
**Heat-treatable steels, alloy steels and
free-cutting steels —**

**Part 3:
Case-hardening steels**

*Aciers pour traitement thermique, aciers alliés et aciers pour
décolletage —*

Partie 3: Aciers pour cémentation



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Contents

Page

Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Classification and designation	2
4.1 Classification	2
4.2 Designation	3
5 Information to be supplied by the purchaser	3
5.1 Mandatory information	3
5.2 Options and/or supplementary or special requirements	3
5.3 Ordering example	3
6 Manufacturing process	4
6.1 General	4
6.2 Deoxidation	4
6.3 Heat-treatment condition and surface condition at delivery	4
6.3.1 Normal condition at delivery	4
6.3.2 Particular heat-treatment condition	4
6.3.3 Particular surface conditions	4
6.4 Traceability of the cast	4
7 Requirements	4
7.1 Chemical composition, hardness and hardenability	4
7.1.1 General	4
7.1.2 Hardenability	5
7.1.3 Chemical composition	5
7.2 Machinability	5
7.3 Cold shearability	5
7.4 Grain size	5
7.5 Non-metallic inclusions	6
7.5.1 Microscopic inclusions	6
7.5.2 Macroscopic inclusions	6
7.6 Internal soundness	6
7.7 Surface condition	6
7.8 Shape, dimensions and tolerances	6
8 Inspection	7
8.1 Testing procedures and types of documents	7
8.2 Frequency of testing	7
8.3 Tests to be carried out for specific inspection	7
8.3.1 General	7
8.3.2 Visual and dimensional inspection	7
9 Test methods	8
9.1 Chemical analysis	8
9.2 Hardness and hardenability tests	8
9.2.1 Verification of hardness	8
9.2.2 Verification of hardenability	8
9.3 Retests	8
10 Marking	8
Annex A (normative) Supplementary or special requirements	31
Annex B (informative) Designation of steels given in this document and of comparable grades covered in various designation systems	33

Annex C (informative) Classification of steel grades according to minimum tensile strength as a function of diameter after hardening and tempering at 200 °C	35
Bibliography	36

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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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 4, *Heat treatable and alloy steels*.

This fourth edition cancels and replaces the third edition (ISO 683-3:2019), which has been technically revised. The main changes are as follows:

- steel grades 23MnCrMo5-5-4 and 17NiCrMoS6-4 have been added;
- the lower silicon content in [Table 3](#) has been deleted and replaced by a new option in [Clause A.4](#).

A list of all parts in the ISO 683 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Heat-treatable steels, alloy steels and free-cutting steels —

Part 3: Case-hardening steels

1 Scope

This document specifies the technical delivery requirements for

- semi-finished products, hot formed (e.g. blooms, billets, slabs) (see NOTE 1),
- bars (see NOTE 1),
- wire rod,
- finished flat products, and
- hammer or drop forgings (see NOTE 1)

manufactured from the case-hardening non-alloy or alloy steels listed in [Table 3](#) and supplied in one of the heat-treatment conditions given for the different types of products in [Table 1](#) and in one of the surface conditions given in [Table 2](#).

The steels are, in general, intended for the manufacture of case-hardened machine parts.

NOTE 1 Hammer-forged semi-finished products (blooms, billets, slabs, etc.), seamless rolled rings and hammerforged bars are covered under semi-finished products or bars and not under the term “hammer and drop forgings”.

NOTE 2 For International Standards relating to steels conforming with the requirements for the chemical composition in [Table 3](#), however, supplied in other product forms or treatment conditions than given above or intended for special applications, and for other related International Standards, see the Bibliography.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing*

ISO 404, *Steel and steel products — General technical delivery requirements*

ISO 642:1999, *Steel — Hardenability test by end quenching (Jominy test)*

ISO 643, *Steels — Micrographic determination of the apparent grain size*

ISO 4885, *Ferrous materials — Heat treatments — Vocabulary*

ISO 4948-1, *Steels — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition*

ISO 4948-2, *Steels — Classification — Part 2: Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics*

ISO/TS 4949, *Steel names based on letter symbols*

ISO 4967, *Steel — Determination of content of non-metallic inclusions — Micrographic method using standard diagrams*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ISO 6929, *Steel products — Vocabulary*

ISO 7788, *Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements*

ISO 9443, *Surface quality classes for hot-rolled bars and wire rod*

ISO/TR 9769, *Steel and iron — Review of available methods of analysis*

ISO 10474, *Steel and steel products — Inspection documents*

ISO 14284, *Steel and iron — Sampling and preparation of samples for the determination of chemical composition*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 377, ISO 4885, ISO 4948-1, ISO 4948-2, ISO 6929, ISO 14284 and the following apply.

NOTE For deviations from these terms and definitions, see NOTE 1 of the Scope and footnote b of [Table 2](#).

ISO and IEC maintain terminological 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

case-hardening steel

steel with a relatively low carbon content, which are carburized or carbonitrided on their surface and subsequently hardened

Note 1 to entry: These steels, after hardening, have a high degree of hardness in the surface zone and good resistance to wear, while the core material is characterized principally by extreme toughness.

Note 2 to entry: Further possibilities for heat treatment of case-hardening steels are, for example, nitrocarburizing and nitriding.

3.2

non-alloy steel

as defined in ISO 4948-1

3.3

alloy steel

as defined in ISO 4948-1

4 Classification and designation

4.1 Classification

The classification of the relevant steel grades is in accordance with ISO 4948-1 and ISO 4948-2. Steel grades C10E, C10R, C15E, C15R, C16E, C16R and 22Mn6 are non-alloy special steels. All other steel grades covered by this document are alloy special steels.