

## C22F

**CHANGING THE PHYSICAL STRUCTURE OF NON-FERROUS METALS AND NON-FERROUS ALLOYS** (surface treatment of metallic material involving at least one process provided for in class [C23](#) and at least one process covered by this subclass, [C23F 17/00](#))

### Definition statement

*This place covers:*

Changing the physical (metallurgical) structure of non-ferrous metals or alloys by heat treatment or by hot or cold working;

Changing the physical structure of non-ferrous metals or alloys by special physical methods, e.g. treatment with neutrons.

The term "non-ferrous alloys" refers to alloys based essentially on metals other than iron.

### Relationships with other classification places

[C21D](#) provides for processes of modifying the physical structure of ferrous metals or alloys, general devices for heat treatment of ferrous or non-ferrous metals or alloys, and making ferrous metals or alloys malleable by decarburization, tempering or other metallurgical treatments.

[C22F](#) provides for decarburization of non-ferrous metal and non-ferrous alloys to modify the physical structure thereof. Subclass [C22B](#) covers the decarburization of metalliferous material for purposes of refining.

[C23F 17/00](#) provides for surface treatment of metallic material involving at least one process provided for in class [C23](#) and at least one process covered in [C22F](#).

When the alloy is produced by a specifically described method (examples, claims), then the method is classified as well in the appropriate subclasses [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:*

Working metallic powder, powder metallurgical apparatus or processes	<a href="#">B22F</a> , <a href="#">C22C 1/04</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Electrolytic production or refining of metals	<a href="#">C25C</a>
Single crystals or homogeneous polycrystalline material with defined structure; production thereof	<a href="#">C30B</a>

#### Informative references

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

Jewellery	<a href="#">A44C</a>
Biomedical applications, stents	<a href="#">A61F</a> , <a href="#">A61L</a>

Dental alloys	<a href="#">A61K</a>
Catalysts	<a href="#">B01J</a>
Mechanical metal-working	<a href="#">B21</a>
Rolling of metal	<a href="#">B21B</a>
Manufacture of metal sheets, wire, rods, tubes, profiles or like semi-manufactured products otherwise than by rolling	<a href="#">B21C</a>
Working or processing of sheet metal or metal tubes, rods, or profiles without essentially removing material; punching	<a href="#">B21D</a>
Forging	<a href="#">B21J</a>
Casting of metals	<a href="#">B22D</a>
Apparatus for mechanical working of metal	<a href="#">B23</a> , <a href="#">B24</a>
Soldering/Brazing/Welding compositions	<a href="#">B23K</a> , <a href="#">B23K 35/00</a>
Layered products	<a href="#">B32B</a>
Lithographic printing plates	<a href="#">B41N</a>
Vehicle parts	<a href="#">B62</a>
Hydrogen storage alloys	<a href="#">C01B</a> , <a href="#">H01M 4/38</a>
Processing of pig iron, e.g. refining, manufacture of wrought iron or steel	<a href="#">C21C</a>
General methods or devices for heat treatment, e.g. hardening, quenching, tempering	<a href="#">C21D 1/00</a>
Alloys	<a href="#">C22C</a>
Making alloys	<a href="#">C22C 1/00</a>
Removing material from alloys to produce alloys of different constitution	<a href="#">C22C 3/00</a>
Coating material with metallic material, cementation (carburizing, nitriding, etc)/Sputtering targets	<a href="#">C23C</a>
Non-mechanical removal of metallic material from surfaces; inhibiting corrosion of metallic material; inhibiting incrustation in general; multi-step processes for surface treatment of metallic material	<a href="#">C23F 17/00</a>
Steam turbines, turbine rotors Blades, turbine blades	<a href="#">F01D</a> , <a href="#">F02C</a> , <a href="#">F01D 5/00</a>
Valve guides/valve seat inserts	<a href="#">F01L</a>
Gas turbine plants	<a href="#">F02C</a>
Bearings, shafts/crankshafts	<a href="#">F16C</a> , <a href="#">F16C 23/00</a>
Sliding member	<a href="#">F16J</a> , <a href="#">F16K</a>
Heat exchangers	<a href="#">F28F</a>
Nuclear reactors/reactor fuel elements	<a href="#">G21C</a> , <a href="#">G21C 3/04</a>
Electrical wires	<a href="#">H01B</a>
Magnets	<a href="#">H01F</a>
Contacts	<a href="#">H01H</a>
Batteries	<a href="#">H01M</a>
Electrical connectors	<a href="#">H01R</a>
Electronic components	<a href="#">H05K</a>
Semiconductor devices/detailsBonding wires, lead frames	<a href="#">H10</a>

## Special rules of classification

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

When the composition of the alloy is disclosed, either in claims or description, the document is also classified in appropriate groups of subclass [C22C](#).

Processes concerning SMA alloys (shape memory alloys) having the ability when originally shaped at a first temperature and reshaped at a second temperature to undergo a reversible thermoelastic transition and resume its original shape when returned to the first temperature or an intermediate temperature are covered by [C22F 1/006](#) as well as [C22F 1/10](#) and [C22F 1/08](#)

The phrase "based on" indicates 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 being the largest constituent of the alloy, regardless of whether or not any one element comprises at least 50 wt%. For example in an alloy with Ni-Ti (~55% Ni) , the base of the alloy is Ni and in an alloy with Co 40 wt%, Ni 30 wt% Al 30 wt%, the base of the alloy is Co.

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

In the groups [C22F 1/04](#), [C22F 1/16-C22F 1/18](#), [C22F 3/00](#) 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.

## 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
Recrystallization	After all metal crystals have been dissolved by heating enough to lose its structural strength, the metal temperature then falls, allowing the crystals to re-form
Aging (or ageing)	A process in which the hardness or strength of a metal alloy having a constituent in supersaturated solid solution is increased over time as the constituent precipitates out as a secondary phase containing the constituent. When occurring at room temperature the process is termed "natural aging", while a process that occurs when subjecting the metal alloy to elevated temperature is termed "artificial aging". Aging for a longer time than that corresponding to maximum strength or hardness at the particular temperature is termed "over-ageing".
Hardening	The increase in resistance to deformation
Precipitation hardening	As the quenched alloy ages, a new material precipitates out of the metallic crystal lattice, filling in abutting spaces, and increasing hardness
Normalizing	A process of heating metallic material above its critical temperature and cooling in air thereby establishing a fine uniform grain size and improving the microstructural uniformity

Quenching	The rapid cooling of metallic material either from elevated temperature to room temperature or cooling of metal to sub-ambient temperature, at a specific rate, with a given medium.
Tempering	Heating of a previously quenched or normalized metallic material to an elevated temperature, and then cooling under suitable conditions to obtain the desired mechanical properties.

## Synonyms and Keywords

*In patent documents the words "aging", "precipitation", "hardening" and "strengthening" are often used as synonyms.*

It should be noted that these terms historically have specific definitions to those in the metallurgical arts.

## C22F 1/00

**Changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working (apparatus for mechanical working of metal [B21](#), [B23](#), [B24](#))**

## Definition statement

*This place covers:*

Methods of changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

## References

### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>

### Informative references

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

General methods or devices for heat treatment, e.g. hardening, quenching, tempering	<a href="#">C21D 1/00</a> - <a href="#">C21D 1/84</a> , <a href="#">C21D 1/76</a>
Alloy compositions	<a href="#">C22C 5/00</a> - <a href="#">C22C 5/10</a> , <a href="#">C22C 9/00</a> - <a href="#">C22C 9/10</a> , <a href="#">C22C 11/00</a> - <a href="#">C22C 11/10</a> , <a href="#">C22C 19/03</a> - <a href="#">C22C 19/058</a>
Alloy compositions	<a href="#">C22C 21/00</a> - <a href="#">C22C 21/18</a> , <a href="#">C22C 23/00</a> - <a href="#">C22C 23/06</a>
Coating metallic material	<a href="#">C23C</a>

## Special rules of classification

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

## Glossary of terms

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

SMA alloys (shape memory alloys)	alloys having the ability when originally shaped at a first temperature and reshaped at a second temperature to undergo a reversible thermoelastic transition and resume its original shape when returned to the first temperature or an intermediate temperature
Quenching	Cooling of metallic material at a specific rate, with a given medium.

## C22F 1/04

### of aluminium or alloys based thereon

#### Definition statement

*This place covers:*

Methods of changing the physical structure of aluminium or aluminium alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

#### Relationships with other classification places

The alloy is classified in [C22C 21/00-C22C 21/18](#) in the corresponding sub-group.

#### References

##### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making aluminium alloys by powder metallurgy	<a href="#">C22C 1/0408</a> - <a href="#">C22C 1/0416</a>

##### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/286</a> , <a href="#">B23K 35/288</a>
Alloys based on aluminium	<a href="#">C22C 21/00</a> - <a href="#">C22C 21/18</a>

## 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 [C22F 1/00](#) class is given. In a case of more than one next major constituent(s), then more than one [C22F 1/00](#) classes are given.

An Al-alloy with Si as the next major constituent comprising in addition Mg as alloying element is classified in [C22F 1/043](#) but also in [C22F 1/043](#) and corresponding [C22C 21/00](#) classes. For example an alloy Al 60%, Si 21%, Mg 19%, will be classified in [C22F 1/043](#) but also in [C22F 1/043](#).

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

**C22F 1/06****of magnesium or alloys based thereon****Definition statement**

*This place covers:*

Methods of changing the physical structure of magnesium or magnesium alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**Relationships with other classification places**

The alloy are classified as well in [C22C 23/00-C22C 23/06](#) in the corresponding sub-group.

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a>

**Informative references**

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

Soldering/welding materials	<a href="#">B23K 35/284</a>
Alloys based on magnesium	<a href="#">C22C 23/00</a> - <a href="#">C22C 23/06</a>

**C22F 1/08****of copper or alloys based thereon****Definition statement**

*This place covers:*

Methods of changing the physical structure of copper or copper alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**Relationships with other classification places**

The alloy is classified as well in [C22C 9/00-C22C 9/10](#) in the corresponding sub-group.

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0425</a>

**Informative references**

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

Jewellery	<a href="#">A44C 27/00</a>
Biomedical applications, stents	<a href="#">A61F</a> , <a href="#">A61L</a>
Soldering/welding materials	<a href="#">B23K 35/302</a>
Alloys based on copper	<a href="#">C22C 9/00</a> - <a href="#">C22C 9/10</a>

**C22F 1/10****of nickel or cobalt or alloys based thereon****Definition statement**

*This place covers:*

Methods of changing the physical structure of copper or copper alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**Relationships with other classification places**

The alloy are classified as well in [C22C 19/00-C22C 19/07](#) in the corresponding sub-group.

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0408</a> , <a href="#">C22C 1/0433</a> , <a href="#">C22C 1/0441</a>

**Informative references**

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

Soldering/welding materials	<a href="#">B23K 35/3033</a> , <a href="#">B23K 35/304</a> , <a href="#">B23K 35/3046</a>
Alloys based on copper	<a href="#">C22C 19/00</a> - <a href="#">C22C 19/07</a>

**C22F 1/11****of chromium or alloys based thereon****Definition statement**

*This place covers:*

Methods of changing the physical structure of chromium or chromium alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

## Relationships with other classification places

The alloy needs to be classified as well in [C22C 27/06](#).

## References

### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/045</a>

### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/32</a>
Alloys based on chromium	<a href="#">C22C 27/06</a>

## C22F 1/12

### of lead or alloys based thereon

## Definition statement

*This place covers:*

Methods of changing the physical structure of lead or lead alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

## Relationships with other classification places

The alloy is classified as well in [C22C 11/00](#) - [C22C 11/10](#).

## References

### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0483</a>

### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/26</a>
Alloys based on lead	<a href="#">C22C 11/00</a> - <a href="#">C22C 11/10</a>



## C22F 1/14

### of noble metals or alloys based thereon

#### Definition statement

*This place covers:*

Methods of changing the physical structure of noble metals or alloys based thereon by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

#### Relationships with other classification places

The alloy needs to be classified as well in [C22C 5/00](#) - [C22C 5/10](#)

#### References

##### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0466</a>

##### Informative references

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

Jewellery	<a href="#">A44C 27/00</a>
Dental alloy	<a href="#">A61K</a>
Catalysts	<a href="#">B01J</a>
Soldering/welding materials	<a href="#">B23K 35/3006</a> , <a href="#">B23K 35/3013</a> , <a href="#">B23K 35/322</a>
Alloys based on noble metals	<a href="#">C22C 5/00</a> - <a href="#">C22C 5/10</a>

#### Special rules of classification

In this group, the last place rule is followed combined with multiple classifications. The alloy is classified as well in [C22C 5/00](#) - [C22C 5/10](#).

#### Glossary of terms

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

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

**C22F 1/16****of other metals or alloys based thereon****Definition statement**

*This place covers:*

Methods of changing the physical structure of other metals or alloys based thereon, i.e. with Zn, Cd, Ti, Zr by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a>

**Special rules of classification**

In this group, the last place rule is followed combined with multiple classifications

**C22F 1/165****{of zinc or cadmium or alloys based thereon}****Definition statement**

*This place covers:*

Methods of changing the physical structure of zinc or cadmium or alloys based thereon, by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0483</a>

**Informative references**

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

Soldering/welding materials	<a href="#">B23K 35/266</a>
Soldering/welding materials	<a href="#">B23K 35/282</a>
Alloys based on zinc	<a href="#">C22C 18/00</a> - <a href="#">C22C 18/04</a>

Alloys based on cadmium	<a href="#">C22C 20/00</a>
-------------------------	----------------------------

### Special rules of classification

In this group, the last place rule is followed combined with multiple classifications, respectively with [C22C](#) symbols for the alloy composition.

## C22F 1/18

### High-melting or refractory metals or alloys based thereon

#### Definition statement

*This place covers:*

Methods of changing the physical structure of 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, by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

#### Relationships with other classification places

When the alloy composition is disclosed, then it is classified as well in [C22C 27/00](#)- [C22C 27/06](#).

#### References

##### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/045</a>

##### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/00</a>
Alloys based on refractory metal	<a href="#">C22C 27/00</a> - <a href="#">C22C 27/06</a>

### Special rules of classification

In this groups, the last place rule is followed combined with multiple classifications. Depending on the base of the alloy the appropriate [C22F](#) class is given combined with classification of said alloy in [C22C](#).

## C22F 1/183

### {of titanium or alloys based thereon}

#### Definition statement

*This place covers:*

Methods of changing the physical structure of titanium or alloys based thereon i.e. with Ti as the major constituent i.e. the base of the alloy, by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

## References

### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0458</a>

### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/32</a>
Alloys based on refractory metal	<a href="#">C22C 14/00</a>

## Special rules of classification

When the alloy composition is disclosed, then it is classified as well in [C22C 14/00](#).

## C22F 1/186

**{of zirconium or alloys based thereon}**

### Definition statement

*This place covers:*

Methods of changing the physical structure of zirconium or alloys based thereon i.e. with Zr as the major constituent i.e. the base of the alloy, by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

## References

### Limiting references

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>
Making alloys by powder metallurgy	<a href="#">C22C 1/04</a> , <a href="#">C22C 1/0458</a>

### Informative references

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

Soldering/welding materials	<a href="#">B23K 35/00</a>
Alloys based on refractory metal	<a href="#">C22C 16/00</a>

## Special rules of classification

When the alloy composition is disclosed, then it is classified as well in [C22C 16/00](#).

**C22F 3/00**

**Changing the physical structure of non-ferrous metals or alloys by special physical methods, e.g. treatment with neutrons**

**Definition statement**

*This place covers:*

Methods of changing the physical structure of non-ferrous metals or alloys by heat treatment or by hot or cold working which are not covered in any of [B22F](#), [B21B](#), [B21J](#), [C21D](#), [C25C](#).

**Relationships with other classification places**

General methods or devices for heat treatments, e.g. annealing, hardening, quenching, tempering are classified in [C21D 1/00](#)

**References****Limiting references**

*This place does not cover:*

Methods of making alloys by powder metallurgy	<a href="#">B22F</a>
Heat treatment, e.g. annealing, quenching, tempering, adapted for particular metallic articles; furnaces therefor	<a href="#">C21D 9/00</a>

**Informative references**

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

General methods or devices for heat treatments, e.g. annealing, hardening, quenching, tempering	<a href="#">C21D 1/00</a>
---	---------------------------