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

**Part 2:
Alloy steels for quenching and tempering**

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

Partie 2: Aciers alliés pour trempe et revenu



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Published in Switzerland

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 683-2 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 4, *Heat treatable and alloy steels*.

This first edition cancels and replaces the first edition of ISO 683-1:1987 and ISO/TR 11637:1997, which have been technically revised.

ISO 683 consists of the following parts, under the general title *Heat-treatable steels, alloy steels and free-cutting steels*:

- *Part 1: Non-alloy steels for quenching and tempering*
- *Part 2: Alloy steels for quenching and tempering*
- *Part 9: Wrought free-cutting steels*
- *Part 10: Wrought nitriding steels*
- *Part 11: Case-hardening steels*
- *Part 14: Hot-rolled steels for quenched and tempered springs*
- *Part 15: Valve steels for internal combustion engines*
- *Part 17: Ball and roller bearing steels*
- *Part 18: Bright products of unalloyed and low alloy steels*

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

Part 2:

Alloy steels for quenching and tempering

1 Scope

1.1 This part of ISO 683 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 direct hardening alloy steels and the alloy flame- and induction-hardening 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 quenched and tempered or austempered (see 3.2 and Note 2) and flame- or induction-hardened machine parts (see Tables 8 and 9).

The requirements for mechanical properties given in this part of ISO 683 are restricted to the sizes given in the relevant Table 8.

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

NOTE 2 For the purposes of simplification, the term “quenched and tempered” is, unless otherwise indicated, used in the following also for the austempered condition.

NOTE 3 For International Standards relating to steels complying 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.

NOTE 4 This part of ISO 683 does not apply to bright products and bars and wire rod for cold heading. For such products, see ISO 683-18 and ISO 4954.

1.2 In special cases, variations in these technical delivery requirements or additions to them can form the subject of an agreement at the time of enquiry and order (see Annex B).

1.3 In addition to this part of ISO 683, the general technical delivery requirements of ISO 404 are applicable.

2 Normative references

The following referenced documents are indispensable for the application 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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

- 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, *Steel — Hardenability test by end quenching (Jominy test)*
- ISO 643, *Steels — Micrographic determination of the apparent grain size*
- ISO 3887, *Steels — Determination of depth of decarburization*
- ISO 4885, *Ferrous products — 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 (scales A, B, C, D, E, F, G, H, K, N, T)*
- ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*
- ISO 6929, *Steel products — Vocabulary*
- ISO 7788, *Steel — Surface finish of hot-rolled plates and wide flats — Delivery requirements*
- ISO 9443, *Heat-treatable and alloy steels — Surface quality classes for hot-rolled round bars and wire rods — Technical delivery conditions*
- ISO/TR 9769, *Steel and Iron — Review of available methods of analysis*
- ISO 10474, *Metallic 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 definitions of 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 Notes 1 and 2 to the Scope.

3.1 ruling section

section for which the specified mechanical properties shall apply

NOTE Independent of the actual shape and dimensions of the cross-section of the product, the size of its ruling section is always given by a diameter. This corresponds to the diameter of an “equivalent round bar”. That is, a round bar which, at the position of its cross-section specified for taking the test pieces for the mechanical tests, will, when being cooled from austenitizing temperature, shows the same cooling rate as the actual ruling section of the product concerned at its position for taking the test pieces.