction

X12-J01E2 [2006]

Ripple reduction

X12-J01E5 [2014]

Reducing electromagnetic interference

(X12-J01E)

This code covers measures to reduce electromagnetic interference generated by the converter itself, e.g. based on circuitry or on constructional details such as screening for which V04-U codes are also assigned. W02-H01 codes (general codes for EMI/RFI reduction at source) are also assigned as appropriate.

Electromagnetic compatibility, EM, EMC, filter, harmonic, PWM frequency, radio frequency interference, RF, SMPS, switched mode, switching frequency, switching regulator, switching transient

X12-J01G [1992]

General cooling details

(X12-J01X)

See also V04-T03 codes.

X12-J01J [2006]

Measurements/monitoring/testing

(X12-J01X)

See S01 for related electrical instrumentation.

X12-J01K [2007]

Constructional details

(X12-J01X)

X12-J01X

Other converter aspects

X12-J02

DC-DC converters

X12-J02A

Without intermediate AC

X12-J02B

With intermediate AC

X12-J03

AC-AC converters

X12-J03A [2005]

Matrix converter

X12-J04

AC-DC converter

Rectifier

X12-J04A [1992]

Half-wave

X12-J04C [1992]

Full-wave

X12-J04C1 [1992]

Bridge

X12-J04C1A [1992]

Characterised by diodes

X12-J04C1B [1992]

Characterised by thyristors

X12-J04E [1992]

Multiplier

X12-J05

DC-AC converter

Inverter

X12-J05A

Full- and half-bridge

X12-J05A1 [1992]

Characterised by bipolar transistors

X12-J05A1A [1992]

Characterised by IGBTs

X12-J05A3 [1992]

Characterised by FETs

X12-J05A5 [1992]

Characterised by thyristors

X12-J05A9 [1992]

Characterised by other switches

X12-J05B [2005]

Inverter-type

To be used in conjunction with other inverter codes such as X12-J05A.

X12-J05B1 [2005]

Voltage source inverter

X12-J05B2 [2005]

Current source inverter

X12-J05B3 [2005]

Utility inter-tie inverter

Includes inverters fed by solar/wind power/etc generators for connecting to a mains/utility supply. For low power inverters, see U24-D codes.

X12-J06 [2005]

Pulse voltage supply

See U24-D06 for low power pulse supply. See U22-A03 also for energy-storage pulse generation.

X12-J09

Other converters

Includes dynamic converters.

X12-J10 [2007]

Bidirectional converter

This code is used in conjunction with other codes to indicate a bidirectional novelty.

X13: Switchgear, Protection, Electric Drives

NOTES:

(1) This class contains high power and indeterminate size apparatus. Low power mechanical and electromechanical switches are coded in V03 only, and electronic switches are coded in U21 only.

(2) X13-A01 and X13-A02 codes are common to switches, circuit breakers and circuit protectors.

X13-A

Switchgear contacts; Special switch arrangements

X13-A01

Contact material, structures and manufacture

X13-A01A [1992]

Materials

X13-A01B [1992]

Structures

Shape

X13-A01C [2002]

Contact manufacture; Testing; Monitoring

X13-A02

Contact engagement techniques

Includes contacts details not covered by X13-A01 codes, e.g. details of contact engagement, heating or cooling of contacts, cleaning or lubricating of contact-making surfaces, increasing contact pressure, preventing vibration of contacts, etc.

X13-A03

Switch operating and driving mechanisms (general)

X13-A03A

Operating parts

Levers, pushbuttons, handles, rods

X13-A03B

Mechanisms

Drives, springs, actuators, cams, gear motors

X13-A03C

Interlocking; Arc control

Locking, latches

X13-A03X

Other details of switch operating and driving mechanisms

Includes casings.

Housing, cover

X13-A04

Special switch arrangements

X13-A04A

Snap-action and time delay

X13-A04B

Linearly movable operating parts

X13-A04B1

Slide switches

X13-A04B2

Push-button switches

X13-A04C

Rotary switches

X13-A04C1

Unlimited or unspecified angle

Knobs

X13-A04C2

Restricted angle

Lever-, toggle-operated, handles

X13-A04D

Tumbler and lockable switches

Rockers

X13-A04E

Encased or on carriage

See X13-E03A also.

Gas-insulated

X13-A04F

Switch manufacture; Testing; Monitoring

X13-A04G [1987]

Contactors

(X13-A04X)

X13-A04G1 [1987]

Electromagnetic

Electromagnets, arc control, cores

X13-A04G5	[1997]
Characterised by type of interrupting medium	
X13-A04G5A	[1997]
Air gap	
X13-A04G5B	[1997]
Gas-insulated	
X13-A04G5C	[1997]
Vacuum	
X13-A04H	[1987]
High power vacuum and gas-filled tubes	
(X13-A04X)	
See also V05-A09 and V05-B codes.	
<i>Thyratrons, discharge tubes</i>	
X13-A04X	
Other switches	
Includes explosively-actuated high power switches.	
X13-B	
Circuit breakers	
X13-B01	
Air-break without arc control	
Includes isolators, sectionalisers and fuse-switches.	
<i>Blades</i>	
X13-B02	
Breaking incorporating arc extinguishing	
Includes air and liquid circuit breakers.	
<i>Oil-break</i>	
X13-B02A	[1987]
Vacuum circuit breakers	
<i>Contacts, electrodes, bellows</i>	
X13-B02B	[1992]
Gas circuit breakers	
X13-B03	
Breaking with separate arc extinguishing means	
<i>Oil-break</i>	
X13-B03A	[1983]
Air/gas-blast circuit breakers	

X13-B03A1	[1992]
Gas-blast circuit breakers	
X13-B03A1A	[1997]
SF6 circuit breakers	
<i>Sulphur hexafluoride</i>	
X13-B04	
Arc extinguishing, prevention and detection	
Includes use of magnets, auxiliary/multiple contacts, insulating body between contacts, impedances, arcing horns, etc.	
<i>Blow-out magnets, resistance-switching</i>	
X13-B05	[1983]
Driving mechanisms	
(X13-B09)	
Includes fluid-, pneumatic-, hydraulic-, motorised- or EM-actuators.	
<i>Electromagnetic, springs, linkages, pistons, cranks, rods</i>	
X13-B08	[1992]
Manufacture, assembly, testing, maintenance	
(X13-B09)	
<i>Measurements, monitoring</i>	
X13-B08A	[1997]
Optical fiber sensors	
X13-B08B	[1997]
Microprocessors	
X13-B09	
Other circuit breaker details	
Includes interlocks, cases, ensuring operation at a predetermined point, vents for arc products, DC circuit breaker, etc.	
X13-C	
Emergency protective circuit arrangements	
This code is for power equipment protection. Low power electronic apparatus protection is in U24-D and U24-F. Exceptions: certain overcurrent and overvoltage protection aspects are in X13-C03 and its application e.g. telephone line protection is in W01-C.	

X13-C01

Disconnection responsive to electrical input

Note: X13-C01A to X13-C01X codes may be used together with X13-C04, X13-C10, X13-C15 and X13-C20 codes.

X13-C01A

Excess current

Overcurrent, short-circuits

X13-C01B

Earth fault current or potential

Includes ELCB and RCCB. See also X13-D05.

Earth leakage circuit breakers, residual current circuit breakers, leakage current

X13-C01C

Excess, under- or no-voltage

X13-C01D

Difference between magnitudes or phase of voltages or currents

Differential protection

X13-C01E [2007]

Distance or impedance

Includes all aspects of distance/impedance relaying. See also S01-D05B for impedance measurements.

X13-C01F [2008]

Arc fault

For detecting and protecting against arcing faults.

X13-C01X

Other disconnection responsive to electrical input

Includes protection schemes responding to power reversal, impedance, loss of synchronism, frequency deviations, etc.; and also includes automatic disconnections and reconnections, indicating operation of fault clearing apparatus, protection CTs and PTs, etc.

Fault indicators, auto-reclosure

X13-C02

Disconnection responsive to non-electrical input

Includes disconnection responsive to temp., line rupture, overspeed of motor/generator etc.

Heat, thermal, line breakage

X13-C03

Limiting excess current or voltage

See X12-A and X12-F codes also.

Surges, transients, lightning arresters

X13-C03A [1997]

Overvoltage limiters

X13-C03A1 [1997]

SiC surge arresters

Silicon carbide

X13-C03A2 [1997]

MOV surge arresters

Metal-oxide varistors

X13-C03A3 [1997]

SF6 surge arresters

X13-C03B [1997]

Overcurrent or earth fault current limiters or suppressors

Peterson coil

X13-C03B1 [1997]

Superconducting current limiter

X13-C04

Protection circuits characterised by applications

X13-C04A

Cable or line systems

X13-C04B

Transformers, generators or sync. capacitors

X13-C04C

Motors

Includes means responding to excess current, voltage increase or reduction, phase interruption, increase or decrease of speed, wrong direction of rotation, etc.

X13-C04D

Converters

Includes rectifiers and inverters. See also X12-J01B.

X13-C04X

Other protection circuits characterised by applications

Includes protection for distribution gear, static capacitors, busbars, etc.

X13-C09

Other emergency protective circuit arrangements

Includes personnel protection.

X13-C10 [1992]

Solid-state (analogue) relay protection

X13-C15 [1997]

Digital or numeric relay protection

X13-C15A [1997]

Microprocessors

X13-C15B [1997]

Artificial intelligence

X13-C15B1 [1997]

Expert systems

X13-C15B2 [1997]

Neural networks

X13-C15C [1997]

Fuzzy logic

X13-C15N [1997]

Characterised by novelty of specific components

X13-C15N1 [1997]

Signal conditioning

X13-C15N2 [1997]

A/D signal conversion

X13-C15N3 [1997]

Protection algorithms

X13-C20 [1997]

Testing of protection schemes

X13-C20A [1997]

Programmable simulators

X13-D

Fuses; Moulded case circuit breakers; General circuit protectors

X13-D01

Melting fuses

X13-D01A

Electrical details

Includes fusible member and its materials, caps, cartridge fillings.

Fuse-links, -elements, -strips, terminals

X13-D01B

Constructional details

Includes fuse operation indicators, holders, bases, distinguishing marks, etc.

Housing, body, cover

X13-D01C [1992]

Manufacture, assembly, testing

(X13-D06)

X13-D01T [1997]

Characterised by type of fuse

X13-D01T1 [1997]

Semi-enclosed fuses

X13-D01T2 [1997]

Cartridge fuses

X13-D01T3 [1997]

Expulsion fuses

X13-D01T4 [1997]

Striker fuses

X13-D01T5 [1997]

Printed fuses

X13-D01T6 [1997]

Fuse resistors

X13-D01T7 [1997]

SMT fuses

X13-D01T8 [1997]

Vacuum fuses

X13-D01T9 [1997]

SF6 fuses

X13-D02

Overload circuit breakers

See X13-D03, X13-D04 and X13-D06 to X13-D09 codes for details.

X13-D02A [1983]

Hand reset mechanism

Reset mechanisms include levers, tumblers, knobs, push-buttons.

X13-D02B [1983]

Power reset mechanism

Includes reclosure types of reset mechanisms.

X13-D02C [1983]

Separate resetting action

X13-D03

Electrothermal or combined EM and electrothermal release mechanisms

Includes bimetal element, expanding rod, strip or wire, fusible mass.

X13-D03A [1997]

Combined EM and electrothermal release mechanisms

X13-D04

Electromagnetic release mechanisms; Reset mechanisms

Electromagnets, armatures, poles

X13-D04A [1992]

Reset mechanisms

X13-D05

Protective switches actuated by abnormal electrical conditions other than solely by excess current

Earth fault currents, current falling below certain level, excess or under voltage, ELCB or RCCB.

X13-D06

Constructional details

Includes housings, casings, bases, mountings, operation indicators, terminals, connections, distinguishing marks.

Terminal colour coding

X13-D07 [1987]

Arc control

(X13-D09)

Arc extinguishing, arc chutes, arc splitters, blow out magnets, arc quenching

X13-D08 [1992]

Manufacture, assembly, testing

For monitoring malfunction of circuit breakers and harmful gases released from them.

(X13-D06)

X13-D09

Other fuses; Moulded case circuit breakers; General circuit protectors

Includes CT for MCCB, locking/interlocking, name or rating plate and the protectors not covered by X13-D01, X13-D02 and X13-D05.

Electrodynamic release, motor-driven

X13-D10 [2002]

Solid state circuit breakers

Contactless

X13-D11 [2002]

Miniature circuit breakers

X13-D12 [2005]

Thermal fuses

Includes one-shot thermal fuses, thermal protectors and thermal cutoffs.

X13-D20 [2002]

Circuit breakers characterised by novel mechanism

X13-D20A [2002]

Sensing mechanism

X13-D20B [2002]

Trigger mechanism

X13-D20C [2002]

Latching and release mechanism

X13-D20D [2002]

Operating mechanism

X13-E

Switchboards, switchyards

Note: This code covers switching devices in association with each other or with transformers, fuses etc. Also, includes mainly constructional details with electrical aspects of power distribution control in X12-H. Motor control centres are covered, with electrical aspects in X13-F and X13-G.

X13-E01

Boards, desks, frameworks

Includes mounting of switches thereon, mosaic or mimic diagrams for supervisory desks or panels.

Rails, slides, building blocks

X13-E02

Casings, boxes

Includes mounting of devices therein, switch box nameplate.

Switch cabinets

X13-E03

Indoor, outdoor or board mounting arrangements

Includes pole mounted units, and transformer substations.

Switch yards

X13-E03A [1992]

Switchgear carriage

X13-E03B [1992]

Switchgear cubicle

X13-E03C [1997]

Characterised by use of SF₆

GIS, gas insulated switchgear, sulfur hexafluoride gas insulated switchgear

X13-E04

Wiring, circuit and safety arrangements

Shutters, guards, earth-pins, -plates, fuse arrangements, CT-, PT- arrangements, interlocks, earthing, racking

X13-E04A [1987]

Wiring; Bus-bars

Includes clamps, arrangements for bus-bars and wiring of units on boards or in boxes.

Arrangements, layouts

X13-E08 [1992]

Manufacture, assembly, testing, maintenance, repair

(X13-E09)

Monitoring

X13-E08A [1997]

Optical fiber sensors

X13-E08B [1997]

Microprocessors

X13-E09

Other switchboards, switchyards

Includes venting arc gases from cubicles, cooling, etc.

X13-F*

Starting, stopping or regulating electric machines

*This code is now discontinued and transferred to X13-H from 201401, but remains searchable and valid for records prior to 2014.

Low power motor control is in V06-N.

X13-F01*

Starting electric motors or converters

*This code is now discontinued and transferred to X13-H01A from 201401, but remains searchable and valid for records prior to 2014.

Includes details of star-delta starters, motor control centres, switches, EM contactors. Also includes starting of generators.

X13-F02*

Stopping or slowing electric machines

*This code is now discontinued and transferred to X13-H01B from 201401, but remains searchable and valid for records prior to 2014.

Plugging, supply reversal, reversing motor, regenerative-, resistive-, dynamic-braking

X13-F03*

Speed regulation of electric motors

*This code is now discontinued and transferred to X13-H01 from 201401, but remains searchable and valid for records prior to 2014.

Involves measuring of speed and comparing with a reference to change motor speed; universal motor speed control.

X13-F03A*

Varying field or armature current in DC motors

*This code is now discontinued and transferred to X13-H01C from 201401, but remains searchable and valid for records prior to 2014.

X13-F03A1*

Using tubes or semiconductors

*This code is now discontinued and transferred to X13-H01C1 from 201401, but remains searchable and valid for records prior to 2014.

Pulse modulation, chopper control, static converters

X13-F03A1A* [1992-2013]

Field supply control

*This code is now discontinued and transferred to X13-H01C1A from 201401, but remains searchable and valid for records prior to 2014.

X13-F03A1B* [1992-2013]

Armature supply control

*This code is now discontinued and transferred to X13-H01C1B from 201401, but remains searchable and valid for records prior to 2014.

X13-F03A9*

Other

*This code is now discontinued and transferred to X13-H01C9 from 201401, but remains searchable and valid for records prior to 2014.

Ward-Leonard sets, metadynes, amplidynes

X13-F03B*

Varying stator or rotor current in AC motors

*This code is now discontinued and transferred to X13-H01D from 201401, but remains searchable and valid for records prior to 2014.

Brush shifting, transductor

X13-F03B1* [1992-2013]

Using semiconductors

*This code is now discontinued and transferred to X13-H01D1 from 201401, but remains searchable and valid for records prior to 2014.

X13-F03B1A* [1992-2013]

Frequency control

*This code is now discontinued and transferred to X13-H01D1A from 201401, but remains searchable and valid for records prior to 2014.

X13-F03B1B* [1992-2013]

Voltage control

*This code is now discontinued and transferred to X13-H01D1B from 201401, but remains searchable and valid for records prior to 2014.

X13-F03B1C* [1992-2013]

Vector speed regulation

*This code is now discontinued and transferred to X13-H01D1C from 201401, but remains searchable and valid for records prior to 2014.

Field-oriented, flux-vector, direct-torque, control

X13-F03C* [1992-2013]

AC/DC brushless motors

(X13-F03X)

*This code is now discontinued and transferred to X13-H01E from 201401, but remains searchable and valid for records prior to 2014.

X13-F03C1* [1997-2013]

Permanent magnet

(X13-F03C)

*This code is now discontinued and transferred to X13-H01E1 from 201401, but remains searchable and valid for records prior to 2014.

PM AC/DC brushless

X13-F03C2* [1997-2013]

Switched reluctance

(X13-F03C)

*This code is now discontinued and transferred to X13-H01E2 from 201401, but remains searchable and valid for records prior to 2014.

SR AC/DC brushless

X13-F03C3* [1997-2013]

Sensorless

(X13-F03C)

*This code is now discontinued and transferred to X13-H01E3 from 201401, but remains searchable and valid for records prior to 2014.

BEMF

X13-F03D* [1997-2013]

Asynchronous motors

*This code is now discontinued and transferred to X13-H01F from 201401, but remains searchable and valid for records prior to 2014.

Induction

X13-F03E* [1997-2013]

Synchronous motors

*This code is now discontinued and transferred to X13-H01G from 201401, but remains searchable and valid for records prior to 2014.

X13-F03E1* [2006-2013]

With permanent magnet

*This code is now discontinued and transferred to X13-H01G1 from 201401, but remains searchable and valid for records prior to 2014.

X13-F03E2* [2006-2013]

Without permanent magnet

*This code is now discontinued and transferred to X13-H01G2 from 201401, but remains searchable and valid for records prior to 2014.

X13-F03F* [1997-2013]

Linear motors

*This code is now discontinued and transferred to X13-H01H from 201401, but remains searchable and valid for records prior to 2014.

X13-F03F1* [1997-2013]

Asynchronous

*This code is now discontinued and transferred to X13-H01H1 from 201401, but remains searchable and valid for records prior to 2014.

Induction, AC, LIM

X13-F03F2* [1997-2013]

Synchronous

*This code is now discontinued and transferred to X13-H01H2 from 201401, but remains searchable and valid for records prior to 2014.

AC, LSM

X13-F03F3* [1997-2013]

Direct current

*This code is now discontinued and transferred to X13-H01H3 from 201401, but remains searchable and valid for records prior to 2014.

DC, linear

X13-F03X*

Other speed regulation of electric motors

*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

Includes control for multi-motors, etc.

X13-F09*

Other

*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

X13-F10* [1997-2013]

Microprocessor based starting, stopping or speed regulation

*This code is now discontinued and transferred to X13-H05 from 201401, but remains searchable and valid for records prior to 2014.

X13-F20* [2005-2013]

Starter-generator/motor-generator speed regulation

*This code is now discontinued and transferred to X13-H07 from 201401, but remains searchable and valid for records prior to 2014.

X13-F25* [2005-2013]

Speed regulation or starting/stopping of electrical machines or converters characterized by specific switching or control device

*This code is now discontinued and transferred to X13-H10 from 201401, but remains searchable and valid for records prior to 2014.

X13-F25A* [2005-2013]

Characterized by bipolar transistors and diodes

*This code is now discontinued and transferred to X13-H10A from 201401, but remains searchable and valid for records prior to 2014.

X13-F25B* [2005-2013]

Characterized by IGBTs

*This code is now discontinued and transferred to X13-H10B from 201401, but remains searchable and valid for records prior to 2014.

X13-F25C* [2005-2013]

Characterized by FETs

*This code is now discontinued and transferred to X13-H10C from 201401, but remains searchable and valid for records prior to 2014.

X13-F25D* [2005-2013]

Characterized by thyristors

*This code is now discontinued and transferred to X13-H10D from 201401, but remains searchable and valid for records prior to 2014.

X13-F25E* [2005-2013]

Characterized by combination of switching devices

*This code is now discontinued and transferred to X13-H10E from 201401, but remains searchable and valid for records prior to 2014.

X13-F25F* [2005-2013]

Characterized by AC-to-DC converter

*This code is now discontinued and transferred to X13-H10F from 201401, but remains searchable and valid for records prior to 2014.

X13-F25G* [2005-2013]

Characterized by DC-to-AC converter

*This code is now discontinued and transferred to X13-H10G from 201401, but remains searchable and valid for records prior to 2014.

X13-F25H* [2005-2013]

Characterized by AC-to-AC

*This code is now discontinued and transferred to X13-H10H from 201401, but remains searchable and valid for records prior to 2014.

X13-F25J* [2005-2013]

Characterized by DC-to-DC converter

*This code is now discontinued and transferred to X13-H10J from 201401, but remains searchable and valid for records prior to 2014.

X13-G*

Controlling electric machines or converters

*This code is now discontinued and transferred to X13-H from 201401, but remains searchable and valid for records prior to 2014.

X13-G01*

Speed or torque of electric motors

*This code is now discontinued and transferred to X13-H01 from 201401, but remains searchable and valid for records prior to 2014.

Includes universal motor speed control.

X13-G01A*

Varying field or armature current in DC motors

*This code is now discontinued and transferred to X13-H01C from 201401, but remains searchable and valid for records prior to 2014.

Ward-Leonard sets, amplidynes, metadynes

X13-G01A1* [1992-2013]

Using semiconductors

*This code is now discontinued and transferred to X13-H01C1 from 201401, but remains searchable and valid for records prior to 2014.

Pulse modulation, chopper control, static converters

X13-G01A1A* [1992-2013]

Field supply control

*This code is now discontinued and transferred to X13-H01C1A from 201401, but remains searchable and valid for records prior to 2014.

X13-G01A1B* [1992-2013]

Armature supply control

*This code is now discontinued and transferred to X13-H01C1B from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B*

Varying stator or rotor current in AC motors

*This code is now discontinued and transferred to X13-H01D from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B1*

Using tubes or semiconductors

*This code is now discontinued and transferred to X13-H01D1 from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B1A* [1992-2013]

Frequency control

*This code is now discontinued and transferred to X13-H01D1A from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B1B* [1992-2013]

Voltage control

*This code is now discontinued and transferred to X13-H01D1B from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B1C* [2005-2013]

Vector speed control

*This code is now discontinued and transferred to X13-H01D1C from 201401, but remains searchable and valid for records prior to 2014.

X13-G01B9*

Other

*This code is now discontinued and transferred to X13-H01D9 from 201401, but remains searchable and valid for records prior to 2014.

X13-G01C* [1992-2013]

AC/DC brushless motors

(X13-G01X)

*This code is now discontinued and transferred to X13-H01E from 201401, but remains searchable and valid for records prior to 2014.

X13-G01C1* [1997-2013]

Permanent magnet

(X13-G01C)

*This code is now discontinued and transferred to X13-H01E1 from 201401, but remains searchable and valid for records prior to 2014.

PM AC/DC brushless

X13-G01C2* [1997-2013]

Switched reluctance

(X13-G01C)

*This code is now discontinued and transferred to X13-H01E2 from 201401, but remains searchable and valid for records prior to 2014.

SR AC/DC brushless

X13-G01C3* [1997-2013]

Sensorless

(X13-G01C)

*This code is now discontinued and transferred to X13-H01E3 from 201401, but remains searchable and valid for records prior to 2014.

BEMF

X13-G01D* [1997-2013]

Asynchronous motors

*This code is now discontinued and transferred to X13-H01F from 201401, but remains searchable and valid for records prior to 2014.

Induction

X13-G01E* [1997-2013]

Synchronous motors

*This code is now discontinued and transferred to X13-H01G from 201401, but remains searchable and valid for records prior to 2014.

X13-G01E1* [2006-2013]

With permanent magnet

*This code is now discontinued and transferred to X13-H01G1 from 201401, but remains searchable and valid for records prior to 2014.

X13-G01E2* [2006-2013]

Without permanent magnet

*This code is now discontinued and transferred to X13-H01G2 from 201401, but remains searchable and valid for records prior to 2014.

X13-G01F* [1997-2013]

Linear motors

*This code is now discontinued and transferred to X13-H01H from 201401, but remains searchable and valid for records prior to 2014.

X13-G01F1* [1997-2013]

Asynchronous

*This code is now discontinued and transferred to X13-H01H1 from 201401, but remains searchable and valid for records prior to 2014.

Induction, AC, LIM

X13-G01F2* [1997-2013]

Synchronous

*This code is now discontinued and transferred to X13-H01H2 from 201401, but remains searchable and valid for records prior to 2014.

AC, LSM

X13-G01F3* [1997-2013]

Direct current

*This code is now discontinued and transferred to X13-H01H3 from 201401, but remains searchable and valid for records prior to 2014.

DC, linear

X13-G01X*

Other speed or torque of electric motors

*This code is now discontinued and transferred to X13-H01X from 201401, but remains searchable and valid for records prior to 2014.

Includes control for multi-motors, etc.

X13-G02*

Electric generators control

*This code is now discontinued and transferred to X13-H02 from 201401, but remains searchable and valid for records prior to 2014.

See V06-N40 codes for speed control of low power generators.

X13-G02A*

Varying field

*This code is now discontinued and transferred to X13-H02A from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T* [1997-2013]

Characterised by type of prime mover or generator

*This code is now discontinued and transferred to X13-H02T from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T1* [1997-2013]

Steam turbine generator

*This code is now discontinued and transferred to X13-H02T1 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T2* [1997-2013]

Hydrogenerator

*This code is now discontinued and transferred to X13-H02T2 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T3* [1997-2013]

IC engine generator

*This code is now discontinued and transferred to X13-H02T3 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T4* [1997-2013]

Gas turbine generator

*This code is now discontinued and transferred to X13-H02T4 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T5* [1997-2013]

Wind turbine generator

*This code is now discontinued and transferred to X13-H02T5 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T6* [2002-2013]

Microturbine generator

*This code is now discontinued and transferred to X13-H02T6 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T7* [2006-2013]

Synchronous generator

*This code is now discontinued and transferred to X13-H02T7A from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T8* [2006-2013]

DC generator

*This code is now discontinued and transferred to X13-H02T8 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T9* [2006-2013]

Other generators' control

*This code is now discontinued and transferred to X13-H02T9 from 201401, but remains searchable and valid for records prior to 2014.

X13-G02T9A* [2006-2013]

Induction generator

*This code is now discontinued and transferred to X13-H02T7B from 201401, but remains searchable and valid for records prior to 2014.

X13-G02X* [1980-2013]

Other control details

*This code is now discontinued and transferred to X13-H02X from 201401, but remains searchable and valid for records prior to 2014.

Includes control by varying prime mover speed, controlling clutch or other mechanical power transmission device, obtaining desired frequency or voltage in predetermined relation, capacitor variation for asynchronous generator.

Prime-mover control, frequency control

X13-G03* [1980-2013]

Static converters

*This code is now discontinued and transferred to X13-H03 from 201401, but remains searchable and valid for records prior to 2014.

This code is used together with X12-J01A and converter-type codes. For low power converter control see U24-D codes.

X13-G03A* [1980-2013]

Controlling DC/AC stages or converters

*This code is now discontinued and transferred to X13-H03A from 201401, but remains searchable and valid for records prior to 2014.

Inverter control

X13-G03B* [1980-2013]

Controlling AC/DC stages or converters

*This code is now discontinued and transferred to X13-H03B from 201401, but remains searchable and valid for records prior to 2014.

Rectifier control

X13-G03C* [2006-2013]

DC-DC converter

*This code is now discontinued and transferred to X13-H03C from 201401, but remains searchable and valid for records prior to 2014.

X13-G03D* [2006-2013]

AC-AC converter

*This code is now discontinued and transferred to X13-H03D from 201401, but remains searchable and valid for records prior to 2014.

X13-G03X* [1980-2013]

Other converters' control

*This code is now discontinued and transferred to X13-H03X from 201401, but remains searchable and valid for records prior to 2014.

X13-G04* [1980-2013]

Dynamo-electric brakes or clutches; Non-static converters

*This code is now discontinued and transferred to X13-H04 from 201401, but remains searchable and valid for records prior to 2014.

From 2006, controllers for reactors/transformers are covered by X12-C02B codes only. For static converters, see X12-J01A and X13-G03 codes only.

X13-G10* [1997-2013]

Microprocessor based control

*This code is now discontinued and transferred to X13-H05 from 201401, but remains searchable and valid for records prior to 2014.

Includes details of DSP processor, ECU, PLC etc.

X13-G15* [2002-2013]

Remote motor control

*This code is now discontinued and transferred to X13-H06 from 201401, but remains searchable and valid for records prior to 2014.

X13-G20* [2002-2013]

Starter-generator/motor-generator control

*This code is now discontinued and transferred to X13-H07 from 201401, but remains searchable and valid for records prior to 2014.

X13-G25* [2005-2013]

Speed control of electrical machines characterized by specific switching or control device

*This code is now discontinued and transferred to X13-H10 from 201401, but remains searchable and valid for records prior to 2014.

X13-G25A* [2005-2013]

Characterized by bipolar transistors and diodes

*This code is now discontinued and transferred to X13-H10A from 201401, but remains searchable and valid for records prior to 2014.

X13-G25B* [2005-2013]

Characterized by IGBTs

*This code is now discontinued and transferred to X13-H10B from 201401, but remains searchable and valid for records prior to 2014.

X13-G25C* [2005-2013]

Characterized by FETs

*This code is now discontinued and transferred to X13-H10C from 201401, but remains searchable and valid for records prior to 2014.

X13-G25D* [2005-2013]

Characterized by thyristors

*This code is now discontinued and transferred to X13-H10D from 201401, but remains searchable and valid for records prior to 2014.

X13-G25E* [2005-2013]

Characterized by combination of switching devices

*This code is now discontinued and transferred to X13-H10E from 201401, but remains searchable and valid for records prior to 2014.

X13-G25F* [2005-2013]

Characterized by AC-to-DC converter

*This code is now discontinued and transferred to X13-H10F from 201401, but remains searchable and valid for records prior to 2014.

X13-G25G* [2005-2013]

Characterized by DC-to-AC converter

*This code is now discontinued and transferred to X13-H10G from 201401, but remains searchable and valid for records prior to 2014.

X13-G25H* [2005-2013]

Characterized by AC-to-AC

*This code is now discontinued and transferred to X13-H10H from 201401, but remains searchable and valid for records prior to 2014.

X13-G25J* [2005-2013]

Characterized by DC-to-DC converter

*This code is now discontinued and transferred to X13-H10J from 201401, but remains searchable and valid for records prior to 2014.

X13-H [2014]

Control of electric machines

(X13-F, X13-G)

Low power motor control is in V06-N.

X13-H01 [2014]

Speed or torque regulation of electric motors or converters

(X13-F03, X13-G01)

Includes universal motor speed control.

X13-H01A [2014]

Starting electric motor or converters (X13-F01)

Includes details of star-delta starters, motor control centres, switches, EM contactors. Also includes starting of generators.

X13-H01B [2014]

Stopping or slowing electric machines or converters

(X13-F02)

Plugging, supply reversal, reversing motor, regenerative-, resistive-, braking, dynamic braking

X13-H01C [2014]

Speed or torque regulation by varying field or armature in DC motors

(X13-F03A, X13-G01A)

Involves measuring of speed and comparing with a reference to change motor speed, universal motor speed control.

X13-H01C1 [2014]

Using tubes or semiconductors

(X13-F03A1, X13-G01A1)

Pulse modulation, chopper control, static converters

X13-H01C1A [2014]

Field supply control

(X13-F03A1A, X13-G01A1A)

X13-H01C1B [2014]

Armature supply control

(X13-F03A1B, X13-G01A1B)

X13-H01C9 [2014]

Other details of speed or torque regulation by varying field /armature current in DC motors

(X13-F03A9)

Ward-Leonard sets, metadynes, amplidynes

X13-H01D [2014]

Speed or torque regulation by varying stator or rotor current in AC motors

(X13-F03B, X13-G01B)

Brush shifting, transductor

X13-H01D1 [2014]

Using semiconductors

(X13-F03B1, X13-G01B1)

X13-H01D1A [2014]

Frequency control

(X13-F03B1A, X13-G01B1A)

X13-H01D1B [2014]

Voltage control

(X13-F03B1B, X13-G01B1B)

X13-H01D1C [2014]

Vector speed regulation

(X13-F03B1C, X13-G01B1C)

Field-oriented, flux-vector, direct-torque, vector control

X13-H01D9 [2014]

Other details of speed or torque regulation by varying stator or rotor current in AC motors

(X13-G01B9)

X13-H01E [2014]

AC/DC brushless motors

(X13-F03C, X13-G01C)

X13-H01E1 [2014]

Permanent magnet

(X13-F03C1, X13-G01C1)

PM AC/DC brushless

X13-H01E2 [2014]

Switched reluctance

(X13-F03C2, X13-G01C2)

SR AC/DC brushless

X13-H01E3 [2014]

Sensorless

(X13-F03C3, X13-G01C3)

BEMF

X13-H01F [2014]

Asynchronous motors

(X13-F03D, X13-G01D)

Induction

X13-H01G [2014]

Synchronous motors

(X13-F03E, X13-G01E)

X13-H01G1 [2014]

Synchronous motors with permanent magnet

(X13-F03E1, X13-G01E1)

X13-H01G2 [2014]

Synchronous motors without permanent magnet

(X13-F03E2, X13-G01E2)

X13-H01H	[2014]
Linear motors	
(X13-F03F, X13-G01F)	
X13-H01H1	[2014]
Asynchronous linear motors	
(X13-F03F1, X13-G01F1)	
<i>Induction, AC, LIM</i>	
X13-H01H2	[2014]
Synchronous linear motors	
(X13-F03F2, X13-G01F2)	
<i>AC, LSM</i>	
X13-H01H3	[2014]
Direct current linear motors	
(X13-F03F3, X13-G01F3)	
<i>DC, linear</i>	
X13-H01X	[2014]
Other speed or torque regulation of electric motors	
(X13-F03X, X13-F09, X13-G01X)	
Includes control for multi-motors, etc.	
X13-H02	[2014]
Electric generators control	
(X13-G02)	
See V06-N40 codes for speed control of low power generators.	
X13-H02A	[2014]
Varying field	
(X13-G02A)	
X13-H02B	[2014]
Frequency control	
(X13-G02X)	
X13-H02C	[2014]
Voltage control	
(X13-G02X)	
X13-H02D	[2014]
Vector speed control	
(X13-G02X)	
X13-H02E	[2014]
Capacitor variation	
(X13-G02X)	
Asynchronous generators are coded under X13-H02T7B.	

X13-H02T	[2014]
Characterised by type of prime mover or generator	
(X13-G02T)	
X13-H02T1	[2014]
Steam turbine generator	
(X13-G02T1)	
X13-H02T2	[2014]
Hydrogenerator	
(X13-G02T2)	
X13-H02T3	[2014]
IC engine generator	
(X13-G02T3)	
X13-H02T4	[2014]
Gas turbine generator	
(X13-G02T4)	
X13-H02T5	[2014]
Wind turbine generator	
(X13-G02T5)	
X13-H02T6	[2014]
Microturbine generator	
(X13-G02T6)	
X13-H02T7	[2014]
Synchronous/Asynchronous generator	
X13-H02T7A	[2014]
Synchronous generator	
(X13-G02T7)	
X13-H02T7B	[2014]
Asynchronous generator	
(X13-G02T9A)	
<i>Induction</i>	
X13-H02T8	[2014]
DC generator	
(X13-G02T8)	
X13-H02T9	[2014]
Other generators' control	
(X13-G02T9)	

X13-H02X [2014]

Other electric generator control details

(X13-G02X)

Includes control by varying prime mover speed, controlling clutch or other mechanical power transmission device. From 2014, details of frequency control are coded under X13-H02B, voltage control under X13-H02C and by variation of capacitor under X13-H02E.

Prime-mover control

X13-H03 [2014]

Static converters control

(X13-G03)

This code is used together with X12-J01A and converter-type codes. For low power converter control see U24-D codes.

X13-H03A [2014]

Controlling DC/AC stages or converters

(X13-G03A)

Inverter control

X13-H03B [2014]

Controlling AC/DC stages or converters

(X13-G03B)

Rectifier control

X13-H03C [2014]

Controlling DC-DC converters

(X13-G03C)

X13-H03D [2014]

Controlling AC-AC converters

(X13-G03D)

X13-H03X [2014]

Other converters' control

(X13-G03X)

X13-H04 [2014]

Dynamo-electric brakes or clutches; Non-static converters

(X13-G04)

From 2006, controllers for reactors/transformers are covered by X12-C02B codes only. For static converters, see X12-J01A and X13-H03 codes only.

X13-H05 [2014]

Microprocessor based control

(X13-F10, X13-G10)

Includes details of DSP processor, ECU, PLC etc.

X13-H06 [2014]

Remote motor control

(X13-G15)

X13-H07 [2014]

Starter-generator/motor-generator control

(X13-F20, X13-G20)

X13-H10 [2014]

Speed control of electrical machines characterized by specific switching or control device

(X13-F25, X13-G25)

These codes are used together with other X13-H codes as appropriate.

X13-H10A [2014]

Characterized by bipolar transistors and diodes

(X13-F25A, X13-G25A)

X13-H10B [2014]

Characterized by IGBTs

(X13-F25B, X13-G25B)

X13-H10C [2014]

Characterized by FETs

(X13-F25C, X13-G25C)

X13-H10D [2014]

Characterized by thyristors

(X13-F25D, X13-G25D)

X13-H10E [2014]

Characterized by combination of switching devices

(X13-F25E, X13-G25E)

X13-H10F [2014]

Characterized by AC-to-DC converter

(X13-F25F, X13-G25F)

Rectifier

X13-H10G [2014]

Characterized by DC-to-AC converter

(X13-F25G, X13-G25G)

Inverter

X13-H10H [2014]

Characterized by AC-to-AC converter

(X13-F25H, X13-G25H)

X13-H10J [2014]
Characterized by DC-to-DC converter
(X13-F25J, X13-G25J)

X13-H99 [2014]
Other control details of electric machines

X13-U [1997]
Characterized by application to specific equipment or industry
For records prior to 2005, these codes were used for applications of medium and high power electric machines control only. From 2005 onwards, these codes are used for applications of fuses, protectors, circuit breakers, and medium and high power switches and electric machines control. See V03 codes for low power electric switches and V06 codes for low power electric machines.

X13-U01 [1997]
Road vehicles

X13-U02 [1997]
Railways

X13-U03 [1997]
Aviation and aerospace

X13-U04 [1997]
Ships and boats

X13-U05 [1997]
Military

X13-U06 [1997]
Industrial machines

X14: Nuclear Power Generation

See also section K for further details of nuclear reactors and nuclear power.

X14-A

Reactor processes

Includes all aspects of reactor processes.

X14-A01

Fast fission

Fast-breeder, fast neutrons

X14-A02

Thermal

Includes boiling-water reactor, pressurised water reactor.

Gas-cooled, PWR, BWR, AGR, thermal neutrons

X14-A03

[1992]

Fusion reactors

Includes plasma confinement and generation.

JET, Tokamak, toroidal-, poloidal-coils, plasma generation

X14-A03A

[1992]

Cold fusion

(X14-A09)

Electrolysis, palladium

X14-A09

Other reactor processes

Includes sub-critical reactors.

X14-B

Reactor components

Includes all aspects (electrical and non-electrical) of components except for cooling where certain items e.g. heat exchangers are excluded.

X14-B01

Pressure vessels, containment

Concrete structures, seals, walls

X14-B02

Shielding; Emergency protection

Includes biological-, reflecting- and thermal-shields.

Neutron shield, emergency shut-down, neutron reflection, gamma radiation thermal shielding

X14-B03

Cooling

Includes pumping or circulating of coolant.

Circulation pumps, liquid, sodium circulation, coolant flow control

X14-B04

Fuel elements

X14-B04A

Manufacture

Includes fuel element manufacture and materials for the fuel and its cladding.

X14-B04X

Fuel assemblies and other details

Includes bundles of pin-, rod- or tube-shaped fuel elements, spacer grids, casings, jackets.

Cladding, grids

X14-B05

Moderator or core structure

Includes locating or supporting of fuel elements, supporting complete structure.

Fuel supports, fuel grids, moderator composition, supporting core, grid supports, heavy water, graphite, core shroud

X14-C

Nuclear power plant and control

Documents are included in X14-C02 to X14-C06 only if some electrical aspects are disclosed. X14-C01 covers both electrical and non-electrical aspects.

X14-C01

Control of nuclear reaction

Includes control or poison rods and their drive arrangements. Also includes control circuits.

Control material, neutron absorber, shut-down, hafnium, boron, cadmium, erbium, europium

X14-C02

Monitoring and testing reactor

See also section S for general instrumentation e.g. S03-G codes covers nuclear or X-radiation.

Probes, measuring-temp, -reactivity, -radioactivity, -strain, -neutron-flux

X14-C03

Fuel handling

Includes fuel handling arrangements to load fuel elements into the reactor and discard used elements. Also includes storage and associated handling of unused fuel, prior to use in the reactor.

Robots, lifting devices, discharging/dismantling irradiated fuel

X14-C04

Manufacture of reactor

X14-C05

Power plant

X14-C05A

Generation of electricity or mechanical energy

X14-C05B

Plant control

Regulating plant parameters, flow, level, feedwater control

X14-C05C [2002]

Measurements relating to plant

(X14-C05X)

For in-situ reactor-related measurements, see X14-C02. Includes arrangements, for example, to check the integrity of welded joints. See also the relevant instrumentation codes in section S.

X14-C05X

Other nuclear power plant aspects

Includes safety suits, personal radiation monitors, cabling, protection. Also includes electrical details of water desalination systems for producing potable water (see also X25-H03 for water treatment). If water is used for cooling the reactor, X14-B03 should be applied.

Cable inlets, plant simulator, dosimeter badge, nuclear desalination, hot cell

X14-C06 [2013]

Maintenance, service, repair

Includes inventory of spare parts (see also X25-F09).

X14-C99 [2018]

Other nuclear power plant details

Includes arrangements to provide heat for purposes other than conversion into power, e.g. for heating buildings.

X14-D

Radioactive waste treatment, power plant decommission, decontamination, etc.

Includes only electrical apparatus and methods for water disposal, decommission of power plant, decontamination of radioactive contaminants, e.g. safety wear (masks, clothes, etc), etc.

Decontamination, disposal, storage, electrolytic waste disposal, decommission

X14-E

Energy from radioactive sources

Includes only electrical apparatus and methods for radioactive/nuclear cells, etc.

X14-F

Plasma technique

Includes generation and handling of plasma for fusion reactors. For other uses, only electrical aspects are included.

X14-F01 [1992]

For fusion

Magnetic confinement

X14-F02 [1992]

For integrated circuit manufacture

See also appropriate U11-C codes.

X14-F03 [1992]

For burners and torches

See also X24-D05.

Plasma gun

X14-F04 [2002]

For propulsion

Covers plasma propulsion techniques for ordnance, space vehicles, etc. See also W06-B03 and W07 codes.

X14-G

Particle accelerators

Documents are included in X14-G only if some electrical aspects are disclosed. See also K08-G and L03-H04D.

X14-G01 [1987]

Linear

Linac, magnets

X14-G02

[1987]

Cyclic

Synchrotrons, cyclotrons, betatrons, magnets

X15: Non-Fossil Fuel Power Generating Systems

NOTES:

See X11-A, X11-B and X11-C codes for steam turbine plants, coal-fired power plants, hydroelectric plants, gas turbine plants, IC engine plants, co-generation plants, etc. Nuclear power generation details are covered by X14 only. See **also** X11-J codes for in-depth constructional details of the generators, e.g. stator, rotor, windings, insulation, etc. See also X12 codes for details of power distribution to e.g. power transmission networks (powergrids).

X15-A

Solar power

X15-A codes cover all details of solar batteries, solar power, solar powered charging of batteries, when there is some novelty/importance regarding the solar aspect. Includes power generation from solar rays as well as other optical radiation, photoelectrochemical and thermophotovoltaic actions. If details about e.g. the semiconductor materials used in the cell (photolayers, etc.), the photoreceivers, the manufacture/packaging of the cells, etc., U12-A02A codes should also be applied. See also X15-A04 or X15-A05 to highlight small scale or large scale power generation, respectively. Photoelectrochemical and dye-sensitized solar cells are also coded under X16-A04. Chargers using solar energy to charge a battery are also coded under X16-G02A.

Details of redox batteries, such as vanadium redox batteries, used for storing energy generated from solar farms to supply power during low generation periods, are coded under X16-C.

X15-A01

Solar heat/radiation collection; Concentrators

Includes solar heat/radiation collection and concentration for both solar thermal energy conversion systems (see also X15-A01A) as well as systems using direct conversion of solar energy (see also X15-A02).

X15-A01A [2005]

Heat collecting panels; Heat collecting pipes

Includes panels provided with pipes carrying liquid that is heated by the sun. Direct conversion panel details are in X15-A02.

Collectors, heat pipes

X15-A01A1 [2011]

Working fluids

(X15-A01C4)

Includes arrangement details of working fluids such as water, molten salts etc.

Heat absorber

X15-A01C [2005]

Concentrators

Includes arrangements to direct sun's rays onto the solar panels/heat pipes using reflectors, lenses and sun-tracking dishes. This code can be applied in conjunction with X15-A01A to highlight application to solar thermal energy conversion systems or X15-A02 to highlight application to direct solar energy conversion systems.

X15-A01C1 [2010]

Mirrors

Focussing mirror, parabolic mirror, parabolic troughs

X15-A01C2 [2010]

Lenses

Focussing lenses, Fresnel lenses

X15-A01C3 [2010]

Tracking arrangements

Includes heliostats.

X15-A01C4* [2010-2010]

Working fluids

*From 2011 this code is transferred to X15-A01A1, but remains searchable for records in 2010. Includes arrangement details of working fluids such as water, molten salts, etc.

X15-A01C9 [2010]

Other concentrators details

X15-A02

Direct conversion photovoltaic panel details; Solar/photovoltaic cells details

X15-A01C codes can be used in conjunction with X15-A02 codes to highlight the concentrators, e.g. mirrors, tracking arrangements, etc. See also U12-A02A codes.

Grid-connected photovoltaic system, grid-tied system, on-grid solar system

X15-A02A [1983]

Single cells

Includes photovoltaic or solar cells (see also U12-A02 codes) and their manufacture. See U12-A02A7 for circuitry arrangements for solar cells.

X15-A02B [1983]

Assemblies of cells

Includes details of interconnections between individual cells. Details of the solar panel or module are covered by X15-A02C.

X15-A02C [2002]

Solar/photovoltaic panel details

Includes mechanical details of solar/photovoltaic panels, modules or tiles, including anti-reflective coating, glass cover to protect the cells from the elements, cleaning system for removing dust (sand) and dirt from the surface of the solar/photovoltaic panels. Also includes interconnections between panels and repair of panels. Mechanical details of roof structures are coded under X15-A02X only. Details of single cells and assemblies of cells (including interconnections between individual cells) are coded under X15-A02A and X15-A02B, respectively.

Solar cell modules, panels, tiles, anti-reflective coating

X15-A02D [2002]

Photoelectrochemical cells

(X15-A02A)

See also X16-A04 and other X16 codes for more detailed breakdown of the details of such cells, and U12-A02 codes.

X15-A02D1 [2005]

Dye-sensitised solar cells

Includes the use of an organic dye and electrolyte for absorbing solar energy and hole transport.

DSSC, Gratzel cells

X15-A02E [2002]

Thermophotovoltaic cells

Includes cells where IR rays are converted to electricity. See also U12-A02 codes.

X15-A02F [2005]

Organic solar cells

Includes cells that use electron-acceptor and electron-donor organic materials.

X15-A02X [2010]

Other solar/photovoltaic panels/cells details

Includes mechanical details of roof structures. Mechanical details of solar/photovoltaic panels, modules or tiles are coded under X15-A02C only. Includes wiring to solar battery, details of junction boxes (also covered by V04-B09 and X12-G04B codes), cooling arrangements and solar module packaging. Packaging details of electronic goods are also coded under Q34-M02.

X15-A04 [2002]

Small scale solar power generation

Covers generation of electricity, for example, to power watches, calculators, etc. Also includes domestic or micro installations. This code is used in conjunction with other X15-A codes.

X15-A05 [2002]

Large scale solar power generation

Covers high power systems, for example, for powering space crafts, vehicles, etc. Includes solar systems installed on roofs of buildings (see also X27-E01A5 for domestic solar heating systems). This code is used in conjunction with the above relevant codes.

Solar-powered vehicles, solar water heating system

X15-A05A [2010]

Solar tower; Solar chimney

Includes use of greenhouse structure to heat air to create updraft in tower containing turbines to generate power.

X15-A05B [2010]

Solar Stirling engine

Includes use of concentrated solar energy as heat source within engine.

X15-A05H* [2010-2015]

Hybrid/Combination plant

*This code is now discontinued and has been transferred to X15-A10 from 201601. It remains searchable for records prior to 2016.

Includes solar thermal plants that are combined with other (including fossil fuel-based) heat or electricity generating equipment to cope with overcast skies or night operation. Details of combination plants not involving solar power are coded under X15-J.

X15-A05X [2010]

Other large scale solar power generation

X15-A08 [2010]

Control, monitoring and testing

Includes control, monitoring and testing details of solar and photovoltaic cells, solar heat collecting devices and concentrators. This code is used in conjunction with other X15-A codes as appropriate. Also includes solar cell evaluation apparatus or solar simulator e.g. to measure theoretical outputs of solar panels.

Simulation

X15-A09

Other solar power aspects

Includes use of solar energy to raise steam for driving generators. Excludes solar energy for heating water, which is covered by X27-E01A codes.

X15-A10 [2016]

Hybrid/Combination plant

(X15-A05H)

Includes solar thermal plants that are combined with other (including fossil fuel-based) heat or electricity generating equipment to cope with overcast skies or night operation. Also see X15-A05 for large scale solar combined plant. Also includes small scale combined solar and wind turbine power generation (also see X15-A04 for small scale solar combined power generators). Details of combination plants not involving solar power are coded under X15-J.

X15-A11 [2026]

Off-shore/floating systems

Floatovoltaic, floating solar farm

X15-A15 [2019]

Manufacture, servicing and maintenance (solar power)

Includes manufacture, servicing and maintenance details of solar power energy plants. This code is used in conjunction with other X15-A codes as appropriate.

X15-B

Wind power

Includes arrangements for electricity generation using wind power. Details of converters and interconnection to the utility mains are covered by, respectively, U24-D/X12-J and X12-H01B codes. Details of redox batteries, such as vanadium redox batteries, used for storing energy generated from wind farms to supply power during low generation periods, are coded under X16-C.

X15-B01

Motors

Constructional details, e.g. gearing systems, clutches, cooling and ventilating systems, manufacture details, rotors and stators details, etc, are also covered by X11-J codes. Blade details are covered by X15-B01C.

X15-B01A [1987]

Turbines

Vanes, windmills, drives

X15-B01A1 [2005]

Large scale

X15-B01A3 [2005]

Small scale

Includes microturbines, e.g. those located at the bottom of a chimney, vehicles, e.g. electric vehicles, etc. For small scale power plants, see X15-B04.

X15-B01A5 [2010]

Horizontal turbines

X15-B01A6 [2010]

Vertical turbines

X15-B01B [1987]

Generators

See also X11.

Asynchronous, synchronous

X15-B01C [2010]

Blade design; Blade material

Includes construction details of blades, including design, materials of blades per se, and attachments for connecting/supporting the blades.

Damping arrangement, de-icing

X15-B02 [2005]

On-shore systems

This code is used in conjunction with other codes as appropriate.

X15-B03 [2005]

Off-shore systems

This code is used in conjunction with other codes as appropriate.

X15-B04 [2006]

Small scale power plant

This code is used in conjunction with other codes as required to indicate the small scale nature, where disclosed, of the plant such as used in vehicles, within a chimney etc.

Small size

X15-B05 [2006]

Control, monitoring and testing

Includes electrical aspects only. Includes blade pitch control, control of blade angle, noise emission monitoring, etc.

Speed control, simulation, speed prediction

X15-B06 [2006]

Support structures

Includes wind turbine tower and its manufacturing.

X15-B09

Other wind power aspects

Includes details of lightning protection system, transportation of wind turbine blades (see also Q15-B12), etc.

Bearing

X15-B15 [2019]

Manufacture, servicing and maintenance (wind power)

Includes manufacture, servicing and maintenance details of wind power energy plants. This code is used in conjunction with other X15-B codes as appropriate.

X15-C

Sea power

Includes use of heat differential between different depths. Hydroelectric power generation using water turbines driven by river flow or river falls is coded under X11-B only.

Details of power plant, e.g. turbines, blades, etc, are also covered under X11-B and X11-J codes.

Details of osmotic power or salinity gradient power are covered by both X11-B09 and X15-C.

Ocean currents, ocean thermal energy conversion, vortex power

X15-C01 [1983]

Wave power

X15-C01A [2010]

Wave energy capture methods

X15-C01A1 [2010]

Point absorbers; Buoys

Includes floating structure with components that move relative to each other due to wave action.

Salter duck[®], Edinburgh duck[®], buoyant moored device

X15-C01A2 [2010]

Attenuators; Surface following

Includes long multi-segment floating structures oriented parallel to the direction of the waves that flex at the segments and drive hydraulic pumps or other converters.

Hinged contour device, Pelamis[®]

X15-C01A3 [2010]

Terminator devices; Oscillating water columns

Includes devices that extend perpendicular to the direction of wave propagation and capture or reflect the power of the wave.

OWC

X15-C01A4 [2010]

Overtopping devices

Includes reservoirs that are filled by incoming waves to levels above the average surrounding ocean and where gravity causes the water released to fall back and drive hydro turbines.

X15-C01A9 [2010]

Other wave energy capture methods

X15-C01B [2010]

Installation location

X15-C01B1 [2010]

On-shore installation

X15-C01B2 [2010]

Near-shore/Off-shore installation

X15-C01C [2010]

Power take-off

Includes details of power take-offs such as hydraulic ram, elastomeric hose pump, pump-to-shore, hydroelectric turbine, air turbine and linear electrical generator.

X15-C02	[2005]
Tide energy	
<i>Tidal, tides</i>	
X15-C02A	[2010]
Tide energy plant type	
X15-C02A1	[2010]
Tidal stream systems	
X15-C02A2	[2010]
Barrages	
X15-C02A3	[2010]
Tidal lagoon	
X15-C02A9	[2010]
Other tide energy plant type	
X15-C02B	[2010]
Novel turbine arrangements	
X15-C03	[2010]
Control, monitoring and testing	
Includes control, monitoring and testing details of either wave power and/or tide energy plants. This code is used in conjunction with other X15-C codes as appropriate.	
<i>Simulation</i>	
X15-C15	[2019]
Manufacture, servicing and maintenance (sea power)	
Includes manufacture, servicing and maintenance details of sea power energy plants. This code is used in conjunction with other X15-C codes as appropriate.	
X15-C99	[2026]
Other ocean/water based power generation	
Includes buoyancy energy storage and deep ocean gravitational energy storage to provide e.g. storage of offshore wind power for later use or for compression of hydrogen. Also includes underwater pumped storage systems.	
<i>BEST, BBES, buoyancy battery energy storage, underwater pumped hydro storage, Ocean battery</i>	

X15-D	[1997]
Thermoelectric power generation	
(X15-X)	
Includes details of thermoelectric generators that convert heat directly into electricity, or generate power from temperature difference (Seebeck effect). Details of thermoelectric devices applied to refrigeration using the Peltier effect are coded under X27-F02B1 only. See also U14 codes.	
<i>Thermovoltaic elements, thermoelectric battery</i>	
X15-E	[1997]
Biomass, biofuel and waste fuel combustion power generation	
(X15-X)	
Includes electrical details of power generation using biomass, waste fuel and biofuels. Biofuels, including their production, are covered by CPI codes. Also includes systems such as electrostatic precipitators for reducing nitrogen oxides, volatile organic compounds and particulate emissions.	
<i>Waste-to-Energy</i>	
X15-G	[2010]
Geothermal power	
(X15-X)	
X15-G01	[2011]
Electricity generation	
Includes generation of electricity from steam produced by heating water pumped down to underground hot rocks.	
<i>Geothermal power</i>	
X15-G02	[2011]
Thermal power	
Includes use of geothermal energy for water heating and provision of hot water to homes and buildings.	
<i>Geothermal heating</i>	
X15-H	[2010]
Profiting from waste heat	
Includes waste heat recovery arrangements, e.g. for recovering heat from sewage or waste water for use in water heating (see X27-E03) e.g. for shower or dishwasher. See X11-C04 instead for combined heat and power plants per se.	

X15-J [2011]

Combined cycle plant

Includes electric power generation by combinations of different non-fossil fuel sources or combinations of non-fossil fuel and other fossil fuel sources such as gas turbines (see also X11-C01). Details of combination plants involving solar power are also coded under X15-A05H (pre-2016).

See X11-C03 only for electric power generation solely using fossil fuel sources.

Hybrid

X15-K [2011]

Cogeneration plant

Includes provision of combined heat and electric power using non-fossil fuel sources.

Combined heat and electric power generation using fossil fuel sources are coded under X11-C04.

CHP

X15-R [2025]

Recycling processes & systems

This code is used in conjunction with other X15-A to X15-X codes as appropriate. See also U11-H for end of life-cycle product recycling, X25-W04 for electrical details of recycling processes/systems or X12-D07 codes for salvaging of cables.

X15-T [2011]

Power generation from traffic flow

(X15-X)

Includes using vehicular traffic flow, animal or human traffic flow etc. to generate electricity. Includes use of compressible hydraulic cylinders or piezoelectric generators buried beneath road that use weight of traffic passing over them to generate electricity.

Parasitic energy harvesting, hydraulic compressible speed bump

X15-V [2011]

Control, monitoring and testing

Includes control, monitoring and testing details of all X15 sections other than X15-A (solar power), X15-B (wind power) and X15-C (sea power).

Control, monitoring and testing details for solar, wind and sea power are only coded under X15-A08, X15-B05 and X15-C03 respectively.

Simulation

X15-W [2011]

Constructional details, manufacture, servicing and maintenance

Includes constructional, manufacturing, servicing and maintenance details for all X15 sections other than X15-A (solar power), X15-B (wind power) and X15-C (sea power). This code is used in conjunction with other X15-D to X15-X codes as appropriate.

X15-X

Other non-conventional power generation

Includes non-conventional power generation systems that can't be coded elsewhere, such as power generated from muscle contraction/relaxation, human exercise. From 2010, geothermal plants are transferred to X15-G. From 2011, generation of electricity from vehicular, animal or human traffic flow is transferred to X15-T.

X16: Electrochemical Storage

NOTES:

- (1) Manufacture of a cell of a particular type is coded with the cell.
- (2) General details like lead acid battery cases are coded with the cell type and its relevant code e.g. X16-F01 and X16-B01B.
- (3) Electrode details are not coded with the cell type if specific provision is made in X16-E.

X16-A

Non-rechargeable or primary cells

Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-A code(s) to highlight the type of primary cells/batteries. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), and battery/cell materials recovery and recycling (X16-M).

X16-A01

With aqueous electrolyte

X16-A01A

Dry cells

Button cells, Zinc-carbon battery

X16-A01B [1992]

Metal-air cell

(X16-A01X, X16-D)

See also X16-D.

Zinc-air

X16-A01X

Other primary cells

X16-A02

With non-aqueous electrolyte

X16-A02A [1987]

Lithium-based cell

Lithium-copper oxide, lithium-thionyl chloride, lithium-chromoxide, lithium-manganese dioxide, lithium-sulphur dioxide, lithium-polycarbon monofluoride

X16-A03 [1987]

Reserve cells

X16-A03A [1987]

Thermal cells

X16-A03B [1987]

Sea-water cells

(X16-A01X)

X16-A04 [1987]

Photoelectrochemical cells

See also U12-A02A and X15-A02D codes.

X16-A05 [2005]

Micro- and printed-primary cell

To be used together with the battery electrolyte type e.g. non-aqueous cell.

X16-B

Rechargeable or secondary cells

Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-B code(s) to highlight the type of secondary cells/batteries. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), and battery/cell materials recovery and recycling (X16-M).

X16-B01

Cells

X16-B01A

Alkaline

Nickel-zinc, alkali

X16-B01A1 [1992]

Nickel-cadmium

X16-B01A3 [1992]

Metal-hydrogen

(X16-B01A, X16-B01X)

Includes nickel-hydrogen, etc. cells.

X16-B01B

Lead-acid

Also includes recombination type and valve regulated lead acid (VRLA) type.

X16-B01C

Sodium-sulphur cells

X16-B01C1 [1992]
High-temperature sodium-sulphur cells

X16-B01C2 [2024]
Low-temperature / Room-temperature sodium-sulphur cells

RT-Na-S

X16-B01D [1987]
Metal-halogen

(X16-B01X)

See also X16-D02.

X16-B01F [1992]
Non-aqueous

(X16-B01X)

Includes organic electrolytes.

X16-B01F1 [1992]
Lithium-based

(X16-B01X)

Includes secondary lithium cells when the state of the electrolyte is not known.

Lithium iron phosphate battery, LFP, lithium sulphur battery

X16-B01F1A [2005]
Lithium-based cells with liquid electrolytes

Includes lithium-sulphur batteries.

Li-S battery

X16-B01F1C [2005]
Lithium-based cells with solid electrolytes

Includes lithium based solid state batteries. See X16-B01S for solid state batteries in general.

SSB

X16-B01G [2005]
Micro- and printed-secondary cells

To be used together with any other battery electrolyte-type cell e.g. alkaline.

X16-B01S [2023]
Solid State batteries

Includes batteries with solid electrolyte. Also see X16-B01F1C for lithium based solid state batteries. See also X16-J01 for solid electrolytes per se. For quasi solid-state electrolytes see X16-J01G instead.

SSB

X16-B01X
Other secondary cells
Includes gas-tight accumulators.

X16-B02 [2026]
Additives; performance-enhancers

Includes use of additive materials such as graphene, e.g. incorporated into electrodes of Li-ion or solid state batteries (see also X16-B01F1 and X16-B01S respectively) to improve battery performance. Also see E05-U05 for nanomaterials such as graphene. Can be used with other X16-B codes as appropriate.

Graphene battery

X16-B09
Other secondary cells' aspects

Includes servicing, maintenance and battery/cell reconditioning. If recycling, see also X16-M and X25-W04.

X16-C
Fuel cells and associated components

Fuel cell electrodes, casings and electrolytes are coded under X16-E06A, X16-C18 and X16-J codes respectively. Cooling, heating and air-conditioning details are coded under X16-K codes, and also under one or more X16-C code(s) to highlight the type of fuel cells. The same applies to battery charging (X16-G codes), battery measurements and testing (X16-H codes), battery/cell materials recovery/recycling (X16-M) and manufacturing details (X16-S).

Redox cell, oxidants, VRB, Vanadium redox battery

X16-C01 [1992]
Solid oxide and solid polymer fuel cell

X16-C01A [1997]
Solid oxide fuel cell

Includes cells using e.g. zirconium oxide electrolyte.

SOFC

X16-C01A1 [2005]
Tubular
Includes tubular solid oxide electrolyte with inner and outer electrodes.

X16-C01A3 [2005]
Monolithic
Includes planar and corrugated solid oxide electrolyte with electrodes on its major surfaces.

X16-C01C [1997]
Solid polymer fuel cell
PEM, SPEFC, SPE fuel cell, proton exchange membrane, solid polyethylene fuel cell, SPFC, PEMFC, direct methanol fuel cell, DMFC

X16-C02	[1992]
Molten carbonate fuel cell	
<i>MCFC</i>	
X16-C03	[1992]
Alkaline fuel cell	
<i>AFC</i>	
X16-C04	[1992]
Phosphoric acid fuel cell	
<i>PAFC</i>	
X16-C06	[2005]
Bio-fuel cell	
Includes, for example, cells with electrodes having a 'bio' catalyst.	
X16-C07	[2005]
Micro/flat fuel cell	
Includes fuel cells using, for example, a small replaceable fuel tank. To be used together with the type of cell such as SOFC.	
X16-C09	[1992]
Control	
Includes catalyst temperature control using fuel and air flow, gas and air circulation, etc.	
X16-C15	[1992]
Fuel/gas supply arrangements, storage facility; Combustion products/exhaust gas handling	
X16-C15A	[2005]
Fuel/gas supply arrangements	
For supplying gas to electrodes.	
X16-C15A1	[2005]
Manifolds	
X16-C15A2	[2005]
Flow plates	
<i>Bipolar plates</i>	
X16-C15A3	[2005]
Fuel wicking	
X16-C15A4	[2005]
Liquid and air transmission pump	
X16-C15C	[2005]
Fuel storage facility	

X16-C15C1	[2005]
Bulk storage facility	
X16-C15C2	[2005]
Replaceable fuel container	
<i>Cartridge, reservoir, cassette, tank</i>	
X16-C15C3	[2005]
Hydrogen storage/absorption material	
X16-C15C3A	[2005]
Nanomaterial/nanotube	
X16-C15E	[2005]
Exhaust/waste handling	
X16-C16	[1997]
Anode and cathode gases separators or separating arrangements	
<i>(X16-F02)</i>	
See X16-F02 for other membranes and anode and cathode separators.	
X16-C17	[1997]
Fuel processing	
X16-C17A	[2005]
Hydrogen generation	
Includes all aspects of hydrogen manufacture if for ultimate, stated use in fuel cells.	
X16-C17A1	[2005]
Reformer	
Includes extraction of hydrogen from hydrocarbons such as methanol, gasoline, etc.	
X16-C17C	[2005]
Catalyst	
For electrode catalyst, see X16-E06A5A.	
X16-C17E	[2005]
Heater	
Includes heating arrangement for fuel processing. For battery and fuel cell heating, see X16-K02.	
X16-C18	[2005]
Fuel cell housing, stack, and sealing arrangements	
<i>(X16-F01, X16-F01A, X16-F06)</i>	
See X16-F codes for batteries.	

X16-D

Hybrid cells, etc.

Includes fuel cell in combination with primary or secondary cell.

X16-D01 [1992]

Metal-air

X16-D02 [1992]

Metal-halogen

X16-E

Electrodes

X16-E01, X16-E02 are either used on their own or in conjunction with the relevant battery type.

X16-E01

Active materials

X16-E01A [1992]

Organic compounds

X16-E01A1 [1992]

Polymers

X16-E01C [1992]

Inorganic compounds

X16-E01C1 [1992]

Oxides, complex oxides

X16-E01E [1992]

Conductive material

X16-E01G [1992]

Manufacturing

X16-E01H [1992]

Characterised by active material size/structure

To be used together with X16-E01A/E01C codes.

X16-E01H1 [2005]

Nanomaterials

To be used together with X16-E01A/E01C codes. See also E05-U05 codes for nanomaterials such as graphene.

Graphene

X16-E01J [2005]

Binders and fillers

(X16-E09)

X16-E02

Carriers, plates, collectors

Collectors, grids, supports

X16-E03

Primary cell electrodes

X16-E03A [1992]

Non-aqueous electrolyte

X16-E03A1 [1997]

Lithium-based non-aqueous electrolyte

X16-E04

Lead-acid accumulator electrodes

X16-E05

Alkaline accumulator electrodes

X16-E05A [1992]

Nickel-cadmium

X16-E05C [1992]

Metal-hydrogen

(X16-E05, X16-E09)

Includes nickel-hydrogen, etc. cells. Also includes hydrogen storage alloys.

X16-E06

Fuel and hybrid cell electrodes

Also includes inert electrodes and catalysts.

X16-E06A [1992]

Fuel cell

X16-E06A1 [2005]

Electrode materials

Includes all 'active' materials for the electrodes and catalysts. For fuel processor catalyst, see X16-C17C1.

X16-E06A1A [2005]

Nanomaterials/nanotubes

Nanocarbon

X16-E06A5 [2005]

Electrode details

Includes constructional and arrangement details of electrodes.

X16-E06A5A [2005]

Catalyst

For fuel processor catalyst, see X16-C17C1.

X16-E06A5C	[2005]
Membrane electrode assembly	
<i>MEA</i>	
X16-E06A5E	[2005]
Gas diffusion layer	
<i>GDL</i>	
X16-E06C	[1992]
Hybrid	
<i>(X16-E06,X16-E09)</i>	
X16-E06C1	[1992]
Metal-air	
X16-E06C2	[1992]
Metal-halogen	
X16-E07	[1987]
Depolariser	
<i>(X16-X)</i>	
X16-E08	[1992]
Non-aqueous electrolyte cell electrodes	
<i>(X16-E09)</i>	
X16-E08A	[1992]
Lithium-based	
<i>(X16-E09)</i>	
X16-E09	
Other electrode aspects	
Includes electrodes not coded above and miscellaneous items relating to electrodes.	
<i>Surfactant</i>	
X16-E10	[1992]
Sodium-sulphur	
<i>(X16-E09)</i>	
X16-E11	[2005]
Photoelectrochemical cell electrode	
See also U12-A02 and X15-A02 codes for solar cells.	
X16-F	
Constructional details of cells or batteries	
X16-F01	
Cases, seals, shapes	
For battery holders, see X16-F06 codes.	

X16-F01A	[1987]
Sealing arrangement	
<i>Gaskets</i>	
X16-F01C	[2005]
Casing	
Used in conjunction with X16-F01A and X16-F01F codes when appropriate.	
<i>Covers, containers, housings, walls, lids</i>	
X16-F01F	[1992]
Characterised by shape of casing	
Used when casing/sealing arrangement is novel.	
X16-F01F1	[1992]
Button/coin	
X16-F01F2	[1992]
Cylindrical/tubular	
X16-F01F3	[1992]
Prismatic	
X16-F01F4	[2005]
Micro- or printed-battery	
X16-F02	
Separators, membranes, spacers	
Steam separators are not coded here but under X16-K01 only, and fuel cell separators are coded under X16-C16 only.	
<i>Cotton, nylon, polypropylene, cellulose-rayon, cellulose-nylon, cellulose-nylon paper, polyethylene, cellophane, polytetrafluoroethylene, woven, non-woven, diaphragm</i>	
X16-F03	
Terminals, internal connections, vents, filler caps	
X16-F03A	[1987]
Terminals; Internal connections	
X16-F03A1	[2005]
Terminals	
Includes externally accessible terminals to contact any equipment being powered by the battery. See X16-F05 for connections used for grouping cells or batteries to form packs.	
X16-F03A3	[2005]
Internal connections	
Includes internal connections within cell or battery, inaccessible on the outside.	

X16-F03B [1987]

Vents, filler caps

Includes arrangement for filling/topping-up with liquids (e.g. electrolytes), or for draining liquids from the casing.

Valves, safety devices, pressure relief

X16-F04 [1987]

Electrolyte circulating arrangement

(X16-F09)

Includes arrangement for stirring the electrolyte.

X16-F05 [1987]

Battery connectors; Jumper cables

(X16-F09)

Details of internal connections are coded under X16-F03A3. Includes connectors for connecting terminals of adjacent batteries or connecting cells outside a battery casing. See also V04 for connectors.

Clamps, interconnectors

X16-F06 [1992]

**Battery holder/compartiment associated with electrical/electronic equipment;
Battery packs; Charging pods**

(X16-F09)

Grouped/stacked fuel cells are covered by X16-C codes.

X16-F06A [2005]

Battery packs

Also covers individual batteries or cells grouped together by external connectors such as groups of batteries for electric vehicles, power station batteries, etc. Battery packs using a specific type of cell such as alkaline are also covered by X16-B01 codes.

Battery module

X16-F06C [2005]

Battery compartment/holder associated with electrical/electronic equipment

See also V04-S03 for casings incorporating such holders/compartments.

X16-F06E [2005]

Charging pods; Cells or battery holder

Includes constructional details. For battery charging circuits, see X16-G codes.

X16-F06E1 [2005]

Charging pods

Includes battery-powered equipment holders designed for charging the battery.

X16-F06E2 [2005]

Cell or battery holder

Includes battery or cell, per se, holder for charging. For example, a mains plug adapter with charging circuit within and section for holding cells to be charged.

X16-F09

Other cell constructional details

Includes getter, packaging carton, theft prevention, nameplate labels, vibration damping arrangements, protection against corrosion/dust/water, arrangement for preventing undesired use such as automatic interruption of current due to temperature change, shock, etc.

Guarantee label, waterproof, dustproof

X16-G

Battery chargers

Includes constructional details of battery chargers.

X16-G01

Using mains supply

Includes AC mains charging and DC mains charging, e.g. DC supercharger for electric vehicle (see also X21-B01A1C). See X12-J codes for power conversion per se.

X16-G02

Using other sources

Jumper cables are coded in X16-F05.

X16-G02A [1983]

Using solar cells

X16-G02B [2002]

Using another battery

X16-G02C [2002]

Using generator

Includes battery charging using an electric generator.

Piezoelectric

X16-G02C1 [2008]

IC engine-driven

X16-G02C2 [2008]

Wind power-driven

X16-G03	[2005]
Non-contact charger units	
To be used in conjunction with other codes. For example, non-contact mains charger is also coded in X16-G01.	
X16-H	[1987]
Battery measurements and testing	
(X16-G)	
Includes electrical and non-electrical measurements.	
X16-H01	[1992]
Remaining charge	
See also S01-G06 codes.	
X16-H02	[1992]
Measurements / testing associated with intrinsic / extrinsic properties	
Includes sensing level, density or humidity of electrolytes, detecting leakage of electrolyte solution, measuring durability of electrolyte film, measuring fuel (e.g. hydrogen) level, concentration or density, measuring specific gravity of electrolytes, measuring membrane air permeability, etc. Temperature control / monitoring is coded under X16-H05 only. See also relevant S codes, e.g. S02-C06 codes for level measurements.	
X16-H03	[2002]
Voltage/current	
See also S01-D and S01-G06 codes.	
X16-H04	[2002]
Battery classification	
Includes testing to classify battery into different types.	
X16-H05	[2009]
Temperature	
Includes details of temperature control and monitoring. See also S03-B codes for temperature measurements.	
X16-H09	[2002]
Smart battery	
This code is used where a battery provides power to an equipment and also stores status data and/or has the facility to transfer this data to the equipment.	

X16-J	[1987]
Electrolytes	
(X16-X)	
Includes dendrite inhibitor, composition.	
X16-J01	[1992]
Solid	
Includes gel electrolyte as well.	
X16-J01A	[1992]
Organic	
X16-J01C	[1992]
Inorganic	
X16-J01E	[2005]
Nanomaterials	
To be used together with other appropriate X16-J codes.	
X16-J01G	[2005]
Gel	
To be used together with other appropriate X16-J codes.	
<i>Quasi solid state</i>	
X16-J02	[1992]
Liquid	
X16-J03	[1992]
Molten/fused salt	
Includes electrolytes which are normally solid at room temperature but liquid at operating temperatures.	
X16-J07	[1992]
Aqueous	
X16-J08	[1992]
Non-aqueous	
X16-J09	[1992]
Electrolyte holders or matrix	
X16-K	[1987]
Battery cooling, heating, etc.	
(X16-X)	
X16-K01	[2005]
Cooling	
<i>Water cooled, refrigeration, baths, coolant circulation, steam separator</i>	

X16-K02 [2005]

Heating

Includes, for example, heating to aid correct battery operation.

X16-K03 [2005]

Air conditioning

Includes humidification, such as moisture introduction within a fuel cell gas, PEMFC humidity control, etc

X16-L [1987]

Other types of electric energy storage

(X16-X)

Includes non-chemical and non-battery types of storage of electric energy. See also X12-H codes for storage of excess generated energy. Does not include pumped storage hydroelectric systems. Includes flywheel storage systems.

X16-L01 [1987]

Storage heaters

See also X27-E01A4.

X16-L02 [1987]

Capacitors

Includes capacitors of the type used for supplying power e.g. electrochemical double layer capacitor/supercapacitor (see also V01-B01D codes).

X16-M [2002]

Battery materials recovery

Includes recovery and recycling details. See also X16-A, X16-B, X16-C codes to highlight the type of batteries/cells. See also X25-W04 for electrical recycling details. Details of battery manufacturing are coded under X16-S.

X16-S [2020]

Manufacture, servicing & maintenance of batteries/cells

Includes all apparatus, mechanisms and method used during the manufacture, servicing and maintenance of battery parts. Includes injection of electrolytes. Details of battery materials recovery are coded under X16-M only. Manufacture of active materials is coded under X16-E01G only. See also other X16 codes as appropriate to highlight the type of batteries/cells manufactured. Prior to 2020, manufacturing details of batteries were coded in X16-X.

Modelling, simulation, repair

X16-X

Other general battery aspects

From 2020, manufacturing details of batteries are coded under X16-S.

X21: Electric Vehicles

X21-A

Electric propulsion and braking

X21-A01

Electric propulsion

Includes all aspects of electric traction for ridden vehicles except electric train/tram (see X23-A codes), electric luggage trolleys (see X25-F05 codes) and electric ship propulsion (see W06-C01 codes). Also, any application not catered for specifically is included. In general, this code will be used in conjunction with other claimed aspects e.g. heating systems.

X21-A01A [1987]

Wheelchair

Includes invalid carriages and mobility vehicles for disabled persons. Also see S05-G02A for wheelchairs or S05-K01 for mobility aids. See Q22-C02 for novel mechanical details of wheelchairs.

X21-A01B [1987]

Forklift truck

Includes electric motor driven forklift trucks (see also X25-F05A). See also X21-X for novel hydraulic fork assemblies. IC engine-driven trucks are instead coded in X22-P05F and X25-F05A, as well as other X22 codes as appropriate depending on the claimed aspects.

X21-A01C [1997]

Electric bicycle

Includes electric tricycle.

X21-A01D [1997]

Hybrid vehicle

Includes vehicles utilising electric traction motor and other power source, i.e. internal combustion engine. Can be used in conjunction with other X21-A01 codes such as X21-A01H for hybrid bus.

HEV, PHEV, plug-in hybrid vehicle

X21-A01D1 [2002]

Parallel hybrid vehicle

Includes vehicle whose wheels are driven by both electric motor and e.g. internal combustion engine, including four wheel drive type vehicles where IC engine drives front wheels and electric motor(s) drive rear wheels. Also see X22-P04A and other relevant X22 codes.

X21-A01D3 [2002]

Series hybrid vehicle

Includes vehicle with electric traction motor and battery that is charged e.g. by IC engine driven generator. See also X21-B04C for on-board IC engine driven generator. Previously coded as electric vehicle in X21-A01F and X21-B04C and not X21-A01D as only electric traction present.

X21-A01E [1997]

Electric golf cart

Excludes electric golf trolley. See also W04-X01F codes.

X21-A01F [1997]

Electric motor car

Includes electric vehicles (EV). Can also be applied to indicate general or unspecified electric vehicle application. See X21-A01J instead for fuel cell powered electric vehicles.

X21-A01G [2002]

Electric scooter/motorcycle

See W04-X03E2 for child's electric toy scooter.

X21-A01H [2002]

Electric bus/lorry

Includes trolley buses, trucks and other commercial vehicles. See X23 only for trams.

X21-A01J [2007]

Fuel cell vehicle

(X21-A01F)

Includes electric vehicles powered using fuel cell technology. Can be used in conjunction with other X21-A01 codes as appropriate, e.g. X21-A01H for fuel cell bus. See X21-A01F for battery driven electric vehicles. Unspecified vehicles using fuel cells are considered to be electrically-propelled vehicles rather than motor vehicles and are thus coded here.

FCV

X21-A01L [2015]

Driverless/autonomous electric vehicles

Includes electric vehicles that can drive themselves. Used with other X21 codes as required, e.g. X21-H for automatic steering and X21-A05 for safety/monitoring arrangements.

X21-A01M [2002]

Other electric vehicles

Includes riding or ride-on type electrically propelled mowers (see also X27-A01A) as well as personal electric transportation devices such as self-balancing vehicle or electric skateboard. See W04-X03E2 for outdoor toys such as skateboards. *Segway®, hoverboard*

X21-A01N [2026]

Agricultural electric vehicle

Includes electric agricultural tractors, combine harvesters, etc. See also X25-N codes. *Agriculture, farm*

X21-A01P [2026]

Construction electric vehicle

Includes loader, bulldozer, crane, mine truck etc. Also see X25-D codes for soil-shifting and mining per se. *Mining*

X21-A01R [2021]

Recreational electric vehicles

Includes electric recreational vehicles such as camper, go-kart, RV, ATV, electric snowmobile or electric ski cycle.

X21-A02

Mounting of propulsion units; Gearing

X21-A02A [2002]

Transmission system and its control

Includes control of clutch, gear ratio and general transmission details. *Gearing, clutch, drive shafts*

X21-A02C [2021]

Thermal management of transmission systems

Includes transmission cooling arrangements. See also X11-J codes for high power motor/transmission cooling.

X21-A03

Electrodynamic and (electro)mechanical brake systems

Includes electrical details of thermal management of electric braking systems. See also Q18-A05 for mechanical details and X11-J06 codes for cooling of motors used in electromechanical/electrodynamic brake systems.

X21-A03A [1997]

(Electro)mechanical

Also includes mechanical friction brakes with additional electrical details. *ABS, anti-lock braking*

X21-A03C [1997]

Electrodynamic

Includes regenerative, resistive and eddy current braking. See also V06-N06 and X13-F02 codes.

X21-A04

Traction motor speed or torque control

See also V06-N, X13-F03 and X13-G01 codes. Includes control of motor output torque, e.g. to supplement torque delivered to wheels by IC engine of hybrid vehicle during gear shifting (see also X21-A01D1 and X22 codes as appropriate).

X21-A04A [1997]

Rectifier control

See also U24-D, X12-J and X13-H03B codes.

X21-A04C [1997]

Inverter control

See also U24-D, X12-J and X13-H03A codes.

X21-A05

Safety; Monitoring; Instrumentation

From 2010 this code has been expanded to include general instrumentation, e.g. for vehicle dashboard. Includes protective arrangements, anti-collision systems etc. Also includes overall arrangements for determining whether it is safe to operate in autonomous driving mode. See also X21-A01L for autonomous electric vehicles per se.

X21-A05A [2013]

Safety systems

Includes electric vehicle safety systems such as cameras for internal/external view, airbags, seatbelts, horns, anti-collision systems, noise generators to make vehicle more noticeable to pedestrians etc.

X21-A05A1 [2022]

Passenger and pedestrian protection

Includes airbags to protect vehicle occupants or pedestrians, seat belts, active head restraints etc.

X21-A05A2 [2022]

External view and internal-view cameras

Includes rear-view reversing cameras and 'enhanced' or 'assisted' vision cameras/display.

X21-A05A3 [2022]

Horns, noise generators

Includes noise generators to make vehicle more noticeable to pedestrians etc.

Pedestrian awareness

X21-A05A5 [2022]

Anti-collision and parking systems

Includes radar, sonar and LIDAR. Also see W06-A04 for radar details, W06-A05 for sonar details and W06-A06 for LIDAR details.

X21-A05E [2013]

Monitoring; Instrumentation

Includes general instrumentation, e.g. for vehicle dashboard. Use in conjunction with X21-A06 codes to indicate the variable being monitored such as X21-A06D for monitoring remaining battery capacity.

X21-A05E6 [2024]

Navigational aids

Includes general navigation systems and information processing aspects of vehicle guidance systems.

GPS, GNSS, dead reckoning, beacons, inertial navigation

X21-A05E7 [2024]

Collision-imminence warning/alarm

Includes lane deviation or crossing alarms, and distance to obstacle indicator. For control of systems to prevent collision, see X21-A05A5.

Road marking sensor, lane marking sensor, deviation, collision warning display

X21-A05E9 [2024]

Service-need/vehicle system malfunction displays

Includes lights and alarms for indicating faults/problems with any onboard systems.

Fault, failure

X21-A05E99 [2025]

Other instrumentation

Includes dashboard instrumentation and driver/occupant warnings not covered previously.

X21-A06 [1997]

Measurements

(X21-A05)

Includes battery remaining charge indicators (see also S01-G, X16-H and X21-B01 codes), maximum distance before need for recharging, speed, novel sensors, etc.

X21-A06A [2021]

Speed and slip sensor

Includes sensing of wheel speed or general vehicle speed.

X21-A06B [2021]

Acceleration and shock sensor

Includes measurement of acceleration, deceleration and shock or impact sensing.

X21-A06C [2021]

Temperature sensor

Includes measurement of battery, motor and other system temperatures.

X21-A06D [2021]

Current and voltage sensors

Includes measurement of electrical parameters such as remaining battery capacity (see also X21-A05E for battery SOS and battery condition alerts). See also X16-H codes and S01-G06A.

SOC, State of charge

X21-A06F [2021]

Distance and deviation sensors

Includes measurement of distance to object and distance between vehicles to maintain safe distance. Also includes lane deviation measurement. See also X21-A05 codes for safety and monitoring per se.

X21-A06H [2021]

Position or angle sensors

Includes rotary or angular position sensing (see also S02-A10D codes), resolvers, encoders (see also U21-A03J).

X21-A06X [2021]

Other vehicle measurements

X21-A07 [1997]

Electric traction motor; Motor-generator

Includes details of the traction motor per se. See also V06-M and X11 codes for further detailed breakdown of motor details. Also includes motor-generator. See X11-H20 for motor-generators per se. See X11-J06 for motor cooling details.

X21-B

Power supply and related aspects

X21-B01

Battery and fuel cell arrangements

Includes traction batteries and fuel cells, and their charging (see also X16).

X21-B01A [1997]

Traction battery; Fuel cell

Includes novel battery and fuel cell details and their grouping to attain higher operating voltage. See also X16 codes for a more detailed breakdown of batteries and fuel cells (X16-C), per se.

Hydrogen fuel arrangements

X21-B01A1 [1997]

Charging arrangements

See also X16-G codes. Includes battery discharging arrangements, e.g. to fully discharge battery before recharging.

X21-B01A1A [1997]

On-board charging systems

Includes charging battery using onboard device such as generator. Also see X16-G02C for battery charging using generator.

X21-B01A1C [1997]

Off-board charging systems

Includes use of off-board mains supply. See X16-G01 for mains battery charging. Also see X16-G03 for wireless battery charging and X12-H01E codes for non-contact power distribution. Details of charging sockets are also coded under V04 and charging cables under X21-D and X12-D codes.

Wireless, inductive

X21-B01B [2002]

Battery/fuel cell management system

Includes battery/fuel cell control, charging control, on-board power supply systems, over-voltage and short-circuit protection. See U24 / X12 codes for further power supply details.

Power control, voltage, current, power conversion

X21-B01B1 [2021]

Battery thermal management

Includes heating and cooling arrangements for batteries and fuel cells. Also see X16-K01 and X16-K02 for battery cooling and heating respectively.

X21-B01E [2012]

Battery exchange/leasing

Includes arrangements for enabling a depleted battery to be removed from a vehicle and replaced with a fully charged battery. Also includes battery leasing.

Lease, exchange, replace

X21-B02

Power supply lines; Power feed

Includes off-board power supply aspects, such as overhead lines for trolley buses (see also X12-G codes).

Power supply cables, overhead lines

X21-B03

Current collectors

Overhead pick-up shoes, brushes

X21-B04 [1997]

Combination of battery and other source

Includes e.g. additional use of electrolytic capacitor, mechanical flywheel, secondary battery.

X21-B04A [1997]

Wind turbine or solar cell array

See also X15-B and X15-A codes for wind and solar power generation respectively.

X21-B04C [1997]

On-board IC engine-driven generator

X21-B04C1 [2002]

IC engine control

Control of internal combustion engine driving generator in series hybrid vehicle. This code is not applied for parallel hybrid vehicles, since novel engine control can be adequately highlighted by the application of X22-A codes.

Fuel injection control, ignition timing control, pollution control, series hybrid

X21-B05 [1997]

Power converter

Includes details of DC-DC converters, power rectifiers and inverters (see also U24-D and X12-J codes depending on power level). Converter control is covered by X21-A04 codes.

X21-C [1997]

Electric vehicle accessories

(X21-A01)

X21-C01 [1997]

Passenger compartment heating systems

X21-C02 [1997]

Passenger compartment air conditioning/ventilation systems

Includes passenger compartment air-conditioning, cooling, ventilating and air treatment arrangements.

X21-C03	[2020]
Passenger accommodation; Passenger cabin	
Includes passenger accommodating arrangements such as seats, beds, seat belts, tables, electric blinds, electric windows. See Q14-C codes for mechanical details.	
X21-C12	[2020]
In-car office/information equipment	
Includes systems to allow working from in-car "office" such as email, internet browsing for booking tickets, hotel reservations, local information, navigation systems etc. For internet gaming see X21-C13 instead.	
X21-C13	[2020]
In-car entertainment systems	
Includes all in-car entertainment devices such as television (including streamed TV services) and games machines powered from vehicle supply. <i>DVD, TV, MP3, MP4, game</i>	
X21-C20	[1997]
Other electric vehicle accessories	
Includes electric vehicle accessories not covered by other X21-C codes.	
X21-D	[1997]
Electric connectors and wiring installations	
See V04 codes for electric connectors and X12-G04 codes for common installation features like wiring clamps.	
X21-E	[1997]
Electric switches	
Includes all switches associated with electric vehicles. See also V03 codes. See U21 for electronic switching.	
X21-F	[1997]
Lights	
Includes internal and external vehicle lighting. See also X26 codes or more details. <i>Headlamp, taillamp, ambience lamps</i>	
X21-H	[2002]
Steering systems	
Includes electric steering arrangements and automatic steering. <i>Power steering, automatic steering</i>	

X21-J*	[2012-2013]
Servicing and testing	
*This code is now discontinued and transferred to X21-X16 from 201301, but remains searchable for 2012 patents. Includes electric vehicle maintenance and servicing equipment. For arrangements for exchanging depleted battery with fully charged one, see X21-B01E instead.	
X21-K	[2010]
Electric vehicle communications and connectivity; Multiplexing; Networking; V2X	
(X21-X)	
Includes vehicle to everything communications (V2X; C-V2X). Includes all communications, connectivity, networking and multiplexing, including cellular (also see W02-C03C1L) and dedicated short range communication (also see W01-A06C4E). Includes communication within an electric vehicle (intra-vehicle), communications between vehicle and other vehicles (inter-vehicle), roadside (V2I), pedestrians (V2P) etc. Includes electric vehicle telephones and hands-free systems. See W01 and W02 codes for telecommunications per se. <i>Multiplex, DSRC, 5G, cellular, data transmission, LAN, local area network, WAN, wide area network, Bluetooth®, CAN bus, controller area network, bus, Ethernet, VAN, UART, universal asynchronous receiver/transmitter</i>	
X21-K02	[2021]
Electric vehicle to network; Vehicle to cloud communications	
Includes electric/hybrid vehicle to cloud (V2C) communication that uses V2N access to broadband cellular mobile networks to enable data exchange with the cloud (also see T01-N codes). Includes over the air (OTA) updates to vehicle software; Remote vehicle diagnostics (also see X22-X16). <i>V2N, V2C, IoT</i>	
X21-K03	[2021]
Intra-vehicle; Vehicle to device communications networking/connectivity	
Includes in-car high speed, integrated communications networks and multiplexing arrangements for interconnecting various vehicle systems e.g. using wireless LAN, serial data bus, Bluetooth® etc. (see also W01 codes), avoiding the need for dedicated point-to-point wiring. Includes vehicle to device (V2D) and cellular V2D (C-V2D) communications to e.g. connect tablet, smartphone or wearable to e.g. vehicle infotainment system. Includes app for controlling vehicle locking. <i>V2D, C-V2D, App, mobile phone</i>	

X21-K05 [2021]

Inter-vehicle communications; V2V

Includes communication between different electric/hybrid vehicles to enable them to wirelessly exchange information about their speed, location, and heading. Includes DSRC V2V and C-V2V communication providing 360 degree awareness of other vehicles. Includes vehicle to motorcycle communication.

Platooning, cooperative adaptive cruise control, V2M, C-V2M

X21-K06 [2021]

Electric vehicle to pedestrian communications

Includes communication between vehicle and persons, pedestrians or cyclists including V2P and cellular V2P communication. Includes warning pedestrian, cyclist or electric scooter rider of danger e.g. approaching vehicle and for warning drivers of presence of other road users.

V2P, C-V2P, cyclist, e-bike, bicycle, scooter

X21-K08 [2021]

Electric vehicle to offboard/infrastructure communications; V2I

Includes communication between electric/hybrid vehicle and offboard infrastructure, roadside units or traffic signals (also see T07-B codes) or device. Includes cellular vehicle-to-infrastructure (C-V2I) communications. Also includes dedicated short range communication (DSRC) based V2I.

Infrastructure, offboard, V2I, C-V2I, traffic signal

X21-K08G [2021]

Electric vehicle to grid communications; V2G

Includes communication between vehicle and grid (V2G) to enable plug-in hybrid and electric vehicles to supply vehicle electric power to electricity grid for peak load levelling or to stabilise intermittent renewable power supplies. Also see X12-H codes for power distribution and X21-B01A1C for smart charging, e.g. charging vehicle battery at night while supplementing grid load during the day. Also includes vehicle to home (V2H) power transfer e.g. for emergency power supply (see X12-H02) or supplementing renewable wind/solar power.

Sell electricity, load-levelling, bidirectional V2G, unidirectional V2G, V1G, smart charging, backup power

X21-M [2012]

Suspension systems and control

Includes electrical control of mechanical springs and dampers, electrical springs and dampers. For electrical suspension control of IC engine vehicle refer X22-M only.

X21-N [2012]

Noise/vibration/harshness reduction

Includes all electrical details of arrangements to reduce noise, vibration and harshness in the vehicle. For mechanical NVH reduction see Q17-N instead.

X21-R [2018]

Rider assist

Includes systems for assisting riding of vehicles such as motorcycles or mono-wheel vehicles. Includes balance-aiding and self-balancing systems e.g. using gyroscopes or automatic steering correction to keep motorcycle upright.

Gyroscope, balance, balancing

X21-U [2005]

Electric vehicle rental, hiring and sharing systems

Includes overall system associated with electric vehicle hiring and rental with some on-board vehicle aspect, e.g. enabling user to book vehicle on-line (see T01-N and T01-J05 codes) while central controller provides authorisation and remote access to allocated vehicle. Also includes car pooling arrangements with some on-board vehicle aspect. Also see T01-J05A2N for business processes related to the transportation industry.

X21-W [2020]

General By-wire/(Semi)Autonomous control

Includes general by-wire control systems including 'total' electric vehicle by-wire control and specific controllers not covered elsewhere. Also includes general (semi)autonomous electric vehicle control but specific system control codes can also be applied such as X21-A04 for electric motor control and X21-B01B for on-board electric power supply control. For systems for determining whether it is safe to operate in autonomous driving mode see X21-A05. See X21-A01L for driverless/autonomous electric vehicles per se and Q19-L for mechanical aspects of an autonomous vehicle.

X21-X [1997]

Other electric vehicle features

Includes electrically operated fork assembly on forklift truck (also see X21-A01B and X25-F05A for forklift per se).

X21-X03 [2018]

Anti-theft and Anti-hacking

Includes anti-theft arrangements with some kind of immobilisation of electric vehicle and systems for preventing hacking or overriding of electric vehicle systems. Includes devices for preventing door lock/motor start signal jamming, code grabbing, 'App' (application) hacking etc. See W05-B codes for theft alarms per se. See X21-K for electric vehicle communications/networking per se.

Door lock, hack, steal, immobilizer

X21-X05 [2024]

Electrical aspects of doors, boots, windows

Includes electrical door opening/closing devices. Also includes electrical aspects of streamlining devices such as spoilers.

Roof spoiler, boot spoiler aerodynamic, sliding door, remote control tailgate opening, electrochromic glass, privacy glass

X21-X16 [2013]

Electric vehicle maintenance and testing

Includes electric vehicle servicing equipment. See X21-B01E for battery exchange equipment. Also includes arrangements for testing electric vehicle systems. See X21-J instead from 2012-2013.

X21-X20 [2013]

Electric vehicle design/manufacture/assembly

Includes electric details of design, manufacture and assembly of electric/hybrid vehicles and their components. See X25-X14 for manufacturing/assembly plant per se. Also includes systems for dismantling vehicle to enable recycling of materials (see also X25-W04). See X16-M and X21-B01 codes also for recycling of batteries and their materials. See T01-J15 codes for computerised design.

X22: Automotive Electrics

X22-A

For internal combustion engines

X22-A01

Ignition

Includes spark modification arrangement, obtaining ignition using laser.

X22-A01A

Ignition systems (using)

Includes ignition coil and cable, accessories e.g. connectors.

X22-A01A1

Magneto- or dynamo-electric generators without subsequent storage

X22-A01A2

Inductive energy storage

X22-A01A3 [1987]

Glow plug heating

(X22-A01A9)

Diesel engine, compression ignition

X22-A01A5 [1992]

Automatic ignition disablement

(X22-A01A9)

Includes disabling ignition e.g. after crash to prevent fire (also see X22-A01A7). Ignition disablement for anti-theft purposes is covered by X22-A08C only.

X22-A01A7 [1992]

Safety

(X22-A01A9)

X22-A01A9

Other ignition systems

Includes capacitive energy storage, ignition noise reduction circuits (see W02-H also). For ignition noise reduction associated with spark plugs, see X22-A01E1J.

RFI suppression

X22-A01B

Advancing or retarding ignition

Ignition control, ignition timing, pre-ignition

X22-A01B1 [1983]

Dependent on knock detection

Pinking or detonation detection

X22-A01B2 [1992]

Advancing

X22-A01B3 [1992]

Retarding

X22-A01C

Distributors; Circuit makers/breakers; Pick-up devices

X22-A01C1 [1992]

Distributors

See V04-L09 for distributors in general.

Distributor rotor, distributor cap

X22-A01C2 [1992]

Circuit-makers or -breakers

X22-A01C3 [1992]

Pick-up devices

Pick-up devices, e.g. sensor wheel in distributor, adapted to sense particular points of timing cycle.

For sensing points of timing cycle, e.g. using cam shaft sensor, see X22-A05C instead.

X22-A01D

Testing ignition installations or timing

Includes ignition mis-fire detection. See also S02-J01A.

Strobes, timing light

X22-A01E

Spark and glow plugs

Includes plasma plugs, connectors, covers.

X22-A01E1 [1987]

Spark plugs

Spark gaps, discharge

X22-A01E1A [1992]

Electrodes

X22-A01E1C [1992]

Insulators

Ceramic

X22-A01E1E [1992]

Manufacture

X22-A01E1G [1992]
Ignition coil/spark plug combinations

X22-A01E1J [1992]
Ignition noise reduction/spark plug combination

X22-A01E3
Glow plugs
Includes glow plugs for pre-heating compression ignition diesel engines (see also X22-A20C).

X22-A02
Fuel systems

X22-A02A [1983]
Fuel injection apparatus
Electromagnets, injectors, piezoelectric, ultrasonic, common rail, direct injection

X22-A02A1 [2005]
Fuel injection valve
Includes atomiser, EM fuel injection valve (also see V02 codes, e.g. V02-E02A1 for electromagnetic valve per se), and injectors.
Electromagnetic, piezoelectric, EM, valve, atomiser

X22-A02A3 [2005]
Common rail arrangements
Includes fuel injection systems using a common rail fuel assembly. Also see X22-A20C for diesel engine applications.
Common rail

X22-A02A5 [2005]
Non-diesel direct injection
Includes direct injection arrangements, e.g. for use in petrol engine.
Homogeneous, stratified, direct

X22-A02B [1987]
Fuel filters and heaters
(X22-A02, X22-A09)
Diesel fuel heaters, electric heaters, PTC element, preheaters

X22-A02C [1987]
Carburettors
Atomisers

X22-A02D [1987]
Fuel pumps
See X22-A03A3 for fuel pump control.

X22-A02E [1992]
Fuel vapour recovery system; Fuel purging
See X22-A03A4 for fuel purging control.

X22-A02F [2005]
Fuel additive/treatment systems
Fuel additive/treatments to improve combustion. Includes water/steam injection and fuel ionising arrangements.
Steam, water, magnetic, ultrasonic, economiser, urea

X22-A02R [2013]
Fuel pressure regulator
Includes electronic pressure regulators and electromagnetic valves for controlling fuel pressure. Also see X22-A02A3 if regulator is used in a common rail fuel system.

X22-A03
Engine control

X22-A03A
Fuel control

X22-A03A1 [1983]
Fuel-injection
Valve controllers

X22-A03A1A [1992]
Injection timing

X22-A03A1C [1992]
Injection quantity

X22-A03A2
Air-fuel ratio; Exhaust gas recirculation

X22-A03A2A [1992]
Air-fuel ratio
Mixture control

X22-A03A2B [2021]
Variable compression ratio
Includes control of engine compression ratio so that lower ratios are used at higher loads to increase power and higher ratios are used at lower loads to increase fuel efficiency.

X22-A03A2C [1992]
Exhaust gas recirculation
EGR

X22-A03A3 [1997]

Fuel pump control

(X22-A02D,X22-A03A)

See X22-A02D for fuel pumps, per se.

X22-A03A4 [1997]

Fuel purging control

(X22-A02E,X22-A03A)

See X22-A02E for fuel purging systems, per se.

X22-A03A5 [2013]

Fuel pressure regulation

Includes fuel pressure regulator control to limit high pressure of fuel. For novel fuel pressure regulators per se, see X22-A02R. For fuel pump control see X22-A03A3 instead.

X22-A03B [1983]

Speed

(X22-A03X)

Includes throttle valve and air control.

X22-A03B1 [1992]

Cruise control

(X22-A03B, X22-G)

This code is used for general cruise control systems either on its own or in conjunction with X22-G03A (transmission based cruise control) or X22-C02D4 (brake based cruise control).

Adaptive cruise control

X22-A03B1A [1992]

By throttle control

Includes the use of servomechanisms operated electrically or fluidically.

X22-A03B1C [2007]

Active cruise control

Includes adaptive cruise control and inter-vehicle distance or vehicle spacing/separation control, e.g. using radar distance sensing (see also W06-A04 codes).

Automatic distance regulation, ADR

X22-A03B2 [1992]

Drive-by-wire/electronic throttle control

Includes 'drive-by-wire' type controllers e.g. using servomotors to control throttle position.

X22-A03B3 [1992]

Idling speed control

X22-A03B5 [1992]

Exhaust braking control

Engine braking

X22-A03C [1987]

Turbocharging, supercharging

(X22-A03X)

X22-A03D [1987]

Power

(X22-A03X)

Includes multi-cylinder in/out of operation control.

Load control, multi-cylinder switching, torque

X22-A03D1 [1992]

Traction control

Used alone or in conjunction with X22-C02C1, or X22-G03B depending on variable being controlled.

Wheel slip control, ASR

X22-A03E [1987]

Stop-start

Includes automatically stopping engine while waiting at level crossing to reduce fuel consumption.

(X22-A03X)

X22-A03F [1992]

Complete engine management

Includes, generally by using a computer, simultaneous control of several aspects of the IC engine e.g. ignition, fuelling, EGR, etc. Also includes integrated engine/transmission control. See also X22-G.

X22-A03F1* [1992-1996]

Fuzzy control

*This code is now discontinued and transferred to X22-A03K. It is still searchable and valid for records from 1992 to 1996.

X22-A03G [1992]

Inlet/outlet valve control

(X22-A03X)

Includes control of intake and exhaust valve timing. Also includes cam control in which multiple, selectable cam lobes can be selected to adjust valve timing, deviation and lift.

X22-A03H [1997]

Temperature control

(X22-A03X)

X22-A03I [2005]

Swirl control

Includes control of air motion in combustion chamber e.g. to enable stratified or ultra-lean burn combustion.

X22-A03J [1997]

Pollution control

(X22-A03A,X22-A03X,X22-A07)

Exhaust gas recirculation and cleaning systems, per se are in X22-A07.

X22-A03K [1997]

Fuzzy control

Fuzzy logic systems per se are covered by T01-J16B where novel technology details are given. See X22-A03F1 codes for records from 1992 to 1996. See also X22-Q for fuzzy control applied to non-engine systems.

X22-A03L [1997]

Secondary air control

(X22-A03B,X22-A03X)

Includes secondary air introduction control for air intake and exhaust passages. It is used on its own or together with other relevant codes e.g. X22-A03J if secondary air control is performed with a view to reducing pollutants.

X22-A03W [2006]

Engine-related by-wire control

Includes engine-based by-wire controllers not covered elsewhere. Drive-by-wire for vehicle/engine speed control is coded in X22-A03B2 instead. See X22-W for general non-engine based by-wire control. Also see X22-K codes for novel vehicle networking/communications systems that enable the by-wire control.

X22-A03X

Other IC engine control aspects

Includes vibration suppression control.

X22-A04 [1983]

Starting motors

Includes motor per se and associated gearing. See X11 for further details of high power motors. Starter solenoid is included in X22-A08 only. For combined starter/generator also see X22-F02 and X11-H20 (or X13-G20 for starter/generator control).

X22-A05 [1983]

Engine related measurements and sensors

(X22-A09)

Only includes on-board measurement or off-board diagnostics interfacing with on-board system. General measurement systems are included in section S, and vehicle testing systems are coded in S02-J. Includes electrical sensors per se as well as their mounting arrangements.

X22-A05A [1983]

Knock detectors; Pressure; Vibration

(X22-A09)

See also S02-F codes for further details. Includes combustion chamber pressure measurement.

X22-A05A1* [1992-2004]

Ambient pressure

*This code is now discontinued and transferred to X22-A05A4, but remains searchable and valid for records from 1992 to 2004.

X22-A05A2 [2005]

Knock detection

Includes pinking and pre-ignition detection.

X22-A05A3* [1992-2004]

Negative pressure

*This code is now discontinued and transferred to X22-A05A4, but remains searchable and valid for records from 1992 to 2004.

X22-A05A4 [2005]

Pressure detection

Includes detection of both ambient and negative pressure.

X22-A05A6 [2005]

Vibration/noise detection

X22-A05B [1983]

Gas sensors

(X22-A09)

See also S03-E03 codes for gas sensors per se.

Exhaust gas, oxygen, lambda, air, emissions, CO, NOx

X22-A05C [1987]

Engine rotation or speed sensors; TDC position sensors

For ignition point sensing see X22-A01C3.

Crankshaft angle/position, rpm counter

X22-A05D	[1987]
Fuel, gas and air flow sensors	
X22-A05E	[1992]
Throttle position sensor	
(X22-A09)	
X22-A05F	[1992]
Temperature	
X22-A05F1	[1992]
Exhaust	
X22-A05F3	[1992]
Engine	
X22-A05G	[1992]
Engine torque	
X22-A05H	[1992]
Multi-fuel proportion measuring	
X22-A05L	[2012]
Fuel/oil level sensing	
Includes fuel and oil level sensors. For dashboard warning of fuel/oil level see X22-E01A and X22-E01C respectively.	
X22-A05N	[2005]
Engine related diagnostics	
Includes diagnostic devices interfacing with engine management system.	
X22-A05X	[1992]
Other IC engine measurements/sensors	
X22-A06	[1987]
Air treatment; Air filters	
(X22-A09)	
From 2009 the scope of this code has been widened to include all electrical aspects of intake air treatment and filtering, such as: air filters with integral clogging detectors (see also X22-A05X for clogging detection and maybe X22-E10 and X22-E01 for driver warning), and e.g. photochemical treatment of intake air with UV light to create ozone to improve combustion. Control of intake air flow using a standard throttle valve should instead be coded in X22-A03B instead under speed control. For novel mechanical aspects of intake air treatment and filtering see Q51-H05 and Q17-E codes.	

X22-A07	[1987]
Catalytic converters, exhaust gas cleaning	
(X22-A09)	
Includes pollution reduction hardware such as particle burner, exhaust gas particle trap clogging detector, exhaust gas recirculating valve and system. For control of EGR, see X22-A03A2C. For pollution control see X22-A03J instead.	
<i>Filters, catalysts, electric heaters, EGR, valve</i>	
X22-A08	[1987]
Starters, ignition switches, relays	
(X22-A09)	
Includes starter solenoid. Further details of switches and relays are in V03-C and V03-D. Novel gearing and starter motors per se are coded in X22-A04. X22-A08 can also be applied to indicate "engine starting" when dealing with engine control patents, where the control is specifically implemented while trying to start an engine.	
<i>Solenoids</i>	
X22-A08A	[1992]
Remote/keyless IC engine starting	
X22-A08C	[1997]
IC engine immobiliser	
For general anti-theft devices see X22-X03.	
X22-A09	
Other IC engine aspects	
Includes lubricating, engine braking, etc.	
<i>Exhaust braking</i>	
X22-A10	[1992]
Engine cooling	
(X22-A09)	
<i>Fans, pumps</i>	
X22-A11	[1992]
Inlet/exhaust valves	
(X22-A09)	
X22-A12	[1992]
Engine noise/vibration reduction and damping	
(X22-A09)	
Includes active noise and vibration suppression devices such as electrically controlled engine mounts. See X22-A03X for general engine noise/vibration control. See W04-V07 codes also for active audible noise cancelling.	

X22-A13 [1992]

External heating to assist starting

Includes electric resistance heater built into engine block or off-board heater slid under engine block, both powered by e.g. off-board mains supply.

X22-A14 [1992]

Turbo- and super-charger

Turbo- and super-charger control is coded in X22-A03C only.

X22-A15 [1992]

Intake air heaters; Engine/cooling water heaters

(X22-A09)

X22-A16 [2002]

Vehicle engine servicing equipment

Includes electrical aspects of oil change/reconditioning apparatus. Includes on-board systems that burn dirty oil in combustion chamber and replenish engine with clean oil.

Oil change

X22-A17 [2010]

Waste heat recovery

(X22-A09)

Includes engine exhaust heat recovery systems, e.g. for passenger compartment heating. See X22-F03 also if exhaust heat is being converted into auxiliary supply of electric power.

X22-A20 [1992]

Type of engine

This code relates to type w.r.t fuel used. Petrol- and indeterminate fuel-types are NOT covered.

X22-A20A [1992]

Mixed fuel

Includes e.g. alcohol and petrol dual fuel type engines. Also includes engines combusting e.g. petrol and oxyhydrogen (HHO).

Brown's gas

X22-A20C [1992]

Diesel

X22-A20E [1997]

Single unconventional fuel

Includes e.g. alcohol burning engines and bio-fuel engines.

X22-A20E1 [2007]

Gaseous fuels

Includes engines running on LPG (liquefied petroleum gas), natural gas, hydrogen or liquid nitrogen. (See X21 codes for vehicles using hydrogen in a fuel cell arrangement). See Q51-D07A for mechanical aspects of gaseous fuelled engines.

X22-A20E3 [2007]

Bio fuels; Alcohol

Includes engines running on free fatty acid methyl ester ("bio diesel") or alcohol such as methanol or ethanol. See Q51-D07C for mechanical aspects of bio fuel/alcohol fuelled IC engines.

X22-A20G [2010]

Air

Includes engines that are capable of being driven completely or partially by compressed air.

X22-A20T [2007]

Two-stroke

Includes IC engines operating on two-stroke cycle, e.g. used in moped (see also X22-P02).

X22-A20X [2011]

Other engines

Includes implosion engines using e.g. HHO (Brown's gas) made e.g. from electrolysis of water to produce hydrogen and oxygen which when combusted contracts to suck up piston rather than push it down.

Oxyhydrogen

X22-B

Lighting or signalling

See also X26 for further details. Vehicle lamp circuitry and mounting arrangements are coded in X22 only.

X22-B01

Main lights

Headlamps, light control, fault detection, fog lamps

X22-B01A [1987]

Bulbs; Light sources

Includes novel light sources such as headlight bulbs per se.

X22-B01A1 [1992]

Discharge lamps

Includes Xenon and High Intensity Discharge (HID) tubes. See also X26-A codes.

X22-B01A3 [1992]

Incandescent lamps

See also X26-B codes.

Halogen lamps

X22-B01A5 [2008]

LEDs

Includes novel light emitting diodes used for vehicle headlamps. See also U12-A01 codes and X26-H for LEDs per se.

X22-B01B [1987]

Fixtures

Includes lenses, reflectors, bulb holders.

Parabolic reflectors, sockets

X22-B01C [1987]

Washers

X22-B01D [1987]

Switches

See also V03 codes for mechanical switches per se. Electronic switching is covered by U21 only.

X22-B01E [1992]

Position control/beam aiming arrangements

Includes mechanical and motorised arrangements for adjusting headlamp position, and controlling movement of e.g. reflector to adjust headlamp aim e.g. to follow curve as vehicle negotiates a bend. See also X26-L.

Tilt control, aim, direction

X22-B01F [2002]

Headlight control circuitry

Includes control of headlamp or front fog/driving lamp illumination and automatic dimming.

X22-B02

Indicators

For indicating intention or presence of vehicle to other road users.

X22-B02A

Braking indicators

From 2005, direction and braking indicators are separated, with turning indicators transferred to X22-B02D and braking indicators remaining in X22-B02A. Prior to 2005, X22-B02A remains searchable for both turning and braking indicators.

Switches, centre, high level brake lamp, stop lamp

X22-B02A1 [1992]

Slowing/accelerating indication

Includes activation of vehicle brake lights in response to driver removing foot from accelerator pedal. See X22-B02A for brake lighting in response to depression of brake pedal.

Slowing, decelerating, accelerating

X22-B02A2 [2002]

Indicating level of braking intensity

Includes selective illumination of array of LEDs to indicate braking severity.

X22-B02B [2005]

Fixtures

Includes reflectors, lenses and bulb holders (see also X26-D01 codes).

Lens, reflector, refractor, diffuser, filter

X22-B02D [2005]

Turning/direction indicators

See X22-B02A for records prior to 2005.

Switches, direction, flasher, repeater, indicator

X22-B02R [2005]

Reversing indicators

Includes reversing lights and audible reversing warnings.

Backing, reverse, beep

X22-B02X

Other vehicle indicator arrangements

Includes side lights, tail lights, hazard lights and warning lights. Reversing lamps and novel fixtures such as reflectors, are coded also in X22-B02R and X22-B02B respectively, from 2005.

X22-B03

Interior lighting; Horns; Portable emergency signal devices

X22-B03A* [1992-2004]

Audible reversing warning

*This code is now discontinued and transferred to X22-B02R from 2005 onwards. It remains searchable and valid for records up to 2004.

X22-B03B [2005]

Interior lighting

Includes courtesy lights, dashboard lights and lighting for other compartments such as vehicle boot.

X22-B03E [2005]

Emergency signalling devices

Includes portable emergency services flashing lights and emergency sirens, search- or spot-light mounted on vehicle roof and electrical details of warning triangle (see also T07-X) to be placed on the road before scene of an accident or broken down vehicle. For mechanical details of emergency signalling devices see Q14-C05 instead.

X22-B03H [2005]

Horns

For mechanical details of vehicle horns see Q14-C04 instead.

X22-B05 [1992]

Illuminated displays for other drivers

(X22-B09)

Includes illuminated number plates and displays conveying e.g. "Thank You", "Assistance required" or other messages, e.g. to help diffuse road rage situation. Also includes illuminated hub caps and decorative emblems and displays for advertising. (See also W05-E03A codes).

Bus destination sign, illuminated licence plate, number plate, emblem, decoration, advertisement

X22-B09

Other vehicle lighting arrangements

Includes general use light switches and door-lock lights. Also includes illumination not intended to warn other road users of vehicle presence/intentions, such as flood light to warn driver of puddle when exiting vehicle.

X22-C* [1980-1996]

Braking, steering

*This code is now discontinued. The 'braking' aspect of the code is transferred to X22-C02 from 1997 onwards but remains valid and searchable for documents from 1980 to 1996. The 'steering' aspect of the code is valid and remains searchable for records from 1980 to 1982. However, since 1983 steering systems have been located in X22-C05, which will remain in force.

Hand brakes, dual-circuit, servo, steering

X22-C01* [1983-1996]

Anti-skid and anti-lock arrangements

*This code is now discontinued and transferred to X22-C02C from 1997 onwards. It is still searchable and valid for records from 1983 to 1996.

Modulating brake pressure

X22-C01A* [1992-1996]

Braking for traction control

*This code is now discontinued and transferred to X22-C02C1 from 1997 onwards. It is still searchable and valid for records from 1992 to 1996. This code was previously used either on its own or in conjunction with X22-A03D1 and X22-G01B. It normally included sensing of wheel acceleration to control braking.

ASR, traction control braking, anti-slip braking

X22-C01B* [1992-1996]

Anti-lock braking

*This code is now discontinued and transferred to X22-C02C3 from 1997 onwards. It is still searchable and valid for records from 1992 to 1996. It previously included sensing of wheel deceleration to control braking pressure.

ABS, anti-lock braking

X22-C02 [1997]

Braking

(X22-C)

See X22-C for records from 1980-1996. See Q18-A codes for mechanical aspects of vehicle brake systems.

X22-C02A [1997]

Parking brakes

(X22-C)

Includes electrical aspects of hand brakes and foot actuated parking brakes. See X22-G codes also for transmission based parking brakes. See X22-C for records from 1980-1996.

X22-C02C [1997]

Braking force controller

(X22-C,X22-C01)

See X22-C and X22-C01 for records from 1983 to 1996.

X22-C02C1 [1997]

Anti-slip brake regulation

(X22-C01A)

This code is used either on its own or in conjunction with X22-A03D1 and X22-G03B. Normally includes sensing of wheel acceleration to control braking force for the wheel that has lost its grip. See X22-C01A for records from 1992 to 1996.

ASR, traction control braking

X22-C02C3 [1997]

Anti-lock brake system

(X22-C01B)

Normally includes sensing of wheel deceleration to control braking pressure to then prevent any wheel from locking. See X22-C01B for records from 1992 to 1996.

ABS, anti-skid braking system

X22-C02C5 [2005]

Electronic stability control

(X22-C02C)

Includes control of braking to enhance vehicle stability, e.g. to control vehicle yaw. See X22-M for vehicle suspension based electronic stability control.

X22-C02C7 [2002]

Brake-by-wire

X22-C02D [1997]

Automatic brake initiation

(X22-C,X22-C01)

Involves braking without any driver intervention. See X22-C for records from 1980 to 1996.

X22-C02D1 [1997]

Collision prevention

(X22-C)

See also X22-J05 codes. See X22-C for records from 1980 to 1996.

X22-C02D1A [2013]

Brake safety

Includes arrangements for detecting inadvertent depression of accelerator pedal instead of brake pedal and automatically applying brakes in response. For novel pedal position sensing see X22-X06L.

X22-C02D2 [1997]

Automatic hill stop brake

Includes brake that is released when the clutch or accelerator pedal is depressed. See X22-C for records from 1980 to 1996.

X22-C02D3 [1997]

Theft prevention

(X22-C)

See also X22-X03. See X22-C for records from 1980 to 1996.

X22-C02D4 [2002]

Cruise control

Includes brake activation to maintain distance between vehicles.

Automatic distance regulation, ADR, cruise control

X22-C02X [2012]

Other braking arrangements

X22-C05 [1983]

Steering

Includes electrical aspects of steering wheel details. See Q18-B codes for mechanical aspects of vehicle steering systems.

X22-C05A [1992]

Power steering

Includes speed responsive power-assisted steering. Includes motor/gearing arrangements and power steering control.

Power assist

X22-C05A1 [1992]

Four-wheel steering

Includes electrical aspects only. See Q18-B09 instead for mechanical passive four wheel steering systems.

X22-C05A3 [2002]

Steer-by-wire

X22-C05A3A [2005]

Steering feedback/'feel' control

Includes arrangements for controlling e.g. torque feedback to steering wheel to improve or adjust driver 'feel', e.g. due to lack of mechanical linkage between wheels and steering wheel.

Feel, feedback

X22-C05B [1992]

Automatic steering

See T06-B01A, and T07-D01 codes.

X22-C05C [1992]

Displays, controls, switches, etc

Includes connectors also when specifically used with steering system. See also X22-X01A.

X22-D

Lockable switches; Locks; Theft alarms

Includes key, and lock heaters for de-icing.

X22-D01 [1992]

Locks and keys

Includes electrically-operated central locks. Also includes door lock heaters (see also X25-B codes for electric heating per se, and possibly X22-J02C prior to 2007). See Q14-H01 for mechanical aspects of vehicle locks.

X22-D01A [1997]

Remote-controlled and keyless entry

X22-D01A1 [2005]

Remote-controlled

Includes radio control. Also see W05-D codes for remote control aspects.

Radio-controlled, IR, infrared, remote-locking

X22-D01A2 [2005]

Keyless entry

Includes use of radio frequency (RF) transponders for keyless door (un)locking (see also T04-K03B and W06-A04B and W02-G05B codes as appropriate).

X22-D01A2A [2005]

Biometric access

Includes fingerprint and voice recognition or retinal scanning (see also S05-D01C5A).

X22-D01A2C [2005]

Card/keypad access

Includes smart/magnetic strip card reader or keypad code entry devices (also see T04 codes).

X22-D02 [1992]

Lockable switches

Includes lockable cover of switch panel.

X22-D03 [1992]

Theft alarms/theft monitoring

See also W05-B codes.

X22-D03A [2005]

Theft alarms

Includes audible and visual alarms (see also W05-B01 codes), e.g. sirens or flashing vehicle hazard lights (see also X22-B codes).

X22-D03C [2005]

Theft monitoring

Includes remote monitoring/indication of vehicle theft, e.g. to central station or vehicle owner (see also W05-B05 codes). Also includes GPS tracking of stolen vehicle (see also W06-A03A5 codes). For in-car camera systems capturing image of thief for on-board recording or remote transmission, see also W02-F01 codes.

X22-E

Instrumentation for dashboard and steering wheel

Includes touch-sensitive screens (see also T04-F codes). Also includes internal display for passengers e.g. in a bus indicating approaching stops (see also T07-A05D). For more details about general instrumentation for vehicles, section S codes must be searched. For example, S01-G06 for battery charge indicator, S02-G codes for speed sensors, S02-J codes for brake and transmission testing, and S02-K06 for recording or indicating in general. Also includes control of all information/warnings presented to driver according to driving situation, e.g. to prioritise important warnings and prevent driver from being distracted by display of minor warnings during emergency situations. For haptic feedback also see W05-A01A1 and for voice warnings see W04-V04C codes. For mechanical aspects of dashboard construction or mechanical instrumentation, see Q17-A11 instead.

Displays, panels, instruments

X22-E01 [1983]

Engine performance and operation indicators

X22-E01A [1992]

Fuel

Includes specific fuel consumption, filter clogging, fuel contamination, level.

X22-E01B [1992]

Temperature

Includes engine radiator/coolant temperature.

X22-E01C [1992]

Oil

Includes pressure, level, contamination.

X22-E02 [1983]

Brakes, tyres, transmission, steering

X22-E02A [1992]

Brakes

Includes brake wear indicator, brake oil contamination and level indicators, parking brake failure detector.

X22-E02B [1992]

Wheels and tyres

Includes tyre pressure measurement (see also S02-F04C1A).

X22-E02C [1992]

Transmission

Includes gear change indication.

X22-E02D [2005]

Steering

Includes indication of information directly relating to vehicle steering system, e.g. steering angle display. For indication of failure of steering angle sensor also see X22-E10 and X22-X06H. This code is not used for general displays mounted on steering wheel. E.g. for speedometer mounted on steering wheel, see X22-E05 and X22-C05C only.

X22-E03 [1987]

Battery charging/condition indicators

From 2006 this code has been expanded to include all vehicle battery warning/indicating aspects. See X22-E and X22-F01 codes prior to 2006. Includes indication of remaining battery capacity (see also S01-G06A and X16-H01), or battery charging/discharging indication. Also includes warning that battery is connected to off-board charger, to prevent vehicle driving off while connected.

X22-E04 [1987]

Driver/passenger alertness alarms; driving behaviour sensing/warning

From 2014 this code has been expanded to include all driver/driving behaviour/condition analysis and warning. Includes driver reflexes/breath tester up to the end of 2013.

X22-E04A [2014]

Driver/passenger alertness alarms/tester

Includes driver reflexes/breath tester, e.g. for preventing driver from driving if drunk or under the influence of drugs. Includes alerting driver through vibration alert through steering wheel or seat (also see W05-A01A1 for vibration based annunciation). Also includes vital sign monitoring for driver or passengers to check on condition of health of vehicle occupants.

Intoxication detector, drowsiness detector, haptic indication, vital signs, remote monitoring

X22-E04D [2014]

Driver/driving behaviour analysis

Includes systems for monitoring driving behaviour, especially of young persons, e.g. to enable reduction in price of car insurance when safer driving is confirmed.

X22-E05 [1987]

Vehicle or engine speed; Mileage indicators

Includes tachographs (see T05-G also), rpm counter. Accident data recorders which give more details like acceleration, brake application, etc. are coded in X22-E12.

Odometers, milometers, taximeters, tachometer

X22-E06 [1987]

Navigational aids

See W06-A and S02-B08 codes also for general navigation systems. Information processing aspects of vehicle guidance systems are covered by T01-J07D3.

Vehicle position sensors, information display, direction indicators, head-up display, HUD

X22-E06A [1992]

Using dead reckoning systems

Includes use of map information stored in e.g. CD-ROM, and compass and wheel turn angle sensors.

X22-E06B [1992]

Using GNSS / GPS

Includes global GNSS systems such as GPS, GLONASS, Galileo and BeiDou and regional GNSS such as QZSS and IRNSS/NavIC.

X22-E06C [1992]

Using roadside beacons

X22-E06D [1992]

Using combination of methods

From 2002, W06-A08 is no longer applied for combination navigation systems specifically for motor vehicles.

X22-E06F [2002]

Navigation information updating system

Includes system for updating map information e.g. for area in which vehicle travels, using information from off-board centre. Also used when off-board traffic centre provides driver with alternative route to destination to avoid congestion/accident (see also X22-E11, T07-G01 and T07-A05C codes).

X22-E07 [1992]

Head-up display

Includes general projection displays, e.g. for head-up display of current vehicle speed (see also X22-E05) or head-up display of e.g. navigational data (see also X22-E06). See also W04-Q01K for head-up video displays.

Projection, windscreen, head-up

X22-E08 [1992]

Radar surveillance detector

See W06-A04E3C also.

X22-E09 [1992]

TV/video camera for all round view

Only used when camera image is presented to driver. For video image recognition of e.g. road signs or obstacles, see X22-E13A only. Also see W04-M01 codes for novel video cameras per se, and W02-F01E for CCTV systems where image is presented to driver.

X22-E09A [2006]

For external view

Includes rear-view reversing cameras and 'enhanced' or 'assisted' vision cameras/displays, such as IR imagers for assisting driver when driving at night or in poor weather conditions (see also W07-G and W04-M01E codes as appropriate). Also see W02-F01E for vehicle external view CCTV system.

X22-E09C [2006]

For internal view

Includes video camera for enabling driver to view interior of vehicle, e.g. to enable bus driver (also see X22-P05A) to see if passenger wants to alight or to monitor vandalism. Can also be used for anti-theft purposes, e.g. to capture image of thief inside vehicle (see also X22-D03C).

X22-E10 [1992]

Service-need/general accessories malfunction displays

Includes faulty lights, oil-change alarms, etc. For indicating faults/problems with any onboard systems.

X22-E11 [1992]

Traffic management/driver information systems

Includes presentation of all types of traffic, weather and road information to driver (see also T07-G codes for off-board traffic and weather information provision aspects). See X22-E06F instead for systems for updating vehicle navigational route information.

Congestion, accident, flood, pot hole, road surface repairs

X22-E12 [1997]

Accident data recorder

(X22-E05)

Includes automatic recording of speed, acceleration, brake application, direction indicator position, headlight on/off status, etc. Tachographs are only coded in X22-E05.

ADR, drive recorder

X22-E13 [1997]

Collision-imminence warning/alarm

(X22-E)

Includes lane deviation or crossing alarms, and distance to obstacle indicator (see also X22-X06 codes). For systems detecting imminence of collision, see X22-J05 codes. For systems preventing collision by e.g. automatic brake application, see X22-C or other appropriate codes.

Road marking sensor, lane marking sensor, deviation, collision warning display

X22-E13A [2002]

Image recognition

Includes video image recognition of obstacles or road signs, e.g. to identify change of speed limits or hazards, road edges. See also T01-J10B/T04-D codes for image recognition. For systems presenting actual video image of road to driver display, see X22-E09 instead.

X22-E14 [2002]

Warning of approaching emergency vehicle

Includes detection of siren and activation of dashboard light or muting vehicle radio.

Ambulance, police car, fire engine

X22-E99 [2008]

Other instrumentation

Includes dashboard instrumentation and warnings not covered previously.

X22-F

Power supplies; Batteries; Alternators; Charging

Includes solar cell panels.

X22-F01 [1987]

Batteries

Includes vehicle battery, per se. Other battery details are in X16.

Connectors, cut-off switch

X22-F01A [1987]

Charging

Includes chargers per se (see also X16-G) and charging control.

X22-F01A1 [1992]

Jumper cables

X22-F01A2 [1992]

Off-board chargers

X22-F02 [1987]

Alternators; Dynamos

Includes vehicle alternator per se (with further details in X11), output controllers (see also X13-G02). For combined starter/generator also see X22-A04 and X11-H20 (or X13-G20 for starter/generator control). Also includes dynamos used as a primary power source on bicycles.

Rectifiers, regulators, dynamo, AC generator, DC generator

X22-F03 [1997]

Auxiliary supply

(X22-F, X22-X)

Includes power supply arrangement for external apparatus, e.g. welding equipment, and encompasses additional battery or generator, including roof mounted wind turbines or solar panels (see also X15 codes). Also includes power supply for microprocessor used e.g. for engine or other controllers. Includes power generated from exhaust heat recovery (see Q51-J02F for mechanical details of exhaust heat recovery).

Wind turbine, solar panel, back-up battery

X22-F04 [2002]

Vehicle power supply control systems

Includes prioritisation of supply of power to specific or essential vehicle systems.

X22-F05 [2002]

Use of cigar lighter socket or auxiliary output as power supply, e.g. for vehicle accessories

Includes kettle, perfume dispenser, portable light and other devices that are powered from cigar lighter socket. Includes Non-contact charging pad to charge mobile phone (also see U24-H02 and W01-C01E5E codes). Used in conjunction with other X22 and cross-reference codes as appropriate.

Mobile phone charging, wireless charging

X22-F09 [1997]

Power supply or battery circuit disablement; Switches

(X22-F, X22-X)

Includes automatic disabling of power from electrical circuits to prevent fire risk upon sensing of crash. Also includes hidden switches for power cut-off for anti-theft purposes.

X22-G [1983]

Power train

Includes power take-off arrangements used to drive auxiliary devices. Also see X22-P09 and X25 for tractor power take-off.

X22-G01 [1992]

Transmission/clutch/gear systems

Includes electrical aspects of powertrain hardware such as novel solenoid valves used in the hydraulic system, electric aspects of differentials (See X22-G05 only for four-wheel drive aspects), motor gearing etc. that are used in an unspecified type of transmission system. Use X22-G01C/X22-G01E instead if type of transmission is detailed.

Automatic transmission, manual transmission, CVT, differential

X22-G01A* [1992-2004]

Cruise control

*This code is now discontinued and transferred to X22-G03A. It is still searchable and valid for records from 1992-2004. This code is used either on its own or in conjunction with X22-A03B1 or X22-C02D4 depending on variables being controlled.

X22-G01B* [1992-2004]

Traction control

*This code is now discontinued and transferred to X22-G03B. It is still searchable and valid for records from 1992-2004. This code is used either on its own or in conjunction with X22-A03D1 or X22-C02C1 depending on variables being controlled.

X22-G01C [2005]

Automatic transmission systems

Includes continuously variable transmission (CVT).

X22-G01D [2009]

Semi-automatic transmission systems

Includes manually shifted transmissions in which all the operations normally performed by the driver when changing gear are performed by electronically controlled actuator assemblies. Includes clutchless transmissions and paddleshift transmission control arrangements.

X22-G01E [2005]

Manual transmission

X22-G03 [2005]

Powertrain/transmission control systems

Includes integral engine/transmission control (also see X22-A03F). Search with T01-J07D1A for microprocessor controlled transmission. See also X22-G01 for records prior to 2005.

X22-G03A [2005]

Cruise control

This code can be used on its own or in conjunction with X22-A03B1 or X22-C02D4 depending on the variables being controlled. See also X22-G01A for records prior to 2005.

X22-G03B [2005]

Traction control

This code can be used on its own or in conjunction with X22-A03D1 or X22-C02C1 depending on the variables being controlled. See also X22-G01B for records prior to 2005.

X22-G03G [2005]

Shift-by-wire

Includes steering wheel mounted gear change arrangements. Paddle-shift.

X22-G03N [2005]

Transmission noise/vibration/harshness control

Includes arrangements for reducing shift-shock. see also X22-A03F for integral engine/transmission control aspects. See also X22-X08 for passenger compartment noise and vibration reduction in general and X22-A12 for engine noise reduction.

X22-G05 [1992]

Four wheel-drive systems

Includes electrical aspects of four, six and all wheel drive systems, such as electrically lockable differentials and electrically locking hubs.

X22-G07 [2012]

Lubrication/cooling arrangements

Lubrication and cooling aspects of transmission systems. For mechanical aspects refer to Q13-A20 and Q13-A22.

X22-H [1983]

Window winders

(X22-X)

Electric window, power window

X22-H01 [1987]

Control

See also V06-N.

Control circuits, obstruction detection

X22-H02 [1987]

Motors

Includes motors per se. See V06-M codes for further motor details.

X22-J [1983]

Vehicle accessories

(X22-X)

Includes electrical aspects of motor vehicle accessories. See Q14 for mechanical details of vehicle accessories.

X22-J01 [1983]

Windscreen wipers

Includes screen washers, motors per se and their controllers (with details in V06-M and V06-N). Also includes snow and ice removal e.g. by using vibrators. For rain or moisture sensors see X22-X06E codes and S03-F09, and S03-E codes.

Switches, position detection, washers

X22-J02 [1983]

Heating, ventilating, air-conditioning

Includes electrical aspects of overall passenger compartment HVAC system.

Control, motors, temp sensors, fans, blowers

X22-J02A [1987]

Demisters

For windscreens, mirrors. See also X25-B01C1C.

X22-J02C [1992]

Heating

Includes heating for passenger compartments. See X25-B01 codes for electrical heating per se.

X22-J02D [2005]

Ventilating

Includes electrical aspects of passenger compartment ventilating. See X22-J02E instead if ventilator/blower is part of an air-conditioning/climate control system. See X22-J03A5 instead for ventilated seats.

X22-J02E [1992]

Air conditioning; Climate control

For novel temperature or humidity sensing arrangements see X22-X06X and S03 codes.

Compressors, refrigeration

X22-J02E1 [2005]

Climate control

X22-J02E3 [2005]

Air treatment arrangements

Includes de-odorisers, perfume dispensers and air ionisers etc. Also includes sterilisation arrangements for killing microorganisms, e.g. using UV radiation.

De-odorisers, perfume dispenser, ioniser

X22-J03 [1983]

Seats, seat belts

(X22-X)

Control, motors

X22-J03A [1992]

Seats

X22-J03A1 [1992]

Heaters

X22-J03A2 [1992]

Massaging devices

X22-J03A3 [2002]

Headrest

Includes automatic adjustment of vehicle headrest according to driver preference. From 2005 active head restraints are transferred to X22-J03A3A.

X22-J03A3A [2005]

Active head restraint

Includes active control of seat headrest to place it in optimum position to protect occupant's head/neck during a collision. Prior to 2005, active head restraints were coded in X22-J03A3 and X22-J11.

X22-J03A5 [2007]

Cooling

(X22-J03A, X22-J02)

Includes ventilating and air-conditioning systems used to cool motor vehicle seats. See X22-J03A and X22-J02 codes prior to 2007.

X22-J03B [1992]

Belts

Inertia sensors

X22-J03B1 [1992]

Automatic release, retraction

X22-J04 [1983]

Mirrors

(X22-X)

Includes mirrors with heaters, loudspeakers, lights, aerials.

Motors, rear-view mirrors, adjusting, wing mirrors, positioning, demisters

X22-J05 [1983]

Anti-collision and parking aids

(X22-X)

These codes are used either on their own or in conjunction with other codes for related anti-collision aspects. The latter include:

(a) imminence of collision warning systems (see X22-E13);

(b) controlling vehicle automatically to avoid collision e.g. automatic application of brakes (see X22-C02D1);

(c) measuring and indicating distance to obstacle or preceding vehicle (see X22-X06F); and

(d) detecting deviation from lane or road marking (see X22-X06G).

Distance sensing, warning alarm

X22-J05A [1992]

Radar systems

For more details on radar see W06-A04.

X22-J05B [1992]

Sonar systems

See W06-A05 also.

Ultrasonics

X22-J05C [1992]

Optical systems

Includes e.g. laser rangefinder. See W06-A06 codes also.

Lidar

X22-J05M [2021]

External sensor mountings; Cleaning

Includes external environmental sensor motorized mountings and positioning systems. Includes sensor cleaning arrangements such as wipers or washers for LIDAR (see also X22-J05C), SONAR, or camera (see also X22-E09A).

X22-J06 [1983]

Lighters

Socket, heater coil

X22-J07 [1987]

Air bags

Includes inflatable side curtains and knee bolsters.

X22-J08 [1987]

Sun visors; Sun roof; Convertible soft top roof

Includes obstruction detection and roof open/close motors.

Controllers, convertible tops, vanity mirror lights

X22-J09 [1992]

Sun screens, curtains

(X22-J, X22-X)

X22-J10 [1992]

Accessories remote starting arrangements

X22-J11 [2002]

Passenger safety systems

Includes anti-submarining seats, flip-up roll over bars and roll over control arrangements. For airbags and seatbelt pre-tensioners see X22-J07 and X22-J03B1 only. From 2005 active head restraints are coded in X22-J03A3A only. Also includes general passenger safety aspects such as systems preventing driver from using mobile telephone or viewing movie whilst driving.

Fire extinguishers, bumpers

X22-J11A [2002]

Emergency signalling

Includes manually activated signalling and automatic mayday signalling or automatic activation of locating beacon after vehicle accident (also see W06-A01C for vehicle borne locating beacon). Automatically illuminated 'assistance required' sign (also see X22-B05).

X22-J11B [2002]

Pedestrian protection systems

Includes vehicle mounted apparatus such as exterior bonnet airbag to protect other road users in event of collision.

X22-J11C [2010]

Vehicle specific clothing

Includes electrical details of all vehicle specific clothing. See X22-P01 and X22-P02 for bicycle and motorcycle wearables. See Q14-C16 for mechanical details of vehicle specific clothing.

Helmets, jackets, gloves, electric heating, LED, lighting, wearable

X22-J12 [2002]

In-car office/information equipment

Includes e-mail, facsimile equipment powered by vehicle supply and on-board aspects such as novel displays and user interfaces used to view e.g. Internet information. From 2007 general Internet browsing e.g. for downloading local tourist information, map information, restaurant menus and shop opening times or for making hotel reservations and booking tickets, is transferred to X22-K08.

X22-J13 [2002]

In-car entertainment systems

Includes television and games machine powered from vehicle supply. Includes monitors e.g. mounted in rear of headrest (see X22-J03A3 also).

VTR, DVD, TV, MP3, game

X22-J14 [2012]

License plates

Includes license plates with RFID transponder (also see W06-A04B and T04-K codes). Illuminated number plates are also codes in X22-B05.

X22-J15 [2012]

Passenger display arrangements

Includes prompter for reminding passenger of approaching destination point, and for reminding passenger to not forget personal items when disembarking.

X22-J19 [2013]

Steps and running boards

Includes automatically controlled retractable steps (see also X22-X19 and S05-K if for disabled person assistance) and illuminated running boards. See Q14-I instead for mechanical details.

X22-J20 [2010]

Vehicle stands, supports, jacks

(X22-J99)

Includes on-board kick-stands for bicycles or motorcycles (see also X22-P01 or X22-P02 respectively), as well as electrical details of off-board stands and supports for parking cycles. For mechanical details of e.g. cycle stands see Q14-J instead. For parking fee charging details see T05 codes. Also includes electrical details of on-board jacks. See X22-X16 for off-board servicing equipment.

Holder, support, rack, stand, kickstand, parking, lock

X22-J99 [2007]

Other vehicle accessories

(X22-J)

Includes electrical accessories not covered elsewhere such as refrigerated cool box (see also X27-F codes) powered from cigarette lighter socket (see also X22-F05). See Q14 instead for mechanical vehicle accessories.

Ash tray

X22-K [1987]

Vehicle communications and connectivity; Multiplexing; Networking; V2X

(X22-X)

Includes vehicle to everything communications (V2X; C-V2X). Includes all communications, connectivity, networking and multiplexing, including cellular (also see W02-C03C1L) and dedicated short range communication (Also see W01-A06C4E). Includes communication within a motor vehicle (intra-vehicle), communications between vehicle and other vehicles (inter-vehicle), roadside (V2I), pedestrians (V2P) etc. Includes vehicle telephones and hands-free systems. See W01 and W02 codes for telecommunications per se.

Multiplex, DSRC, 5G, Fcellular, data transmission, LAN, WAN, wide area network, Bluetooth®, CAN bus, controller area network, bus, ethernet, VAN, UART, universal asynchronous receiver/transmitter, V2X, C-V2X

X22-K01* [2007-2008]

Multiplex control system

*This code is now discontinued and combined with X22-K03 from 2009 onwards since current vehicle networking and multiplexing are essentially the same thing. It is still searchable and valid for records from 2007 to 2009. See W05-D02 also for multiple access and multiplexing control signals transmission, and T01-J07D1B for multiplex control system using microprocessor technology. Used to highlight multiplex control of distributed (electrical) loads via single electric cable/bus and fiber-optic systems.

X22-K02 [2021]

Vehicle to network; Vehicle to cloud communications

Includes vehicle to cloud (V2C) communication that uses V2N access to broadband cellular mobile networks to enable data exchange with the cloud (also see T01-N codes). Includes over the air (OTA) updates to vehicle software. Remote vehicle diagnostics (also see X22-X16). Includes browsing and downloading information such as navigation data (see X22-E06F), local tourist information, shop opening times (see X22-J12), restaurant menus, music files (see X22-J13) and making hotel reservations or booking tickets using in-car connectivity to the cloud. See X22-K08 for connectivity to e.g. wifi hotspot in service station.

V2N, V2C, IoT

X22-K03 [2007]

Intra-vehicle; Vehicle to device communications networking/connectivity; Multiplexing

(X22-K01)

Includes in-car high speed, integrated communications networks and multiplexing arrangements for interconnecting various vehicle systems, e.g. using wireless LANs or serial data buses, Bluetooth® etc. (see also W01 codes), avoiding the need for dedicated point-to-point wiring. For enabling internal communications between previously standalone vehicle control systems such as engine and braking systems. Includes DSRC vehicle to device (V2D) and cellular vehicle to device (C-V2D) communications to e.g. connect smartphone, tablet or wearable to vehicle infotainment system. Includes app for controlling vehicle locking/starting.

CAN bus, CAN 2.0, LAN, LIN, Ethernet, wireless, UART, VAN, ABUS, SAE J1850, local interconnect network, controller area network, universal asynchronous receiver/transmitter, V2D, C-V2D, mobile phone

X22-K05	[2007]
Inter-vehicle communications; V2V	
Includes communication between different vehicles to enable them to wirelessly exchange information about their speed, location, and heading. Includes DSRC V2V and C-V2V communication providing 360 degree awareness of other vehicles. Also includes systems such as Bluetooth (RTM) ad-hoc networks for allowing communication between different vehicles, e.g. for passing traffic or navigation data between vehicles (see also X22-E06F, for informing vehicle of presence of nearby vehicles e.g. by transmitting GPS position data between vehicles, or for automatic collision avoidance (see also X22-J05 codes) or other safety purposes.	
<i>Platooning, cooperative adaptive cruise control, wireless, piconet, cellular V2V</i>	
X22-K06	[2021]
Vehicle to pedestrian communications; V2P	
Includes communication between vehicle and persons, pedestrians or cyclists including DSRC V2P and cellular V2P communication. Includes warning pedestrian or cyclist of dangers such as approaching vehicle and for warning drivers of presence of other road users.	
<i>V2P, C-V2P, cyclist, bicycle</i>	
X22-K08	[2007]
Vehicle to offboard/infrastructure communications; V2I	
(X22-J12)	
Includes communication between motor vehicle and offboard infrastructure, roadside units or traffic signals (also see T07-B codes). Includes cellular vehicle-to-infrastructure (C-V2I) communications. Also includes dedicated short range communication (DSRC) based V2I. Includes systems for communication between vehicle and external systems such as wifi hotspot in service station for downloading information via offboard system that provides connectivity.	
<i>Infrastructure, offboard, V2I, C-V2I</i>	
X22-K11	[2008]
Vehicle telephone	
Includes all aspects of car phones, including hands-free arrangements. Also see W01 codes for telephones and cellular communication per se. Also see X22-X02B for novel phone mounting arrangement.	
X22-K99	[2007]
Other multiplexing/networking/communications	

X22-L	[1987]
Speech synthesizers; Speech recognition units for various applications; Gesture control	
(X22-X)	
From 2020 this code has been expanded to cover other forms of non-touch control mechanisms such as gesture control. See W04-V codes also for speech analysis/synthesis per se. Includes systems for recognizing hand movements, facial expressions or eye movements used to control vehicle functions (also see S05-D01C5A). For microphones etc. used for car telephone see X22-K11 instead.	
<i>Microphone, gestural, eye tracking, gaze</i>	
X22-M	[1987]
Suspensions	
(X22-X)	
Includes control of suspensions.	
<i>Dampers, height controllers, shock absorbers, spring vibration control, levelling</i>	
X22-M01	[2006]
Suspension systems	
Includes electrical aspects of motor vehicle suspension hardware.	
X22-M01A	[2008]
Mechanical springs/dampers	
Includes electrical aspects of motor vehicle suspensions using mechanical/pneumatic/fluid springs and dampers.	
X22-M01C	[2008]
Electrical springs/dampers	
Includes suspensions that utilise linear electromagnetic motors (LEMs) at each wheel in place of conventional shock absorbers and springs. See also V06 codes for linear electric motors per se.	
X22-M03	[2006]
Suspension control	
Includes suspension control arrangements such as active suspension, electronically controlled dampers, body roll control etc.	
X22-N	[1987]
Switches for general application	
(X22-X)	
See also V03 for mechanical switches per se. Electronic switching is covered by U21 codes only.	

X22-P	[1992]
General vehicle types	
X22-P01	[1992]
Bicycle	
<i>Tricycle</i>	
X22-P02	[1992]
Motorcycle	
<i>Moped</i>	
X22-P03	[1992]
External combustion e.g. gas turbine	
X22-P04	[1992]
Hybrid	
Includes vehicles with electric motor- and IC engine-prime movers. Also see X21-A01D and other X21 codes as appropriate.	
<i>Parallel hybrid</i>	
X22-P04A	[2007]
Hybrid-electric	
Includes series/parallel/mixed hybrid-electric and hybrid-fuel cell vehicles	
X22-P04E	[2007]
Hybrid-mechanical	
Includes electrical details of hybrid-flywheel and hybrid-pneumatic or hybrid-hydraulic vehicles.	
<i>Petro-hydraulic, petro-air, compressed air</i>	
X22-P05	[1992]
Commercial vehicles	
Includes non-specific delivery vehicles	
X22-P05A	[2002]
Bus/coach	
X22-P05B	[2002]
Lorry/truck	
Includes articulated trucks/heavy goods vehicles.	
X22-P05C	[2002]
Taxi	
X22-P05F	[2005]
Forklift truck	
See also X25-F05A. Electric forklift trucks are coded in X21-A01B only.	

X22-P05H	[2010]
Road cleaning vehicles	
(X22-P05X)	
Includes road sweepers and snow ploughs (see also X25-U05).	
X22-P05R	[2010]
Refuse collection vehicles	
(X22-P05X)	
Includes rubbish trucks.	
X22-P05X	[2002]
Other commercial vehicles	
Includes commercial vans and tow trucks.	
X22-P06	[1992]
Military	
X22-P07	[1992]
Construction	
<i>Bulldozer</i>	
X22-P08	[1992]
Recreation	
<i>Go-kart, caravan, RV, snowmobile, ATV</i>	
X22-P09	[1992]
Agricultural	
See also X25-N codes.	
X22-P10	[1992]
Emergency services	
Includes ambulances, fire engines, police cars.	
X22-P11	[2002]
Towed trailers	
Includes electrical aspects, e.g. lights on rear of trailer towed by vehicle (see X22-B02 codes also) or trailer of heavy goods vehicle (see X22-P05B also).	
X22-P12	[2012]
Amphibious vehicles	
Also see W06-C15X or Q24-P30 as appropriate.	
X22-P15	[2015]
Driverless/autonomous vehicles	
Includes vehicles that can drive themselves. Used with X22-C05B, X22-C02D, X22-A03B codes and X22-J05 codes as required for automatic steering, braking, speed control and radar type anti-collision systems.	

X22-Q	[1992]
Non-engine related fuzzy control	
This code is used either on its own or in conjunction with other related codes, e.g. X22-M for suspension systems. Fuzzy logic systems, per se, are covered by T01-J16B where novel technology details are given.	
X22-R	[2018]
Rider assist	
Includes systems for assisting riding of vehicles such as motorcycles or mono-wheel vehicles. Includes balance-aiding and self-balancing systems e.g. using gyroscopes or automatic steering correction to keep motorcycle upright. <i>Gyroscope, balance, balancing</i>	
X22-U	[2005]
Motor vehicle rental, hiring and sharing systems	
Includes overall system associated with motor vehicle hiring and rental with some on-board vehicle aspect, e.g. enabling user to book vehicle on-line (see T01-N and T01-J05 codes) while central controller provides authorisation and remote access to allocated vehicle. Also includes car pooling arrangements with some on-board vehicle aspect. See also T01-J05A2N for business processes related to the transportation industry. <i>Hiring, leasing, rental, car-pool, car sharing, internet booking</i>	
X22-W	[2006]
Non-engine related by-wire control	
Includes general by-wire control systems, including 'total' vehicle by-wire control and specific controllers not covered elsewhere such as by-wire headlamp beam aiming controller (see also X22-B01E and X26-L). By-wire brake (X22-C02C7), shift (X22-G03G) and steer (X22-C05A1) controllers are coded in their relevant sections ONLY. See X22-A03W only for general engine based by-wire controllers. Also see X22-K codes for novel vehicle networking/communications systems that enable the by-wire control. Also includes overall systems for determining whether it is safe to operate in autonomous driving mode and for switching between manual and (semi)autonomous driving modes. See also X22-P15 for autonomous vehicles per se and other codes as appropriate. Includes vehicle intelligent adaptive control systems. <i>Driver-profile auto adaptation</i>	

X22-X	
Other vehicle aspects	
Includes static electricity (see also X25-S) and cathodic protection (see also X25-R06), driving instruction simulators (see also W04-W07A) etc. Also includes electrical aspects of vehicle tires such as heaters (also see X25-B codes). See X22-E02B instead for tyre pressure sensing/warning.	
X22-X01	[1987]
Wiring harnesses; Electrical connectors in general	
See V04 also for connectors and harnesses. Includes all wiring/cabling installations.	
X22-X01A	[1997]
Electric connectors	
See also V04 codes.	
X22-X01B	[1997]
Wiring or cable installations	
Includes also wiring harnesses, see V04-V02 and X12-D07.	
X22-X01B1	[1997]
Clamps	
For general cable clamps, see also X12-G04A2.	
X22-X01B2	[1997]
Grommets or bushing	
See also X12-E03C and X12-G04A3.	
X22-X01C	[2012]
Fuse box/wiring box	
Includes fuse boxes and their covers (see also X13-D codes), and wiring boxes.	
X22-X02	[1987]
Aerials; Radio and loudspeaker mountings, etc.	
See W02-B and W03-B codes for further aerial and radio details. <i>Antenna, window aerials, automatic aerial retraction</i>	
X22-X02A	[1992]
Aerials	
X22-X02A1	[1992]
Roof/body mounted	
X22-X02A3	[1992]
Glass-mounted	

X22-X02B [1992]

Radio, cassette player, CD player, minidisk player, and loudspeaker mountings; etc.

Includes mounting for other electronic devices such as mobile phone, handheld navigation device or computer.

Car telephone mounting

X22-X03 [1992]

Anti-theft and Anti-hacking

Includes anti-theft arrangements with some kind of immobilisation of vehicle (see X22-A08C for engine based immobilisers) and systems for preventing hacking or overriding of vehicle systems. Use with X22-D codes such as X22-D01A for arrangements for preventing jamming, code grabbing, App hacking etc. to illegally gain vehicle access. See W05-B codes for theft alarms per se. See X22-K codes for vehicle communications per se.

Steal, theft, override

X22-X04 [1992]

Refrigeration for container trucks

See also X27-F for refrigeration per se.

X22-X05 [1992]

Electrical aspects of doors, boots, windows

Includes electrical door opening/closing devices (see X22-D01 instead for door locking arrangements and X22-H codes for window winders). Also includes electrical aspects of streamlining devices such as spoilers.

Roof spoiler, aerodynamic, sliding door, remote control tailgate opening, electrochromic glass, privacy glass

X22-X06 [1992]

Non-engine related measurements/sensors

These codes are used on their own or in conjunction with other codes depending on claimed aspects. For general instrumentation, S01, S02, and S03 codes should also be searched. Includes electrical sensors per se and their mounting arrangements. These codes are generally applied when the sensor is novel per se or when a standard sensor is used in an unusual way.

X22-X06A [1992]

Wheel speed and slip sensors

Includes sensing of wheel speed or general vehicle speed. Measurement of engine speed is coded in X22-A05C only.

X22-X06B [1992]

Acceleration or shock sensors

Includes measurement of acceleration, deceleration and shock or impact sensing. See also S02-G03.

X22-X06C [1997]

Road friction sensor

See also S03-F08.

X22-X06D [1997]

Seat occupation sensor

Also includes child seat presence or absence detector to then inhibit or trigger e.g. air bag. See also S03-C06.

X22-X06E [1997]

Rain or moisture sensor

(X22-J01,X22-X06)

See S03-F09 and S03-E codes. Includes humidity sensor.

X22-X06F [1997]

Distance to obstacle measurement

See also X22-E13 or X22-J05 codes and S02-B01.

X22-X06G [1997]

Lane deviation sensing arrangement

Includes optical recognition of white line.

X22-X06H [1997]

Steering angle/torque sensor

From 2010 this code has been expanded to include steering torque sensing. Prior to 2010 see X22-X06(X).

X22-X06J [1997]

Yaw sensor

Measuring angular rotation or movement around yaw axis/direction of heading.

Centre of gravity, vertical axis accelerometer, gyroscope

X22-X06K [1997]

On-board weighing system

See X22-P05B for lorry on-board load/cargo weighing arrangements.

X22-X06L [1997]

Control pedals' position sensors

X22-X06M [2002]

Submergence sensing arrangement

For detecting submergence of vehicle in water, e.g. for control of vehicle windows to allow escape from sinking vehicle.

Sinking detection

X22-X06N [2005]

Non-engine related diagnostics

Includes diagnostic devices interfacing with vehicle control devices. See also S02-J codes for testing per se.

X22-X06T [2010]

Temperature sensor

Includes non-engine temperature sensing e.g. for control of vehicle air conditioner (see also S03-B codes). For engine related temperature sensing see X22-A05F codes instead.

X22-X06X [2005]

Other non-engine related measurements/sensors

Includes other specific measurements and sensors such as suspension height sensor (see also X22-M), gear shift and gear position sensors (see also X22-G). Includes coupling sensor.

Ground clearance measurement

X22-X07 [1992]

Road toll devices

See also T07-A03E for roadside charging aspect.

X22-X08 [1992]

Noise/vibration/harshness reduction

Includes general noise, vibration and harshness (NVH) control for improving comfort of vehicle occupants. For transmission based NVH control see X22-G03N only, and for engine based vibration and noise reduction see X22-A12 or X22-A03X as appropriate. See also W04-V. See Q17-N for mechanical NVH reduction arrangements.

X22-X09 [1992]

On-board tyre inflator

X22-X10 [1992]

Electronic components

Includes components e.g. ASICs for vehicles but with no mention of its specific use. See also appropriate U codes. Also includes general electronic control units where specific function being controlled is not detailed. See X22-A03 for general engine based ECUs where specific engine system being controlled is not detailed.

X22-X11 [2002]

Agricultural implements and their control

Includes electrical aspects of implements attached to tractor and driven by power take-off.

X22-X12 [2002]

Pedal arrangements

Includes pedals that are electrically positioned according to driver's requirements and other electrical arrangements connected to pedal operation or adjustment. See X22-X06L for control pedals' position sensors per se.

Electronic accelerator pedal

X22-X16 [2005]

Vehicle maintenance equipment and service monitoring; Vehicle testing

Includes on-board aspects associated with e.g. fleet maintenance, vehicle servicing equipment (see X22-A16 for engine servicing equipment) and remote service monitoring (see X22-E10 for on-board service required warning). Includes off-board arrangements for testing/measuring vehicle wheel alignment (see also S02-J02A), vehicle rolling roads and engine dynamometers (see also S02-J01A). See X22-X06 codes for on-board vehicle measurement systems.

X22-X18 [2007]

Vehicle (un)loading arrangements

Includes tail lifts used on lorries (see also X22-P05B), vehicle mounted cranes and other loading/unloading ramps/fixtures. See Q15 codes for mechanical (un)loading aspects.

X22-X19 [2007]

Disabled people aids

(X22-X)

Includes all systems or vehicle adaptations for helping physically challenged persons drive or travel in motor vehicle. Includes wheelchair lifting arrangements and ramps. See also S05-K01. For mechanical aspects see Q15-B13 instead.

X22-X20 [2008]

Vehicle design/manufacture/assembly

Includes electrical details of design, manufacture and assembly of vehicles and vehicle components. See Q16-D codes for mechanical aspects of vehicle design and manufacture.

X22-X20A [2008]

**Vehicle
manufacture/assembly/dismantling**

Includes manufacture and assembly of motor vehicles and their components. See X25-X14 for manufacturing/assembly plants per se. Also includes systems for dismantling vehicles e.g. to enable recycling of materials (see also X25-W04).

Spray painting, end-of-life disposal

X22-X20E [2008]

Vehicle design

Includes all electrical details of vehicle design. Also see T01-J15 codes for computer aided design (CAD).

Simulation testing

X23: Electric Railways and Signalling

Note: Also includes non-electric traction railways with substantial electrical content in the disclosure. See Q21 instead for mechanical aspects of railways.

X23-A

Electric railways

X23-A01

Propulsion, braking, suspension

X23-A01A [1983]

Propulsion

Includes transmission of mechanical power.

Drive system, mountings

X23-A01A1 [1987]

Electric motor

Includes motors per se, with further details in X11.

Linear motors, induction motors, dc motors, coils, magnetic circuits

X23-A01A2 [1987]

Engines

Includes engine control and electrical hardware aspects of railway vehicle engines.

Diesel-electric locomotive, diesel, petrol, fuel

X23-A01A2B [2016]

Engine control

Includes general combustion engine control such as speed, fuel and ignition control. For pollution control see X23-A01A2C instead.

X23-A01A2C [2014]

Exhaust gas cleaning systems; Pollution reduction

Includes electrical details of locomotive engine exhaust gas cleaning systems and pollution reduction arrangements. For mechanical aspects see Q21-C01C and Q51-J02 codes.

Catalytic converters, EGR, catalyst electric heating

X23-A01A3 [1997]

Power converters

See X23-A02A for converter control for train/tram motors. See also X12-J and X13-G03 codes.

X23-A01A4 [1997]

Magnetic levitation arrangements

Includes superconducting magnets/coils for levitation or suspending of railway car. See also X12-C05 codes.

X23-A01A5 [1997]

Transformers

Includes supply step-down and converter transformers. See X12-C codes for further transformer details.

X23-A01B [1983]

Braking

Includes train brakes as well as track brakes.

X23-A01B1 [1997]

(Electro)mechanical brakes

Includes electromagnetic and electrically-operated mechanical brakes (see X25-L02 also) as well as electro-pneumatic and electro-hydraulic brakes.

Electro-magnetic, electrohydraulic, electropneumatic

X23-A01B3 [1997]

Electrodynamic brakes

Includes resistive, eddy current and regenerative brakes (see also X13-F02).

X23-A01B5 [1997]

Automatic braking

Includes ATP(automatic train protection)-triggered braking to prevent accidents. See also X23-B02.

X23-A01C [2005]

Suspension

Includes electrical aspects of railway vehicle suspension systems, such as carriage/ride tilt control. Magnetically levitated suspension/propulsion systems are coded in X23-A01A4 only.

X23-A01L [2012]

Lubrication arrangements

Electrical aspects of train/locomotive lubrication.

X23-A02

Motor control; Monitoring operation

Includes motor protection, safety interlocks e.g. dead man's handle, operating data monitoring. Also see X13-C.

X23-A02A [1987]

Motor control

See also X13-F or X13-G.

X23-A02C [1997]

Automatic train control

See also X23-A01B5 for automatic braking.
Includes train door opening, vehicle status reporting, speed limiting, etc.

X23-A02E [1997]

Data bus

Includes the bus, per se, and associated hardware for communications (see also W05-D06F) between sub-systems and the main system on the train. Also, allows remote monitoring and control on multiple unit trains. Carries signals from ATP and ATC systems for various controls and status reporting.

X23-A02G [2002]

On-board monitoring systems

Includes on-board radio communication, e.g. between head and end of train, and general on-board system monitoring. Includes on-board camera and image analysis to prevent collision.

X23-A03

Power supply aspects

X23-A03A [2002]

Power supply lines; Off-board supply

Includes all power supply aspects i.e. track side poles, insulators, (see also X12-G codes) etc., supply protection (see also X13-C codes), substations for feeding power to the railway network (see also X13-E codes).

Electric overhead supply, power rails

X23-A03C [2002]

On-board power supply systems; Power supply control

Includes on-board generators per se, with further details in X11 or X13 if its control is part of the invention, and power supply or conversion arrangements etc.

Battery, fuel cell

X23-A04

Current collectors

Pick-up, pantograph, brushes, shoes

X23-A05

Measuring; Testing

Includes brake monitoring sensors, track straightness determination, other train sensors etc.

X23-A08 [2012]

Shunting or short distance haulage devices

Electrical aspect of shunting or short distance haulage devices.

X23-A09

Other on-board (electric) railway train details

Includes connectors for cables passing between carriages etc. Includes refrigerated compartment for transporting cargo. For other offboard railway system details see X23-S99 instead.

X23-A09A* [2002-2009]

Off-board/railway station systems

*This code is now discontinued and transferred to X23-S. It is still valid and searchable for records prior to 2010. From 2005 major electric track laying equipment is transferred to X23-X. For station based passenger information/communications systems see X23-C02.

X23-A09A1* [2005-2009]

Security systems

*This code is now retired and transferred to X23-S01. It remains searchable and valid for records prior to 2010.

X23-A09A1A* [2005-2009]

For personnel

*This code is now discontinued and transferred to X23-S01A. It is still valid and searchable for records prior to 2010. Includes detection of concealed weapons. Also includes all aspects of passenger tracking and monitoring, including authorisation/access control for passengers (see T05-D codes also).

X23-A09A1E* [2005-2009]

For baggage

*This code is now discontinued and transferred to X23-S01E. It is still valid and searchable for records prior to 2010. Includes all aspects of baggage inspection, monitoring and tracking. Includes use of transponder tags (see also W02 codes) or bar-code reader (see also T04 codes). See S03-C03 and S03-E06B codes for inspection.

X23-A09A3* [2005-2009]

Station safety systems

*This code is now discontinued and transferred to X23-S03. It is still valid and searchable for records prior to 2010. Includes fire-fighting arrangements and automatic platform-edge doors control. Prior to 2005, platform edge doors control was coded in X23-A09.

X23-A09A9* [2005-2009]

Other station details

*This code is now discontinued and transferred to X23-S99. It is still valid and searchable for records prior to 2010. Includes transportation of baggage and passengers, and railway station specific heating and air-conditioning.

X23-A10 [1997]

Environmental control and lighting

(X23-A09)

Includes on-board train heating and air-conditioning systems, internal and external train lighting.

X23-A13 [2002]

On-board train accessories

Includes electrically adjustable seats, electric windows, electric door locks etc. Also used for in-train entertainment systems.

X23-A15 [2013]

Passenger safety systems

Includes seat belts, airbags and fire-fighting equipment on-board the train. For station based passenger safety systems see X23-S03 instead. See X25-X05 also for fire-fighting equipment per se.

X23-A16 [2014]

Cargo (un)loading arrangements

Includes train mounted cranes and other loading/unloading ramps/fixtures. See Q21-J06 for mechanical (un)loading aspects. For station side equipment see X23-S99 instead.

X23-A17 [2014]

Traction increasing equipment

Includes dispensing of particulate matter such as sand under train wheels on track to prevent wheel slippage and increasing grip. For mechanical aspects see Q21-D10A

X23-B

Signalling; Safety

X23-B01

On route devices controlled by passage of train

X23-B01A [1997]

Axle counters; End-of-train passage detection

Includes null flux detector and eddy current detector.

X23-B01C [1997]

Track circuits

Includes associated transmitter and receiver circuits (see also W02 codes e.g. W02-C02 codes for near field systems, W02-C03 codes for radio systems, and W02-G codes for radio equipment per se).

AC-, DC-, audio frequency-, track circuits

X23-B02

On route devices controlling vehicle device

For ATP and ATC signalling to control brakes and train operation see X23-A01B5 and X23-A02C codes.

Cab-, ATP-, automatic train protection-, ATC-, automatic train control-, signalling

X23-B02A [1997]

Magnetic and inductive transponders

Includes train-mounted detector coils to pick-up safe passage tone, speed monitor tone and proceed tone from track-side equipment.

X23-B02C [1997]

Radio communication link

Includes provision of communications (see also appropriate W02-B, W02-C and W02-G codes) between the driver and signal centres. Also includes RF beacons to provide track data like speed limits, gradients, speed and braking commands, destination, stopping patterns, etc.

X23-B02C1 [1997]

Radio communications system for speech

Includes speech radio for train dispatching and safety-critical operational messages. On-board public telephones are coded in X23-C01 only.

X23-B03

Points and signal operation; Signals

Lamp details are in X26. Road/rail traffic intersection signalling is also in T07.

Switching, lamps, relays

X23-B04

Station blocking; Interlocking between points and signals; Warning devices along route

X23-B04A [1997]

Signals and points interlocking

Includes relay interlocking.

X23-B04A1 [1997]

Solid state interlocking

Includes processor-based interlocks.
SSI, solid state interlocking, electronic

X23-B04C [1997]

Station blocking; Track blocking

Includes track blocking for preventing two trains from entering same track block, for anti-collision purposes.

X23-B04E [1997]

Warning and safety devices along route or between trains

From 2006 this code has been expanded to include warning devices operating between trains as well as warning devices along train route.

X23-B04E1 [2002]

Signalling to portable alarm unit

Includes transmission of on-coming train warning to portable unit carried by track maintenance personnel. Also see W05 codes.

X23-B05

Traffic control; Classification yards

Includes marshalling of trains. Used for local control of trains e.g. in shunting yard. For control of entire railway network see X23-B05C only.

X23-B05A [1997]

Rail/road crossing systems

Includes level crossings.

X23-B05C [1997]

Integrated central control

Includes system for automated transit control, automatic train scheduling and supervisory system. Also includes vehicle movement, power distribution, alarms for faults, system status information.

X23-B09 [1997]

Other signalling aspects

Includes e.g. track conductors for improved signal transmission compared with use of the rails in track circuits.

X23-C [1997]

Passenger information/communications systems

(X23-A09,X23-B)
Railway/train information

X23-C01 [1997]

On-board PA system; Displays; Telephones
(X23-B02C1)

Includes automatically triggered, e.g. by train or signalling, systems. See W04-S05 and W05-E codes, respectively, for PA systems and general displays. See also W05-A codes for warning tones. Also includes on-board public telephones (also see W01 codes), systems for enabling use of passenger's mobile phone e.g. while in tunnel, and passenger information arrangements e.g. allowing on-board internet browsing (see also T01 codes).

X23-C02 [1997]

Off-board platform/station systems

Includes automatically triggered, e.g. by train or signalling, systems. Also includes station based timetable displays, internet browsing systems, computerised ticket reservation systems and other station based information/communications systems.

X23-D [2014]

Type of carriage or wagon

Includes electrical details of specific types of carriages. For mechanical aspects see Q21-C03 codes.

X23-D01 [2014]

Wagon/freight car

Includes electrical details of wagons, vans or freight cars.

X23-D02 [2014]

Hopper car

Includes electrical details of e.g. wagons for carrying particulate material with dispensing openings at bottom of wagon.

X23-D03 [2014]

Tanker wagons

Includes tankers carrying fluids.

X23-D04 [2014]

Mine cars

Includes electrical aspects of mine locomotives and cars. Also see X25-D for mining.

X23-D05 [2018]

Passenger carriages

Includes electrical aspects of passenger carriages. See Q21-C03A for mechanical details.

X23-D09	[2014]
Other railway vehicles	
Includes electrical details of rail vehicles convertible for use on road (see also Q19-R02).	
X23-P	[2014]
Railway Type	
Includes electrical details of special railway types.	
X23-P01	[2014]
Elevated railways	
Includes electrical details of elevated railways with or without suspended vehicles.	
X23-P02	[2014]
Monorail	
Includes electrical details of monorail aspects.	
X23-P03	[2014]
Cableways	
Includes electrical aspects of aerial ways, cableways.	
X23-P05	[2014]
Magnetically levitated railways	
For novel MAGLEV train suspension/ propulsion details see X23-A01A4 also.	
X23-P06	[2014]
Underground railways	
Includes electrical details of underground railways/Metro <i>Subway, metro</i>	
X23-P09	[2014]
Other railway types	
Includes rack railway.	
X23-N	[2012]
Noise/vibration/harshness reduction	
Includes all electrical details of arrangements to reduce noise, vibration and harshness in the train. For mechanical NVH reduction see Q21-N instead.	

X23-S	[2010]
Station/off-board railway systems	
(X23-A09A)	
Includes electrical aspects of all offboard/station/platform details. From 2005 major electric track laying equipment has been transferred to X23-X. For station based passenger information/communications systems see X23-C02 instead. See Q21-A codes for mechanical details of offboard railway stations and tracks. For offboard power supply systems see X23-A03A instead.	
X23-S01	[2010]
Security systems	
(X23-A09A1)	
Includes off-board systems for protecting railway passengers and cargo.	
X23-S01A	[2010]
For personnel	
(X23-A09A1A)	
Includes detection of concealed weapons. Also includes all aspects of passenger tracking and monitoring, including authorisation/access control for passengers (see T05-D codes also).	
X23-S01E	[2010]
For baggage	
(X23-A09A1E)	
Includes all aspects of baggage inspection, monitoring and tracking. Includes use of transponder tags (see also T04-K03B, W06-A04B and W02-G05 codes) or bar-code reader (see also T04-A03B1). See S03-C03 and S03-E06B codes for inspection.	
X23-S03	[2010]
Station safety systems	
(X23-A09A3)	
Includes fire-fighting arrangements (see also X25-X05) and automatic platform-edge doors control (see also X25-U01). Prior to 2005, platform edge doors control was coded in X23-A09.	
X23-S05	[2010]
Tunnels	
(X23-A09A5)	
Includes electrical details of tunnel construction and maintenance, as well as tunnel lighting arrangements (see also X26 codes). See Q21-A codes for mechanical details of railway or subway tunnels.	

X23-S99 [2010]

Other offboard/station details

(X23-A09A9)

Includes transportation of baggage and passengers (see also X25-F codes), and railway station specific heating and air-conditioning (see also X27-E codes).

X23-X [2005]

Other railway system details

Includes major electric railway track laying equipment and track maintenance equipment (coded in X23-A09A prior to 2005). See Q21-A01 for mechanical details of track maintenance/construction.

Track repair, track-laying

X23-X16 [2014]

Maintenance; Servicing; Testing

Includes locomotive/train servicing and testing equipment.

Service, maintain, test, diagnostics

X23-X20 [2014]

Rail vehicle design/manufacture/assembly

Includes electric details of design, manufacture and assembly of railway trains and their components. See X25-X14 for manufacturing/assembly plant per se. Also includes systems for dismantling vehicle to enable recycling of materials (see also X25-W04). See X16-M for recycling of batteries and their materials. See T01-J15 codes for computerised design.

X24: Electric Welding

Note: Patents are coded in X24 only if the soldering or welding equipment is useful in the electrical or electronic industry e.g. PCBs, electric motors, or if substantial electrical content is disclosed.

X24-A

Electric soldering

X24-A01

Solder, soldering methods, flux

Solder wire

X24-A01A [1992]

Solder, flux

Includes details of solder manufacture. See also P55-D01.

X24-A01C [1992]

Soldering methods

X24-A02

(De)soldering equipment, irons, bits, baths

Includes soldering equipment and systems.

Tinning, heaters

X24-A02A [1992]

(De)soldering irons, bits

X24-A02C [1992]

Wave soldering baths

X24-A02E [1992]

Reflow soldering using laser, hot gas, electric heating, etc.

(X24-A09)

For use of laser, see also X24-D03B.

X24-A02X [2007]

Other soldering equipment

Includes spray soldering systems using solder droplets in stream of hot gas to build up solder deposit, e.g. for fixing conductor wires to semiconductor circuit (see also U11 codes). Also includes ultrasonic and laser soldering equipment.

X24-A04 [2006]

Soldering accessories

Includes solder feeding devices and dispensers.

X24-A09

Other electrical soldering aspects

Includes brazing, control and measurements. Also includes cooling details of soldering, soldering simulators and recycling of solder. From 2006, solder feeding devices have been transferred to X24-A04..

X24-B

Arc welding or cutting

X24-B01

Seam and built-up arc welding

X24-B02

Arrangements or circuits

X24-B02A

Generating ignition voltage; Stabilising and magnetic control of arc

Arc ignition, moving arc

X24-B02X

Other circuit details

Includes protective circuits, remote controls.

Power supplies, pulse supply

X24-B03

Automatic feeding of electrodes or work

Includes welding robots, motor control.

Robot control, positioning, guiding

X24-B04

Electrodes and accessories

Includes welding rods, electrodes, materials and media. Also includes all aspects of cables and connectors, and other accessories with significant electrical content. Includes protective mask (see also X27-A02B1A).

X24-B05

Submerged-arc welding, stud welding

Includes shielded metal-arc welding using a covered electrode stick, and submerged arc welding where weld area is protected by granulated flux. Also includes electroslog and flash butt welding.

X24-B06

Using shielding gas

Includes WIG (Wolfram inert gas), GMAW (gas metal-arc welding) or MIG (metal inert gas), TIG (tungsten inert gas) or GTAW (gas tungsten-arc welding) and associated shielding gas feed control. Also includes plasma-arc welding/cutting (PAW) where heat for melting is provided by arc formed between non-consumable tungsten electrode and constricting orifice of torch itself.

WIG, MIG, TIG, GMAW, GTAW, plasma-arc

X24-B09

Other arc welding or cutting aspects

Includes welders using insulated electrodes, percussion welding, testing.

Inspecting, measurements

X24-C

Resistance welding or cutting

X24-C01

Electric supply or control circuits

Monitoring

X24-C04 [2006]

Electrodes and Accessories

X24-C09

Other resistance welding or cutting aspects

Includes spot welding, resistance seam welding (forming a series of overlapping spot-welds), resistance butt welding and projection welding (where the flow of current is confined to protrusions embossed on surface of material to be welded). For robotic spot welding see also X25-A03E1.

Spot welder, seam, projection

X24-D

Other welding, cutting or boring

X24-D01

Welding by induction heating

X24-D02

Electron-beam welding or cutting

See V05-F02 also for electron beam equipment.

Beam focussing, melting, cutting, etching, trimming, hole punching, shaping, beam control, multiple beam

X24-D03

Laser beam welding or cutting

See appropriate V08 codes for laser control details.

Shaping, optical system, control

X24-D03A [1992]

For metal working

Covers all aspects of working metal using laser beam (and having sufficient electrical content) e.g. cutting, trimming, hole forming etc. Also see appropriate corresponding codes in X25-A codes e.g. for cutting per se. Also includes laser-hybrid welding combining laser welding and e.g. shielded arc welding (also see X24-B06), and robotic laser welding.

Laser-hybrid

X24-D03B [1992]

For electrical and electronic components

Covers etching of PCBs see V04-R01C5 also, cutting substrate see U11-C07A4 also, trimming resistor valve see V01-A04H3 and trimming capacitor valve see V01-B04C3 also. For reflow soldering using laser see X24-A02E also.

X24-D03X [1992]

Other laser beam welding/cutting aspects

Includes details of laser cutting through other materials, such as glass, ceramics, etc.

X24-D04

Welding of plastics materials

See also X25-A06 and maybe T06-D13 for plastics working. Includes dielectric welding, RF welding and high frequency welding to fuse plastics together.

Electric resistance heaters, HF welding

X24-D05 [1987]

Flame or gas welding/cutting

From 2006, details of plasma welding are covered by X24-B06 only.

Blow torch

X24-D06* [1992-2005]

Ultrasonic

(X24-D09)

*This code is now discontinued and transferred to X24-D08A. It is still searchable for records from 1992-2005.

X24-D07* [1992-2005]

Friction welding

(X24-D09)

*This code is now discontinued and transferred to X24-D08C. It is still searchable for records from 1992-2005.

X24-D08 [2006]

Solid state welding

Includes low temperature welding processes not involving fusion. Includes hot pressure welding and roll welding.

Cold welding, HPW, ROW

X24-D08A [2006]

Ultrasonic welding

Involves applying ultrasonic vibrations parallel to interface of surfaces being joined, which are under compressive force, so that welding is reached through a solid state process involving atomic movement and diffusion. Also see X24-D04 for ultrasonic welding of plastics.

USW

X24-D08C [2006]

Friction welding

Includes friction stir welding, and inertia welding.

FRW

X24-D08E [2006]

Magnetic pulse welding

Includes cold welding of electrically conductive metals in the total absence of fusion.

Cold welding, inductor coil, capacitor discharge

X24-D08G [2006]

Diffusion bonding

Involves solid state diffusion by application of pressure and temperature to a joint surface for a prescribed period of time.

Aerospace, titanium, loading press, cladding, diffusion welding, DFW

X24-D08X [2006]

Other solid state welding/bonding

Includes explosive welding and forge welding processes.

EXW, FOW

X24-D09

Other welding, cutting or boring aspects

(X24-B09)

Includes non-specific welding apparatus with substantial electrical content, electrolytic welding and high frequency welding used on non-plastic materials. High-frequency welding used on plastic materials is coded under X24-D04 only.

X24-D10 [2006]

Welding, cutting, boring accessories

Coverage is restricted to all aspects of cables and connectors, with other accessories requiring significant electrical content.

Welding mask, goggles

X24-D11 [2020]

Testing of weld

Includes testing, monitoring aspects of welding.

X24-E* [1980-2005]

Welding rods, electrodes, materials or media

*This code is now discontinued, but remains searchable for records prior to 2006. Novel welding rods, electrodes, cables, connectors etc. are now covered by the electrode/accessory codes in the relevant areas, e.g. X24-B04, X24-C04 and X24-D10.

X24-F

Electro-erosion

X24-F01

Apparatus, devices, electric circuits

X24-F01A

For electro-erosion in an electrolytic medium

Electrochemical, ECM

X24-F01B [1992]

Electrical discharge machining

(X24-F01X)

Includes arc or spark discharge.

Discharge machining, EDM, discharge wire cut, EDWC

X24-F01X

Other electro-erosion/machining apparatus

X24-F02

Electrodes

Includes moving and spacing of electrodes.

X24-F04 [2006]

Electro-erosion accessories

Includes cables and connectors for electro-erosion and electrical discharge machining equipment. See also V04 codes for connectors and X12 codes for cables.

X24-F09

Other electro-erosion details

X24-G

Welding generators/motors or transformers/inductors

See also X11, X12.

X25: Industrial Electric Equipment

This class, apart from the exceptions below, includes only those patents with substantial electrical content. Appropriate control aspects relating to various codes in this class are in T06-D. For example, general machine tool control is represented by X25-A03F and T06-D06.

EXCEPTIONS: Electric furnaces and heating, components (e.g. pumps) and electrolysis apparatus.

X25-A

Working materials

X25-A01

Casting metals

Includes all electrical aspects of casting e.g. EM stirrer. Control see T06-D05B also.

Moulding, continuous-, centrifugal-casting, ingot, foundries, die, ladles

X25-A02

Shaping (excluding cutting)

Control see T06-D05A also.

Forming, extruding, corrugating, seaming, folding, squeezing, blanking, electromagnetic forming, electro-hydraulic forming

X25-A02A [1983]

Presses

Control details see T06-D20.

Baling, rams

X25-A02B [1983]

Rolling

Control details see T06-D05A1.

Mills, sheets, foils, tubes, strips, bars, rods

X25-A02C [1992]

Forging

Control details see T06-D05A.

X25-A02D [1992]

Hammering, bending, punching

For control details see T06-D05A. See X25-X10 instead for engraving systems

Stamping

X25-A02E [1992]

Wire drawing

Control details see T06-D05A.

X25-A02F [2018]

Straightening/stretching; Edge/Metal Flanging

Covers electrical details only. Mechanical details are covered in P52 class. Also includes finishing details such as attaching head to a drawing-pin, and metal shaping using fluid pressure, shock waves, etc.

Chemical explosives, edge-curling, edge armoring

X25-A03

Tools

Includes screw tighteners and general aspects of tools. For general control of machine tools see T06-D06 also. For systems for cleaning of work space, e.g. combined sanding and dust extracting machine, also see X25-H05.

Workpiece positioning, work tables, tool changing, chucks, turret

X25-A03A [1983]

Turning

Includes lathes.

X25-A03B [1983]

Boring, drilling, cutting

X25-A03B1 [2002]

Boring, drilling

Centre-point

X25-A03B2 [2002]

Cutting

Includes cutters, saws, trimming, grooving. See also T06-D07 for control apparatus.

X25-A03C [1983]

Milling, grinding, polishing

(X25-A09)

Control details T06-D07A also.

X25-A03C1 [1992]

Milling

Broaching, nanometer milling machine

X25-A03C2 [1992]

Grinding, abrading, honing, lapping

Blasting, planing, sanding, sander

X25-A03C3 [1992]

Polishing, burnishing

X25-A03D [1983]

Handheld tools

Used in conjunction with the above codes if applicable. For example, handheld drills are also coded in X25-A03B.

X25-A03E [1983]

Manipulators

Control details see T06-D07B also and for CAM/CAD robot programming see T01 also.

Robots, grappling, gripper, programmable

X25-A03E1 [1992]

Applications e.g. welding

X25-A03E2 [1992]

Assembling

Covers robots used in car manufacturing plants when robot details are claimed. See also X25-F01 for conveyor details.

X25-A03F [1983]

Control

Used in conjunction with above codes for different tool types. Also includes details of industrial automation system.

Monitoring, simulation

X25-A03R [2019]

Riveting

See also T06-D06A and X25-A03F for riveter control. See X25-X prior to 2018.

X25-A04

Cathodic sputtering

Mainly apparatus for sputtering and chemical vapour deposition included. For methods, substantial electrical details must be disclosed. See U11-C09 for sputtering and CVD apparatus used for integrated circuit manufacture and appropriate T03/W04 codes for magnetic head manufacture. Non-cathodic, e.g. general plasma (laser) deposition is not included - see X25-A09 and X14-F codes.

Cathodes, targets, coating, deposition, anodes, evaporation

X25-A05 [1983]

Working glass

(X25-A09)

Forming glassware, gob

X25-A06 [1983]

Working plastics

(X25-A09)

Includes welding (see also X24-D04), fusing, extruding, moulding, injecting etc. For control details, see T06-D13 also.

X25-A07 [1987]

Working rubber

(X25-A06)

Tyre manufacture

X25-A08 [2006]

3D/4D/5D printing; Additive manufacturing

Details of 3D scanners are coded under T04-M05. See also X25-A06 for electrical aspects of working plastics.

3D replicator, rapid prototyping, solid freeform fabrication, SFF, 3D modelling, active origami

X25-A08A [2016]

Method for 3D/4D/5D printing and additive manufacturing

X25-A08B [2016]

Apparatus for 3D/4D/5D printing and additive manufacturing

Computer control details of 3D printing/additive manufacturing machines are coded under T01-J07B3 and T06-D17. For details of 3D scanners see T04-M05. For ink-jet printhead details see S06-G03.

Extruder

X25-A08C [2016]

Types of 3D/4D/5D printing and additive manufacturing

X25-A08C1 [2016]

Stereolithography

SLA

X25-A08C2 [2016]

Fused deposition modelling/3D/4D/5D printing using inkjet technology

Inkjet technology is also coded under S06-G10.

FDM®, extruders, extrusion tips, fused filament fabrication, FFF

X25-A08C3 [2016]

Selective laser sintering

SLS

X25-A08C4	[2016]
Laminated object manufacturing	
<i>LOM</i>	
X25-A08C9	[2016]
Other types of 3D/4D/5D printing and additive manufacturing	
X25-A08M	[2016]
3D/4D/5D printing and additive manufacturing materials	
Codes in X25-A08M section indicate the type of material used to produce the printed object. For novel material compositions, see the relevant codes in classes A-M.	
X25-A08M1	[2016]
Metals	
X25-A08M2	[2016]
Plastics	
X25-A06 should also be applied.	
X25-A08M3	[2016]
Organic materials	
Includes organic materials used to produce biological products such as human tissue replacements. See also X25-A08U2.	
X25-A08M4	[2018]
Food	
See also X25-A08U7 and X25-P01X.	
<i>Chocolate</i>	
X25-A08M8	[2020]
4D-compatible materials	
Materials which are compatible with 4D printing techniques. This code is used in conjunction with other X25-A08M codes.	
<i>Programmable matter</i>	
X25-A08M9	[2020]
Other 3D/4D/5D printing and additive manufacturing materials	
Includes specific materials not covered by other X25-A08M codes, e.g. concrete, silica sand, magnesium sand, chromite sand, etc.	

X25-A08U	[2016]
3D/4D/5D printing and additive manufacturing applications	
Codes in X25-A08U section are used in conjunction with other X25-A08 codes to highlight what is manufactured using the 3D/4D/5D printing and additive manufacturing systems.	
X25-A08U1	[2016]
Domestic and personal items	
See also P21-P28 classes.	
<i>Watch, clothes, footwear, jewellery, kitchen equipment, tableware</i>	
X25-A08U2	[2016]
Pharmaceutical; Medical	
See also B class codes for pharmaceutical applications; P32 for prosthetics.	
<i>Bio-printing, prosthetics, pills, tissue engineering</i>	
X25-A08U3	[2016]
Vehicles; Aerospace	
See Q24/Q25/W06 classes for aerospace and shipping; Q11-Q19/X21/X22 for land vehicles and Q21/X23 for railway vehicles.	
X25-A08U4	[2016]
Industrial	
Includes manufacture of components not covered by other X25-A08U codes. Includes manufacture of components used in the construction and building industry. See X25-A06 for electrical aspects of working plastics.	
<i>Tool, robotics, television, phone, oil/gas industry</i>	
X25-A08U5	[2016]
Sports, toys, entertainment and arts	
Includes art pieces, figurines, action figures, etc. For manufacture of sports equipment, toys and novelty items see also P36 class.	
X25-A08U6	[2016]
Defence	
See also Q79/W07 classes for military weapons etc.	
<i>Weapons, ammunitions, military</i>	
X25-A08U7	[2016]
Food industry	
See also X25-P codes for electrical aspects of food processing.	
X25-A08U9	[2016]
Other specific 3D/4D/5D printing and additive manufacturing applications	

X25-A08X [2016]

Other details of 3D/4D/5D printing and additive manufacturing

X25-A09

Other material working aspects

Includes metallic coating, e.g. plasma deposition, plasma spray coating or plasma transferred arc hardfacing, e.g. for applying wear-resistant metallic material such as Stellite® to steel. For other coating, such as painting, see X25-K05.

Cement, ceramic, concrete

X25-A10 [2007]

Working wood

Includes arrangements for working wood. See other X25-A codes to highlight the action being carried out, e.g. X25-A03A for wood turning. For felling of timber or processing lumber see X25-X01 instead.

Turning

X25-B

Electric heating

All domestic applications are also in X27.

X25-B01

Ohmic resistance heating

Includes protective arrangements, IR heaters e.g. quartz lamps.

X25-B01A

Electrodes

X25-B01B

Heater element materials or conductor arrangements

X25-B01C

Plate heaters

Includes resistance heaters having extended surface area substantially in a two-dimensional plane.

X25-B01C1

Non-flexible elements

X25-B01C1A [1992]

Panels

X25-B01C1B [1992]

Hotplate; Cooker hob

Covers all aspects of resistance heating in cookers, see X27-C02 also.

X25-B01C1C [1992]

Windscreen heater, demister

Includes windscreen and wing mirror heaters. See also X22-J02A for vehicle windscreen demister.

X25-B01C3 [1992]

Flexible elements

(X25-B01C9)

Includes heating nets or webs.

X25-B01C3A [1992]

Electric blanket

See X27-E02 also for electric blanket.

X25-B01C3B [1992]

Under carpet, wall heating elements

See X27-E01A3 also, for wall, carpet and underfloor heating.

X25-B01C3C [1992]

Pads, seats

See X22-J02 and X22-J03 also for vehicle seat. See X27-E02 also for domestic application. See X27-A also for domestic seat application.

Mattress

X25-B01C9

Other plate heaters

Foils

X25-B01D

Rod or tube elements

Also includes heating cables.

Electric bar heater

X25-B01E

With granular, powdered or fluid current path, furnace elements

X25-B01E1 [1992]

Furnace elements

See X25-C01 also for ohmic resistance furnace.

X25-B01E2 [1992]

Water, immersion heaters

See X27-E03A also for domestic water heating.

X25-B01F [2005]

Positive Temperature Coefficient heaters

PTC, self regulating

X25-B01H [1992]

Infrared heaters (includes lamps)

Halogen, IR

X25-B01H1 [1992]

Cooking apparatus

See also X27-C02A for cooker.

X25-B01H3 [1992]

Industrial applications

Includes dryers, etc.

X25-B02

Electric-, magnetic- or electromagnetic-field heating

Laser heating

X25-B02A

Induction heating

Power supply, control

X25-B02A1 [1983]

Inductors

See X12-C also.

Coils

X25-B02A2 [1992]

Cooking appliances

See also X27-C06 for induction cooker.

X25-B02B

Microwave heating

Details of microwave power tubes per se are in V05, waveguide devices in general in W02-A. Includes circuits, feed lines, waveguides, mode stirrers and door seals.

Control, antenna, magnetrons, chambers

X25-B02B1 [1992]

Cooking; Oven

Aspects of cooking vessels are only in X27-C01.

Microwave oven, chambers, magnetrons, antenna, control

X25-B02B3 [1992]

Industrial scale heating; Drying

For large scale food processing etc. see X25-P01 and X27-C also, for drying see X25-G also.

X25-B02D [1992]

Dielectric heating

Includes radio frequency (RF) heating where alternating electric field causes molecules to repeatedly align with field creating heat similar to friction.

X25-B02F [2011]

Thermoelectric/Solid state heating

(X25-B)

Includes thermoelectric heating using an applied voltage to cause a temperature difference across the thermoelectric module, e.g. a sandwich formed from two ceramic plates with N and P type bismuth telluride in between. Charge carriers, i.e. electrons and positive holes absorb heat on one side of the thermoelectric module and transport it to the other side where it is used for heating. See X27-F02B1 for thermoelectric cooling.

Peltier heater, thermoelectric heat pump, solid state

X25-B02X

Other electric-, magnetic- or electromagnetic-field heating aspects

Includes electron beam heating, etc.

X25-B03

Electric discharge heating

X25-B03A

Electrodes or electrode arrangements

X25-B03B

Arc discharge or glow discharge

X25-B03X

Other electric discharge heating aspects

Includes power control, power supplies.

X25-B04

Automatic switching for heating equipment

Control, thermostats

X25-C

Industrial furnaces

Elements for the various heater types are in X25-B. Other details are coded in relevant places in X25-C. Incinerators for industrial waste disposal are also coded under X25-W01A. Mechanical details of general solid waste disposal are coded by P43-E codes.

Cremation

X25-C01

Ohmic resistance

Resistance element, temp control, power supply, charging/discharging, crucible, hearth

X25-C02

Electric discharge

Includes arc furnaces.

Electrode, power supply, crucible, hearth

X25-C03

Monitoring, control

X25-C05 [1992]

Induction furnace

(X25-C09)

Zone melting, coreless, core-type, coil

X25-C07

Gas Furnaces

Includes electrical aspects of gas furnaces.

Electrode, power supply, crucible, hearth

X25-C09

Other industrial furnaces

X25-D

Soil-shifting; Mining

X25-D01 [1983]

Soil shifting, excavators

Includes fuzes and blasting using explosives (see W07-C codes for military applications). See T06-D08E also, for control details.

Dredger, bulldozer

X25-D02

Mining

Covers rock or ground testing (see also specific S03 codes e.g. S03-E14E which includes investigation methods of soil, rock etc.). Use T06-D11 also, for control details.

Dust removal, roof condition monitor, rock hardness testing, powered support, quarries, miner's helmets, blasting, detonator, mineshaft ventilation

X25-D02A [1983]

Handling material, e.g. lift, conveyor

See also X25-F.

Vehicles, mine locomotives

X25-D02B [1983]

Tools

Shears, drills, picks, cutters

X25-D02C [1992]

Intrinsically safe power supply/equipment; Testing

X25-E [2020]

Earth-drilling, well logging

Also includes pumping and heating to aid oil recovery. Control details see T06-D12 also. Also see H01-A, H01-B and H01-C codes respectively for well logging, drilling and producing.

Cables, connectors

X25-E01 [1983]

Drilling equipment

Covers large-scale deep-well drilling e.g. oil, gas, water, etc. For drilling in the construction industry, see X25-U, and for drills used in the mining industry, see X25-D02B.

X25-E02 [1983]

Well logging

Geophysical prospecting in general is in S03-C.

X25-E02A [1992]

Measuring arrangements

Sondes, sampling, penetration depth, measuring, testing, surveying

X25-E02A1 [1992]

Transmission details

See appropriate W05-D codes for transmission details.

X25-E03 [2006]

Well production; Extraction of oil, gas, water, etc.

Includes pumping assemblies. Also see X25-L03A for novel electric pumps per se.

X25-F

Conveying, lifting, hauling, handling materials

Includes filling materials, labelling, tagging, e.g. electronic tagging using e.g. radio frequency ID tags to track goods/items during conveyance (see also W06-A04B5 and W02-G05 codes), etc.

General control details are also coded in T06-D08 as appropriate.

Tagging machines, weighing

X25-F01 [1983]

Conveyors

Includes vibratory feeders and detecting articles on conveyor.

Belts, transporting goods, shelving and retrieving, locating, addressing

X25-F01A [1983]

Conveyor control

See also T06-D08C for control.

X25-F02 [1983]

Web/strip/coil handling

See T06-D08A also for control details dealing with web-advancing apparatus, and T06-D08B also for control of article feeding or tension regulation.

Rolls, sheets, tension-control, filaments, winding, coiling, wrapping, tension control

X25-F02A [1992]

Paper or envelope handling

X25-F03 [1983]

Packing; Dispensers

X25-F03A [1987]

Packing; Bottling; Packages; Labelling/tagging

Includes all electrical details of packaging plant and methods as well as electrical details of packages/bottles per se. For packaging of TV receivers, AV equipment or electronic components in general, see W03-A19C, W03-G10G and V04-X01A respectively. From 2012, mechanical details of packaging processes and equipment are coded under Q31, details of container/closure and transit packaging under Q32, details of packaging container and closure materials under Q33, and the types of goods packages, bottled, labelled, etc, under Q34

X25-F03A1 [2011]

Packing/Bottling plant and methods

Includes methods for filling and sealing packages as well as bottling and tinning plants. Also see other X25 and X27 codes as according to what is being packaged, e.g. see also X25-P01X for canning food, X25-P01C for bottling milk and X27-A02 for packaging beauty treatments. Also includes unpacking and bundling details.

Wrapping, stapling, stapler, canning, filling

X25-F03A3 [2011]

Electrical aspects of packaging; Smart packages; Labels and tags

Includes electrical details of packages/bottles per se such as packages with built in sensors, displays, expiry or deterioration indicators or tags. See X25-F11 and T05-G02 for systems for tracking of packages or goods being shipped. If the package is intended for a specific use, also see other X25 and X27 codes as appropriate, e.g. X25-P01X for food, X25-P01C for milk and X27-A02C for packages for stationary.

Carton, box, bottle, pouch, lid, sensor, display

X25-F03A3A [2011]

Smart packages

Includes packages/bottles containing smart devices such as RFID tags or electric time-temperature or food quality indicators. Novel aspects of tags and labels are also assigned X25-F03A3C. Also see T04-K and W02-G05 for novel transponders/labels attached to package, and X25-F11 and T05-G02 for systems for tracking of packages or goods being shipped. If the package is intended for a specific use, also see other X25 and X27 codes as appropriate, e.g. X25-P01X for food, X25-P01C for milk and X27-A02C for packages for stationary. See X27-F05 for intelligent refrigerators that monitor smart food items.

Sensor, alarm, warning, display

X25-F03A3C [2011]

Labels and tags

(X25-F08)

Includes novel labels or tags applied to smart packages for which X25-F03A3A is also assigned. Also includes methods and systems for the attachment of labels or tags to goods, or the printing of a label on a package (also see S06-G codes for printing using inkjet technology). Also see T04-K and W06-A04B5 codes for labelling/tagging using a smart or RFID tag/label and also W02-G05 codes when novel RF details are involved, such as receiver or transmitter circuitry or antennae. See T03-H02A codes for labelling of record carriers such as CDs or cassettes. Product-identifying tags providing electronic article surveillance (EAS) capability are also assigned W05-B01A2 codes depending on the technology use. Also see X25-F11 for tracking of tagged/labelled goods and X25-F07 for automated warehousing utilising tagged goods.

Bar code, smart label, transponder, RF-ID, transponder, passive tag, battery-assisted passive tag, BAP, active tag

X25-F03B [1992]

Dispensers

Dispensing measured volumes in general is covered by S02-C04 codes.

Stamps

X25-F03B1 [1992]

Dispensers for comestibles

Includes vending machines for food/drink etc, see relevant T05-H codes also. See X27-X for stock control in pub e.g. optics etc.

Beer, water, dispensing

X25-F03B2 [1992]

Forecourt dispensers

Includes petrol pump, air dispenser in garage for vehicle tyres, etc.

X25-F04 [1983]

Lifts

Includes details of passengers lifts and goods lifts. Electrical details of doors are also coded under X25-U01.

Elevators, floor indicators, door operation, escalators

X25-F04A [1983]

Control

See also T06-D08D for control details.

Floor-call, speed/acceleration control, motor control, dispatching

X25-F05 [1983]

Cranes, hoists, winches, trucks

Includes lifting magnets, cable car, jack, ski lift, vehicle mounted equipment (see X22-also). For control details see T06-D08E also. Details of passengers lifts and goods lifts are included under X25-F04.

X25-F05A [1987]

Trucks, goods or robotic vehicles

Includes IC engine and electric forklift trucks, vehicles mounted with lifting platform (also see X22-X18 or Q15-A codes), and walk behind trucks (also see X22-P05F or X21-A01B for IC engine and electric fork lifts respectively). See T06-D08F for forklift control. See Q19-C06 instead for mechanical aspects of forklift trucks. Also includes walking robots and electrical aspects of shopping trolleys such as electric drive arrangements and advertising displays/bar-code readers. See Q22-A02 for mechanical aspects of trolleys and Q38-B for mechanical details of trucks and robotic vehicles.

Fork lift, walking robot, electric shopping trolley, climbing robot, inspection robots, autonomous, carts

X25-F05A1 [1987]

Running on tracks

Includes robotic vehicles/trucks running on tracks or following painted lines on factory floor using e.g. optical sensors or image processing (see also T01-J10B/T04-D codes). See also T06-B01A and T06-D08F for 2D position control of goods conveying vehicles.

Factory automation vehicles, automatic guided vehicle, AGV

X25-F06 [1987]

Sorting

(X25-F)

See also X25-W04 for recycling, and T05-K.

X25-F07 [2002]

Automated warehousing

Includes shelving and retrieving arrangements. See also T06-D08 for control, X25-F01 for conveyors, X25-F05A for conveying trucks and X25-F03A3C for warehousing of tagged goods. Electrical details of manipulators used to grab goods are also coded under X25-A03E.

Three dimensional warehouse, stereoscopic warehouse, intelligent warehouse

X25-F08* [2002-2010]

Labelling/Tagging

*This code is now discontinued and transferred to X25-F03A3C but remains searchable and valid for codes from 2002-2010. Includes details of the actual attachment of the label or tag to the item, or printing of the label on the item (also see S06-G codes for printing using inkjet technology). See X25-F03A codes if the labelling/tagging is part of the packing/bottling arrangement, and X25-F11 for goods tracking arrangements. See also T04-K, W06-A04B5 and possibly W02-G05 codes for labelling/tagging using a smart or RFID tag/label. See T03-H02A codes for labelling of record carriers such as CDs or cassettes.

X25-F09 [2007]

Inventory/Stock management

Includes inventory management and monitoring of materials/articles being removed/replaced from storage area. See T01-J05A2 for non-networked inventory monitoring or T01-N01A2 for network, e.g. Internet, based systems.
Stock control

X25-F11 [2007]

Goods tracking

Includes arrangements for monitoring location of goods containers or individual articles being moved. For use of radio transponders attached to goods, also see X25-F03A3C and T04-K03B for transponder tags/labels and T04-K02 for reading and writing aspects. See also T01-N01A2E for Internet based tracking. Novel RF details of transponder tags/interrogation are also covered by W02-G05 codes and W06-A04B5 codes cover RF transponder identification. See W05-B01A2 codes instead for theft alarms triggered by transponder tags.

X25-F12 [2016]

Delivery methods and equipment

Includes use of drones to deliver articles in remote or difficult locations (also see W04-X03E1M and W06-B15U for unmanned aerial vehicles used for commercial/industrial application). Also see S02-B04 for aerial photographic surveying and W07-F04 for aerial reconnaissance.

Delivery, drop, package, post, supplies, logistics, quadcopter, rotorcraft

X25-G

Drying

See T06-D20 for control details also.

Heater control, air flow control, microwave heaters, infrared heaters, electric heaters

X25-H

Separating materials, cleaning, sterilizing

X25-H01

Magnetic separation

Coils, electromagnets

X25-H02

Electrostatic separation

X25-H02A

From gases or vapour

X25-H02A1

Plant or installations

Electrostatic precipitation, power supply, controllers

X25-H02A2

Constructional details

X25-H02B

From liquids or solids

X25-H03 [1983]

Water and sewage treatment

(X25-H09)

Includes water distillation, water sterilization e.g. using ultraviolet radiation, desalination plant, aerator, swimming pool cleaning (see X25-X06 also). Water recycling is also coded under X25-W04.

X25-H04 [2006]

Ground/soil decontamination

Includes cleaning of contaminated soil, e.g. from pollution by petroleum or heavy metal spills.

X25-H05 [2006]

Industrial workspace cleaning

Includes e.g. vacuum systems for dust extraction or removing swarf etc. during machining of materials. Can be used in conjunction with X25-A codes as appropriate. See X27-E01B only for general air-conditioning of industrial work spaces.

Vacuum, dust, extraction

X25-H06 [2011]

Mechanical separation

Includes separation by mechanical means such as centrifugal separators and separation by floatation.

X25-H09

Other material separation and cleaning aspects

Includes electrodialysis, dry cleaning plant (see X27-D09 for domestic scale dry cleaning), general disinfection and sterilization, etc. From 2011, separation by floatation is coded in X25-H06. Details of industrial laundry equipment are also coded under X25-T05.

Fractional distillation, general cleaning

X25-H09A [2002]

Ultrasonic cleaning

Includes ultrasonic bath and ultrasonic sterilizers. See X27-D07A for domestic ultrasonic mixed mode cleaning.

X25-H09C [2002]

Vehicle washer

Includes electrical aspects of vehicle washing equipment.
Car wash

X25-J

Mixing, crushing

Includes centrifuges, magnetic mixing, ore crusher. See T06-D04 for control details. Includes large scale shredders. Small size shredders, e.g. used in offices to shred confidential documents, are coded under X27-A02C only.

Pulverising, grinding, milling, ball mills, cyclone

X25-K

Spraying and coating equipment

X25-K01

Electrostatic spraying equipment

X25-K05 [1987]

Coating equipment

X25-K09

Other spraying and coating equipment

Includes atomisers.

X25-L

Components

Includes novel electrical components per se, and mechanical parts of these components, e.g. a mechanical impeller used in an electric pump. To be coded in the X25-L section, the electrical components themselves need to be novel. Therefore, a novel electrohydraulic system using off-the-shelf solenoid valves will be coded in X25-L09 but X25-L01A will not be applied as well since the valves are not novel. Motor vehicle applications are excluded from this section – See X22 instead.

X25-L01

Valves

Includes electro hydraulic valves.

Motorised valves, electric actuators, position monitor, fluid-pressure actuator (electrical)

X25-L01A [1983]

Electromagnetic

Details of electromagnets are in V02-E.

Solenoids, control, coils

X25-L02

Electric brakes, clutches, gears

Electromagnets, EM coupling, transmission

X25-L03 [1983]

Pumps, compressors

(X25-L09)

Electrically-driven, controllers

X25-L03A [1992]

Pumps

X25-L03B [1992]

Compressors

See X27-F02C1 for compressor used in refrigeration.

X25-L04 [1983]

Blowers, fans

(X25-L09)

Electrically-driven, controllers

X25-L05 [1987]

Vibrators

(X25-L09)

Electromagnetic, motorised, coils, electrodynamic

X25-L06 [1987]

Seals, magnetic bearings

(X25-L09)

Magnetic seals

X25-L07 [1987]

Heat exchangers, heat pipes

(X25-X)

Includes heat exchanger comprising built-in electric resistance heater to supplement heat exchange or solenoid flow control valve.

X25-L09

Other electrical components

Includes shock absorbers, electroviscous actuators, etc. Electrohydraulic valves are coded under X25-L01 only. Novel details of electrohydraulic systems other than valves are coded under X25-L09.

Dampers, electrorheological fluid

X25-M

Locks

Alarm systems are in W05-B. See also T04-A and T05-D for card readers and access control systems, respectively.

Keys, alarms

X25-M01 [1983]

Electronic

Codes, keyboard-operated, magnetic card, memory

X25-M02 [1983]

Electric/magnetic

Electromagnets, solenoids, slides, bars, coil, bolts

X25-N

Agriculture

X25-N01 [1983]

Arable

Includes insecticide spraying, bird scarers, greenhouse. See also X25-X02 for vermin/insect extermination. Also includes details of rice polishing/milling and flour polishing/milling (see also X25-P01X for general food processing).

Seed treatment, grain silos, ventilation, parasite/vermin extermination, agricultural produce grading/sorting, hay baling, weeding

X25-N01A [1983]

Soil working, sowing, harvesting

Includes tractors. For control see T06-D01A. From 2015, mechanical details of soil working and planting are coded under P11, and mechanical details of harvesting are coded under P12.

Ploughs, depth control, combine harvesters, threshers

X25-N01B [1987]

Fertilising; Irrigating; Culture

See T06-D01B for control details. Includes rain influencing systems for agricultural reasons (see also X25-X20 code).

Sprinklers

X25-N02 [1983]

Livestock

Includes branding, bee-keeping, egg incubator, horse training (see W04-X01 also). For control details see T06-D01C also.

Poultry-, cattle-, fish-farming, trawler fishing gear, eggs grading

X25-N02A [1987]

Feeding and drinking

Also includes manufacture of animal feed (also coded under X25-P01X).

Automatic feeders, dispensers, compound feed

X25-N02B [1987]

Milking

See also X25-P01C for milk processing, and X25-F03A for milk bottling.

Milking control, metering, monitoring

X25-N02C [1987]

Housing; Fencing

Includes heating and air conditioning. For electric fence see X25-X11 also.

X25-P

Foodstuff industry, tobacco, pharmaceuticals

X25-P01 [1983]

Bulk food processing

See T06-D02 for control details also.

Industrial cooking, bread baking, food sorting

X25-P01A [2002]

Industrial cooking/baking equipment

Includes industrial scale food processing such as mixing bread dough and kneading, and also industrial cooking/baking systems such as large scale ovens. For domestic cooking/baking see X27-C codes instead.

X25-P01B [2002]

Industrial beer brewing/alcoholic beverage production equipment

Includes electrical aspects of large scale beer or wine making equipment, and - since 2006 - this code also covers electrical details of equipment for producing all type of alcoholic beverages, including spirits, etc. See X27-X02 only for small scale domestic brewing/wine making. Also includes packaging/bottling of beverages. See also X25-F03A1 for bottling.

Distillery, winery

X25-P01C [2002]

Milk processing

Includes pasteurisation. See X25-N02B for milking control, metering and monitoring for livestock. See X25-F03A for bottling of milk.

X25-P01X [2002]

General food processing

Includes meat slicing, food packing/canning (also see X25-F03A for food packing/tinning). Also includes food/packaging sterilization/disinfection e.g. using mechanical cleaning, chemicals, heat, radiation or electricity. See e.g. X27-D10 for general domestic scale sterilizing/disinfecting. Also includes details for milling and polishing rice or other seeds, manufacturing of animal feed, and 3D printed food. Details of 3D printing are also included under X25-A08M4 and X25-A08U7. Manufacturing of animal feed is also coded under X25-N02A.

Packing, canning, tinning, sterilising, UV, microwave, ultrasonic, plasma, flour/rice polishing/milling, oil pressing

X25-P02 [1987]

Pharmaceuticals

For control details see T06-D02A also.

X25-P03 [1997]

Tobacco

(X25-P)

Cigarette manufacture, perforating filter paper, cigarette packing

X25-Q

Metallurgic processes

For control details see T06-D09 also. For industrial furnaces per se, see X25-C. Also includes electrical details of powder metallurgy process (see also M22-H).

X25-Q01 [1983]

Iron and steel manufacture

Furnace control, arc furnaces, blast furnaces, cupola

X25-Q02 [1983]

Heat treatment, cold working, etc.

Annealing, quenching, hardening, tempering

X25-R

Electrolysis, electrophoresis

X25-R01

For production of non-metals

Terminals

X25-R01A

Cells

X25-R01B

Electrodes

Anodes, cathodes

X25-R01C

Separators

Membranes, ion exchange separators, diaphragms

X25-R01D

Control

X25-R02

For metal refining, etc.

Cells, electrowinning, baths

X25-R03

Electroforming

X25-R04

Electroplating

Does **not** include electroless (e.g. nickel) plating via a chemical reduction process without use of electrical energy (see M13-B codes instead).

Electrodeposition

X25-R04A

Cells

Electrodes

X25-R04B

Control

Current control, measurements, monitoring

X25-R05

Anodising

Coating

X25-R06

**Electrolytic cleaning, etching, polishing;
Sacrificial anodes**

Corrosion protection, cathodic protection

X25-R07 [1983]

Electrophoretic coating

Includes anodic and cathodic coating of electrode with non-conductive organic coating, where colloidal particles suspended in a liquid medium migrate under the influence of an electric field and are deposited onto the electrode.

Electropainting, E-coating, electrocoating, EP

X25-S

Static electricity prevention

Includes lightning rods (see also X12-G) and materials.

Antistatic coatings, discharging

X25-S01 [1992]

Clean room; Computer installation

See also T04-L08 when used with computer installations e.g. data centers, and U11-C15 when the clean room is used during semiconductor manufacturing.

X25-T [1983]

Textile and paper industries

(X25-X)

X25-T01* [1983-2005]

Fiber, yarn, etc. manufacture

(X25-X)

*This code is now discontinued and transferred to X25-T04A from 2006. It is still searchable and remains valid for records from 1983-2005. See T06-D03B for control details also.

Spinning, winding, bobbins, twisting, combing, carding, crimping

X25-T02* [1983-2005]

Fabric manufacture

(X25-X)

*This code is now discontinued and transferred to X25-T04B from 2006. It is still searchable and remains valid for records from 1983-2005. From 2006 embroidery machines have been transferred to X25-T04C. See T06-D03C for control details also.

Knitting machines, tension-control, embroider, looms, wefting machines, warping machines

X25-T03* [1983-2005]

Sewing machines

(X25-X)

*This code is now discontinued and transferred to X25-T04C from 2006. It is still searchable and remains valid for records from 1983-2005. See T06-D03D for control details also.

X25-T04 [2006]

Textile industry

Bleaching, binding

X25-T04A [2006]

Fiber, yarn, etc. manufacture

See T06-D03B also for control details.

Spinning, winding, bobbins, twisting, combing, carding, crimping

X25-T04B [2006]

Fabric manufacture

See T06-D03C also for control details.

Tension-control

X25-T04B1 [2006]

Weaving machines

Looms, wefting, warping machines, tension-control

X25-T04B2 [2006]

Knitting machines

Weft knitting

X25-T04B3 [2006]

Non-woven fabric production machines

Includes production of non-woven fabrics such as wadding, felt or fleece, and the production of fabrics, e.g. by welding together thermoplastic fibers (see also X24-D04).

Cotton wool

X25-T04C [2006]

Sewing machines; Embroidery machines

See T06-D03D also for control details of sewing and embroidery machines.

Sew, embroider

X25-T04D [2007]

Textile printing; Textile dyeing

See also S06-G10 if using inkjet printing. See also F03-F codes for dyeing/printing.

X25-T04G [2006]

Other textile industry aspects

Includes industrial scale fabric pressing/ironing, fabric cutting, industrial electric scissors etc.

X25-T05 [2017]

Industrial laundry equipment

Includes commercial and industrial laundry washing and drying equipment. Also includes industrial dry-cleaning plants (see also X25-H09), laundry feeders (see also X25-F01), folders, industrial ironing equipment, stackers and garment baggers (see also X25-F03A).

Drying details are also coded under X25-G, and cleaning details are also coded under X25-H codes. Domestic scale laundry washing and drying equipment is coded under X27-D only.

Batch dryer, washer extractor, batch washing system

X25-T09 [1987]

Paper industry

(X25-X)

See T06-D03A also for control details.

X25-T09A [2002]

Paper manufacture

X25-T09B [2002]

Cardboard manufacture

X25-T09C [2002]

Paper shredding/cutting

See X27-A02C also for domestic size shredder and business equipment.

X25-T09G [2002]

Other paper industry aspects

See also X25-W04 for paper recycling, X25-A02A for paper press, and X25-F02A only for paper and envelope handling. Includes book binding (see also S06-C05).

Binding, printing

X25-U [1983]

Building, construction industry

(X25-X)

Concrete mixers, pile-drivers, stone cutters

X25-U01 [1983]

Doors and windows

(X25-X)

Includes gates, skylights. Also includes lift doors. Lift doors are also coded under X25-F04.

Doors control, drive motors, garage door, road barrier, electrochromic covering

X25-U02 [1997]

Car Parks; Car storage and retrieval

(X25-X)

X25-U05 [1987]

Road construction; Road maintenance e.g. road cleaning, gritting

Includes electrical details of road tunnels, e.g. ventilation system. Also includes monitoring of road condition, e.g. damage of road surface. If road condition is transmitted to the driver of a vehicle, T07-G02 should also be applied. If the monitoring system is mounted on the vehicle, see X22 only.

De-icing, snow ploughs

X25-V [1987]

Cryogenics

(X25-X)

Includes electrical aspects of cryogenics producing very low temperatures (i.e. below -150 degrees Celsius).

X25-W [1997]

Industrial waste disposal, recycling; Electric steam boilers

(X25-X)

X25-W01 [1997]

Industrial waste disposal

(X25-X)

Includes details of large scale garbage disposal control systems and large non-domestic bins. Domestic waste disposal, such as kitchen waste disposal units and electrical rubbish bins, are coded under X27-K only. Recycling processes/systems are coded under X25-W04 only. Does not include radioactive waste disposal (see K07-B or X14-D).

X25-W01A [2002]

Incinerators

Electrical details of furnaces are coded under X25-C.

X25-W02 [1997]

Electric steam boilers

(X25-X)

X25-W04 [2002]

Recycling processes/systems

Includes recycling processes for plastics, paper and aluminium, as well as retrieval and sorting of waste for recycling. See also X25-F06 for sorting, and X25-T09 for paper industry. For recycling of copier and printer components also see S06-K04C. Water recycling is also coded under X25-H03.

X25-X

Other industrial electric equipment

Includes fume cupboard, ventilators etc. For riveting see X25-A03R.

X25-X01 [2002]

Timber industry

Includes tree felling and transporting equipment, wood drying (see X25-G also) and sawing of lumber. For wood working such as wood turning, see X25-A10 instead.

X25-X02 [2002]

Vermin/insect extermination, repulsion or trapping

Includes devices for killing, trapping and deterring/scaring pests such as rats or flies. See X27-X for domestic insecticide dispenser, and X25-N01 for arable insecticide spraying.

X25-X03 [2002]

Killing and stunning of animals

Includes abattoirs (see also X25-N02 for livestock animals). Also includes animal deterrent/repulsion systems, e.g. for preventing wild animals from straying into specific area. Also see X25-N02 for deterring livestock and X25-X11 for electric fences per se. For vermin/insect deterrent systems see X25-X02 instead.

Abattoir, stun

X25-X04 [2002]

Ozone manufacture

Also see X27-E01B2 for air-conditioning, and X12-F03.

X25-X05 [2002]

Fire fighting equipment

Includes details of early fire warning systems e.g. in buildings. W05-B02 codes are also assigned for fire alarms. Mechanical details of fire fighting equipment are coded by P35-C codes.

Sprinklers, fire extinguishers

X25-X06 [2002]

Swimming pools

Includes electrically operated covers, lights, heaters, etc. See X26 for lighting and X27-E03/X25-B for electric water heating.

X25-X07 [2002]

Leather working/cutting

See X27-A02B1B also for footwear manufacture.

X25-X08 [2002]

Stirling engines

Includes engines used in refrigeration systems. See X27-F for refrigeration.

X25-X09 [2002]

Lubricating systems

X25-X10 [2002]

Engraving systems

Includes engraving using mechanical means as well as laser marking. Also includes stamping. See X25-A02D for punching/stamping.

Laser coding

X25-X11 [2002]

Electric fence

See also X25-N02C for livestock fencing.

X25-X12 [2002]

General industrial safety systems

Used in conjunction with other X25 codes as appropriate.

X25-X13 [2005]

Industrial combustion

Includes boilers using solid, liquid or gaseous fuels and involving electrical aspects. Domestic scale combustion, e.g. central heating gas boiler, is not included - see X27-G.

X25-X14 [2005]

Manufacturing/assembly plants

Includes assembly line systems and general manufacturing plants. For novel assembly/manufacturing devices, such as manipulators or conveyors, see X25-A03E and X25-F01, respectively. Control details of manufacturing processes using 5G technology are also covered by W02-C03C1L.

Industry 4.0, vehicle assembly line, car manufacturing plant

X25-X20 [2008]

Weather influencing/manipulation

Includes all electrical aspects of systems for controlling weather conditions such as using artificial lightning to produce rain or disperse clouds. Also includes electrical aspects associated with dispersing materials for cloud seeding. For measurement of weather conditions see S03-D codes. See W06-B01C9 for aircraft-mounted weather influencing systems, and X25-N01B if rain is being influenced for agricultural reasons.

X25-Y [1997]

Pipelines

X25-Y01* [1997-2004]

Toilets

*This code is now discontinued and transferred to X27-L from 2005. It is still searchable and remains valid for records from 1997-2004. Public and domestic toilets and urinals. Includes toilets with integral bidets (see also X27-A02A).

X25-Y02 [1997]

Pipelines

Includes flow control valves, sensors and other electrical components, e.g. for large scale oil, sewage and water pipes. See also X25-L01 for valves per se, and X25-H03 for water and sewage treatment.

X26: Lighting

NOTES:

(1) Also includes illumination obtained by unconventional sources like LED, EL devices. However, such devices used for displays and signalling are not included.

(2) Vehicle lamp circuitry / control and mounting arrangements onto vehicle body are coded in X22 only. X26 codes are applied to highlight the type of lamp (e.g. LED, incandescent, etc), or novel details of fixtures (e.g. lenses, refractors, etc.).

X26-A

Discharge (including arc) lamps

Discharge tubes for purposes other than lighting are in V05.

X26-A01

Lamps

X26-A01A

Multi-discharge path, arc, electron-stream and external electrode lamps

Xenon lamp

X26-A01B [1987]

Electrode-less, microwave lamps

(X26-A01X)

Waveguides, antennae, EM coils, field generation, inductive coupling, travelling wave discharge, microwave discharge, capacitive discharge, sulphur lamp

X26-A01B1 [2008]

Plasma lamps

Includes electrode-less lamps using plasma discharge.

X26-A01C [1997]

Dielectric barrier discharge lamps

(X26-A01X)

X26-A01D [2002]

High pressure discharge lamps

Covers metal halide, sodium vapour, etc lamps.
HID, high intensity discharge

X26-A01E [2002]

Low pressure discharge lamps

Covers mercury, sodium, etc lamps operating at fractional pressures. Low pressure electrodeless and fluorescent lamps are in X26-A01B and X26-A01E1, respectively.

Deuterium arc lamp

X26-A01E1 [2002]

Fluorescent lamps

X26-A01X

Other discharge lamps

X26-A02

Construction

X26-A02A

Containers; Seals

Includes end caps.

X26-A02A1 [1987]

Seals; Leading-in conductors

Leads, cement, cermet seals

X26-A02A2 [1992]

Containers

Bulb, envelope, chamber, tube

X26-A02A2A [2002]

Inner envelope

X26-A02A2B [2002]

Outer envelope

X26-A02B

Electrodes, shields, screens

X26-A02C

Fillings

Metal halides, mercury, sodium, iodides

X26-A02D

Filters, phosphors

Fluorescent coatings, luminescent coatings

X26-A02E [2002]

Inductor or HF coil

(X26-A02X)

Includes coil and toroidal core for operating electrodeless lamp. Coil arrangements, e.g. for impedance matching, are also covered by the relevant V02-F and U25 codes.

X26-A02F [2005]

Integral light source and reflector

For reflectors as part of a light fixture, see X26-D01A.

X26-A02G [2005]

Integral operating circuit/envelope

Includes constructional details of the combination. Electrical details of the operating circuits are covered by X26-C01 codes.

X26-A02X

Other discharge lamp constructional details

Includes pressure maintenance, gettering, tube-shatter prevention, cooling, etc.

Amalgams

X26-A03

Manufacture

Also includes testing, phosphor recovery, packaging, etc.

X26-A03A [1992]

Welding end caps

X26-A03B [1992]

Container

Includes coating of films.

X26-A03C [1992]

Electrodes

X26-B

Incandescent lamps

X26-B01

Lamps

Includes photo-flash bulbs (see also S06-B03B).

Photoflash arrays, primers

X26-B01A [2005]

Halogen lamps

Tungsten lamp

X26-B01B [2005]

Heating lamp

See X25-B/X27-C codes, respectively, for industrial/cooking/heating applications.

X26-B02

Constructional details

X26-B02A

Envelopes, seals, filament mountings, connections

X26-B02A1 [1987]

Envelopes, seals

Includes end caps, filters e.g. coated onto the inside of the envelope.

Bulbs

X26-B02A2 [1987]

Filament mountings, connections

Also includes lead wires, lead-in conductors.

X26-B02A3 [2005]

Filaments

(X26-B02X)

X26-B02B [2005]

Integral light source and reflector

For reflectors as part of a light fixture, see X26-D01A.

X26-B02X

Other incandescent lamp constructional details

Includes fillings, getters, etc.

X26-B03

Manufacture

Also includes testing, packaging etc.

X26-B03A [1992]

Incandescent bodies

X26-B03B [1992]

Vessels

X26-C

Lamp operation and control

Vehicle lamp circuitry and control are coded in X22-B01F only. LED circuitry and control are coded in X26-H03 only.

X26-C01

Discharge (including arc) lamps

For unspecified lamp-type controllers, see X26-C03 codes.

X26-C01A

Operating and controlling flashlamps

For camera flash see S06-B03A also.

Strobes

X26-C01B

Lamp operating circuits; Starters

X26-C01B1 [1992]

Inductive ballast; Inductive components; Starter switches

Includes normally non-electronic starting aids.

X26-C01B1A [2005]

Inductive ballast

Includes inductive starting circuit.

X26-C01B1C [2005]

Inductive components

Includes novel inductors/transformers specifically for use in (non)electronic ballasts. See V02-G codes for further details for reactors and transformers.

X26-C01B2 [1992]

Electronic ballast

Ignition circuit

X26-C01B2A [1992]

Inverters

See also U24-D05 codes for further details.

X26-C01B3 [1992]

For electrodeless lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B4 [2002]

For high pressure discharge lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B5 [2002]

For low pressure discharge lamps

This lamp-type code is used with the above 'ballast' codes, as appropriate.

X26-C01B5A [2005]

Fluorescent lamp

CCFL, cold cathode fluorescent lamp

X26-C01C

Controlling lamp intensity

Dimming

X26-C01D [2005]

Current/power/voltage control

For general low power control circuits for voltage and current. See also U24-D/E codes.

On-Off

X26-C01E [2005]

Remote control

See also W05-D codes for remote controllers.

X26-C01X

Other discharge lamp operation/control

X26-C02

Incandescent lamps

For unspecified lamp-type controllers, see X26-C03 codes.

X26-C02A [2005]

Halogen lamps

X26-C02B [2005]

Heating lamp

See X25-B/X27-C codes, respectively, for industrial/cooking/heating applications.

X26-C02C [2005]

Dimmer

See also W05-D codes for remote controllers.

X26-C03

Lamps (general)

See also V04-Q30U and other V04-Q codes for details of printed circuits.

Transformers, wiring, PCB

X26-C03A

Regulating voltage or current; Controlling intensity

X26-C03A1 [1992]

Regulating voltage or current

X26-C03A5 [1992]

Controlling intensity

Dimming

X26-C03C [1992]

Remote-controlled switching

(X26-C03X)

Includes all aspects of remotely controlling the light, including remotely adjusting the brightness (also coded in X26-C03A5) and remotely switching the light on/off (also coded in X26-C03E). See also W05-D codes. Also includes real-time monitoring of street lamps.

X26-C03E [1992]

On-off switching

(X26-C03X)

Includes use of person presence/absence detection.

X26-C03X

Other general lamp circuit arrangements

Includes circuitry to detect lamp failure.

X26-D [1983]

Fixtures

Arrangement details for supporting, suspending or attaching the light/lamp to e.g. a wall, ceiling, floor, etc, not involving details of light distribution are coded by X26-R. For vehicle lighting, see also X22-B codes.

X26-D01 [1992]

Reflectors, refractors, diffusers, filters, screens

Generally, includes items considered to be part of the light fitting structure. So, excludes optical systems that are at some distance from the light source.

X26-D01A [2002]

Reflectors

X26-D01B [2002]

Refractors

Lens

X26-D01C [2002]

Filters

X26-D01D [2002]

Screens

Gobo, "Goes-Before-Optics"

X26-D01E [2002]

Diffusers

A diffuser in the form of a cover for a light fitting is also coded in X26-D03.

X26-D01E1 [2002]

For displays

Includes diffusers for back- and edge-lighting arrangements for displays (see also X26-U04A1 and X26-U04A2 respectively). See also W05-E05B codes (only for records prior to 2007) and U14-K01A codes, respectively, for general display and LCD back-lighting.

X26-D01F [2002]

Light guides

Includes light guides such as a plate, glass block, optical fibre, etc. used locally within a light fitting. For guiding of light over some distance, see X26-G. Where the light guiding aspect relates to the backlighting of an LCD, see also U14-K01A and W05-E05B (only for records prior to 2007) codes.

X26-D01G [2002]

Polarisers

X26-D02 [1992]

Cooling

For cooling arrangements associated with the lamp itself, see X26-A02X and X26-B02X.

X26-D03 [2002]

Housing or case for light fitting

Includes protective fittings such as a cage, etc. Also includes cover glasses, globes and bowls as part of the housing for the light fitting. This code is used in conjunction with other codes as appropriate, e.g. X26-D01E for a globe with diffusing property.

X26-E [1983]

Portable lights

(X26-X)

Includes lights which can be carried around personally or moved around.

X26-E01 [1987]

Portable battery-powered lights

X26-E01A [2005]

Torches

Flashlights

X26-E01A1 [2005]

LED-based

X26-E01B [2005]

Lanterns

X26-E01C	[2005]
Penlights	
X26-E01D	[2005]
Key ring lights	
X26-E01E	[2005]
Portable lights using renewable/green energy resources, e.g. solar lights	
From 2006, this code has been expanded to include all small solar powered lights, such as garden/path lights, etc. From 2020, this code has been expanded further to include all portable lights using renewable/green energy resources, including wind powered lights or combinations of different green energy resources. Details of the solar cells are covered by X15-A codes and details of wind power are covered by X15-B codes. Non-portable lights using renewable/green energy resources are coded under X26-S.	
X26-E01F	[2005]
Wearable	
Includes portable lights mounted on clothing, shoes, jewellery, etc. <i>Watch, helmet mine lamp</i>	
X26-E02	[1987]
Portable mains-powered lights	
X26-E02A	[2005]
Table lamps	
X26-E02B	[2005]
Floor lamps	
X26-E02C	[2005]
Emergency	
Includes portable and fixed emergency lights, e.g. exit lights with batteries previously charged by the mains, and emergency lights in e.g. an operating theatre when the main power is off.	
X26-E02D	[2005]
Night lights	
Includes light/mains plug combinations used in, say, children's rooms.	
X26-F	[1987]
Lamp holders	
(X26-A02X, X26-B02X) See also V04-K01. <i>Bayonet, screw holder</i>	

X26-G	[1987]
Illumination using optical guiding structures	
(X26-X)	
Includes, in general, the use of guides such as optical fibers, rods, etc in leading light from a source to a distant location. For light guiding structures within a light fitting or for 'local' use, see X26-D01F. For optical fiber-based illumination, see also V07-N03. Guiding of solar/sun light is not included unless a space is illuminated with a combination of natural and electric lights with, for example, the latter controlled to supplement or supplant natural light depending on ambient conditions.	
X26-H	[1992]
Light emitting diodes (LEDs)	
(X26-X)	
Includes all LEDs only when used for illumination. OLEDs or organic LED-based lighting is covered by X26-J only . <i>LED candle</i>	
X26-H01	[2008]
LEDs; Details of P-N junctions and semiconductor structures	
Includes semiconductor P-N junction type LEDs, per se, when used for illumination. See also U12-A01 codes for more details of the diodes.	
X26-H02	[2009]
Constructional details of LED lights	
Includes constructional details of LED lamps such as envelopes, lead wires, lead-in conductors, reflectors, etc. See also X26-D codes for cooling arrangements (X26-D02), reflectors (X26-D01A), housing (X26-D03), etc. <i>Leading-in conductor, seal</i>	
X26-H03	[2008]
LED circuits/control	
X26-H03A	[2011]
LED circuits	
Includes circuits for driving/operating LEDs. See also U12-A01A5 codes.	
X26-H03C	[2011]
LED control	
Includes voltage control, intensity control, remote switching, on/off control, hue/colour control of RGB LED lamps, etc. LED control is only coded here and does not need an X26-C03 code to be applied. <i>Dimming</i>	

X26-J	[1992]
Electroluminescent devices (EL)	
(X26-X)	
Includes electroluminescent devices - such as OLEDs - and their circuits, when used for illumination. Does not includes EL/OLED (organic LED) displays. See also U14-J codes for all electroluminescent light sources and displays. Manufacture of electroluminescent light sources are not covered by X26 codes, but by U14-J codes only. LED-based lighting is covered by X26-H only .	
X26-K	[1992]
Stage Lighting	
(X26-X)	
<i>Gobo, "Goes-Before-Optics"</i>	
X26-L	[2002]
Beam aiming arrangement	
(X26-X)	
Includes motorised movement of, for example, a reflector to vary beam direction. See X22-B01E also for vehicle applications. Also includes movement of the light, per se, as in stage lights, etc.	
<i>Searchlight positioning</i>	
X26-M	[2002]
Decorative or special-effects lighting	
(X26-X)	
Includes lighting for Christmas decorations, decorative light strings, LED candles, etc. See also W04-X03C for novelties and ornamental lights, X26-H codes for details of LED lights, and X26-X for light strings.	
X26-N	[2002]
Laser	
(X26-X)	
Includes arrangement of lasers for illumination. See V08 codes for claimed details of lasers.	
X26-P	[2002]
Shades	
(X26-X)	
X26-Q	[2008]
Lamps with non-visible output	
Includes lamps that primarily produce illumination outside of the visible spectrum.	

X26-Q01	[2008]
IR lamps	
Includes all lamps that produce IR illumination, e.g. IR LEDS (see also X26-H codes) used for night vision/surveillance system illumination. Can be used in conjunction with other X26 codes as appropriate, such as X26-U03 for infrared lamps used for heating/curing. See also X25-B01H for infrared heating lamps, and X27-C02A for domestic cooking hobs using infrared lamps.	
<i>Infrared</i>	
X26-Q03	[2008]
UV lamps	
Includes all lamps that produce UV illumination, e.g. fluorescent back-lights (see also X26-A codes) and sun tan lamps (see also X26-U01).	
<i>Ultraviolet</i>	
X26-R	[2010]
Supporting/suspending arrangements for light fitting	
(X26-X)	
Includes arrangement details for supporting, suspending or attaching the light/lamp to e.g. a wall, ceiling, floor, inside a refrigerator, in a vehicle, etc. Includes wall, ceiling or floor attachments, lamp posts, clips, clamps, suction or magnetic attachments, details of pendants, hand grips, etc. Details of light distribution, e.g. reflectors, refractors, filters, polarisers, etc, are covered by X26-D codes.	
X26-S	[2017]
Lights using renewable/green energy resources, e.g. solar lights	
Covers all kinds of non-portable lights powered by renewable/green energy, such as solar or wind powered lights, or combinations of different green energy resources. Portable lights using renewable/green energy resources are coded under X26-E01E. Details of solar panels are coded under X15-A, and details of wind power under X15-B.	
X26-U	[2005]
Lighting applications	
To be used with other relevant X26 codes. See also appropriate classes e.g. S05 for medical applications.	

X26-U01 [2005]

Cosmetic

Includes lights for sun tanning, and (flashing) lights for toothbrushes, vanity/compact mirrors, etc. See also X27 codes.

X26-U02 [2005]

Medical

Includes lights used during treatment of acne, jaundice, psoriasis, etc., during photo-chemistry, colour and light therapies, in surgical instruments (e.g. endoscope), etc.

X26-U03 [2005]

Heating/curing, disinfection/sterilisation

Includes e.g. IR heat lamps or UV lamps used for curing adhesives or inks. Not used when X26-B01B/C02B are applied. See also X25-B01H for infrared heating lamps. Also includes disinfection and/or sterilisation using UV or IR light sources see also X27-D10.

X26-U04 [2005]

Displays/signs

For back- and edge-lighting.

X26-U04A [2007]

Displays

Includes light sources and fittings for lighting of displays. For LCDs see also U14-K01A codes, and T04-H03D if LCD is also for computer monitors.

X26-U04A1 [2007]

Back-lighting

See also U14-K01A4C for LCD back-lighting. For records prior to 2007, see also W05-E05B1.

X26-U04A2 [2007]

Edge-lighting

For records prior to 2007, see also W05-E05B3.

X26-U04B [2007]

Signs

Includes the lighting of any translucent or transparent information source, such as advertisements (see also W05-E03A1), traffic-related signs (see also T07-B codes and X26-U06 for street signs) etc.

X26-U05 [2005]

General lighting system

Includes general lighting systems on building sites.
GLS, floodlights

X26-U05A [2005]

General commercial lighting

Includes general lighting arrangements used specifically in commercial/business applications such as office lighting.

X26-U05B [2009]

General domestic lighting

Includes general lighting arrangements used in domestic settings, e.g. ceiling pendant lights, wall lights, bathroom mirror lights. Also includes lighting arrangements in domestic appliances (e.g. refrigerator, oven, hood, furniture, etc.), and garden lighting. Lights for toothbrushes are coded under X26-U01 only. Domestic applications are also coded under X27 codes.

X26-U06 [2005]

Street

Includes street lighting (e.g. lamppost), illuminated traffic bollards (also see T07-X), and lighted signs, such as road signs (also see T07-B codes). Illuminated road signs are also coded under X26-U04B and T07-B codes. Also includes lighting details of traffic lights (see T07-B05A for traffic signalling per se). Includes tunnel and bridge lighting details.

Lamppost, bollard, road markings

X26-U07 [2005]

Vehicles

Includes lighting for motor vehicle, electric vehicle and train.

X26-U08 [2005]

Marine vessels

Includes beacon lights and ship navigation lights. See also W06-C01C (lighting equipment for marine vessels) and W06-C07C (buoys and beacons).

X26-U09 [2005]

Aircraft/space craft

X26-U10 [2006]

Projectors

Includes display projectors and cine projectors. See also W04-Q01 and S06-B, codes respectively.

X26-U11 [2006]

Cameras

X26-U11A [2006]

Digital cameras

See also W04-M01 codes.

X26-U11B [2006]

Film-based cameras

See also S06-B codes.

X26-U12 [2016]

Plant growth

Includes LEDs or any other lighting arrangements for plant growing purpose.

Greenhouse

X26-U99 [2006]

Other lighting applications

Includes light arrangement in reptile houses, aquaria, vivaria, umbrellas, vases, sewing machines, screwdrivers, keys, handbags, clothes, rucksacks, walking stick lights, etc. Cosmetic items, e.g. toothbrushes, are coded under X26-U01 only. See also X27 codes for domestic/personal items. Also includes teaching equipment using training and simulation aids i.e. for illustrating light refraction etc.

X26-V [2020]

Maintenance, repair and cleaning of lamps

This code is used in conjunction with other X26 codes as appropriate.

X26-X

Other light sources and details

Covers lighting details not involving light emission (X26-A, etc), light distribution (X26-D) or light/lamp attachments. Includes light strings/garland etc. Light strings for Christmas lights or other decorative or novelty lights are also coded in X26-M. From 2010 see X26-R only for supporting/suspending arrangements for light fitting. Also includes water-tight and gas-tight arrangements.

Insect repellent

X27: Domestic Electrical Appliances

Also includes industrial cooking, space heating, refrigeration and combustion, with significant electrical content. Non-electrical domestic appliances with some electrical aspects are also covered here.

X27-A

Garden and personal articles

X27-A01 [1983]

Garden equipment

Includes electrical aspects only e.g. power distribution, motor, switch, etc. Includes potted plants.

X27-A01A [1987]

Lawn mower, hedge clipper

Includes hedge trimmers, Strimmers®, tree and shrub clippers and also robotic type lawn mowers (T06-B01A may also be required for 2-D position control).

Electric motor, switch, cable, IC engine, protective cut-out

X27-A01B [2006]

Garden furniture

Includes garden furniture such as patio heaters, patio umbrellas etc. incorporating some electrical content, such as built-in lights (see also X26 codes).

X27-A02 [1983]

Personal articles

Includes e.g. calorie counter, wristwatches are not included - see S04, bathroom scales, hair thickening device, umbrella, beauty treatment, powder compact, pill timing/warning device, also W05-A and S05-X, key finder (see W05-A also depending on transmission details). From 201501, non-electrical details of umbrellas are coded under P24-A02.

Facial steamer

X27-A02A [1983]

Personal hygiene

Includes articles for washing - e.g. foot washers, bidets, contact lens steriliser, incontinence detector, weighing scales, roller towel.

X27-A02A1 [1987]

Driers, hair curlers

Includes drier for hair, hands, feet, nail polish and body. Also includes hair extension apparatus and hair straighteners etc. From 201501, non-electrical details of hair curlers, etc, are coded under P24-C01.

Heating element, hair brush, smoothing tongs

X27-A02A2 [1987]

Massaging devices, sunbeds

Includes light sources. See also S05-A and X26-A.

Solarium, ultraviolet, lamp, tan, UV, sunbed

X27-A02A3 [1987]

Electric toothbrushes; Electric razors

X27-A02A3A [1992]

Electric toothbrushes

Includes electric toothbrushes and toothpaste dispensers. From 201501, non-electrical details of manual toothbrushes are coded under P24-E.

Motor, switch, head, brush, battery

X27-A02A3B [1992]

Electric razors; Hair clippers; Depilatory tool

(X27-A02A)

Includes all aspects e.g. blades, foil, handle. Also includes electric hair clipper. From 201501, non-electrical details of shaving equipment are coded under P24-C02.

Head, motor, switch, brush, battery, wet, dry

X27-A02A4 [1997]

Bath; Shower; Washbasin

(X27-X)

Includes electrical aspects such as electric mixer tap or presence detector. For electric water heating aspects of e.g. showers or baths, see X27-E03A1 only.

Sink, tap, detector, EM valve

X27-A02B [1983]

Clothing, jewellery

Includes electrical aspects only, flashing badges, shirts, buttons etc. See also W05-A as appropriate.

X27-A02B1 [1987]

Clothing

Includes electrical aspects only. X27-A02B1 codes can be used alone or in conjunction with one another depending on claimed aspects. Also include electrical details of coat hangers.

Backpack, rucksack

X27-A02B1A [2002]

Garments

Includes electrical aspects of e.g. shirts, buttons, protective helmets, heated gloves, life jackets. Non-electrical details of garments are coded by P21 codes.

X27-A02B1B [2002]

Footwear and its manufacture

Includes safety boots and shoes (see X25-X07 for electrical aspects of leather cutting). Non-electrical details of footwear are coded by P22 codes.

X27-A02B1E [2005]

With integral electrical parts

Includes clothing in which e.g. lighting, sensors, wiring, heating elements (see-X25-B01 codes), actuators and other electrical parts are integrated into fabric. E.g. includes electrical elements such as resistive heating elements woven into fabric, flexible electrical coatings applied to fabric or fibers, or e.g. LEDs moulded into plastic sole of shoe. Also see X25-T codes for fabric manufacture per se.

X27-A02B1F [2005]

With attachable electrical parts

Includes electrical parts that are attachable to clothing. E.g. includes LED fixed to cap by clip, or LED incorporated in button that is sewn onto e.g. shirt fabric.

X27-A02B2 [1987]

Jewellery

In general includes jewellery with electrical devices e.g. flashing LEDs to create eye-catching effect.
Brooch, clip, jewel

X27-A02C [1987]

Stationery and business equipment

Includes electrical aspects only of pens, briefcases, diaries, files incorporating computer, note pads, etc. For notepad computers and PDAs see T01 only, and for electronic blackboards and other conference equipment see W04-W05 only.
Bag, magnetic clasp or button, suitcases

X27-A02D

Spectacles, goggles

Includes electrical aspects only, e.g. liquid crystal light valve for welding goggles, see X24 also. For the manufacture of glasses see also X25-A03C2 and X25-A05 for glass lenses or X25-A06 for soft, plastic lenses.

X27-A02E [2007]

Walking sticks

Includes sticks with integral electrical components. Also see S05-K01 for walking sticks used by physically challenged person. From 201501, non-electrical details of walking sticks are coded under P24-A01.

X27-A02F [2014]

Electronic cigarettes

Includes details of atomizer, cartridge, disposable cartomizer. Packaging details are coded under Q34-M02. Electrical details of tobacco cigarettes (including their manufacture) are coded under X25-P03.

E-cigarette, personal vaporizer, PV, electronic nicotine delivery system, ENDS

X27-A03 [1997]

Furniture

(X27-A)

Electrical aspects only of mattresses, beds, chairs, tables, seats, sofas, pillows (including travel pillows), cushions etc. Heaters for seats, beds, pillows, etc. are coded under X27-E02. See also X25-B codes for novel electrical heating elements per se. See also X26 codes for novel lighting elements.

Mattress, chair, table, cupboard

X27-B

Kitchen appliances

Includes all aspects of electrical kitchen appliances. Tableware, glassware and cutlery (with no electrical content) are coded under P27-B03.

Other non-electrical kitchen equipment, such as spice racks, egg slicers, coffee grinder, vacuum flasks, etc. are coded under P28-A.

X27-B01 [1983]

Tea/coffee machines, kettles

Includes water reservoir, flow heater, jug, jug funnel etc. Excludes paper filters and funnels for cups. Large size coffee/tea machine, see X25-P01 also.
Percolator, cappuccino machine, espresso maker

X27-B02 [1987]

Pop-up toasters

X27-B03 [1987]

Food processors/mixers

Includes juice extractor, food processor tools, ice-cream manufacture, blenders, fruits and vegetables peeling machines. See X27-C08 instead for bread makers. Small handheld fruit and vegetable peelers are coded under X27-B04.

Motor, beater, grinder, chopper, blade, churner

X27-B04 [1987]

Knives, tin openers etc.

Includes bottle openers, and handheld fruit and vegetable peelers.

Can opener

X27-B05 [1997]

Extractor hoods

(X27-B)

For extractors for use in toilets, see X27-L. For ventilators per-se see X27-E01B1.

X27-B09 [2007]

Other kitchen appliances

Includes electrical details of food warmer for serving trolley, soda mixer, beverage dispenser for e.g. carbonated drinks, kitchen tap, milk frother (see X27-B01 instead if part of cappuccino machine), buffet food container with automatic lid etc. Also includes cutlery or drinking vessels (cups, glasses, etc.) with electrical content, such as integrated lights, temperature displays, etc. Also includes baby bottle sterilisers and baby food warmers. Food warmers, bottle sterilisers, and cutlery specially made for children/babies are also coded under X27-X01.

X27-C

Cooking appliances

Includes all aspects of apparatus using electrical heating, and electrical aspects only of gas cooker. Excludes discardable hob covers e.g. metal foil.

X27-C01 [1983]

Microwave ovens

See also X25-B02B for microwave heating in general. Covers all aspects, including heater for browning, switches, fans, lamps, etc. Microwave-transparent cooking-ware is included only if the patent bears an 'H' IPC.

X27-C01A [1987]

Constructional details

Includes chamber/cavity, door, seal, interlocks etc.

X27-C01B [1987]

Magnetron, control, waveguide, turntable

X27-C01B1 [1992]

Magnetron, waveguide, turntable

Antenna

X27-C01B3 [1992]

Control and power supplies of microwave oven

Timer, programmer

X27-C02 [1983]

Electric ovens, hobs

Air fryers are coded under X27-C03.

Ceramic, plate, glass, hotplate

X27-C02A [1987]

Using lamps

Lamps are also in X26-B.

Filament, halogen, incandescent, infrared, tungsten

X27-C02C [2002]

Fan assisted electric ovens

X27-C03 [1987]

Electric grills and electric fryers

(X27-C09)

Air fryer

X27-C03A [1992]

Electric deep-fat fryers

Rotofryer, twin fryer

X27-C03B [1992]

Electric grills; Oven toasters; Electric roasters

X27-C03C [1992]

Electric griddles

Includes sandwich maker, steak griddle etc.

X27-C03D [2009]

Electric frying pans; Electric woks

Includes standalone electric frying pans and electric woks. Electric deep-fat fryers are coded under X27-C03A only.

X27-C04 [1987]
Electric steamers; Electric pressure and rice cookers

(X27-C09)

Includes cooking by steam using self-contained vessel with heater.

Rice cooker, egg steamer, pressure cooker

X27-C05 [1987]

Gas cookers

(X27-C09)

Includes electric aspects only. Gas igniters are in X27-G01 only, unless forming part of cooker construction, e.g. pilot lighter.

Hob, burner, valve

X27-C06 [1987]

Induction cookers

(X27-C09)

See also X25-B02A for general aspects of induction heating.

X27-C07 [1992]

Combination ovens

Includes joint cooking apparatus such as resistance, microwave, convection. See appropriate X25, X27 codes for claimed heating.

X27-C08 [2006]

Breadmakers

For specific electric heating details also see appropriate X25-B codes.

X27-C09 [1983]

Other cooking appliances

Includes electrical devices inserted into food to measure temperature, cooking time estimation. Also includes slow cookers, and other cooking vessels with electrical content not covered by other X27-C codes. Non-electrical cookware and ovenware are coded under P28-A02 only.

X27-D

Cleaning and disinfecting appliances

Includes all aspects of domestic cleaning. Commercial and industrial laundry washing and drying machines are coded under X25-T05 only. General cleaning is also in X25-H09.

X27-D01 [1983]

Washing machines

Includes all aspects, e.g. feet, doors, water inlet/outlets pipes etc. Excludes kitchen 'furniture' aspects such as worktop under which machine is kept.

Control, programme timer switch, cam, pump, detergent dispenser, motor, laundry machine, drum, packaging for machine

X27-D01A [1983]

Clothes washers

Also see X27-D07 codes for mixed mode cleaning, e.g. using ultraviolet radiation to kill bacteria. Also includes details of washing machines specifically made for washing shoes.

X27-D01A1 [2007]

Machine types

X27-D01A1A [2007]

Vertical axis washers

Includes vertical axis top loader machines.

X27-D01A1B [2007]

Front loading horizontal axis washers

Includes drum type washer.

X27-D01A1C [2007]

Top loading horizontal axis washers

X27-D01A1D [2007]

Tilt axis washers

Includes fixed and variable tilt axis washers.

X27-D01A1X [2007]

Other machine types

Includes twin tub machines.

X27-D01A3 [2007]

Component parts/constructional details

X27-D01A3A [2007]

Providing mechanical energy to clothes

Includes drums, lifters, agitators, pulsators.

X27-D01A3B [2007]

Drive arrangements

Includes drive motors, drive belts and transmissions. See also V06-M codes for novel motors/transmissions per se.

Contra rotation

X27-D01A3C [2007]

Casings

Includes machine housings, doors, seals, feet, wheels, insulation etc.

X27-D01A3D [2007]

Dispensing systems

Includes soap powder and fabric conditioner dispenser trays and from 2007 ball type dispensers placed in the washing machine drum.

X27-D01A3E [2007]

Liquid management systems

Includes water supply/discharge pipes, valves, pumps, pump seals, water heaters, filters, water recirculation, spray systems and systems for removing or preventing scum formation. Details of steam generating arrangements are also included under X27-D07E.

X27-D01A3F [2007]

Vibration damping systems

Includes active suspensions and counter weights for reducing machine noise and vibration.

X27-D01A3X [2007]

Other component parts

Includes packaging such as boxes and transit bolts. Also see Q32-A08 and Q32-T for boxes and transit packaging per se.

X27-D01A5 [2007]

Control systems of clothes washers

Includes all electrical control aspects such as programme timer switches. Also see T06-A05C for use of control algorithms to optimise wash cycle according to sensed parameters. For control of mechanical variables such as liquid flow or level, also see T06-B codes.

X27-D01B [1983]

Dishwashers

Also see X27-D07 codes for mixed mode cleaning, e.g. using ultrasonic vibration to enhance cleaning action.

X27-D01B1 [2007]

Machine types

X27-D01B1A [2007]

Built-in or wheeled

Includes front loading traditional type full size or slimline dishwashers.

Free-standing

X27-D01B1B [2007]

Drawer type

Includes twin drawer dishwashers.

X27-D01B1X [2007]

Other configurations

Includes top loading or portable, small size 'counter top' dishwashers.

X27-D01B3 [2007]

Component parts/constructional details

X27-D01B3A [2007]

Racks

X27-D01B3B [2007]

Drive arrangements

Includes pump drive motors, belts, transmissions etc.

X27-D01B3C [2007]

Casings

Includes machine housings, doors, seals, tubs, feet, wheels, insulation etc.

X27-D01B3D [2007]

Dispensing systems

Includes salt and cleaning powder/tablet dispensers.

X27-D01B3E [2007]

Liquid management systems

Includes water supply/discharge/recirculation, valves, water heaters, pumps, pump seals and spray arms.

X27-D01B3F [2007]

Drying systems

Includes heater elements (see also X25-B01 for electrical resistance heating per se), heat exchangers, air flow arrangements, vents, condensing arrangements etc.

X27-D01B3G [2007]

Soil collection and management

Includes filters, screens, sizers and choppers.

X27-D01B3X [2007]

Other component parts

X27-D01B5 [2007]

Control systems of dishwashers

Includes all electrical control aspects. Also see T06-A05C for use of control algorithms to optimise cleaning cycle according to sensed parameters. For control of mechanical variables such as liquid flow, also see T06-B codes.

X27-D01C [1987]

Combined washer/driers

This code can be used in conjunction with X27-D01A or X27-D02 codes as appropriate to highlight the novel aspects.

X27-D02 [1983]

Laundry driers

Includes clothes and shoe driers.

Drum, spin, tumble, condenser

X27-D02A [2007]

Machine types

X27-D02A1 [2007]

Electric vented tumble driers

X27-D02A2 [2007]

Gas vented tumble driers

X27-D02A3 [2007]

Heat pump tumble driers

X27-D02A4 [2007]

Condensing tumble driers

X27-D02A5 [2007]

Microwave tumble driers

X27-D02A6 [2007]

Non-tumble driers

Includes cabinets, bags, drying rooms and drawers for drying flat or hanging clothes. See also X27-D07E for use of steam to assist in removing creases from hanging clothes during drying.

X27-D02A9 [2007]

Other driers

X27-D02B [2007]

Component parts/constructional details

X27-D02B1 [2007]

Providing mechanical energy to clothes

Includes drums and lifters.

Tumble

X27-D02B2 [2007]

Drive arrangements

Includes drive motors, drive belts, gears etc. See also V06-M codes for details of motors/transmissions per se.

Contra rotation

X27-D02B3 [2007]

Heating systems

Includes electrical heaters (see also X25-B codes), combustion aspects (see also X27-G codes) and heat exchangers.

X27-D02B4 [2007]

Air moving systems

Includes blowers, ducts, vents, valves and air recirculation arrangements.

X27-D02B5 [2007]

Casings

Includes housings, doors, seals, feet, wheels, insulation etc.

X27-D02B6 [2007]

Dispensing systems

Includes deodoriser/conditioner (see also X27-D07M) dispensers.

X27-D02B7 [2007]

Vibration damping systems

Includes damping arrangements to reduce machine noise

X27-D02B8 [2007]

Lint management systems

Includes mechanical lint/fluff filters.

X27-D02B9 [2007]

Other component parts

X27-D02C [2007]

Control systems of laundry driers

Includes all electrical control aspects such as programme/temperature control switches. Also see T06-A05C for use of control algorithms to optimise drying performance according to sensed parameters such as load weight. For sensing of temperature or moisture content, see also S03-B and S03-E02C1 codes respectively.

X27-D02L [2007]

Clothes lines

See X27-D06 prior to 2007. Includes motorized arrangements for raising and lowering line or for rotating rotary washing line. Details of purely mechanical clothes lines are coded under P28-C05.

X27-D02X [2007]

Other laundry driers

For electrical aspects of mangles, see X27-D09 instead.

X27-D03 [1983]

Irons

For electrical aspects of ironing boards search X27-D09 also.

Steam, sole plate, heater

X27-D04 [1983]

Vacuum cleaners

Includes constructional details of vacuum cleaner, e.g. casing. Details of replaceable items, e.g. nozzles, tools, are coded under X27-D04A only. Also see X27-D07 for mixed mode cleaning, e.g. using ultraviolet radiation to kill mites or bacteria. For combined vacuum cleaner and e.g. carpet washer, also see X27-D08.

Motor, suction, fan

X27-D04A [1992]

Accessories

Includes all aspects e.g. paper bag, wheels, attachments, tools, nozzles etc.

Hose, nozzle filter, brush, bag

X27-D04B [1992]

Motors

Includes vacuum cleaner motors per se. See also V06 codes for a more detailed breakdown of motors per se.

X27-D04B1 [1992]

Control systems of vacuum cleaners

X27-D04C [2002]

Cyclone type

Includes dual and multi-cyclone type vacuum cleaners.

X27-D04R [2006]

Robotic vacuum cleaners

Includes autonomous vacuum cleaners. Also see X27-U for domestic assistance robots per se.

Automatic guidance

X27-D05 [2002]

Floor cleaners/washers/polishers

From 2006 this code has been expanded to include all floor sweeping, washing and polishing machines. Also includes robotic floor cleaning machines (T06-B01A may also be required for 2-D position control). For carpet cleaning see X27-D08 only.

Sweeper

X27-D06* [2002-2006]

Clothes lines

*This code is now discontinued and transferred to X27-D02L from 2007. It is still searchable and valid for records from 2002-2005. Includes motorised arrangements for raising and lowering line or for rotating rotary washing line.

X27-D07 [2005]

Mixed mode cleaning

Includes cleaning systems with secondary cleaning, disinfecting, deodorising or sterilising function. This code can be used in conjunction with other X27-D codes to specify the primary cleaning function.

X27-D07A [2005]

Using vibration

Includes use of ultrasonic vibrator to provide enhanced cleaning action.

X27-D07C [2005]

Using radiation

Includes use of ultraviolet or microwave radiation e.g. to kill germs.

UV, microwave

X27-D07E [2007]

Using steam/vapour

Includes steam generation arrangements and vapour generation from a liquid/solid. Includes use of steam in refresh cycles to deodorise and remove creases from unwashed clothes.

Anti-wrinkle, de-crease, non-iron, refresher

X27-D07F [2007]

Bubble systems

Includes water aeration arrangements and air bubble generators for improving cleaning.

X27-D07K [2007]

Using chemicals

Includes anti-microbial generators, chemical coatings for machine components and spray systems to deliver disinfectant to the clothes.

X27-D07K1 [2007]

Chemical coatings

Includes drums (see also X27-D01A3A for washing machines) coated with anti-microbial substance e.g. nano-silver (see also D09-A01 and E35-B chemistry codes).

X27-D07K3 [2007]

Chemistry generation

Includes silver/copper/zinc/ozone/ions generated inside the machine using e.g. electrolysis systems (see also X25-R codes), photocatalysts etc.

Anti-microbial, ionisation, ozoniser

X27-D07K5 [2007]

Dispensing systems

Includes systems for dispensing/spraying e.g. anti-microbial/sterilising chemicals to the clothes.

X27-D07M [2007]

Fabric enhancement

Includes electrical aspects of systems for treating clothes with stain resistance or water and insect repellency chemicals. See also X27-D01A3D and X27-D02B6 for fabric conditioner dispensers used in clothes washer and drier respectively.

X27-D07X [2005]

Using other medium

Includes use of other systems to provide a secondary cleaning/deodorising action.

X27-D08 [1992]

Carpet cleaners/ shampoo machines

X27-D09

Other cleaning appliances

Includes mangles, trouser press and domestic scale dry cleaning (for commercial dry-cleaning, see X25-H09 and X25-T05 only). Also includes electrical aspects of ironing boards and clothes pegs. Details of ironing boards with no electrical details are coded under P28-C05.

X27-D10 [2006]

Disinfection and sterilization arrangements

Includes general disinfection and sterilization systems not covered elsewhere, e.g. using ultraviolet/microwave radiation or heat. For mixed mode cleaning/sterilizing see X27-D07 codes only. For air treatment arrangements see X27-E01B2 only. Industrial food processing sterilization is covered by X25-P01X only, and medical sterilization is covered by S05-G01 codes only.

X27-D11 [2024]

Eco features of cleaning appliances

This code can be used in conjunction with other X27-D codes to highlight the type of cleaning appliances, e.g. X27-D02 for tumble dryers, X27-D01B for dishwashers. Details of water recovery in washing machines are also coded under X27-D01A3E. Also includes energy recovery systems that improve operating efficiency. Also see U24-K for power supply unit power-saving mode/operation.

Green, power reduction

X27-E

Heating, ventilating, air conditioning

Includes all aspects of electric heating and electrical aspects only of other types of heating e.g. gas or oil combustion. See also X27-G for details of domestic combustion. Details of electric heaters are also in X25-B.

X27-E01

Space heating and air conditioning systems

For heating combined with cooling i.e. air conditioning, e.g. by using refrigeration systems, see also X27-E01B.

Room, building

X27-E01A [1983]

Heating systems (incl. control)

Includes control circuits, thermostat, heating cost measurement and calculation, storage heater control system.

X27-E01A1 [1987]

Circulating water, warm air

Includes central heating systems pump or fan.

X27-E01A2 [1987]

Electric radiant bar and fan-heaters, oil filled electric heaters

X27-E01A3 [1987]

Electric underfloor, electrically-heated carpets

X27-E01A4 [1987]

Electric storage heaters

See also X16-L.

X27-E01A5 [1987]

Solar heating

Includes electrical aspects only e.g. combination solar and electric heating.

Collector

X27-E01B [1983]

Air-conditioning

Includes only electrical aspects of air conditioners (e.g. mechanical heat exchangers are excluded), control systems, refrigeration systems (see also X27-F). Vehicle air-conditioning is only in X22-J02E.

X27-E01B1 [1987]

Electric fans, ventilators

Motor, ceiling, blade, table, portable

X27-E01B2 [1987]

Ozoniser, air cleaner and freshener, (de)humidifier

Details of air cleaning for computer rooms or laboratories are also coded in T04-L08, and clean rooms are also coded in X25-S01.

Electrostatic, filter, purification, atomiser, ion generation

X27-E01C [2010]

Climate control

Includes systems that automatically maintain room temperature by e.g. automatic window opening (see X25-M01 for novel electric windows per se), usage of waste heat etc.

X27-E02 [1987]

Electric blankets, heating pads

(X27-E09)

See also X27-A if part of bed construction. If pad is portable, see also X27-A02.

X27-E03 [1987]

Water heaters

Includes electric details of gas and solar water heaters.

Temperature-control

X27-E03A [1987]

Electric

Includes through-flow heater, water bed heater.

X27-E03A1 [1987]

Shower, whirlpool bath, sauna

Includes Jacuzzi® and Turkish bath, which is also coded in X27-A02A.

X27-E09

Other heating, ventilating, air conditioning aspects

Includes foot warmer.

X27-F

Refrigeration

Includes all domestic and industrial systems, e.g. cold rooms and components, display cabinets, water coolers, heat pump systems (for air-conditioning, see X27-E01B also), refrigerated containers for lorry (see also X22-X04). Cryogenics is in X25-V. Also includes refrigerant per se. From 2006 ice manufacture is transferred to X27-F04, though ice manufacture remains searchable in X27-F prior to 2006.

X27-F01 [1983]

Constructional details

Includes door, seal, feet, cabinets, ice tray.

X27-F02 [1983]

Refrigeration/heat pump systems/components

Includes air circulation e.g. by fan.

X27-F02A [1987]

Refrigeration systems

Includes details of overall refrigeration system.

X27-F02A1 [2005]

Magnetic cooling

Includes magnetic fridge and freezers that utilise magnetocaloric effect of some metals that become hot when magnetised and cool when demagnetised.

Magnetic, magnetocaloric

X27-F02B [1987]

Heat pump systems

Also includes heat recovery using refrigerant.

X27-F02B1 [2005]

Solid state heat pumps

Includes thermoelectric cooling, e.g. for mini fridge and freezers and picnic coolers. See V04-T03C instead for thermoelectric cooling used in electronic devices, and U14-E05A2 for thermoelectric devices. Also includes electrocaloric effect cooling using e.g. thin film perovskite PZT (PbZrTiO₃) to provide cooling under an applied electric field. See X25-B02F for thermoelectric heating.

Thermoelectric, Peltier effect

X27-F02C [1987]

Components

Includes heat exchangers, expansion valve absorbers, adsorbers, condenser, evaporator, etc.

X27-F02C1 [1987]

Compressors, electric motors, pumps

Screw, rotating vane, scroll, centrifugal, rotary, swashplate, reciprocating

X27-F02C2 [1987]

Frost/temp. sensors, interior lights, switches

See also S03-B codes for temperature sensors, X26 codes for lighting and V03 codes for switches per se.

Thermostat

X27-F02X [2007]

Other refrigeration components

X27-F03 [1983]

Refrigeration control

Includes defrost activation, ice monitoring, leak detection.

X27-F04 [2006]

Ice manufacture

Includes domestic and industrial ice manufacture. For ice cube trays per se, see X27-F01 only. Also includes working/handling of ice and production of ice or snow for winter sports etc. See also P36-A08C for ice rinks.

X27-F05 [2007]

Intelligent refrigerators

Includes reader-writer equipment to know the content of the fridge (see also T04-K codes), or screen display on fridge door displaying a list or an image of the fridge content. This code does not include details on refrigeration per se, see X27-F03 for refrigeration control details.

X27-G

Domestic combustion

Includes domestic boilers using solid, liquid or gaseous fuels and involving electrical aspects. Exhaust gas sensors per se are not included, see e.g. S03-E02, S03-E03. Combustion processes for central heating are also coded in X27-E03. See X25-X13 instead for industrial combustion aspects such as gas fired furnaces.

X27-G01 [1983]

Igniters

Includes cigarette lighters using piezoelectric crystal (also see X27-A02 and V06-M06D).

Ignition, light spark, fuel

X27-G02 [1983]

Combustion control; Flame monitors

Includes fuel/air supply control.

X27-H [1987]

Domestic pets

(X27-X)

Includes electrical aspects only.

Dog, cat, fish, budgerigar, tortoise, rabbit, guinea pig

X27-H01 [1987]

Aquarium, vivarium

Covers electrical aspects such as air conditioning, heating, lighting systems, etc. of aquaria and vivaria. Other environment-controlled housings, such as kennels, dog houses, aviaries etc, are coded under X27-H04.

Heater, pump, lighting, air

X27-H02 [2005]

Feeding and drinking

Includes heated food bowl and timed food dispenser.

Timer, dispenser

X27-H03 [2005]

Control and training

Includes electrical or electromagnetic shocking apparatus for the control/training of pets, e.g. dogs. Also includes ultrasonic deterrent devices for confining pets within a specific area. Includes pet searching systems, transponder collars for controlling pet access e.g. through cat flap, and RFID or identification tags. Transponders and RFID are also coded under T04-K codes and W06-A04B5 and W02-G05B codes as appropriate.

Control, train, shock, deterrent, behaviour, identification tag, pet searching system

X27-H04 [2009]

Environmental control; Housings

Includes electrical aspects, such as air conditioning, heating, lighting systems, etc. for kennels, aviaries, etc. Details for aquaria or vivaria are coded under X27-H01 instead. Electrical details of pet transporting bags/boxes or carriers are coded under X27-H09 only.

Dog house, kennel, aviary

X27-H09 [2007]

Other domestic pet aspects

Includes heated pet transporting bags/boxes.

X27-K [1997]

Domestic waste disposal

Includes only electrical aspects of domestic waste disposal, such as kitchen waste disposal units and electrical rubbish bins. Large non-domestic bins are coded under X25-W01 only.

X27-L [2005]

Toilets

Includes all electrical aspects of public and domestic toilets and urinals. Includes toilets with integral bidets (see also X27-A02A). Prior to 2005, toilets were coded in X25-Y01.

X27-T [1997]

Curtains, blinds

(X27-X)

Includes electrical aspects, e.g. remote curtain opening/closing device.

X27-U [2006]

Domestic assistance robots

Includes e.g. humanoid robots which carry out general housework, nursing (see also S05 codes) and other duties. For task-specific robots also see relevant codes elsewhere, e.g. X27-D codes for cleaning robots. For industrial scale robots see X25-A03E or X25-F05A only.

X27-V [2006]

Home automation

Includes systems for automatically controlling/programming multiple pieces of domestic equipment, e.g. using internet, telephone communication or AI. The use of AI technology at home is also coded under T01-J16P5. For remote control of individual domestic devices, use the appropriate device code only (see also W05-D codes), and for individual robotic/automated equipment, such as a robotic vacuum cleaner, use the appropriate code (e.g. X27-D04R) only.

Total home control, AI

X27-X

Other domestic electrical appliances

Includes ash tray, insecticide dispenser for house, wallpaper stripping iron, mail box, paper towel dispenser (also X25-F03), pill bottle warning alarm indicating lid removal (also W05-A02) etc. Can also be used for indicating general domestic appliance "white goods" application, including mechanical aspects of unspecified or general white goods.

Mosquito repeller, doorbell

X27-X01 [2002]

Baby equipment

Includes equipment for babies, toddlers and young children. Includes baby monitoring alarms, babies prams, nappy wetting alarm, baby chamber pot (see X25-L also), etc. Also includes cutlery and cups with electric contents, such as lights or temperature displays. Cutlery and cups with electric contents are also coded under X27-B09.

Baby food/bottle warmer, baby bottle sterilizer

X27-X02 [2002]

Domestic beer brewing/alcoholic beverage production equipment

Includes beer brewing plant (domestic scale), beer mat, beer dispenser (see also X25-F03B1). Also includes domestic wine production equipment. Industrial beer brewing/alcoholic beverage production equipment is coded under X25-P01B. Also include electrical details of wine cellars. Refrigeration details of wine cellars are coded under X27-F codes.

X27-X03 [2007]

White goods with built-in secondary function

Includes white goods such as refrigerators and microwaves having additional built-in device providing secondary function, e.g. television, video display, computer for e.g. Internet browsing. This code can be used in conjunction with other X27 codes to highlight the primary function of the device. For example, a refrigerator with a built-in TV display will be also coded in X27-F01 and W03-G03A/W03-A codes.

PART 2: Subject Index and Appendices

Subject Index

This index provides a detailed listing of technologies and indicates the corresponding manual codes. While the intention has been to produce a comprehensive index, it is not possible to include entries for all possible variations in particular technological fields without the result becoming very unwieldy.

Thus, in cases where a desired subject heading cannot be found as an index entry, alternatives such as abbreviations, terms in full, or synonyms should be considered.

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NC

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	W04-G01B8	dialling restricted by access code	W01-C01B5D
built-in broadcast radio receiver	W01-C01P6E	dialling restricted by mechanical lock	W01-C01B5B
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	W04-M01B1		W01-C01A2A
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built-in entertainment device	W01-C01P6	display, calling subscriber number	W01-C01F3
built-in flashlight	W01-C01P9	display, constructional aspects	W01-C01A2
	X26-E01	display, dialling	W01-C01B3
built-in game player	W01-C01P6L	display, edge lighting	W01-C01A2A
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	S05-D01	display, user interface	W01-C01B3
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	W01-C01F5		
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casing			

Telephone subscriber equipment (continued)

fourth generation (4G) mobile phone
 gain control
 GPRS phone
 graphics and display processing
 hands free dialling
 hands free kit, mobile phone
 hands free loudspeaker telephone
 handset construction
 haptic transducer systems
 haptic signal processing
 headset
 hygiene arrangements
 i-mode handset
 ID security, cellular telephone
 ID security, cordless telephone
 idle state determination
 instant messaging
 integrated with answering machine
 integrated with facsimile
 integrated with modem
 integrated with other equipment
 integrated with PDA
 intercom
 interfacing systems
 internal mounting of components
 ISDN (see also **ISDN**)
 ISDN subscriber end interface
 key telephone set
 keyboard
 keyboard circuitry/coding
 keyboard construction
 keyboard illumination
 keyboard layout
 keyboard switching element
 LCR, subscriber apparatus
 line holding arrangements
 line interface arrangements
 loudspeaker type
 manufacture
 memory storage
 memory storage, internal
 memory storage, external
 menu-driven telephone
 metering of calls
 MMS telephone
 multimedia apparatus
 Multimedia Message Service facility
 multimedia signal processing
 muting circuit, audio
 muting ringer

non-contact charging
 operating system
 packet handling facility
 personal handy phone (PHS)
 portable cell phone
 power saving
 power supply
 program control aspects
 protection of confidential data
 pushbutton telephone set
 push to talk over packet network
 radiation protectn., construction for
 recycling
 relative position input
 repertory dialling
 reply dialler
 ring tone/tune downloading
 restricted dialling
 ringer muting
 ringer timed disconnection
 ringer transducer
 ringer volume setting
 ringing, general
 ringing, mechanical
 ringing, optical
 satellite
 secure dialling
 security based on biometric ID
 sensing acceleration of handset
 sensing external devices
 sensing orientation of handset
 sensing other users in vicinity
 sensing proximity of user
 sensing rotation of handset
 short dialling
 sixth generation (6G) mobile phone
 smartphone
 SMS telephone
 software updating / modification
 sound hood
 speech amplifier
 speech amplifier for earphone
 speech amplifier for loudspeaker
 speech amplifier for microphone
 splitter, e.g. POTS / ISDN
 standby arrangements
 subscriber calling devices
 subscriber ISDN equipment
 switching interface
 telephone cable
 testing
 text messaging telephone
 third generation (3G) mobile phone
 theft alarm
 timed disconnection of ringer

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 X16-G03
 W01-C01Q3C
 W01-C01G6G
 W01-C01D1E
 W01-C01D3C
 W01-C01Q7
 W01-C01E
 W01-C01Q3
 W01-C01Q8E
 W01-C01G3
 W01-C01G6H
 W01-C01A4
 W01-C01W
 W01-C01B8L
 W01-C01B1
 W01-C01B1E
 W01-C01F1P
 W01-C01B5
 W01-C01F1B
 W01-C01F1C
 W01-C01F1A
 W01-C01F1B
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 W01-C01B5
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 W01-C01G8S
 W01-C01G6A
 W01-C01Q3A
 W01-C01A7
 W01-C01C1
 W01-C01C1B
 W01-C01C1B
 W01-C01C1A
 W01-C01L5
 W01-C01Q7
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 W01-C01H
 W01-C01X
 W01-C01K
 W01-C01G6A
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 W01-C01Q8A
 W05-B01
 W01-C01F1C

Telephone subscriber equipment (continued)

transducer (earphone)	V06-V01 S05-D01C5A V06-V04B W01-C01M
transducer (microphone)	V06-V01 V06-V04A2 V06-V04B W01-C01M
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computer-telephony integration (CTI)	W01-C05B4A
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direct mode radio	W01-C05B4C
entertainment systems	W01-C05B1C
ENUM	W01-C05B3H
facsimile	W01-C05B3H
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internet access	W01-C02G5C
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modem	W01-C05B1E
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	T05-L01E		X24-B03
batches	S02-D02B		X25-A03E1
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		arc, seam	X24-B01
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arc, testing	X24-B09
arc, using insulating electrodes	X24-B09
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electronics	P55-U42
industrial	P55-U40
jewellery	P55-U50A
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personal items	P55-U50
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P55-T02	
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	X24-D10
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P55-T20	
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P55-T20	
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	X24-D10
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explosive welding	X24-D08X
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X24-D09	
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inertia welding	X24-D08C
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laser beam, electrical/electronic	
components	X24-D03B
laser beam, metal working	X24-D03A
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P55-T20	
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maintenance (non-electrical welding)	P55-G
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monitoring welding	X24-D11
pre-treatment (non-electrical welding)	P55-A
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plastics materials	X24-D04
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protective equipment (non-electrical welding)	
	P55-T20
repair (non-electrical welding)	P55-G
resistance	X24-C
resistance butt	X24-C09
resistance, accessories	X24-C04
resistance, control	X24-C01
resistance, power supply	U24-D
	U24-E
	X12-H01C
	X24-C01
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roll welding	X24-D08
safety arrangement (non-electrical welding)	
P55-T20	
solid state bonding	X24-D08
solid state welding	X24-D08
	P55-C02
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testing of wel	X24-D11
transformer	X12-C01E
	X24-G
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work conveying system (non-electrical welding)	
P55-T02C	
Well logging	X25-E02
electromagnetic	S03-C02
measuring arrangements	X25-E02A
mud pulse telemetry	W05-D06M1
non-seismic measurements	S03-C07A
optical	S03-C04
seismic	S03-C01C5
transmission details	W05-D07H
	W05-D08E
	X25-E02A1
using nuclear radiation	S03-C03
Well production	X25-E03
control	T06-D12
Wet separation of solids	
from liquids	P41-E03C
of two or more kinds of solids	P41-E03A
Wettability measurement	S03-F04
Wheatstone bridge	S01-F01
resistance strain gauge	S01-F01A
Wheel	Q11-A
axle	Q11-A05
bearing	Q11-A06
castor	Q11-A08
cover	Q11-A07
disc wheel	Q11-A02
hub	Q11-A04
manufacture/assembly	Q11-A28

nuts	Q11-A20
rail-engaging wheel	Q11-A17
rim	Q11-A03
spoke	Q11-A01
traction increasing equipment	Q11-A15
Wheelchair	
electric	S05-G02A
	X21-A01A
mechanical	P33-A01
	Q22-C02
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Whirlpool bath	X27-E03A1
Whistle	P86-E01C5
White goods	X27
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White space utilization, radio	W02-C03G5
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	W01-A06B5B
Width measurement	S02-A10B
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Wiegand wire, pulse generation	U22-A02X
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WIG welding	X24-B06
WIMPS	T01-J12
Winch	X25-F05
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Wind instrument	P86-A01A
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blade support/damping	X15-B01C
control	X15-B05
generator	X15-B01B
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manufacture	X15-B15
monitoring, testing, control	X15-B05
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support structure	X15-B06
support structure, manufacture	X15-B06
testing	X15-B05
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turbine, blade angle control	X15-B09
turbine, horizontal-axis	X15-B01A5
turbine, large scale	X15-B01A1
turbine, microturbine	X15-B01A3
turbine, small scale	X15-B01A3
turbine, transportation of blades	Q15-B12
	X15-B09
turbine, vane	X15-B01A
turbine, vertical-axis	X15-B01A6
wind turbine generator, electric power generation, application	X11-U01E
Wind-photovoltaic energy converters	
	U12-A02A9
Wind-vane	S02-H
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	X25-T01
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Window	
cleaning equipment	P28-C01
for building, electrical	X25-U01
for building, mechanical	Q43-A06
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Windows®-based phone	W01-C01G8S
Wire	
joining, high power superconducting	
	X12-G01E1
joining, low power superconducting	
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	X12-G01E1
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waveguide conductor	W02-A01B1
Wire bonding for semiconductor devices	
	U11-E01A
connection details	U11-D03A2
wires, metallurgical aspects	U11-D03B1
	U11-E01A
Wire dot impact printer for computer	S06-F01

Wire drawing	X25-A02E	control	T06-D16
control	T06-D05A	tools	P63-T
	X25-A02E	Word processing (WP)	T01-J11A
Wire stripper	V04-P03	dictionary	T01-J11A1
	X12-G01B	grammar-checking	T01-J11A1
Wireless battery charging	X16-G03	Work	
Wireless headphones	V06-V01M	measurement of,	S02-F02
	V06-V04A4	special purpose measurement of	S02-F03B
	W03-G05C5A	Working	
Wireless link telemetry/telecontrol	W05-D06A	cement	X25-A09
Wireless loudspeakers	V06-V01M	ceramic	X25-A09
	V06-V04A1	clay	P64-C
	W03-G05C5C	concrete	X25-A09
Wireless microphone	V06-V01M	gem stones	P64-E50E
	V06-V04A2	glass	X25-A05
	W04-S05C1	plastics	X25-A06
Wireless data network	W01-A06C4	rock	P64-E50A
Wireless transducer, electromechanical	V06-V01M	rubber	X25-A07
Wiring		stone-like materials	P64-E
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for ship	W06-C01C1	liquid application	P42-T05E
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for vehicle	X22-X01B	WP	T01-J11A
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	X12-D07D	general	P23-C02
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	X12-D03M	Writer or reader for smart card	T04-K02
harness, per se	X12-D03M	Writing, drawing instruments	P77
loom	V04-V02	constructional details	P77-T
loom, tie	V04-V02	core materials	P77-B
machine, general circuit manufacture	V04-V02	ball point pens	P77-A02
manual, general circuit manufacture	V04-V02	felt-tip pens	P77-A03
Wiring for integrated circuit		fountain pens	P77-A01
3-D interconnections	U11-D03C3B	manufacture	P77-M
grounding	U11-D03C1A	pencils	P77-A04
high density	U11-D03C2	stylus	P77-A05
layout	U11-D03C1A	Writing into digital static stores	U14-A07
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Wiring harness - see Wiring			
Wood	P63		
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recycling/recovery	P63-R		
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X

X-ray

analysis	S03-E06
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control of generators	V05-E02
crystallography	S03-E06C
diagnosis for dentistry	S05-E03
diagnosis, medical	S05-D02A
dose control	V05-E02C5C
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generators	V05-E01 V05-E03
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X-ray equipment

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monitoring temperature	V05-E02C5A
power supply	V05-E02A
protection	V05-E02C5
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X-ray fluorescence

S03-E06D

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non-standard	V05-E03
non-standard generator details	V05-E03
non-target impact type tube	V05-E03
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X-ray laser

extreme ultraviolet	V08-B02
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masks	U11-C04H2

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wave effect manipulation	V05-E08C V05-E08A

X-ray spectrometer

measuring radiation	S03-G02C3
discharge tube details	V05-F01A6

X-ray tube

anode cooling	V05-E01B5
anode electrode	V05-E01A
anode electrode material composition	V05-E01A1
cathodes	V05-E01C
characterised by type	V05-E01H
circular electron beam path type tube	V05-E01H5A
cold cathode emitters	V05-E01C7
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electron-optical apparatus	V05-E01D1
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flash type tube	V05-E01H7
lead-in conductors	V05-E01E5
liquid metal anode type	V05-E01H9
multiple rotary anode type tube	V05-E01H1A
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rotary anode cooling	V05-E01B5
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rotary anode type tube	V05-E01H1
seals	V05-E01E3
tube cooling	V05-E01B5

X-ray tube windows

V05-E01E1A

X-Y digitiser

T04-E

X-Y plotters

S02-K05

Xenon lamp

X26-A01A

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S06-E

Y

Yoke

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high frequency transformer	V02-F02 V02-F03A2
high power device	X12-C01A
high power reactor	X12-C01A X12-C01F
high power transformer	X12-C01A X12-C01E
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low power supply reactor	V02-G01C V02-G02A2
low power supply transformer	V02-G01A V02-G02A2
manufacture	V02-H03 X12-C01D1

Z

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laser zapping (fuses, etc.)	U11-C07B U11-C19B
TV channel changing	W03-A02B3

Zebra ® connection

V04-A07

Zeeman effect

S01-E01C

Zener diode

U12-C01D

ZIF connector

V04-M16

ZigBee

digital interface	W01-A0A7H2A
network	W01-A06C4A

Zinc selenide - see All-BVI compounds

Zinc sulphide - see All-BVI compounds

Zone refining, semiconductor

U11-B02A

Appendices

Appendix 1: EPI Subject Matter Coverage

Patents are included in EPI in two ways, namely:

1. Automatic inclusion based on the assigned IPC
2. Intellectual selection based on technical content

Automatic inclusion criteria

Some sections of the IPC relate to subject matter which is always of relevance to EPI. Thus assignment of any IPC from section H, will result in inclusion. Patents bearing certain other IPC subsections are also automatically included, to ensure that all disclosures received by Clarivate can be assigned to at least one part of our overall classification system. Since some of these IPCs relate to technologies which are not inherently electrical, this results in the inclusion in EPI of some inventions of a purely mechanical nature, in the fields of instrumentation and control, for example.

It should be noted that where an IPC is considered to be inappropriate the normal correspondence between IPC and Clarivate classification does not apply. In some cases, this may necessitate the assignment by Clarivate of an additional IPC to enable the invention to be covered by the most suitable class of the General and Mechanical Patents Index, rather than EPI. From 2006 mechanical patents relating to the transportation area have been intellectually selected for inclusion in EPI.

Below is a list of IPC sections and subsections which normally guarantee the inclusion of a patent in EPI. For further details of the relation between IPC and EPI classes please refer to Appendix 4, the concise guide to EPI classification. (For details of the correspondence between IPC and manual codes see Appendix 3).

A61N	G06
G01	G07
G02B6	G08
G02F	G09G
G03G	G10H
G04	G10L
G05B	G11
G05D	G12
G05F	H

Intellectual selection criteria

Patents are included on this basis provided that at least one of the following criteria is satisfied:-

a Relevance to an electrical industry

This may involve the product of an industry itself, or manufacturing methods and equipment (whether electrical or not) used in that industry. Examples of such industries include electrical and electronic components, semiconductor device manufacture, data recording, telecommunications, and computers.

b Significant electrical content

Patents included on this basis may relate to any field of technology, provided that any electrical aspect forms a significant part of the invention, and is not just an incidental feature.

For example, in the case of a machine tool, the presence of an electric motor or limit switch alone would not normally justify its inclusion. If the incorporation of motor or switch in the tool was the novel aspect then it would be included. In the industrial field, examples of inventions that are covered by EPI on the basis of significant electrical content include conveyors, lifting equipment, food processing, metallurgy, textiles etc.

Note that the electrical content required must normally be a claimed feature of the invention. However, disclosures with considerable electrical content in a detailed description of the invention which is clearly referred to in general terms in the claims would be included.

Note also that the use of existing electrical apparatus or techniques in patents claiming a process or method only would not normally be sufficient for inclusion

c Relevance to automotive electrics

Any patent of this type with electrical content - not necessarily claimed - is included in EPI

d Relevance to domestic electrical equipment

All aspects of domestic electrical equipment are selected, including purely mechanical details such as refrigerator door seals or shelves for electric cookers.

e Relevance to other specified subjects

All novel aspects of the following are included:-

- Clocks and watches
- Electrophotography
- Holography
- Line printers and electronic typewriters
- Steam turbines

f Relevance to non-electrical content

From the dates highlighted below, patents coverage has been extended so that general or mechanical aspects of an invention are also selected for inclusion in the Electrical (or Engineering) Patent Index .

From 2006 all mechanical aspects of transportation related patents (vehicles, aircraft, ships, trains) are included.

From 2012 all mechanical aspects of packaging related inventions are included.

From 2015 patents are also selected to highlight general or mechanical aspects of an invention for other technologies.

Appendix 2: EPI Manual Coding Criteria

EPI manual codes are normally assigned in two ways, namely:-

- 1 To highlight the novel aspect of an invention itself
- 2 To indicate significant application

In the first case, codes will usually be assigned based on the content of the patent claims. In the second case, applications may be derived from either the claims or the wider disclosure of the specification.

The following general points should be noted regarding the assignment of EPI codes:-

- 1 A patent may be selected for inclusion in EPI based on its intended use only, the actual novel aspect being outside the scope of EPI codes. For example, the invention may relate to a novel chemical compound of relevance to an electrical or electronic industry, such as a polymer composition intended as a magnetic tape substrate. In such a case, only the application aspect can be conveyed by EPI codes.
- 2 Where an invention has no stated application, is of universal application, or a series of applications is given which are merely standard uses for such a device, manual codes are usually assigned to describe only the invention itself. Examples of this include a common electronic component such as a capacitor, or a battery of a type used in a wide variety of portable devices. However, significant electrical applications which are emphasised, or are one among several non-electrical applications, will be coded.
- 3 EPI manual codes are hierarchical in structure, such that an increase in the number of characters represents a finer subject breakdown. This means that in cases where the precise details of an invention cannot be determined with certainty, or where several code subdivisions are equally applicable, a general manual code may be assigned. A more general code is also assigned if an appropriate sub-division code does not exist. Thus, when formulating a search, users are advised to consider the inclusion of a more general code in addition to finer subdivisions which are known to be relevant.
- 4 In many areas of the EPI coding system, in addition to codes for a product, separate subdivision codes are provided to represent materials used in the product, their manufacture, and manufacture of the product. Where 'materials' and 'manufacture' codes are not available, these topics are coded as the product itself. Note that in general, the manufacture of materials used in a product is not coded as manufacture of the product unless it is one of a number of steps in a process for manufacturing the product as a whole. Thus, manufacture of a polymer material which can be used as a magnetic tape substrate is coded as a tape substrate. Subsequent processing of the material, such as cutting or shaping to form the actual substrate, is coded as substrate manufacture.

5 As explained in *Appendix 1*, patents are included in EPI either by virtue of patent office-assigned IPC or by an intellectual selection process. Irrespective of the initial route by which the invention is included, the same intellectual criteria are used to assign manual codes. However, it should be noted that the requirements for electrical content differ between EPI classes since, as explained in Appendix 1, some inventions are included because of their assigned IPC being 'guaranteed' for EPI and may not have an electrical aspect. For example, a patent in the field of instrumentation or control, included only on the basis of its IPC, cannot be assigned for an application in X25 (industrial equipment) since the electrical content requirements for that class are not satisfied. Conversely, an invention selected for X25 based on its electrical content can be coded for any significant control or instrumentation content where relevant.

Appendix 3: IPC to EPI Manual Code Approximate Concordance

The following concordance is intended to assist users in determining, for an IPC relating to a technical field of interest, the EPI manual code, or code group, which represents similar subject matter. Where it is thought helpful, some combinations of IPCs which may be used to represent a particular topic have been included. When seeking the EPI code (or codes) corresponding to such a combination, the IPCs will be found in alphanumeric order. This table is intended as a general guide only, to be used as a 'short cut' to finding an approximately equivalent area of the EPI coding system. Where a number of code subdivisions correspond to a particular IPC, only the highest level code is shown for clarity. In addition, it should be remembered that patents bearing IPCs relating to technologies which are not inherently electrical will only be included in EPI if the specification in question has substantial electrical content.

Section A

A01	X25-N	A01C-021	P11-B01
	X27-A	A01C-023	P11-T99
A01B	P11	A01D	P12
A01B-001	P11-A01	A01D-001-011	P12-A01
	P11-C01	A01D-013-043	P12-A02
A01B-005/04	P11-T04	A01D-015,017	P12-T02
A01B-015/02	P11-T01	A01D-019	P12-T03
A01B-015/04-10	P11-T99	A01D-034	X27-A01
A01B-015/12, 14	P11-T02	A01D-037-39	P12-T99
A01B-015/16	P11-T01	A01D-041/133	Q76-U40
A01B-015/18, 20	P11-T99	A01D-044	P12-E99
A01B-023/02, 04, 06	P11-T01	A01D-045/16	P15-L01
A01B-015/035, 037, 049, 051, 059, 063, 067-071, 076-077	P11-T	A01D-045/06, 46/08-18	P15-E05
A01B-027-041	P11-A99	A01D-045/16	P12-E99
A01B-033	P11-A05	A01D-045/22-28	P12-E02
A01B-035	P11-A99	A01D-046/02-06	P12-E06
	P11-T99	A01D-046/24-28	P12-E01
A01B-037	P11-T99	A01D-057-65,87-89	P12-T01
A01B-039	P11-A99	A01D-059	P12-T99
A01B-041, 045	P11-B01	A01D-067/02	P12-G
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A01B-043	P11-A04	A01D-075/08	P12-G
A01B-049-059	P11-T04	A01D-075/18, 20	P12-T10
A01B-061/02	P11-T04		Q68-S
A01B-061/04	P11-T99	A01D-082-085, 090	P12-T99
A01B-063	P11-T03	A01D-087,89	P12-T01
A01B-067	P11-T04	A01D-090	P12-T99
A01B-069-79	P11-T99	A01D-090/00-16	Q19-G
A01B-077	P11-T03	A01F	P12
A01C	P11	A01F-011/02	P12-E05
A01C-001/00	P11-C99	A01F-017	P12-T01
A01C-001/02-08	P11-C02	A01F-021	P12-T10
A01C-003, 015, 021	P11-B01	A01F-021/00	Q68-S
A01C-003/02	P11-B02	A01F-025/12	Q76-U21E1
A01C-003/04-08	P11-B01	A01G	P13
A01C-005	P11-A06	A01G-001, 003, 017	P13-A07
A01C-007	P11-C03A	A01G-001/02	P13-E02
A01C-009, 011, 013	P11-C04	A01G-001/04	P13-E07
A01C-015, 21	P11-B01	A01G-003	X27-A01
A01C-019	P11-T99	A01G-005	P13-E08
		A01G-007/02	P13-A01C
		A01G-007/02,04	P13-A07
		A01G-007/06	P13-A04

Appendix 3: IPC to EPI Manual Code Approximate Concordance

A01G-009	X27-A01	A01K-069-099	P14-B02
A01G-009/02-12	P13-A02A		P14-E01C
A01G-009/12	P13-A02B	A01L	P14-A06
A01G-009/02-12	P13-A02		P14-E01A
A01G-009/14-26	P13-A01		P61-U05
A01G-009/18	P13-A01C	A01L-013	P14-A01A
A01G-009/20,22	P13-A01B	A01M	X27-X02
A01G-009/24,26	P13-A01A		P14-B01
A01G-013-015	P13-A04		P61-U05
A01G-016	P13-E03	A01M-001-005	P14-E01F
A01G-017- 023	P13-A03	A01M-007	P13-A04
A01G-017/02,04	P13-E06	A21-24	X25-P
A01G-017/06,08	P13-A07	A21B	X25-P01A
A01G-025,027	P13-A06	A23,47	X25-P01A
A01G-025/14	X27-A01	A23B-007/02-03	Q76-U21E1
A01G-027	X27-A01	A23C-023	P26-B02
A01G-029	P13-A05	A23L	X25-F03A
A01G-031	P13-A99		X25-P01X
A01G-033	P13-E99	A24	P63-U08
A01H	P13-B		X25-P03
	P61-U05	A24B	P15-L
A01H-001	P13-B02	A24B-003-015	P15-L05
A01H-001	P13-E01	A24C	P15-M
A01H-003	P13-B02	A24D	P15-T
A01H-004	P13-B01	A24D-001	P15-A01
A01H-005/02	P13-E08	A24D-001/16	P15-T04
A01H-015	P13-E07	A24D-003	P15-T01
A01H-017	P13-B02	A24D-003/02	P15-M
A01J	P13-F	A24F-001-005, 011	P15-T03
	X25-P01C	A24F-007	P15-L01
A01J-001-009	P13-F01	A24F-015, 017	P15-T04
	P13-F50A	A24F-015	Q34-L
A01J-007	P13-G	A24F-019-031	P15-T99
A01J-011	P13-F50A	A24F-040	Q34-M02
A01J-011/10	P13-F50B		X27-A02F
A01J-015-27	P13-F02	A24F-040/46	X25-B
	P13-F50C	A24F-040/465	X25-B02A
A01J-099	P13-F50X	A24F-040/57	X25-B04
A01J-099	P13-F99	A24F-047	P15-T99
A01K	P14		X27-A02F
	P61-U05	A41-43	X27-A02B
	X25-N02A		X27-A02B1A
A01K-001-003	P14-A01A	A41-47	X27-A02
A01K-003/005	X25-X11	A41	P21
A01K-013, 014	P14-A03		P62-V31
A01K-015/02,04	X27-H03	A41B	X27-A02B1A
	P14-A01B	A41B-001, 003/04	P21-A
A01K-021	P14-A05	A41B-003-007	P21-T01
A01K-017	P14-A03	A41B-009,011	P21-E
A01K-021	P14-A05	A41B-013	P21-K
A01K-025, 027	P14-A04	A41B-015	P21-X
A01K-031-045	P14-A01A	A41C	P21-E
	P14-E01B		X27-A02B1A
A01K-037	P14-A01	A41C-005	P21-M
A01K-039/00,06	X27-H02	A41D	X26-E01F
A01K-047-59	P14-E01F		X27-A02B1A
A01K-049	P14-A05	A41D-001/02	P21-C
A01K-061/02	X27-H02	A41D-001/04	P21-A
A01K-063/00	X27-H01	A41D-001/06-16	P21-B
A01K-063-099	P14-E01C	A41D-001/14,16	P21-B02
A01K-063	P14-A01A	A41D-001/18	P21-A
A01K-067	P14-A05	A41D-001/20,21	P21-K
A01K-067/033,04	P14-E01F	A41D-001/06-012	P21-B01

Appendix 3: IPC to EPI Manual Code Approximate Concordance

A41D-001/080-086	P21-D	A44C-013,015	P23-C99
A41D-003,005	P21-C	A44C-017/02,04	P23-C20
A41D-007, 020	P21-D	A44C-019	P23-C15
A41D-010	P21-E	A44C-021	P23-C30
A41D-011	P21-K	A44C-023	P23-C02
A41D-013	P21-N	A44C-025	P23-C99
A41D-013/11	P21-F	A44C-027	P23-M
A41D-017	P21-N	A45,47	X27-A02A3
A41D-019	P21-H	A45B	P24-A
A41D-019/015	P21-N	A45B-001	P24-A01
A41D-019/02,04	P21-M	A45B-011-019	P24-A02
A41D-023,025	P21-H	A45B-021	P24-A01
A41D-027	P21-T	A45B-021-025	P24-A02
A41D-027/02-20	P21-T01	A45B-027	P24-A03
A41F	P21-L	A45C	P24-B
	X27-A02B1A		X26-E01F
A41G-001	P21-X	A45C-011/20	P28-A03
A41G-003-007	P21-F	A45D	X27-A02A1
A41G-009,011	P21-X		X27-A02A3B
A41H	P21-M		P24-C
		A45D-001-024	P24-C01
A42	P21	A45D-019	P28-B
A42B	X27-A02B1A	A45D-026,027	P24-C02
A42B-003	P21-N	A45D-029,030	P24-C03
A42C	P21-M	A45D-033-040	P24-C04
A43	P22	A45D-042	P24-C99
A43B-001	P22-T50	A45D-042/08	P24-C02
A43B-003/02-04	P22-B	A45D-044	P24-C
A43B-003/06-26	P22-A	A45D-044/02-16	P24-C01
A43B-009	P22-A	A45D-044/18-20	P24-C04
A43B-011	P22-T99	A45D-097	P24-C
A43B-013	P22-T01	A45F	P24-D
A43B-013/02-12	P22-T50	A45F-003	X26-E01F
A43B-015	P22-T04	A46	P24-E
A43B-017-021	P22-T01	A46D	P24-M
A43B-021/02-20	P22-T50	A47	X27-A02A3A
A43B-023/24,25	P22-T99		X27-A03
A43B-023/30	P22-T06		V06-V04S
A43C-001-011	P22-T05	A47,B62B	X27-X01
A43C-013-017	P22-T06	A47,F24C,H05B	X27-C
A43D	P22-M	A47B	P25
A44	P23		P63-U19
	X27-A02B2	A47B-001-013	P25-A
A44B	P23-A	A47B-013	P25-A02
A44B-001	P23-A01	A47B-013/02-06	P25-A02B
A44B-001/02	P23-A50	A47B-013/08-16	P25-A02A
A44B-003	P23-A01	A47B-017,019	P25-A01A
A44B-005	P23-A03	A47B-021	P25-A01A
A44B-006	P23-A04		T04-L07
A44B-007	P23-A99	A47B-025,031,035	P25-A01X
A44B-009/08	P23-A04	A47B-027	P25-A01A
A44B-011	P23-A06	A47B-033	P25-A01D
A44B-013	P23-A08	A47B-037/02	P25-A01X
A44B-015	P23-A99	A47B-037/04	P25-A01C
A44B-017	P23-A01	A47B-039	P25-A01A
A44B-018	P23-A08	A47B-041	P25-A01A
A44B-019	P23-A07		P25-A02
A44B-019/42-64	P23-M	A47B-041/02	P25-A02A
A44C	P23-C	A47B-043	P25-C
A44C-001,003	P23-C01	A47B-045-047	P25-C02
A44C-005	P23-C02	A47B-049-055	P25-C
A44C-007,009	P23-C03	A47B-057	P25-C02B
A44C-011	P23-C02	A47B-061	P25-B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

A47B-063,065	P25-C01A	A47G-023/02	Q32-D06
A47B-065	P25-C02B	A47G-025	P27-B05
A47B-067	P25-C	A47G-027	P27-B04
A47B-067/02	P25-C01B	A47G-029	P27-B99
A47B-067/04	P25-C01C	A47G-033	P27-B06
A47B-069-077	P25-C01B	A47G-035	P27-B99
A47B-079	P25-C01C	A47H	X27-T
A47B-081/00	P25-C01X		P27-C
A47B-081/02,04	P25-C01B	A47H-024/14	P62-V31
A47B-081/06	P25-C01C	A47J	X27-B
A47B-083	P25-A		P28-A
A47B-083,085	P25-L	A47J-009	P28-A99
A47B-085/02-06	P25-A	A47J-017	P28-A01
A47B-085/08	P25-C		X27-B04
A47B-087	P25-L	A47J-019	P28-A01
A47B-088/457	X27-A03		X27-B
A47B-096	P25-C	A47J-019/02,06	X27-B03
A47B-096/02	P25-C02B	A47J-021	P28-A01
A47C	P26		X27-B09
	P63-U19	A47J-023,025	P28-A01
A47C-001/04-11	P26-A01B		X27-B09
A47C-001/11	P26-E	A47J-027	P28-A02
A47C-001/12,13	P26-A01C	A47J-027/08-09	X27-C04
A47C-001/14	P26-A01D	A47J-027/21	X27-B01
A47C-001/16	P26-A01C	A47J-029	P28-A02
A47C-003/18-40	P26-A10A	A47J-031	P28-A01
A47C-004	P26-A01D	A47J-031/02-36	X27-B01
A47C-005/10	P26-A01D	A47J-033,036	P28-A02
A47C-007	P26-A10	A47J-036/38	X27-B05
A47C-007/02-60	P26-A10A	A47J-037	P28-A02
A47C-007/64-74	P26-A10X		X27-C
A47C-009/02	P26-A01A	A47J-037/06-08	X27-C03B
A47C-009/04,08	P26-A01X	A47J-037/12	X27-C03A
A47C-011/02	P26-A01C	A47J-037/10	P28-A02
A47C-017	P26-B		X27-C03D
A47C-017/12	P26-B03	A47J-039	P28-A02
A47C-017/38-50	P26-B02	A47J-041	P28-A99
A47C-017/52-84	P26-B03		Q75-A01
A47C-019	P26-B02	A47J-042	P28-A01
A47C-020,023	P26-B	A47J-043	P28-A01
A47C-023,027	P26-C	A47J-043/04-14	X27-B03
A47C-029	P26-F	A47J-044	P28-A01
A47D	P26-F	A47J-045	P28-A99
	P63-U19	A47J-047	X27-B09
A47F	P27-A	A47J-047/01-16	P28-A03
A47F-001,003	P27-A01	A47J-047/18-20	P28-A99
A47F-003/04	Q75-A02	A47K	P28-B
A47F-005-008	P27-A01	A47K-001-004	X27-A02A4
A47F-009	P27-A02	A47K-001	P28-B01
A47F-010	P27-A99	A47K-003	P28-B02
A47F-011	P27-A01	A47K-004	P28-B01
A47F-013	P27-A99	A47K-004	P28-B02
A47G	P27-B	A47K-005-007	P28-B03
A47G-001	P27-B01	A47K-010	P28-B03
A47G-005-007	P27-B99	A47K-010	Q76-U01
A47G-007/04	P25-A01X	A47K-010/02	P27-B02
A47G-009	P27-B02	A47K-010/48	V06-V04P
A47G-011	P27-B03	A47K-011	P28-B04
A47G-019	P27-B03	A47K-013	P28-B04
	X27-B09	A47K-017	P28-B99
A47G-021	P27-B03	A47L	P28-C
A47G-023	P27-B03		X27-D03
	X27-B09		X27-D04

A47L,D06F	X27-D	A61D	P32
A47L,D06F-053	X27-D06	A61D-001	S05-B
A47L-009,B04C	X27-D04C	A61F	P32
A47L-011,-013	X27-D05		S05-F
A61	S05-G02G	A61F-002/14-16	S05-F05
	S05-X	A61F-002/18	S05-F01
A61,G06F-017	S05-G02G1	A61F-002/24	S05-F04
	S05-G02G2	A61F-002/28-46,54-66,3	S05-F03
A61B	P31	A61F-005/14	P22-F05
	S05-D	A61F-005/44	S05-F02
	S05-G02B2	A61F-013	P32-A60
A61B,A61G-003	S05-G02B2B	A61G	P33
A61B,G06F-015	S05-D06		S05-G02
A61B-001	S05-D04	A61G,A61L-002,009	S05-G
A61B-001,G01M-011	V07-N02	A61G-001,005	S05-G02A
A61B-003	S05-D05	A61G-003/00-08	Q19-H03
A61B-003,G03B-005	S06-B01E	A61G-003/00	P26-A01B
A61B-005	S05-D01J	A61G-005	Q22-C02
A61B-005,008	S05-D01		P26-A01B
A61B-005,G01N	S05-C05	A61G-007	S05-G02B
A61B-005,G01N-033,35	S05-C02	A61G-011/00	S05-G02B3A
	S05-C03	A61G-013,015	S05-G02C
A61B-005/02	S05-D01B	A61G-013/00	P25-A01X
A61B-005/03,16	S05-D01X	A61G-015/00	P26-A01B
A61B-005/04	S05-D01A	A61G-021/00	Q19-C07
A61B-005/05	S05-D01D1	A61H	P33
	S05-D02B		X27-A02A2
A61B-005/05,12	S05-D01D	A61H,A61N	S05-A
A61B-005/08	S05-D01C1	A61H,A63B	W04-X01A5
A61B-005/08,007/00-04	S05-D01H	A61H-001-023,037,039	S05-A05
A61B-005/08,10,22	S05-D01C	A61H-003	S05-K01
A61B-005/10,11,22	S05-D01C5	A61H-003,A61	S05-K
A61B-005/10,22	S05-D01C5A	A61H-005	S05-A07
A61B-005/14	S05-D01G	A61H-031	S05-A05A
A61B-005/14,	S05-C01	A61H-033-037	S05-A09
A61B-005/14,20,G01N-033,035	S05-C	A61J	P33
A61B-005/16	S05-D01F		S05-M
A61B-005/20,	S05-C09	A61J-001,007	S05-M03
A61B-006	S05-D02	A61J-007	S05-M01
A61B-006/03	S05-D02A1		S05-M02
A61B-006/04	S05-D02A6		S05-M04
	S05-D02E	A61L	P34
A61B-006/08-10	S05-D02A3		X25-H
A61B-006/14,A61C	S05-E03	A61L-002,009	S05-G01
A61B-006/40	S05-D02A3	A61L-002/02,16	S05-G01A
A61B-006/42,46	S05-D02A5	A61L-002/04-14	S05-G01B
A61B-006/51	S05-E03	A61M	P34
A61B-008	S05-D03	A61M-001	S05-H
A61B-017	S05-B01	A61M-001/00-12	S05-H02
	S05-B04	A61M-001/14-38	S05-H01
	S05-B05	A61M-005	S05-J
A61B-017,019	S05-B09	A61M-005/16	S05-J01A
A61B-017,019,	S05-B	A61M-016	S05-G02E
A61B-017/225	S05-B02	A61M-019,021	S05-L02
A61B-017/36-41	S05-B03	A61M-019,021,016/01	S05-L01
A61B-018/02	S05-B06	A61M-019-021	S05-L
A61C	P32	A61M-037	S05-J02
	S05-E	A61N	P34
A61C-001,003	S05-E01	A61N-001/00	S05-A03E2
A61C-019	S05-E02	A61N-001/04-06	S05-A02
		A61N-001/10-16,40	S05-A03B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

A61N-001/18-34,38	S05-A04	A63B-067	P36-A
A61N-001/30	S05-A04A		P36-C
A61N-001/36-378	S05-A01		W04-X
A61N-001/365,368	S05-A01A1	A63B-069	P36-A
	S05-A01A5		P85-A01N
A61N-001/378	S05-A01C		W04-X01A
A61N-001/38,39	S05-A01B	A63B-071	P36-A01
A61N-001/40,002, 005,7	S05-A03		W04-X01K1
A61N-002/02-12	S05-A03E1	A63B-102	P36-A01
A61N-005	S05-A03A2		W04-X01K1
A61N-005/02-04	S05-A03D	A63C-001 -017	P36-A03
A61N-005/06	S05-A03A9		P36-E07
A61N-005/06,08	S05-A03A		W04-X01 K3P
A61N-005/10	S05-A03F		W04-X03E2
	S05-A03X	A63C-019	P36-A03
A61N-007	S05-A03C		P36-A08C
A62B-001	P35-A01		W04-X01 F
A62B-003	P35-A01	A63D	P36-A01
A62B-005	P35-A		P36-C13
A62B-007 - 015	P35-A03E	A63D-015/04	P25-A01X
A62B-017	P35-A03C	A63F-001	P36-C05
A62B-018	P35-A03E1		W04-X02B5
	W06-B01C9	A63F-003	P36-C01
A62B-019 -027	P35-A03E		W04-X02B1
A62B-029	P35-A03G	A63F-005	P36-C09
A62B-031	P35-A03E		W04-X02E
A62B-033	P35-A99	A63F-007 -011	P36-C
A62B-035	P35-A03A		W04-X02
A62C	P35-C	A63F-013	W04-X02C
	X25-X05	A63F,H04H	W02-F10G
A62C-002	P35-C05		W03-A16C5G
A62C-004	P35-C05	A63G	W04-X03E2
A62C-005	P35-C01		W04-X03G3
A62C-008	P35-C99	A63H	W04-X03E
A62C-011 - 025	P35-C01C1	A63H-003	P36-E05
A62C-027	X22-P10		W04-X03E5
	P35-C01C5	A63H-017-029	P36-E01
	Q19-H02		W04-X03E1
A62C-029	P35-C01C5	A63H-030	P36-E
	Q24-P28		W04-X03E8
	W06-C01C9	A63J	P36-E15
A62C 35/00	P35-C01C3		P36-F
A62D-001	P35-C01A8		W04-X03G1
A62D-003	P35-X		W04-X03G7
A62D-005	P35-A03C	A63J, G10H	W04-U08
A62D-007 -009	P35-A03E	A63K	P36-A03
A63	P36		P36-A08C
	W04-X		W04-X01F
A63,G04,G06M,G07	W04-X01C		W04-X01K3
A63,G06M,G09F	W04-X01C3		
A63,G07,G08B	W04-X01H		
A63,G09B	W04-W07E		
A63B	P21-D		
A63B-001 -026	P36-A06		
	P85-A01N		
	W04-X01A		
A63B-027 -029	P36-A06		
A63B-031 -035	P36-A03		
	W04-X01K3J		
A63B-037 -063	P36-A01		
	W04-X01K1		

Section B

B01D-003/14,B03B, B01F,B02,B04B,C B01L-009/02 B02B	X25-H09 X25-J P25-A01X P41-A07A P41-V60A	B23H-007 B23K	X24-F02 P55 X24-D
B02C	P41-A03 P41-V60A	B23K,B25J B23K-001	X25-A03E1 X24-A01 X24-A02C X24-A02E
B03B B03C,B08 B03C-001	P41-E03 X25-H P41-E07 X25-H01	B23K-001,-003	X24-A V04-R04A P55-B
B03C-003 B03C-005,007 B03D B03D,B07B B04 B04C B05B	X25-H02 X25-H02B P41-E03 X25-H09 P41-J X27-D04C P42-A X25-K	B23K-001/012-015 B23K-001/018 B23K-001/20 B23K-003	V04-R04A3J P55-B03 P55-A X24-A02A P55-A
B05B-005 B05C B05D B06,B08B-007 B06B B06B-001 B06L-005 B07	X25-K01 P42-B P42-E X25-H09 P43-A V06-V04C X23-A04 P41-K X25-F06	B23K-003/02-03	V04-R04A3L P55-T01 P55-T02A
B07B-013, B07C-001-5 B07C,G07D B07C-001-5 B08B B09 B09B B21 B21B	X25-F06 T05-K X25-F06 P43-B X25-W01 P43-E X25-A02D X25-A02B P51-A	B23K-003/06 B23K-005,-007 B23K-005 B23K-005/24 B23K-005/213 B23K-007, 020 B23K-007/10 B23K-009 B23K-009/02-04 B23K-009/06-09 B23K-009/10 B23K-009/12 B23K-009/14 B23K-009/16 B23K-009/18-20 B23K-010 B23K-011 B23K-011/24-26 B23K-013 B23K-015	X24-D05 P55-C01 P55-T01 P55-A P55-C P55-T01 X24-B X24-B01 X24-B02A X24-B02X X24-B03 X24-B04 X24-B06 X24-B05 X24-B06 X24-C X24-C01 X24-D01 X24-D02 V05-F08E3 P55-C02
B21B-009, 033, 037, 038 B21B-039, 041 B21B-043 B21C-001-019 B21C-009, 029 B21C-023-035 B21C-025 B21C-031, 051 B21C-033, 045, 047 B21D B21D-L B21F B21J B22 B22D B23B-H B23B	P51-T20 P51-T25 P51-T22 P51-B P51-T22 P51-C P51-T05 P51-T20 P51-T25 X25-A02 P52 X25-A02E X25-A02C P53 X25-A01 P54 X25-A03A X25-A03B X25-A03C1 X25-A03C X24-F X24-F01B X24-F01A	B23K-020 B23K-020/10 B23K-020/12 B23K-020/24 B23K-026 B23K-035 B23K-035/362, 363 B23K-035/40 B23K-037/04, 053, 06 B23P-005 B23P-006 B23P-009 B23P-011, 013, 015, 017, 019, 021, 023, 025 B23P-015 B23Q B23Q-001 B23Q-003-009, 016 B23Q-011, 015, 017, 023 B23Q-033, 035	X24-D06 X24-D08A X24-D07 P55-A X24-D03 X24-E P55-D01 P55-D03 P55-T02C P56-B P56-G P56-A P56-X P56-U06 P56-U40 P56-T P56-T01 P56-T25 P56-T20 P56-C

Appendix 3: IPC to EPI Manual Code Approximate Concordance

B24	P61	B60B-009/26	Q11-A01
	X25-A03C2	B60B-009/28	Q11-A01
	X25-A03C3	B60B-011/00-10	Q11-A
B25	P62	B60B-015/00-28	Q11-A15A
	X25-A03D	B60B-017/00-02	Q11-A17
B25J	X25-A03E	B60B-019/00	Q11-A
B26	P62	B60B-019/02	Q11-A17
B27	P63	B60B-019/04-14	Q11-A
B27B	X25-A03	B60B-021/00-025/22	Q11-A03
	X25-X01	B60B-027/00-06	Q11-A04
B28	P64	B60B-029/00	Q11-A28
B29	X25-A06	B60B-030/00-10	Q11-A30
B29C-027	X24-D04	B60B-031/00-06	Q11-A28
B29C-033,-035,-67	X25-A08	B60B-033/00-08	Q11-A08
B30	P71	B60B-035/00-18	Q11-A05
B30B	X25-A02A	B60B-037/00-12	Q11-A19
B31,D21	X25-T09A	B60B-039/00-12	Q11-A15B
	X25-T09B	B60C-001/00	Q11-B
B31	P72	B60C-003/00-08	Q11-B
B32	P73	B60C-005/00-24	Q11-B01A
B33	X25-A08	B60C-007/00-28	Q11-B01S
B33Y-010	X25-A08A	B60C-009/00-30	Q11-B04
B33Y-030	X25-A08B	B60C-011/00-24	Q11-B06
B33Y-070	X25-A08M	B60C-013/00-04	Q11-B05
B41	S06-C	B60C-015/00-06	Q11-B03
B41B-G	P74	B60C-017/00-017/10	Q11-B15
B41B	S06-C01	B60C-019/00-023/20	Q11-B30
B41C,G03F	S06-C02	B60C-023/02-08,20	X22-E02B
B41F	S06-C03	B60C-023/10-14	X22-X09
B41J-N	P75	B60C-027/00-22	Q11-A15
B41J,G06F-003/09,12,	S06-K07	B60C-029/00-06	Q11-B02
B41J,G06K	S06-K	B60D-001/00	Q11-C
B41J,G06K,G09G	T04-L, T04-X	B60D-001/00-66	Q11-C02
B41J,G06K-015	S06	B60D-001/01-07	Q11-C01
B41J-002/01-215	S06-G	B60D-003/00	Q11-C05
B41J-002/02-035	S06-G02	B60D-005/00	Q11-C07
B41J-002/04-065	S06-G01	B60D-007/00	Q11-C
B41J-002/22-31	S06-F	B60F-001/00-04	Q19-R02
B41J-002/23-305	S06-F01	B60F-003/00	Q19-R01
B41J-002/305	S06-F03	B60F-005/00-02	Q19-R09
B41J-002/31	S06-F02	B60F-005/02	Q25-P10
B41J-002/315-38	S06-H	B60G	X22-M01
B41J-002/325	S06-H02	B60G-001/00-001/04	Q12-A
B41J-002/335-34	U14-H01B	B60G-003/00-28	Q12-B
B41J-002/335-375	S06-H03	B60G-005/00-06	Q12-B
B41J-002/39-425	S06-J	B60G-007/00-04	Q12-B
B41J-002/435-48	S06-E	B60G-011/00	Q12-B01
B41J-002/435-48,G03	S06-E01	B60G-011/02-12	Q12-B01A
B41J-002/525	S06-K01	B60G-011/14-16	Q12-B01B
B41J-003	S06-K99A	B60G-011/18-20	Q12-B01C
B41J-011-015	S06-K03A	B60G-011/22-24	Q12-B01D
B42	P76	B60G-011/26-30	Q12-B01E
	X27-A02C	B60G-011/32-64	Q12-B01F
B43	P77	B60G-013/00-02	Q12-B02
B43M	P77-D	B60G-013/04	Q12-B02A
B44	P78	B60G-013/06-12	Q12-B02B
B44B	X25-X10	B60G-013/14-18	Q12-B02
B51F-017/00-36	Q21-D07	B60G-015/00-14	Q12-B03
B60B-001/00-14	Q11-A01	B60G-017	X22-M
B60B-003/00-18	Q11-A02	B60G-017/00-08	Q12-B04
B60B-005/00-04	Q11-A30	B60G-017/015	X22-M03
B60B-007/00-20	Q11-A07	B60G-021/00-025/00	Q12-X
B60B-009/00-24	Q11-A	B60H	X22-J02

Appendix 3: IPC to EPI Manual Code Approximate Concordance

B60H-001/00-003/06	Q14-M	B60P-001/04-34	Q15-A01
B60J-001/00-20	Q17-A07	B60P-001/36-38	Q15-A02
B60J-003,-007	X22-J08	B60P-001/40-42	Q15-A03
B60J-003/00-06	Q14-D	B60P-001/43	Q15-A04
B60J-005/00-14	Q17-A06	B60P-001/44-46	Q15-A05
B60J-010/00-12	Q17-A09	B60P-001/48-50	Q15-A15
B60J-011/00	Q14-X	B60P-001/52	Q15-A07
B60K	X21-A02	B60P-001/54	Q15-A06
B60K-003/00-006/12	Q17-E01	B60P-001/56	Q15-A15
B60K-006/00	X21-A01D	B60P-001/58-62	Q15-A08
B60K-006/02	X21-A01D1	B60P-001/64	Q15-A15
B60K-006/10	X22-A09	B60P-003/00	Q15-B
B60K-008/00	Q17-E01	B60P-003/022-025	Q15-B01
B60K-011/00-08	Q17-E02	B60P-003/03	Q15-B02
B60K-011/12	Q17-A	B60P-003/035	Q15-B03
B60K-013/00-06	Q17-E15	B60P-003/04-05	Q15-B04
B60K-015/00-10	Q17-E04	B60P-003/055	Q15-B06
B60K-016/00	Q17-X	B60P-003/06-12	Q15-B07
B60K-017/00	Q13-A	B60P-003/14	Q15-B30
B60K-017/02	Q13-A03	B60P-003/16	Q15-B11
B60K-017/04-16	Q13-A	B60P-003/18	Q15-B30
B60K-017/22-24	Q13-A07	B60P-003/20	Q15-B05
B60K-017/26-32	Q13-A30	B60P-003/22-24	Q15-B08
B60K-017/34-356	Q13-A11	B60P-003/28	Q15-B07
B60K-017/36	Q13-A	B60P-003/30	Q15-B09
B60K-025/00-10	Q13-C	B60P-003/32-39	Q15-B10
B60K-025/02	Q11-C02	B60P-003/40-41	Q15-B12
B60K-025/06	Q11-C02	B60P-003/42	Q15-B30
B60K-026/00	Q17-E05	B60P-005/00	Q15-C
B60K-028/16	X22-G03B	B60P-007/00-18	Q15-D
B60K-031	X22-G03A	B60P-009/00	Q15-X
B60K-031/00	X22-C02D4	B60Q	X22-B
B60K-031/00,12-14	X22-A03B1	B60Q-001,F21Q-001	X22-B02
	X22-C02D4	B60Q-001/04-20,	X22-B01
B60K-031/02-10	X22-A03B1A	B60Q-001/22,005/00	X22-B02R
B60K-035/00-037/06	Q17-A11	B60Q-001/24-32,46-52	X22-B02X
B60K-041,F16H-061	X22-G	B60Q-001/34-42	X22-B02D
B60K-041/00-20	Q17-E05	B60Q-001/44	X22-B02A
B60L	X21-A	B60Q-001/52	X22-B02E
	X23-A	B60Q-003-007	X22-B03B
B60L-001/02-16	X23-A10	B60Q-005/00	Q14-C04
B60L-003	X21-A05	B60Q-007/00-02	Q14-C05
	X23-A02G	B60R-001/00-12	Q14-E
B60L-005	X21-B03	B60R-003/00-/04	Q14-I
	X23-A04	B60R-005/00-04	Q14-F
B60L-007,H02P-003	X21-A03	B60R-007/00-14	Q14-F01
	X23-A01B	B60R-009/00-12	Q14-F02
	X23-A01B3	B60R-011/00-06	Q14-F
B60L-008,-009,-011,-13	X23-A01A	B60R-011/02	X22-X02
B60L-009-011	X21-A01	B60R-013/00-04	Q17-A10
B60L-013/00	Q21-B05A	B60R-013/06-07	Q17-A09
B60L-013/04,06,08	X23-A01A4	B60R-013/08	Q17-N
B60L-013/04-10	Q21-B05A	B60R-013/10	Q17-A10
B60L-015,H02P-005,-7	X21-A04	B60R-015/00-04	Q14-L
	X23-A02A	B60R-016/02-06	X22-X
B60M-001-005	X21-B02	B60R-017/00-02	Q17-X
B60M-001-007	X23-A03A	B60R-019/00-56	Q17-A12
B60N-002	X22-J03A	B60R-021/00	X22-J11
B60N-002/00-72	Q14-A		X22-J11B
B60N-002/48	X22-J03A3	B60R-021/00-34	Q14-C02
B60N-003/00-005/00	Q14-X	B60R-021/01	X22-J11
B60P-001/00-64	Q15-A	B60R-021/16	X22-J07
B60P-001/02	Q15-A15	B60R-022	X22-J03B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

B60R-022/00-48	Q14-C01	B61D-005/00-06	Q21-C03C
B60R-022/195	X22-J03B1	B61D-007/00-32	Q21-C03D
B60R-022/32	X22-J03B1	B61D-009/00-14	Q21-C03E
B60R-025,G08B-013	W03-B03A1	B61D-011/00-02	Q21-C03F
B60R-025/00-10	Q14-H	B61D-013/00-02	Q21-B03A
B60R-027/00	Q17-X		Q21-C03G
B60S-001/00-003/06	Q16-A01	B61D-015/00-04	Q21-C03X
B60S-001/08	X22-J01	B61D-015/06	Q21-C03H
B60S-003	X25-H09C	B61D-015/08-12	Q21-C03I
B60S-005/00-06	Q16-A02	B61D-017/00	Q21-D
B60S-009/00-013/02	Q16-A03	B61D-017/02-22	Q21-D14
B60T-003/00	Q18-A10	B61D-017/24-26	Q21-D
B60T-007/00	Q18-A07	B61D-019/00-02	Q21-D15
B60T-007/02-06	Q18-A07A	B61D-023/00-02	Q21-J05
B60T-007/08,10	X22-C02A	B61D-025/00	Q21-D16
B60T-007/08-10	Q18-A07B	B61D-027/00	Q21-J02
B60T-007/12	X22-C02D	B61D-031/00	Q21-J01
B60T-007/12-22	Q18-A07C	B61D-033/00	Q21-J03
B60T-008	X22-C02C	B61D-035/00	Q21-J04
B60T-008/32-50, 58-64,72-86		B61D-037/00	Q21-J09
	X22-C02C3	B61D-039/00	Q21-D17
B60T-008/32-50, 66-84	X22-C02C1	B61D-041/00-043/00	Q21-J09
B60T-013/74	X22-C02C7	B61D-045/00	Q21-J07
B60T-017/18-22	Q18-A15	B61D-047/00	Q21-J06
B60V-001/00-22	Q19-R01	B61D-049/00	Q21-J09
	Q17-A15	B61F-005/28-36	Q21-D06
B60V-003/00-02	Q19-R01	B61F-005/38-48	Q21-D05
B60V-003/06	Q24-P10	B61F-007/00	Q21-D08
B60V-003/08	Q25-A05F	B61F-009/00	Q21-D09
B61B-001/00-02	Q21-A	B61F-011/00	Q21-D10
B61B-003/00-02	Q21-B01A	B61F-015/00-28	Q21-D06
B61B-005/00-02	Q21-B01B	B61F-019/00-10	Q21-D11
B61B-007/00-06	Q21-B03	B61G-001/00-007/14	Q21-D12A
B61B-009/00	Q21-B03A	B61G-009/00-24	Q21-D12B
B61B-010/00-04	Q21-B03B	B61G-011/00-18	Q21-D12C
B61B-011/00	Q21-B03C	B61H	X23-A01B
B61B-012/00-12	Q21-B03	B61H-001/00-005/00	Q21-F01
B61B-013/00	Q21-B09	B61H-007/00-12	Q21-F02
B61B-013/02	Q21-B04	B61H-009/00-06	Q21-F09
B61B-013/04-06	Q21-B02	B61H-009/02	Q21-B03
B61B-013/08	Q21-B05	B61H-011/00-04	Q21-F09
B61B-013/12	Q21-C01D	B61H-011/06-10	Q21-F03
B61B-015/00	Q21-B09	B61H-011/14-16	Q21-F09
B61C-001/00-14	Q21-C01A	B61H-013/00-38	Q21-F05
B61C-003/00-02	Q21-C01B	B61H-015/00	Q21-F04
B61C-005/00-04	Q21-C01C	B61J-001/00-10	Q21-A06
B61C-007/00-04	Q21-C01D	B61J-001/12	Q21-A15
B61C-008/00	Q21-M02	B61J-003/00-12	Q21-A07
B61C-009/00-52	Q21-D13	B61J-005/02	Q21-X
B61C-009/02-06	Q21-C01A	B61K-001/00-02	Q21-A04
B61C-009/08-36	Q21-C01C	B61K-003/00-02	Q21-A05
B61C-009/38-52	Q21-C01B	B61K-003/02	Q21-X
B61C-011/00	Q21-C01D	B61K-005/00-02	Q21-A08
B61C-011/02	Q21-C01D1	B61K-005/04-06	Q21-M03
B61C-011/04	Q21-B04	B61K-007/00-22	Q21-A02
	Q21-C01D2	B61K-009/00	Q21-S
B61C-011/06	Q21-C01D3	B61K-011/00	Q21-M02
B61C-013/00-02	Q21-B09	B61K-011/02	Q21-M03
B61C-013/04	Q21-B01	B61K-013/00-04	Q21-J09
B61C-013/06	Q21-B03	B61K-013/04	X23-C01
B61C-013/08	Q21-B02	B61L	X23-B
B61D-001/00-08	Q21-C03A	B61L-001/00-12,20	X23-B01
B61D-003/00-20	Q21-C03B	B61L-001/14,16	X23-B01A

Appendix 3: IPC to EPI Manual Code Approximate Concordance

B61L-001/18	X23-B01C	B62D-025/00-033/10	Q17-A02
B61L-003	X23-B02	B62D-031/00-04	Q19-C01
B61L-003/12	X23-B02C	B62D-035/00-039/00	Q17-A05
B61L-005/00	Q21-S01	B62D-041/00	Q17-A20
B61L-005/02-10	Q21-S01A	B62D-043/00-10	Q17-A13
B61L-005/12-18	Q21-S01C1	B62D-047/00-02	Q19-C01
B61L-005/20-24	Q21-S01C2		Q19-C01
B61L-005-015	X23-B03	B62D-049/00-051/00	Q17-A20
B61L-011/00-08	Q21-S01A	B62D-053/00-12	Q19-C02
B61L-013/00-04	Q21-S01C	B62D-053/08-12	Q11-C02
B61L-015/00-02	Q21-S01C3	B62D-055/00-32	Q17-A14
B61L-017	X23-B05	B62D-057/00-04	Q17-E15
B61L-019	X23-B04A	B62D-059/00-04	Q19-J
B61L-019/00-16	Q21-S01E	B62D-061/00-063/04	Q17-X
B61L-019-023	X23-B04	B62D-063/06-08	Q19-J
B61L-021	X23-B04C	B62D-065/00-18	Q16-D
B61L-023	X23-B04E		Q21-M05
B61L-023/00	Q21-S05	B62D-067/00	Q16-R
B61L-023/08-20	Q21-S05A	B62H-001/00-14	Q14-J
B61L-023/22-32	Q21-S05C	B62H-003/00-12	Q14-J
B61L-023/34	Q21-S05	B62H-007/00	Q14-C07
B61L-025-029	X23-B05	B62J-027/00	Q14-C06
B61L-027	X23-B05C	B62J-029/00	Q14-C06
B61L-029	X23-B05A	B62J-035/00-037/00	Q17-E04
B61L-029/00	Q21-S07		Q19-B
B61L-029/02-06	Q21-S07A	B62K-001/00	Q19-A
B61L-029/08-22	Q21-S07B	B62K-001/14	Q18-B09
B61L-029/24-32	Q21-S07C	B62K-003/00-16	Q19-A
B62B-001/00-26	Q22-A01	B62K-005/02-06	Q19-A
B62B-003/00-18	Q22-A02	B62K-007/00-04	Q19-A
B62B-005/00-08	Q22-A03	B62K-009/00-02	Q19-A
B62B-007/00	Q22-B	B62K-009/02	Q19-A
B62B-007/02	Q22-B01	B62K-011/00-14	Q19-B
B62B-007/04-14	Q22-B02	B62K-011/02-10	Q17-A
B62B-009/00-28	Q22-B03	B62K-011/12	Q18-B15
B62B-011/00	Q22-C	B62K-013/02	Q19-A
B62B-013/00-019/04	Q22-C01	B62K-013/04	Q19-A
B62C-001/00-04	Q22-D	B62K-013/06	Q19-A
B62D	X22-C05	B62K-027/00-16	Q14-G
B62D-001/00-02	Q18-B01	B62M-001/02	Q13-A15
B62D-001/04-11	Q18-B01A	B62M-001/12	Q13-A15
B62D-001/12-14	Q18-B01B	B62M-001/12-16	Q13-A15
B62D-001/16-20	Q18-B01D	B62M-003/00-06	Q13-A15
B62D-001/22-28	Q18-B01X	B62M-003/08-12	Q13-A16
B62D-003/00	Q18-B02	B62M-003/14	Q13-A15
B62D-003/02-12	Q18-B02A	B62M-003/16	Q13-A15
B62D-003/14	Q18-B02B	B62M-005/00	Q13-A15
B62D-005	X22-C05A	B62M-007/00-14	Q19-B
B62D-005/00	Q18-B06		Q17-A
B62D-005/02	Q18-B06A	B62M-027/00-02	Q22-C01
B62D-005/04	X22-C05A3		Q22-C01
B62D-005/06-32	Q18-B06C	B63	Q24
B62D-006	X22-C05B		W06-C
B62D-006/00-10	Q18-B07	B63B-022	Q24-P18
B62D-007/00-22	Q18-B03		W06-C07C
B62D-009/00-04	Q18-B09	B63,B63C	W06-C07
B62D-011/00-24	Q18-B12	B63-001-005	Q24-R
B62D-012/00-019/00	Q18-B15		W06-C07A
B62D-013/00-06	Q19-J	B63,G01S	W06-C01B1
B62D-021/00-20	Q17-A08	B63,G05	W06-C01A
B62D-021/20	Q19-J	B63,G06F,G08C	W06-C01B8
B62D-023/00	Q17-A03	B63,H01R,H02G	W06-C01C1
B62D-024/00-04	Q17-A08		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

B63B	W06-C01C	B64F-005	Q25-R09
B63B,F21,F24	W06-C01C5		Q25-X05
B63B,G01	W06-C01B5		Q25-X07
B63B,G015,H01Q	W06-C01B		W06-B06
B63B,H01Q,H04B	W06-C01B7		W06-B08
B63B,H02J,H02K	W06-C01C3	B64G	W06-B03
B63C-009	W06-C10	B64G-001	W06-B03A
	W06-C15C	B64G-001,-006	W06-B03D
B63G-007,F41	W07-F05	B64G-001,F24J,H02M,	W06-B03B
B63H,F02,G05	W06-C01A1	B65	X25-F01
B63H,G05D-001	W06-C01A5		X25-F03
B64	W06-B		X25-F03B1
B64,B64G-007,G09B	W06-B04	B65,B66	X25-F
B64,G01N,G01V	W06-B02A	B65,G01,H01L-021	U11-F
B64C,B64D	W06-B01	B65,H01J-009	V05-L07E7
B64C,B64D,F02C,	W06-B01A1	B65D	Q32
B64C,B64D,G05D-001	W06-B01A5		Q33
B64C,B64D,G06F	W06-B01B8	B65D-001/02-08	Q32-A01
	W06-B01C	B65D-001/09	Q32-A02
B64C,B64D,G07C	W06-B01B6	B65D-001/10	Q32-A04
B64C,B64D,H01R	W06-B01C1	B65D-001/12-20	Q32-A05
B64C-013/00-50	W06-B01A5	B65D-001/22-30	Q32-A08
B64C-015/00-14	W06-B01A5	B65D-001/34-36	Q32-A09
B64C-031/00-036	W06-B09	B65D-001/38	Q32-A10
B64D	W06-B02D	B65D-001/40-48	Q32-B
B64D,F21,F24	W06-B01C5	B65D-003-017	Q32-B
B64D,G01C,G01S	W06-B01B1	B65D-030, 033	Q32-A15
B64D,G11B,H04B	W06-B01C7	B65D-035	Q32-A16
B64D,H01Q,H04B	W06-B01B	B65D-039, 041, 043, 045	
B64D,H02J,K,M	W06-B01C3		Q32-C
B64D-001	Q25-B15	B65D-047, 049, 050, 083	
B64D-003	Q25-R07		Q32-D06
B64D-007	Q25-P13	B65D-057, 065, 088-090	
	Q25-M		Q32-T
B64D-009	Q25-B02C	B65D-085	Q34
B64D-010	Q25-X01	B65F-001/014	X25-W04
B64D-011	Q25-B01	B65F-003/00-28	Q19-C04
B64D-013	Q25-B03	B65G	X25-F07
B64D-013	W06-B01C5	B65H	X25-F02A
B64D-015	Q25-B04	B66	X25-F04
	W06-B01C4		X25-F05A
B64D-017	Q25-B09G	B81	U12-B03F1
B64D-019,21	Q25-B09G		V03-C07A
B64D-023	Q25-X03		V03-C10
B64D-025	Q25-B09		V03-D06B1
	W06-B01C8		V03-D10
	W06-B01C9		V06-V01K1
B64D-025/68	Q25-A07G		V06-V03A7
B64D-027,29,31,33,35	Q25-C02		V06-M06G
B64D-031	W06-B01A1		V06-M11G
B64D-035	Q25-C03		V06-N22
B64D-037,39	Q25-C02M		V06-N40H
B64D-043	W06-B01B	B82	U12-B03F2
B64D-045	Q25-B09		V03-C07A
B64D-045	W06-B01C		V03-C10A
B64F	W06-B02		V03-D06B1
B64F-001/02	Q25-A07G		V03-D10A
B64F,F21,G01S	W06-B02E		V06-V01K2
B64F-001,003	Q25-R		V06-V03A7
B64F-001	W06-B02		V06-M06G9
B64F-003	W06-B01C3		V06-M11G
			V06-N22A
			V06-N40H1

Section C

C02F-001/00-011/20	X25-H03
C09K-011,H05B-033	U11-A15
C09K-019	U11-A03A
C12C	X25-P01B
C12C-013	X27-X02
C14B	X25-X07
C21	X25-Q
C23C	X25-A04
C23C,H01J	V05-F08D
C23C,H01J-037	V05-F08D5
C23C,H01J-037/32-36	V05-F05C
C23C-014,H01J- 037/34	V05-F05C
	V05-F08D1A
C23C-014/24	U11-C01A1
C23C-014/34	U11-C01A3
	U11-C09A
	U11-C01A9
C23C-016	U11-C09B
C25	X25-R
C25B	X25-R01
C25B-001/13	X25-X04
C25B-009	X25-R01A
C25B-011	X25-R01B
C25B-013	X25-R01C
C25C	X25-R02
C25D	X25-R03
	X25-R04
	X25-R05
	X25-R07
C30B-013	U11-B02A
	U11-B02B
C30B-015	U11-B01
C30B-015/34	U11-B04
C30B-029/04,08,36	U11-B03C
C30B-029/40	U11-B03A
C30B-029/48	U11-B03B

Section D

D01,02,07	X25-T04A
D01-07	X25-T04
D03	X25-T04B1
D03-06	X25-T04B
D04B	X25-T04B2
D04H	X25-T04B3
D05B,D05C	X25-T04C
D06	X25-T04G
D06F	X27-D01A
D06F-019/00	X27-D01A
	X27-D07
D06F-039/20	X27-D01A3E
D06F-039/30	X27-D01A3X
D06F-039/40	X27-D07E
	X27-D01A3E
D06F-049,058	X27-D02
D06F-053	X27-D06
D06F-075	X27-D03
D21	X25-T09

Section E

E01	Q41
	X25-U
E02	Q42
E02F	X25-D01
E02F,E21C,D,F	X25-D
E03D-001/00-013/00	X27-L
E03	Q42
E04B	Q43
E04C	Q44
E04D, F	Q45
E04H-004	X25-X06
E04H-006	X25-U02
E05	Q47
E06	Q48
E05B	X25-M
E21	Q49
E21B	X25-E
E21B,G01V,G08C	W05-D07H
E21C	X25-D02B
E21C,D,F	X25-D02
E21F	X25-D02C

Section F

F01	X11-A
F01B-001/01	Q51-A01A
F01B-001/02-12	Q51-A01B
F01B-003/00	Q51-A
F01B-005/00	Q51-A
F01B-007/00-20	Q51-A01C
F01B-009/00-08	Q51-A03E
F01B-021/00-04	Q51-A03A
F01C-001/02-46	Q51-B
F01C-003/00-08	Q51-B
F01C-005/00-08	Q51-B
F01C-007/00	Q51-B
F01C-009/00	Q51-B05
F01C-017/00-06	Q51-B03E
F01C-019/00-12	Q51-B03C
F01D	Q52
	X11-A01
F01D-005,-007	X11-A01A
F01D-005/02-10	X11-A01A2
F01D-005/12-20	X11-A01A1
F01D-005/22-34	X11-A01A2
F01D-009,-011	X11-A01B
F01D-017	X11-A10A
F01D-019,-021	X11-A10B
F01D-025	X11-A01C
F01L-001/00-3/24	Q51-E
F01L-005/00-24	Q51-E02
F01L-007/00-18	Q51-E03
F01L-009/04	X22-A11
F01L-015/00-031/00	Q51-E04
F01M-	Q51-F
F01M-003/00-04	Q51-F02
F01M-011/00-25	Q51-F01
F01N-009	X22-A07
F01P	X22-A10
F01P-	Q51-G
F01P-001/00-10	Q51-G01
F01P-003/00-22	Q51-G02
F02	W06-C01A1
F02B	X11-C02
F02B-033/00-44	Q51-H05A
F02C	X11-C01
F02D	X22-A03
	W06-B01A1
F02D,G05	W06-B01A1
F02D-001	X22-A03A3
F02D-009	X22-A03B
F02D-009/06	X22-A03B5
F02D-013	X22-A03G
F02D-013,-017	X22-A03D
F02D-023,-043	X22-A03C
F02D-041/02-20,24-28	X22-A03A
F02D-041/08,16,	X22-A03B3
F02D-041/30-32, 36-38	X22-A03A1
F02D-041/34,40	X22-A03A1A
	X22-A03A1C
F02D-043	X22-A03A2
F02D-043,F02M-007/10	X22-A03A2A
F02M,F02M-027/04	X22-A02
F02M-001/12,	
-003/045,07,-007/10-11	X22-A02C

Appendix 3: IPC to EPI Manual Code Approximate Concordance

F02M-003/045,06-07	X22-A03B3	F16C-001	Q62-A
F02M-013/00-15/02	Q51-H01	F16C-003	Q62-B
F02M-025/08	X22-A03A4	F16C-005, -007	Q62-C
F02M-025/08,-033	X22-A02E	F16C-009	Q62-G
F02M-031/125	X22-A02B	F16C-011	Q62-D
F02M-031/13	X22-A15	F16C-013	Q62-G
F02M-035	X22-A06	F16C-017 -043	Q62-G
F02M-035/00-16	Q51-H05	F16D,F	Q63
F02M-037/08-10	X22-A02D	F16D,H	X25-L02
F02M-039-059	Q51-H01B	F16G,H	Q64
F02M-051,069/42	X22-A02A	F16H-061	X22-G
F02M-1/00-19/02	Q51-H01A	F16J	Q65
F02N-011,H01H	X22-A08	F16K	Q66
F02P	X22-A01		X25-L01
F02P,H01F-038/12	X22-A01A	F16L	Q67
F02P-001	X22-A01A1	F16M-S	Q68
F02P-003/01,06-12	X22-A01A9	F16N	X25-X09
F02P-003/02-055	X22-A01A2	F16T	Q69
F02P-005	X22-A01B	F17	Q69
F02P-007	X22-A01C	F21	Q71
F02P-007/02-04	X22-A01C1	F21K-002/08,F21V-001	X26-X
F02P-007/06	X22-A01C2	F21L-004,-011,-013-14/0-4	X26-E
F02P-007/063-073	X22-A01C3	F21L-004/00-08	X26-E01
F02P-009	X22-A01A9	F21M-003	X22-B01
F02P-011	X22-A01A7	F21M-007	X22-B01
F02P-017	X22-A01D	F21P-005	X26-K
F02P-017/02	X22-A01E	F21Q-001	X22-B02
F02P-019/02	X22-A01A3	F21V-001/00-26	X26-P
F03B	Q54-A	F21V-003/00-04	X26-D03
	Q54-B	F21V-005,-007,-009,-011,-013	
	X11-B		X26-D01
F03B-001-011	X11-B01	F21V-005/00-08	X26-D01B
F03B-013	X11-B09	F21V-007/00-22	X26-D01A
F03B-013/06	X11-B06	F21V-008	V07-N03
F03B-013/12-24	X15-C01		X26-G
F03B-015	X11-B10	F21V-008/00	V07-N03
F03C	Q53		X26-G
F03D	Q54-G	F21V-009/00-16	X26-D01C
	X15-B	F21V-011/00-18	X26-D01D
F03D-001-005	X15-B01A	F21V-013/00-14	X26-D01
F03D-007-011	X15-B09	F21V-014/00-08	X26-L
F03G	Q54-E	F21V-015/00-08	X26-D03
	Q54-F	F21V-017,-019	X26-X
F03H	Q54-X	F21V-021	X26-R
F03H-005	W06-B03A	F21V-029	X26-D02
F04	X25-L03	F22	Q72
F04B	Q55		X25-W02
F04C	Q55	F23	Q73
F04D	Q56-A		X27-G
	Q56-B	F23G-007	X25-W01
F04F	Q56-C		X25-W01A
F15	Q57	F23N	X27-G02
F15B-007	Q57-A	F23Q	X27-G01
F15B-009 - 13	Q57-B	F23Q-007/00	X22-A01E
F15B-017	Q57-C	F24	Q74
F15B-018	Q57-B		X27-E
F15B-015/19	Q57-D	F24C	X27-C03
F15B-019	Q57-X		X27-C04
F15B-021/02	Q57-B		X27-C07
F15B-021/08	Q57-B		X27-C09
F15C	Q57-E	F24C,F23	X27-C05
F16B	Q61	F24C,H05B-006/02-44	X27-C06
F16C	Q62	F24C-007,	X27-C01

Appendix 3: IPC to EPI Manual Code Approximate Concordance

F24C-007,-015,	X27-C02	F41H-011	W07-F03
F24C-007,H05B	X27-C02C	F41H-011/12-16	W07-F05
F24C-007,H05B-003	X27-C02A	F41H-011/16	Q19-D
F24C-15/20	X27-B05	F41J	W07-D01
F24D	X27-E01A	F41J,G09B	W07-D
F24D,F24H	X27-E01A1	F42	Q79
F24D,F24J	X27-E01A5	F42C	W07-C
F24D,H05B-003	X27-E01A3	F42C-009	W07-C03E
F24F	X27-E01B	F42C-013	W07-C03C
F24H	X27-E09	F42C-015	W07-C05
F24H,H05B	X27-E03A	F42C-019	W07-C01
F24H,H05B-003	X27-E03		
F24J-002/04-40	X15-A01		
F24J-003/08,H01L-035	X15-X		
F25	Q75		
	X27-F		
F25B	X27-F02B		
	X27-F02C		
	X27-F03		
F25B-030/00	X27-F02B		
F25D-023	X27-F01		
F26	Q76		
F26B	X25-G		
F26B-001	Q76-A		
F26B-003	Q76-B01		
F26B-005	Q76-B02		
F26B-007	Q76-B03		
F26B-013	Q76-U21A		
F26B-017	Q76-U21B		
F26B-021	Q76-T04		
F26B-023	Q76-T06		
F27	Q77		
F27D	X25-C		
F27D-011/02-04	X25-C01		
F27D-011/06	X25-C05		
F27D-011/08-12	X25-C02		
F27D-019,-021	X25-C03		
F28	Q78		
F41	Q79		
F41,F42,H01,H02	W07-J		
F41,F42,H01B,H01R	W07-J01		
F41,F42,H02	W07-J03		
F41,F42,H05K	W07-J05		
F41,G09B	W07-D05		
F41,H01J-031,H04N	W07-G		
F41A-019/58	W07-E01		
F41B-006,F41F	W07-E05		
F41B-006,H02K	W07-E05A		
F41B-015/04	W07-E08		
F41G-001	W07-B01		
F41G-001-003	W07-B		
F41G-003,005	W07-B05		
F41G-007	W07-A		
	W07-A01C		
F41G-007,G01C,S	W07-A01A		
F41G-007,G01J,H01L	W07-A03B		
F41G-007,G02B,	W07-A03D		
F41G-007,H01Q	W07-A03A		
F41G-007/20-22	W07-A01C		
F41G-007/24-28	W07-A01E1		
F41G-007/30-32	W07-A01E3		
F41H-005/007	W07-F03		
F41H-007/00-10	Q19-D		

Section G

G01,B64D	W06-B01B5
G01,F41,F42	W07-H
G01,H01C-010	V01-A03D3
G01,H01G-007	V01-B02B3
G01,H01J-037	V05-F08B
G01B	S02-A
G01B-003,005	S02-A01
G01B-003/02-10, 12,18	S02-A01A
G01B-003/11	S02-A10B
	S02-A01
G01B-003/12	S02-A01A
G01B-003/14	S02-A01
	S02-A10C
G01B-003/16	S02-A01A
G01B-003/18	S02-A01A
G01B-003/18-56	S02-A01B
G01B-003/56	S02-A01B,
	S02-A10D1
G01B-005	S02-A01
G01B-005/004-016	S02-A01,
	S02-A10G1
G01B-005/02-06	S02-A01,
	S02-A10B
G01B-005/08-12	S02-A01,
	S02-A10A
G01B-005/14-18	S02-A01,
	S02-A10B
G01B-005/20, 207, 213, 22	S02-A01
	S02-A10C
G01B-005/24	S02-A01
	S02-A10D
G01B-005/245, 25, 252, 255	
	S02-A01
	S02-A10D2
G01B-005/26	S02-A01,
	S02-A10C
G01B-005/28	S02-A01
	S02-A10E
G01B-005/30	S02-A01
	S02-A10F
G01B-007	S02-A02
G01B-007/004-016	S02-A02,
	S02-A10G1
G01B-007/02-06	S02-A02,
	S02-A10B
G01B-007/12-13	S02-A02,
	S02-A10A
G01B-007/14,15	S02-A02,
	S02-A10B
G01B-007/16, 24	S02-A02,
	S02-A10F
G01B-007/26	S02-A02,
	S02-A10B
G01B-007/28-293	S02-A02,
	S02-A10C
G01B-007/30	S02-A02,
	S02-A10D
G01B-007/305, 315	S02-A02,
	S02-A10D2
G01B-007/32	S02-A02,
	S02-A10C

G01B-007/34	S02-A02,
	S02-A10E
G01B-009,11	S02-A03
G01B-009/02-029	S02-A03,
	S02-A03A
G01B-009/04-08	S02-A03
G01B-009/10	S02-A03,
	S02-A10D1
G01B-011/02-06	S02-A03,
	S02-A10B
G01B-011/08-12	S02-A03,
	S02-A10A
G01B-011/14	S02-A03,
	S02-A10B
G01B-011/16	S02-A03,
	S02-A10F
G01B-011/22	S02-A03,
	S02-A10B
G01B-011/24-25	S02-A03,
	S02-A10C
G01B-011/255	S02-A03,
	S02-A10A
G01B-011/26-275	S02-A03,
	S02-A10D
G01B-011/28	S02-A03,
	S02-A10C
G01B-011/30	S02-A03,
	S02-A10E
G01B-013	S02-A04
G01B-013/02-06	S02-A04,
	S02-A10B
G01B-013/08-10	S02-A04,
	S02-A10A
G01B-013/12-14	S02-A04,
	S02-A10B
G01B-013/16	S02-A04,
	S02-A10C
G01B-013/18	S02-A04,
	S02-A10D
G01B-013/19, 195	S02-A04,
	S02-A10D2
G01B-013/20	S02-A04,
	S02-A10C
G01B-013/22	S02-A04,
	S02-A10E
G01B-013/24	S02-A04,
	S02-A10F
G01B-015	S02-A05
G01B-015/02	S02-A05,
	S02-A10B
G01B-015/04	S02-A05,
	S02-A10C
G01B-015/06	S02-A05,
	S02-A10F
G01B-015/08	S02-A05,
	S02-A10E
G01B-017	S02-A05B
G01B-017/02	S02-A05B,
	S02-A10B
G01B-017/04	S02-A05B,
	S02-A10F

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G01B-017/06	S02-A05B, S02-A10C	G01F-001/56-64	S02-C01B4
G01B-017/08	S02-A05B, S02-A10E	G01F-001/56-68	S02-C01B
G01B-021	S02-A10	G01F-001/66	S02-C01B1
G01B-021/02-08	S02-A10B	G01F-001/68	S02-C01B7
G01B-021/10-14	S02-A10A	G01F-001/684-692	S02-C01B7A
G01B-021/16-18	S02-A10B	G01F-001/696-699	S02-C01B7C
G01B-021/20	S02-A10C	G01F-001/76-90	S02-C01F
G01B-021/22	S02-A10D	G01F-003	S02-C02
G01B-021/24, 26	S02-A10D2	G01F-011,013	S02-C04
G01B-021/28	S02-A10C	G01F-011/02-08	S02-C04A
G01B-021/30	S02-A10E	G01F-011/10-26	S02-C04B
G01B-021/32	S02-A10F	G01F-011/28-46	S02-C04C
G01C	S02-B	G01F-013	S02-C04X
G01C-001	S02-B05	G01F-017,019	S02-C05
G01C-003	S02-B01	G01F-023	S02-C06
G01C-005,007	S02-B02	G01F-023/14-20	S02-C06B
G01C-009	S02-B03	G01F-023/24	S02-C06C1
G01C-011,013	S02-B04	G01F-023/24,26	S02-C06C
G01C-017	S02-B06	G01F-023/26	S02-C06C3
G01C-019	S02-B07	G01F-023/26,28	S02-C06C9
G01C-019,G01B-009	V07-N01	G01F-023/28	S02-C06D
G01C-019/64-72	S02-B07B	G01F-023/30-76	S02-C06A
G01C-021	S02-B08	G01F-025	S02-C07
G01C-021,G01S	X22-E06	G01G	S02-D
G01C-022	S02-B12	G01G-001	S02-D01A
G01C-023	S02-B11	G01G-001-009	S02-D01
G01C-025	S02-B10	G01G-003	S02-D01B
G01C-029	U14-D01B	G01G-005-009	S02-D01X
G01D	S02-K	G01G-011	S02-D02A
	S03-B01H5	G01G-011-019	S02-D02
G01D,G01J,G12B	S03-A05	G01G-013,015	S02-D02B
G01D,G12B	S02-G07C	G01G-017,019/02-07	S02-D02C
G01D-001	S02-K01	G01G-019/08-64	S02-D02X
G01D-003	S02-K02	G01G-021,023/00-16,48	S02-D09
G01D-004	S02-K08B	G01G-023/18-46	S02-D03
G01D-004,021	S02-K08	G01H	S02-E
G01D-005	S02-K03	G01H-003,009,011	S02-E02
G01D-005/00-10, 42-52	S02-K03X	G01H-005,007,013, 015	S02-E01
G01D-005/12-252	S02-K03A	G01H-017	S02-E09
G01D-005/12-40	S02-K03A5F	G01J	V07-N01
G01D-005/16	S02-K03A2A		S03-A
G01D-005/16,20,22	S02-K03A2	G01J,G12B-015/00-06	S03-A04
G01D-005/20	S02-K03A2C	G01J-001	S03-A01
G01D-005/24	S02-K03A1C	G01J-001,G03B	W04-M01D5A
G01D-005/24,242	S02-K03A1		W04-M01D5B
G01D-005/242	S02-K03A1A	G01J-001/00-60	S03-A01B1
G01D-005/26-40	S02-K03B		S03-A01B5
G01D-007	S02-K04		S03-A01B7
G01D-007/12	S02-K04A		S03-A01B9
G01D-009	S02-K05	G01J-001/00-60,42, 46	S03-A01B
G01D-011	S02-K06X	G01J-001/10-36	S03-A01A
G01D-011,013,015	S02-K06	G01J-001/12-26	S03-A02A1
G01D-013	S02-K06A	G01J-001/20-60	S03-A01B3
G01D-015	S02-K06B	G01J-003,004	S03-A02
G01D-018	S02-K07	G01J-003/00-52	S03-A02X
G01D-021	S02-K08A	G01J-003/12-40	S03-A02A
G01F	S02-C	G01J-003/42,44	S03-A02B
G01F-001	S02-C01	G01J-003/427	S03-E04A4
G01F-001/05	S02-C01A	G01J-003/45-453	S03-A02F
G01F-001/06-12,34-50	S02-C01A1	G01J-003/46-52	S03-A02C
G01F-001/20-32,52,54	S02-C01A9	G01J-004/02,04	S03-A02C
		G01J-005	S03-A03
		G01J-007,009,011	S03-A09

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G01K	S03-B	G01M-015	S02-J01
G01K-001,015	S03-B01H	G01M-017	S02-J02
G01K-001/20-26,015	S03-B01H5	G01N	S05-C05
G01K-001-013	S03-B01K	G01N,G01D,G12B	S03-E04P
	S03-B01X	G01N,G11B-005/84	T03-A02C5A
G01K-001-015	S03-B01	G01N,G11B-011,-013	T03-D01A8J
G01K-005	S03-B01D	G01N,H01J-009/20-223	V05-L02H
G01K-007/01,30-40	S03-B01C	G01N-001	S03-E13
G01K-007/02-14	S03-B01A		S03-E13F
G01K-007/18,20	S03-B01B	G01N-001,005-007, 021-037	S03-E
G01K-007/22,	V01-A02A7A		S03-E13A
G01K-007/22,24	S03-B01F	G01N-001/04-08	S03-E13B
G01K-013	S03-B01E	G01N-001/10-20	S03-E13B1
G01K-015	S03-B01H1	G01N-001/12,14	S03-E13B2
	S03-B01H3	G01N-001/16-20	S03-E13C
G01K-017,019	S03-B02	G01N-001/22-26	S03-E13D
G01L	S02-F	G01N-001/28-44	S03-F02
G01L-001	S02-F01	G01N-003	S03-F
G01L-001/02-08	S02-F01A	G01N-003,009-019, 037	S03-F02C
G01L-001/10-14	S02-F01B	G01N-003/08-18	S03-F02D
G01L-001/16	S02-F01E	G01N-003/20-24	S03-F02X
G01L-001/18-22	S02-F01C	G01N-003/26,28,62	S03-F02E
G01L-001/24	S02-F01G	G01N-003/30-38	S03-F02A
G01L-001/25-26	S02-F01X	G01N-003/40-54	S03-F02B
G01L-003	S02-F02	G01N-003/56-60	S03-E12B
G01L-005	S02-F03	G01N-005	S03-E12
G01L-005/03-10	S02-F03A	G01N-005,007	S03-F01
G01L-005/12,13,16,22,24,28	S02-F03B	G01N-009	S03-F01X
	S02-F03X	G01N-009/02-06, 30-36	S03-F01A
G01L-005/14,18-22,26	S02-F04A	G01N-009/08-28	S03-F03
G01L-007	S02-F04A1	G01N-011	S03-F03X
G01L-007/04,06	S02-F04A2	G01N-011/02-08	S03-F03A
G01L-007/08-14	S02-F04A9	G01N-011/10-16	S03-F04
G01L-007/16-24	S02-F04X	G01N-013/00-04	S03-E14H1
G01L-007-023	S02-F04	G01N-015/01	S03-F05C
G01L-007-027	S02-F04B	G01N-015/02	S03-E04
G01L-009	S02-F04B1	G01N-015/0205	S03-F05
G01L-009/02-06	S02-F04B2	G01N-015/02-05	S03-F05A
G01L-009/08-18	S02-F04J	G01N-015/04,05	S03-F06A
G01L-011/02	S02-F04C1	G01N-015/06	S03-F06
G01L-013	S02-F04C1A	G01N-015/06-14	S03-F06B
G01L-013,17	S02-F04C	G01N-015/08-14	S03-E02
G01L-013/00-06,15,17	S02-F04C3	G01N-015/1031,12,13	S03-F07
G01L-015	S02-F04E	G01N-017/00-04	S03-F08
G01L-019	S02-F04D1	G01N-019/02-04	S03-F09
G01L-021	S02-F04D	G01N-019/10	S03-E04
G01L-021,023	S02-F04D3	G01N-021	S03-E04R1
G01L-023	S02-F04F		V07-J
G01L-025,027	S02-J	G01N-021,G01M-011	S03-E04A5G
G01M	S02-J05	G01N-021/21-39	S03-E04A5L
G01M-001	S02-J06		S03-E04A4
G01M-003	S02-J06A	G01N-021/25-39	S03-E04A
G01M-003/04-24	S02-J06A1		S03-E04A1
G01M-003/16	S02-J06A5	G01N-021/27	S03-E04A5
G01M-003/20	S02-J06A3	G01N-021/31-39	S03-E04A5E
G01M-003/24	S02-J06B	G01N-021/33	S03-E04A5B
G01M-003/26-34	S02-J06X	G01N-021/35	S03-E04B5
G01M-003/36	S02-J08	G01N-021/41-45	S03-E04B
G01M-007	S02-J07	G01N-021/41-61	S03-E04C
G01M-009/00-08,10	S02-J04	G01N-021/47-53	S03-E04C2
G01M-011	V07-N02	G01N-021/51	S03-E04C1
G01M-013	S02-J03	G01N-021/53	

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G01N-021/55-57	S03-E04B1B	G01N-030,031	S03-E09
G01N-021/55-61	S03-E04B1	G01N-030/02-96	S03-E09C
G01N-021/59-61	S03-E04B1A	G01N-030/62-78	S03-E09C7
G01N-021/62-74	S03-E04D	G01N-030/66	S03-E09C7C
G01N-021/65	S03-E04D1	G01N-030/68	S03-E09C7D
G01N-021/75-83	S03-E04E	G01N-030/70	S03-E09C7E
G01N-021/85	S03-E04H	G01N-030/72	S03-E09C7B
G01N-021/86	S03-E04G	G01N-030/74	S03-E09C7A
G01N-021/87	S03-E04F3	G01N-031/02	S03-E09A
G01N-021/87-91	S03-E04F	G01N-031/10,12	S03-E09B
G01N-021/88-91	S03-E04F1	G01N-031/16-20	S03-E09D
	S03-E04F2	G01N-031/22	S03-E09E
G01N-022	S03-E05	G01N-033	S03-E14
G01N-022/02	S03-E05C	G01N-033,035	S05-C01
G01N-022/04	S03-E05A		S05-C09
G01N-023	S03-E06		S05-C
	S03-E06H2		S05-C01
G01N-023/04	V05-F08A		S05-C09
G01N-023/04,	V05-F04J		S05-C02
G01N-023/04,05	S03-E06B	G01N-033/02-15	S03-E14A
G01N-023/06-18	S03-E06A	G01N-033/15	S03-E14A1
G01N-023/18	S03-E06A1	G01N-033/18	S03-E14B
G01N-023/20-207	S03-E06C	G01N-033/20	S03-E14C
G01N-023/22-227	S03-E06D	G01N-033/22	S03-E14E1
G01N-024	S03-E07G		S03-E14E3
	S03-E07X	G01N-033/22,24	S03-E14E
G01N-024/00-14	S03-E07	G01N-033/24	S03-E14E7
G01N-024/08	S03-E07A	G01N-033/26-32	S03-E14F
	S03-E07C	G01N-033/34,36	S03-E14G
G01N-024/10	S01-E02A4	G01N-033/38	S03-E14D1
	S03-E07E		S03-E14D4
G01N-025	S03-E01	G01N-033/38-46	S03-E14D
G01N-025/02-18	S03-E01A	G01N-033/44-46	S03-E14D7
G01N-025/20-48	S03-E01C	G01N-033/48-98	S03-E14H
G01N-025/25-62	S03-E01B3		S03-E14L
G01N-025/50-72	S03-E01B	G01N-033/53-577	S03-E09F
G01N-027	S03-E02C5		S03-E14H
G01N-027/02-24	S03-E02	G01N-035	S03-E13D1
G01N-027/06-10,14-20	S03-E02B	G01N-035/00-10	S03-E15
G01N-027/12	S03-E02A	G01P	S02-G
G01N-027/22	S03-E02C1	G01P-003	S02-G01
G01N-027/22,24	S03-E02C	G01P-003/36-40	S02-G01A
G01N-027/24	S03-E02C3	G01P-003/42-60	S02-G01B
G01N-027/26-453	S03-E03A	G01P-003/44-495	S02-G01B1
	S03-E03B	G01P-003/50-60	S02-G01B9
	S03-E03C	G01P-005	S02-G02
	S03-E03X	G01P-005/01,18-22	S02-G02X
G01N-027/26-49	S03-E03	G01P-005/02-07, 14-175	S02-G02B
G01N-027/327	S03-E03C1	G01P-005/08-12	S02-G02A
G01N-027/447	S03-E03E	G01P-013	S02-H
G01N-027/60-70	S03-E10A8	G01P-015/00-16	S02-G03
	S03-E10A2	G01P-021, G01D, G12B	S02-G07
	S03-E10A	G01Q	V05-F01A5
	S03-E10A1	G01R,H01C-017	V01-A04H1
	S03-E10A1A	G01R,H01G-013	V01-B04C
	S03-E10A3	G01R,H01L,H01P-011	W02-A07B1
	S03-E10A5	G01R,H01Q-001	W02-B08A
G01N-027/72-90	S03-E11	G01R,H04B-003/46-48	W01-C08C
G01N-027/82-90	S03-E11A		W02-C01D
G01N-027/92	S03-E10C	G01R-001,015,035	S01-H
G01N-029	S03-E08	G01R-001/06-067	S01-H03B
G01N-029/02,16-28	S03-E08X	G01R-001/06-073	S01-H03
G01N-029/04-14	S03-E08A	G01R-001/073	S01-H03A

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G01R-001-009	T01-A	G01R-033	S01-E
G01R-011	S01-B	G01R-033/02-10	S01-E01
G01R-013	S01-C	G01R-033/032	S01-E01C
G01R-013/20-34	S01-C01	G01R-033/035	S01-E01A
G01R-015	S01-H07	G01R-033/06	S01-E01B
G01R-015/02-07	S01-H02	G01R-033/12-18	S01-E02X
G01R-015/20	S01-D01D1	G01R-033/12-64	S01-E02
G01R-017	S01-F	G01R-033/20-567	S01-E02A3
G01R-017/02-08, 20,22	S01-F09		S01-E02A8
G01R-017/10-18	S01-F01		S01-E02A9
G01R-019	S01-D01	G01R-033/20-64	S01-E02A
G01R-019/02-03	S01-D01A1	G01R-033/24-465	S01-E02A1
G01R-019/04	S01-D01A3	G01R-033/30,31	S01-E02A1A
G01R-019/04-12	S01-D01A	G01R-033/32-38	S01-E02A8A
G01R-019/14	S01-D01B	G01R-033/38-389	S01-E02A8E
G01R-019/145-155	S01-D01B1	G01R-033/48-58	S01-E02A2
G01R-019/165-17	S01-D01B5	G01R-033/56-567	S01-E02A2A
G01R-019/18	S01-D01C		S01-E02A8C
G01R-019/18-20	S01-D01C1A	G01R-035	S01-H01
G01R-019/18-20, 25-257	S01-D01C1	G01S	W06-A
G01R-019/22	S01-D01C5		W06-B01B1
G01R-019/25-257	S01-D01C1B		W06-B02E
G01R-019-029	S01-D		X22-E06
G01R-021,022	S01-D02	G01S-001	W06-A01
G01R-023	S01-D03	G01S-001/68	W06-A01C
G01R-023/06-09,12	S01-D03A	G01S-003	W06-A02
G01R-023/10	S01-D03B	G01S-003/02-74	W06-A02A
G01R-023/16-20	S01-D03C	G01S-003/78-789	W06-A02C
G01R-025	S01-D04	G01S-003/80-82,86,	W04-Y03G3
G01R-027	S01-D05	G01S-003/80-86	W06-A02E
G01R-027/02-22	S01-D05B	G01S-005	W06-A03
G01R-027/26	S01-D05A	G01S-007	W06-A04E9
G01R-027/28-32	S01-D05C	G01S-007,-007/28	W06-A04G5
G01R-029/02-033	S01-D06	G01S-007,-007/282	W06-A04G1
G01R-029/06	S01-D08A	G01S-007,-007/285-34	W06-A04G3
G01R-029/06,26	S01-D08	G01S-007,-007/292	W06-A04E5
G01R-029/08,10	S01-D07B	G01S-007,-007/40	W06-A04E3C
G01R-029/08-14	S01-D07	G01S-007,013	W06-A04
G01R-029/10	S01-D07B1	G01S-007,-013	W06-A04G
G01R-029/12,14	S01-D07A	G01S-007,-013,H01Q	W06-A04G7
G01R-029/26	S01-D08B	G01S-007,013/02-72	W06-A04A
G01R-031	S01-G	G01S-007,013/06-48	W06-A04A1
	V04-R06	G01S-007,013/50-64	W06-A04A2
G01R-031/02-06	S01-G04A	G01S-007,013/74-84	W06-A04B
	S01-G04C	G01S-007,015	W06-A05
G01R-031/02-07	S01-G04	G01S-007,015,H04R	W06-A05C7
G01R-031/08-11	S01-G05	G01S-007,017	W06-A06
G01R-031/12-20	S01-G03	G01S-007/00-51	W06-A06C
G01R-031/24,25,	V05-L07E	G01S-007/04-26	W06-A04C
G01R-031/24-25	S01-G02A	G01S-007/28-292	W06-A04D
G01R-031/24-26	S01-G02	G01S-007/295,298	W06-A04E3E
G01R-031/26-27	S01-G02B	G01S-007/295,298,40	W06-A04E3
G01R-031/28-3163	S01-G01C1	G01S-007/36	W06-A04E1C
G01R-031/28-318	S01-G01		W06-A05C8
G01R-031/28-3193	S01-G01A	G01S-007/36,38	W06-A04E1
	S01-G01B	G01S-007/40	W06-A04E3A
G01R-031/316-3163	S01-G01C	G01S-007/495	W06-A06C8
G01R-031/317	U21-C03D1	G01S-007/497	W06-A06C5
G01R-031/3177	S01-G01A5	G01S-007/51	W06-A06C3
G01R-031/327-333	S01-G10	G01S-007/537,-015	W06-A05C8
G01R-031/34	S01-G07	G01S-007/56-52,-015	W06-A05C3A
G01R-031/36	S01-G06	G01S-013	W06-A04H
	X16-H		W06-A04X

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G01S-013,-013/90	W06-A04J	G01V-003/08-11	S03-C02B
G01S-013/32-40,536, 82-84		G01V-003/12-40	S03-C02X
	W06-A04F	G01V-003/175	S03-C02F
G01S-013/89,90	W06-A04H3	G01V-005	S03-C03
G01S-013/91,92	W06-A04H7	G01V-005/20,22,26	S03-C06
G01S-013/93	W06-A04H1K	G01V-007-011	S03-C04
G01S-013/94	W06-A04H1	G01V-008/02	S03-C04A
G01S-013/95,G01W-001	W06-A04H2	G01V-008/10-26	S03-C08
G01S-015	W06-A05C7	G01V-009/04	S03-C08A
G01S-015/02	W06-A05D		S03-C08C
G01S-015/04-46	W06-A05D1	G01V-013	S03-C10
G01S-015/50-62	W06-A05D2	G01V-020	T01-J13
G01S-015/66	W06-A05H5	G01W	S03-D
G01S-015/74	W06-A05B	G01W,G08G	T07-G05
G01S-015/88	W06-A05H	G01W-001/14	S03-D02A
G01S-015/89	W06-A05H3	G02	P81
G01S-015/93	W06-A05H1K	G02B,H01J-029/89	V05-D07C5A
G01S-015/96	W06-A05H1C		V05-D07C5E
G01S-017/02	W06-A06D		V05-D07C5
G01S-017/06-46	W06-A06D1	G02B-001	P81-A
G01S-017/50-58	W06-A06D2		V07-F02
G01S-017/66	W06-A06H5	G02B-003	P81-A01
G01S-017/74	W06-A06B	G02B 3/14	P81-A01V1
G01S-017/88	W06-A06H	G02B-005	P81-A
G01S-017/89	W06-A06H3		V 07-F02
G01S-017/93	W06-A06H1K	G02B-003,-005	V07-F02A
G01S-017/95	W06-A06H2	G02B-003,006/32	V07-G04
	W06-A06H9	G02B-005	V07-F02B
G01S-017/96	W06-A06H9	G02B-005/32	V07-F02C
G01S-019	W06-A03A5	G02B-006	P81-A09
G01S-019/13-37	W06-A03A5R		V07-F01
G01S-019/03-12,41	W06-A03A5A		V07-F01A3A
G01S-019/42-51	W06-A03A5C		V07-F01A3C
G01T	S03-G		V07-G02
G01T-001	S03-G02		V07-G03
G01T-001/02-15	S03-G02A		V07-G10A
G01T-001/16-28	S03-G02B		V07-H04
G01T-001/18	S03-G02B2A	G02B-006,H01J-029/89	V05-D07C5C
G01T-001/18-185,22-28	S03-G02B2	G02B-006/04-08	V07-F01A1B
G01T-001/185	S03-G02B2C	G02B-006/06	V07-F01A1C
G01T-001/20-208	S03-G02B1	G02B-006/12	V07-F01A5S
G01T-001/24	S03-G02B2G	G02B-006/13	V07-F01A5A
G01T-001/28	S03-G02B2E	G02B-006/14	V07-F03
G01T-001/29	S03-G02C1	G02B-006/24-42	V07-G
G01T-001/29-40	S03-G02C	G02B-006/245,25	V07-G01
G01T-001/30	S03-G02C5	G02B-006/255	V07-G10B
G01T-001/32	S03-G02C1A	G02B-006/28	V07-G10E
G01T-001/34	S03-G02C1C	G02B-006/28,	V07-G11
G01T-001/36-40	S03-G02C3	G02B-006/30	V07-G10D
G01T-003	S03-G01C	G02B-006/42	U12-A01C
G01T-003,005	S03-G01		V07-G10C
G01T-005	S03-G01A	G02B-006/44	V07-F01B1A
G01V	S03-C		V07-F01B
G01V-001	S03-C01		V07-H
G01V-001/01	S03-C05		V07-K01
G01V-001/02-157	S03-C01A	G02B-006/44,46	V07-H04A
G01V-001/16-26	S03-C01B	G02B-007	P81-A
G01V-001/28-37	S03-C01X		P81-T01
G01V-001/38-393	S03-C01C1	G02B-009 -015	P81-A01
G01V-001/38-40	S03-C01C	G02B-017	P81-A
G01V-001/40	S03-C01C5	G02B-019	P81-A13
G01V-003	S03-C02	G02B-021	P81-A50C
G01V-003/02-06	S03-C02A	G02B-023	P81-A50A

G02B-025	P81-A50C	G03B-001,017	S06-B08B
G02B-026	P81-A50J	G03B-001,027	S06-B04
	V07-K	G03B-003	S06-B01B
G02B-026,H04N-		G03B-003,013	S06-B01
001/04-20	S06-D03	G03B-003,013,G11B	S06-B01B2B
G02B-026/02	V07-G15	G03B-003/02	S06-B01B1
	V07-K01B	G03B-005	S06-B01E
G02B-026/06	V07-K02	G03B-007	S06-B02A
G02B-026/08,10	V07-K05		S06-B02B
G02B-027/10	V07-G10E		S06-B02C
G02B-027/56	V07-G11		W04-M01D5C
G02C	P81-A50G	G03B-007,009	S06-B02
	X27-A02D	G03B-007/26	S06-B08C
G02C,H04R-025	W04-Y05A5	G03B-009	W04-M01C7
G02F	P81-A50J		W04-M01C8
G02F,G02B-026	V07-K	G03B-011	W04-M01C3
G02F,H04B-010	W02-C04A6	G03B-011,H01L-027, H10B	W04-M01C3E
G02F,H04N-005/74,-9/31	W04-Q01B	G03B-013	S06-B01A
	W04-Q01E7		W04-M01D
G02F-001	V07-K01A		W04-M01D3C
	V07-K01C	G03B-015/03-05	S06-B03
	V07-K10	G03B-015/04	S06-B03B
	W04-Q01B5	G03B-015/05	S06-B03A
	T03-B02B7E	G03B-021,023	S06-B06
	V07-K01C2	G03B-021/56-62	W04-Q01F
	V07-K01C1		W04-Q01F5
	V07-K01	G03B-027	S06-B04A
	V07-K02	G03C	P83
	W02-C04A5A	G03D-H	P84
G02F-001/03	U14-K04	G03F	V05-F08C
G02F-001/09	V07-K03	G03F-007	U11-A06
G02F-001/13	U14-K01		V04-R01A
G02F-001/133	U14-K01A	G03F-007/004	V04-R01A1
G02F-001/133,	U14-K01A2C	G03F-007/16	U11-C04A1B
G02F-001/133,134	U14-K01A1	G03F-007/20	U11-C04B3
G02F-001/1335	U14-K01A1C		U11-C04B1
G02F-001/1337	U14-K01A1A		U11-C04B2
G02F-001/1339	U14-K01A1D		U11-C04C
G02F-001/1341	U14-K01A1J		U11-C04E1
G02F-001/1343	U14-K01A1B	G03F-007/20-24	V04-R12
G02F-001/1345	U14-K01A4B	G03F-007/213	U11-C04E1A
G02F-001/135	U14-K01A2D	G03F-007/30	U11-C04A1C
G02F-001/136	U14-K01A2	G03F-007/32	U11-A11
	U14-K01A2B	G03F-007/36	U11-C04A1D
	U14-K01A2A	G03F-007/38,40	U11-C04A1A
G02F-001/137	U14-K01A1G	G03F-009	V04-R10
G02F-001/15	U14-K02	G03G	S06-D/K
G02F-001/153,155,157,161	U14-K02A	G03G-005	S06-E01
G02F-001/163	U14-K02B	G03G-005,013/04,015/04	S06-E03G
G02F-001/167	U14-K03	G03G-005/04-09	S06-E01A
G02F-001/23	V07-K04	G03G-005/06-07	S06-E01A1
G02F-001/29-33	V07-K05	G03G-005/08	S06-E01A2
G02F-001/313,025	U12-A02C3	G03G-005/09	S06-E01A3
G02F-001/35-39	V07-K10B	G03G-005/10,14	S06-E01B
G02F-003	V07-K06	G03G-005/12,013/01,	
G02F-007,H01L-039, H01L-060		015/01	S06-K01
	U21-A03G	G03G-005/16,013/04,015/04,	
G03B	P82	G03G-009	S06-E04C
G03B,G03G	S06-B04A1	G03G-009,013/06, 015/06	S06-E04A9
G03B,H04N-005/225	W04-M01C	G03G-009,013/06-10,	
G03B-001	S06-B04B	G03G-009,013/08-12,	
	S06-B08A	G03G-009/08-10	S06-E04C1
		G03G-009/08-10,013/08-09,	

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G03G-009/12-14	S06-E04C2	G04C,G04G	S04-B
	S06-E04B	G04C-001,003/14, 003/16,010	
G03G-009/16	S06-E04C9		S04-B01
G03G-013,015	S06-E06D	G04C-003/02-06	S04-B02
	S06-E	G04C-003/14,16	S04-B01B
G03G-013,015, 021/18	S06-E	G04C-009,G04G-003,5	S04-B03
G03G-013/02,015/02	S06-E02	G04C-010	S04-B01A
	S06-E02A	G04C-011,013,015,	S04-B01A
G03G-013/04,013/054	S06-E03X	G04C-017,019,	S04-B06
G03G-013/04,015/04	S06-E03G3	G04C-021,G04G-013	S04-B05
	S06-E03A	G04C-023,G04G-015	S04-C
	S06-E03B	G04D	S04-D
	S06-E03D	G04F-001-005	S04-C09
	S06-E03E1	G04F-007-013	S04-C03
	S06-E03F	G04G,G11B,	W04-E04C
	S06-E03G3	G04G,G11B,H04N	W04-E04C
	S06-E03G1	G04G-007	S04-B06
G03G-013/04,015/04, 015/043		G04G-009,011	S04-B04
	S06-E03E	G05B	T06
G03G-013/04,015/041	S06-E03C	G05B,G06F,G07F	T05-H08C
G03G-013/04-05,015/04-05			T05-H08C1
	S06-E03	G05B-001	T06-A01
G03G-013/06,015/06	S06-E04A1	G05B-005,-006	T06-A02
	S06-E04A2	G05B-007,-009	T06-A03
G03G-013/10-11,015/10-11		G05B-011	T06-A06
	S06-E04B	G05B-011/01	T06-A06A
G03G-013/14-18,015/14-18		G05B-011/06-12	T06-A06A1A
	S06-E05	G05B-011/14-18	T06-A06A1D
G03G-013/20,015/20	S06-E06	G05B-011/26-30,32	T06-A06A2
G03G-015,021/02	S06-K07C1	G05B-011/36-42	T06-A06A9
G03G-015,021/04	S06-K07	G05B-011/44-60	T06-A06B
G03G-015/04,015/054	S06-E03X	G05B-013	T06-A05
G03G-015/23,021	S06-K02A	G05B-015	T06-A07A
G03G-015/36	S06-K07A4	G05B-017	T06-A07B
G03G-016,019	S06-E07	G05B-019/00,02	T06-A04
G03G-017	S06-E08	G05B-019/04	T06-A04B
G03G-021	S06-K06	G05B-019/042-16	T06-A04B1
	S06-K02	G05B-019/18	T06-A04A
	S06-K04	G05B-019/19,401,402,	
G03G-021/06,021/08	S06-K06B	G05B-019/21-39	T06-A04A1
G03G-021/10,021/12	S06-K06C2	G05B-019/40	T06-A04A9
G03G-021/14	S06-K07A	G05B-019/4069	T06-A04A6
G03G-021/20	S06-E01D	G05B-019/408-4099	T06-A04A4
G03H	V07-M	G05B-019/414,4155	T06-A04A2
G04	S04-C07	G05B-019/41-4105	T06-A04A5
	S04-E	G05B-019/418	T06-A04A2A
G04B	S04-A		T06-A04B7
G04B-001,013-018	S04-A01	G05B-019/42-427	T06-A04B5
G04B-003/02-06	S04-B02A	G05B-019/43,44,46	T06-A04B3
G04B-003-011,027	S04-A03	G05B-021	T06-A10
G04B-019/02,019/28-34,		G05B-023	T06-A08
G04B-019/04-21	S04-A02A	G05B-024	T06-A20
G04B-019/22-26	S04-A02B	G05D	T06-B
G04B-019-025	S04-A02	G05D-001	T06-B01
G04B-021/08,047/04	S04-B05A		T07-D
G04B-025/02-04	S04-B07	G05D-001/02,03	T06-B01A
G04B-025/06	S04-B08		T07-D01
G04B-029-033	S04-A05	G05D-001/04-08	W06-B03F
G04B-037/22	S04-A04B	G05D-001/04-08,12	T06-B01B
G04B-037-039	S04-A04	G05D-001/10	T06-B01X
G04B-037-039,043	S04-A04A2	G05D-001/12	W07-A01C
G04B-043	S04-A04A1	G05D-001/14	X22-X12
G04B-045-049	S04-A09	G05D-003	T06-B02

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G05D-003/10	T06-B02A	G06F-001/18	T01-L01
G05D-003/12-20	T06-B02B	G06F-001/20	T01-L02A
G05D-005	T06-B03	G06F-001/26-32	T01-L01
G05D-007	T06-B04	G06F-001/30	T01-L01B
G05D-007/01	T06-B04A	G06F-003	T01-C
G05D-007/03	T06-B04X	G06F-003/02	T01-C02
G05D-007/06	T06-B04B	G06F-003/023	T01-C02A
G05D-009	T06-B05		T04-F01
G05D-011	T06-B08	G06F-003/023-027	T01-C02A1
G05D-011/02	T06-B08A	G06F-003/03	T01-C02B
G05D-011/03-12	T06-B08A9	G06F-003/033	T01-C02B1
G05D-011/13	T06-B08A1	G06F-003/05	T01-C08
G05D-011/16	T06-B08X	G06F-003/06	T01-C01
G05D-013/02-06	T06-B09	G06F-003/09	T01-C05
G05D-013/08-60	T06-B09A	G06F-003/12	T01-C05A
G05D-013/62	T06-B09B	G06F-003/13	T01-C05B
G05D-015	T06-B10	G06F-003/13,	S06-K99E
G05D-016/02,20	T06-B11	G06F-003/14	T01-C04
G05D-016/04-12	T06-B11A	G06F-003/147	T01-C04B
G05D-016/14-18	T06-B11X	G06F-003/153	T01-C04A
G05D-017,-019	T06-B12	G06F-005	T01-D
G05D-021	T06-B06		T01-D01
G05D-022,024,025	T06-B07		T01-D01A
G05D-023	T06-B13		T01-D09
G05D-023/01-13	T06-B13A	G06F-005/01	T01-D03
G05D-023/185	T06-B13X	G06F-005/06	T01-D04
G05D-023/19	T06-B13B	G06F-007	T01-E
G05D-023/20-26	T06-B13B1	G06F-007/06-36	T01-E01
G05D-023/27-275	T06-B13B9	G06F-007/10-12	T01-E01B
G05D-023/30-32	T06-B13B2	G06F-007/38,40,48	T01-E02
G05D-027	T06-B14	G06F-007/42,50	T01-E02A
G05D-029	T06-B20	G06F-007/44,52	T01-E02B
G05D-105/05	X25-D01	G06F-007/48,49,544,56	T01-E02X
	X25-D02	G06F-007/58	T01-E04
G05F	U24-E	G06F-007/60-72	T01-E03
G05F-001/10	U24-E02	G06F-009	T01-F
G05F-001/12-455	U24-E02A		T01-H07C3E
G05F-001/46-62	U24-E02B	G06F-009/04-06	U21-C03B9
G05F-001/625-656	U24-E02C	G06F-009/22	T01-F01
G05F-001/66	U24-E02D	G06F-009/24	T01-F01B
G05F-001/67	U24-E02D1	G06F-009/26	T01-F01C
G05F-001/70	U24-E02D2	G06F-009/28	T01-F01A
G05F-003	U24-E01	G06F-009/30-318	T01-F03
G05F-005	U24-E03	G06F-009/32-36	T01-F03A
G05F-007	U24-E04	G06F-009/38	T01-F03B
G05G	T06-C	G06F-009/40-42	T01-F04
G05G-001,-003	T06-C01	G06F-009/44	T01-F05
G05G-005	T06-C02		T01-F07
G05G-007,-009,-011,-13	T06-C03	G06F-009/445	T01-F01B
G05G-007,-011	T06-C03A		T01-F05B
G05G-009,-013	T06-C03B	G06F-009/45	T01-F05A
G05G-015-025	T06-C09	G06F-009/455	T01-F05G3
G06-007/30-46	T02-A04B5	G06F-009/46	T01-F02
G06C	T01-A		T01-F05G5
G06D	T01-B	G06F-011	T01-G
G06E	T01-M06D		T01-G11X
	T02-A03B	G06F-011/08	T01-G01A
G06F,G11B,H04B,H04N	W03-G03A1	G06F-011/10	T01-G01A1
	W03-G06	G06F-011/14-20	T01-G03
G06F-001/02	T01-J17	G06F-011/16	T01-G05B
G06F-001/04-14	T01-K	G06F-011/22	T01-G02
G06F-001/08	T01-K01	G06F-011/24	T01-G02B
G06F-001/16	T01-L02	G06F-011/25	T01-G

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G06F-011/263	T01-G07A	G06F-018/15	T04-D03
G06F-011/267	T01-G02A1		T01-J03
G06F-011/27	T01-G02A2B	G06F-018/20	T04-D04
G06F-011/277	T01-G02A2C		T01-J10B2
G06F-011/30	T01-G05C	G06F-018/21	T01-J10B2A
G06F-011/34	T01-G05C1	G06F-018/211	T01-J10B2
G06F-012	T01-H	G06F-018/2111	T01-J16C4
G06F-012,G11C,	W04-P01C8	G06F-018/2113	T01-J04B2
G06F-012/02-04	T01-H01	G06F-018/2115-2131	T01-J04B1
G06F-012/06	T01-H01A	G06F-018/2132, 2133	T01-J04B
G06F-012/08-12	T01-H03A	G06F-018/2134-2136	T01-J04D
	T01-H03B	G06F-018/2137	T01-J04C
G06F-012/14	T01-H01C2	G06F-018/214	T04-D04
	T01-H01C1		T01-J10B2
G06F-012/16	T01-H01C3	G06F-018/22	T04-D04
	T01-H01C4		T01-J10B2A
G06F-013	T01-H	G06F-018/23-232	T04-D04
	T01-N01D	G06F-018/2321	T01-J03
G06F-013/10	T01-H05		T04-D04
G06F-013/12	T01-H05A	G06F-018/23211	T01-J04
G06F-013/14	T01-H05B		T04-D04
G06F-013/16-18	T01-H05B1	G06F-018/23213	T01-J04
G06F-013/20-34	T01-H05B2		T04-D04
G06F-013/36-378	T01-H05B3	G06F-018/2323	T01-J04
G06F-013/38	T01-H07		T04-D04
G06F-013/40	T01-H07A	G06F-018/2325	T01-J04C
G06F-013/42	T01-H07B		T04-D04
G06F-015	T01-J	G06F-018/2337	T01-J16B
	S05-D06		T04-D04
G06F-015/02	T01-J01	G06F-018/24-28	T01-J16C3
G06F-015/16	T01-M02	G06F-018/30	T01-J10B2
	U11-G	G06F-018/40	T01-J20B1
G06F-015/18	T01-J16		T01-J12B
	U21-C03B1B	G06F-019/00	T01-J
G06F-015/76	T01-M		T01-J07B1
	T01-M02C3	G06F 21/76	T01-F06
G06F-015/78	T01-M01	G06F 123/00	T01-J05B1
G06F-015/80	T01-M02C		T01-J10B2
G06F-015/82	T01-M03	G06F 123/00	T01-J05B2
G06F-017	S05-G02G1	G06F 123/02	T01-J05B2
G06F-017,-163,-171	T01-J07D	G06F-101/00	T01-J17
	T01-J07D3	G06F-151, 153, 155	T01-J05A
G06F-017,-165	T01-J07D3A	G06F-157/00	T01-J05A1
G06F-017/10	T01-J04	G06F-159/00	T01-J06A
G06F-017/11-13	T01-J04A	G06F-161/00	T01-P02
G06F-017/14	T01-J04B	G06F-163, 165	T01-J06B
G06F-017/14,H03H-017	W04-Y03G1	G06F-167/00	T01-J
G06F-017/15	T01-J04B2		T01-J07
G06F-017/16	T01-J04C	G06G	T02-A
G06F-017/17	T01-J04D	G06G-001	T02-A01
G06F-017/18	T01-J03	G06G-003,005	T02-A02
G06F-017/20	T01-J18	G06G-007	T02-A04
	W04-V	G06G-007/02-10	T02-A04X
G06F-017/21-27	T01-J11A	G06G-007/12	T02-A04B
G06F-017/28	T01-J14	G06G-007/16-164	T02-A04B1
G06F-017/30	T01-J05B	G06G-007/18-188	T02-A04B2
	T01-J05C	G06G-007/20,24,25	T02-A04B3
G06F-017/40	T01-J07A	G06G-007/26,28	T02-A04B4
G06F-017/50	T01-J15	G06G-007/48	T02-A04A
G06F-018	T04-D	G06G-007/52,62-635	T02-A04A1
	T01-J10B2A	G06G-007/60-80	T02-A04A9
G06F-018/10	T04-D03	G06G-009,G06E	T02-A03
		G06J	T02-B

G06K	S06-K07	G06N-003/0464, 047	T01-J16C1
	T04-L	G06N-003/0475	T01-J16C4
	T04-X	G06N-003/048	T01-J16C1
G06K,G07F-007	T05-H02C5X		T01-J04
G06K,G11B-007,		G06N-003/049-065	T01-J16C1
G06K,G11B-023/40	T03-H02A3	G06N-003/08-0985	T01-J16C2
G06K-001,-007	T04-A	G06N-003/10	T01-J16C4
G06K-001/02-10,20-22,-007/02-06,-021			T01-J12B1
	T04-A01	G06N-003/12-126	T01-J16C4
G06K-001/12	T04-A02	G06N-005/00-047	T01-J16C
G06K-005	T04-B	G06N-005/048	T01-J16C
G06K-007	T04-A03X		T01-J16B
G06K-007/08	T04-A03A	G06N-007/00	T01-J16A
G06K-007/08,	T05-H02C5A		T01-J04E
G06K-007/08-14	T04-A03	G06N-007/01	T01-J16A
G06K-007/10-14	T04-A03B		T01-J04E
	T05-H02C5B	G06Q	T01-J05A
G06K-009	T04-D		T01-N01A
G06K-009,-011	T04-F04	G06Q-010	T01-J05A1
G06K-009/18	T04-D01		T01-J05A2
G06K-009/20-34	T04-D02		T01-N01A1
G06K-009/24	T04-D02A		T01-N01A2
G06K-009/36-60	T04-D03	G06Q-010/04	T01-J05A2C
G06K-009/40	T04-D03A		T01-N01A2F
G06K-009/48,52	T04-D03B	G06Q-010/047	T01-J05A
G06K-009/62-82	T04-D04		T01-N01A
G06K-011	T04-M		T01-J21C
G06K-011/02-04	T04-E	G06Q-010/06	T01-J05A2B
G06K-011/06-20	T04-F		T01-N01A2H
	T04-F02B2	G06Q-010/063	T01-J05A2C
	T04-F02C		T01-N01A2C
G06K-011/18	T04-F02B1A	G06Q-010/0631	T01-J05A2B
G06K-011/18-20	T04-F02A1		T01-N01A2H
	T04-F02B3	G06Q-010/0633	T01-J05A2B
	T04-F05		T01-N01A2B
G06K-013	S06-K03A	G06Q-010/0635	T01-J05A2F
	T04-J		T01-N01A2J
G06K-015	S06	G06Q-010/0637	T01-J05A2F
G06K-019	T04-C		T01-N01A2E
	T05-H02C5C	G06Q-010/0639	T01-J05A2H
G06K-019/07	W02-C02G7		T01-N01A2H
G06K-019/07-077	T04-K	G06Q-010/067	T01-J05A2A
	T04-K01		T01-N01A2H
G06K-019/12	T04-C01	G06Q-010/08	T01-J05A2D
G06K-019/14-16	T04-C02		T01-N01A2B
G06M-001,-003	T05-B	G06Q-010/083	T01-J05A2D
G06M-003	T05-B01		T01-N01A2B
G06M-007	T05-A01	G06Q-010/0831	T01-J05A2D
G06M-007-011	T05-A		T01-N01A2B
G06M-009-011	T05-A02		T01-N01A1
G06N-003/00	T01-J13A	G06Q-010/0832	T01-J05A2D
G06N-003/004-008	T01-J13A		T01-N01A2B
G06N-003/02	T01-J16C1	G06Q-010/0833	T01-J05A2D
G06N-003/04	T01-J16C1		T01-N01A2B
G06N-003/042	T01-J16C1	G06Q-010/0834	T01-J05A2D
G06N-003/043	T01-J16C1		T01-N01A2B
	T01-J16B	G06Q-010/0835-0837	T01-J05A2D
G06N-003/044	T01-J16C1		T01-N01A2B
G06N-003/0445	T01-J16C1	G06Q-010/087	T01-J05A2F
	T01-J05B		T01-N01A2B
G06N-003/045	T01-J16C1	G06Q-010/0875	T01-J05A2D
G06N-003/0455	T01-J16C1		T01-N01A2B
	T01-D02		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G06Q-010/10	T01-J05A2 T01-N01A2	G06Q-040/08	T01-J05A2E T01-N01A2J
G06Q-010/101	T01-J05A2D T01-N01A2B	G06Q-040/10	T01-J05A3 T01-N01A2L
G06Q-010/105-1053	T01-J05A2H T01-N01A2H	G06Q-040/12	T01-J05A1 T01-N01A1
G06Q-010/1057	T01-J05A2H T01-N01A2H	G06Q-050	T01-N01A2
G06Q-010/107	T01-N01C	G06Q-090/00	T01-J05A T01-N01A1
G06Q-010/109	T01-J05A2H T01-N03A3	G06T	T01-J10
G06Q-010/1091	T01-J05A2H T01-N01A2H T01-N03A3	G06T-003/40-60	T01-J10B3A
G06Q-010/1093	T01-J05A2H T01-N03A3	G06T-009/00-40	T01-J10D
G06Q-020	T01-N01A1	G06T-011	T01-J10C
G06Q 20/18	T01-N01A1 T05-H04	G06T-015/00-70, 17/00-17/50	T01-J10C4
G06Q-030	T01-N01A2A	G06T-03/00-60	T01-J10B3
G06Q-030/01	T01-J05A2H T01-N01A2B	G06T-05/00-50	T01-J10B1
G06Q-030/012	T01-J05A2D T01-N01A2B	G06T-07/00-60	T01-J10B2A
G06Q-030/014	T01-J05A2D T01-N01A2H	G06T-13/00	T01-J10C5
G06Q-030/015	T05-L01F T01-J05A2D T01-N01A2H	G06V-010/10	T04-D02
G06Q-030/016-018	T01-J05A2D T01-N01A2H	G06V-020/00	T04-D04
G06Q-030/02-0201	T01-J05A2M T01-N01A2C	G07	T05
G06Q-030/0202	T01-J05A2F T01-N01A2C	G07B	T05-C
G06Q-030/0203-0207	T01-J05A2M T01-N01A2C	G07B-001-011	T05-C01
G06Q-030/0208-0234	T01-J05A2F T01-N01A2C	G07B-011,G07C-009	T05-D01A1
G06Q-030/0235	T01-J05A2M T01-N01A2C	G07B-013,-015	T05-C03
G06Q-030/0238	T01-J05A1 T01-N01A2C	G07B-015,G07C-009	T05-D02
G06Q-030/0241-0273	T01-J05A2M T01-N01A2C	G07B-015/00	T07-A03A X22-X07
G06Q-030/0279	T01-J05A2F T01-N01A2C	G07B-015/01	T07-A03E
G06Q-030/0282	T01-J05A2M T01-N01A2C	G07B-017	T05-C05
G06Q-030/0283	T01-J05A2F T01-N01A2C	G07C	W06-B01B6
G06Q-030/06-0645	T01-J05A2F T01-N01A2A	G07C-001	T05-G03
G06Q-040	T01-J05A1 T01-N01A	G07C-001/30	T05-G03A
G06Q-040/02	T01-J05A1 T01-N01A1	G07C-001-007	T05-G
G06Q-040/03	T01-J05A1 T01-N01A1	G07C-003	T05-G02
G06Q-040/04	T01-J05A2F T01-N01A2F	G07C-005	T05-G01
G06Q-040/06	T01-J05A2F T01-N01A2F	G07C-009	T05-D
		G07C-009,G07B-011	T05-D01A
		G07C-011	T05-E
		G07C-013,-015	T05-F
		G07D	T05-K01 T05-K02
		G07D-005,-007	T05-J
		G07D-009	T05-L
		G07F	T05-H
		G07F,H04N-007/10,173	W03-A16C5J
		G07F,H04N-007/173	W02-F10J W02-F10N5
		G07F-003	T05-H03
		G07F-005	T05-H01
		G07F-007	T05-H02
		G07F-007/04	T05-H02A
		G07F-007/06	T05-H02E
		G07F-007/08-12	T05-H02C5A T05-H02C5B T05-H02C5C T05-H02C
		G07F-011	T05-H04
		G07F-013,-015	T05-H06
		G07F-017	T05-H05
		G07F-017/02-18	T05-H05C
		G07F-019	T05-L03

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G07F-17/30-38	T05-H05E	G08C,B64	W05-D07D
G07G-001	T05-L01	G08C,H02J-13/00	W05-D07F
G07G-001,H04L	T05-L01D	G08C,H04L	W05-D06F
G07G-001-005	T05-L	G08C-015	W05-D02
G08B	W05	G08C-017	W05-D06A1
G08B,H04N-007/18	W02-F01A5		W05-D06T
G08B-001	W05-A01	G08C-017/02, H04B 1/59	W05-D08G
G08B-003	W05-A02	G08C-017/02	W05-D06A1A
G08B-005	W05-A03		W05-D06G5
G08B-005/36-38	W05-A03A	G08C-017/02, H04B 1/59	
G08B-006	W05-A01A1		W05-D06A1A
G08B-007	W05-A04A		W05-D08G
G08B-007,009	W05-A04	G08C-017/04	W05-D06A1B
G08B-009	W05-A04C		W05-D06T1
G08B-013	W05-B01	G08C-017/06	W05-D06A1B
G08B-013,G11B-027	W04-J01C		W05-D06T5
G08B-013/02	W05-B01B	G08C-019	W05-D
G08B-013/04	W05-B01G	G08C-019,H04M-011	W05-D06G1
G08B-013/06-12	W05-B01B1	G08C-019/02-14	W05-D08A
G08B-013/14	W05-B01B2	G08C-023	W05-D06M
G08B-013/16	W05-B01C1	G08C-023,H04B-011	W05-D06A5
G08B-013/18-193	W05-B01C2	G08C-023/02	W05-D06A5
G08B-013/194-196	W05-B01C5		W05-D06M
G08B-013/20	W05-B01X	G08C-023/04	W05-D06A3
G08B-013/24	W05-B01A	G08C-023/06	W05-D06C
G08B-013/26	W05-B01A1	G08C-025	W05-D05
G08B-015	W05-B01D	G08G	T07
G08B-017	W05-B02	G08G-001	T07-A
G08B-017/02	W05-B02C		T07-H
G08B-017/06	W05-B02D	G08G-001,-001/014	T07-F
G08B-017/10	W05-B02A	G08G-001,-001/054	T07-A03C
G08B-017/103-107	W05-B02A1	G08G-001,G09F	T07-B05C
G08B-017/11	W05-B02A5		T07-B05E
G08B-017/11-113	W05-B02A3	G08G-001/002	T07-A01B1
G08B-017/117	W05-B02A5	G08G-001/015	T07-A01D
	W05-B05B4	G08G-001/016	T07-E
G08B-017/12	W05-B02B	G08G-001/02-048	T07-A01B
G08B-019	W05-B03	G08G-001/07-087	T07-C
G08B-021/02-08	W05-B07	G08G-001/087	T07-C07
G08B-021/10	W05-B08	G08G-001/09-096	T07-B
G08B-021/12-14	W05-B07L	G08G-001/095	T07-B05A
G08B-021/16	W05-B02A	G08G-001/0955	T07-B05A1
	W05-B07L	G08G-001/096	T07-B05A5
	W05-B08J	G08G-001/0965	X22-E14
G08B-021/18-24	W05-A	G08G-001/097	T07-C05
	W05-B	G08G-001/127	T07-A05B
G08B-023	W05-B04	G08G-001/14	T07-F
G08B-025	W05-B05	G08G-003	W06-C
G08B-025/06	W05-B05B1	G08G-005	W06-B
G08B-025/08	W05-B05B3		W06-A04H7
	W05-B05G1	G08G-015	W06-B01C8
	W05-B05G5	G09B	P85-A
G08B-025/10	W05-B05B2		W04-W
	W05-B05B4	G09B-003	P85-A07
	W05-B05G5	G09B-007	W04-W01
G08B-025/14	W05-B05	G09B-009	P85-A05A
G08B-026	W05-B05A5		W04-W07A
G08B-027	W05-B05A7	G09B-011	P85-A01C
G08B-029	W05-C	G09B-015	P85-A01J
G08B-029/04	W05-C01A	G09B-017	P85-A01C
G08B-029/06-08	W05-C01B	G09B-023-027	P85-A05
G08B-031	W05-C02C3		W04-W07C
G08C	W05-D	G09B-029	P85-A50E

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G09C	P85-C	G10L-013	W04-V02
G09D-001	P85-A50A		W04-V04C1
G09D-003	P85-A50C	G10L-015	W04-V01
G09F	P85-E		W04-V04A
	W05-E	G10L-015/26	W04-V04A6
G09F,H04M-001	W01-C01A2	G10L-017	W04-V04A3
G09F,H04N-005/74	W04-Q01K	G10L-019	W04-V05G
G09F,H05K	W05-E05G	G10L-019/02	W04-V05G5
G09F-007	P85-E01	G10L-019/04-113	W04-V05G3
G09F-009	W05-E01	G10L-019/12-135	W04-V05G3A
	W05-E02	G10L-019/16-22	W04-V05G
G09F-011	W05-E03	G10L-019/24	W04-V05G8
G09F-013	W05-E03	G10L-021	W04-V05
G09F-013/16	T07-B05G	G10L-021/02	W04-V05E
	X22-B03	G10L-021/04	W04-V05J
G09F-013/17	X22-B03	G10L-021/043-049	W04-V05J5
G09F-015 -017	P85-E01	G10L-021/055-057	W04-V05
	P85-T01	G10L-021/06-18	W04-V04
G09G	T04-H		W04-V05
G09G,G11B,H04B, H04N	W03-G05G	G10L-025	W04-V04
G09G-001	T04-H01		W04-V05
G09G-001/06-18	T04-H01A	G10L-025/78-84	W04-V04A1
G09G-001/20-28	T04-H01B	G11B	T03
G09G-001/28	T04-H01B1	G11B,A63	W04-X03A
G09G-003	T04-H03	G11B,H01J-037	T03-C03
	W04-M01D3C	G11B,H01L-039	T03-C07
G09G-003,-005	T04-H03D	G11B,H02M,H04B	W03-G02
G09G-003,H01J-017/36	V05-A01G	G11B,H04N-005/335,-005/781, 101	W04-M01B1A
G09G-003/04-19	T04-H03A		W04-B14
G09G-003/20-38	T04-H03B	G11B,H04N-005/781	W04-B14
G09G-003/28	T04-H03C4	G11B,H04N-005/84-85	W04-C
G09G-003/30-32	T04-H03C3	G11B,H04N-005/913	W04-F01L
G09G-003/36	T04-H03C2	G11B,H04N-007/173	W02-F10K
G09G-005/22-32	W03-A10C	G11B,H04N	W04-E04C5E
G10B	P86-A01C		W04-E20
	W04-U02C	G11B-003	W04-A
G10D-001 -003	P86-A03	G11B-003/02-42	W04-A03
G10D-007 -009	P86-A01A	G11B-003/44-56, 60,61	W04-A02
G10D-011	P86-A01C1	G11B-003/58,68-90	W04-A01
G10D-013	P86-A05	G11B-005	T03-A
G10D-015 -017	P86-A	G11B-005,H01L-039	T03-A01E
G10F	P86-A99		T03-A06K
G10G	P86-A30	G11B-005/02-09	T03-A06
G10G,G10H	W04-U07	G11B-005/024	T03-A06E
G10G-001/04,G10H	W04-U06	G11B-005/027	T03-A06A
G10H	W04-U		T03-A06B
G10H-001	W04-U04	G11B-005/03	T03-A06G
G10H-001/02-16	W04-U03	G11B-005/035	T03-A06D
G10H-001/18-30,34	W04-U04A	G11B-005/09	T03-A06C
	W04-U04J	G11B-005/10-115	T03-A03J7
G10H-001/32	W04-U04G		T03-A04A1D
G10H-001/36-42	W04-U04C	G11B-005/10-40	T03-A03
G10H-003	W04-U02		T03-A04A1
G10H-003,H04R	W04-U02A1	G11B-005/127	T03-A03B
G10H-005	W04-U01A		T03-A03J5
G10H-005,-007	W04-U01		T03-A04A1C
G10H-007	W04-U01C	G11B-005/127-153,33	T03-A03J1A
G10K	P86-E	G11B-005/133	T03-A03J1C
G10K-011/178	W04-V07	G11B-005/133-153	T03-A03J1
G10L	W04-V	G11B-005/187	T03-A03J3
G10L,G11B,H03M	W04-G01F	G11B-005/187-21	T03-A03J3A
G10L,H03M,	W02-C06C	G11B-005/23	T03-A03F1
G10L,H04R-025	W04-Y03G5		T03-A03J3C

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G11B-005/265-29	T03-A03A	G11B-007/0033	T03-B10C
G11B-005/31	T03-A03E	G11B-007/0037	T03-B10A
G11B-005/325	T03-A06E1	G11B-007/004-006	T03-B05
	T03-A03J1E		W04-C05
G11B-005/33-35	T03-A03C	G11B-007/0065	T03-B12
G11B-005/37	T03-A03C5	G11B-007/007-013	T03-B01F
G11B-005/39	T03-A03C3		W04-C01F
	T03-A03C9J	G11B-007/033	T03-B10C
G11B-005/40	T03-A03	G11B-007/037	T03-B10A
G11B-005/41	T03-A04B	G11B-007/08-10	T03-B02A
G11B-005/455	T03-A04A5	G11B-007/12-22	T03-B02B
G11B-005/465	T03-A04B1	G11B-007/125	T03-B02A7
G11B-005/48-60	T03-A05		T03-B02B1
G11B-005/49,50	T03-A05C3	G11B-007/125,135	T03-B02B7E
G11B-005/49,50,54	T03-A05C	G11B-007/13	T03-B02B3
G11B-005/53	T03-A05D	G11B-007/135	T03-B02B5
G11B-005/54	T03-A05C5		T03-B02B6
	T03-A05G		T03-B02B7
G11B-005/55	T03-A05B	G11B-007/24	T03-B01
G11B-005/55,584,596	T03-A05B1A	G11B-007/26	T03-B01E
G11B-005/56	T03-A05A3	G11B-009	T03-C
G11B-005/58	T03-A05A	G11B-009,H01J-037	T03-C05
	T03-A05C1	G11B-009-013,	W04-D
G11B-005/584,596	T03-A05A1C	G11B-011,-013	T03-D
	T03-A05A1G		T03-A06N
G11B-005/588,-015/473	T03-A05A1D		W04-D
G11B-005/588,592	T03-A05A1A	G11B-015	T03-E
G11B-005/60	T03-A05C1A	G11B-015/02-03	T03-E05
G11B-005/627,-023/26	T03-A01H	G11B-015/04	T03-A07A1A
G11B-005/66	T03-A01F	G11B-015/05-093	T03-E05A
G11B-005/68-618	T03-A01A8C	G11B-015/087	T03-E05A1
G11B-005/68-718	T03-A01A7	G11B-015/093	T03-E05A3
	T03-A01A8		T03-E05A7
G11B-005/702	T03-A01A3	G11B-015/10	T03-E05B
G11B-005/704	T03-A01B1	G11B-015/26-295, 34-42	T03-E07
G11B-005/704,71,72	T03-A01B	G11B-015/30-32	T03-E06
G11B-005/706	T03-A01A1A	G11B-015/30-32, H02K	T03-E06A
	T03-A01A1C	G11B-015/43,44	T03-E04
G11B-005/706,714	T03-A01A1	G11B-015/46-54	T03-E03
G11B-005/708,71	T03-A01A5	G11B-015/467	T03-E03A7
G11B-005/71	T03-A01B5A	G11B-015/52	T03-E03A5
	T03-A01B5B	G11B-015/52,-019/28, -27/19-32	
G11B-005/712,714	T03-A01A1E		T03-J03A1
G11B-005/716,718	T03-A01A6	G11B-015/54	T03-E03A1
G11B-005/72	T03-A01B5C	G11B-015/60-64	T03-E02
	T03-A01B5D	G11B-015/60-70, -23/37	T03-E01
G11B-005/73	T03-A01B1	G11B-015/665	T03-E01C1
G11B-005/74-82	T03-A01C	G11B-015/66-67	T03-E01C
G11B-005/76	T03-A01C7	G11B-015/675-68	T03-E01B
G11B-005/78	T03-A01C3	G11B-015/68	T03-E01B5
G11B-005/80	T03-A01C5	G11B-017	T03-F01
G11B-005/82	T03-A01C1	G11B-019	T03-F02
G11B-005/84	T03-A02	G11B-019,H02K	T03-F02C1
G11B-005/842-848	T03-A02A1	G11B-019/22	T03-F02C5
G11B-005/85	T03-A02A3	G11B-019/24,28	T03-F02A1
G11B-005/852	T03-A02A5A	G11B-020	T03-P
G11B-005/855	T03-A02A	G11B-020/02-08	T03-P02
G11B-005/858	T03-A02A1	G11B-020/10	T03-P01D
G11B-005/86	T03-A07B	G11B-020/10-18	T03-P01
G11B-007	T03-B	G11B-020/12	T03-P01F
	W04-C		T03-B05F
G11B-007/002	T03-B10	G11B-020/12-16	T03-J03A3
G11B-007/003	T03-B10E		T03-J03A5

Appendix 3: IPC to EPI Manual Code Approximate Concordance

G11B-020/14-16	T03-J03C5	G11C-011/404,405,412	U14-A03B
G11B-020/14-16,-027	T03-J03A	G11C-011/408,415,418	U14-A08
G11B-020/14-16, H03K	T03-J03C	G11C-011/409,416,419,	U14-A07
G11B-020/18	T03-P01A	G11C-011/41	U14-A07C
G11B-020/24	T03-P05	G11C-011/411	U14-A03A1
	W04-G01D	G11C-011/412	U14-A03B1
G11B-021	T03-G	G11C-011/42	U14-A02A
	W04-V04E	G11C-011/42,	U14-A02
G11B-021,H02K	T03-G02A1	G11C-011/44	U14-A03G
G11B-021/08,10	T03-G02B	G11C-011/54	U14-B01
	T03-G02C	G11C-013/02,06	U14-A02B9
G11B-021/12,14,21	T03-G01	G11C-013/04	U14-A02B
G11B-021/24	T03-G02A5	G11C-013/04-08	U14-A02
G11B-023	T03-H	G11C-014	U14-A03B9
G11B-023/037	T03-E01A	G11C-015	U14-A05
G11B-023/06,07	T03-H01C	G11C-016/02	U14-A06C
G11B-023/08-107	T03-H01B	G11C-016/04	U14-A03B7
G11B-023/28	T03-H02A1C	G11C-016/06	U14-A07B
G11B-023/40	T03-H02A1A	G11C-016/06,	U14-A07
G11B-025	T03-M	G11C-017	U14-A06
G11B-025/04	T03-M01	G11C-017/10,12	U14-A06B5
G11B-025/06,08	T03-M02	G11C-017/16,14	U14-A06B1
G11B-027	T03-J03A5	G11C-017/18	U14-A07
	T03-J	G11C-019	U14-A01
	T03-K	G11C-019/02	U14-A01A
	W04-H	G11C-020/18	W04-G01F1
	W04-J	G11C-027	U14-B
G11B-027/02-06	T03-K01	G11C-027/02	U21-B03
	W04-H05E	G11C-029	U14-D
G11B-027/10-32	T03-J01	G12B	S01-J
	W04-H01		S01-J03
G11B-027/34	T03-K03		S02-G07C
	W04-J03	G12B-001,011-017	S01-J02
G11B-027/36	T03-K07	G12B-009/02-06	S01-J01
	W04-J07	G12B-011	S01-J02A
G11B-031	W04-K	G16B	S05, T01
G11B-033	T03-L	G16C	T01
	W04-L	G16H	S05, T01
G11B-033/08	T03-L05N	G16Y	T01
	T03-L05S	G16Z	T01
G11C	U14	G21B-001	X14-A03
G11C,H03,H04B	W04-G01B	G21C	X14-B
G11C-005	U14-C	G21C,D	X14-C
G11C-005/06-12	U14-C01	G21C-001/00	X14-A
G11C-005/14	U14-A09	G21C-001/02-03	X14-A01
G11C-007	U14-A07	G21C-001/04-28	X14-A02
G11C-007/06	U14-A07A	G21C-001/30-32	X14-A09
G11C-008	U14-A08B	G21C-003/02	X14-B04
	U14-A08	G21C-003/04-38	X14-B04X
G11C-008/02	U14-A08A	G21C-003/42-64	X14-B04A
G11C-011	U14-A03B5	G21C-005	X14-B05
G11C-011/02,08,12, 16,18,19	U14-A04	G21C-007	X14-C01
	U14-A04X	G21C-009-011	X14-B02
G11C-011/04,06	U14-A03X	G21C-013	X14-B01
G11C-011/13	U14-A01A1	G21C-015	X14-B03
G11C-011/14,-019	U14-A04A	G21C-017	X14-C02
G11C-011/14,15	U14-A03	G21C-019	X14-C03
G11C-011/21	U14-A03F	G21C-021	X14-C04
G11C-011/22	U14-A03X	G21D	X14-C05
G11C-011/23,26-30, 46,50,	U14-A03B4	G21D-003	X14-C05B
G11C-011/24	U14-A03A	G21D-005-007	X14-C05A
G11C-011/36,39,411	U14-A03B4A	G21F-003/02-035	X14-C05X
G11C-011/401-406		G21F-009	X14-D

G21G-004/02	V05-E06
G21H-001	X14-E
G21K	V05-E08
G21K,G03B	V05-M01C
G21K,H01J-037	V05-F01A
G21K-001/02-04	V05-E08C
G21K-001/06	V05-E08A
G21K-007	V05-F01A3

Section H

H01-031/03	U12-A02B5X
H01B	X12-D
	X12-E
H01B-001	X12-D01
H01B-001/02	X12-D01A
H01B-001/04,06	X12-D01C
H01B-001/08-10	X12-D01B
H01B-001/12	X12-D01C1
H01B-001/14-18	X12-D01F2
H01B-001/14-24	X12-D01F1
H01B-003	X12-E
H01B-003/02	X12-E01
H01B-003/04-06,10,14-16	X12-E01B
H01B-003/08	X12-E01X
H01B-003/12	X12-E01A
H01B-003/18	X12-E02
H01B-003/20-28	X12-E02A
H01B-003/30-46	X12-E02B
H01B-003/48-56	X12-E02X
H01B-005	X12-D02
H01B-005/02-12,16	X12-D02
H01B-005/14	X12-D02A
H01B-007/00	X12-D03
H01B-007/02	X12-D03D
H01B-007/04-06	X12-D03A2
H01B-007/08	X12-D03A1
H01B-007/10	X12-D03J
H01B-007/12,14	X12-D03K
H01B-007/16	X12-D03L
H01B-007/17-24	X12-D03B1
H01B-007/26,30	X12-D03B3
H01B-007/28-288	X12-D03H
H01B-007/29-295	X12-D03C
H01B-007/32	X12-D03B2
H01B-007/36	X12-D03C
H01B-007/38-40	X12-D03X
H01B-007/42	X12-D03C
H01B-009/00-06	X12-D04
H01B-009/02,-11/6-10	X12-D03E
H01B-011/00-16	X12-D05
H01B-011/18-20	X12-D05M
H01B-011/22	X12-D08
H01B-012	X12-D06
H01B-013,-015	X12-D07
H01B-013/012	X12-D07D
H01B-013/02-04	X12-D07C
H01B-013/04-08,16, 28-30,34	X12-D07X
H01B-013/06	X12-D07B
H01B-013/08-12,18-20	X12-D07B9
H01B-013/14-16	X12-D07B1
H01B-013/22-26,32	X12-D07A
H01B-013/30,-015	X12-D07X
H01B-015	X12-D07X
H01B-017	X22-X01B2
H01B-017, H01F-027/29	X12-C01C
H01B-017/00	X12-E03
H01B-017/02-30	X12-E03A
H01B-017/32-54	X12-E03X
H01B-017/56,60-66	X12-E03C

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01B-017/58	X12-E03C1	H01F-005,-027/28,30,32	X12-C01B
	X12-G04A3	H01F-006	V02-E02X1
H01B-019	X12-E04	H01F-006/02,06	X12-C05
H01C	V01-A	H01F-006/04	X12-C02A3
	X12-A	H01F-007	V02-E
H01C,H01C-008	V01-A02X		X12-C06
H01C-001	V01-A01	H01F-007/02-04	V02-E01
H01C-001,-010	V01-A03A	H01F-007/06	V02-E02
	V01-A03A1	H01F-007/08-18	V02-E02A
	V01-A03B	H01F-007/20	V02-E02X
H01C-001/01-016	V01-A01A	H01F-010/00-32	V02-B
H01C-001/02-036	V01-A01B	H01F-010/10-24	V02-A01
H01C-001/04	V01-A01D		V02-A02
H01C-001/14-148	V01-A01C	H01F-013	V05-D08A
H01C-003	V01-A02F		W03-A08A4
H01C-003,-008,-011,-13	V01-A02	H01F-017	V02-F01
H01C-003,-017,	V01-A04K5	H01F-019	V02-F02
H01C-007	V01-A02A7A	H01F-021	V02-F01D
	V01-A02C		V02-F02G
	V01-A02D	H01F-027	V02-F03
H01C-007,-017	V01-A04K3		V02-G02
	V01-A04K4	H01F-027/00,038/26, 30,36	V02-G02
H01C-007/02	V01-A02A5B		V02-F03A3
H01C-007/02,04,-017	V01-A04K1	H01F-027/02-06	V02-G02A3
H01C-007/04	V01-A02A5A		X12-C03
H01C-007/06	V01-A02H	H01F-027/02-06,33	X12-C02A
H01C-007/10-13	V01-A02B	H01F-027/08-10, 18-22	V02-F03A1
H01C-007/10-13,-017	V01-A04K2	H01F-027/08-22	V02-G02A1
H01C-010	V01-A03		X12-C02A1
H01C-010/04	V01-A03C8	H01F-027/12-14	X12-C02A2
H01C-011	V01-A02X	H01F-027/16	X12-C09
H01C-013	V01-A02G	H01F-027/23,40-42	V02-F03A2
H01C-013/02	V01-A02G1	H01F-027/24-26	V02-G02A2
H01C-017	V01-A04		V02-F03B
H01C-017,-017/30	V01-A04E	H01F-027/28-30	V02-G02B
H01C-017/06-20	V01-A04B		V02-F03X
H01C-017/22	V01-A04H3	H01F-027/29,33,40-42	V02-G02X
H01C-017/22-26	U14-H04B		V02-F03B1
	U14-H01C	H01F-027/32	V02-G02B1
H01C-017/28	V01-A04F		V02-F03D
H01F	V02	H01F-027/34-38	V02-G02d
	X12		X12-C04
H01F,H04B-015	V05-D08B	H01F-029	V02-G01A1
H01F,H04N-009/28,285	W03-A08A5A		V02-G01C1
H01F-001	V02-A	H01F-029,-030,-036, -38/16	X12-C01E
H01F-001/032	V02-A01		X12-C01F
H01F-001/04-08	V02-A01A	H01F-029,037	V02-F03C
H01F-001/09	V02-A01C	H01F-029/00,06	V02-G02C
H01F-001/10	U11-A04		V02-G02C1
H01F-001/10-117	V02-A01B	H01F-029/02-04	V02-F03C1
H01F-001/113-117	V02-A09		X12-C02B1
H01F-001/12	V02-A02	H01F-029/06-14	X12-C02B
H01F-001/14-28	V02-A02A		V02-F03C2
H01F-001/28	V02-A09		V02-G02C2
H01F-001/33	V02-A02C	H01F-030,038/08-10	V02-G01A
H01F-001/34-38	V02-A02B	H01F-037,038/08-10	V02-G01C
H01F-001/37-375	V02-A09	H01F-038/02-06	V02-G01A2
H01F-001/40	V02-A05	H01F-038/10,	X26-C01B1
H01F-001/42	V02-A03	H01F-038/12	V02-G01
H01F-001/44	V02-A04	H01F-038/14	V02-G01D
H01F-003	V02-C	H01F-038/18	V02-F02D
H01F-003,-027/24-26	X12-C01A		
H01F-005,-013	V02-D		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01F-038/20-24,28,32,34,40	V02-G01B	H01G-009/038	V01-B01B
H01F-038/20-40	X12-C01G		V01-B01D
H01F-038/42	V02-F02A	H01G-009/04	V01-B01A
H01F-041	T03-A04A1C	H01G-009/052	V01-B01A1
	V02-H	H01G-009/055	V01-B01A15
	X12-C01D	H01G-009/058	V01-B01A3
H01F-041/02	V02-H03	H01G-009/08-12	V01-B01B7
	V02-H04	H01G-009/12	V01-B01B7A
	X12-C01D1	H01G-009/16-22	V01-B01C
H01F-041/04-12	V02-H01	H01G-009/24	V01-B01G
	X12-C01D2	H01G-011	V01-B01D
H01F-041/14-16,22,28-34	V02-H02	H01G-013	V01-B01G
H01F-041/18	V02-H02B		V01-B04
H01F-041/20	V02-H02A	H01G-013,-013/02	V01-B04A1
H01F-041/24-26	V02-H02C	H01G-013,-013/04	V01-B04B7
H01G	X12-B	H01G-013	V01-B01G
	V01-B		V01-B04
H01G-002	V01-B	H01G-015	V01-B03C8
H01G-002/02-06	V01-B01B7	H01G-017	V01-B03C8
	V01-B03D7	H01H	V03-C
H01G-002/08	V01-B01X		X13-A
	V01-B03X		X13-B
H01G-002/10-12	V01-B01B7	H01H-001	V03-A09
	V01-B03D3	H01H-001,-011	V03-A
H01G-002/14	V01-B01F	H01H-001/02-04	V03-A01A
	V01-B03D3A		X13-A01A
	V01-B03E5	H01H-001/02-10	V03-A01
H01G-002/16	V01-B01F1	H01H-001/02-10, 011/04	X13-A01
	V01-B03E5	H01H-001/06-10	V03-A01B
H01G-002/18	V01-B01F5		X13-A01B
	V01-B03E5	H01H-001/12-48	V03-A02
H01G-004	V01-B03	H01H-001/12-66	X13-A02
H01G-004/005	V01-B03D1	H01H-001/64-66	V03-A03
H01G-004/008	V01-B03D1G	H01H-003,-009	V03-B09
H01G-004/01-012	V01-B03D1		X13-A03
H01G-004/015	V01-B03E1	H01H-003/02-12	X13-A03A
H01G-004/08-12	V01-B03A	H01H-003/14	V03-B01B
H01G-004/14-18	V01-B03B	H01H-003/14-18	V03-B01
H01G-004/224	V01-B03D3	H01H-003/16-18	V03-B01A
H01G-004/228-252	V01-B03D5	H01H-003/22-52	V03-B02
H01G-004/258	V01-B03H	H01H-003/22-58	X13-A03B
H01G-004/30	V01-B03C3A	H01H-003-009	V03-B
H01G-004/32	V01-B03C1	H01H-005	V03-B03A
H01G-004/35	V01-B03C7	H01H-005,-007	V03-B03
H01G-004/40	V01-B03C8		X13-A04A
H01G-004/42	V01-B03C7	H01H-005,-007,-40	X13-A04
H01G-005	V01-B02A	H01H-009/02-06	V03-B04A
H01G-005,007	V01-B02	H01H-009/02-14	V03-B04
H01G-005/38	V01-B02A5F	H01H-009/16-18	V03-B05
H01G-007	V01-B02B	H01H-009/20	V03-B06A
H01G-007/02	V01-B02B5	H01H-009/20-30	V03-B06
H01G-009	V01-B01	H01H-009/20-50	X13-A03C
H01G-009/008-12	V01-B01A7	H01H-009/30	V03-B06B
H01G-009/016	V01-B01A7	H01H-011	V03-C07
	V01-B01D		X13-A04F
H01G-009/02	V01-B01B3	H01H-011/04	V03-A08
H01G-009/022	V01-B01B	H01H-013	V03-C01A
H01G-009/025-032	V01-B01B1		X13-A04B2
H01G-009/035	V01-B01B5	H01H-013,-015	V03-C01
			X13-A04B
		H01H-013/02-48	V03-C01A3
		H01H-013/50-66	V03-C01A1
		H01H-013/68-76	V03-C01A2

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H01H-013/702-718	V03-C01A2	H01H-063-067	V03-E
H01H-015	V03-C01B	H01H-069	X13-D01C
	X13-A04B1		X13-D08
H01H-017,025	V03-C03	H01H-069,-085	X13-D01
H01H-019	V03-C02A	H01H-069-087	X13-D
	X13-A04C1	H01H-071,-079,-081,-87	X13-D09
H01H-019,-021	V03-C02	H01H-071/02-08	X13-D06
	X13-A04C	H01H-071/14-22	X13-D03
H01H-021	V03-C02B	H01H-071/24-38,50-74	X13-D04
	X13-A04C2	H01H-071/40	X13-D03A
H01H-023	V03-C04	H01H-071/50-74	X13-D04A
H01H-023,-027	X13-A04D	H01H-073	X13-D02A
H01H-025	V03-C03A	H01H-073-077	X13-D02
H01H-027	V03-C05	H01H-075	X13-D02B
H01H-029,-039	V03-C09	H01H-077	X13-D02C
H01H-031	X13-B01	H01H-083	X13-D05
H01H-033	X13-B09	H01H-085	X13-D01T
H01H-033/04-26	X13-B04	H01H-085/045	X13-D01T2
H01H-033/28-42	X13-B05	H01H-085/046	X13-D01T5
H01H-033/60-68	X13-B02	H01H-085/047	X13-D01T8
H01H-033/64	X13-B02B	H01H-085/048	X13-D01T6
H01H-033/66-668	X13-B02A		X13-D01T7
	X26-A03B	H01H-085/055-157,18	X13-D01A
H01H-033/70-99	X13-B03	H01H-085/16-62	X13-D01B
H01H-033/82-835,	X13-B03A	H01H-085/42	X13-D01T9
H01H-033/86-873, 91,95,985		H01J	V05
	X13-B03A		X26
H01H-035	V03-C06X	H01J-001	V05-M02
H01H-035/02-14	V03-C06C		V05-M03
H01H-035/18,42	V03-C06X	H01J-001/02-12	V05-M02
H01H-035/24-40	V03-C06D		V05-M03A
H01H-035-039	V03-C06	H01J-001/10	V05-M07
H01H-036	V03-C06A	H01J-001/12	V05-M03A
H01H-037	V03-C06B	H01J-001/13-28	V05-M02
H01H-037/36-44	V03-C06B9	H01J-001/14	V05-M02A
H01H-037/46-56	V03-C06B1	H01J-001/30	V05-M03A
H01H-039	V03-C09	H01J-001/304-316	U12-B03D
H01H-043	S04-C01	H01J-001/36-44	V05-M03E
	V03-C08	H01J-001/46-48	V05-M03C
H01H-045,-049,-050	V03-D06	H01J-001/54-78	V05-M01
H01H-045,-050/02-14	V03-D06A	H01J-001/63	V05-M01A
H01H-045-061	V03-D	H01J-003	V05-M04
H01H-047/02-20,-50/86-92		H01J-005	V05-M05
	V03-D01	H01J-005/02-16	V05-M05A
H01H-047/22-36	V03-D02	H01J-005/18	V05-M05E
H01H-049	V03-D06B	H01J-005/20-44	V05-M05C
H01H-050,-051	X13-A04G1	H01J-005/46	V05-M05B
H01H-050/02-14	V03-D06A	H01J-007/02-12	V05-M09
H01H-050/16-42	V03-D03A	H01J-007/18	V05-M06
H01H-050/16-84	V03-D03	H01J 007/24-28	V05-M07
H01H-050/44-46	V03-D03B	H01J-009	V05-L
H01H-050/54-62	V03-D03C		X26-A03
H01H-050/64-84	V03-D03D	H01J-009/02	V05-L01
H01H-051	V03-D04	H01J-009/04	V05-L01A1
H01H-051/22-26	V03-D04A1	H01J-009/08-10	V05-L01A1A
H01H-051/22-29	V03-D04A	H01J-009/12	V05-L01A5
H01H-051/28,29	V03-D04A5	H01J-009/14	V05-L01B
H01H-053	V03-D05E	H01J-009/16	V05-L01B1
H01H-053-061	V03-D05	H01J-009/18	V05-L01B
H01H-055	V03-D05B	H01J-009/20-233	V05-L02
H01H-057	V03-D05A	H01J-009/236	V02-H01
H01H-059	V03-D05C		W03-A08A1B
H01H-061	V03-D05D		

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H01J-009/24	V05-L03A X26-A03B	H01J-019,-021 H01J-019,H01L	V05-B V05-B05A8 V05-B05B7
H01J-009/26	V05-L03C X26-A03B	H01J-019/02-22	V05-B01B1
H01J-009/28	V05-L03A5 X26-A03	H01J-019/16	V05-B01B1A
H01J-009/30	V05-L03A X26-A03B	H01J-019/24	V05-B03B1 V05-B05A5 V05-B05B3
H01J-009/32	V05-L03C X26-A03B	H01J-019/24,H01L	V05-B05A5A
H01J-009/34	V05-L03C5 X26-A03B	H01J-019/28-38	V05-B05B5
H01J-009/36	V05-L03C1 X26-A03B	H01J-019/32	V05-B05B5B
H01J-009/28	V05-L03A5	H01J-019/32-34	V05-B03B5
H01J-009/36	V05-L03C1	H01J-019/32-36	V05-B01B5
H01J-009/38	V05-L03C5 X26-A03B	H01J-019/38	V05-B01B3 V05-B03B3 V05-B05B5A
H01J-009/385	V05-L03C5C X26-A03B	H01J-019/54-62	V05-B03B7
H01J-009/39	V05-L03C7A X26-A03B	H01J-019/62	V05-B01B7
H01J-009/395	V05-L03C5E X26-A03B	H01J-019/74	V05-B01B6
H01J-009/40	V05-L03C5 X26-A03B	H01J-021	V05-B01 V05-B03 V05-B05
H01J-009/42	V05-L07E1 X26-A03	H01J-021,H01L	V05-B05A3C
H01J-009/44	V05-L07E5 X26-A03	H01J-021/04	V05-B01A1 V05-B05A1A
H01J-009/46	V05-L07A X26-A03	H01J-021/10	V05-B01A3 V05-B01A7 V05-B05A1B
H01J-009/48	V05-L07C X26-A03	H01J-021/10,14	V05-B01A5
H01J-009/50	V05-L07E5 X26-A03	H01J-023	V05-C02 V05-C03 V05-C01
H01J-009/52	V05-L07E6 X26-A03	H01J-025	V05-C01C
H01J-011	V05-A	H01J-025/10-30	V05-C01B
H01J-013	V05-B03	H01J-025/34-49	V05-C01A
H01J-015	V05-A03 V05-A05	H01J-025/50-60	V05-E05
H01J-017	V05-A	H01J-027	V05-E
H01J-017,H02H	V05-A05	H01J-027,H01J-035,	V05-D
H01J-017/04,16	V05-A01D1C	H01J-029	V05-D07C
H01J-017/04-12	V05-A01C	H01J-029,-029/89	V05-D
H01J-017/06	V05-A01C3A	H01J-029,-031	V05-D06E
H01J-017/06-08	V05-A01C3	H01J-029,-043	V05-D07B5
H01J-017/10	V05-A01C1	H01J-029,H05K-009	V05-D05
H01J-017/12	V05-A01C2	H01J-029/02-45	V05-D01C3
H01J-017/16	V05-A01D1 V05-A01D3	H01J-029/04	V05-D05C V05-D05C5
H01J-017/16-18	V05-A01D	H01J-029/06	V05-D05E
H01J-017/18	V05-A01D1A V05-A01D3A	H01J-029/07	V05-D05D
H01J-017/20	V05-A01D5 V05-A01B1	H01J-029/07,-009/227	V05-D05D5A
H01J-017/49	V05-A01	H01J-029/18	V05-D05B3
H01J-017/64	V05-A03	H01J-029/18-34	V05-D05B
H01J-019	V05-B01B V05-B03B V05-B05A8X V05-B05B	H01J-029/20	V05-D05B1
		H01J-029/22,28	V05-D05B7
		H01J-029/26	V05-D05B5C
		H01J-029/28	V05-D05B7A
		H01J-029/30,32	V05-D05B5
		H01J-029/34	V05-D05F
		H01J-029/36,38	V05-D05A1
		H01J-029/36-45	V05-D05A
		H01J-029/39-45	V05-D05A5
		H01J-029/46-82	V05-D06
		H01J-029/48	V05-D06A1A
		H01J-029/48,50	V05-D06A1

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H01J-029/48-68	V05-D06A	H01J-037/244	V05-F04H
H01J-029/50	V05-D06A1B	H01J-037/248	V05-F05E5
	V05-D06A1C	H01J-037/252,256	V05-F01A4
	V05-D06A1E	H01J-037/26	V05-F01A1
H01J-029/52	V05-D06A2	H01J-037/26-295	V05-F01A1C
H01J-029/56	V05-D06A5		V05-F01A2
H01J-029/58-68	V05-D06A3	H01J-037/27	V05-F01A1A
H01J-029/74	V05-D06B5	H01J-037/28	V05-F01A1B
H01J-029/76	V02-F01A	H01J-037/30-317	V05-F05A
	V05-D06B1	H01J-037/30-36	V05-F05
H01J-029/80,81	V05-D06C	H01J-037/32-36	V05-F08D1
H01J-029/86	V05-D07A3	H01J-037/73-77	V05-F04A
	V05-D07A5	H01J-040	V05-G
	V05-D07A7A	H01J-040/06	V05-G01
H01J-029/86,87	V05-D07A	H01J-041	V05-K03
H01J-029/86,90	V05-D07A7	H01J-043	V05-K01
H01J-029/86-90	V05-D07	H01J-047	V05-H
H01J-029/87	V05-D07A1	H01J-049	V05-J01
H01J-029/88	V05-D07B3	H01J-049/04	V05-J01C
H01J-029/88,90	V05-D07B	H01J-049/10-18	V05-J01E
H01J-029/89	V05-D07C3	H01J-049/20,22	V05-J01G
	V05-D07C5C	H01J-049/26-42	S03-E10A
H01J-029/90	V05-D07B1		V05-J01A1
H01J-029/94	V05-D07E	H01J-049/30	S03-E10A1
	V05-D08	H01J-049/32	S03-E10A1A
H01J-031	V05-D	H01J-049/40	S03-E10A3
H01J-031/08-22	V05-D01	H01J-049/42	S03-E10A5
H01J-031/26-42	V05-D02	H01J-049/44-48	V05-J01A5
H01J-031/44,48-56	V05-D03	H01J-061/02	X26-A02
H01J-031/49-495	V05-D03C	H01J-061/04-10	X26-A02B
H01J-031/50-56	V05-D03B	H01J-061/12-22	X26-A02C
H01J-031/58-68	V05-D04	H01J-061/24-28, 50-56	X26-A02X
H01J-033	V05-J	H01J-061/30-35	X26-A02A2
H01J-035	V05-E01	H01J-061/36	X26-A02A1
H01J-035/06	V05-E01C	H01J-061/38-48	X26-A02D
H01J-035/08	V05-E01A	H01J-061/60-68	X26-A01A
H01J-035/10	V05-E01B	H01J-061/70-80	X26-A01E
H01J-035/10-14	V05-E01D	H01J-061/80-82	X26-A01D
H01J-035/12	V05-E01F	H01J-063	X26-A01A
H01J-035/14	V05-E01D1	H01J-063,H05B-031	X26-A01A
H01J-035/16	V05-E01E3	H01J-065	X26-A01B
	V05-E01E5		X26-A01C
H01J-035/16-18	V05-E01E	H01K	X26-B
H01J-035/18	V05-E01E1A	H01K,H04N-005/225	W04-M01H
H01J-035/22	V05-E01H7	H01K,H04N-005/74	W04-Q01B7
H01J-035/26	V05-E01H1	H01K-001	X26-B02
H01J-035/30	V05-E01H5	H01K-001/02-16	X26-B02A3
H01J-037	V05-F	H01K-001/18-24,40	X26-B02A2
H01J-037/02-06	V05-F04	H01K-001/26,50-70	X26-B02X
H01J-037/073	V05-F04A3	H01K-001/28-38, 42-48	X26-B02A1
H01J-037/075	V05-F04A1A	H01K-003	X26-B03
H01J-037/08	V05-F04A5	H01K-003/02-04	X26-B03A
H01J-037/10-153	V05-F04C	H01K-003/22-26	X26-B03B
H01J-037/12	V05-F04C1E	H01K-005-013	X26-B01
H01J-037/14-143	V05-F04C1A	H01L,G11C	T01-H01B3
H01J-037/145	V05-F04C1C	H01L,H01P-011,H05K	W02-A07A1
H01J-037/147	V05-F04C5	H01L,H04B-001/10	W02-G03B3C
H01J-037/16	V05-F04D1	H01L,H04N-005/33	W04-M01E1A
H01J-037/16-18	V05-F04D	H01L-021	U12-A01B2
H01J-037/18	V05-F04D3		U12-A02A3
H01J-037/20	V05-F04G		
H01J-037/22	V05-F04J		
H01J-037/24	V05-F05E5		

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H01L-021/027	U11-C04A1B	H01L-021/302,461	U11-C07A
	U11-C04C	H01L-021/304	U11-C06A1A
	U11-C04E1	H01L-021/304,306	U11-A10
	U11-C04A1H	H01L-021/306	U11-C06A1B
	U11-C04D	H01L-021/306,465	U11-C07B
	U11-C04E2	H01L-021/308,467,302	U11-C07D
	U11-C04F	H01L-021/31	U11-C05B9C
	U11-C04G	H01L-021/31,32,469,475	U11-C05B9
	U11-C04H	H01L-021/31,469,475	U11-C05B9A
	U11-C04B3		U11-C05B9B
	U11-C04B1	H01L-021/31,88,95	U11-C05D1
	U11-C04B2	H01L-021/311	U11-C07C3
H01L-021/027,033	U11-C04D1	H01L-021/312	U11-A06A
H01L-021/027,66	U11-C04A1E		U11-A08A1
H01L-021/06	U11-C01J3B	H01L-021/312,47	U11-C05A
H01L-021/078	U11-C06B	H01L-021/314,16,18	U11-A08A2
H01L-021/078,304	U11-C06A2	H01L-021/314,471	U11-C05B
H01L-021/18	U11-C01J3A	H01L-021/316	U11-C05B7
H01L-021/20,36	U11-C01J1	H01L-021/318	U11-C05B5
H01L-021/203	U11-C09A	H01L-021/32,26,475	U11-C05B3
H01L-021/203	U11-C01A9	H01L-021/321,311	U11-C02J3
	U11-C01A2	H01L-021/322	U11-C03J2B
	U11-C09D	H01L-021/324	U11-C03A
H01L-021/203,205, 3065			U11-C03J1
	U11-C09M		U11-C03J2A
H01L-021/203,363	U11-C01A	H01L-021/324,76	U11-C08C
H01L-021/205	U11-C09B	H01L-021/328,331	U13-D03B2
H01L-021/205,26	U11-C01B1	H01L-021/328,334	U11-C18
H01L-021/205,302	U11-C09C	H01L-021/329	U11-C18B1
H01L-021/205,365	U11-C01B	H01L-021/331	U11-C18A2
H01L-021/208,368	U11-C01H	H01L-021/331,335	U11-C18A
H01L-021/22,26	U11-C02J1A	H01L-021/332	U11-C18B2
	U11-C02J1C	H01L-021/334	U11-C18A3
	U11-C02J2	H01L-021/339	U11-C18B3
	U11-C02J5	H01L-021/34	U11-C01J4
	U11-C02J6	H01L-021/363,44	U11-C05B2
	U11-C02J7	H01L-021/38,42	U11-C02J1B
	U11-C02A	H01L-021/40,24	U11-C02X
H01L-021/26	U11-C03B	H01L-021/50	U11-E
	U11-C03J5	H01L-021/52,58	U11-D03B3
H01L-021/26,261	U11-C02J4		U11-E02A3
H01L-021/26,42	U11-C02B	H01L-021/52,68	U11-F02A3
H01L-021/261,263	U11-C03E	H01L-021/56	U11-E02A
H01L-021/266,426	U11-C02B2	H01L-021/60	U11-E01
H01L-021/268	U11-C03C	H01L-021/60,52,58	U11-E01C
H01L-021/28	U11-C05E	H01L-021/60,603,607	U11-E01A
	U11-C05F1		U11-E01B
	U11-C05F2	H01L-021/60,H01L-023	U14-H05
	U11-C05F3	H01L-021/66	U11-F01
	U11-C05F4	H01L-021/66,G06K-009	U11-F01B3
	U11-C05F5	H01L-021/68	U11-F02
	U11-C05F6	H01L-021/72,74,76	U11-C08A5
H01L-021/28,44	U11-C05C	H01L-021/74,76	U11-C08B1
H01L-021/285,443	U11-C05C3		U11-C08B2
	U11-C05C5		U11-C08B3
H01L-021/30	U11-C07C1		U11-C08B9
	U11-C07C4	H01L-021/76	U11-C08A2
	U11-C07D2	H01L-021/761	U11-C08A1
	U11-C07D3	H01L-021/762	U11-C08A4
	U11-C07D4	H01L-021/762,763	U11-C08A3
H01L-021/30,28,88	U11-C07C2		
H01L-021/302,26,461	U11-C07A2		
H01L-021/302,308, 467	U11-C07D1		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01L-021/82	U11-D03C1	H01L-023/64,66,535,538	U11-D03C3
	U11-D03C2		U11-D03B9
	U13-C04D	H01L-023/66	U11-D01A4
	U11-G		U11-D01A6
H01L-021/8246	U13-C04A1	H01L-025	U14-H03
H01L-021/84,86	U11-C08A6		X15-A02
H01L-021/88	U11-C05D3		U14-H04
	U11-C05D2	H01L-025,-049	U14-H03G
H01L-021/88,90	U11-C05G2C	H01L-025,H05K	U14-H05
H01L-021/90	U11-C05C7	H01L-025,H05K-001	U13-A
	U11-C05D4	H01L-027	U13-C06
H01L-021/90,50	U11-D03B9		U13-C08
H01L-021/90,92	U11-D03B1		U13-C09
H01L-021/90,92,60	U11-D03A2		U13-E02
H01L-021/90,92,88	U11-D03B2		U14-H03H
H01L-021/92,90	U11-C05G2B		U13-D03B2
H01L-023	U11-D		U13-C04C
	U11-E02A2		W04-M01B5
	U11-E02B	H01L-027,-049,H05K	U14-H
	U14-H04A3	H01L-027,H03	U13-B
	U12-A02B3	H01L-027/01	U14-H01C
	U12-A01B3	H01L-027/02	U13-E01
H01L-023,-025	U14-H05		U13-E09
	U14-H03A3		U11-C05G1A
	U14-H03B	H01L-027/04	U11-C05G1B
	U14-H03B1		U11-C05G1C
	U14-H03B2		U12-C02A1
H01L-023,-025,G11C	U14-A10		U12-C03
H01L-023/02,04,05,08	U11-D01A1		U13-C04B1A
	U11-D01A3	H01L-027/06	U13-C01A
H01L-023/02,32	U11-D01	H01L-027/06,01	U13-D01B
H01L-023/12	U11-D01A	H01L-027/06,07	U13-B04
H01L-023/29	U11-A07	H01L-027/07	U13-B03
H01L-023/32	U11-D01Q		U13-C02C
H01L-023/34	U11-D02A		U13-C03
H01L-023/34,36	U11-D02B		U13-D03
H01L-023/38	U11-D02D2	H01L-027/082	U13-B01
H01L-023/40	U11-D02B2		U13-C01
H01L-023/46	U11-D02D1		U13-D01
H01L-023/48	U11-A08B	H01L-027/085	U13-B02
	U11-D03		U13-C02
H01L-023/48,50	U11-D03A1	H01L-027/085,088,092	U13-D02
H01L-023/495	U11-D03A1A	H01L-027/088,092	U13-B02A
H01L-023/498	U11-D03A1B		U13-C02A
H01L-023/52	U11-D03A4	H01L-027/095	U13-B02B
	U11-D03A5		U13-C02B
	U11-D03A6	H01L-027/10	U13-C04
	U11-D03A9	H01L-027/108	U13-C04B1A
	U11-C06B	H01L-027/11	U13-C04B1B
H01L-023/52,047, 049,55,057	U11-D03A3	H01L-027/112,115	U13-C04A
	U11-D03A3		U13-C04B2
H01L-023/525	U11-C05G2A	H01L-027/118,	U11-D03C2
H01L-023/528	U11-D03C1A	H01L-027/118,02	U13-C04D
H01L-023/532	U11-D03B1	H01L-027/12	U11-C08A6
	U11-D03B2	H01L-027/14	S06-E03G1
H01L-023/535,538	U11-C05D3		U11-C18B4
H01L-023/538	U14-H03F2		U11-C18D
	U11-C05D2		U13-A01
H01L-023/552,556	U11-D01C2		U13-D04A
H01L-023/60	U11-D01C3	H01L-027/14,16	U13-A01X
H01L-023/62	U11-D03C1B	H01L-027/146	U13-A01A
H01L-023/62,528,	U11-D03C1		U13-A01B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01L-027/148	U13-A02X	H01L-029/94	U12-C02A
	U13-A02C	H01L-029/95	U12-C02X
	U13-A02	H01L-031	U12-A02
	U13-A02B		U12-A02C3
H01L-027/15-26	U11-C18B9	H01L-031,-033	U12-A
H01L-027/16	U14-E01	H01L-031,H01L-031/04	U12-A02A
H01L-027/20-26	U13-D04	H01L-031/02,03	U12-A02B5
H01L-029	U12-C02F	H01L-031/02,03,04	U12-A02A3
	U12-D	H01L-031/02,04	U12-A02A4
	U12-E01A4	H01L-031/02,04,068,072	U12-A02A4C
	U12-E01A5	H01L-031/0203,	U12-A02A1
	U14-K01A2B	H01L-031/0216,04	U12-A02A4D
H01L-029,-027	U12-C02	H01L-031/0224,04	U12-A02A4A
H01L-029,-049	U12-C02C	H01L-031/0236,04	U12-A02A4B
H01L-029/02-10	U12-E01B	H01L-031/0248	U12-A02A2
H01L-029/02-38	U12-E	H01L-031/0296	U12-A02B5A
H01L-029/12	U12-E01A		U12-A02A2A
H01L-029/15	U12-E01B2	H01L-031/0304	U12-A02B5B
H01L-029/16	U12-E01A3		U12-A02A2B
H01L-029/20	U12-E01A1	H01L-031/0312	U12-A02B5D
H01L-029/22,18	U12-E01A2		U12-A02A2C
H01L-029/24-28	U12-E01A9	H01L-031/032,0336	U12-A02A2E
H01L-029/40,45,47	U12-E02	H01L-031/032,0336,0344	U12-A02A2X
H01L-029/66	U12-D02K	H01L-031/0352	U12-A02A2Q
H01L-029/70	U12-D01	H01L-031/036,0376	U12-A02A2F
H01L-029/72	U12-D01A1	H01L-031/0368,0376	U12-A02B5C
	U12-D01A5	H01L-031/04	U12-A02A1
H01L-029/72,73	U12-D01A		U12-A02A2
H01L-029/73	U12-D01A3		U12-A02A2A
	U12-D01A4		U12-A02A2B
H01L-029/73,72	U12-D01A9		U12-A02A2C
H01L-029/737	U12-D01A2		U12-A02A2X
H01L-029/74	U12-D01B		U12-A02A2Q
H01L-029/74,87	U12-D01B4		U12-A02A2F
H01L-029/744	U12-D01B3		U12-A02A4E
H01L-029/745,749	U12-D01B1	H01L-031/042	U12-A02A5
H01L-029/747	U12-D01B2		U12-A02A6
H01L-029/76	U12-D02	H01L-031/05	U12-A02A7
H01L-029/76,78	U12-D02A5	H01L-031/058,055	U12-A02A9
H01L-029/76,80	U12-D02J2	H01L-031/08	U12-A02B1
H01L-029/775	U12-D02D1	H01L-031/08,09,10	U12-A02B
H01L-029/775,778	U12-D02D	H01L-031/08,10,11	U12-A02B3
H01L-029/778	U12-D02D2	H01L-031/10	U12-A02B2A
H01L-029/78	U12-D02A	H01L-031/10,11	U12-A02B2
H01L-029/784	U12-D02A3		U12-A02B4
	U12-D02A4	H01L-031/11,112,113	U12-A02B2B
H01L-029/786	U12-B03A	H01L-031/111	U12-A02B2C
H01L-029/788	U12-D02A1	H01L-031/115-119	U12-A03
H01L-029/792	U12-D02A2	H01L-031/12	U12-A02C1
H01L-029/796,816	U13-A02B	H01L-031/12,14,16,18	U12-A02C
	U13-A02A	H01L-033	U12-A01
	U13-A02C		X26-H
	U13-A02	H01L-033,-021	U12-A01A2
H01L-029/80,812	U12-D02B	H01L-033,-023	U12-A01A4
H01L-029/84	U11-C18C	H01L-035	U14-E05
H01L-029/84,G01L-009	U12-B03E		U14-E09
H01L-029/861	U12-C01	H01L-035,-037	U14-E
H01L-029/864	U12-C01E	H01L-037	U14-E01B
H01L-029/866	U12-C01D		U14-E01C
H01L-029/868,872	U12-C01C	H01L-037/02	U14-E01A
H01L-029/88,885	U12-C01G	H01L-037/04	U14-E02
H01L-029/93	U12-C02B		
	V01-B02B1		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01L-039	U14-F	H01M-010/06-22	X16-B01B
	T03-A01E	H01M-010/24-32	X16-B01A
	T03-A06K	H01M-010/36-38	X16-B01X
H01L-039/22	U14-F02B	H01M-010/39	X16-B01C
H01L-039/24	U11-C18B9	H01M-010/40	X16-B01F
	U14-F01A1	H01M-010/42	X16-B09
	U14-F01B1	H01M-010/50	X16-K
H01L-041	U11-A02	H01M-012	X16-B01D
	U14-G	H01M-012,-014,-016	X16-D
	V06-V01B	H01P	W02-A
	V06-V01D	H01P-001	W02-A01C
H01L-041/04-053,			W02-A01D
08-113, 18-193	V06-V01B		W02-A04
H01L-041/06,12,20	V06-V01D		W02-A06
H01L-041/22-26	V06-V01B	H01P-001,H03H	W02-A06E
H01L-041/22-26	V06-V01D	H01P-001/02	W02-A01C1
H01L-041/22-26	V06-V03	H01P-001/04	W02-A01C2
H01L-043	U12-B01	H01P-001/06	W02-A01C3
H01L-043,-045,-047	U12-B	H01P-001/08	W02-A01C5
H01L-043/04,06,14	U12-B01A	H01P-001/10-15	W02-A04A
H01L-043/08	U12-B01B	H01P-001/11,12	W02-A04A1
H01L-045	U12-B02	H01P-001/14	W02-A04A3
H01L-047/02	U12-B02A	H01P-001/15	W02-A04A5
H01L-049	U12-B03	H01P-001/16	W02-A06A
	U14-K01A2A	H01P-001/162	W02-A06A1
H01L-049,G02F	U14-H01A	H01P-001/165	W02-A06B
H01L-049/02	U12-B03B	H01P-001/17	W02-A06B1
	U14-H01	H01P-001/175	W02-A06B3
	U14-H02	H01P-001/18-195	W02-A06C
	U12-B03A	H01P-001/185	W02-A06C1
H01M-002	X16-F	H01P-001/19-195	W02-A06C2
H01M-002/02-06	X16-F01	H01P-001/201-205	W02-A05A
H01M-002/08	X16-F01A	H01P-001/201-219	W02-A05K
H01M-002/10	X16-F06	H01P-001/202	W02-A05A1A
H01M-002/12	X16-F03B		W02-A05A1C
H01M-002/14-18	X16-F02	H01P-001/20-219	W02-A05
H01M-002/20-34	X16-F03	H01P-001/203	W02-A05A2
H01M-002/36-40	X16-F04	H01P-001/205	W02-A05A1E
H01M-004	X16-E		W02-A05A3
H01M-004/02,36-46	X16-E01	H01P-001/207	W02-A05B
H01M-004/06-12	X16-E03	H01P-001/208	W02-A05B1
H01M-004/14-23	X16-E04	H01P-001/210-219	W02-A05K4
H01M-004/24-34	X16-E05	H01P-001/211	W02-A05B2
H01M-004/48-57	X16-E01C1	H01P-001/212	W02-A05K6
H01M-004/60	X16-E01A	H01P-001/213	W02-A05K7
H01M-004/64-84	X16-E02	H01P-001/215-218	W02-A05E
H01M-004/86-98	X16-E06	H01P-001/219	W02-A05F
H01M-006/02	X16-A	H01P-001/22	W02-A04C5
H01M-006/04	X16-A01	H01P-001/22-23	W02-A04C
H01M-006/06-12	X16-A01A	H01P-001/23	W02-A04C1
H01M-006/14-20	X16-A02	H01P-001/24	W02-A04D
H01M-006/30-32	X16-A03	H01P-001/36-375	W02-A04E
H01M-006/34	X16-A03B	H01P-001/38-397	W02-A04F
H01M-006/36	X16-A03A	H01P-001/387	W02-A04F1
H01M-008	X16-C	H01P-003	W02-A01
	X21-B01A	H01P-003/02-08	W02-A01A
H01M-008/04	X16-C09	H01P-003/10-18	W02-A01B
H01M-008/10-12	X16-C01	H01P-005/00-04	W02-A02
H01M-008/14	X16-C02	H01P-005/08-10	W02-A02A
H01M-008/16	X16-C06	H01P-005/103	W02-A02A1
H01M-008/24	X16-C18	H01P-005/107	W02-A02A2
H01M-010	X16-B	H01P-005/12	W02-A02B
H01M-010/00-02	X16-B01	H01P-005/16-22	W02-A02B1

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01P-005/18	W02-A02B1A	H01Q-021/06	W02-B05B
H01P-005/20	W02-A02B1C		W02-B05B6
H01P-005/22	W02-A02B1D	H01Q-021/10	W02-B05C
H01P-007	W02-A03A	H01R	V04
H01P-007/02	W02-A03A2	H01R-004	V04-A
H01P-007/04	W02-A03A2A	H01R-004/02,06,08	V04-A01
	W02-A03A2C	H01R-004/04	V04-A06
H01P-007/06	W02-A03A3	H01R-004/10-20	V04-A02
H01P-007/08	W02-A03A4	H01R-004/24-26	V04-A03
H01P-007/10	W02-A03A5	H01R-004/28	V04-A04
H01P-009/00-04	W02-A03B	H01R-004/30-36	V04-A04B
H01P-011	W02-A07	H01R-004/38-46	V04-A04A
H01Q	W02-B	H01R-004/48	V04-A04C
H01Q-001	W02-B	H01R-004/50-52	V04-A04X
H01Q-001/02	W02-B07B	H01R-004/54-62	V04-A09
H01Q-001/04	W02-B07	H01R-004/64,66	V04-A05
	W02-B08	H01R-004/68	V04-A10
H01Q-001/06	W02-B08X		X12-G02X
H01Q-001/08	W02-B07A5	H01R-004/70,72	V04-A08
	W02-B08K	H01R-009	V04-B
H01Q-001/10	W02-B01C1A	H01R-009/05	V04-B03
H01Q-001/12-22	W02-B07A	H01R-009/11	V04-B04
H01Q-001/24	W02-B08C3	H01R-009/15	V04-B09
H01Q-001/26	W02-B08B	H01R-009/16-24,28	V04-B05
H01Q-001/28	W02-B08F5	H01R-009/26	V04-B05A
	W02-B08F7	H01R-011	V04-C
	W02-B08F6	H01R-011/01-09	V04-C05
H01Q-001/32	W02-B07C1	H01R-011/11-32	V04-C01
	W02-B07D	H01R-012,-024	V04-B
	W02-B08F1		V04-G
H01Q-001/34	W02-B08F2	H01R-012/02,18	V04-G09
H01Q-001/42	W02-B07C	H01R-012/04-06,32-36	V04-B01
H01Q-001/50	W02-B08B1	H01R-012/08-12,38	V04-B02
H01Q-001/52	W02-B08P6	H01R-012/16-28	V04-G02
H01Q-003	W02-B06E	H01R-012/18,20	V04-G02A
H01Q-003/00-46	W02-B06	H01R-012/22	V04-G02B
H01Q-005	W02-B08R1	H01R-013	V04-D
H01Q-007/00-08	W02-B01A	H01R-013/02-03	V04-D01
H01Q-007/06-08	W02-B01A1	H01R-013/04-08	V04-D01A
H01Q-009	W02-B01	H01R-013/10-14	V04-D01B
H01Q-009,011	W02-B01C	H01R-013/40-436	V04-D02
H01Q-009/16	W02-B01B1	H01R-013/44-453	V04-D06A
H01Q-009/261	W02-B01B2	H01R-013/46-533	V04-D03
H01Q-009/27	W02-B01B3	H01R-013/56-60,72-74	V04-D09
H01Q-011	W02-B01D	H01R-013/58-595	V04-D06D
H01Q-011/08	W02-B01C3	H01R-013/62-625, 629-639	
H01Q-013	W02-B02		V04-D04
H01Q-013/00-28	W02-B02	H01R-013/627	V04-D04A
H01Q-013/02	W02-B02B	H01R-013/64-645	V04-D06C
H01Q-013/08	W02-B02A	H01R-013/648-658	V04-D06B
H01Q-013/10-18	W02-B02C	H01R-013/66-719	V04-D05
H01Q-015	W02-B03	H01R-024	V04-E
H01Q-015/02-12	W02-B03A		V04-F
H01Q-015/14	W02-B03B2A		V04-G01
H01Q-015/14-22	W02-B03B	H01R-025,-027,-029	V04-H
H01Q-015/24	W02-B03C	H01R-025/14-16	V04-H01
H01Q-017	W02-B03D	H01R-031	V04-J
H01Q-019	W02-B04	H01R-033	V04-K
H01Q-019/02	W02-B04A	H01R-033/02-46	V04-K01
H01Q-019/06-09	W02-B04B		X26-F
H01Q-019/12	W02-B04E	H01R-035,041	V04-N
H01Q-019/30	W02-B04D	H01R-039/02	V04-L
H01Q-021	W02-B05		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H01R-039/04-16,56,32-34	V04-L01A	H01T	X12-F
H01R-039/04-59	V06-M12	H01T-001,-002,-007,-009,-011,014	X12-F01
	X11-J03		X12-F01A
H01R-039/18-30,36-44,58-59	V04-L01B	H01T-004	X22-A01E
	V04-L09	H01T-013	X22-A01E1A
H01R-039/60-64	V04-P	H01T-013/22-36	X22-A01E1C
H01R-043	V04-P09	H01T-013/39	X22-A01E1J
H01R-043/01,027,26-28	V04-P08	H01T-013/41	X22-A01E1G
H01R-043/02	V04-P01C	H01T-013/44	X12-F02
H01R-043/033	V04-P01A	H01T-015	X12-F04
H01R-043/04-058	V04-P02	H01T-019	S06-E02A
H01R-043/06-14	V06-M11A	H01T-019/00	X22-A01E1E
	X11-J08A	H01T-021/02-04	X12-F09
H01R-043/16,20-24	V04-P06	H01T-021/06	X12-F03
H01R-043/18	V04-P07	H01T-023	X13-E
H01R-101/00	V04-E	H02B	X13-E09
H01R-103/00	V04-F	H02B-001	X13-E01
H01R-105/00	V04-G	H02B-001/01-056,-015	X13-E04
H01R-107/00	V04-G	H02B-001/06-24	X13-E04A
H01S-001/00,02,04,06	V08-B01	H02B-001/20-24	X13-E02
H01S-003	V08-A06	H02B-001/26-52	X13-E08
	V08-A	H02B-003	X13-E03
H01S-003/02,05	V08-A01	H02B-005-013	X13-E03A
H01S-003/036	V08-A01C	H02B-011	X13-A04E
H01S-003/038	V08-A01B	H02B-011,-013	X13-E03B
H01S-003/04	V08-A05	H02B-013	W06-B01C1
H01S-003/043	U12-A01B3A	H02G	W01-D
H01S-003/05	V08-A01A		X12-G
H01S-003/082	V08-A01A3		W06-C01C1
H01S-003/083	V08-A01A1		W06-B01C1
H01S-003/09	V08-A02	H02G-001	W01-D01
H01S-003/0941,16,17	V08-A04C1		X12-G01
H01S-003/096	V08-A02A	H02G-001/02,04	X12-G01A1
H01S-003/097	V08-A02C	H02G-001/06	X12-G01A7
H01S-003/098	V08-A03B	H02G-001/08	X12-G01A7D
H01S-003/10	V08-A06A	H02G-001/10	X12-G01A7G
	V08-A03	H02G-001/12	X12-G01B
H01S-003/10,11,13,34	V08-A01A2	H02G-001/14	X12-G01E
H01S-003/109	V08-A03C1	H02G-001/16	X12-G01D
H01S-003/11	V08-A03D	H02G-003,009/00-12	X12-G04
H01S-003/13	V08-A03A1	H02G-003/02-06,22	X12-G04A
	V08-A03C2	H02G-003/02-06,22-24	X12-G04A
H01S-003/133	U12-A01B4	H02G-003/08-20	X12-G04B
H01S-003/14	V08-A01D1	H02G-003/26,28	X12-G04A1
H01S-003/16,17	V07-K01C2	H02G-003/30,36	X12-G04A
	V08-A04C	H02G-003/32	X12-G04A2
H01S-003/17	V08-A04C2	H02G-003/34,38-40	X12-G04A1
H01S-003/18	U12-A01B1A	H02G-005	X12-G03
	U12-A01B1B	H02G-007	X12-G05
H01S-003/18,19	V07-K01C1	H02G-011	X12-G08
	U12-A01B	H02G-013	X12-G01F
	V08-A04A	H02G-015	W01-D02
	U12-A01B2		X12-G02
	U12-A01B3	H02G-015/007-013,20-34	X12-G02X
H01S-003/19,085	U12-A01B1		X12-G02B
H01S-003/20	V08-A04D	H02G-015/02-076	X12-G02C
H01S-003/22	V08-A04B	H02G-015/08-196	X13-C
H01S-003/23	V08-A07	H02H	U24-F
H01S-003/30	V08-A04X	H02H-001-007,011	W01-C08A
H01S-004,H01S-001	V08-B	H02H-001-009H04M	X13-C01
H01S-004/00	V08-B02	H02H-003	

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H02H-003/08-10	X13-C01A	H02K-003/32-44	V06-M08B
H02H-003/14-17	X13-C01B	H02K-003/46-52	X11-J02C
H02H-003/20-253	X13-C01C	H02K-005	X11-J07
H02H-003/26-36	X13-C01D	H02K-005/00-99	V06-M09
H02H-005	X13-C02	H02K-005/14-173	X11-J07A
H02H-006,-011	X13-C09	H02K-007	V06-M10
H02H-007	X13-C04		X11-J05
H02H-007/04-06	X13-C04B	H02K-007/10-12	X11-J05A
H02H-007/08-097	X13-C04C	H02K-007/14-20	X11-J05B
H02H-007/10-127	U24-D01B	H02K-009	V06-M13
	X12-J01B		X11-J06
	X13-C04D	H02K-009/19-22	X11-J06A
H02H-007/26-30	X13-C04A	H02K-011	V06-M14
H02H-009	U24-F02		X11-J04
	X13-C03	H02K-013	V06-M12
H02H-009/02,08	X12-H01A3		X11-J03
	X13-C03B	H02K-015	V06-M11
H02H-009/04	X13-C03A		X11-J08
H02J	U24-H	H02K-015/02-03	V06-M11D
	X12-H	H02K-015/02-04	X11-J08A
H02J-001/00-16,-003/36	X12-H01D	H02K-015/04-095	V06-M11B
H02J-001-005,-017	X12-H01		X11-J08B
H02J-003	U24-H	H02K-015/10-12	V06-M11C
H02J-003/01	X12-H01A4	H02K-015/10-12,16	X11-J08C
H02J-003/04-08,34,		H02K-015/20-28	X11-J08B
38-50	X12-H01B	H02K-016,-025-027,-031,-047,-053,-057	X11-H09
H02J-003/12	X12-H01A1		X11-E
H02J-003/14	X12-H01A1A	H02K-017	V06-M02
H02J-003/16	X12-H01A1C	H02K-017,-023,-027	V06-M02B
H02J-003/18-22	X12-H01A2	H02K-017,027	V06-M01B
H02J-003/24	X12-H01A5	H02K-019	X11-D
H02J-003/26	X12-H01A6		V06-M01
H02J-003/28-32	X12-H01A7	H02K-019,-021	V06-M01A
H02J-003/38	U24-E02D1A	H02K-021	X11-G
H02J-007/00,32,36	X16-G		V06-M02A
H02J-007/02-12	X16-G01	H02K-023	X11-F
H02J-007/14-30	X16-G02C		V06-M06A
H02J-007/35	X16-G02A	H02K-024	
H02J-007/50,60	X16-G02	H02K-025-026,-031,-047,-057	V06-M06
H02J-007/60	U24-H02L		V06-M03
H02J-007/90	U24-H04	H02K-029	X11-H01
H02J-009	U24-J		X11-H01C
H02J-009,-011	X12-H02	H02K-029/06-12	V06-M04
H02J-013	X12-H03	H02K-033,035	V06-M04A
H02J-015	X12-H06	H02K-033/18	V06-M05
H02J-017	U24-H02	H02K-037	V06-M05A
	X12-H01E	H02K-037/02-08	V06-M05B
H02J-050	U24-H02	H02K-037/10-20	V06-M06B
	X12-H01E	H02K-041	X11-H02
H02K	V06-M		V06-M06B1
	X11	H02K-041/025	X11-H02A
H02K-001	V06-M07		V06-M06B2
	X11-J01	H02K-041/03	X11-H02B
H02K-001/12-20	V06-M07A		V06-M06B3
	X11-J01A	H02K-041/035	X11-H02C
H02K-001/22-32	V06-M07B		X11-H03B
	X11-J01B	H02K-044	X11-H03
H02K-001-015	X11-J	H02K-044,-049,-051	V06-M06K
H02K-003	V06-M08	H02K-044/02, 04, 06	V06-M06Q
	X11-J02	H02K-044/08-28	X11-H03B1
H02K-003/04-24	X11-J02A		X11-H03A
H02K-003/04-28	V06-M08A	H02K-049,-051	X11-H05
H02K-003/30-44	X11-J02B	H02K-055	

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H02M	W06-C01C3 U24-D X12-J X23-A01A3 W06-C01C3 W06-B01C3 W06-B03B	H02N-002/06	V06-N11D V06-N11E
H02M, H03G, H03D-001	U24-C03	H02N-002/10-12,16	V06-M06D V06-M06H
H02M, H03K	U21-B05C	H02N-002/14	V06-N07 V06-N09
H02M, H04N-005/225	W04-M01P	H02N-002/18	V06-M06D2
H02M-001	U24-D01 X12-J01	H02P, H02N	V06-N
H02M-001/02-096	U24-D01A X12-J01A	H02P-001	V06-N05 X13-H01A
H02M-001/02-096, -007	X13-H03B	H02P-003	V06-N06 X13-H01 X21-A03 X23-A01B X23-A01B3
H02M-001/10,16, 20-30	U24-D01X X12-J01X X12-J01E1	H02P-005	X13-H01X
H02M-001/12	U24-D01E1	H02P-006	X13-H01G
H02M-001/12,14,15	U24-D01E X12-J01E	H02P-021	X13-H01D1C
H02M-001/14,15	X12-J01E2 U24-D01E2	H02P-005,-007	X21-A04
H02M-003	U24-D02 X12-J02	H02P-005/06-26	X13-H01C
H02M-003/02-158,20	U24-D02A X12-J02A	H02P-005/06-26,46-52, -007/06-34,68-695	V06-N02
H02M-003/137-142, 156-158,-005/451,452	X13-H03X	H02P-005/28-44,46-52, -007/36-66,74-753	V06-N03
H02M-003/16-18, 34-42, 54-62,86-96,-009,011	U24-D09 X12-J09	H02P-005/46-52	X13-H01X V06-N30 V06-N04 X13-H01E
H02M-003/22-338,44	U24-D02B X12-J02B	H02P-007	V06-N X13-H X13-H01G1 X13-H01G2
H02M-005	U24-D03 X12-J03	H02P-007/06-34	X13-H01C
H02M-007/02-155, 17-217,23,26-28,40	X12-J04	H02P-007/282,298	X13-H01C1A
H02M-007/02-155, 17-28,40	U24-D04	H02P-007/28-298	X13-H01C1
H02M-007/162,219	U24-D04C1 X12-J04C1	H02P-007/285-295	X13-H01C1B
H02M-007/25	U24-D04E X12-J04E	H02P-007/36-66	X13-H01D
H02M-007/42-519, 523-5383,539-5395, 64-84,98	U24-D05 X12-J05	H02P-007/38-50,54, 56,64,66	X13-H01D
H02M-007/521,5387	U24-D05A	H02P-007/58-638	X13-H01D1
H02M-007/525-529, 539-5395,758	X13-H03A	H02P-007/622	X13-H01D1B
H02N	V06-N13	H02P-007/628-632	X13-H01D1A
H02N-001	V06-M06B8 V06-M06F V06-N11F V06-N40F	H02P-007/67-80	V06-N30 X13-H01X
H02N-001,-010,-013	X11-H04	H02P-008	V06-N01
H02N-001,H02N-013	V06-N08	H02P-009	V06-N40 X13-H02 X13-H02T7 X13-H02T8 X13-H02T9 X13-H02T7B
H02N-002/02-04,08	V06-M06B7 V06-M06B9	H02P-009/08-38	X13-H02A
		H02P-011,015,017	X13-H04
		H02P-021	V06-N37 X13-H01D1C
		H02S	X15-A
		H03B-001	U23-A U23-E
		H03B-005/00-06	U23-A01
		H03B-005/08-16	U23-A01B
		H03B-005/18	U23-A01B2
		H03B-005/30-42	U23-A01A
		H03B-005/32-38	U22-A04A2

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H03B-007,009	U23-A02	H03G-003/20-24,30-32	U24-C01C
H03B-011-017,023-029	U23-F	H03G-003/26,28,34	W02-G03B1
H03B-019	U23-B	H03G-003/30	U24-C01B
H03B-021	U23-J05	H03G-003/34	U24-C05C
H03B-021,H03D-007	U23-J	H03G-005	U25-F05
H03B-021-028	U23-F03		W03-C05A
H03B-023-029	U23-F03	H03G-005/02-14	U25-F05C
H03B-029/00	U23-F05	H03G-005/16-28	U25-F05A
H03C,H03D	U23-P	H03G-007	U24-C02B
H03C-001	U23-G	H03G-009	U24-C05D
H03C-003	U23-H	H03G-011	U24-C02A
H03D,H03G-003/20	U24-C01G	H03H	U14
H03D,H04B-001	W03-B02C		U25
H03D-001	U23-K		V06
H03D-003	U23-L	H03H-003	V06-V01E
H03D-007	U23-J	H03H-003	V06-V03
H03D-007,H03B-021	U23-J05	H03H-007	U25-D
H03D-007/00-12	U23-J01C1		U25-E
H03D-007/14	U23-J01C5	H03H-007/01-13	U25-E02
H03D-013	U23-C	H03H-007/18	U25-F01
H03D7/18	W02-G03A5A	H03H-007/19	U25-E05Q
	W03-A01B5A	H03H-007/20	U25-F01A
	W03-B01A5A	H03H-007/21	U25-F01
H03F	U24-G	H03H-007/24-27	U25-D07C
H03F,H04N-005/44	W03-A	H03H-007/30-34	U25-A05
H03F,H04R-027	W04-S05A	H03H-007/38-40	U25-D05
H03F,H05K	W03-C07	H03H-007/42	U25-D03
H03F-001	U24-G03	H03H-007/46	U25-D01C
H03F-001/02-07	U24-G03N		U25-E05K
H03F-001/26-28	U24-G03D1	H03H-007/48	U25-D01C
H03F-001/30	U24-G03G	H03H-009	V06-V01E
	U24-G03H	H03H-009/02-25	V06-V01E
H03F-001/32	U24-G03D5	H03H-009/02-25	V06-V02
H03F-001/34-36	U24-G03A	H03H-009/40-44	V06-V04D2
H03F-001/38-40	U24-G03B	H03H-009/46-64	V06-V04D1
H03F-001/42-50	U24-G03J	H03H-011	U25
H03F-001/52,54	U24-G03C	H03H-011/04-06	U25-E01
H03F-003	U24-G	H03H-011/08,10	U25-C
H03F-003/181-187	U24-G01C	H03H-011/12-14	U25-E01
	W03-C01A	H03H-011/16	U25-F01
H03F-003/189-195	U24-G01D	H03H-011/18	U25-E05Q
H03F-003/20-24	U24-G01B	H03H-011/20	U25-F01A
H03F-003/26-32	U24-G02C	H03H-011/22	U25-F01
H03F-003/34-36	U24-G02D	H03H-011/24	U25-D07
H03F-003/38	U24-G02E	H03H-011/26	U25-A05
H03F-003/45	U24-G02A	H03H-011/28-30	U25-D05
H03F-003/50,52	U24-G02A7	H03H-011/32	U25-D03
H03F-003/62,64	U24-G02F3	H03H-011/34	U25-D01A
H03F-003/68	U24-G02F2		U25-E05K
H03F-003/72	U24-G02F1	H03H-011/36	U25-D01A
H03F-007	U24-G04E	H03H-015	U25-A02
H03F-007-021	U24-B	H03H-017	U22-G
H03G	U24-C	H03H-017,H04R-025	W04-Y03G3
H03G,H04B	W04-G04	H03H-017/02	U22-G01
H03G,H04B-001	W02-G03D	H03H-017/04	U22-G01A1
	W03-A03A	H03H-017/06	U22-G01A3
	W03-B02A	H03H-017/08	U22-G03
H03G,H04M-001/60	W01-C01C1C	H03H-019	U25-A01
H03G-003/02-18	U24-C05A	H03H-021	U22-G01A5
H03G-003/02-18,	U24-C05		U25-A
H03G-003/20	U24-C01G	H03J	U25
H03G-003/20-22	U24-C01	H03J-001	U25-K
H03G-003/20-22,30	U24-C01A	H03J-003	U25-G

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H03J-005	U25-H	H03K-017/28	U21-B02A1
H03J-007	U25-J	H03K-017/296	U21-B02A2
H03J-007/02-16	U25-J05	H03K-017/30,13	U21-B02A3
H03J-007/18-32	U25-J01	H03K-017/57	U21-B01
H03J-009	W03-A02C	H03K-017/58,60,74	U21-B01A
	W03-G05A	H03K-017/687	U21-B01B
H03K	U21	H03K-017/723	U21-B01D1
	U22	H03K-017/72-735	U21-B01C
H03K-003	U22-A	H03K-017/78	U21-B01E
	U22-B	H03K-017/945,96	U21-B02C
H03K-003/01-017	U22-B05	H03K-017/945-955	U21-B02C1
H03K-003/023	U22-A02E	H03K-017/965-98	U21-B02C2
H03K-003/027-037	U22-A02D	H03K-019	U21-C
H03K-003/16-22	U22-A04A1	H03K-019/003	U21-C03A
H03K-003/26-30	U22-A02A	H03K-019/007	U21-C03C
H03K-003/295-297	U22-A02E	H03K-019/0175	U21-C02
	U22-A04D5	H03K-019/0175,018,185	U21-C02A
H03K-003/353-356	U22-A02B	H03K-019/02	U21-C01
H03K-003/53-57	U22-A03	H03K-019/04,06,16,17,18,185	U21-C01X
H03K-003/64-86	U22-A01		U21-C01C
H03K-003/84	U22-A01A	H03K-019/08	U21-C01C
H03K-004	U22-C	H03K-019/082,10,12	U21-C01A
H03K-004/04	U22-C09	H03K-019/084,09	U21-C01A1
H03K-004/06-90	U22-C01	H03K-019/086	U21-C01A2
H03K-004/92-94	U22-C09	H03K-019/088	U21-C01A3
H03K-005	U22-D	H03K-019/091	U21-C01A4
H03K-005/003-007	U22-D01A1A	H03K-019/094	U21-C01B
H03K-005/01	U22-D01	H03K-019/0944	U21-C01B5
H03K-005/02	U22-D01A1	H03K-019/0944,0948	U21-C01B3
H03K-005/04	U22-D01A6	H03K-019/0952,0956	U21-C01B1
H03K-005/05	U22-D01A6C	H03K-019/10	U21-C01R
	U22-D01A7	H03K-019/14	U21-C01G
H03K-005/06,07	U22-D01A5	H03K-019/173,177	U21-C01E
	U22-D01A6A	H03K-019/177	U13-C04C
H03K-005/08	U22-D01A1C	H03K-019/195	U21-C01F
H03K-005/12	U22-D01A1	H03K-019/20	U21-C03B
H03K-005/125	U22-D02	H03K-019/23	U21-C03B2
H03K-005/1252-1254	U22-D01A3	H03K-021/02,08	U21-D01
H03K-005/13-145	U22-D04	H03K-021/38	U21-D02A
H03K-005/15-151	U22-D06	H03K-021/38,40	U21-D02
H03K-005/153-1536	U22-D07	H03K-021/40	U21-D02B
H03K-005/1532	U22-D07C	H03K-021-023	U21-D09
H03K-005/1534-1536	U22-D07A	H03K-021-029	U21-D
H03K-005/156	U22-D05		U23-D01B1
H03K-005/19	U22-D03	H03K-023	U21-D05
H03K-005/22	U22-D02		U21-D06
H03K-005/24	U22-D02A	H03K-023/03,74	U21-D06B
H03K-005/26	U22-D02E	H03K-023/06,28,46,76,82,84	
	U22-D02C		U21-D06X
	U22-D02G	H03K-023/23,80	U21-D06A
H03K-007	U22-E	H03K-023/40	U21-D03
H03K-007/02	U22-E01E	H03K-023/44,52,60	U21-D06A1
H03K-007/04	U22-E01C	H03K-023/54	U21-D03A
H03K-007/06	U22-E01G	H03K-023/58	U21-D04
H03K-007/08	U22-E01A	H03K-023/62	U21-D05A
H03K-009	U22-E05A	H03K-023/64	U21-D05B
H03K-011	U22-E05C	H03K-023/66	U21-D05B1
H03K-017	U21-B	H03K-023/68	U21-D05B2B
H03K-017/04,06, 10,12	U21-B02D		U21-D05B3
H03K-017/08	U21-B02E	H03K-023/72	U21-D05B2A
H03K-017/14	U21-B02G	H03K-023/78	U21-D06A3
H03K-017/16	U21-B02F	H03L	U22
H03K-017/20,22	U21-B02B		U23

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H03L-001/02-04	U23-E05	H04B-001/03-036	W02-G01H
H03L-001-005	U22-B	H04B-001/04	W02-G01
	U23-E	H04B-001/06	W02-G03
H03L-003	U22-B09		W03-B
	U23-E	H04B-001/08	W02-G03H
H03L-005	U23-E01A		W03-B01A8
H03L-007	U22-H		W03-B05
	U23-D	H04B-001/10	W02-G03B1
H03L-007/00-04	U23-D02	H04B-001/10,H04B-001/30	W02-G03B4G
H03L-007/06-07	U23-D01	H04B-001/10,H04H-040	W03-B02C3A
H03L-007/08-083	U23-D01A	H04B-001/10-12	W02-G03B
H03L-007/085-093	U23-D01A3	H04B-001/14	W02-G03B2
H03L-007/095	U23-D01A5	H04B-001/16,28	W02-G03C1
H03L-007/099	U23-D01A1		W03-B02B1
H03L-007/10-14	U23-D01F		W02-G03
H03L-007/16-23	U23-D01B	H04B-001/26	W03-B01A5
H03L-007/193	U23-D01B1		W02-G03C
H03L-009	U23-D02	H04B-001/30	W02-G03A8
H03M	U21-A		W03-A01B6
H03M-001	U21-A02		W03-B01A6
	U21-A03	H04B-001/38-58	W02-G02
	W05-D01		
H03M-001/02	U21-A03H	H04B-001/3822	W02-G02A2
H03M-001/06,08	U21-A02B7G	H04B-001/3827	W02-G02A1
	U21-A03F7G	H04B-001/46	W02-G02A5C
H03M-001/08,10,68	U21-A02B	H04B-001/59	W05-D08G
H03M-001/10	U21-A02B2		W02-G05
	U21-A03F1		W05-D08G
H03M-001/22,28,30	U21-A03J9	H04B-001/62	W02-G04B
H03M-001/24	U21-A03J1	H04B-001/64	W02-G04B1
H03M-001/36	U21-A03C		W02-G04B9
H03M-001/38	U21-A03B	H04B-001/66	W02-G04
H03M-001/50,60	U21-A03A	H04B-001/69-713	W02-K05
H03M-001/66	U21-A02A	H04B-001/707	W02-K05A7
H03M-001/76,68	U21-A02A9	H04B-001/7115	W02-G03B6A
H03M-001/78	U21-A02A2	H04B-001/713	W02-K05A6
H03M-001/80	U21-A02A1	H04B-001/74	W02-G08
H03M-001/82,86	U21-A02A3	H04B-003	W02-C01
H03M-003	U21-A04	H04B-003/03	W02-C01X
H03M-003/02	U21-A04A	H04B-003/04-18	W02-C01B
H03M-003/04	U21-A04B	H04B-003/20-23	W02-C01C1
H03M-005/00-22	U21-A05C	H04B-003/26	W02-C01B
	W01-A02	H04B-003/28	W02-C01C3A
H03M-007	U21-A05A	H04B-003/30	W02-C01C3B
	W01-A02A	H04B-003/32-34	W02-C01C2
H03M-007/02-28	U21-A05A1	H04B-003/36-38	W02-C01E
H03M-007/30	U21-A05A2	H04B-003/40-42	W02-C01X
H03M-007/40	U21-A05A2A	H04B-003/44	W02-C01E1
H03M-007/46	U21-A05A2B	H04B-003/46-48	W02-C01D
H03M-009	U21-A05B	H04B-003/50	W02-C01X
H03M-011	U21-A05D	H04B-003/52	W02-C01A1
H03M-013	U21-A06	H04B-003/54	W02-C01A3
	W01-A01B	H04B-005	W02-C02G7
	W01-A01B4	H04B-005/00	W02-C02
H03M-013/05-21	W01-A01B1	H04B-005/04	W02-C02G5
H03M-013/09-11	W01-A01B1A		W05-A05C
H03M-013/23	W01-A01B2G	H04B-005/06	W02-C02
H04B	W02		W04-S05C1
	W03	H04B-007	W02-C03
H04B-001	W02-G	H04B-007/02-08	W02-C03A
	W03	H04B-007/02-12	W02-C03A5
H04B-001/02	W02-G01	H04B-007/10	W02-C03A4
H04B-001/02-04	W02-G01	H04B-007/12	W02-C03A3

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04B-007/14-17	W02-C03B	H04H-040	W03-A
H04B-007/185-195	W02-C03B1B		W03-B
H04B-007/204-216	W02-C03B	H04H-040/90	W03-A16A
	W02-C03B1D		W03-B06A
	W02-C03B2	H04H-060	W02-D
	W02-K		W02-F
H04B-007/24	W02-C03D	H04H-060/72	W02-D07E
H04B-007/26	W02-C03C		W02-F10E5
H04B-010	W02-C04	H04J	W02-K
H04B-010/03-079	W02-C04C1	H04J-001,-011	W02-K07C
H04B-010/11-118	W02-C04B2	H04J-001/00-20	W02-K01
H04B-010/25	W02-C04B1	H04J-003	W02-K02
H04B-010/2507-2569	W02-C04B1	H04J-003,H04Q	U21-B05E
	W02-C04A7	H04J-003/04	W02-K02
H04B-010/2575-2587	W02-C04B1	H04J-003/06	W02-K02A
H04B-010/27	W01-A06C1	H04J-003/07	W02-K02A3
	W02-C04	H04J-003/08	W02-K02B3
H04B-010/272	W01-A06B3	H04J-003/08,12-14	W02-K02B
	W01-A06C1	H04J-003/12	W02-K02B1
	W02-C04	H04J-003/14	W02-K02B5
H04B-010/275	W01-A06B2	H04J-004/00	W02-K07A
	W01-A06C1	H04J-004/00,-011/00	W02-K07
	W02-C04	H04J-011/00	W02-K07E
H04B-010/278	W01-A06B1	H04J-013	W02-K08
	W01-A06C1	H04J-013/00-06	W02-K05
	W02-C04	H04J-013/04	W02-K05A7
H04B-010/29-299	W02-C04A5	H04J-013/06	W02-K05A6
H04B-010/40-43	W02-C04A4	H04J-014	W02-K04
H04B-010/50-556	W02-C04A1	H04K	W02-L
H04B-010/564	W02-C04A1C		W02-F10N1
H04B-010/572-588	W02-C04A1	H04L	W01-A
H04B-010/60-69	W02-C04A3	H04L,H04B-010	W01-A07E
H04B-010/70-85	W02-C04	H04L-001	W01-A01
H04B-010/90	W02-C09		W03-A10A1
H04B-011	W02-C07	H04L-001/002-018	W01-A01A
H04B-014/02-06	W02-C06C	H04L-001/02	W01-A01A
	W02-C06	H04L-001/16	W01-A01A
H04B-015	W02-H	H04L-001/1607	W01-A01A
H04B-017	W02-C05	H04L-001/18-1809	W01-A01A
H04B-017/309	W02-C03E1	H04L-001/1812	W01-A01B4
H04B-017/318	W02-G03J1	H04L-001/1822-1867	W01-A01A
H04B-017/336	W02-G03J5	H04L-001/20-24	W01-A01C
H04B-017/391	W02-C03E5	H04L-005	W01-A03
H04H-020	W02-D	H04L-005/14-18	W01-A03D
	W02-F	H04L-005/22-26	W01-A03C
H04H-020/12-14	W02-D04	H04L-007	W01-A04
	W02-F04	H04L-007/02	W01-A04B
H04H-020/38	W02-F10	H04L-007/027	W01-A04B2
H04H-020/47-49	W02-E	H04L-007/033	W01-A04B1
	W02-F06B	H04L-007/04-10	W01-A04A
H04H-020/51	W02-D05A	H04L-007/06	W01-A04A1
	W02-E	H04L-007/08	W01-A04A2
	W02-F06A	H04L-007/10	W01-A04A9
	W02-F06B	H04L-009	W01-A05
H04H-020/59	W02-D		W01-A05E
	W02-F	H04L-009/06-30	W01-A05A
	W05-B08	H04L-009/32	W01-A05B
H04H-020/78-79	W02-F03A	H04L-012	W01-A06
H04H-020/81	W02-E	H04L-012/02-16	W01-A06
	W02-F06B	H04L-012/14	W01-A07K
H04H-020/88-9	W01-C05B5A	H04L-012/18	W01-A06E1A
	W02-D	H04L-012/24-26	W01-A06A
	W02-F		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04L-012/28	W01-A06B5A W01-A06B5B W01-A06B7	H04L-012/851-893	W01-A03B W01-A06A3 W01-A06E1L
H04L-012/28,H04M-011	W01-A06B5C	H04L-012/901-905	W01-A03B W01-A06E1 W01-A06G3
H04L-012/40	W01-A06B1	H04L-012/911-927	W01-A03B W01-A06E1L
H04L-012/403	W01-A06B1 W01-A06E2A	H04L-012/931-935	W01-A06G5
H04L-012/407	W01-A06B1 W01-A06E2B	H04L-012/937	W01-A06E1
H04L-012/417	W01-A06B1 W01-A06E2B	H04L-012/939-945	W01-A03B W01-A06A1 W01-A06E1
H04L-012/42	W01-A06B2	H04L-012/947	W01-A06E1J
H04L-012/423	W01-A06B2 W01-A06E2A	H04L-012/951-955	W01-A03B
H04L-012/427	W01-A06B2 W01-A06E2B	H04L-013-017	W01-A07
H04L-012/43	W01-A03C W01-A06B2	H04L-015/00-34	W01-A07A
H04L-012/433	W01-A06B2 W01-A06E2B	H04L-015/04-22	W01-A07A W01-A07C
H04L-012/437	W01-A06A W01-A06B2	H04L-015/24-34	W01-A07A W01-A07D
H04L-012/44	W01-A06B3 W01-A06B4	H04L-017/00-30	W01-A07B
H04L-012/46	W01-A06G3	H04L-017/02-14	W01-A07C W01-A07B
H04L-012/50-52	W01-A06G1	H04L-017/16-30	W01-A07D
H04L-012/54-58	W01-A06G2	H04L-025	W01-A08
H04L-012/66	W01-A06G3	H04L-025/03-04	W01-A08B2
H04L-012/70	W01-A03B	H04L-025/20-28	W01-A06G5G
H04L-012/701	W01-A03B W01-A06E1J	H04L-025/30-36	W01-A08C
H04L-012/703-713	W01-A03B W01-A06A1 W01-A06E1J	H04L-025/38-66	W01-A08A
H04L-012/715-749	W01-A03B W01-A06E1J	H04L-025/40-52	W01-A08A1
H04L-012/751	W01-A03B W01-A06A3 W01-A06E	H04L-025/48	W01-A08A1A
H04L-012/753	W01-A03B W01-A06A3 W01-A06E1J	H04L-025/50	W01-A08A1B
H04L-012/755	W01-A03B W01-A06A3 W01-A06E	H04L-025/52-66	W01-A06G5G
H04L-012/757	W01-A03B W01-A06A3 W01-A06E1J	H04L-027	W01-A09
H04L-012/759	W01-A03B W01-A06A3 W01-A06E	H04L-027/02-08	W01-A09A1
H04L-012/761	W01-A03B W01-A06E1A W01-A06E1J	H04L-027/02-16	W01-A09A
H04L-012/763	W01-A03B W01-A06E1J	H04L-027/10-16	W01-A09A2
H04L-012/771-775	W01-A06G5E	H04L-027/18-24	W01-A09B
H04L-012/781	W01-A03B W01-A06E1J W01-A06F2	H04L-027/26-30	W01-A09D W02-K05
H04L-012/801-841	W01-A03B W01-A06E1L W01-A06E1J	H04L-027/34-38	W01-A09C
		H04L-029	W01-A07G9 W01-A07X
		H04L-029,H05K-005	W01-A07J
		H04L-029/02	W01-A07F
		H04L-029/04	W01-A07F1
		H04L-029/06	W01-A07G
		H04L-029/08	W01-A07G1
		H04L-029/10	W01-A07H2
		H04L-029/10	W01-A07H1 W01-A07H4
		H04L-029/10-12	W01-A07H
		H04L-029/10-12, H04M-001	W01-C01R
		H04L-029/14	W01-A07L
		H04L-065/1101-1108	W01-A06F3
		H04L-065/403	W01-A06E1A
		H04M	W01-C
		H04M-001/00-78	W01-C01
		H04M-001/02,23	W01-C01A2
		H04M-001/24	W01-C01K
		H04M-001/26	W01-C01B8

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04M-001/26-56	W01-C01B	H04M-019/00-06	W01-C02E
H04M-001/27-278	W01-C01B1	H04M-019/02	W01-C01F1
H04M-001/30-54	W01-C01B7	H04M-019/08	W01-C01E
H04M-001/36,66	W01-C01B5	H04N	S06
H04M-001/56	W01-C01B3		S06-K
H04M-001/57	W01-C01F3		W03-A
H04M-001/57,66	W01-C01F		W04-F
H04M-001/58	W01-C01C3		W04-M
H04M-001/58-65	W01-C01C		W04-N
H04M-001/60	W01-C01C1		W04-P
H04M-001/64,65	W01-C01C5		W04-Q
	W01-C01P3	H04N-001	S06
H04M-001/66	W01-C01F5	H04N-001/024-032,23	S06-G
H04M-001/72	W01-C01D1	H04N-001/024-036,23-29	S06
H04M-001/725-737	W01-C01D1	H04N-001/028	S06-D05
H04M-001/738-76	W01-C01L	H04N-001/028,	U14-H01B
H04M-001/80	W01-C01N	H04N-001/028,001/19	S06-D
H04M-001-009	W01-C01G1	H04N-001/032	S06-G03
H04M-003	W01-C02	H04N-001/032,23	S06-H
H04M-003/02,18	W01-C02D5	H04N-001/032-036,23-29	S06
H04M-003/02-04	W01-C02D3	H04N-001/036	S06-E
H04M-003/06	W01-C02D1	H04N-001/04-20	S06-D03
H04M-003/08,22	W01-C02A7	H04N-001/04-20,31	S06-D04
H04M-003/08-14	W01-C02A	H04N-001/047,001/053	S06-D04A
H04M-003/22-36	W01-C02A1	H04N-001/21,32-44	S06-K07
H04M-003/36	W01-C02A1A	H04N-001/21,64	S06-K07A4
H04M-003/38	W01-C02B6	H04N-001/31	S06-K03
H04M-003/42	W01-C02B	H04N-001/32,333,42	S06-K07C4
H04M-003/44-45	W01-C02B5	H04N-001/32,36,42	S06-K07C5
H04M-003/46	W01-C02B2C	H04N-001/32,411,42,64	S06-K07C3
H04M-003/48	W01-C02B3	H04N-001/32-36,42-44	S06-K07C6
H04M-003/50-52	W01-C02B4		S06-K07C2B
H04M-003/53	W01-C02B4	H04N-001/32-36, 42-44,64	S06-K03C
H04M-003/533	W01-C02B7C	H04N-001/38-40,50	S06-K04A4C
H04M-003/54	W01-C02B2N	H04N-001/38-409,	
	W01-C02B2E	001/46-62	S06-K04A4C
H04M-003/54,58	W01-C02B2		S06-K07
H04M-003/56	W01-C02B1	H04N-001/38-409,52-62	S06-K07A4
H04M-003/58	W01-C02B2L	H04N-001/387	S06-K04A4B
H04M-003/58	W01-C02B2M	H04N-001/393	S06-K04A4A
H04M-003/60	W01-C02C	H04N-001/401	S06-K04A4A
H04M-003/60-64	W01-C02D	H04N-001/40-401	S06-K07A4
H04M-005	W01-C09	H04N-001/41-419,64	S06-K07A4D
H04M-007	W01-C03	H04N-001/44	S06-K07C7
H04M-009,-013	W01-C04	H04N-001/46,50-64	S06-K01
H04M-009/08	W01-C01G2	H04N-003	W03-A08A1
H04M-011	W01-C01P		W04-M
	W01-C05	H04N-003/02-08	W03-A08F
	W01-C01F6C		W04-M01E5
H04M-011/02,04	W01-C05A	H04N-003/09	W04-M01E1
H04M-011/06-10	W01-C05B		W04-M01E5
H04M-011/08	W01-C05B5A	H04N-003/16	W03-A08A1
	W01-C05B5C	H04N-003/18-19	W03-A08A1C
H04M-011/10	W01-C05B5E	H04N-003/20	W03-A08A7A
H04M-015	W01-C01B4	H04N-003/223	W03-A08A1F
	W01-C01J	H04N-003/227	W03-A08A1E
	W01-C06	H04N-003/23-237	W03-A08A1D
H04M-015/28,30	W01-C01J	H04N-003/24	W03-A08A7
H04M-017	W01-C07A	H04N-003/24,-005/46	W03-A08A7C
	W01-C07A	H04N-003/26	W03-A08A3A
H04M-017,-003	W01-C07A7	H04N-003/27	W03-A08A
H04M-017,-019	W01-C07		W03-A11B1A
H04M-019	W01-C07B	H04N-003/30	W03-A08A1J

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04N-003/30-32	W03-A08A1G	H04N-005/335,781,85	W04-M01B1E
H04N-003/36-40	W04-M02	H04N-005/341-349	W04-M01B5A
H04N-005	W03	H04N-005/44	W03-A01B5
	W04		W03-A15
H04N-005/04-06	W03-A06		W03-A
H04N-005/067-073	W04-M05		W03-A18A2
H04N-005/08	W03-A06A	H04N-005/44,-007/10	W03-A01A5
H04N-005/10	W03-A06C	H04N-005/44,-007/20	W03-A01A1
H04N-005/14	W03-A04	H04N-005/44,H04Q-009	W03-A02C5G
	W04-P	H04N-005/44,H05K	W03-A19
H04N-005/16-18	W03-A04C		W03-A19A
	W04-P01K		W03-A19C
H04N-005/202	W03-A04A	H04N-005/445	W03-A13
	W04-P01E1	H04N-005/45	W03-A13B
H04N-005/205	W03-A04B	H04N-005/455	W03-A03C
	W04-P01E	H04N-005/46	W03-A11
H04N-005/208	W03-A04B1	H04N-005/46,-009/66	W03-A05D1
	W04-P01E5	H04N-005/50	W03-A01C
H04N-005/21	W03-A04G		W03-A02A
	W03-A04H	H04N-005/52-56	W03-A03A
	W04-P01F	H04N-005/57	W03-A04D
	W03-A04G	H04N-005/58	W03-A04D5
H04N-005/21,-009/78	W03-A05B5	H04N-005/59	W03-A04D1
H04N-005/213	W02-G03B5	H04N-005/60	W03-A03
	W03-A04H	H04N-005/62	W03-A03C1
	W04-P01F1	H04N-005/63	W03-A07
H04N-005/217	W04-M01D6	H04N-005/64	W03-A09A1
	W04-P01H1	H04N-005/645	W03-A09A5
	W04-P01H3	H04N-005/65	W03-A08E
H04N-005/222	W04-N		W03-A08X
H04N-005/225	W04-M01C3		W03-A09
	W04-M01P5	H04N-005/655	W03-A09A5
	W04-M01D8	H04N-005/66	W03-A08
	W04-M01C	H04N-005/68	W03-A08A8
H04N-005/225,232	W04-M01D3C	H04N-005/70	W03-A08C
	W04-M01D		W03-A08X
	W04-M01D1	H04N-005/72	W03-A08E
H04N-005/225,232,278	W04-M01D4	H04N-005/74	W04-Q01
H04N-005/225,335	W04-M01M	H04N-005/76	W04-F
H04N-005/228	W04-M01A	H04N-005/761	W04-E04C8
H04N-005/232	W04-M01D5A	H04N-005/765-775	W04-K
	W04-M01D5B	H04N-005/78	W04-B
	W04-M01D5C	H04N-005/781	W04-B14
	W04-M01D	H04N-005/782-783	W04-B10G
H04N-005/262	W04-N05		W04-B10
H04N-005/262,272,-9/74	W04-N05C		W04-B10D
H04N-005/265	W04-N05B1		W04-B10
H04N-005/268	W04-N05B5	H04N-005/84	W04-C
H04N-005/272	W04-N05C5	H04N-005/84-85	W04-C10A3
H04N-005/272,275	W04-M01S	H04N-005/907	W04-P01C8
H04N-005/275	W04-N05C5A		W04-F01M
	W04-N05C5E		W04-P01C
H04N-005/278	W04-M01D4	H04N-005/91	W04-F01
	W04-N05C1A	H04N-005/911	W04-F01E
H04N-005/28	W04-N01	H04N-005/913	W04-F01L
H04N-005/30	W04-M01	H04N-005/91-956,-9/79-898	W04-F01
H04N-005/31	W04-M01F5		W04-F01F
H04N-005/32-325	W04-M01F1	H04N-005/919-917	W04-F01
H04N-005/33	W04-M01E1	H04N-005/92-973	W04-F01
H04N-005/335	W04-M01C3E	H04N-005/94-945	W04-F02A
	W04-M01B5	H04N-005/95-956	W04-F02B
	W04-M01B	H04N-007	W02-F
H04N-005/335,101/00	W04-M01B1		W04-P

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04N-007/01	W03-A11A	H04N-009/88-888	W04-F02A
	W04-N05A	H04N-009/89-898	W04-F02B
H04N-007/01,26	W04-F01H3A	H04N-011	W02-F02
	W04-N05A1	H04N-013/128	W04-N05C7
H04N-007/015	W02-F06C	H04N-013/189	W04-F01P
H04N-007/025	W02-F05B	H04N-013/194	W02-F03B
	W04-N05C1A	H04N-013/20-296	W04-M01L
H04N-007/081-088	W02-F05B	H04N-013/30-398	W03-A12A
	W03-A10	H04N-017	W02-F04
H04N-007/087	W03-A10C	H04N-017/04	W03-A18A1
	W03-A10A1	H04N-017/06	W04-J07
H04N-007/10	W02-F03A	H04N-019	W04-P01A
H04N-007/10,173	W03-A16C5G	H04N-019/34-36	W04-P01A4S
H04N-007/12	W02-F07M	H04N-019/50	W04-P01A5
H04N-007/14	W02-F08	H04N-019/60	W04-P01A3
H04N-007/15	W02-F08A	H04N-019/61-615	W04-P01A4
H04N-007/16	W02-F05A	H04N-019/67	W04-P01A6
	W03-A16C3	H04N-019/91-93	W04-P01A4J
H04N-007/16-173	W02-F10N1	H04N-021	W02-F10
H04N-007/167-171	W02-F05A1A		W03-A16
	W02-F05A1B	H04N-021/20-222	W02-F10K
	W02-F10N1	H04N-021/2225	W02-F10A1
	W03-A16C3A		W02-F10K
H04N-007/173	W02-F10		W03-A16C5A
	W03-A16C5	H04N-021/226-233	W02-F10K
H04N-007/18	W02-F01	H04N-021/234-2343	W02-F10A
H04N-007/20	W02-F06A		W02-F10K
	W02-F03A7	H04N-021/2347	W02-F10A
H04N-007/22	W02-F03A3		W02-F10K
H04N-007/24-28	W02-F07M		W02-F10N1
	W04-F01F	H04N-021/235-2362	W02-F05C
	W04-P01A		W02-F10K
H04N-007/30	W02-F07B		W02-F10N1
	W04-P01A3	H04N-021/2365-2368	W02-F10A
H04N-007/32-44	W02-F07C		W02-F10K
	W04-P01A5	H04N-021/237-2385	W02-F10K
H04N-007/46	W02-F07D	H04N-021/2387	W02-F10K
	W04-P01A7		W04-E20T
H04N-007/48-50	W02-F07M	H04N-021/2389	W02-F10
	W04-P01A4	H04N-021/239	W02-F10N7
H04N-007/52-68	W02-F07M	H04N-021/24-254	W02-F10K
	W04-P01A	H04N-021/2543-2547	W02-F10N5
H04N-009/04-10	W04-M01	H04N-021/258	W02-F10N
H04N-009/24	W03-A08A5E		W02-F10Q
H04N-009/28-285	W03-A08A5	H04N-021/262	W02-F10
H04N-009/29	W03-A08A4	H04N-021/266	W02-F10A
H04N-009/31	W04-Q01	H04N-021/2662	W02-F07M1A
H04N-009/44	W03-A05A		W02-F10A
H04N-009/45	W03-A05A1	H04N-021/2665	W02-F10
H04N-009/455	W03-A05A3	H04N-021/2668	W02-F10Q
H04N-009/65	W04-Q05	H04N-021/27-274	W02-F10K
H04N-009/66	W03-A05D	H04N-021/2743	W02-F10A
H04N-009/67	W03-A05E		W02-F10F
H04N-009/68-69	W03-A05C		W02-F10K
H04N-009/70-71	W03-A05C3	H04N-021/2743-2747	W02-F10A
H04N-009/73	W03-A05C5		W02-F10K
	W04-P01D	H04N-021/278	W02-F10E5
H04N-009/74	W04-N05C	H04N-021/40-414	W03-A16
H04N-009/75	W04-N05C5A	H04N-021/4147	W03-A16E1
H04N-009/76	W04-N05B1	H04N-021/418	W03-A16C3C
H04N-009/78	W03-A05B	H04N-021/4223	W03-A16
	W04-P01L		W04-M01
H04N-009/79-877	W04-F01D		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04N-021/4227	W03-A16	H04N-023/17	W04-M01E5
	W03-G05A	H04N-023/20, 21, 23	W04-M01E1
	W04-E04	H04N-023/30	W04-M01F1
H04N-021/426-43	W03-A16	H04N-023/40	W04-M01D6
H04N-021/431	W03-A02C5A	H04N-023/45	W04-M01B7
	W03-A16	H04N-023/50	W04-M01G
	W04-E04A	H04N-023/51, 52	W04-M01G1A
	W04-J03C	H04N-023/53	W04-M01D3
H04N-021/432-4335	W03-A16E1	H04N-023/54	W04-M01G1B
	W04-B14C3	H04N-023/55	W04-M01B8
H04N-021/436-4367	W03-A16	H04N-023/56	W04-M01H
	W03-G05C1	H04N-023/57	W04-M01G7
H04N-021/437	W02-F10N7	H04N-023/58	W04-M01B8
H04N-021/438-439	W03-A16	H04N-023/60	W04-M01D2
H04N-021/44	W03-A16C5A	H04N-023/61	W04-M01D2C
H04N-021/4402	W03-A11A	H04N-023/611	W04-M01D2F
	W03-A16C5A	H04N-023/617	W04-M01D2S
H04N-021/4405-4408	W03-A16C3	H04N-023/62	W04-M01D3
	W03-A16C5A	H04N-023/63	W04-M01D3A
H04N-021/441-4415	W03-A16C3C	H04N-023/65	W04-M01P
	W03-A18A6	H04N-023/66	W04-M01D3
H04N-021/442-4425	W03-A16	H04N-023/661	W04-M01D2X
	W03-A18A2		T01-N01D3
H04N-021/443	W03-A16	H04N-023/663	W04-M01B8
	W03-A18A2	H04N-023/667	W04-M01D3
	W03-A18A8		W04-M01D2F
H04N-021/45	W03-A18A5C	H04N-023/67	W04-M01D2E
H04N-021/454-4545	W03-A18A5G	H04N-023/68	W04-M01D7
H04N-021/458	W03-A16G	H04N-023/69	W04-M01C1B
	W03-A18A8A	H04N-023/695	W04-M01G7
H04N-021/462	W03-A11A		W04-M01D2C
	W03-A13J	H04N-023/698	W04-M01S
H04N-021/4623-4627	W03-A16C3	H04N-023/70	W04-M01B8
H04N-021/466	W03-A18A5C		W04-M01D2E
H04N-021/47-4728	W03-A16C5	H04N-023/71	W04-M01B8
H04N-021/475	W03-A18A5C		W04-M01D2E
	W03-A18A6	H04N-023/72	W04-M01D2C
H04N-021/478	W03-A16C5	H04N-023/73, 74	W04-M01D2A
H04N-021/4782	T01-N03A1	H04N-023/741	W04-M01D2C
	W03-A16C5K		W04-M01B8
H04N-021/4786	T01-N01C	H04N-023/743	W04-M01D2A
	W03-A16C5K	H04N-023/745	W04-M01H1
H04N-021/4788	T01-N03A1C	H04N-023/75	W04-M01C
	W03-A16C5K	H04N-023/76-85	W04-M01D6A
H04N-021/60-61	W01-A06	H04N-023/86	W04-M01B8
	W02-F03	H04N-023/87, 88	W04-N05C
	W02-F10	H04N-023/90	W04-N01
H04N-021/6334	W02-F10N3	H04N-023/95	W04-M01H
H04N-021/637-6379	W02-F10N7	H04N-023/951	W04-N05C5
H04N-021/64-6547	W02-F10	H04N-023/955	W04-N05C1
H04N-021/658-6587	W02-F10N7	H04N-023/957	W04-M01H1
H04N-021/80-8355	W02-F10	H04N-023/958	W04-M01D2C
H04N-021/8358	W02-F10N1C	H04N-023/959	W04-M01D2C
	W04-F01L3		W04-N05C7
	W04-G01L3	H04N-25/00	W04-M01B5
H04N-021/84-8405	W02-F10E5	H04N-25/10-17	W04-M01B5
H04N-021/845-858	W02-F10	H04N-25/20,21	W04-M01B5
H04N-023/00	W04-M01B5	H04N-25/30	W04-M01F1
H04N-023/10	W04-M01B5A	H04N-25/40	W04-M01B5A
H04N-023/11	W04-M01F	H04N-25/42	W04-M01D1
H04N-023/12, 13	W04-M01B5	H04N-25/44-447	W04-M01E5
H04N-023/15	W04-M01D7	H04N-25/46	W04-M01E5C
H04N-023/16	W04-M01C3A	H04N-25/47	W04-M01B8

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04N-25/48	W04-M01B8A	H04R,H04N-005/44	W03-A15C
H04N-25/50,51	W04-M01B8B	H04R,H04R-001	W04-S01C
H04N-25/53-535	W04-M01B8X	H04R,H04R-025	W04-Y02
H04N-25/57-59	W04-M01B8B	H04R,H04R-027	W04-S05C
H04N-25/60-628	W04-M01B8C	H04R-001	V06-V02
H04N-25/63-633	W04-M01B8X		W04-S01
H04N-25/65	W04-M01B5	H04R-001,-027	W04-S
H04N-25/67-677	W04-M01C3	H04R-001/02-04,14-18	V06-V02E
H04N-25/68-69	W04-M01G1B		V06-V02F
H04N-25/70-709	W04-M01G1B	H04R-001/20-40	V06-V02G
H04N-25/71-715	W04-M01B7	H04R-001/20-40	W04-S01E5
H04N-25/72,73	W04-M01B5	H04R-003	V06-V02S
H04N-25/74	W04-M01B5A		W04-T
H04N-25/75	W04-M01D6A	H04R-005	W04-R
H04N-25/76-79	W04-M01B5A	H04R-007	V06-V02A
H04N-101/00	W04-M01B1	H04R-009	V06-V01A
H04Q	W03-G05	H04R-009-023	V06-V
	W01-B	H04R-011-015,-023	V06-V01A2
H04Q-001/02-16	W01-B20		V06-V04B
H04Q-001/20-26	W01-B08		V06-V01X
H04Q-001/30-50	W01-B09	H04R-017	V06-V01B
H04Q-003	W01-B01	H04R-019	V06-V01C
	W01-B02	H04R-025	W04-Y
H04Q-003/545	W01-B02A1	H04R-027	W04-S05
H04Q-003/54-555	W01-B02A	H04R-029	V06-V03B
H04Q-003/58-68	W01-B03A	H04R-031	V06-V03
H04Q-003/58-78	W01-B03	H04S	W04-R
H04Q-003/70-78	W01-B03C	H04S-003	W04-R01E
H04Q-005/00-24	W01-B04	H04S-005	W04-R01A
H04Q-007	W01-B05	H04S-007	W03-C03A
H04Q-007,H04B-007/26	W01-B05A		W04-R
	W02-C03C	H04W	W01-A06C4
H04Q-007/06	W01-B05A	W01-B05A1	
H04Q-007/08	W01-B05A5		W02-C03C
	W05-A05C	H04W-004/02-04	W01-C02B7L
H04Q-007/10	W01-B05A5	H04W-004/06	W01-A06E1A
	W05-A05C1E		W01-B05A1M
H04Q-007/12	W01-B05A5	H04W-004/10	W01-C05B4G
	W05-A05C	H04W-004/14	W01-B05A1F
H04Q-007/14-18	W05-A05C1A		W01-C02B7D
H04Q-007/20	W01-B05A	H04W-004/16	W01-C02B2
	W02-C03C	H04W-004/24-26	W01-A06E1E
H04Q-007/22	W01-B05A1A		W01-C06
	W02-C03C1	H04W-008/00	W01-A06E
H04Q-007/24	W01-B05A1	H04W-008/02	W01-A06E1
H04Q-007/26	W01-B05A1		W01-B05A1
	W01-C02G5		W02-C03C1E
H04Q-007/28	W01-B05A	H04W-008/04-06	W01-A06E1
	W01-B05A7		W01-E01C1
	W02-C03C3G		W01-E01C3
H04Q-007/30	W01-B05A		W02-C03C1E
	W02-C03C1B	H04W-008/08-16	W01-A06E1
	W02-C03C3B		W01-B05A1
H04Q-007/32	W01-C01D1		W02-C03C1E
	W01-C01D3	H04W-008/18	W01-A06E
H04Q-007/34	W01-B05A		W01-B05A1
	W01-B08	H04W-008/20	W01-E01C5
	W01-C01K	H04W-008/22	W01-A06E
	W02-C05		W01-B05A1
H04Q-009	W03-G05A	H04W-008/24	W01-E01C5
	W05-D	H04W-008/26-28	W01-A06E1
H04Q-011	W01-B07		W01-B03C
H04R	V06-V		W01-B05A1

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04W-008/30	W01-A06E	H04W-072/0457	W02-C03R1C
H04W-012	W01-A06E1C	H04W-072/06	W02-C03R1
	W01-C02B6A	H04W-072/08	W02-C03R1
H04W-016/02-16	W01-A06E1L		W02-G03J5
	W02-C03G1	H04W-072/10	W02-C03R1
H04W-016/22	W01-A06D	H04W-072/11	W02-C03R1D
	W02-C03E5	H04W-072/115	W02-C03R1E
H04W-016/24	W02-C03C1	H04W-072/12	W02-C03R1
H04W-016/26	W02-C03C1B		W01-A06A3
H04W-016/28	W02-C03A4	H04W-072/121	W02-C03R1
	W02-C03C1		W01-A06A3
H04W-016/30-32	W02-C03C1A	H04W-072/1263	W02-C03R1
H04W-024/00-04	W01-A06A		W01-A06A3
	W01-A06E	H04W-072/1268	W02-C03R1F
H04W-024/06	W01-A06A3	H04W-072/1273	W02-C03R1G
	W01-A06D	H04W-072/14	W02-C03R1
	W02-C03E5	H04W-072/20	W02-C03R4
H04W-024/08	W01-A06A3	H04W-072/21	W02-C03R4
H04W-028/00-26	W01-A06E1L		W02-C03R1F
	W02-C03G1	H04W-072/23	W02-C03R4
H04W-028/00-088	W01-A06A3		W02-C03R1G
	W01-A06E1L	H04W-072/231	W02-C03R4
H04W-036/00-18	W02-C03C1D	H04W-072/232	W02-C03R4
H04W-036/20	W02-C03C1D	H04W-072/25	W02-C03R4
	W02-H01J5	H04W-072/27	W02-C03R4
H04W-036/22-28	W02-C03C1D	H04W-072/29	W02-C03R4
H04W-036/22	W01-A06A3	H04W-072/30	W02-C03R5
	W01-A06E1L	H04W-072/40	W02-C03R6
H04W-036/30	W01-A01C	H04W-072/50	W02-C03R1
	W02-C03C1D	H04W-072/51	W02-C03R1
	W02-G03J1A	H04W-072/512	W02-C03R1
	W02-G03J5A	H04W-072/52	W02-C03R1
H04W-036/32-38	W02-C03C1D		W01-A06A3
H04W-040/00-38	W01-A06E1J	H04W-072/53	W02-C03R1
H04W-048/00-20	W01-A06E1	H04W-072/54	W02-C03R1
H04W-052/00-04	W02-C03E3		W02-G03J5
H04W-052/06-16	W02-C03E3A	H04W-072/541	W02-C03R1
H04W-052/18	W02-C03E3		W02-G03J5
H04W-052/20	W01-A01C1C	H04W-072/542	W02-C03R1
	W02-C03E3		W02-G03J5
H04W-052/22	W02-C03E3	H04W-072/543	W02-C03R1
H04W-052/24	W02-C03E3		W02-G03J5
	W02-G03J1A	H04W-072/56	W02-C03R1
	W02-G03J5A	H04W-072/563	W02-C03R1
H04W-052/26	W01-A06A3	H04W-072/566	W02-C03R1
	W02-C03E3	H04W-074/00-04	W01-A06F1
H04W-052/28-38	W02-C03E3		W02-K
H04W-052/40	W02-C03A	H04W-074/06	W01-A06F1C
	W02-C03C1D	H04W-074/08	W01-A06F1A
	W02-C03E3		W01-A06F1G
H04W-052/44	W02-C03E3	H04W-076/45	W01-C05B4G
H04W-052/46	W02-C03B2	H04W-080/00	W01-A06F
	W02-C03E3	H04W-080/02-06	W01-A06F2
H04W-052/48	W01-A01A	H04W-080/08	W01-A06F
	W02-C03E3	H04W-080/10-12	W01-A06F3
H04W-052/50	W02-C03E3	H04W-084/00-02	W01-A06B5
H04W-052/52	W02-C03E3	H04W-084/04-08	W01-A06B5B
	W02-G01C1	H04W-084/10-16	W01-A06B5A
H04W-052/54-60	W02-C03E3	H04W-084/18-22	W01-A06B8
H04W-060/00-06	W01-E01C3	H04W-088/02-06	W01-A07H2
H04W-064/00	W02-C03C1E		W01-C01D3
H04W-072/00-14	W01-A06E1L		W02-C03C1C
	W02-C03G1		

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H04W-088/08-12	W01-A06G5C W01-B05A1 W02-C03C1B	H05H	V05-E03A V05-E03B V05-E03C
H04W-088/14	W01-A06G3	H05H,H05G-002	V05-E03
H04W-088/16	W01-A06G5C	H05H-001	X14-F U11-C09C
H04W-088/18	W01-A06A W01-A06E	H05H-003/06	V05-E06
H05B	X25-B X26-C	H05H-003-005,-007	X14-G
H05B-001	X25-B04	H05H-007,-011-013	X14-G02
H05B-003	X27-C02 V01-A02A7D X25-B01 X27-E02	H05H-007-009	X14-G01
H05B-003/02-08	X25-B01A	H05K	W03-G01 W02-A07B1
H05B-003/10-18	X25-B01B	H05K-001	V04-Q
H05B-003/22-38	X25-B01C	H05K-001/02	V04-Q05
H05B-003/34-38	X25-B01C3	H05K-001/03-05	V04-R07L
H05B-003/42-58	X25-B01D	H05K-001/09	V04-R02P
H05B-003/60-66, 78-82	X25-B01E	H05K-001/11	V04-Q01
H05B-003/62-66	X25-B01E1	H05K-001/14	V04-Q02B
H05B-003/68-76	X25-B01C1B	H05K-001/16	V04-Q04
H05B-003/78-82	X25-B01E2	H05K-001/18	V04-Q02A
H05B-003/84-86	X25-B01C1C	H05K-003	U14-H03F U14-H03F1 U14-H03F2
H05B-006	X25-B02	H05K-003	V04-R
H05B-006/02-34	X25-B02A	H05K-003/02-08	V04-R01C
H05B-006/36-44	X25-B02A1	H05K-003/10-20	V04-R02
H05B-006/46-62	X25-B02D	H05K-003/22	V04-R03
H05B-006/64-80	X27-C01 X25-B02B	H05K-003/24	V04-R03A
H05B-006/80	X25-B02B1	H05K-003/26	V04-R03C
H05B-007	X25-B03	H05K-003/28	V04-R03E
H05B-007/02-14	X25-B03A	H05K-003/30-32,36	V04-R04
H05B-007/16-22	X25-B03B	H05K-003/34	V04-R04A
H05B-031	X26-A01A	H05K-003/38	V04-R07P1
H05B-033	U14-J X26-J	H05K-003/42	V04-R02C
H05B-033,H01L-041	U11-C01J7	H05K-003/44	V04-R07B
H05B-033/04	U14-J02B	H05K-003/46	U14-H03F V04-R05A
H05B-033/06,26,28	U14-J02A	H05K-005/02	V04-S
H05B-033/08	U14-J03	H05K-005/04-06	V04-S01
H05B-033/10	U14-J01	H05K-005/06	V04-S02A
H05B-037	X26-C03	H05K-005/10-15	V04-S30
H05B-037/02	X26-C03A	H05K-007	V04-T
H05B-037/03-04	X26-C03X	H05K-007/02-12	V04-T01
H05B-039	X26-C02	H05K-007/14-18	V04-T02
H05B-041	X26-C01	H05K-007/20	U24-D01G V04-T03 X12-J01G
H05B-041/02-12	X26-C01B1	H05K-009	V04-U
H05B-041/14-24	X26-C01B	H05K-011	W03-G03
H05B-041/14-298	X26-C01B2	H05K-013	V04-V X12-D07D
H05B-041/231	X26-C01B4	H05K-013,H02G-003	X22-X01B
H05B-041/232-234	X26-C01B5	H05K-013/02	V04-R04 V04-R04G
H05B-041/26-29	X26-C01B2A	H05K-013/02-04	V04-V01
H05B-041/30-34	X26-C01A	H05K-013/06	V04-V02
H05B-041/36,44-46	X26-C01X	H05K-013/08	V04-V09
H05B-041/38-42	X26-C01C	H10B-0	U14-A03
H05F	X25-S	H10B-010/00	U14-A03A
H05G	V05-E	H10B-010/10	U14-A03A1
H05G-001	V05-E02	H10B-012/00, 10	U14-A03B4
H05G-001/10-24	V05-E02A	H10B-020/00, 10	U14-A03B7
H05G-001/30-54	V05-E02C	H10B-020/20 - 20/25	U14-A06B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H10B-041/00-70	U14-A03B7	H10H 20/823	U12-A01A1B
H10B-043/00-50	U14-A03B7	H10H 20/824,825	U12-A01A1A
H10B-051/00-50	U14-A03F	H10H 20/826	U12-A01A1C
H10B-053/00-50	U14-A03F	H10H 20/83	U12-A01A2
H10B-061/00	U14-A04A	H10H 20/831,832	U12-A01A
H10B-063/00 - 63/10	U14-A03H	H10H 20/833	U12-A01A1X
H10B-069/00	U14-A06C	H10H 20/85	U12-A01A4
H10B-080/00	U14-A03F	H10H 20/851	U12-A01A4B
	U14-A10	H10H 20/852	U12-A01A4
H10D-080/30	U12-Q	H10H 20/853	U12-A01A
H10D-001/40, 43, 47	U12-C03A	H10H 20/854	U12-A01A6
H10D-001/60, 62	U12-C02A	H10H 20/857	U12-A01A4
H10D-008/20, 25	U12-C01D	H10H 29/01	U12-A01A2
H10D-008/40	U12-C01E	H10H 29/32	U12-A01A5
H10D-008/50, 60, 80	U12-C01C	H10H 29/34,37	U12-A01A4B
H10D-008/70, 75	U12-C01G	H10H 29/41	U12-A01A5
H10D-010	U12-D01A	H10H 29/45,49	U12-A01A5B
H10D-012	U12-D01	H10H 29/80	U12-A01A5
H10D-018/40	U12-D01B1	H10H 29/85	U12-A01A4
H10D-018/60-65	U12-D01B3	H10H 29/851	U12-A01A4B
H10D-018/80	U12-D01B2	H10H 29/852	U12-A01A4
H10D-044	U11-C18B9	H10H 29/853	U12-A01A
	U12-D02X	H10H 29/854	U12-A01A4
H10D-030/43	U12-D02D1	H10K-010/20 - 10/43	U21-B01A
H10D-048/34	U12-D01	H10K-010/46	U21-B01B
H10D-048/36	U12-D02	H10K-019/10	U12-D02A
H10D-062/822, 83	U12-E01A3	H10K-019/10	U21-B01B
H10D-062/824,85	U12-E01A1	H10K-030/00 - 30/65	U12-A02
H10D-062/826,86	U12-E01A2	H10K-030/00	U12-A02
H10D-064	U12-E02	H10K-030/50-57	X15-A02
H10D-089/60	U13-E01	H10K-030/80 - 30/89	U12-A02A
H10F	X15-A02	H10K-039	X15-A02
H10F-010	U12-A02A8	H10K-039/00	U12-A02A5
H10F-0142, 161	U12-A02A4C	H10K-039/10	U12-A02A2D
H10F-010/163	U12-A02A2B	H10K-039/10-18	X15-A02F
H10F-010/164	U12-A02A2C	H10K-039/12 - 39/36	U12-A02A
H10F-010/172	U12-A02A4C	H10K-039/18	X15-A02C
H10F-019/30, 31	U12-A02A2F	H10K-050/00 - 50/30	U12-A02A2D
H10F-019/80	U12-A02A5	H10K-050/80 - 50/88	U12-A01A2
H10F-019/85	U12-A02A4D	H10K-059/00 - 59/88	U12-A02A2D
H10F-030/10	U12-A02B1	H10K-059/90 - 59/95	U12-A02A2D
H10F-030/20, 24-28	U12-A02B2B	H10K-065/00	U12-A02C1
H10F-030/22	U12-A02B2A	H10K-071/00 - 71/80	U11-C01
H10F-030/29	U12-A03	H10N-010/00	U14-E05
H10F-039/10-12, 18, 90, 95	U13-A	H10N-010/01	U14-E05C
	U13-A01	H10N-010/10	U14-E05
H10F-039/12	U13-A01	H10N-010/13	U14-E05A2
H10F-039/15	U13-A02	H10N-010/17	U14-E05A3
H10F-039/18	U13-A01	H10N-010/80-82	U14-E05A
H10F-039/15	U13-A02	H10N-010/85-857	U14-E05B
H10F-055	U12-A02A9	H10N-015/00	U14-E02
	U12-A02D	H10N-015/10	U14-E05
H10F-055/20	U12-A02C1	H10N-015/20	U14-E02
H10F-071	U12-A02A1	H10N-019/00	U14-E
H10F-077/30, 48	U12-A02A4D	H10N-030/00	V06-V
H10F-077/124	U12-A02A2B	H10N-030/01-098	V06-V03A
H10F-077/122	U12-A02A2C	H10N-030/20	V06-V04C
H10F-077/20	U12-A02A4A	H10N-030/30	V06-V04G
H10H 20/00	U12-A01A	H10N-030/40	V06-V04F
H10H 20/01,80	U12-A01A2	H10N-030/50	V06-V01B1
H10H 20/81	U12-A01A1	H10N-030/80	V06-V02
H10H 20/811,812	U12-A01A1X	H10N-030/85-857	V06-V02R
H10H 20/813	U12-A01A1	H10N-030/87	V06-V02B

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H10N-030/88	V06-V02H V06-V02E V06-V02F	H10P-034/00 H10P-034/42 H10P-036/00	U11-D02B1 U11-C07A4 U11-C02
H10N-035/00-85	V06-V01D	H10P-036/20	U11-C02
H10N-039/00	U13-D04	H10P-050/00	U11-C07C
H10N-050/01	U12-B01A	H10P-050/20	U11-C07A1
H10N-050/10	U12-B01	H10P-050/24	U11-C07C
H10N-050/20	U12-B	H10P-050/26	U11-C07C02
H10N-050/80-85	U12-B01A	H10P-050/28	U11-C07C03
H10N-052/00,01	U12-B01A	H10P-050/60	U11-C07B
H10N-052/80	U12-B01	H10P-050/61	U11-C07A2
H10N-052/85	U12-B01A	H10P-050/64	U11-C07C
H10N-059/00	U12-B01	H10P-050/66	U11-C07C02
H10N-060/00-12	U14-F	H10P-050/68	U11-C07C03
H10N-060/20, 30	T03-A01E	H10P-052/00	U11-C06A1A
H10N-060/35, 355	U14-F02B	H10P-052/20	U11-C06A1
H10N-060/80-83	U14-F	H10P-052/40	U11-C06A1
H10N-060/84, 85	T03-C07	H10P-054/00	U11-C06A2
H10N-069/00	U14-F01	H10P-054/20	U11-C07A4, U11-C06A2
H10N-070/00	U24-G02E	H10P-054/30	U11-C07A4, U11-C06A2
H10N-070/10	U24-G04D	H10P-054/40	U11-C06A2
H10N-079/00	U14-A03H	H10P-054/50	U11-C06A2
H10N-080/00,10	U12-B02A	H10P-054/92	U11-C06A2
H10N-089/00	U12-B02A	H10P-054/94	U11-C06A1B
H10N-097/00	U12-B03	H10P-056/00	U11-C01J8A
H10P 10/00	U11-C01J8A	H10P-058/00	U11-C06A2
H10P 14/00	U11-C05C2A	H10P-070/00	U11-C06A1B
H10P 14/22	U11-C01A	H10P-072/00	U11-F02A2
H10P 14/24	U11-C01B	H10P-072/30	U11-F02A4
H10P 14/26	U11-C01B	H10P-072/50	U11-F02B
H10P 14/40	U11-A08B	H10P-072/70	U11-F02A4
H10P 14/43	U11-C01B	H10P-072/72	U11-F02A2
H10P 14/44	U11-C01A	H10P-072/76	U11-F02A2
H10P 14/45	U11-C01A3	H10P-072/78	U11-F02A2
H10P 14/46	U11-C01B	H10P-074/00	U11-F02A2
H10P 14/47	U11-C05C6	H10P-074/20	U11-C04A1E
H10P 14/60	U11-A08A	H10P-076/00	U11-C04D
H10P 14/61	U11-C04D	H10P-076/20	U11-C04D
H10P 14/68	U11-A06A	H10P-076/40	U11-C04D
H10P-010/00	U11-C01J8A	H10P-095/00	U11-C09X
H10P-014/00	U11-C05C2A	H10P-095/90	U11-C03A
H10P-014/22	U11-C01A	H10W-010/00	U11-C08
H10P-014/24	U11-C01B	H10W-010/10	U11-C08A3
H10P-014/26	U11-C01B	H10W-010/13	U11-C08A2
H10P-014/40	U11-A08B	H10W-010/17	U11-C07D4
H10P-014/43	U11-C01B	H10W-010/30	U11-C08A1
H10P-014/44	U11-C01A	H10W-010/40	U11-C08A3
H10P-014/45	U11-C01A3	H10W-015/00	U11-C08b9
H10P-014/46	U11-C01B	H10W-020/00	U11-C01J8A
H10P-014/47	U11-C05C6	H10W-020/00	U11-C01J8
H10P-014/60	U11-A08A	H10W-020/20	U11-C05G2
H10P-014/61	U11-C04D	H10W-020/40	U11-C05G2
H10P-014/68	U11-A06A	H10W-020/41	U11-C05C6
H10P-014/69	U11-A06B	H10W-020/42	U11-C05G2
H10P-030/00	U11-C02B2	H10W-020/43	U11-C05G2
H10P-030/20	U11-C02J	H10W-020/44	U11-C05C
H10P-030/22	U11-C04D	H10W-020/45	U11-C05B9
H10P-030/28	U11-C02J	H10W-020/47	U11-C05B9
H10P-030/40	U11-C02J3	H10W-020/48	U11-C05B9
H10P-032/00	U11-C02J	H10W-020/49	U11-C05G
H10P-032/10	U11-C02J	H10W-040/00	U13-E01
H10P-032/20	U11-C02J3	H10W-040/20	U11-D02B
H10P-032/30	U11-C02J3	H10W-040/25	U11-D02B1

Appendix 3: IPC to EPI Manual Code Approximate Concordance

H10W-040/28	U11-D02D2
H10W-040/30	U11-D02D1
H10W-040/40	U11-D02D1
H10W-040/47	U11-D02D1
H10W-040/60	U11-D02B2
H10W-040/70	U11-D02B
H10W-040/80	U11-D01C6
H10W-042/00	U11-D01C6
H10W-042/20	U11-D01C5
H10W-042/25	U11-D01C2
H10W-042/40	U11-D01C4
H10W-042/60	U11-D01C3
H10W-042/80	U11-D01C9
H10W-046/00	U11-D01C9
H10W-070/00	U11-D01A
H10W-070/02	U11-D01A1
H10W-070/04	U11-D03A1A
H10W-070/09	U11-D01A8
H10W-070/40	U11-D03A1A
H10W-070/60	U11-D01A9
H10W-070/62	U11-C05D
H10W-070/63	U11-C05G2C
H10W-070/65	U11-C05D
H10W-070/66	U11-C05D
H10W-070/67	U11-C05B1
H10W-070/68	U11-C05B2
H10W-070/685	U11-C05B9
H10W-070/69	U11-C05B9
H10W-070/695	U11-C05A1
H10W-070/698	U11-C05B6
H10W-072/00	U11-D03B
H10W-072/20	U11-D03B
H10W-072/29	U11-D03B1
H10W-072/40	U11-D03B3
H10W-072/49	U11-D03B1
H10W-072/50	U11-E01A
H10W-072/59	U11-D03B1
H10W-072/90	U11-D03B
H10W-074/00	U11-E02A
H10W-074/01	U11-E02A
H10W-074/15	U11-E01C
H10W-076/13	U11-C05D
H10W-076/132	U11-C05C2
H10W-076/134	U11-C05C2
H10W-076/136	U11-C05C2
H10W-076/138	U11-C05C2
H10W-076/15	U11-C05B9
H10W-076/153	U11-C05B9
H10W-076/157	U11-C05B9
H10W-076/17	U11-C05
H10W-076/40	U11-E02A
H10W-076/60	U11-E02A
H10W-078/00	U11-F02A4
H10W-080/00	U11-C01J8A
H10W-090/10	U11-D01A6
H10W-090/15	U11-D01A6
H10W-090/20	U11-D01A6
H10W-090/22	U11-D01A6
H10W-090/24	U11-D01A6
H10W-090/26	U11-D01A6
H10W-090/28	U11-D01A6

Appendix 4: Concise Guide to EPI and Mechanical Classification

In the following list, the main IPCs for each class are indicated purely as a guide.

P1 AGRICULTURE, FOOD TOBACCO

P11 Soil working, planting

(A01B, C)

P12 Harvesting

(A01D, F)

P13 Plant culture, dairy products

(A01G, H, J)

P14 Animal management and care

(A01K, L, M)

P15 Tobacco

(A24)

P2 PERSONAL, DOMESTIC

P21 Wearing apparel

(A41, A42)

P22 Footwear

(A43)

P23 Haberdashery, jewellery

(A44).

P24 Hand, travelling articles, brushes

(A45, A46)

P25 Office furniture

(A47B)

P26 Chairs, sofas, beds

(A47C, D)

P27 Shop, household, furnishings, upholstery

Covers upholstery from 201201, prior to 2012 this was classified as Q39.

(A47F, G, H, B68F, G)

P28 Kitchen, sanitary equipment

(A47J, K, L)

P3 HEALTH, AMUSEMENT

P31 Diagnosis, surgery

(A61B)

P32 Dentistry, bandages, veterinary, prosthesis

(A61C, D, F)

P33 Medical aids, oral administration

(A61G, H, J)

P34 Sterilising, syringes, electrotherapy

(A61L, M, N)

P35 Life-saving, fire-fighting

(A62)

P36 Sports, games, toys, saddlery

Covers saddlery from 201201, prior to 2012 this was classified as Q39.

(A63, B68B, C)

P4 SEPARATING, MIXING

P41 Crushing: centrifuging, separating solids

(B02, B03, B04, B07)

P42 Spraying, atomising

(B05)

P43 Sorting, cleaning, waste disposal

(B06, B08, B09)

P5 SHAPING METAL

P51 Rolling, drawing, extruding
(B21B, C)

P52 Metal punching, working, forging
(B21D-L)

P53 Metal casting, powder metallurgy
(B22)

P54 Metal milling, machining
(B23B-H)

P55 Soldering, welding metal
(B23K)

P56 Machine tools
(B23P, Q)

P6 SHAPING NON-METALS

P61 Grinding, polishing
(B24)

P62 Hand tools, cutting
(B25, B26)

P63 Working, preserving wood
(B27)

P64 Working cement, clay, stone
(B28)

P7 PRESSING, PRINTING

P71 Presses
(B30)

P72 Working paper
(B31)

P73 Layered products
(B32)

P74 Printing: lining machines
(B41B-G)

P75 Typewriters, stamps, duplicators
(B41JN)

P76 Books, special printed matter
(B42)

**P77 Writing, drawing appliances,
bureau/desk accessories**
(B43)

P78 Decorative art
(B44)

P8 OPTICS, PHOTOGRAPHY, GENERAL

P81 Optics
(G02)

P82 Photographic apparatus
(G03B)

**P83 Photographic processes,
compositions**
(G03C)

P84 Other photographic
(G03D-H)

P85 Education, cryptography, adverts.
(G09)

P86 Musical instruments, acoustics
(G10)

Q1 VEHICLES IN GENERAL

Includes mechanical aspects of vehicles in general and associated vehicle equipment.

Q11 Wheels; Tyres; Connections

Alloy, steel, spoked wheels. Hubs, axles, rims, bearings, covers. Snow chains, spikes. Wheel manufacture, assembly and mounting. Inflatable, solid, runflat, heavy duty tyres. Tyre sidewalls, beads, valves, reinforcements, inserts. Tyre manufacture, mounting and inspection. Connections, hitches, towing, draw gear.

(B60B-D)

Q12 Suspension systems

Rigid and resilient suspensions. Springs, dampers, shock absorbers, anti-roll bars. Ride height adjustment. Ball joints, Panhard rods, Watt linkages, trailing arms.

(B60G)

Q13 Powertrain; Chainset; Transmission systems and their control

Automatic, double clutch, manual, semi-automatic, CVT transmissions. Torque converter, clutch, retarder, gearbox, differential. All wheel drive, 4WD. Cranks, pedals. Cooling and lubrication. Powertrain/transmission control. Power take-offs.

(B60K, B60W, B62M)

Q14 Vehicle accessories

Seats, saddles, beds. Safety devices, inflatable airbags, seatbelts, crash bars, horns, reflectors. Sun shades/visors, curtains. Mirrors, windscreen wipers. Luggage racks, panniers, mudguards. Side cars, forecars. Anti-theft arrangements, locks. Steps, stands. Heating, ventilating and air-conditioning. Sanitation.

(B60H, B60N, B60Q, B60R, B62H-J)

Q15 Vehicle arrangements for transporting special loads

Loading and unloading arrangements. Ramps, platforms, conveyors, belts, rollers, vibrators. Carrying buildings, meat, animals, reels, vehicles, concrete. Cargo tie-down equipment. On-board weighing equipment.

(B60P)

Q16 Vehicle servicing; Maintenance; Cleaning equipment; Vehicle design and manufacture

Servicing, maintenance, repair. Car wash, cleaning. Vehicle manufacture/assembly.

(B60S)

Q17 Vehicle construction; Fittings; Propulsion arrangements

Subframes, chassis, superstructures. Doors, windows. Sunroofs, convertible roofs. Dashboards, instrumentation. Body finishing parts. Endless tracks. Air-cushion equipment. Engine propulsion arrangements. Engine cooling, mounting, lubricating. Noise/vibration/harshness reduction/control.

(B60J-K, B60R, B60V-W)

Q18 Brake systems; Steering systems; Control

Discs, drums, pads, callipers, valves, cylinders. Disc/drum brake assemblies. Brake cooling. Brake control, pedals, levers. Steering systems. Rack and pinion. Hydraulic power assistance. Steering wheel, steering column.

(B60T, B62L)

Q19 Vehicle applications

Cycles, motorcycles, scooters, mopeds.
Cars, vans, trucks, buses, taxis. Military
vehicles, tanks. Agricultural vehicles,
tractors, combine harvesters. Recreational
vehicles, SUV, MPV, motor home, camper
van, snow mobile. Emergency vehicles,
police car, fire engine, ambulance. Electric
and hybrid vehicles.

Q2 SPECIAL VEHICLES

Includes mechanical aspects of special vehicles.

Q21 Railways

Track construction. Station/platform equipment. Monorail, elevated, rope/cable, tramway, funicular, rack railways. Propulsion. Passenger carriage, freight car, wagon, hopper, buffer car. Superstructures, under frames, bogies, doors, windows. Brake systems. Accessories. HVAC, sanitation. Railway servicing, maintenance, manufacture, assembly. Train control. Level crossings, gates, signals, points.
(B60L-M, B61)

Q22 Hand/foot/animal drawn vehicles

Hand carts, wheelbarrows. Perambulators. Sledges/ice boats. Wheelchairs. Foot propelled vehicles. Horse-drawn carts.
(B62B-C)

Q24 Ships; Waterborne vessels; Related equipment

Hulls, frames, keels, decks, bulkheads, masts. Windows, doors, hatches, port holes. Accessories. Heating/ventilating/air-conditioning. Sanitation. Desalination plants. Safety equipment, fire-fighting, lifeboats, life vests. Mooring/anchoring. Ship propulsion, propellers, engines, steering. Boats, submarines, hovercraft, surfboards, canoes. Harbour, dock, pier, jetty, boat hoist. Marine vessel servicing, maintenance, manufacture, assembly.
(B63)

Q25 Aircraft; aviation; cosmonautics

Aircraft construction, fuselage, hull, wings. Doors, windows, undercarriage. Accessories. Sanitation, toilets, shower, HVAC. Safety systems, fire-fighting, oxygen supply, escape slide, parachute. Aircraft propulsion and steering. Altitude/attitude control, flaps, control surfaces. Balloon, helicopter, glider, military, commercial aircraft. Ground equipment, hangar, runway construction. Space vehicles. Aircraft/spacecraft servicing, maintenance, manufacture, assembly.
(B64)

Q3 CONVEYING, PACKAGING, STORING

From 2012 manual codes have been assigned for all mechanical details of conveying, packaging and storing
(B65, B66)

Q31 Packaging processes and equipment

From 2012 Q31 has been redefined to cover codes that are intended to highlight the equipment/methods etc. used for packaging/labelling material/goods during primary and secondary packaging. The type of container/bottle being filled/labelled/closed etc., as well as the container material can be specified by assigning Q32 and Q33 codes, respectively. The type of product being packaged/bottled can also be highlighted by the assignment of Q34 codes. For novel details of the actual container/bottle or its closure see Q32 codes instead. Details of transit packaging are coded under Q32-T. Prior to 2012 Q31 remains searchable for packaging and labelling in general.
(B65B,C)

Q32 Container/Closure Types, Special packaging features and Transit packaging

From 2012 Q32 has been redefined to cover container and closure types and special features of containers/packaging. Q32 codes should be used in conjunction with Q31, Q33 and Q34 codes as appropriate. Manufacturing and recycling details are covered by Q31-R. Prior to 2012 Q32 remains searchable for containers in general.

Q33: Packaging container and closure materials

From 2012 Q33 has been redefined to highlight the material the container or closure is made of. Q33 codes should be used with Q31, Q32 and Q34 as appropriate. Prior to 2012 Q33 remains searchable for closures in general.

Q34: Types of goods packages, bottled, bound, labelled, unpacked

From 2012 Q34 has been redefined to highlight the type of product being packaged/bottled etc. and should be used in conjunction with other Q31-Q33 codes as appropriate. Prior to 2012 Q34 remains searchable for packaging elements/types in general (now covered in general by Q32).

Q35: Refuse Collection; Conveyors

(B65F,G)

Q36: Handling Thin Materials

(B65H)

Q37 Container traffic (pre-1984 only)

Q38: Hoisting; Lifting; Hauling; Trucks

(B66)

Q39 Liquid, handling, saddlery, upholstery - discontinued 2012

From 201201 liquid handling is incorporated into Q31-Q34, saddlery is incorporated into P36 and upholstery is incorporated into P27.

Q4 BUILDINGS, CONSTRUCTION

Q41 Road, rail, bridge construction

(E01)

Q42 Hydraulic engineering, soil shifting and sewerage

(E02,3)

Q43 General building constructions

(E04B)

Q44 Structural elements

(E04C)

Q45 Roofing, stairs, floors

(E04D,F)

Q46 Building aids, special structures

(E04G,H)

Q47 Locks, window and door fittings

(E05)

Q48 Blinds, shutters, ladders, doors

(E06)

Q49 Mining

(E21)

Q5 ENGINES; PUMPS; COMPRESSORS; FLUID PRESSURE ACTUATORS

Includes engines, pumps, compressors, actuators etc. of relevance to the transportation area.

Q51 Internal combustion engines; Reciprocating engines; Rotary engines

Internal combustion engines.

Reciprocating, rotary, oscillating piston engines. Hot gas positive displacement engines, steam engines. Pistons and cylinders. Valves and valve drive arrangements. IC engine cooling/lubricating. Fuel systems. Ignition systems. Exhaust systems, silencing, pollution control.

(F01, F02B,D,F,G,M,N,P)

Q52 Reaction engines: External combustion; Gas turbines; Rockets

Gas turbine, turboprop, turboprop, RAMJET, rocket engines. Pulse detonation engines. External combustion engines, steam turbines. Rotors, stators, nozzles, nacelles, afterburners. Fuel systems. Ignition systems. Lubrication and cooling.

(F01D, F02C, F02K, F02M)

Q53 Positive displacement fluid engines (i.e. driven by fluid)

Liquid driven positive displacement engines and motors. Reciprocating, rotary, oscillating piston engines. Valves, pistons, cylinders, seals.

(F03C)

Q54 Non-positive displacement fluid engines (i.e. driven by fluid);

Miscellaneous motors and machines for producing mechanical power/thrust Liquid driven non-positive displacement engines and motors. Impulse, reaction, friction, endless chain type engines. Waterwheels, water turbines. Francis, Kaplan and propeller turbines. Spring motors. Gravity/inertia motors. Wind, solar, geothermal, muscle power motors.

(F03B,D,G,H)

Q55 Positive displacement fluid machines/pumps/compressors (i.e. for driving fluid)

Positive displacement pumps, compressors. Scroll compressors. Reciprocating, rotary or oscillating piston machines. Valves, seals, rotors, casings. (F04B,C)

Q56 Non-positive displacement fluid machines/pumps/compressors (i.e. for driving fluid)

Radial flow, axial flow, jet and diffusion pumps and compressors. Fans. Siphons. Shafts, bearings, rotors, casings, cavitations reducers.

(F04D,F)

Q57 Fluid pressure actuators; Hydraulic/pneumatics in general

Telemotors. Servomotors. Pyrotechnic actuators Controlling fluid flow. Hydraulics. (F15)

Q6 ENGINEERING ELEMENTS

Includes novel engineering elements of relevance to the transportation area.

Q61 Fastening elements; Connections

Nuts, bolts, washers. Rivets and rivnuts. Nails, staples, dowels. Clamps, suction cups, hooks. Torque-limiting, anti-tamper, locking, friction grip, key connections.
(F16B)

Q62 Shafts and bearings

Flexible and rigid shafts. Crankshafts, eccentrics. Pivotal connections. Ball joints. Ball, roller, sliding contact and hydrodynamic bearings. Cooling and lubricating. Manufacture.
(F16C)

Q63 Couplings; Clutches; Brakes; Springs; Dampers Universal joints

Constant velocity (CV) joints. Slip, yielding, impulse couplings. Fluid couplings. Clutches. Disc, drum and band brakes. Brake pads, callipers. Springs, shock absorbers, dampers. Coil springs and leaf springs.
(F16D,F)

Q64 Belts; Chains; Gearing

Drive belts, timing belts. Drive chains. Pulleys, sprockets, gearing. Cams, cam followers, worms, toothed gears. Fluid gearing. Gearing control, gear levers. Lubrication and cooling.
(F16G,H)

Q65 Pistons; Cylinders; Packing; Seals

Pistons, plungers. Cylinders and liners. Seals, packing. Piston rings
(F16J)

Q66 Valves; Taps; Cocks; Vents

Lift, gate, sliding, diaphragm and rotary valves. Valve seats, seals, casings, housings. Poppet valves. Check valves. Safety/equalising valves. Vent valves.
(F16K)

Q67 Pipes; Joints; Fittings

Pipes and hoses. Pipe/hose connections/joints. Compression joints. Quick fastening/release connections. Seals. Clips. Pipe laying and repair.
(F16L)

Q68 Other engineering elements

Frames. Machinery beds. Engine beds. Axle stands. Trestles. General lubrication arrangements. General safety devices.
(F16M-S)

Q69 Storing/distributing gas/liquid

Pressure vessels. Gas holders/tanks. Vessel filling and discharging equipment. Pipeline systems.
(F16T, F17)

Q7 LIGHTING, HEATING

Q71 Lighting

(F21)

Q72 Steam generation

(F22)

Q73 Combustion equipment/processes

(F23)

Q74 Heating; Ranges; Ventilating

(F24)

Q75 Refrigeration; Liquefaction

(F25)

Q76 Drying

(F26)

Q77 Furnaces; Kilns; Ovens; Retorts

(F27)

Q78 Heat exchange in general

(F28)

Q79 Weapons; Ammunition; Blasting

(F41,42)

S INSTRUMENTATION MEASURING AND TESTING

Includes electrical aspects of medical equipment, photographic and printing apparatus.

S01 Electrical Instruments

Oscilloscopes, multimeters, electricity meters, semiconductor devices and PCB testing, NMR, MRI, magnetic and electric field measurement, radio test equipment, instrument housing and other details.
(G01R, G12B)

S02 Engineering Instrumentation

Measuring dimensions, weight, flow rate, mechanical vibrations, force, acceleration and velocity measurement, measurement transducers, testing engines and machines, gyroscopes, scales, dials, pointers and other details.
(G01B-H, L, M, P)

S03 Scientific Instrumentation

Photometry, calorimetry.
Thermometers.
Meteorology, geophysics, measurement of nuclear or X-radiation. Investigating chemical or physical properties.
Immunoassay, LAB-ON-CHIP, Chemical indicators or reagents.
(G01J, K, N, T-W)

S04 Clocks and Timers

Electronic and mechanical clocks and watches. Time switches. Time-interval measuring.
(G04B-G)

S05 Electrical Medical Equipment

Electrotherapy. Electrosurgical apparatus. Blood cell counters. Electrical diagnostic apparatus. Tomography. Veterinary apparatus.
(A61B, C, F - J, L- N)

S06 Electrophotography and Photography

Cameras, film projectors and processing (electrical aspects only). Electrography, xerography. Rotary press printers (electrical aspects only).
(G03, G03G)

T COMPUTING AND CONTROL

Covers control systems, data recording equipment, computing devices and peripheral apparatus, including construction details.

T01 Digital Computers

Electronic data processors, interfaces and programme control. Mechanical digital computers.

(G06C-F, T, G16)

T02 Analogue and Hybrid Computers

Function evaluators, equation solvers, simulators.

(G06G, J)

T03 Data Recording

Analogue and digital recording on tape, disc etc, using for example, magnetic, optical, magneto-optical, capacitive methods.

(G11B)

T04 Computer Peripheral Equipment

Card and tape punches and readers. Magnetic, optical and smart cards. VDUs, character and graphics generators. Pattern recognition, magnetic ink recognition, bar codes. COM equipment.

(G06K)

T05 Counting, Checking, Vending, ATM and POS Systems

Counting systems. Ticket issuing, registering and franking apparatus. Attendance registering apparatus. Coin and paper currency handling. Point-of-sale equipment. Electronic funds transfer.

(G06M, G07B-G)

T06 Process and Machine Control

General control systems. (Non)numerical, programmable and adaptive control. Control of non-electrical variables e.g. temperature or flow. Control system applications e.g. machine tools, lifts.

(G05B, D)

T07 Traffic Control Systems

Road traffic monitoring. Road traffic control. Traffic light systems, flow control. Traffic, weather and navigation data updating.

(G08G)

U SEMICONDUCTORS AND ELECTRONIC CIRCUITRY

Includes semiconductor components *per se*, their manufacture and circuitry. Circuits using electronic components are included, e.g. filters and oscillators.

U11 Semiconductor Materials and Processes

Semiconductor, insulating and conductive materials. Crystal growth. Substrate and layer processing: deposition, etching, doping and heat treatment. Packages, mountings and assembly. Testing and handling of both integrated and discrete semiconductor devices.

(Manufacture of LEDs, lasers, solar cells and aspects of thick film and hybrid circuits are covered in U12 and U14).

(C30B, H01L)

U12 Discrete Devices

Discrete semiconductor devices or specific components of integrated circuits.

Optoelectronic devices: discrete Photodetectors, LEDs and lasers both discrete or array. Solar cells. Hall-effect, magnetoresistive or spintronic devices. Diodes, capacitors and resistors. Bipolar transistors, thyristors, FETs. Quantum interference devices. Micromechanical devices. Semiconductor transducers.

(H01L)

U13 Integrated Circuits

Digital circuits, especially with matrix array, e.g. ROM, DRAM, SRAM memories, programmable logic and gate array. Solid state image sensors, e.g. CCD, photodetector array.

Excludes routinely integrated circuits with no integration novelty.

(H01L)

U14 Memories, Film and Hybrid Circuits

Digital memories including magnetic, optical, semiconductor, ferroelectric, analog memories. Testing of memories. Thermoelectric devices. Superconductive materials and devices. Acoustic wave devices. Thin film arrays and layers. Thick film and hybrid circuits including multilayer ceramic wiring boards and aspects of manufacture. Electroluminescent light sources. Liquid crystal displays, electrochromic, electrophoretic, electroluminescent and electrowetting displays. Non-display switchable glass panels.

(G11C, H01L)

U21 Logic Circuits, Electronic Switching and Coding

Logic gates, inverters, buffers, field programmable gate arrays. A/D and D/A conversion, position encoders, delta modulation. Code conversion, data compression, error detection and correction. Counter circuits, frequency dividers. Electronic switching, proximity/touch switches.

(H03K, M)

U22 Pulse Generation and Manipulation

Rectangular and triangular wave Oscillators, pulse generators, (astable, bistable, etc). Pulse shaping and manipulation. Pulse modulation and demodulation including PAM, PPM, PFM, and PDM. Digital filters. DSP.

(H03H, K, L)

U23 Oscillation and Modulation Oscillators, mixers.

Amplitude and angle (de)modulation. Frequency and phase comparators. PLLs, indirect and direct frequency synthesisers.

(H03B-D, H03L)

U24 Amplifiers and Low Power Supplies

DC, LF, HF, small signal and power amplifiers. Gain control. Volume compression or expansion. Limiters. Voltage and current stabilisation, power supplies, converters, inverters, rectifiers. Low power protection.
(H03F, H03G, G05F, H02M)

U25 Impedance Networks and Tuning

Tone or bandwidth control. Impedance converters. Analogue filters (active and passive). Voltage dividers, attenuators, impedance matching, baluns. Tuning circuits. AFC.
(H03H, H03J)

V ELECTRONIC COMPONENTS

Includes electrical and electro-optical components. Component mounting and construction details. Electrical discharge devices, for purposes other than lighting, are included

V01 Resistors and Capacitors

Low power fixed and variable discrete devices. Thermistors and varistors. Electrolytic (including double-layer, super- and ultracapacitors) and non-electrolytic capacitors.
(H01C, G)

V02 Inductors and Transformers

Low power inductive components. Communication type inductive components. (Electro)magnets. Magnetic materials.
(H01F)

V03 Switches, Relays

Low power switches and relays. Thermally or magnetically operated switches.
(H01H)

V04 Printed Circuits and Connectors

PCBs and their manufacture. Low power connectors. Electronic apparatus, housings and constructional details. RFI/EMI screening. General circuit manufacture.
(H01R, H05K)

V05 Valves, Discharge Tubes and CRTs

Vacuum tubes, klystrons, TWTs, magnetrons, CRTs, field emission displays, camera tubes, X-ray tubes and operating circuits. Photoelectric discharge tubes, electron multipliers, plasma/ion processing tubes. Electron and scanning probe microscopes. Gas filled tubes. Gas discharge displays.
(H01J, H05G)

V06 Electromechanical Transducers and Small Machines

Audio, communication, and measurement-type transducers. Electromechanical resonators. Small electric machines and their controllers. Micromachines.
(H04R, H03H, H02K)

V07 Fibre-optics and Light Control

Light-guides, optical fibres, integrated optics and optical cables. Connectors, couplers, mode selectors, polarisers. Control of intensity, phase, polarisation, wavelength and direction. Spatial light modulators. Optical fibre amplifiers.
(G02B, F)

V08 Lasers and Masers

Optical resonators. Laser pumping, control e.g. intensity, frequency stabilisation, cooling, testing. Gas, semiconductor, solid state, dye-free electron, X-Ray lasers. Masers.
(H01S)

W COMMUNICATIONS

Covers telecommunications, audio and video equipment, telemetry/telecontrol and radar, aviation, marine and military systems where electrical details are included.

W01 Telephone and Data Transmission Systems

Error detection and correction. Code conversion.
Synchronising. Secret data communication. Data networks (LAN, WAN, etc). ISDN. Baseband and broadband data transmission. Exchanges, call metering, test equipment, equipment racks, intelligent network, call centre. Subscriber equipment, cordless, cellular and satellite phones. Telephone line and cable installation.
(H04L, M, Q, W)

W02 Broadcasting, Radio and Line Transmission Systems

Aerials, waveguides, resonators and other distributed constant components. Transmitters, transceivers, transponders. Communication receivers. Line transmission systems. Radio systems, including diversity, relay, mobile (including cellular). Optical and ultrasonic wave transmission systems. Spread Spectrum communication. Secret communication, jamming. TV systems, including stereoscopic, cable, subscription, satellite, interactive and high definition. Stereophonic broadcast systems.
(H01P, Q, H04B, H, J, K)

W03 TV and Broadcast Radio Receivers

AM/FM and DAB radio receivers, car radios. TV receivers including text aspects and MHEG, DVB, high definition, satellite, 3D/stereoscopic, stereophonic and surround sound. Remote control and interconnection.
(H04)

W04 Audio/Video Recording and Systems

Stereophonic systems, loudspeaker enclosures, public address Audio/visual recording applications, formatting, signal processing and constructional aspects. General audio signal processing and sound mixing. Electronic musical instruments. Video cameras, TV studio and special effects equipment. General video signal processing. Projection TV and analogous systems. Video games, karaoke. Electronic educational apparatus. Sports equipment, toys. Speech coding, analysis and synthesis. Antiphase sound cancelling. Hearing aids. Audio and video aspects of multimedia.
(G10H, L, G11B, H04N)

W05 Alarms, Signalling, Telemetry and Telecontrol

Burglar and fire alarms. Personal call arrangements. Paging systems. Signal transmission systems for remote control and monitoring, e.g. in home bus systems, vehicle remote control bus systems. Advertising arrangements (electrical aspects).
(G08B, C)

W06 Aviation, Marine and Radar Systems

Radar, sonar and lidar. Velocity and depth measuring equipment. Position fixing and direction finding. Navigation systems, e.g. GPS. Airport control systems. Ship and aircraft control and instrumentation. Flight simulators. Space vehicles, including satellites.
(G01S)

W07 Electrical Military Equipment and Weapons

Target indicating systems. Sighting and aiming devices. Missile direction control. Military training equipment. Arming and safety devices. Electric weapons. Personnel and equipment protection. Battlefield communications. Military reconnaissance.
(F41, F42B, C)

X ELECTRIC POWER ENGINEERING

Includes power generation, storage, distribution and utilisation. Electrical details of ground vehicles. Industrial-use patents with significant electrical detail are included. Patents relating to domestic electrical appliances do not have to contain electrical novelty to be included.

X11 Power Generation and High Power Machines

Conventional power generating prime movers. Dynamo-electric machines. MHD generators.

(H02K, N)

X12 Power Distribution/Components/

Converters High power AC, DC and HVDC distribution/control. Power and communication cables. Superconducting cables, coils and magnets. Installing power cables and lines. Power transformers, reactors. Spark gaps and circuits. Insulators. High power connectors. Power converters. Conductive, superconductive and insulating materials.

(H01B, H01T, H02G, H02J, H02M)

X13 Switchgear, Protection, Electric Drives

Electric machine and static power converter controllers. Switchboards, switchyards, switchgear. Power system protection. Circuit protectors, circuit breakers, fuses.

(H02B, H02H, H02P)

X14 Nuclear Power Generation

Nuclear reactor processes, components and power plants. Control mechanisms. Plasma techniques. Particle accelerators.

(G21, H05H)

X15 Non-Fossil Fuel Power Generating Systems

Geothermal, wind, wave and solar energy, types of power generation.

(F03D, F24J)

X16 Electrochemical Storage

Primary, secondary and fuel cells and batteries. Battery chargers. Non-electrochemical storage of electric energy.

(H01M)

X21 Electric Vehicles

Electric cars, trolley buses, hybrid vehicles, fuel cell vehicles. Propulsion, braking.

Traction batteries. Control equipment.

(B60L)

X22 Automotive Electrics

Vehicle accessories. Vehicle lighting. IC engine ignition. IC engine controllers. Batteries and charging. Starting motors, and generators. Engine and vehicle instrumentation. Non-engine related controllers e.g. transmissions, brakes. Passenger safety. Intra/inter-vehicle communications, multiplexing.

(B60K, Q, R, T; F02D, M, N, P; F21M)

X23 Electric Railways and Signalling

Electric propulsion and braking. Traction motors and control. Traction power supplies. Power supply lines, current controllers. Signalling equipment. Railway traffic control.

(B60L, B61L)

X24 Electric Welding

Electric soldering. Arc, induction, electron beam, resistance, laser beam, solid state and HF welding. Electroerosion.

(B23K)

X25 Industrial Electric Equipment

3-D printing / Additive manufacturing, Electric furnaces and kilns. Resistance, induction, electric discharge and EM field heating. Electrostatic spraying and cleaning. Vibrating apparatus. Electrolytic processes, electro-refining metals. Electrically powered tools. Industrial drying equipment. Ore separating magnets. Magnetic work holders, lifting magnets. Textile and paper manufacture, sewing and embroidery machines. Industrial food processing. Industrial components e.g. pumps, fans. Electric construction/building equipment. Electric agricultural equipment. Cryogenics.
(H05B, F27)

X26 Lighting

Discharge, incandescent and electric arc lamps. Operating and control equipment. Light fittings. Portable lighting devices. Stage lighting equipment. LED, EL and fibre-optic illumination, including display back-lighting.
(F21, H01J, H01K, H05B)

X27 Domestic Electric Appliances

Washing machines, dryers, irons. Vacuum cleaners. Electric cookers, microwave ovens. Kitchen equipment. Refrigerators. Water heaters. Space heating and air conditioning equipment. Personal and hygiene electrical appliances. Home automation appliances.
(A47, F24)

Appendix 5: Nanotechnology

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to Nanotech industries.

For full details please look up the relevant code in the applicable manual. Classes A-N are covered by the CPI manual and section P-X by the EPI manual.

Note - Items in italics are of nanotech interest but may contain details not applicable to nanotech.

FULLERENES

containing heteroatoms	<i>E05-U01</i>
carbon only	<i>E05-U02</i>
	<i>L02-H04B</i>
<i>electroconductivity agent for polymers</i>	<i>A08-M09A1</i>
<i>thermal conductivity agent for polymers</i>	<i>A08-M09C1</i>

GRAPHENE

carbon nanofilm	<i>E05-U05C</i>
electroconductivity agent for polymers	<i>A08-M09A1</i>
thermal conductivity agent for polymers	<i>A08-M09C1</i>

NANOBUDDS

carbon only	E05-U05D
inorganic	E31-U04

NANOCATALYSTS

N06-C09

NANOCRYSTALS (NON-FERROUS ALLOYS)

M26-C02

NANOELECTROMECHANICAL DEVICE/SYSTEM

actuators	V06-M06G9
control	V06-N22A
electronic switching	U21-B01T
generators	V06-M06G8A
medical devices	S05-Y02
motors	V06-M06G9
control	V06-N22A
relays	V03-D10A
resonators	V06-V01E
	V06-V01K2
semiconductor device	U12-B03F2A
semiconductor structure	U12-B03F2
semiconductor structure, manufacture	U11-C18C
semiconductor system	U12-B03F2B
sensors	S03-H02B
	V06-V01K2
	V06-V04G
switches	V03-C10A
manufacture, testing and monitoring	V03-C07A

DNA switches	B11-C12
	C11-C12
transducers(audio)	V06-V01K2
	V06-V04A

NANOELECTRONIC DEVICE/SYSTEM

cathodes	
image display	V05-D05C5A
field emission device	V05-B05A5C
general	V05-M03A1
X-ray tube	V05-E01C7A
semiconductor structure, manufacture	U11-C13
	U12-E01B2
logic circuit	U21-C01T
sensors	S03-H02B

NANOFIBERS

carbon nanofibers	E05-U05B

NANOFILMS

E31-U03
B05-U05B
C05-U05B

NANOFILTERS

J01-C04

NANOHORNS

B05-U05A
C05-U05A
E05-U05D
E31-U04

NANOIMPRINTED MAGNETIC RECORD CARRIER

manufacture	T03-A01G3
	T03-A02G3

NANOIMPRINT LITHOGRAPHY

U11-C04J

NANOMATERIALS

battery electrode	X16-E01H1
ceramics/cement	L02-A12
conductive	L03-A02G
	L03-A03N
	X12-D01D
electrolytes	X16-J01E
fuel cell electrode	X16-E06A1A
fuel cell storage	X16-C15C3A
general use	V04-X01B1
insulating, inorganic	X12-E01D
insulating, organic	X12-E02D
magnetic	L03-B02N
	V02-A10

magnetic, manufacture	V02-A10C
magnetic, novel	V02-A10A
structures	U11-A14
	U11-C13
production	J04-F02
manufacture of nanowires/nanotubes	X12-D07E2A
NANOMORPHOLOGY (COLOR CHEMISTRY)	
pigment	E27-B01A
dye	E27-B02A
other color chemistry	E27-B03A
NANOPARTICLES	
	B12-M11Q
	C12-M11Q
carbon nanoparticles	E05-U05A
inorganic	E31-U01
NANOPARTICULATE PRODUCTION	
	V05-F08G
NANOPHASE ALLOYS	
ferrous	M27-D03
non-ferrous	M26-C02
NANORELAYS	
	U12-B03F2A
	V03-D10A
manufacture	V03-D06B1
NANORODS	
	B05-U05A
	C05-U05A
carbon nanorods	E05-U05B
inorganic	E31-U02
NANOSTRUCTURES	
electrically-conductive (general)	X12-D02C2D
electrically-insulating (general)	X12-E03D
production	J04-F02
magnetic film	V02-B04
manufacture	V02-H02G
inorganic	B05-U06
	C05-U06
	E31-U
organic	E05-U
pharmaceutical (other)	B05-U05C
	C05-U05C
dye or pigment bound to nanostructure	E24-U

NANOTECHNOLOGY

pharma applications (general)	B11-C12 C11-C12
polymers application (general)	A12-W14

NANOTECHNOLOGY DEVICES (THERAPEUTIC)

B12-M10A7
C12-M10A7

NANOTUBES

carbon only	B05-U03A C05-U03A E05-U03 L02-H04B V05-B05A5C
<i>used as electroconductivity agent for polymers</i>	A08-M09A1
<i>used as thermal conductivity agent for polymers</i>	A08-M09C1
carbon plus heteroatom	B05-U04 C05-U04 E05-U04
other 3D structures	B05-U05A C05-U05A
inorganic	E31-U02
manufacture of nanotubes	X12-D07E2A

NANOWHISKERS

inorganic	E31-U02
organic	E05-U05B

Appendix 6: Green technology

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to "green technologies" such as "green" transportation, e.g. hybrid, fuel cell and other zero emissions vehicles; alternative power sources such as wind and solar power; bio-fuels and any other technologies that enable control of pollution or reduction of carbon footprints.

For full details please look up the relevant code in the applicable manual. Classes A-N are covered by the CPI manual and section P-X by the EPI manual.

Note – Items in italics are of green interest but may contain details not applicable to green technologies.

CARBON CAPTURE

carbon trading	T01-N01A2M
catalysts	
for the removal/treatment of carbon (compounds)	N07-L02D
for gas purification or waste gas treatment	N07-L01C
gas adsorbents (to store gaseous compounds e.g. CO ₂)	J06-B06C
gas separation , e.g. separation of CO ₂ from atmospheric gases	J01-E03
gaseous filters (especially designed for waste gases)	J01-G03B
treatment of waste gases	J01-E02

CONSTRUCTION/BUILDINGS

doors & windows	
coating for glass	G02-A05K
	L01-G04
ventilation & sealing (e.g. thermal insulation)	Q48-J
electrical details	X25-U01
general building insulation	Q43-A99
living roof	Q45-A02
pipe protection (e.g. pipe lagging, thermal insulation)	Q67-D
rainwater harvesting system	Q43-H

ENVIRONMENTAL AWARENESS

biodegradability (of plastics)	A09-A07
environmental vessel for collecting pollution from open water	Q24-P06
environmentally friendly inventions (compositions/applications)	E11-W
	C14-Y
green agro-chemicals (general)	N07-K01
green catalysts	E11-K03
green chemistry (general)	E11-W
applications/compositions	

green pharmaceuticals (general)	B14-Y
oil spillage cleanup waste containment	H03-G
to prevent water contamination	D04-A05
GREEN POWER SOURCES AND ENERGY GENERATION	A12-W16
battery	X16
catalysts	N07-L03A
for electric vehicle	X21-B01A
carbon trading	T01-N01A2M
electricity generation	
from biomass combustion	X15-E
from exercise machine	W04-X01A5
	X15-X
from vehicle movement	X15-X
from waste fuel combustion	X15-E
environmental protection, e.g. for reducing carbon footprint and improving emissions	
for steam turbine plant	X11-A08
for gas turbine/IC engine/combined cycle & cogeneration plants, etc	X11-C08
flywheel energy storage	Q54-F
	X21-B04
fuel cell	X16-C
	L03-E04
catalysts	N07-L03A
for vehicle	X21-B01A
	X22-F01
polymer details	A12-E06
geothermal power	Q54-H
	X15-G
hydroelectric power	X11-B
dams	X11-B
generators	X11-B
mini/micro plant	X11-B05
pumped storage	X11-B06
turbines/water wheels	X11-B01
muscle power	Q54-I
	X15-X
ocean thermal energy conversion	Q54-X
	X15-C
osmotic power	X11-B09
	X15-C
profiting from waste heat	X15-H
IC engine exhaust heat recovery	Q51-J02F
IC engine waste heat recovery	X22-A17
power generation from traffic flow	X15-T
recycling/recovery of components	X15-R
sea power	X15-C
Seebeck effect	X15-D

salinity gradient power	X11-B09
	X15-C
smart power grid	X12-H08
<i>use of AI</i>	T01-J16P10
solar power	Q54-H
	U12-A02
	X15-A
for electric vehicle	X21-B04A
for motor vehicle	X22-F03
photoelectric cells	A12-E11B
solar collector	X15-A01
solar panels	U12-A02A5
	X15-A02B
	L03-E05B
polymer details	A12-R02B
thermoelectric power	X15-D
tidal power	X15-C02
vortex power	X11-B09
	X15-C
water power	X11-B
	X15-C
water turbine	Q54-A
	X11-B01
generator	X11-B
wave power	X15-C01
wind power	Q54-G
	X15-B
for boat	Q24-E01E
for electric vehicle	X21-B04A
for motor vehicle	X22-F03
GREEN FUELS	
biofuels	
produced from algae	B14-Y
	C14-Y
gaseous biofuels	H06-A04
biogas	H06-A04
ethane	H06-A04
structural details	E10-J02D2
hydrogen	H06-A03
production by electrical means	E31-A02A
hydrogen generation-fuel cell	L03-E04I
	X16-C17
hydrogen reformer-fuel cell	X16-C17
hydrogen storage-fuel cell	X16-C15
molecular decomposition of hydrocarbons (plasmatron)	V05-F08F
methane	H06-A04
structural details	E10-J02D1
produced by fermentation	D05-C14

liquid biofuels	H06-B07
alcohol	H06-B08
bioalcohol	H06-B08
biodiesel	H06-B04A
bioether	H06-B07
butanol	H06-B08
ethanol	H06-B08
propanol	H06-B08
vegetable oil	H06-B04A
solid biofuels	
<i>from municipal/agricultural</i>	<i>D05-A04A</i>
waste treatment	H09-F03
GREEN PACKAGING / GREEN FOOD TECHNOLOGY	Q33-J
biodegradable	
food packaging	D03-K08A
	Q33-J
packaging	Q31 to Q34
biodegradable packaging	Q33-J01
edible packaging	Q33-J04
energy efficient packaging	Q33-J06
packaging made from renewable sources	Q33-J02
recyclable/reuseable packaging	Q33-J03
polymer packaging	A12-P
biodegradable plastics	A09-A07
scrap recovery/recycling of plastics	A11-C03
by shredding, cutting, pulverising, granulating	A11-C03A
cellulose production (incl. recycling paper bags)	F05-A02B
GREEN TRANSPORTATION	
aircraft, muscle/pedal power	Q25-C01G
battery charging	X16-G02
for electric vehicle	X21-B01A
for motor vehicle	X22-F01A
for railway train	X23-A03C
bicycle	Q19-A
	X22-P01
boat	Q24
animal-drawn	Q24-E02G
canoe/kayak	Q24-P20
electric propulsion	W06-B01C6
muscle/pedal power	Q24-E01G
wind (sail) power	Q24-E01E
	Q24-P22
electric vehicle	Q19-P
	X21-A01F
foot propelled vehicles	Q22-M
fuel cell vehicle	Q19-P
	X21-A01J

hybrid vehicle	Q19-Q
	X21-A01D
hybrid-electric	X22-P04
	Q19-Q01
hybrid-mechanical	X22-P04A
	Q19-Q05
parallel hybrid	X22-P04E
series hybrid	X21-A01D1
regenerative braking	X21-A01D3
	X13-H01B
	X21-A03C
POLLUTION CONTROL/REDUCTION	
catalytic combustion	N07-L01A
desulphurisation of coal	H09-H02
polymer application	A12-W11
fuel vapour recovery for IC engine	Q51-H02
electrical details	X22-A02E
using coagulants/ flocculants	A12-W11E
or polyelectrolytes	
other	A12-W11F
oil refinery	H05-L
polymer processing	A11-C07
waste gas treatment	
catalyst details	N07-L01C
for engine exhaust	Q51-J02
	E11-Q02A
	N07-L01C1
for motor vehicle exhaust	Q17-E09
	X22-A03J
removal of N oxides	E31-H02
catalytically	E31-H01
removal of S hydride, H ₂ S	E31-F01B
removal of S oxide SO ₂ , SO ₃ , SO _x	E31-F01A
removal of sulphur compounds	E31-F01
	N07-L02B
H ₂ SO ₄ , thiosulfate	E31-F01C
RECYCLING/RECOVERY OF MATERIALS	
electrical recycling equipment	X25-W04
chemical extraction, recovery, purification	E11-Q01
medical	P31-R
	P32-R
	P33-R
	P34-R
polymer scrap recovery/recycling	A11-C03
rainwater harvesting systems	Q43-H
recycling electrical components, equipment, and material	
	V04-X01G
	L03-J01
AV equipment	W03-G10C

battery materials	X16-M L03-E06
capacitor materials	
electrolytic	V01-B01G6G
non-electrolytic	V01-B04B8G
copier/printer/fax/scanner parts	S06-K04C
discharge tube salvaging	V05-L07E6
mobile phone	W01-C01D3C W01-C01W
phones (landline telephones, smartphones & accessories)	W01-C01W
record carrier recycling and destroying	
general	T03-H02R
magnetic	T03-A01R
magneto-optical	T03-D01R
optical	T03-B01R
resistor materials	V01-A04R2
TV receiver	W03-A19C
semiconductors	U11-H L03-X06
recycling/recovery of ceramic	L02-A01
recycling/recovery of clay/slip/cement/stone	P64-R
recycling/recovery of combustion apparatus	Q73-R
recycling/recovery of components from lighting devices	Q71-R
recycling/recovery of drying parts/components	Q76-R
recycling/recovery of components used in green power generating systems, such as solar power/wind power/sea or wave power plants, etc	X15-R
recycling/recovery of furnaces, kilns and retorts parts	Q77-R
recycling/recovery of glass	L01-B02
recycling/recovery of grinding media	P61-R
recycling/recovery of heat exchanger components	Q78-R
recycling/recovery of heating, ranges and ventilating systems/parts	Q74-R
recycling/recovery of medical components and material	
dentistry, bandages, veterinary, prosthesis components	P32-R
diagnosis or surgery components	P31-R
medical aids	P33-R
recycling/recovery of metal working machines and components	
foundry moulding, metal casting and powder metallurgy components	P53-R
milling and machining components	P54-R
punching, working and forging systems	P52-R
rolling, drawing and extruding systems	P51-R
recycling/recovery of paper	X25-T09G P72-A10 F05-A02B S06-K04A
in copier/printer/fax/scanner	
recycling/recovery of photographic apparatus/components	P82-R

recycling/recovery of photographic agents	P83-R
	P84-R
recycling/recovery of soldering and welding components	P55-R
recycling/recovery of toner	S06-K04B
recycling/recovery of aircraft / space vehicles	W06-B10
recycling/recovery of wood/waste wood/sawdust	P63-R
recycling waste water	D04-A06
	X25-H03
	X25-W04
from semiconductor manufacture	L04-X02
recovery of fibres	F03-E02
recovery of ferrous metals	M24-A07
recovery of non-ferrous metals	M25-E
recovery of organic products/waste	D05-A04A
e.g. for fertilizer production	
regeneration of pulp liquors during paper and fibre-board manufacture	F05-A02C
other	J09-C01A
WATER/WASTE TREATMENT	E11-Q02
	N07-L01
drying step during sewage treatment	Q76-U40
industrial waste/effluent treatment	H09-F02
	E11-Q02B
capacitor manufacture	
electrolytic	V01-B01G6E
non-electrolytic	V01-B04B8E
semiconductor manufacture	U11-C15Q
resistor manufacture	V01-A04R1
municipal/agricultural waste treatment	H09-F03
packaging of sewage effluent	Q34-H99
polymer waste treatment	A11-C07
purification of non-gaseous hydrocarbons	N07-L01D
removal of materials/compounds	
removal of carbon compounds	N07-L02D
removal of catalyst poisons	E11-Q02C
removal of impurities in general	N07-L02
removal of halogen compounds	N07-L02A
removal of metal compounds	N07-L02E
removal of nitrogen compounds	N07-L02C
removal of sulphur compounds	N07-L02B
removal of unwanted chemical	E11-Q02C
reaction by-products	
sewage treatment	D04-A01J
	D04-B10
	D04-B11
	D05-A04A
drying	Q76-U40
electrical systems	X25-H03
incineration of sludge	D04-B10B

pyrolysis of sludge	D04-B10B
organic waste, town waste or sludge fermentation	D05-A04A
waste disposal processes/purification	N07-L01
catalytic combustion of waste	N07-L01A
waste water treatment	N07-L01B
	X25-H03
waste water from paper manufacture	F05-A02C
sewage sludge removal/treatment	D04-B10
electrical systems	X25-H03
dewatering sludge	D04-B10A
water treatment	D04-A01J
	N07-L01B
compositions	A11-W11J
removing coal slurry	D04-B03
removing hydrocarbons	D04-B03
removing impurities	D04-B
removing inorganic cyanides	D04-B07A
removing inorganic fluorine compounds	D04-B07E
and (thio)cyanates	
removing inorganic nitrogen compounds	D04-B07C
removing inorganic phosphorous	D04-B07B
removing inorganic sulphur compounds	D04-B07D
removing metals	D04-B05
heavy metals	D04-B05A
neutralising chromium	D04-B05A
removing lead	D04-B05A
removing mineral oil	D04-B03
removing natural products	D04-B04
clarification of water containing fat	D04-B04
removing organic materials	D04-B06
halohydrocarbons	D04-B06E
organic dyes/brighteners	D04-B06B
phenolic compounds	D04-B06A
polymers/monomers	D04-B06D
surfactants	D04-B06C
removing radioactive materials	D04-B07
	K07-B

Appendix 7: Internet of Things

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to the "Internet of Things" (IoT). Details of Artificial Intelligence (AI) are covered in Appendix 9.

For full details please look up the relevant code in the CPI manual (Classes A-N) and EPI manual (Classes P-X).

CONNECTIVITY

data transmission

data transfer	T01-N01A2A
multimedia	T01-N01D
audio, sound transfer	T01-N01D1
video transfer	T01-N01D1A
document transfer	T01-N01D1B
from remote site or server	T01-N01D2
cloud computing services	T01-N01D3
internet-based transmission for IoT comms	T01-N01D3A
wireless network-based transmission for IoT comms	W05-D06E1
cellular network-based transmission for IoT comms	W05-D06E1A
	W05-D06E1C

network control

communications and control	T01-N02
communication	T01-N02A
communication protocol	T01-N02A1
addressing	T01-N02A1A
ad-hoc network systems	T01-N02A1B
network communication	T01-N02A2
LAN	T01-N02A2A
WAN	T01-N02A2B
client/server system	T01-N02A2C
SAN	T01-N02A2D
peer-to-peer networks	T01-N02A2E
other network communication system	T01-N02A2X
hardware	T01-N02A3
dedicated systems for accessing the internet	T01-N02A3A
computer based routing	T01-N02A3B
servers	T01-N02A3C
control	T01-N02B
access and control	T01-N02B1

GENERAL

computer networks	T01-M02A1
network-only computers	T01-M02A1A
client-server systems	T01-M02A1B
internetworking	T01-M02A1C
internet-of-things	T01-N01F
internet-based transmission for IoT comms	W05-D06E1

control or measurement signal transmission (specific)

W05-D07

HOME

home automation - general

control

X27-V

data transmission

W05-D07A

TV equipment

W03-A16C5K

kitchen appliances

X27-B

intelligent refrigerator

X27-F05

lighting

remote-controlled switching

X26-C03C

robots - domestic assistance

X27-U

smart grids

X12-H08

utility meter reading / measurement

S01-B01

internet/intranet

X12-H03E7

remote metering

X12-H04A

internet/intranet metering

X12-H04B

individual transmission/distribution/mains line meters

X12-H04C

for utility meters i.e. electricity, gas, water

W05-D07G

INDUSTRIAL

agricultural / farming

W05-D07N

building control

W05-D07C

earth drilling and well logging

W05-D07H

factory automation

W05-D07B

X25-F07

office automation

W05-D07A

power generation and distribution

W05-D07F

smart grids

X12-H08

utility meter reading / measurement

S01-B01

internet/intranet

X12-H03E7

utility electrical measurements

X12-H04

remote metering

X12-H04A

internet/intranet metering

X12-H04B

for utility meters i.e. electricity, gas, water

W05-D07G

MEDICAL

medical systems / equipment

T01-N01E

information systems

T01-N01E1

data transmission

W05-D07M

telediagnosis

S05-D06A

MILITARY EQUIPMENT

military clothing, e.g. IoT sensors inserted in soldier's uniform to monitor physical and mental health

W07-F01B

X27-A02B1

S05-D01

NETWORK SECURITY

data transmission	W05-D05B5
preventing or detecting interception	W05-D05B5A
protecting against malicious software	W05-D05B5C
preventing or detecting unauthorized network access	W05-D05B5E
system / network monitoring	T01-N02B2
user monitoring	T01-N02B2A
system and fault monitoring	T01-N02B2B
transmitted content analysis	T01-N02B2C
network security, anti-malware	T01-N02B3
user authentication / control	T01-N02B1
file management and access	T01-N02B1A
user privileges/password systems	T01-N02B1B
unsolicited advertising protection	T01-N02B1C
firewalls	T01-N02B1D
network operating system management	T01-N02B1E
internet portals	T01-N02B1F
internet gateway	T01-N02B1G
biometric authentication	T01-N02B1H

VEHICLES

control	X21-A01L
driverless/autonomous vehicles	X22-P15
data transmission	W05-D07D
inter-vehicle communication (V2V)	X21-K05
	X22-K05
intra-vehicle/vehicle to device communication (V2D)	X21-K03
	X22-K03
multiplexing/networking/communication	X21-K
	X22-K03
vehicle to grid communication (V2G)	X21-K08G
vehicle to network; vehicle to cloud communication (V2I)	X21-K02
	X22-K02
vehicle to offboard interfacing/communication	X21-K08
	X22-K08
vehicle to pedestrian communication (V2P)	X21-K06
	X22-K06

Appendix 8: Digital Health

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to Digital Health or Digital Healthcare including telemedicine, health information technology, mobile health and personalized medicine.

For full details please look up the relevant codes in the CPI manual (classes A-N), and the GMPI and EPI manual (classes P-X).

ELECTRICAL MEDICAL EQUIPMENT

alarm based on medical parameter or medical failure	S05-Y01
	W05-B07G5
built-in phone medical parameter monitoring equipment	W01-C01P8
electrical medical diagnosis/monitoring	S05-D
blood pressure monitoring	S05-D01B1A
	S02-F04C2
blood flow monitoring	S05-D01B1B
diet/nutrition monitoring	S05-D09
heart rate monitoring	S05-D01B5
implanted device	S05-Y05
ingestible device	S05-Y05
measuring and recording systems for bio-electric currents	S05-D01A
electrocardiography (ECG, EKG)	S05-D01A1
encephalography/myography (EMG, EEG, MEG)	S05-D01A2
measuring neurological/nerve stimulation	S05-D01A
online medicine	T01-N01E
sleep monitoring	S05-D01C7
telediagnosis	S05-D06A
diagnostic displays	S05-D07
hospital equipment	
patient monitoring	S05-G02B2
patient monitoring from remote location	S05-G02B2A
pacemakers	
remote programming and control	S05-A01A5A
artificial organs	B11-C04F
peripheral devices for therapeutic regimens	B11-C06C
transmission of control or measurement signals for medical equipment	W05-D07M

FITNESS/PERFORMANCE TRACKING

performance monitoring during e.g. sports training	W04-A01A1
physiological measurements	S05-D01
smart phones	W01-C01G8S
smart watches	T01-M06A1D
	S04-B09
wearable computers	T01-M06A1D

HEALTHCARE INFORMATICS - MEDICAL/HOSPITAL IT SYSTEMS

computerised teaching models	B11-C11B W04-W
data processing for medical equipment and information systems	T01-J06
data transfer/storage	S05-G02G3
data transmission	W01
preventing or detecting interception	W05-D05B5A
protecting against malicious software	W05-D05B5C
preventing or detecting unauthorized network access	W05-D05B5E
data/drug database	B11-C11 T01-J05B4
health care administration	S05-G02G2 T01-J05A2
hospital IT system	S05-G02G T01-J06A
medical simulation and training	S05-P T01-J30A W04-W07
online medical information systems	T01-N01E1
patient medical records	S05-G02G1 T01-J05B T01-J06A1
pharmacovigilance	S05-G02G5
telediagnosis	S05-D06A
patient medical records	T01-J06A1

OPERATING SYSTEMS/NETWORK CONNECTIVITY

health apps	T01-N03A1
computer processing for sports and training equipment	T01-J30D
data transmission	W01
preventing or detecting interception	W05-D05B5A
protecting against malicious software	W05-D05B5C
preventing or detecting unauthorized network access	W05-D05B5E
diagnostic displays	S05-D07
online medicine	T01-N01E
software	T01-S
transmission of control or measurement signals for medical equipment	W05-D07M
user monitoring	T01-N02B2A

PERSONAL ITEMS

calorie counter	S05-D09 X27-A02

biosensor	B11-C08E8 S05-C
PERSONALISED/PRECISION MEDICINE	
3D printing of medications/tablets	X25-A08C2 X25-A08U2
bioprinting	B11-C17 X25-A08M3 X25-A08U2
drug design by computer modelling	B11-C08H T01-J13
formulation counting/measuring devices	B11-C06B
patient compliance methods and systems	B11-C11A S05-G02G5
targeted therapies	B12-Q01A S05-A
REMOTE CONTROL AND MONITORING	
alarm based on medical parameter or medical failure implanted/ingestible device	W05-B07G5 S05-Y05 B11-C04A
medical parameter monitoring equipment	W01-C01P8
pacemakers	S05-A01A5A
patient monitoring	S05-G02B2 T01-J06A
remote control (telemetry)	W05-D08E
telediagnosis	S05-D06A
transmission of control or measurement signals for medical equipment	W05-D07M

Appendix 9: Artificial Intelligence (AI)

This appendix is designed as a quick reference guide for all manual codes across the chemistry, life sciences and engineering technologies that relate to Artificial Intelligence. Details of Internet of Things (IOT) are covered in Appendix 7.

For full details please look up the relevant codes in the GMPI and EPI manual (classes P-X).

AI TECHNIQUES

T01-J16

AI human-computer interface

T01-J16E

AI using internet/network

T01-N01G

Bayes theorem

T01-J16C5

Chatbot/ChatGPT

T01-J16E

Complex learning

T01-J16D

Computer vision

T01-J16C3B

T01-J10B2

T04-D07

Distributed artificial intelligence

T01-J16D

T01-N01D3A

Expert systems

T01-J16A

Fuzzy logic systems

T01-J16B

Genetic algorithms

T01-J16C4

Image analysis/processing/conversion

T01-J16C3B

T01-J10B2

T04-D03

Intelligent searching

T01-J16C6

T01-J05B3

T01-N03A2

Knowledge processing

T01-J16C

Large language models (LLM)

T01-J16C3C

Machine learning

T01-J16C2

Natural language processing

T01-J16C3

Neural networks

T01-J16C1

T06-A05A

Pictorial language processing

T01-J16C3

Predictive analytics

T01-J16C5

Probabilistic reasoning

T01-J16C5

Speech processing

T01-J16C3A

T01-J18

T01-C08A

W04-V

AI APPLICATIONS

T01-J16P

Aerospace

T01-J16P9

W06-B

T01-J07D

Advertising (targeted -)

T01-J16P4

T01-J05A2M

T01-N01A2C

Agriculture, fishing & forestry

T01-J16P1

T01-J05A4

X25-N

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Biology (computational -)	T01-J16P6B
Business, banking, finance & retail	T01-J13A T01-J16P4 T01-J05A T01-N01A
Chatbot /ChatGPT	T01-J16E T01-N03A1C
Communication	T01-J16P8 T01-N01D3 W01
Crime detection	T01-J16P7
Cyber-bullying combat	T01-J16P4 T01-N02B2
Cyber warfare	T01-J16P7 T01-N02B2 W07-F03 W07-X
Deep-fakes (detection of -)	T01-J16P3
Domestic & personal	T01-J16P5 X27
Early warning systems for earthquakes, landslides, etc	T01-J16P6B T01-J13 S03-C05 W05-B08
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