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**Ferrous materials — Heat treatments  
— Vocabulary**

*Matériaux ferreux — Traitements thermiques — Vocabulaire*

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 17, *Steel*.

This third edition cancels and replaces the second edition (ISO 4885:2017), of which it constitutes a minor revision with a corrected [Figure 1 d](#).

ISO 4885:2018

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# Ferrous materials — Heat treatments — Vocabulary

## 1 Scope

This document defines important terms used in the heat treatment of ferrous materials.

NOTE The term ferrous materials include products and workpieces of steel and cast iron.

[Annex A](#) provides an alphabetical list of terms defined in this document, as well as their equivalents in French, German, Chinese and Japanese.

[Table 1](#) shows the various iron-carbon (Fe-C) phases.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

### 3.1

#### **acicular structure**

structure which appears in the form of needles in a micrograph

### 3.2

#### **activity**

effective concentration of species under non-ideal (e.g. concentrated) conditions; for *heat treatment* ([3.108](#)), this means the effective concentration of carbon or nitrogen (or both) in heat treatment media and in ferrous materials

Note 1 to entry: Ratio of the vapour pressure of a gas (usually carbon or nitrogen) in a given state (e.g. in *austenite* ([3.12](#)) of specific carbon/nitrogen concentration) to the vapour pressure of the pure gas, as a reference state, at the same temperature.

### 3.3

#### **ageing**

change in the properties of steels depending on time and temperature after hot working or *heat treatment* ([3.108](#)) or after cold-working operation, due to the migration of interstitial elements

Note 1 to entry: The ageing phenomenon can lead to higher strength and lower ductility.

Note 2 to entry: The ageing effect can be accelerated either by cold forming and/or subsequent *heating* ([3.109](#)) to moderate temperatures (e.g. 250 °C) and soaking (e.g. for 1 h).

### 3.4

#### **air-hardening steel**

DEPRECATED: self-hardening steel

steel, the *hardenability* ([3.103](#)) of which is such that *cooling* ([3.45](#)) in air produces a martensitic structure in objects of considerable size

### 3.5

#### **alpha iron**

stable state of pure iron at temperatures below 911 °C

Note 1 to entry: The crystalline structure of an alpha iron is body-centred cubic.

Note 2 to entry: Alpha iron is ferromagnetic at temperatures below 768 °C (the Curie point).

### 3.6

#### **alpha mixed crystal**

iron with body-centred cubic lattice structure with alloying elements in interstitial or substitutional solution

Note 1 to entry: The material science for alpha mixed crystal is ferritic.

Note 2 to entry: Alpha mixed crystal is ferromagnetic.

### 3.7

#### **aluminizing**

DEPRECATED: calorizing

*surface treatment into and on a workpiece* ([3.201](#)) relating to aluminium

### 3.8

#### **annealing**

*heat treatment* ([3.108](#)) consisting of *heating* ([3.109](#)) and *soaking* ([3.185](#)) at a suitable temperature followed by *cooling* ([3.45](#)) under conditions such that, after return to ambient temperature, the metal will be in a structural state closer to that of equilibrium

Note 1 to entry: Since this definition is very general, it is advisable to use an expression specifying the aim of the treatment. See *bright annealing* ([3.29](#)), *full annealing* ([3.89](#)), *softening/soft annealing* ([3.186](#)), *inter-critical annealing* ([3.122](#)), *isothermal annealing* ([3.127](#)) and subcritical annealing.

### 3.9

#### **ausferrite**

fine-grained mixture of *ferrite* ([3.85](#)) and stabilized *austenite* ([3.12](#)) which should lead to high hardness and ductility of austempered ductile cast iron (ADI)

### 3.10

#### **ausforming**

*thermomechanical treatment* ([3.208](#)) of a workpiece which consists of plastically deforming the metastable *austenite* ([3.12](#)) before subjecting it to the martensitic and/or bainitic transformation

### 3.11

#### **austempering**

isothermal heat treatment for producing bainitic (see [3.17](#) and [3.18](#)) or ausferritic (see [3.9](#)) structure of a workpiece

Note 1 to entry: The final *cooling* ([3.45](#)) to ambient temperature is not at a specific rate.

### 3.12

#### **austenite**

solid solution of one or more elements in *gamma iron* ([3.91](#))

Note 1 to entry: See also [Table 1](#).

### 3.13

#### **austenitic steel**

steel where the structure consists of *austenite* ([3.12](#)) at ambient temperature

Note 1 to entry: Cast austenitic steels can contain up to about 20 % of *ferrite* ([3.85](#)).