



SLOVENSKI STANDARD SIST EN ISO 4885:2017

01-maj-2017

Nadomešča:
SIST EN 10052:2000

Železove zlitine - Toplotne obdelave - Slovar (ISO 4885:2017)

Ferrous products - Heat treatments - Vocabulary (ISO 4885:2017)

Eisenwerkstoffe - Wärmebehandlung - Begriffe (ISO 4885:2017)

Produits ferreux - Traitements thermiques - Vocabulaire (ISO 4885:2017)

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ICS:

01.040.77	Metalurgija (Slovarji)	Metallurgy (Vocabularies)
25.200	Toplotna obdelava	Heat treatment
77.080.01	Železne kovine na splošno	Ferrous metals in general

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en,fr,de

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EUROPEAN STANDARD

EN ISO 4885

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2017

ICS 01.040.25; 01.040.77; 25.200; 77.140.01

Supersedes EN 10052:1993

English Version

Ferrous materials - Heat treatments - Vocabulary (ISO 4885:2017)

Matériaux ferreux - Traitements thermiques -
Vocabulaire (ISO 4885:2017)

Eisenwerkstoffe - Wärmebehandlung - Begriffe (ISO
4885:2017)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents	Page
European foreword.....	3

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[SIST EN ISO 4885:2017](https://standards.iteh.ai/catalog/standards/sist/2a516ce9-8d11-492b-a35d-ca4387a2033e/sist-en-iso-4885-2017)
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European foreword

This document (EN ISO 4885:2017) has been prepared by Technical Committee ISO/TC 17 “Steel” in collaboration with Technical Committee ECISS/TC 100 “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of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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INTERNATIONAL
STANDARD

ISO
4885

Second edition
2017-02

**Ferrous materials — Heat treatments
— Vocabulary**

Matériaux ferreux — Traitements thermiques — Vocabulaire

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Reference number
ISO 4885:2017(E)

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Contents	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
Annex A (informative) Equivalent terms	31
Bibliography	41

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(standards.iteh.ai)

[SIST EN ISO 4885:2017](https://standards.iteh.ai/catalog/standards/sist/2a516ce9-8d11-492b-a35d-ca4387a2033e/sist-en-iso-4885-2017)

<https://standards.iteh.ai/catalog/standards/sist/2a516ce9-8d11-492b-a35d-ca4387a2033e/sist-en-iso-4885-2017>

ISO 4885:2017(E)**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).

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For an explanation on 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.

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

This second edition cancels and replaces the first edition (ISO 4885:1996), which has been technically revised.

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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 <http://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 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) to create the ageing effects.

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

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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 interstitially or substitutively 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 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 ([3.207](#)) 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 structure which is austenitic at ambient temperature

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

3.14**austenitizing**

heating (3.109) a workpiece to *austenitizing temperature* (3.15) and holding at this, so that the microstructure is predominantly austenitic

Note 1 to entry: The amount of the minimum required temperature results from the heat speed and the steel composition. The holding period depends on the heating conditions used.

3.15**austenitizing temperature**

temperature at which the workpiece is maintained during austenitization

3.16**auto-tempering**

self-tempering

tempering undergone by *martensite* (3.137) during *quenching* (3.168) or subsequent *cooling* (3.45)

3.17**bainite**

microstructure resulting from the transformation of *austenite* (3.12) at temperatures above *martensite* (3.137) start temperature (M_s) and outside the *pearlite* (3.155) range consisting of ferrite laths and carbides which are dispersed either inside the ferrite laths (lower bainite) or between the ferrite laths (upper bainite)

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

3.18**bainitizing**

austenitizing (3.14) and *quenching* (3.168) to a temperature above M_s and isothermal soaking to ensure a transformation of the *austenite* (3.12) to *bainite* (3.17)

3.19**bake hardening steel**

steel with the ability to gain an increase of yield strength after a plastic pre-strain and a subsequent *heat treatment* (3.108) in the usual industrial paint processes (in the region of 170 °C for 20 min)

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) and a good dent resistance.

3.20**baking**

heat treatment (3.108) permitting the release of hydrogen absorbed in a ferrous product without modifying its structure

Note 1 to entry: The treatment is generally carried out following an electrolytic plating or pickling, or a welding operation.

3.21**banded structure**

lines of constituents of the microstructure caused by *segregation* (3.179) during solidification

3.22**blacking**

operation carried out in an oxidizing medium at a temperature such that the polished surface of a workpiece becomes covered with a thin, continuous, adherent film of dark-coloured oxide (see 3.151)

3.23**black nitriding**

nitriding (3.143) followed by *oxidation* (3.150) of the steel surface

Note 1 to entry: After *nitrocarburizing* (3.144), *blacking* (3.22) will improve the corrosion resistance and the surface properties

ISO 4885:2017(E)

3.24

blank nitriding

blank nitrocarburizing

simulation treatment which consists of reproducing the thermal cycle of *nitriding* (3.143)/*nitrocarburizing* (3.144) without the nitriding/nitrocarburizing medium

Note 1 to entry: This treatment makes it possible to assess the metallurgical consequences of the thermal cycle of nitriding/nitrocarburizing.

3.25

batch annealing

box annealing

process in which strip is annealed in tight coil form, within a protective atmosphere, for a predetermined time-temperature cycle

3.26

blueing

treatment carried out in an oxidizing medium (see 3.152) at a temperature such that the bright surface of a workpiece becomes covered with a thin, continuous, adherent film of blue-coloured oxide

Note 1 to entry: If the blueing is carried out in superheated water vapour, it is also called steam treatment.

3.27

boost-diffuse carburizing

carburizing carried out in two or more successive stages and/or different temperatures with different carbon potentials

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3.28

boriding

thermochemical treatment (3.207) of a workpiece to enrich the surface of a workpiece with boron

Note 1 to entry: The medium in which boriding takes place should be specified, e.g. pack boriding, paste boriding, etc.

3.29

bright annealing

annealing (3.8) in a medium preventing the *oxidation* (3.150) of the surface and keeps the original surface quality

3.30

burning

irreversible change in the structure and properties brought about by the onset of melting at the grain boundaries and surface

3.31

carbon activity

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

3.32

carbon mass transfer coefficient

coefficient of the mass of carbon transfer from the carburizing medium into steel (per unit surface area and time)

Note 1 to entry: Also defined as the mass of carbon transferred from the carburizing medium into the steel, per unit surface area per second, for a unit difference between the carbon potential and actual surface carbon content.

3.33 carbon level

carbon content in percent of mass in an austenitized probe of pure iron at a given temperature in the equilibrium with the carburizing medium

Note 1 to entry: The "carbon level" has been defined for practical use, because the carbon potential of steels cannot be measured directly in carburizing media; see Reference [13].

3.34 carbon profile

carbon content depending on the distance from the surface

3.35 carbonitriding

thermochemical treatment (3.207) to enrich the surface layer with carbon and nitrogen

Note 1 to entry: The elements are in solid solution in the *austenite* (3.12), usually the carbonitrided workpiece undergoes *quench hardening* (3.167) (immediately or later).

Note 2 to entry: Carbonitriding is a *carburizing* (3.36) process.

Note 3 to entry: The medium in which carbonitriding takes place should be specified, e.g. gas, salt bath, etc.

3.36 carburizing

DEPRECATED: cementation

thermochemical treatment (3.207) which is applied to a workpiece in the austenitic state, to obtain a surface enrichment in carbon, which is in solid solution in the *austenite* (3.12)

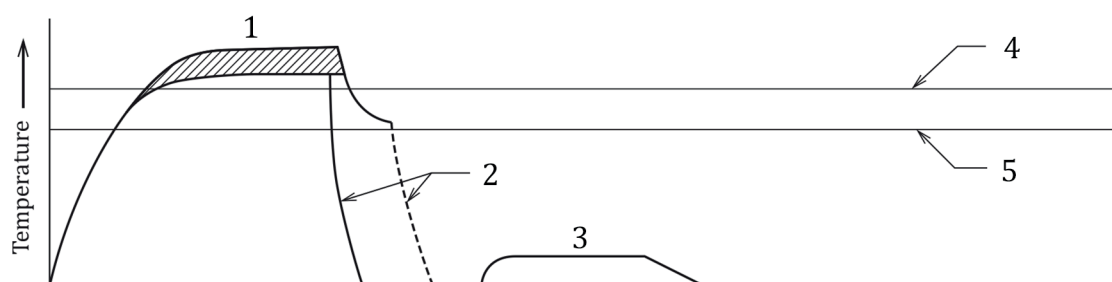
Note 1 to entry: The carburized workpiece undergoes *quench hardening* (3.167) (immediately or later).

Note 2 to entry: The medium in which carburizing takes place should be specified, e.g. gas, pack, etc.

3.37 case hardening

treatment consisting of *carburizing* (3.36) or *carbonitriding* (3.35) followed by *quench hardening* (3.167)

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



a) Direct-hardening treatment