SECTION C — CHEMISTRY; METALLURGY

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

Note(s) [2012.01]

1. Processes or devices specific to the transformation of iron ore or iron carbonyl into iron, either solid or molten, are classified in subclass C21B.
2. Processes or devices specific to:
   - processing of pig-iron or cast iron;
   - manufacture of wrought-iron, wrought-steel or carbon steel;
   - treatment in molten state of ferrous alloys;

are classified in subclass C21C.
3. The following processes or devices are classified in subclass C21D:
   - processes specific to heat treatment of ferrous alloys or steels;
   - devices for heat treatment of metals or alloys.

C22B PRODUCTION OR REFINING OF METALS (making metallic powder or suspensions thereof B22F 9/00; production of metals by electrolysis or electrophoresis C25)**; PRETREATMENT OF RAW MATERIALS**

Note(s)

In this subclass, groups for obtaining metals include obtaining the metals by non-metallurgical processes, and obtaining metal compounds by metallurgical processes. Thus, for example, group C22B 11/00 covers the production of silver by reduction of ammoniacal silver oxide in solution, and group C22B 17/00 covers the production of cadmium oxide by a metallurgical process. Furthermore, although compounds of arsenic and antimony are classified in C01G, production of the elements themselves is covered by C22B, as well as the production of their compounds by metallurgical processes.

Subclass index

1/00 Preliminary treatment of ores or scrap [1, 2006.01]

1/02 • Roasting processes (C22B 1/16 takes precedence) **[1, 2006.01]**
1/04 • • Blast roasting **[1, 2006.01]**
1/06 • • Sulfating roasting **[1, 2006.01]**
1/08 • • Chloridising roasting **[1, 2006.01]**
1/10 • • in fluidised form **[1, 2006.01]**
1/11 • Removing sulfur, phosphorus or arsenic, other than by roasting **[2, 2006.01]**
1/14 • Agglomerating; Briquetting; Binding; Granulating **[1, 2006.01]**
1/16 • • Sintering; Agglomerating **[1, 2006.01]**
1/18 • • • in sinter pots **[1, 2006.01]**
1/20 • • • in sintering machines with movable grates **[1, 2006.01]**
1/212 • • • in tunnel furnaces **[2, 2006.01]**
1/214 • • • in shaft furnaces **[2, 2006.01]**
1/216 • • • in rotary furnaces **[2, 2006.01]**
1/22 • • • in other sintering apparatus **[1, 2006.01]**
1/24 • • Binding; Briquetting **[1, 2006.01]**
1/242 • • • with binders **[2, 2006.01]**
1/243 • • • • inorganic **[2, 2006.01]**
1/244 • • • • organic **[2, 2006.01]**
1/245 • • • • • with carbonaceous material for the production of coked agglomerates **[2, 2006.01]**
1/248 • • • of metal scrap or alloys **[2, 2006.01]**
1/26 • Cooling of roasted, sintered, or agglomerated ores **[1, 2006.01]**

3/00 Extraction of metal compounds from ores or concentrates by wet processes [1, 5, 2006.01]

Note(s) [1, 2006.01]

When classifying in this group, the nature of any metal which is considered to represent information of interest for search may also be classified in the main groups only of C22B 11/00-C22B 25/00, in group C22B 19/34 or in any of groups C22B 26/00-C22B 61/00. This can, for example, be the case when it is considered of interest to enable searching for extraction of specific metals or their compounds. Such non-obligatory classification should be given as "additional information".

3/02 • Apparatus therefor **[1, 2006.01]**
3/04 • by leaching (C22B 3/18 takes precedence) **[5, 2006.01]**
3/06 • • in inorganic acid solutions **[5, 2006.01]**
3/08 • • • Sulfuric acid **[5, 2006.01]**
3/10 • • • Hydrochloric acid **[5, 2006.01]**
3/12 • • in inorganic alkaline solutions **[5, 2006.01]**
3/14 • • • containing ammonia or ammonium salts **[5, 2006.01]**
3/16 • • in organic solutions **[5, 2006.01]**
3/18 • with the aid of microorganisms or enzymes, e.g. bacteria or algae **[5, 2006.01]**
3/20 • Treatment or purification of solutions, e.g. obtained by leaching (C22B 3/18 takes precedence) **[5, 2006.01]**
3/22 • • by physical processes, e.g. by filtration, by magnetic means (C22B 3/26 takes precedence) **[5, 2006.01]**
3/24 • • • by adsorption on solid substances, e.g. by extraction with solid resins **[5, 2006.01]**
3/26 • • by liquid-liquid extraction using organic compounds **[5, 2006.01]**

Note(s) [5]

In groups C22B 3/28-C22B 3/40:

a. the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, compounds are classified in the last appropriate place;
b. when two or more compounds are used successively, each compound is classified as such;
c. mixtures containing two or more compounds covered individually by the same one of groups C22B 3/28-C22B 3/38, are classified only in that group.

3/28 • • • Amines **[5, 2006.01]**
3/30 • • • Oximes **[5, 2006.01]**
3/32 • • • Carboxylic acids **[5, 2006.01]**
3/34 • • • containing sulfur **[5, 2006.01]**
3/36 • • • Heterocyclic compounds (C22B 3/34 takes precedence) **[5, 2006.01]**
3/38 • • • containing phosphorus **[5, 2006.01]**
3/40 • • • Mixtures **[5, 2006.01]**
3/42 • • by ion-exchange extraction **[5, 2006.01]**
3/44 • • by chemical processes (C22B 3/26, C22B 3/42 take precedence) **[5, 2006.01]**
3/46 • • • by substitution, e.g. by cementation **[5, 2006.01]**

4/00 Electrothermal treatment of ores or metallurgical products for obtaining metals or alloys (general methods of refining or remelting metals C22B 9/00; obtaining iron or steel C21B, C21C) **[2, 2006.01]**
4/02 • Light metals **[2, 2006.01]**
4/04 • Heavy metals **[2, 2006.01]**
4/06 • Alloys **[2, 2006.01]**
4/08 • Apparatus **[2, 2006.01]**

5/00 General processes of reducing to metals [1, 2006.01]
5/02 • Dry processes **[1, 2006.01]**
5/04 • • by aluminium, other metals, or silicon **[1, 2006.01]**
5/06 • • by carbides or the like **[1, 2006.01]**
5/08 • • by sulfides; Roasting reaction processes **[1, 2006.01]**
5/10 • • by solid carbonaceous reducing agents **[1, 2006.01]**
5/12 • • by gases **[1, 2006.01]**
5/14 • • • fluidised material **[1, 2006.01]**
5/16 • • with volatilisation or condensation of the metal being produced **[1, 2006.01]**
5/18 • • Reducing step-by-step **[1, 2006.01]**
5/20 • • from metal carbonyls **[1, 2006.01]**

7/00 Working-up raw materials other than ores, e.g. scrap, to produce non-ferrous metals or compounds thereof [1, 2006.01]
7/02 • Working-up flue dust **[1, 2006.01]**
7/04 • Working-up slag **[1, 2006.01]**

9/00 General processes of refining or remelting of metals; Apparatus for electroslag or arc remelting of metals [1, 2006.01]
9/02 • Refining by liquating, filtering, centrifuging, distilling or supersonic wave action **[1, 2006.01]**
9/04 • Refining by applying a vacuum **[1, 3, 2006.01]**
9/05 • Refining by treating with gases, e.g. gas flushing **[3, 2006.01]**
9/10 • with refining or fluxing agents; Use of materials therefor (C22B 9/18 takes precedence) **[1, 3, 2006.01]**
9/14 • Refining in the solid state **[1, 2006.01]**
9/16 • Remelting metals (liquating C22B 9/02) **[3, 2006.01]**
9/18 • • Electroslag remelting **[3, 2006.01]**
9/187 • • • Apparatus therefor, e.g. furnaces **[5, 2006.01]**
9/193 • • • • Moulds, bottom plates or starter plates **[5, 2006.01]**
9/20 • • Arc remelting **[3, 2006.01]**
9/21 • • • Apparatus therefor **[5, 2006.01]**
9/22 • • with heating by wave energy or particle radiation **[3, 2006.01]**

11/00 Obtaining noble metals [1, 2006.01]
11/02 • by dry processes **[1, 2006.01]**
11/06 • Chloridising **[1, 2006.01]**
11/08 • by cyaniding **[1, 2006.01]**
11/10 • by amalgamating **[1, 2006.01]**
11/12 • • Apparatus therefor **[1, 2006.01]**

13/00 Obtaining lead [1, 2006.01]
13/02 • by dry processes **[1, 2006.01]**
13/06 • Refining **[1, 2006.01]**
13/08 • • Separating metals from lead by precipitating, e.g. by Parkes process **[1, 2006.01]**
13/10 • • Separating metals from lead by crystallising, e.g. by Pattison process **[1, 2006.01]**

15/00 Obtaining copper [1, 2006.01]
15/02 • in blast furnaces **[1, 2006.01]**
15/04 • in reverberatory furnaces **[1, 2006.01]**
15/06 • in converters **[1, 2006.01]**
15/14 • Refining **[1, 2006.01]**

17/00 Obtaining cadmium [1, 2006.01]
17/02 • by dry processes **[1, 2006.01]**
17/06 • Refining **[1, 2006.01]**

19/00 Obtaining zinc or zinc oxide [1, 2006.01]
19/02 • Preliminary treatment of ores; Preliminary refining of zinc oxide **[1, 2006.01]**
19/04 • Obtaining zinc by distilling **[1, 2006.01]**
19/06 • • in muffle furnaces **[1, 2006.01]**
19/08 • • in blast furnaces **[1, 2006.01]**
19/10 • • in reverberatory furnaces **[1, 2006.01]**

19/12 • • in crucible furnaces **[1, 2006.01]**
19/14 • • in vertical retorts **[1, 2006.01]**
19/16 • • Distilling vessels **[1, 2006.01]**
19/18 • • • Condensers; Receiving vessels **[1, 2006.01]**
19/20 • Obtaining zinc otherwise than by distilling **[1, 2006.01]**
19/28 • from muffle furnace residues **[1, 2006.01]**
19/30 • from metallic residues or scraps **[1, 2006.01]**
19/32 • Refining zinc **[1, 2006.01]**
19/34 • Obtaining zinc oxide (purifying zinc oxide C01G 9/02) **[1, 2006.01]**
19/36 • • in blast or reverberatory furnaces **[1, 2006.01]**
19/38 • • in rotary furnaces **[1, 2006.01]**

21/00 Obtaining aluminium [1, 2006.01]
21/02 • with reducing **[1, 2006.01]**
21/04 • with alkali metals **[1, 2006.01]**
21/06 • Refining **[1, 2006.01]**

23/00 Obtaining nickel or cobalt [1, 2006.01]
23/02 • by dry processes **[1, 2006.01]**
23/06 • Refining **[1, 2006.01]**

25/00 Obtaining tin [1, 2006.01]
25/02 • by dry processes **[1, 2006.01]**
25/06 • from scrap, especially tin scrap (by electrolytic process C25C 1/14) **[1, 2006.01]**
25/08 • Refining **[1, 2006.01]**

26/00 Obtaining alkali, alkaline earth metals or magnesium [2, 2006.01]
26/10 • Obtaining alkali metals **[2, 2006.01]**
26/12 • • Obtaining lithium **[2, 2006.01]**
26/20 • Obtaining alkaline earth metals or magnesium **[2, 2006.01]**
26/22 • • Obtaining magnesium **[2, 2006.01]**

30/00 Obtaining antimony, arsenic or bismuth [2, 2006.01]
30/02 • Obtaining antimony **[2, 2006.01]**
30/04 • Obtaining arsenic **[2, 2006.01]**
30/06 • Obtaining bismuth **[2, 2006.01]**

34/00 Obtaining refractory metals [2, 2006.01]
34/10 • Obtaining titanium, zirconium or hafnium **[2, 2006.01]**
34/12 • • Obtaining titanium **[2, 2006.01]**
34/14 • • Obtaining zirconium or hafnium **[2, 2006.01]**
34/20 • Obtaining niobium, tantalum or vanadium **[2, 2006.01]**
34/22 • • Obtaining vanadium **[2, 2006.01]**
34/24 • • Obtaining niobium or tantalum **[2, 2006.01]**
34/30 • Obtaining chromium, molybdenum or tungsten **[2, 2006.01]**
34/32 • • Obtaining chromium **[2, 2006.01]**
34/34 • • Obtaining molybdenum **[2, 2006.01]**
34/36 • • Obtaining tungsten **[2, 2006.01]**

35/00 Obtaining beryllium [1, 2006.01]

41/00 Obtaining germanium [1, 2006.01]

43/00 Obtaining mercury [1, 2006.01]

47/00 Obtaining manganese [1, 2006.01]

58/00 Obtaining gallium or indium [2, 2006.01]

59/00 Obtaining rare earth metals [1, 2006.01]

60/00 Obtaining metals of atomic number 87 or higher, i.e. radioactive metals [2, 2006.01]
60/02 • Obtaining thorium, uranium or other actinides **[2, 2006.01]**
60/04 • • Obtaining plutonium **[2, 2006.01]**

61/00 Obtaining metals not elsewhere provided for in this subclass (iron C21) **[1, 2, 2006.01]**

C22C ALLOYS (treatment of alloys C21D, C22F)

Note(s) [2, 4]

In this subclass, the following terms or expressions are used with the meanings indicated:

- "alloys" includes also:
  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.
- "based on" requires at least 50% by weight of the specified constituent or of the specified group of constituents.

Subclass index

Non-ferrous alloys, i.e. alloys based essentially on metals other than iron [2, 5]

Note(s) [2009.01]

Groups C22C 43/00-C22C 49/00 take precedence over groups C22C 1/00-C22C 38/00.

1/00 **Making non-ferrous alloys** (by electrothermic methods C22B 4/00; by electrolysis C25C 1/24, C25C 3/36) **[1, 2006.01, 2023.01]**
1/02 • by melting **[1, 2006.01]**
1/03 • • using master alloys **[2, 2006.01]**
1/04 • by powder metallurgy (C22C 1/08 takes precedence) **[1, 2, 2006.01, 2023.01]**
1/047 • • comprising intermetallic compounds **[2023.01]**
1/05 • • Mixtures of metal powder with non-metallic powder (C22C 1/08 takes precedence) **[1, 2, 2006.01, 2023.01]**
1/051 • • • Making hard metals based on borides, carbides, nitrides, oxides or silicides; Preparation of the powder mixture used as the starting material therefor **[2023.01]**
1/053 • • • • with in situ formation of hard compounds **[2023.01]**
1/055 • • • • • using carbon **[2023.01]**
1/056 • • • • • using gas **[2023.01]**
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 **[2023.01]**
1/059 • • • Making alloys comprising less than 5% by weight of dispersed reinforcing phases **[2023.01]**
1/06 • with the use of special agents for refining or deoxidising **[1, 2006.01]**
1/08 • Alloys with open or closed pores **[1, 2006.01]**
1/10 • Alloys containing non-metals (C22C 1/05, C22C 1/08 take precedence) **[1, 2, 2006.01, 2023.01]**
1/11 • Making amorphous alloys **[2023.01]**
1/12 • by processing in a semi-solid state, e.g. holding the alloy in the solid-liquid phase **[2023.01]**

3/00 **Removing material from non-ferrous alloys to produce alloys of different constitution [1, 2006.01]**

5/00 **Alloys based on noble metals [1, 2006.01]**
5/02 • Alloys based on gold **[2, 2006.01]**
5/04 • Alloys based on a platinum group metal **[2, 2006.01]**
5/06 • Alloys based on silver **[2, 2006.01]**
5/08 • • with copper as the next major constituent **[2, 2006.01]**
5/10 • • with cadmium as the next major constituent **[2, 2006.01]**

7/00 **Alloys based on mercury [1, 2006.01]**

9/00 **Alloys based on copper [1, 2006.01]**
9/01 • with aluminium as the next major constituent **[2, 2006.01]**
9/02 • with tin as the next major constituent **[1, 2, 2006.01]**
9/04 • with zinc as the next major constituent **[1, 2, 2006.01]**
9/05 • with manganese as the next major constituent **[2, 2006.01]**
9/06 • with nickel or cobalt as the next major constituent **[1, 2, 2006.01]**
9/08 • with lead as the next major constituent **[1, 2, 2006.01]**
9/10 • with silicon as the next major constituent **[1, 2006.01]**

11/00 **Alloys based on lead [1, 2006.01]**
11/02 • with an alkali or an alkaline earth metal as the next major constituent **[1, 2, 2006.01]**
11/04 • with copper as the next major constituent **[2, 2006.01]**
11/06 • with tin as the next major constituent **[2, 2006.01]**
11/08 • with antimony or bismuth as the next major constituent **[2, 2006.01]**
11/10 • • with tin **[2, 2006.01]**

12/00 **Alloys based on antimony or bismuth [2, 2006.01]**

13/00 **Alloys based on tin [1, 2006.01]**
13/02 • with antimony or bismuth as the next major constituent **[2, 2006.01]**

14/00 **Alloys based on titanium [2, 2006.01]**

16/00 **Alloys based on zirconium [2, 2006.01]**

18/00 **Alloys based on zinc [2, 2006.01]**
18/02 • with copper as the next major constituent **[2, 2006.01]**
18/04 • with aluminium as the next major constituent **[2, 2006.01]**

19/00 **Alloys based on nickel or cobalt [1, 2006.01]**
19/03 • based on nickel **[2, 2006.01]**
19/05 • • with chromium **[2, 2006.01]**
19/07 • based on cobalt **[2, 2006.01]**

20/00 **Alloys based on cadmium [2, 2006.01]**

21/00 **Alloys based on aluminium [1, 2006.01]**
21/02 • with silicon as the next major constituent **[1, 2, 2006.01]**
21/04 • • Modified aluminium-silicon alloys **[1, 2006.01]**
21/06 • with magnesium as the next major constituent **[2, 2006.01]**
21/08 • • with silicon **[2, 2006.01]**
21/10 • with zinc as the next major constituent **[2, 2006.01]**
21/12 • with copper as the next major constituent **[2, 2006.01]**

Note(s) [4]

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.

21/14 • • with silicon **[2, 2006.01]**
21/16 • • with magnesium **[2, 2006.01]**
21/18 • • with zinc **[2, 2006.01]**

22/00 **Alloys based on manganese [2, 2006.01]**

23/00 **Alloys based on magnesium [1, 2006.01]**
23/02 • with aluminium as the next major constituent **[2, 2006.01]**
23/04 • with zinc or cadmium as the next major constituent **[2, 2006.01]**
23/06 • with a rare earth metal as the next major constituent **[2, 2006.01]**

24/00 **Alloys based on an alkali or an alkaline earth metal [2, 2006.01]**

25/00 Alloys based on beryllium [1, 2006.01]

26/00 Alloys containing diamond [4, 2006.01]

27/00 Alloys based on rhenium or a refractory metal not mentioned in groups C22C 14/00 or C22C 16/00 [1, 2, 2006.01]

27/02 • Alloys based on vanadium, niobium or tantalum **[2, 2006.01]**

27/04 • Alloys based on tungsten or molybdenum **[2, 2006.01]**

27/06 • Alloys based on chromium **[2, 2006.01]**

28/00 Alloys based on a metal not provided for in groups C22C 5/00-C22C 27/00 [2, 2006.01]

29/00 Alloys based on carbides, oxides, borides, nitrides or silicides, e.g. cermets, or other metal compounds, e. g. oxynitrides, sulfides [1, 4, 2006.01]

29/02 • based on carbides or carbonitrides **[4, 2006.01]**

29/04 • • based on carbonitrides **[4, 2006.01]**

29/06 • • based on carbides, but not containing other metal compounds **[4, 2006.01]**

29/08 • • • based on tungsten carbide **[4, 2006.01]**

29/10 • • • based on titanium carbide **[4, 2006.01]**

29/12 • based on oxides **[4, 2006.01]**

29/14 • based on borides **[4, 2006.01]**

29/16 • based on nitrides **[4, 2006.01]**

29/18 • based on silicides **[4, 2006.01]**

30/00 Alloys containing less than 50% by weight of each constituent [2, 2006.01]

Note(s) [4]

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.

30/02 • containing copper **[2, 2006.01]**

30/04 • containing tin or lead **[2, 2006.01]**

30/06 • containing zinc **[2, 2006.01]**

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 [2, 2006.01]

Ferrous alloys, i.e. alloys based on iron [2, 5]

33/00 Making ferrous alloys (heat treatment thereof C21D 5/00, C21D 6/00) **[1, 2006.01]**

33/02 • by powder metallurgy **[1, 2006.01]**

33/04 • by melting **[2, 2006.01]**

33/06 • • using master alloys **[2, 2006.01]**

33/08 • Making cast-iron alloys **[2, 2006.01]**

33/10 • • including procedures for adding magnesium **[2, 2006.01]**

33/12 • • • by fluidised injection **[2, 2006.01]**

35/00 Master alloys for iron or steel [1, 2006.01]

Note(s) [2]

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.

37/00 Cast-iron alloys [1, 2, 2006.01]

37/04 • containing spheroidal graphite **[1, 2006.01]**

37/06 • containing chromium **[1, 2, 2006.01]**

37/08 • • with nickel **[1, 2006.01]**

37/10 • containing aluminium or silicon **[1, 2006.01]**

38/00 Ferrous alloys, e.g. steel alloys (cast-iron alloys C22C 37/00) **[2, 2006.01]**

38/02 • containing silicon **[2, 2006.01]**

38/04 • containing manganese **[2, 2006.01]**

38/06 • containing aluminium **[2, 2006.01]**

38/08 • containing nickel **[2, 2006.01]**

38/10 • containing cobalt **[2, 2006.01]**

38/12 • containing tungsten, tantalum, molybdenum, vanadium or niobium **[2, 2006.01]**

38/14 • containing titanium or zirconium **[2, 2006.01]**

38/16 • containing copper **[2, 2006.01]**

38/18 • containing chromium **[2, 2006.01]**

38/20 • • with copper **[2, 2006.01]**

38/22 • • with molybdenum or tungsten **[2, 2006.01]**

38/24 • • with vanadium **[2, 2006.01]**

38/26 • • with niobium or tantalum **[2, 2006.01]**

38/28 • • with titanium or zirconium **[2, 2006.01]**

38/30 • • with cobalt **[2, 2006.01]**

38/32 • • with boron **[2, 2006.01]**

38/34 • • with more than 1.5% by weight of silicon **[2, 2006.01]**

38/36 • • with more than 1.7% by weight of carbon **[2, 2006.01]**

38/38 • • with more than 1.5% by weight of manganese **[2, 2006.01]**

38/40 • • with nickel **[2, 2006.01]**

38/42 • • • with copper **[2, 2006.01]**

38/44 • • • with molybdenum or tungsten **[2, 2006.01]**

38/46 • • • with vanadium **[2, 2006.01]**

38/48 • • • with niobium or tantalum **[2, 2006.01]**

38/50 • • • with titanium or zirconium **[2, 2006.01]**

38/52 • • • with cobalt **[2, 2006.01]**

38/54 • • • with boron **[2, 2006.01]**

38/56 • • • with more than 1.7% by weight of carbon **[2, 2006.01]**

38/58 • • • with more than 1.5% by weight of manganese **[2, 2006.01]**

38/60 • containing lead, selenium, tellurium or antimony, or more than 0.04% by weight of sulfur **[2, 2006.01]**

43/00 Alloys containing radioactive materials [2, 2006.01]

45/00 Amorphous alloys (making amorphous non-ferrous alloys C22C 1/11) **[5, 2006.01, 2023.01]**

45/02 • with iron as the major constituent **[5, 2006.01]**

45/04 • with nickel or cobalt as the major constituent **[5, 2006.01]**

45/06 • with beryllium as the major constituent **[5, 2006.01]**

45/08 • with aluminium as the major constituent **[5, 2006.01]**

45/10 • with molybdenum, tungsten, niobium, tantalum, titanium, or zirconium as the major constituent **[5, 2006.01]**

Alloys containing fibres or filaments [7]

Note(s) [7]

In groups C22C 47/00 and C22C 49/00, it is desirable to add the indexing codes of groups C22C 101/00, C22C 111/00 and C22C 121/00.

47/00 Making alloys containing metallic or non-metallic fibres or filaments [7, 2006.01]

47/02 • Pretreatment of the fibres or filaments **[7, 2006.01]**
47/04 • • by coating, e.g. with a protective or activated covering **[7, 2006.01]**
47/06 • • by forming the fibres or filaments into a preformed structure, e.g. using a temporary binder to form a mat-like element **[7, 2006.01]**
47/08 • by contacting the fibres or filaments with molten metal, e.g. by infiltrating the fibres or filaments placed in a mould **[7, 2006.01]**
47/10 • • Infiltration in the presence of a reactive atmosphere; Reactive infiltration **[7, 2006.01]**
47/12 • • Infiltration or casting under mechanical pressure **[7, 2006.01]**
47/14 • by powder metallurgy, i.e. by processing mixtures of metal powder and fibres or filaments **[7, 2006.01]**
47/16 • by thermal spraying of the metal, e.g. plasma spraying **[7, 2006.01]**
47/18 • • using a preformed structure of fibres or filaments **[7, 2006.01]**
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 **[7, 2006.01]**

49/00 Alloys containing metallic or non-metallic fibres or filaments [7, 2006.01]

49/02 • characterised by the matrix material **[7, 2006.01]**
49/04 • • Light metals **[7, 2006.01]**
49/06 • • • Aluminium **[7, 2006.01]**
49/08 • • Iron group metals **[7, 2006.01]**
49/10 • • Refractory metals **[7, 2006.01]**
49/11 • • • Titanium **[7, 2006.01]**
49/12 • • Intermetallic matrix material **[7, 2006.01]**
49/14 • characterised by the fibres or filaments **[7, 2006.01]**

Indexing scheme associated with groups C22C 47/00 and C22C 49/00, relating to the nature of the fibrous materials contained in metal-fibrous composites. [7]

101/00 Non-metallic fibres or filaments [7, 2006.01]

101/02 • based on oxides, e.g. oxide ceramic fibres **[7, 2006.01]**
101/04 • • Aluminium oxide **[7, 2006.01]**
101/06 • • Mixed oxides, e.g. aluminium silicate or glass **[7, 2006.01]**
101/08 • based on non-oxides, e.g. non-oxide ceramic fibres **[7, 2006.01]**
101/10 • • Carbon **[7, 2006.01]**
101/12 • • Carbides **[7, 2006.01]**
101/14 • • • Silicon carbide **[7, 2006.01]**
101/16 • • Nitrides **[7, 2006.01]**
101/18 • • • Silicon nitride **[7, 2006.01]**
101/20 • • Boron **[7, 2006.01]**
101/22 • • Borides **[7, 2006.01]**

111/00 Metallic fibres or filaments [7, 2006.01]

111/02 • Refractory metal fibres or filaments, e.g. tungsten fibres **[7, 2006.01]**

121/00 Pretreated fibres or filaments [7, 2006.01]

121/02 • Coated fibres or filaments, e.g. ceramic fibres with protective coatings **[7, 2006.01]**

C22F CHANGING THE PHYSICAL STRUCTURE OF NON-FERROUS METALS OR NON-FERROUS ALLOYS (processes specific to heat treatment of ferrous alloys or steels and devices for heat treatment of metals or alloys C21D)

Note(s) [2012.01]

Surface treatments of metallic material involving at least one process provided for in class C23 and at least one process covered by this subclass are classified in group C23F 17/00.

1/00 Changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working [1, 2006.01]

1/02 • in inert or controlled atmosphere or vacuum **[1, 2006.01]**
1/04 • of aluminium or alloys based thereon **[1, 2006.01]**
1/043 • • of alloys with silicon as the next major constituent **[4, 2006.01]**
1/047 • • of alloys with magnesium as the next major constituent **[4, 2006.01]**
1/05 • • of alloys of the Al-Si-Mg type, i.e. containing silicon and magnesium in approximately equal proportions **[4, 2006.01]**
1/053 • • of alloys with zinc as the next major constituent **[4, 2006.01]**
1/057 • • of alloys with copper as the next major constituent **[4, 2006.01]**
1/06 • of magnesium or alloys based thereon **[1, 2006.01]**
1/08 • of copper or alloys based thereon **[1, 2006.01]**
1/10 • of nickel or cobalt or alloys based thereon **[1, 2006.01]**
1/11 • of chromium or alloys based thereon **[1, 2006.01]**
1/12 • of lead or alloys based thereon **[1, 2006.01]**
1/14 • of noble metals or alloys based thereon **[1, 2006.01]**
1/16 • of other metals or alloys based thereon **[1, 2006.01]**
1/18 • • High-melting or refractory metals or alloys based thereon **[1, 2006.01]**

3/00 Changing the physical structure of non-ferrous metals or alloys by special physical methods, e.g. treatment with neutrons [1, 2006.01]

3/02 • by solidifying a melt controlled by supersonic waves or electric or magnetic fields **[1, 2006.01]**