SIST

# SLOVENSKI STANDARD
# SIST EN ISO 4885:2026

**01-oktober-2026**

**Železove zlitine - Toplotna obdelava - Slovar (ISO 4885:2026)**

Ferrous materials - Heat treatments - Vocabulary (ISO 4885:2026)

Eisenwerkstoffe - Wärmebehandlung - Begriffe (ISO 4885:2026)

Matériaux ferreux - Traitements thermiques - Vocabulaire (ISO 4885:2026)



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# EN ISO 4885

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English Version

# Ferrous materials - Heat treatments - Vocabulary (ISO 4885:2026)

Matériaux ferreux - Traitements thermiques - Vocabulaire (ISO 4885:2026)

Eisenwerkstoffe - Wärmebehandlung - Begriffe (ISO 4885:2026)

This European Standard was approved by CEN on 25 July 2026.

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# European foreword

This document (EN ISO 4885:2026) has been prepared by Technical Committee ISO/TC 17 "Steel" in collaboration with Technical Committee CEN/TC 459/SC 12 “General issues” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2027, and conflicting national standards shall be withdrawn at the latest by February 2027.

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## Endorsement notice

The text of ISO 4885:2026 has been approved by CEN as EN ISO 4885:2026 without any modification.

International Standard

# ISO 4885

Fourth edition
2026-07

# Ferrous materials — Heat treatments — Vocabulary

*Matériaux ferreux — Traitements thermiques — Vocabulaire*



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# Foreword

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This document was prepared by Technical Committee ISO/TC 17, *Steel,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 12, *General issues,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).



This fourth edition cancels and replaces the third edition (ISO 4885:2018), which has been technically revised.

The main changes are as follows:

— the list of terms has been restructured and classified into 9 categories: general, annealing and normalizing, quenching, tempering and partitioning, ageing, surface heat treatment, thermochemical treatment, structure, defects;

— 66 new terms have been added, such as “continuous austenitization diagram”, “expanded austenite”, “partitioning”, “total thickness of surface hardening depth”, etc.;

— 9 terms have been deleted, such as “acicular structure”, “ferritic steel”, “quenching temperature”, etc.;

— 4 terms have been integrated, namely “baking/ hydrogen removal annealing”, “continuous-cooling-transformation diagram/CCT diagram”;

— 3 terms have been divided into 6 new terms, namely “blank nitriding/ blank nitrocarburizing”, “overheating/ oversoaking”, “sub-zero treatment/ cryogenic treatment (former deep freezing)”;

— 39 terms have been added synonyms, such as “cooling function/ cooling curve”, “blackening/ blacking”, “transformation temperature/ critical point”, etc.

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# Ferrous materials — Heat treatments — Vocabulary

## 1 Scope

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

Annex A provides an alphabetical list of terms defined in this document, as well as their equivalents in French, German, Russian, 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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/



### 3.1 General terms

**3.1.1**
**accelerated cooling**
method of cooling in the rolling process and which aims at conditioning the crystal structure of steels and improving the mechanical properties by means of rolling followed by cooling down through the temperature range for transformation with a greater speed than that of air-cooling

Note 1 to entry: This does not include the cooling method for quenching which merely cools rapidly on a rolling line using the accelerated cooling equipment.

Note 2 to entry: Cooling for equipment protection, capability compensation of cooling bed, etc are not included in the accelerated cooling because they do not affect mechanical properties of steel.

Note 3 to entry: Accelerated cooling is frequently used for tubes, forgings and thick plates.

**3.1.2**
**austenitizing**
*heating* (3.1.37) a ferrous material above $A_1$ or $A_3$ temperature and *soaking* (3.1.57) for enough time to form partial or complete austenite

Note 1 to entry: Complete austenitizing takes place above $A_3$ temperature, while partial austenitizing takes place between $A_1$ and $A_{cm}$ temperatures.

Note 2 to entry: The minimum temperature and the length of the soaking time required depend on the steel composition, the initial microstructure and the heating conditions used.

**3.1.3**
**austenitizing temperature**
temperature at which the ferrous material is maintained during *austenitizing* (3.1.2)

**3.1.4**
**bake hardening steel**
steel with the ability to gain an increase of yield strength after a plastic pre-strain and a subsequent *heat treatment* (3.1.35)

Note 1 to entry: These steels have a good suitability for cold forming and present a high resistance to plastic straining (which is increased on finished parts during *heat treatment* (3.1.35) and a good dent resistance.

Note 2 to entry: The usual industrial paint processes are in the region of 170 °C for 20 min.

**3.1.5**
**cast iron**
alloy of iron, carbon and silicon where the carbon content is approximately more than 2 %

**3.1.6**
**characteristic cooling curve**
diagram showing the variations of cooling rate in the core of a specimen with temperature

Note 1 to entry: Characteristic cooling curve reflects the cooling capacity of a specimen in a cooling medium at different temperatures.

**3.1.7**
**controlled atmosphere**
*furnace atmosphere* (3.1.31) of which composition can be controlled for the purpose of oxidation or reduction, carburization or decarburization

Note 1 to entry: The main purpose of controlled atmosphere is to effectively carry out thermo-chemical treatment, such as carburizing and carbonitriding, and to prevent oxidation or decarburization of ferrous materials during heating.



**3.1.8**
**controlled atmosphere heat treatment**
heat treatment carried out in a controlled atmosphere to prevent oxidation and decarburization, or allow carburizing (nitriding) as required



Note 1 to entry: Heat treatment in a protective atmosphere or inert gas is also called protective atmosphere heat treatment.

**3.1.9**
**controlled cooling**
cooling according to the predetermined cooling schedule during heat treatment

**3.1.10**
**controlled rolling**
rolling process where rolling temperature and reduction are controlled to achieve enhanced mechanical properties

EXAMPLE *Normalizing rolling* (3.1.51), *thermomechanical rolling* (3.1.64).

Note 1 to entry: Controlled rolling is used for fine grain ferritic steels and for dual-phase steel for obtaining fine-grain structure.

**3.1.11**
**cooling**
decreasing of the temperature of a hot ferrous material, either continuously, discontinuously, gradually, in one or more steps or interrupted

Note 1 to entry: The medium in which cooling takes place should be specified, e.g. air, oil, water, etc. See also *quenching* (3.3.21).

**3.1.12**
**cooling conditions**
cooling schedules
condition(s) (temperature and kind of cooling medium, relative movements, agitation, etc.) under which the *cooling* (3.1.11) of the ferrous material takes place

**3.1.13**
**cooling function**
cooling curve
temperature change at a defined point of a ferrous material or in a furnace load as a function of time during cooling

Note 1 to entry: The cooling function can be shown as a graph or written in a mathematical formula.

**3.1.14**
**cooling rate**
variation in temperature as a function of time during *cooling* (3.1.11)

Note 1 to entry: A distinction is made between an instantaneous rate corresponding to a specific temperature, and an average rate over a defined interval of temperature or time.

**3.1.15**
**cooling time**
cooling duration
interval of time separating two characteristic temperatures of the *cooling function* (3.1.13)

Note 1 to entry: It is always necessary to specify precisely what the temperatures are.

**3.1.16**
**critical cooling**
cooling necessary to avoid transformation to an undesired microstructure



Note 1 to entry: The cooling course can be characterized by the gradient of temperature or of the *cooling rate* (3.1.14) in general or at given temperatures or times.



**3.1.17**
**critical cooling rate**
rate corresponding to the *critical cooling* (3.1.16)

**3.1.18**
**critical diameter**
diameter, $d$, of a cylinder with a length ≥ 3 $d$, having a structure of a volume fraction of 50 % of *martensite* (3.8.22) at the centre after *quench hardening* (3.3.19) with defined conditions

**3.1.19**
**decomposition of austenite**
decomposition of austenite into *ferrite* (3.8.11) and *pearlite* (3.8.26) or into ferrite and *cementite* (3.8.8) or into *bainite* (3.8.5) with decreasing temperature

**3.1.20**
**differential heating**
heating that generates temperature gradient in a ferrous material purposely

**3.1.21**
**endogas**
gas mixture produced by incomplete combustion of hydrocarbons

Note 1 to entry: Composition of endogas is usually: by using methane, about a volume fraction of 20 % of carbon monoxide, about a volume fraction of 41 % of hydrogen and residual nitrogen; by using propane, about a volume fraction of 24 % of carbon monoxide, about a volume fraction of 31 % hydrogen and residual nitrogen; by using vaporised methanol with a volume fraction of 60 % of methanol and 40 % of nitrogen, resulting in a volume fraction of 20 % of carbon monoxide, 40 % of hydrogen and residual nitrogen.

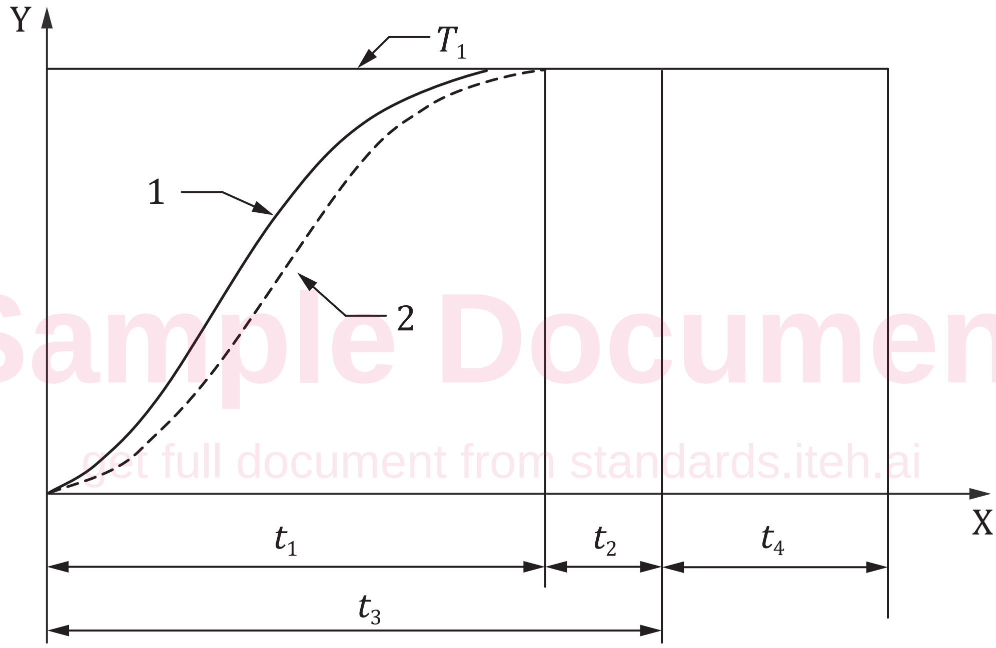
Note 2 to entry: The endogas is used as a basic or carrier gas. *Carbon level* (3.7.9) of the ferrous material is usual about a mass fraction of 0,4 %. For higher carbon levels of the ferrous material, it is necessary to add a gas to donate carbon, e.g. for carburizing.

**3.1.22**
**endothermic atmosphere**
*furnace atmosphere* (3.1.31) produced endothermically and with a carbon potential capable of being matched to the carbon content of the ferrous material under *heat treatment* (3.1.35) in order to reduce, increase or maintain the *carbon level* (3.7.9) at the surface of the ferrous material

Note 1 to entry: Endothermic means that heat energy is transferred to the atmosphere.

**3.1.23**
**equalization**
second stage of *heating* (3.1.37) of a ferrous material whereby the required temperature is obtained at the surface throughout its section

Note 1 to entry: See Figure 1.




**Key**

| | |
|---|---|
| Y | temperature, $T$ |
| X | time, $t$ |
| 1 | heating curve of surface |
| 2 | heating curve of core |
| $T_1$ | austenitizing or quenching temperature |
| $t_1$ | heating up time |
| $t_2$ | equalization time |
| $t_3$ | heating time |
| $t_4$ | soaking time |

**Figure 1 — Schematic representation of heating during an austenitizing treatment**

**3.1.24**
**equilibrium diagram**
graphical representation of the temperature and composition limits of phase fields in an alloy system

**3.1.25**
**equivalent diameter**
equivalent diameter of cooling rate
ruling section
diameter, *d*, of a cylinder of the same steel (of length ≥ 3 *d*) in which the *cooling rate* (3.1.14) in the core is identical to the slowest cooling rate recorded in the considered ferrous workpiece with an irregular shape, under the same *cooling conditions* (3.1.12)

Note 1 to entry: The determination of the equivalent diameter is described in ISO 683-1[1] and ISO 683-2[2].

**3.1.26**
**eutectoid transformation**
reversible transformation of *austenite* (3.8.4) into *pearlite* (3.8.26) (ferrite + cementite) that occurs at a constant temperature

Note 1 to entry: Temperature for eutectoid transformation of pure iron is 723 °C. Alloying elements or cooling speed influence this temperature.

**3.1.27**
**exogas**
gas mixture produced by complete combustion of hydrocarbons

Note 1 to entry: Composition of exogas is usually a volume fraction of 6,8 % to 10 % of carbon dioxide, 2,4 % to 7,4 % of carbon monoxide, 2,5 % to 9,5 % of hydrogen, small amounts of oxygen, water vapor, residual nitrogen.

Note 2 to entry: Exogas is used to protect ferrous material surfaces from oxidation and has a decarburizing effect.

**3.1.28**
**exothermic atmosphere**
*furnace atmosphere* (3.1.31) produced exothermically and controlled not oxidizing the ferrous material



Note 1 to entry: Exothermic means that heat energy is transferred from the atmosphere.

**3.1.29**
**ferrous material**

metals and alloys with iron as the principal element

Note 1 to entry: Ferrous materials include products and workpieces of steel and cast iron.

**3.1.30**
**fluidized bed**
*heat treatment* (3.1.35) medium made by a ceramic powder fluidized by a gas into a furnace heated from the outside

Note 1 to entry: The fluidizing gas can be inert to protect the surface of heat-treated ferrous materials or a reactive gas for a *thermochemical treatment* (3.7.54) such as *carburizing* (3.7.13).

**3.1.31**
**furnace atmosphere**
gaseous filling of a furnace, used for *heat treatment* (3.1.35)

Note 1 to entry: Gaseous filling can be pure gas or gas mixture. The atmosphere can be inert or reactive.

Note 2 to entry: The purpose of furnace atmospheres is to prevent *oxidation* (3.9.11) or *decarburization* (3.9.2) or to be the carrier or reactive gas in a *thermochemical treatment* (3.7.54).

**3.1.32**
**heat conduction**
spontaneous heat flow from a body at a higher temperature to a body at a lower temperature and/or within a ferrous material with locally different temperatures, e.g. between surface and core

Note 1 to entry: In the absence of external drivers, temperature differences decay over time, and the bodies approach to thermal equilibrium.