

CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

METALLURGY

C22 METALLURGY; FERROUS OR NON-FERROUS ALLOYS; TREATMENT OF ALLOYS OR NON-FERROUS METALS

C22C ALLOYS (flints [C06C 15/00](#); treatment of alloys [C21D](#), [C22F](#))

NOTES

- In this subclass, the following terms or expressions are used with the meanings indicated:
 - "alloys" includes also:
 - metallic composite materials containing a substantial proportion of fibres or other somewhat larger particles;
 - 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;
 - "based on" requires at least 50% by weight of the specified constituent or of the specified group of constituents.
- Groups [C22C 43/00](#) - [C22C 49/00](#) take precedence over groups [C22C 1/00](#) - [C22C 38/00](#).
{This Note corresponds to IPC Note (1) relating to [C22C 1/00](#) - [C22C 38/00](#).}
- In groups [C22C 37/00](#) and [C22C 38/00](#), the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, an alloy is classified in the last appropriate place that provides for one of the alloying components. {This Note corresponds to IPC Note (1) relating to [C22C 37/00](#) - [C22C 38/00](#).}
- {In this subclass it is desirable to classify the individual aspects of combinations of processes or materials for powder metallurgy using Combination Sets with symbols chosen from groups [C22C 1/00](#) - [C22C 43/00](#) or from groups [B22F 1/00](#) - [B22F 9/00](#).}
- {In this subclass the special database "ALLOYS" is used. This system includes 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.}

WARNINGS

- The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

C22C 101/00 , C22C 101/20	covered by	C04B 35/62227
C22C 101/02	covered by	C04B 35/62231
C22C 101/04	covered by	C04B 35/62236
C22C 101/06	covered by	C04B 35/62245
C22C 101/08	covered by	C04B 35/62272
C22C 101/10	covered by	D01F 9/12
C22C 101/12	covered by	C04B 35/62277
C22C 101/14	covered by	C04B 35/62281
C22C 101/16	covered by	C04B 35/62286
C22C 101/18	covered by	C04B 35/62295
C22C 101/22	covered by	C04B 35/6229
C22C 111/00 - C22C 111/02	covered by	C22C 47/00 , C22C 49/00
C22C 121/00 - C22C 121/02	covered by	C22C 47/02 - C22C 47/068 , C22C 49/00
- In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

Non-ferrous alloys, i.e. alloys based essentially on metals other than iron (master alloys for iron and steel [C22C 35/00](#); alloys containing radioactive material [C22C 43/00](#); amorphous alloys [C22C 45/00](#); alloys containing fibres or filaments [C22C 47/00](#), [C22C 49/00](#))

1/00 Making alloys (powder-metallurgical apparatus or processes, not specially modified for making alloys [B22F](#); by electrothermal methods [C22B 4/00](#); by electrolysis [C25C](#))

- | | |
|-------|--|
| 1/002 | • {Making amorphous alloys (processes for making amorphous material by powder metallurgy B22F)} |
| 1/005 | • {Making alloys with holding in the range of the solid-liquid phase} |
| 1/007 | • {Preparing arsenides or antimonides, especially of the III-VI-compound type, e.g. aluminium or gallium arsenide} |
| 1/02 | • by melting {(C22C 1/1036 takes precedence)} |
| 1/023 | • • {Alloys based on nickel} |
| 1/026 | • • {Alloys based on aluminium} |
| 1/03 | • • using master alloys |

- 1/04 . . by powder metallurgy ([C22C 1/08](#), {[C22C 1/05](#), [C22C 1/10](#), [C22C 32/00](#), [C22C 47/00](#), [C22C 49/00](#)} take precedence)
- 1/0408 . . {Light metal alloys}
- 1/0416 . . . {Aluminium-based alloys}
- 1/0425 . . {Copper-based alloys}
- 1/0433 . . {Nickel- or cobalt-based alloys}
- 1/0441 . . . {Alloys based on intermetallic compounds of the type rare earth - Co, Ni}
- 1/045 . . {Alloys based on refractory metals}
- 1/0458 . . . {Alloys based on titanium, zirconium, hafnium}
- 1/0466 . . {Alloys based on noble metals}
- 1/0475 . . {Impregnated alloys}
- 1/0483 . . {Alloys based on the low melting point metals Zn, Pb, Sn, Cd, In or Ga}
- 1/0491 . . {comprising intermetallic compounds ([C22C 1/0441](#) takes precedence)}
- 1/05 . . Mixtures of metal powder with non-metallic powder ([C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)
- 1/051 . . . {Making hard metals based on borides, carbides, nitrides, oxides or silicides; Preparation of the powder mixture used as the starting material}
- 1/053 {with *in situ* forming of the hard compound ([C22C 1/058](#) takes precedence)}
- 1/055 {using carbon}
- 1/056 {using gas}
- 1/058 . . . {by reaction sintering (i.e. gasless reaction starting from a mixture of solid metal compounds)}
- 1/06 . . with the use of special agents for refining or deoxidising
- 1/08 . . Alloys with open or closed pores {(by powder metallurgy [B22F 3/11](#))}
- 2001/081 . . {Casting porous metals into porous preform skelet without foaming}
- 2001/082 . . . {with removal of the preform}
- 2001/083 . . {Foaming process in molten metal other than by powder metallurgy}
- 2001/085 . . . {with external pressure or pressure buildup to make porous metals}
- 2001/086 . . . {Gas foaming process}
- 2001/087 . . . {after casting in solidified or solidifying metal to make porous metals}
- 2001/088 . . {Foaming process with solid metal other than by powder metallurgy}
- 1/10 . . Alloys containing non-metals ({[C22C 1/05](#)}, [C22C 1/08](#), {[C22C 47/00](#), [C22C 49/00](#)} take precedence)
- 1/1005 . . {Pretreatment of the non-metallic additives (pretreatment of non-metallic fibres [C22C 47/02](#))}
- WARNING**
- Groups [C22C 1/1005](#), [C22C 1/101](#) and [C22C 1/1015](#) are not complete, see also [C22C 1/10](#)
- 1/101 . . . {by coating}
- 1/1015 . . . {by preparing or treating a non-metallic additive preform}
- 2001/1021 {the preform being ceramic}
- 1/1026 . . {starting from a solution or a suspension of (a) compound(s) of at least one of the alloy constituents}
- 1/1031 . . {starting from (a) gaseous compound(s) or (a) vapour(s) of at least one of the constituents}
- 1/1036 . . {starting from a melt (infiltration of sintered ceramic preforms with molten metal [C04B 41/51](#))}
- 1/1042 . . . {by atomising (atomising molten metal [B22F 9/08](#))}
- 2001/1047 . . . {by mixing and casting liquid metal matrix composites}
- 2001/1052 {by mixing and casting metal matrix composites with reaction}
- 2001/1057 . . . {Reactive infiltration}
- 2001/1063 {Gas reaction, e.g. lanxide}
- 1/1068 . . . {Making hard metals based on borides, carbides, nitrides, oxides, silicides}
- 2001/1073 . . . {Infiltration or casting under mechanical pressure, e.g. squeeze casting}
- 1/1078 . . {by internal oxidation of material in solid state}
- 1/1084 . . {by mechanical alloying (blending, milling)}
- 2001/1089 . . {by partial reduction or decomposition of a solid metal compound}
- 1/1094 . . {comprising an after-treatment}
- NOTE**
- Documents classified in group [C22C 1/1094](#) are also classified in subclass [C22F](#)
- 3/00 Removing material from alloys to produce alloys of different constitution {separation of the constituents of alloys}**
- 3/005 . . {Separation of the constituents of alloys}
- 5/00 Alloys based on noble metals**
- 5/02 . . Alloys based on gold
- 5/04 . . Alloys based on a platinum group metal
- 5/06 . . Alloys based on silver
- 5/08 . . with copper as the next major constituent
- 5/10 . . with cadmium as the next major constituent
- 7/00 Alloys based on mercury**
- 9/00 Alloys based on copper**
- 9/01 . . with aluminium as the next major constituent
- 9/02 . . with tin as the next major constituent
- 9/04 . . with zinc as the next major constituent
- 9/05 . . with manganese as the next major constituent
- 9/06 . . with nickel or cobalt as the next major constituent
- 9/08 . . with lead as the next major constituent
- 9/10 . . with silicon as the next major constituent
- 11/00 Alloys based on lead**
- 11/02 . . with an alkali or an alkaline earth metal as the next major constituent
- 11/04 . . with copper as the next major constituent
- 11/06 . . with tin as the next major constituent
- 11/08 . . with antimony or bismuth as the next major constituent
- 11/10 . . with tin
- 12/00 Alloys based on antimony or bismuth**
- 13/00 Alloys based on tin**

13/02	<ul style="list-style-type: none"> with antimony or bismuth as the next major constituent 	24/00	Alloys based on an alkali or an alkaline earth metal
14/00	Alloys based on titanium	25/00	Alloys based on beryllium
16/00	Alloys based on zirconium	26/00	Alloys containing diamond {or cubic or wurtzitic boron nitride, fullerenes or carbon nanotubes}
18/00	Alloys based on zinc	2026/001	<ul style="list-style-type: none"> {Fullerenes}
18/02	<ul style="list-style-type: none"> with copper as the next major constituent 	2026/002	<ul style="list-style-type: none"> {Carbon nanotubes}
18/04	<ul style="list-style-type: none"> with aluminium as the next major constituent 	2026/003	<ul style="list-style-type: none"> {Cubic boron nitrides only}
19/00	Alloys based on nickel or cobalt	2026/005	<ul style="list-style-type: none"> {with additional metal compounds being borides}
19/002	<ul style="list-style-type: none"> {with copper as the next major constituent} 	2026/006	<ul style="list-style-type: none"> {with additional metal compounds being carbides}
19/005	<ul style="list-style-type: none"> {with Manganese as the next major constituent} 	2026/007	<ul style="list-style-type: none"> {with additional metal compounds being nitrides}
19/007	<ul style="list-style-type: none"> {with a light metal (alkali metal Li, Na, K, Rb, Cs; earth alkali metal Be, Mg, Ca, Sr, Ba, Al Ga, Ge, Ti) or B, Si, Zr, Hf, Sc, Y, lanthanides, actinides, as the next major constituent} 	2026/008	<ul style="list-style-type: none"> {with additional metal compounds other than carbides, borides or nitrides}
19/03	<ul style="list-style-type: none"> based on nickel 	27/00	Alloys based on rhenium or a refractory metal not mentioned in groups C22C 14/00 or C22C 16/00
19/05	<ul style="list-style-type: none"> with chromium 	27/02	<ul style="list-style-type: none"> Alloys based on vanadium, niobium, or tantalum
19/051	<ul style="list-style-type: none"> {and Mo or W} 	27/025	<ul style="list-style-type: none"> {alloys based on vanadium}
19/052	<ul style="list-style-type: none"> {with the maximum Cr content being at least 40%} 	27/04	<ul style="list-style-type: none"> Alloys based on tungsten or molybdenum
19/053	<ul style="list-style-type: none"> {with the maximum Cr content being at least 30% but less than 40%} 	27/06	<ul style="list-style-type: none"> Alloys based on chromium
19/055	<ul style="list-style-type: none"> {with the maximum Cr content being at least 20% but less than 30%} 	28/00	Alloys based on a metal not provided for in groups C22C 5/00 - C22C 27/00
19/056	<ul style="list-style-type: none"> {with the maximum Cr content being at least 10% but less than 20%} 	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)}
19/057	<ul style="list-style-type: none"> {with the maximum Cr content being less 10%} 	29/005	<ul style="list-style-type: none"> {comprising a particular metallic binder}
19/058	<ul style="list-style-type: none"> {without Mo and W} 	29/02	<ul style="list-style-type: none"> based on carbides or carbonitrides
19/07	<ul style="list-style-type: none"> based on cobalt 	29/04	<ul style="list-style-type: none"> based on carbonitrides
20/00	Alloys based on cadmium	29/06	<ul style="list-style-type: none"> based on carbides, but not containing other metal compounds
21/00	Alloys based on aluminium	29/062	<ul style="list-style-type: none"> {based on B₄C}
	NOTE	29/065	<ul style="list-style-type: none"> {based on SiC}
	In groups C22C 21/14 - C22C 21/18 , the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, an alloy is classified in the last appropriate place.	29/067	<ul style="list-style-type: none"> {comprising a particular metallic binder}
	{This Note corresponds to IPC Note (1) relating to C22C 21/14 - C22C 21/18 .}	29/08	<ul style="list-style-type: none"> based on tungsten carbide
21/003	<ul style="list-style-type: none"> {containing at least 2.6% of one or more of the elements: tin, lead, antimony, bismuth, cadmium, and titanium} 	29/10	<ul style="list-style-type: none"> based on titanium carbide
21/006	<ul style="list-style-type: none"> {containing Hg} 	29/12	<ul style="list-style-type: none"> based on oxides
21/02	<ul style="list-style-type: none"> with silicon as the next major constituent 	29/14	<ul style="list-style-type: none"> based on borides
21/04	<ul style="list-style-type: none"> Modified aluminium-silicon alloys 	29/16	<ul style="list-style-type: none"> based on nitrides {(containing cubic BN or wurtzitic BN and diamond C22C 26/00)}
21/06	<ul style="list-style-type: none"> with magnesium as the next major constituent 	29/18	<ul style="list-style-type: none"> based on silicides
21/08	<ul style="list-style-type: none"> with silicon 	30/00	Alloys containing less than 50% by weight of each constituent
21/10	<ul style="list-style-type: none"> with zinc as the next major constituent 		NOTE
21/12	<ul style="list-style-type: none"> with copper as the next major constituent 		In groups C22C 30/02 - C22C 30/06 , the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, an alloy is classified in the last appropriate place.
21/14	<ul style="list-style-type: none"> with silicon 		{This Note corresponds to IPC Note (1) relating to C22C 30/02 - C22C 30/06 .}
21/16	<ul style="list-style-type: none"> with magnesium 	30/02	<ul style="list-style-type: none"> containing copper
21/18	<ul style="list-style-type: none"> with zinc 	30/04	<ul style="list-style-type: none"> containing tin or lead
22/00	Alloys based on manganese	30/06	<ul style="list-style-type: none"> containing zinc
23/00	Alloys based on magnesium		
23/02	<ul style="list-style-type: none"> with aluminium as the next major constituent 		
23/04	<ul style="list-style-type: none"> with zinc or cadmium as the next major constituent 		
23/06	<ul style="list-style-type: none"> with a rare earth metal as the next major constituent 		

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

NOTE

This group comprises also dispersion hardened alloys with less than 5% of dispersed compounds

- 32/0005 . {with at least one oxides and at least one of carbides, nitrides, borides or silicides as the main non-metallic constituents}
- 32/001 . {with only oxides}
- 32/0015 . . {with only single oxides as main non-metallic constituents}
- 32/0021 . . . {Matrix based on noble metals, Cu or alloys thereof}
- 32/0026 . . . {Matrix based on Ni, Co, Cr or alloys thereof; Matrix based on Fe for ODS steels (matrix based on Fe for steels other than ODS [C22C 33/00](#), by powder metallurgy [C22C 33/02](#))}
- 32/0031 . . . {Matrix based on refractory metals, W, Mo, Nb, Hf, Ta, Zr, Ti, V or alloys thereof}
- 32/0036 . . . {Matrix based on Al, Mg, Be or alloys thereof}
- 32/0042 . . . {Matrix based on low melting metals, Pb, Sn, In, Zn, Cd or alloys thereof}
- 32/0047 . {with carbides, nitrides, borides or silicides as the main non-metallic constituents}
- 32/0052 . . {only carbides}
- 32/0057 . . . {based on B₄C}
- 32/0063 . . . {based on SiC}
- 32/0068 . . {only nitrides}
- 32/0073 . . {only borides}
- 32/0078 . . {only silicides}
- 32/0084 . {carbon or graphite as the main non-metallic constituent}
- 32/0089 . {with other, not previously mentioned inorganic compounds as the main non-metallic constituent, e.g. sulfides, glass}
- 32/0094 . {with organic materials as the main non-metallic constituent, e.g. resin}

Ferrous alloys, i.e. alloys based on iron (alloys containing radioactive material [C22C 43/00](#); amorphous alloys [C22C 45/00](#); alloys containing fibres or filaments [C22C 47/00](#), [C22C 49/00](#); heat treatment thereof [C21D](#))

33/00 Making ferrous alloys

- 33/003 . {making amorphous alloys}
- 33/006 . {compositions used for making ferrous alloys}
- 33/02 . by powder metallurgy (working metallic powder [B22F](#))
- 33/0207 . . {Using a mixture of prealloyed powders or a master alloy (mixtures of metal powder in general [B22F 1/09](#))}
- 33/0214 . . . {comprising P or a phosphorus compound}
- 33/0221 . . . {comprising S or a sulfur compound}
- 33/0228 . . . {comprising other non-metallic compounds or more than 5% of graphite}
- 33/0235 . . {Starting from compounds, e.g. oxides (manufacture of articles starting from powder comprising reducible metal compounds in general [B22F 3/001](#))}

- 33/0242 . . {using the impregnating technique (impregnating articles in general [B22F 3/26](#))}
- 33/025 . . {having an intermetallic of the REM-Fe type which is not magnetic}
- 33/0257 . . {characterised by the range of the alloying elements}
- 33/0264 . . . {the maximum content of each alloying element not exceeding 5%}
- 33/0271 {with only C, Mn, Si, P, S, As as alloying elements, e.g. carbon steel}
- 33/0278 . . . {with at least one alloying element having a minimum content above 5%}
- 33/0285 {with Cr, Co, or Ni having a minimum content higher than 5%}
- 33/0292 {with more than 5% preformed carbides, nitrides or borides}
- 33/04 . by melting
- 33/06 . . using master alloys
- 33/08 . Making cast-iron alloys
- 33/10 . . including procedures for adding magnesium
- 33/12 . . . by fluidised injection

35/00 Master alloys for iron or steel

- 35/005 . {based on iron, e.g. ferro-alloys}

37/00 Cast-iron alloys

- 37/04 . containing spheroidal graphite
- 37/06 . containing chromium
- 37/08 . . with nickel
- 37/10 . containing aluminium or silicon

38/00 Ferrous alloys, e.g. steel alloys (cast-iron alloys [C22C 37/00](#))

- 38/001 . {containing N}
- 38/002 . {containing In, Mg, or other elements not provided for in one single group [C22C 38/001](#) - [C22C 38/60](#)}
- 38/004 . {Very low carbon steels, i.e. having a carbon content of less than 0,01%}
- 38/005 . {containing rare earths, i.e. Sc, Y, Lanthanides}
- 38/007 . {containing silver}
- 38/008 . {containing tin}
- 38/02 . containing silicon
- 38/04 . containing manganese
- 38/06 . containing aluminium
- 38/08 . containing nickel {([C22C 38/105](#) takes precedence)}
- 38/10 . containing cobalt
- 38/105 . . {containing Co and Ni}
- 38/12 . containing tungsten, tantalum, molybdenum, vanadium, or niobium
- 38/14 . containing titanium or zirconium
- 38/16 . containing copper
- 38/18 . containing chromium
- 38/20 . . with copper
- 38/22 . . with molybdenum or tungsten
- 38/24 . . with vanadium
- 38/26 . . with niobium or tantalum
- 38/28 . . with titanium or zirconium
- 38/30 . . with cobalt
- 38/32 . . with boron
- 38/34 . . with more than 1.5% by weight of silicon
- 38/36 . . with more than 1.7% by weight of carbon
- 38/38 . . with more than 1.5% by weight of manganese
- 38/40 . . with nickel

- 38/42 . . . with copper
- 38/44 . . . with molybdenum or tungsten
- 38/46 . . . with vanadium
- 38/48 . . . with niobium or tantalum
- 38/50 . . . with titanium or zirconium
- 38/52 . . . with cobalt
- 38/54 . . . with boron
- 38/56 . . . with more than 1.7% by weight of carbon
- 38/58 . . . with more than 1.5% by weight of manganese
- 38/60 . containing lead, selenium, tellurium, or antimony, or more than 0.04% by weight of sulfur

43/00 Alloys containing radioactive materials

45/00 Amorphous alloys

- 45/001 . {with Cu as the major constituent}
- 45/003 . {with one or more of the noble metals as major constituent}
- 45/005 . {with Mg as the major constituent}
- 45/006 . {with Cr as the major constituent}
- 45/008 . {with Fe, Co or Ni as the major constituent (C22C 45/02, C22C 45/04 take precedence)}
- 45/02 . with iron as the major constituent
- 45/04 . with nickel or cobalt as the major constituent
- 45/06 . with beryllium as the major constituent
- 45/08 . with aluminium as the major constituent
- 45/10 . with molybdenum, tungsten, niobium, tantalum, titanium, or zirconium {or Hf} as the major constituent

Alloys containing fibres or filaments

47/00 Making alloys containing metallic or non-metallic fibres or filaments

- 2047/005 . {Working of filaments or rods into fibre reinforced metal by mechanical deformation}
- 47/02 . Pretreatment of the fibres or filaments
- 47/025 . . {Aligning or orienting the fibres}
- 47/04 . . by coating, e.g. with a protective or activated covering
- 47/06 . . by forming the fibres or filaments into a preformed structure, e.g. using a temporary binder to form a mat-like element
- 47/062 . . . {from wires or filaments only}
- 47/064 {Winding wires}
- 47/066 {Weaving wires}
- 47/068 {Aligning wires}
- 47/08 . by contacting the fibres or filaments with molten metal, e.g. by infiltrating the fibres or filaments placed in a mould {(C22C 47/16 takes precedence)}
- 47/10 . . Infiltration in the presence of a reactive atmosphere; Reactive infiltration
- 47/12 . . Infiltration or casting under mechanical pressure
- 47/14 . by powder metallurgy, i.e. by processing mixtures of metal powder and fibres or filaments
- 47/16 . by thermal spraying of the metal, e.g. plasma spraying {(atomising molten metal comprising fibres see also C22C 1/1042)}
- 47/18 . . using a preformed structure of fibres or filaments
- 47/20 . by subjecting to pressure and heat an assembly comprising at least one metal layer or sheet and one layer of fibres or filaments
- 2047/205 . . {placing wires inside grooves of a metal layer}

49/00 Alloys containing metallic or non-metallic fibres or filaments

- 49/02 . characterised by the matrix material
- 49/04 . . Light metals
- 49/06 . . . Aluminium
- 49/08 . . Iron group metals
- 49/10 . . Refractory metals
- 49/11 . . . Titanium
- 49/12 . . Intermetallic matrix material
- 49/14 . characterised by the fibres or filaments

2200/00 Crystalline structure

- 2200/02 . Amorphous
- 2200/04 . Nanocrystalline
- 2200/06 . Quasicrystalline

Non-ferrous alloys, i.e. alloys based essentially on metals other than iron (master alloys for iron and steel C22C 35/00; alloys containing radioactive material C22C 43/00; amorphous alloys C22C 45/00; alloys containing fibres or filaments C22C 47/00, C22C 49/00)

2202/00 Physical properties

- 2202/02 . Magnetic
- 2202/04 . Hydrogen absorbing

2204/00 End product comprising different layers, coatings or parts of cermet