

C22C

ALLOYS (flints [C06C 15/00](#); treatment of alloys [C21D](#), [C22F](#))

Definition statement

This place covers:

Ferrous and non ferrous alloys, radioactive alloys, amorphous alloys, alloys containing fibres or filaments.

It covers also cermets, master alloys, metal matrix composites, methods of making amorphous alloys as well as methods of making alloys by melting, by powder metallurgy, by removing material from alloys to produce alloys of different constitution.

Therefore, the term "alloys" includes:

- a) metallic composite materials containing a substantial proportion of fibres or other somewhat larger particles;
- b) ceramic compositions containing free metal bonded to carbides, diamond, oxides, borides, nitrides or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides or sulfides, other than as macroscopic reinforcing agents.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22E](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#), etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well (see informative references for some of them).

References

Limiting references

This place does not cover:

Working metallic powder, powder metallurgical apparatus or processes	B22F
Alloys based on non-metals (such as B, Si, Se, Te- based alloys etc.)	C01B , C01D , C01G
Ceramics	C04B
Changing the physical structure of ferrous alloys	C21D
Changing the physical structure of non ferrous metals/alloys	C22F 1/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Jewellery	A44C 27/00
Biomedical applications, stents	A61F , A61L
Dental alloys	A61K
Catalysts	B01J
Soldering/welding (materials)	B23K , B23K 35/00
Layered products	B32B
Lithographic printing plates	B41N

Refining of metals	C22B
Coating/Sputtering targets	C23C/ C23C 14/00
Electrolytic production or refining of metals	C25C
Single crystals	C30B
Steam turbines, turbine rotors blades, turbine blades	F01D , F01D 5/00
Valve guides/valve seat inserts	F01L
Gas turbine plants	F02C
Bearings, shafts/crankshafts	F16C , F16C 23/00
Springs	F16F
Sliding members	F16J , F16K
Heat exchangers	F28F
Armour constructions/plates	F41H
Magnetic head applications	G11B 5/31
Magnetic alloy thin films (such as used in magnetoresistive applications in magnetic heads)	G11B 5/39
Magnetic alloy thin films (such as used in magnetic thin film media applications)	G11B 5/64
Magnetic alloy thin films (such as used in static memory applications)	G11C 11/00
Nuclear reactors/reactor fuel elements	G21C , G21C 3/04
Electrical wires	H01B
Magnets	H01F
Contacts	H01H
Shadow masks	H01J
Semiconductor devices/detailsBonding wires, lead frames	H01L
Batteries/fuel cells	H01M
Electrical connectors	H01R
Electronic components	H05K

Special rules of classification

The phrase "based on" means in general at least 50% by weight of the specified constituent or of the specified group of constituents.

The base of the alloy in a broader sense is interpreted as the metallic element which is the major constituent of the alloy, whether the content of that element is more or less than 50 wt%. For example in an alloy with Ni 40 wt%, Fe 30 wt% Co 30 wt%, the base of the alloy is Ni.

It is possible for an alloy to have more than one base major constituent.

When the alloy contains less than 50 wt% of each constituent, i.e. alloy with more than one base, then in addition to the [C22C](#) corresponding to the major constituent(s) at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

In [C22C 5/00-C22C 30/00](#), [C22C 37/00-C22C 45/00](#), [C22C](#) classes are given for both inventive and additionally disclosed alloys, whether in the claims, description, figures or inventive examples

Special rules of classification

The compositions of amorphous alloys are classified in [C22C 45/00](#). The methods of making Fe-based amorphous alloys are classified in [C22C 33/003](#). The methods of making amorphous alloys (other than Fe-based ones) are classified in [C22C 1/11](#). Semi-amorphous alloys are classified both as amorphous and as crystalline ones ([C22C 45/00](#) and [C22C 5/00-C22C 38/00](#)). The compositions of cast-iron alloys are classified in [C22C 37/00](#). The methods of making cast-iron alloys are classified in [C22C 33/08-C22C 33/12](#).

Alloys based on a metal not provided for in the groups [C22C 5/00- C22C 45/10](#) e.g. Ga-based, In-based alloys etc. are classified in [C22C 28/00](#).

In the groups [C22C 5/00-C22C 30/00](#), [C22C 37/00-C22C 45/00](#), the last place rule is followed (classification in the last appropriate place) combined with multiple classifications, for a classification of a 100% disclosed alloy composition.

In this subclass a computerised search system is available for online searching via the database "Alloys" of EPOQUE. This system, used as a search aid, contains all patent documents classified in groups [C22C 1/04](#) and [C22C 5/00 - C22C 49/14](#) and provides information on the composition of the alloys, their uses and characteristics.

The alloy composition(s) is/are indexed in the Alloys database and different records are created for all disclosed alloy composition on the basis of:

a) the claims taken in combination with the description of the application as well as b) the inventive examples (individual examples, tables). In this case fictive elemental ranges are created with lower limits and upper limits as disclosed in the inventive examples disclosed in the table(s).

Rules for indexing compositions, composites and layers in [C22C](#) and [B22](#):

Classes: [C22C 1/04+](#), [C22C 1/05+](#), [C22C 1/10+](#), [C22C 26/00+](#), [C22C 29/00+](#), [C22C 32/00+](#), [C22C 33/02+](#), [B22F](#).

Indexed are the claims, usually not the entire document.

In case the claims are rather broad, examples are being indexed.

As a rule only the end products are indexed, not disclosed method or intermediates products.

However, if those methods or intermediate products are significant, they may be indexed as well.

The word "particles" used throughout this document covers both powder and fibre (or other geometrical) forms, unless indicated specifically otherwise.

Particles and mixtures of particles are indexed only by a combination of Indexing-codes which form a string. Specific compositions (by specific ranges) are also classified in the Alloys database of EPOQUE. If the particles are processed into a product having a specific composition, that is one with specific ranges, then the document should be classified in the corresponding [C22C](#) class. If the composition is not specific and different from the original particle composition (e.g. due to mixing or reaction with other materials during processing) then this should be indexed by an Indexing Code-string.

Definitions:

- Non-metals are, according to the IPC: B C H N O P S Se Si Te, noble gases, halogens.

Metals: elements other than non-metals.

- Metal compounds include: borides, carbide, hydrides, nitrides, oxides, sulfides, silicides, selenides, tellurides, carbonitrides.

Note: a silicide, selenide or telluride is not an intermetallic according to our coding, even though much scientific literature designates them as such.

- Intermetallic compounds (IM) and complex compounds:

Special rules of classification

A constituent out of an intermetallic or a complex compound is described in one string with the other constituents.

E.g. a Ni alloy with Co which includes an IM out of Al and Ti.

[B22F 2303/01](#), [B22F 2301/15](#), [B22F 2303/10](#), [B22F 2301/15](#), [B22F 2303/15](#);

[B22F 2303/15](#), [B22F 2301/052](#), [B22F 2301/205](#);

E.g. a Ni alloy with an IM of Al and Ni and Potassium aluminate

[B22F 2303/01](#), [B22F 2301/15](#), [B22F 2303/10](#), [B22F 2303/15](#), [B22F 2302/35](#);

[B22F 2303/15](#), [B22F 2301/052](#), [B22F 2301/15](#);

[B22F 2302/35](#), [B22F 2302/25](#), [B22F 2301/052](#), [B22F 2301/054](#);

An IM and a complex oxide in sequence is also possible.

- Complex borides, carbides, nitrides, oxides, silicides, sulfides, carbonitrides, carboxides:

A complex compound as above comprises two or more metallic elements with a non-metallic element(s).

The indexing follows the same rules as for IM (intermetallic)

e.g.: an Al alloy which includes a complex carbide comprising Mo and W:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/10](#), [B22F 2301/20](#);

or which includes a complex boride comprising Ti and Zr:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/05](#), [B22F 2301/205](#) ;

or which includes a complex carbonitride comprising Ta and Ti:

[B22F 2303/01](#), [B22F 2302/35](#);

[B22F 2302/35](#), [B22F 2302/15](#), [B22F 2301/20](#), [B22F 2301/205](#);

- Aluminates, borates, carbonates, nitrates, phosphates, silicates and sulphates are not indexed as complex oxides but indicated as "other". They should be retrieved by full text search.
- Carbon, graphite, diamond and carbon nanotubes are separately indexed as well.

e.g. carbon nanotubes coated with iron

[B22F 2302/403](#), [B22F 1/17](#), [B22F 2301/35](#)

or an iron particle coated with carbon nanotubes

[B22F 2301/35](#), [B22F 1/16](#), [B22F 2302/403](#)

Classification aspects:

The alloying elements of the particle, fibre, mix or layer can be disclosed either as obligatory or as optional. These codes can be connected with other code words like "coating alloy".

The elements are listed according to their wt%.: highest weight first, for a range the lowest limit of that range. If not specified: alphabetically.

Special rules of classification

The main component is not necessarily over 50%. If more elements can be the main component, they are listed in sequence. When some of the elements could be an alloying element as well, they must be repeated in a sentence with alloy.

A coating is used only for material that covers the surface of a particle or fibre. It is indexed by including the corresponding class ([B22F 1/16](#) or [B22F 1/17](#)) followed by the elements/components making up the coating (see example above).

If multiple coatings are applied the corresponding class is repeated within the string.

When the coating is formed of individual particles or fibres, then the appropriate Indexing Code is indicated in the string as well.

For fibres the corresponding class ([B22F 1/0547](#) or [B22F 1/062](#)) is put in the string.

A molten metal infiltrating a metal preform will be indicated in addition to the overall composition.

note: when molten metal infiltrates a preform out of ceramic material, not being fibre, the ceramic material is described as a compulsory alloy component with the metal as the main component (or vice versa in case of a cermet being formed).

Each layer in a layered product is indexed in a separate string. When one of the layers has the function of a support layer and which is not made by powder metallurgy, this is indicated as "support layer" together with the layer composition to which it is attached.

e.g. a layered product comprising two layers formed by powder metallurgy on top of a cast metal support: A first layer of Al, a second layer of an Al alloy having 4 compulsory alloy components and optionally carbides, oxides or nitrides as alloying components, supported by a steel sheet (not made by powder metallurgy).

[B22F 2303/40](#), [B22F 2301/052](#);

[B22F 2303/40](#), [B22F 2301/052](#), [B22F 2303/05](#), [B22F 2301/10](#), [B22F 2301/20](#), [B22F 2302/40+](#), [B22F 2302/45](#), [B22F 2303/10](#), [B22F 2302/105](#), [B22F 2302/253](#), [B22F 2302/10](#), [B22F 2302/20+](#), [B22F 2302/205](#), [B22F 2303/405](#), [B22F 2301/35](#), [B22F 2303/05](#), [B22F 2302/40](#);

When a mixture of metal or non-metallic (compounds) forms a final composition which is not the aggregate of the "ingredients", the composition of the different parts of the mixture is indexed. Each new mixture is in a different paragraph. The coding is likely to occur in the classes [C22C 33/0207](#)-[C22C 33/0228](#) and class [B22F 1/09](#).

e.g. A mixture of two powders is isostatically pressed and sintered.

One powder consists of tungsten carbide with 5% of a Co binder, alloyed with Ni.

Its size is from 10 to 50 micron. This powder constitutes the major part of the mixture.

The second powder consists mainly of zirconium oxide and some aluminium-phosphate. Its size is more than 100 microns.

This gives the following indexing:

[B22F 2303/45](#), [C22C 29/08](#), [B22F 2303/05](#), [B22F 2301/15](#), [B22F 2304/10](#);

[B22F 2303/45](#), [B22F 2302/25](#), [B22F 2302/45](#), [B22F 2304/10](#), [B22F 2304/15](#);

The size of the used powders may be of interest. If this is claimed or given as extra information in the text, the size "range" is indicated to avoid/surpass different nomenclature.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Alloy	A composition of plural elements at least one of which is a free metal. It also includes material containing any combination of fibres, filaments, whiskers and particles, e.g. carbides, diamond, oxides, borides, nitrides, silicides, or other metal compounds, e.g. oxynitrides or sulfides embedded in a metallic matrix
Base / Based on	at least 50% by weight of the specified constituent or of the specified group of constituents, or the metallic element which is the largest constituent of the alloy.
Amorphous	Possessing no regular crystalline arrangement of atoms.
Cermet	Material containing any combination of fibres, filaments, whiskers and particles, e.g. carbides, diamond, oxides, borides, nitrides, silicides, or other metal compounds, e.g. oxynitrides or sulfides embedded in a metallic matrix.
Master alloy	A mixture or alloy of elements which are to be added to a charge or molten metal in order to provide a desired composition, deoxidize the molten metal or provide a fine grain size etc.
Refining	Purification of metal by removing impurities therefrom.

C22C 1/00

Making non-ferrous alloys (by electrothermic methods [C22B 4/00](#); by electrolysis [C25C 1/24](#), [C25C 3/36](#))

Definition statement

This place covers:

Methods for making non-ferrous alloys.

Relationships with other classification places

When the alloy is produced by a specifically disclosed process, then the process is also classified, e.g. in subclasses [C22F](#), [C21D](#), [B22E](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#).

Methods of making alloys containing metallic or non-metallic fibres or filaments are classified in group [C22C 47/00](#).

References

Limiting references

This place does not cover:

Making non-ferrous alloys by electrothermic methods	C22B 4/00
Making non-ferrous alloys by electrolysis	C25C 1/24 , C25C 3/36

Informative references

Attention is drawn to the following places, which may be of interest for search:

Alloy compositions	C22C 5/00 - C22C 45/00
Methods of making ferrous amorphous alloys	C22C 33/003

Working metallic powder; Apparatus or processes for powder metallurgy; Making metallic powder	B22F
Soldering or welding (materials)	B23K , B23K 35/00
Changing the physical structure of ferrous metals/alloys	C21D
Refining of metals	C22B
Changing the physical structure of non-ferrous metals/alloys	C22F
Coating	C23C
Electrolytic production or refining of metals	C25C
Electroplating	C25D
Crystal growth	C30B

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

In situ formation	The phase formed (whether metal or non-metal) is not added in advance, but is generated in situ in the matrix by reaction during the entire process of preparing the alloy, including powder treatment, sintering, etc.
Reaction sintering	The powder raw material undergoes a chemical reaction at a certain temperature and simultaneously performs densification and synthesis of the specified components to obtain a predetermined sintered body.

C22C 1/04

by powder metallurgy ([C22C 1/08](#) takes precedence)

Definition statement

This place covers:

Non-ferrous alloys made by powder metallurgy containing only metallic or intermetallic constituents.

Relationships with other classification places

Subclass [B22F](#) covers processes of making or treating metallic powders, working metallic powders, and making workpieces or articles therefrom.

References

Limiting references

This place does not cover:

Alloys with open or closed pores	C22C 1/08
----------------------------------	---------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Rods, electrodes, materials or media, for use in soldering, welding or cutting	B23K 35/00
Selenium, Tellurium; compounds thereof	C01B 19/00

Silicon, compounds thereof	C01B 33/02
Ceramic products containing shaped metallic materials	C04B 35/74
Flints	C06C 15/00
Processing of pig iron, e.g. refining, manufacture of wrought iron or steel	C21C
Coating material with metallic material; cementation (carburizing, nitriding, etc.) processes	C23C
Single crystals or homogeneous polycrystalline material with defined structure, e.g. directionally solidified	C30B 29/00
Metals for projectiles	F42B 12/72 - F42B 12/745
Metallic powders for capacitors	H01G 9/0525

Special rules of classification

The alloys are classified according to their main component in one of the subgroups

[C22C 1/0408](#) - [C22C 1/0483](#):

- [C22C 1/0408](#): alkali, alkaline earth, Be, Mg, Al (when not specific);
- [C22C 1/0416](#): Al, when specific;
- [C22C 1/0425](#): Cu;
- [C22C 1/0433](#): Ni or Co;
- [C22C 1/0441](#): Ni or Co including intermetallic compounds of RE-type;
- [C22C 1/045](#): V, Cr, Nb, Mo, Ta, W, Re (Ti, Zr, Hf when not specific);
- [C22C 1/0458](#): Ti, Zr, Hf when specific;
- [C22C 1/0466](#): Ag, Au, Os, Ir, Pt, Ru, Rh, Pd;
- [C22C 1/047](#): comprising intermetallic compounds;
- [C22C 1/0475](#): impregnated alloys;
- [C22C 1/0483](#): low melting point metals are Zn, Pb, Sn, Cd, In and Ga.

C22C 1/05

Mixtures of metal powder with non-metallic powder ([C22C 1/08](#) takes precedence)

Definition statement

This place covers:

Making non-ferrous alloys by using mixtures of metal powder with non-metallic powder as starting materials. Non-metallic powders include hard compounds, graphene, sulfides, organic materials, etc.

Relationships with other classification places

When specific processes or process steps of powder metallurgy are not covered by any of the subgroups of group [C22C 1/05](#) and covered by subclass [B22F](#), classification should be made in both parent group [C22C 1/05](#) and in the relevant groups of subclass [B22F](#), in order not to lose potentially relevant information.

References

Limiting references

This place does not cover:

Alloys with open or closed pores	C22C 1/08
----------------------------------	---------------------------

C22C 1/051

**Making hard metals based on borides, carbides, nitrides, oxides or silicides;
Preparation of the powder mixture used as the starting material therefor**

Definition statement

This place covers:

- Making hard metals based on borides, carbides, nitrides, oxides or silicides by powder metallurgy.
- Preparation of the powder mixture used as the starting material therefor.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Composition of cermets	C22C 29/00
Composition of non-ferrous alloys with 5-50% metal compounds	C22C 32/00

C22C 1/053

with in situ formation of hard compounds

Definition statement

This place covers:

Hard compounds that are generated in situ in the matrix by reaction during the preparation process.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

In situ formation	The phase formed (whether metal or non-metal) is not added in advance, but is generated in situ in the matrix by reaction during the entire process of preparing the alloy, including powder treatment, sintering, etc.
-------------------	---

C22C 1/055

using carbon

Definition statement

This place covers:

In situ formation of hard compounds by reacting with carbon during the preparation process.

C22C 1/056**using gas****Definition statement**

This place covers:

In situ formation of hard compounds by reacting with gas during the preparation process.

C22C 1/057**with in situ formation of phases other than hard compounds by solid state reaction sintering, e.g. metal phase formed by reduction reaction****Definition statement**

This place covers:

In situ formation of a second phase, e.g. metal phase, other than hard compounds by solid state reaction sintering during the preparation process.

C22C 1/059**Making alloys comprising less than 5% by weight of dispersed reinforcing phases****Definition statement**

This place covers:

Preparation of alloys based on metals and containing less than 5% by weight of dispersed reinforcing phases.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Dispersed reinforcing phase	The ultrafine second phase (hardened phase) for reinforcing alloys, which is insoluble in a base metal.
-----------------------------	---

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "dispersed reinforcing phases", "dispersion reinforced phases" and "dispersion strengthened phases"

C22C 1/08**Alloys with open or closed pores****Definition statement**

This place covers:

Porous products obtained by processes involving a molten metal bath.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Casting metal foams	B22D 25/005
Making porous workpieces or articles	B22F 3/11

C22C 1/10

Alloys containing non-metals ([C22C 1/05](#), [C22C 1/08](#) take precedence)

Definition statement

This place covers:

Processes for making alloys containing metal or non-metallic compounds wherein the metal is the major constituent. The processes cover both wet and dry processes as well as pre-treatments of the added compounds and after-treatments.

References

Limiting references

This place does not cover:

Processes for making cermets	C22C 1/05
Alloys with open or closed pores	C22C 1/08

Informative references

Attention is drawn to the following places, which may be of interest for search:

Infiltrating sintered metal powder article	B22F 3/26
Infiltration of sintered ceramic preforms with molten metal	C04B 41/51

Special rules of classification

Spray casting composite powder, including fibres : [C22C 1/1042](#)

When a filler material can only be of a fibrous nature, classification is made in group [C22C 47/00](#), [C22C 49/00](#). When the filler material is chosen from alternatives which can be fibrous or non-fibrous, classification is made in group [C22C 1/10](#). When both fibrous and non-fibrous fillers are present, classification is made in group [C22C 47/00](#), [C22C 49/00](#) and also in group [C22C 32/00](#) if the composition is of importance.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

C22C 3/00

Removing material from alloys to produce alloys of different constitution {separation of the constituents of alloys}

Definition statement

This place covers:

methods of separation of constituents of alloys such as purification, recovery, removing of undesirable material(s) etc.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Alloy compositions	C22C 5/00 - C22C 45/00
Alloys based on mercury	C22C 7/00
Refining of metals	C22B

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

C22C 5/00

Alloys based on noble metals

Definition statement

This place covers:

Noble metal based alloys i.e. with the noble metal (Ag, Au, platinum group) as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/003
Laminates	B32B
Magnetic media/head laminates	G11B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Jewellery	A44C 27/00
-----------	----------------------------

Dental alloys	A61K
Catalysts	B01J
Powder metallurgy	B22F , C22C 1/04
Soldering/welding materials	B23K 35/3006 , B23K 35/3013 , B23K 35/322
Changing the physical structure of noble metals and alloys based thereon	C22F 1/14

Special rules of classification

In [C22C 5/06-C22C 5/10](#) the last place rule is followed combined with multiple classifications.

For example a silver alloy with Cu as the next major constituent is classified in [C22C 5/08](#) (last place rule).

When the alloy contains less than 50 wt% of each constituent, with a noble metal being a major constituent, then in addition to the corresponding [C22C 5/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

For example for an alloy with 45-55 wt% Au, 35-45 wt% Cu and the rest other metallic constituents, both classes [C22C 5/02](#) and [C22C 30/02](#) are given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 7/00

Alloys based on mercury

Definition statement

This place covers:

Mercury based alloys i.e. with Hg as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dental alloys	A61K
Powder metallurgy	B22F , C22C 1/04

Changing the physical structure of non ferrous metals and alloys based thereon	C22F 1/16
--	---------------------------

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Hg being a major constituent, then in addition to the [C22C 7/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 9/00

Alloys based on copper

Definition statement

This place covers:

Copper metal based alloys i.e. with Cu as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C23C](#), [C23D](#), [B23K](#), [C25B](#), [B22D](#), [C25D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/001
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Jewellery	A44C 27/00
Biomedical applications, stents	A61F , A61L
Soldering/welding materials	B23K 35/302
Changing the physical structure of copper of alloys based thereon	C22F 1/08

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Cu, the corresponding [C22C 9/00](#) class(es) is/are given.

For example: in a Cu alloy consisting of 30 wt% Sn, 30 wt% Zn, the balance being Cu, both classes [C22C 9/02](#) and [C22C 9/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Cu being a major constituent, then in addition to the corresponding [C22C 9/00](#) class the class [C22C 30/02](#) class is given and depending on the remaining main alloying elements [C22C 30/00](#) and/or [C22C 30/04](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 11/00

Alloys based on lead

Definition statement

This place covers:

Lead based alloys i.e. with Pb as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/268
Changing the physical structure of lead or alloys based thereon	C22F 1/12

Special rules of classification

In [C22C 11/08-C22C 11/10](#) the last place rule is followed combined with multiple classifications.

A lead alloy with Bi as the next major constituent and comprising Sn is classified in [C22C 11/10](#) (last place rule).

For example: in a Pb alloy consisting of 25 wt% Cu, 25 wt% Sn, the balance being Pb, both classes [C22C 11/04](#) and [C22C 11/06](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Pb being a major constituent, then in addition to the corresponding [C22C 11/00](#) class the class [C22C 30/04](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 12/00

Alloys based on antimony or bismuth

Definition statement

This place covers:

Antimony or bismuth based alloys i.e. with Sb or Bi as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00 , B23K 35/264
Changing the physical structure of antimony, bismuth or alloys based thereon	C22F 1/16

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Sb or Bi being a major constituent, then in addition to the [C22C 12/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 13/00

Alloys based on tin

Definition statement

This place covers:

Tin based alloys i.e. with Sn as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/262
Changing the physical structure of tin or alloys based thereon	C22F 1/16

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

A tin alloy with Bi as the next major constituent is classified in [C22C 13/02](#) (last place rule).

For example: in a Sn alloy consisting of 25 wt% Bi, 25 wt% Zn, the balance being Sn, both classes [C22C 13/00](#) and [C22C 13/02](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Sn being a major constituent, then in addition to the corresponding [C22C 13/00](#) class the class [C22C 30/04](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/06](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 14/00**Alloys based on titanium****Definition statement**

This place covers:

Titanium based alloys i.e. with Ti as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/product is classified as well.

References**Limiting references**

This place does not cover:

Amorphous alloys	C22C 45/10
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/325
Changing the physical structure of titanium or alloys based thereon	C22F 1/183

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Ti being a major constituent, then in addition to [C22C 14/00](#) class at least one [C22C 30/00](#) class is given depending on the rest of the main alloying element(s).

The alloy composition(s) is/are indexed in the Alloys database.

C22C 16/00

Alloys based on zirconium

Definition statement

This place covers:

Zirconium based alloys i.e. with Zr as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/10
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00
Changing the physical structure of zirconium or alloys based thereon	C22F 1/186

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Zr being a major constituent, then in addition to [C22C 16/00](#) class at least one [C22C 30/00](#) class is given depending on the rest of the main alloying element(s).

The alloy composition(s) is/are indexed in the Alloys database.

C22C 18/00

Alloys based on zinc

Definition statement

This place covers:

Zinc based alloys i.e. with Zn as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/282
Changing the physical structure of zinc or alloys based thereon	C22F 1/165

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

For example: in a Zn alloy consisting of 20 wt% Cu, 20 wt% Al, the balance being Zn, both classes [C22C 18/02](#) and [C22C 18/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Zn being a major constituent, then in addition to the corresponding [C22C 18/00](#) class the class [C22C 30/06](#) class is given and depending on the rest of the main alloying elements [C22C 30/00](#) and/or [C22C 30/02](#) and/or [C22C 30/04](#) may also be given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 19/00

Alloys based on nickel or cobalt

Definition statement

This place covers:

Nickel or cobalt based alloys i.e. with Ni or Co as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/04 , C22C 45/008
Laminates	B32B
Magnetic media/MRAM/head laminates	G11B , G11C

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/3033 , B23K 35/304 , B23K 35/3046
Changing the physical structure of nickel or cobalt or alloys based thereon	C22F 1/10

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. In [C22C 19/05](#)-[C22C 19/058](#) multiple classes may be given for Ni-based alloys depending on the Cr content and the presence of Mo, W in it.

For example a nickel alloy with 8-32 wt% Cr comprising also Mo is classified in [C22C 19/057](#), [C22C 19/056](#), [C22C 19/055](#) and [C22C 19/053](#). Depending on the composition [C22C 19/002](#)-[C22C 19/007](#) may also be given.

Cobalt alloys are classified in [C22C 19/07](#). Depending on the composition [C22C 19/002](#)-[C22C 19/007](#) may also be given.

When the alloy contains less than 50 wt% of each constituent, with Ni or cobalt being a major constituent, then in addition to the corresponding [C22C 19/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 20/00

Alloys based on cadmium

Definition statement

This place covers:

Cadmium based alloys i.e. with Cd as the major constituent i.e. the base of the alloy.

Relationships with other classification places

In an alloy consisting of 40-50 wt% Cd, 40-50 wt% Pb and the rest other metallic constituents, the classes [C22C 20/00](#) and [C22C 30/00](#) are given. (A class/at least one class is also given in [C22C 11/00](#) for the lead-base).

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

Relationships with other classification places

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/266
Changing the physical structure of cadmium or alloys based thereon	C22F 1/165

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Cd being a major constituent, then in addition to [C22C 20/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 21/00

Alloys based on aluminium

Definition statement

This place covers:

Aluminium based alloys i.e. with Al as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/08
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/286 , B23K 35/288
Changing the physical structure of aluminium or alloys based thereon	C22F 1/04 - C22F 1/057

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Al, the corresponding [C22C 21/00](#) class is given. In a case of more than one next major constituent(s), then more than one [C22C 21/00](#) classes are given.

An Al-alloy with Cu as the next major constituent comprising in addition Si, Mg and Zn as alloying elements is classified in [C22C 21/14](#), [C22C 21/16](#) and [C22C 21/18](#).

When the alloy contains less than 50 wt% of each constituent, with Al being a major constituent, then in addition to the corresponding [C22C 21/00](#) class at least one [C22C 30/00](#) class is also given depending on the remaining main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 22/00

Alloys based on manganese

Definition statement

This place covers:

Manganese based alloys i.e. with Mn as the major constituent i.e. the base of the alloy

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc.

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/3026
Changing the physical structure of manganese or alloys based thereon	C22F 1/16

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Mn being a major constituent, then in addition to [C22C 22/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database. examples/tables.

C22C 23/00

Alloys based on magnesium

Definition statement

This place covers:

Magnesium based alloys i.e. with Mg as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/005
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/284
Changing the physical structure of magnesium or alloys based thereon	C22F 1/06

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the next major constituent to Mg, the corresponding [C22C 23/00](#) class is given. In a case of more than one next major constituent(s), then more than one [C22C 23/00](#) classes are given.

For example in a Mg alloy consisting of 20 wt% Zn, 20 wt% Al, the balance being Mg, both classes [C22C 23/02](#) and [C22C 23/04](#) are given.

When the alloy contains less than 50 wt% of each constituent, with Mg being a major constituent, then in addition to the corresponding [C22C 23/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 24/00

Alloys based on an alkali or an alkaline earth metal

Definition statement

This place covers:

Alkali or alkaline earth metal based alloys i.e. with Li, Na, K, Rb, Cs, Fr, Ca, Sr, Ba, Ra as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00
Changing the physical structure of alkali or alkaline earth metal or alloys based thereon	C22F

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with an alkali or alkaline earth metal being a major constituent, then in addition to corresponding [C22C 24/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 25/00

Alloys based on beryllium

Definition statement

This place covers:

Beryllium based alloys i.e. with Be as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/06
Laminates	B32B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00
Changing the physical structure of beryllium or alloys based thereon	C22F 1/16

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, with Be being a major constituent, then in addition [C22C 25/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 26/00**Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}****References****Limiting references**

This place does not cover:

Laminates	B32B
Diamond with silicon binder	C04B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Preparation of diamond	B01J 3/06 , C01B 32/00
Composite workpieces or articles	B22F 7/06
Preparation of carbon nanosized materials - fullerenes - carbon nanotubes Preparation of graphite materials, incl. - graphene	C01B 32/152 , C01B 32/158 , C01B 32/182

Special rules of classification

In case there are other compounds present apart from the main compound, this additional information concerning the composition of the further compound will be given by an Indexing Code ;

fullerenes and carbon nanotubes are also indicated by means of an Indexing Code.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. In case the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

PCD	PolyCrystalline Diamond
-----	-------------------------

Fullerenes	buckyballs
------------	------------

C22C 27/00

Alloys based on rhenium or a refractory metal not mentioned in groups [C22C 14/00](#) or [C22C 16/00](#)

Definition statement

This place covers:

Rhenium or refractory metal based alloys other than Ti-, Zr- based alloys i.e. with Re, V, Cr, Nb, Mo, Hf, Ta, W as the major constituent i.e. the base of the alloy.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00 , C22C 45/006 , C22C 45/10
Laminates	B32B
Magnetic media/MRAM/head laminates	G11B , G11C

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00
Changing the physical structure of Re,V, Cr, Nb, Mo, Hf, Ta, W or alloys based thereon	C22F 1/18

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on the base of the alloy the appropriate [C22C 27/00](#) class is given.

Vanadium based alloys are classified in [C22C 27/025](#).

Niobium, tantalum based alloys are classified in [C22C 27/02](#).

Alloys based on Re, Hf are classified in [C22C 27/00](#).

When the alloy contains less than 50 wt% of each constituent, with Re,V, Cr, Nb, Mo, Hf, Ta, W being a major constituent, then in addition to the corresponding [C22C 27/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 28/00

Alloys based on a metal not provided for in groups [C22C 5/00](#) - [C22C 27/00](#)

Definition statement

This place covers:

alloys not otherwise provided for, such as alloys based on Ga, Ge, In, Rare earth metals etc.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B
Alloys based on non-metals (such as B, Si, Se, Te-based alloys)	C01B , C01D , C01G

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/00
Changing the physical structure of non-ferrous metals and non-ferrous alloys	C22F

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, then in addition to [C22C 28/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 29/00

Alloys based on carbides, oxides, nitrides, borides, or silicides, e.g. cermets, or other metal compounds, e.g. oxynitrides, sulfides {([C22C 26/00](#) takes precedence)}

Definition statement

This place covers:

alloys containing more than 50wt% of carbides, oxides, nitrides, borides, oxynitrides, sulfides etc., i.e. cermets

References

Limiting references

This place does not cover:

Cubic or wurtzitic boron nitrides	C22C 26/00
Laminates	B32B
Magnetic media/head laminates	G11B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Dry process for making cermets	C22C 1/05
Non-ferrous alloys containing at least 5wt% but less than 50wt% of carbides, oxides, nitrides, borides, oxynitrides, sulfides etc.	C22C 32/00
Ferrous alloys obtained by powder metallurgy with more than 5wt% of carbides, nitrides or borides	C22C 33/0292
Welding material	B23K 35/327
Spray coating material	C23C 4/06

Special rules of classification

Depending on the composition of either the matrix or the main metallic or non-metallic compound, the composition is classified in one of the subgroups of [C22C 29/00](#).

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

Cermet	mmc, metal ceramic matrix
--------	---------------------------

C22C 30/00

Alloys containing less than 50% by weight of each constituent

Definition statement

This place covers:

Alloys of multiple bases, i.e. with more than one element as major constituents.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
Laminates	B32B
Magnetic media/ head laminates	G11B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Powder metallurgy	B22F
Soldering/welding materials	B23K 35/00
Changing the physical structure of ferrous alloys	C21D
Coatings, sputtering targets	C23C
Magnets	H01F

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications. Depending on whether the alloy contains Cu, Sn, Pb, Zn the corresponding [C22C 30/00](#) class is given. When the alloy comprises more than one of Cu, Sn, Pb, Zn, more than one [C22C 30/00](#) are given.

For example an alloy consisting of 40 wt% Cu, 40 wt% Sn and 20% Zn is classified in [C22C 30/02](#), [C22C 30/04](#), [C22C 30/06](#).

In addition to the corresponding [C22C 30/00](#) class other [C22C](#) classes may also be given based on the specific embodiments.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 32/00

Non-ferrous alloys containing at least 5% by weight but less than 50% by weight of oxides, carbides, borides, nitrides, silicides or other metal compounds, e.g. oxynitrides, sulfides, whether added as such or formed in situ

Definition statement

This place covers:

Dispersion hardened alloys with less than 5wt% of dispersed compounds, e.g. ODS aluminium are also classified in this group.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Alloys containing cubic or wurtzitic Boron Nitrides, diamonds	C22C 26/00
Ferrous alloys (by powder metallurgy)	C22C 33/02
Resin bonded metal powders or metal carbides or the like	B29K 2303/06

Laminates	B32B
-----------	----------------------

Special rules of classification

Depending on the composition of the main metallic or non-metallic compound, the composition is classified in one of the subgroups of [C22C 32/00](#).

Exception: ODS steels (including those containing less than 5wt% Oxide Dispersions) are classified in [C22C 33/0261](#) when the oxide dispersions are the single non-metallic constituent.

All other ferrous alloys obtained by powder metallurgy and having metallic or non-metallic compounds therein are classified in [C22C 33/0214](#) - [C22C 33/0228](#) or [C22C 33/0292](#).

When a filler material can only be of a fibrous nature, classification is made in groups [C22C 47/00](#) and [C22C 49/00](#). When the filler material is chosen from alternatives which can be fibrous or non-fibrous, classification is made in group [C22C 1/10](#). When both fibrous and non-fibrous fillers are present, classification is made in groups [C22C 47/00](#) and [C22C 49/00](#) and also in group [C22C 32/00](#) if the composition is of importance.

C22C 33/00

Making ferrous alloys

Definition statement

This place covers:

Methods of making ferrous alloys, cast irons, amorphous ferrous alloys not provided in any of [C21D](#), [C22B](#), [C21B](#). Use of master alloys for the production of ferrous alloys.

Relationships with other classification places

The compositions of the amorphous alloys are classified in [C22C 45/00](#).

The methods of making amorphous alloys (other than Fe-based ones) are classified in [C22C 1/11](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

The cast iron compositions are classified in [C22C 37/00](#).

Master alloy compositions are classified in [C22C 35/00](#).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Powder metallurgy methods	C22C 33/02 , B22F
---------------------------	---

Informative references

Attention is drawn to the following places, which may be of interest for search:

Changing the physical structure of ferrous alloys	C21D
Refining of metals	C22B

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

C22C 33/02

by powder metallurgy (working metallic powder [B22F](#))

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Chemical treatment of metallic powders (incl. decarburising)	B22F 1/145
--	----------------------------

Special rules of classification

Iron or steel alloys containing metal or non-metallic compounds are classified as follows:

- ODS steels: [C22C 32/0026](#)
- containing more than 5wt% carbides, nitrides or borides (NOT BN) : [C22C 33/0292](#)
- containing phosphor compounds: [C22C 33/0214](#)
- containing sulphur compounds: [C22C 33/0221](#)
- containing other compounds, incl. Boron Nitrides and less than 5wt% carbides, nitrides or borides, or more than 5wt% graphite: [C22C 33/0228](#)

If less than 5wt% of graphite is present as essential feature then classify in [C22C 33/0228](#) nevertheless; if not index.

When the composition of a product is expressed in ranges and is the basis of the invention or when specific examples are given in the description, the composition, respectively the examples, should also be classified in the database Alloys. When the composition is expressed in general terms or is not the basis of the invention, the composition is indexed by deep-indexing according to the scheme of [B22F](#) and in accordance with the rules presented in the annex.

C22C 35/00

Master alloys for iron or steel

Definition statement

This place covers:

Master alloys used for the production of iron/steel

Relationships with other classification places

Ferrous alloys, steels are classified in [C22C 38/00](#).

The cast iron compositions are classified in [C22C 37/00](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

Making ferrous alloys by melting using master alloys is classified in [C22C 33/06](#).

References

Limiting references

This place does not cover:

Making ferrous alloys	C22C 33/00
-----------------------	----------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Powder metallurgy	B22F
Changing the physical structure of ferrous alloys	C21D
Refining of metals	C22B

Special rules of classification

Fe-based master alloys are classified in [C22C 35/005](#).

The master alloy compositions are indexed in the Alloys database.

C22C 37/00

Cast-iron alloys

Definition statement

This place covers:

Cast iron alloy compositions

Relationships with other classification places

Making cast iron alloys [C22C 33/08](#) – [C22C 33/12](#).

References

Limiting references

This place does not cover:

Steel alloy compositions	C22C 38/00
--------------------------	----------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Making cast iron alloys	C22C 33/08 – C22C 33/12
Changing the physical structure of ferrous alloys	C21D
Refining of metals	C22B

Special rules of classification

If the cast iron contains spheroidal, nodular graphite, then it is classified in [C22C 37/04](#).

In these groups, the last place rule is followed combined with multiple classifications. Depending on whether the cast iron contains Cr, Al or Si, the corresponding [C22C 37/00](#) classes are given.

When a cast iron contains spheroidal graphite as well as Cr, Ni and Si the classes [C22C 37/04](#), [C22C 37/08](#) and [C22C 37/10](#) are given.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 38/00

Ferrous alloys, e.g. steel alloys (cast-iron alloys [C22C 37/00](#))

Definition statement

This place covers:

Iron based alloys and all types of steels (low alloy steels, dual-phase steels, tool steels, spring steels, maraging steels, stainless steels, ferritic, austenitic, martensitic, bainitic, pearlitic etc.).

Relationships with other classification places

Cast iron compositions are classified in [C22C 37/00](#).

Fe-based amorphous alloys are classified in [C22C 45/02](#).

Methods of changing the physical structure of ferrous alloys are classified in [C21D](#).

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22E](#), [C21D](#), [B22E](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc.).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Cast irons	C22C 37/00
Amorphous alloys	C22C 45/02 , C22C 45/008

Informative references

Attention is drawn to the following places, which may be of interest for search:

Soldering/welding materials	B23K 35/3053 - B23K 35/3093
Layered products	B32B
Changing the physical structure of ferrous alloys	C21D

Special rules of classification

In these groups, the last place rule is followed combined with multiple classifications.

Ferrous alloys/steels containing Cr (and no Ni) are classified in [C22C 38/18-C22C 38/38](#). It is noted that depending on the alloying elements present in the composition the classes [C22C 1/11](#)-[C22C 16/00](#), [C22C 38/60](#) may also be given in addition to the ones of [C22C 38/18-C22C 38/38](#).

Ferrous alloys/steels containing Cr and Ni are classified in [C22C 38/40-C22C 38/58](#). It is noted that depending on the alloying elements present in the composition the classes [C22C 1/11](#) -[C22C 16/00](#), [C22C 38/60](#) may also be given in addition to the ones of [C22C 38/40-C22C 38/58](#)

Due to lack of IPC entry, Steels/Ferrous alloys containing Cr with Ni with more than 1.5 wt% of Si are classified at [C22C 38/34](#), i.e. using the class for Steels/Ferrous alloys containing Cr with more than 1.5 wt% of Si.

For example a stainless steel consisting of by mass %, C: 0.03-0.12%, Si: 0.1-1%, Mn: 0.1-2%, Cr: 20% to 28%, Ni: 15-35%, W: 4-10%, Ti: 0.01-0.3%, Nb: 0.01-1%, sol. Al: 0.0005-0.04%, B: 0.0005-0.01%, REM 0.0005-0.2% and the balance Fe and impurities; is classified in:

[C22C 38/02](#); [C22C 38/04](#); [C22C 38/58](#); [C22C 38/44](#); [C22C 38/50](#); [C22C 38/48](#); [C22C 38/005](#); [C22C 38/54](#).

When that the ferrous alloy/steel contains Cr, whereas Ni is being optionally added, then if specific examples exist with Cr without Ni as well as with Cr and Ni, the composition is classified in both in [C22C 38/18-C22C 38/38](#) and [C22C 38/40-C22C 38/58](#).

In the class [C22C 38/004](#) are classified very low carbon steels i.e. with carbon content less than 0.01 wt%, when: a) the carbon range discloses a specific low limit being less than 0.01 wt% or b) the examples disclose carbon contents less than 0.01 wt%. Specific disclosures therefore such as C 0.0001- 0.0050 wt% (or 1-50 ppm) are classified in [C22C 38/004](#). General disclosures however such as C 0-0.03 wt% not accompanied by specific carbon contents less than 0.01 wt% are not classified in [C22C 38/004](#).

In the class [C22C 38/002](#) are classified ferrous alloy/steel which contain elements for which no entry is provided in the groups [C22C 38/001](#), [C22C 38/004-C22C 38/60](#), such as P, In, Mg, precious metals etc.

It is noted that class [C22C 38/60](#) is an one dot entry.

When the alloy contains less than 50 wt% of each constituent, with Fe being a major constituent, then in addition to the corresponding [C22C 38/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The ferrous alloy/steel composition(s) is/are indexed in the Alloys database.

C22C 43/00

Alloys containing radioactive materials

Definition statement

This place covers:

alloys which are radioactive or contain an element with radioactive isotopes, e.g. uranium, promethium, technetium etc.

Relationships with other classification places

When the alloy is produced by a specifically described method (examples, claims) then the method is classified as well ([C22F](#), [C21D](#), [B22F](#), [C23C](#), [B23K](#), [C25D](#), [C25B](#), [B22D](#), [B21J](#), [B21B](#), [B21C](#) etc).

When the alloy is intended for a particular use/product then the use/ product is classified as well.

References

Limiting references

This place does not cover:

Amorphous alloys	C22C 45/00
------------------	----------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Nuclear reactors/reactor fuel elements	G21C , G21C 3/07
--	--

Special rules of classification

When the alloy contains less than 50 wt% of each constituent, then in addition to [C22C 43/00](#) class at least one [C22C 30/00](#) class is also given depending on the rest of the main alloying elements.

The alloy composition(s) is/are indexed in the Alloys database.

C22C 45/00**Amorphous alloys (making amorphous non-ferrous alloys [C22C 1/11](#))****Definition statement**

This place covers:

Amorphous alloys and metallic glasses.

Relationships with other classification places

The methods of making Fe-based amorphous alloys are classified in [C22C 33/003](#).

Semi-amorphous alloys are classified both as amorphous and as crystalline ones having a corresponding [C22C 45/00](#) subclass and [C22C 5/00](#) - [C22C 38/00](#) subclasses.

When the alloy is intended for a particular use/product then the use/product is classified as well.

References**Limiting references**

This place does not cover:

Making amorphous non-ferrous alloys	C22C 1/11
-------------------------------------	---------------------------

Informative references

Attention is drawn to the following places, which may be of interest for search:

Powder metallurgy	B22F
Soldering/welding materials	B23K 35/00
Ceramics	C04B
Changing the physical structure of ferrous alloys	C21D
Changing the physical structure of non-ferrous alloys	C22F
Coatings	C23C

Special rules of classification

Depending on the major constituent, i.e. the base of the alloy, the corresponding [C22C 45/00](#) subgroup is given.

Fe-based amorphous alloys are classified in [C22C 45/02](#).

Ni or Co-based amorphous alloys are classified in [C22C 45/04](#).

Amorphous alloys with a major constituent which is not disclosed in any of [C22C 45/001-C22C 45/10](#) classes are classified in the [C22C 45/00](#).