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High-strength cast steels for general engineering and structural purposes

Aciers moulés à haute résistance pour construction mécanique et construction métallique d'usage général

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Foreword

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This document was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 11, *Steel castings*.

This third edition cancels and replaces the second edition (ISO 9477:2015), which has been technically revised.

The main changes are as follows:

— the mandatory Terms and definitions clause (see Clause 3) has been added and subsequent clauses have been renumbered;

— in Clause 6 (former Clause 5), silicon content has been deleted;

— editorial changes have been applied.

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.

High-strength cast steels for general engineering and structural purposes

1 Scope

This document specifies requirements for four grades of heat-treated cast carbon and alloy steels for general engineering and structural purposes.

In cases where castings are produced by welding component parts together, this document does not cover the welding process or the properties of the weldment.

The four steel grades are intended for service at ambient temperature.

2 Normative references

The following document is 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 4990:2023, *Steel castings — General technical delivery requirements*

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 General conditions for delivery

Materials furnished in accordance with this document shall conform to the applicable requirements of ISO 4990, including the requirements that are indicated in the inquiry and purchase order.

5 Heat treatment

The type of heat treatment is left to the discretion of the manufacturer, unless specifically agreed upon at the time of ordering.

6 Chemical requirements

6.1 The maximum contents of sulphur and phosphorous shall be 0,025 % and 0,030 %, respectively.

6.2 The chemical composition may be agreed upon between the manufacturer and purchaser.

6.3 The maximum carbon equivalent allowed in the supplied chemical composition may be agreed upon between the manufacturer and purchaser. The carbon equivalent, CE, of the supplied alloy is defined as follows:

$$CE=C+Mn/6+(Cr+Mo+V)/5+(Ni+Cu)/15$$

7 Mechanical properties

7.1 The mechanical properties of the specified steel grade shall conform to Table 1.

7.2 Either the reduction of area or the impact strength shall be determined and shall conform to the requirements specified for the grade in Table 1. The choice of test is at the discretion of the manufacturer, unless specified by the purchaser at the time of ordering.

7.3 In the case of castings supplied in the quench and tempered condition and where the thickness is >75 mm, ISO 4990:2023, B.6.1.3 shall be required.

Table 1 — Mechanical properties at ambient temperatures on test blocks (28-mm thick)

Steel grade	R_p[b] min. MPa	R_m MPa	A min. %	By choice, according to order	
				Z[a] min. %	AV[a] min. J
410–620	410	620 to 770	16	40	20
540–720	540	720 to 870	14	35	20
620–820	620	820 to 970	11	30	18
840–1 030	840	1 030 to 1 180	7	22	15

R_p 0,2 % proof stress

R_m tensile strength

A percentage elongation

Z reduction of area

KV impact energy

1 MPa = 1 N/mm^2

NOTE 1 The required mechanical properties are obtained from 28 mm thick standard test blocks, cast either separately from, or attached to, the casting that they represent. The test values so exhibited therefore represent the quality of steel from which the castings have been poured. They do not necessarily represent the properties of the casting themselves, which might be affected by solidification conditions and the rate of cooling during heat treatment, which, in turn, are influenced by casting thickness, size, and shape,

NOTE 2 Ambient temperature is taken as 23 °C ± 5 °C.

NOTE 3 Properties at other temperatures can be agreed on through the use of supplementary requirements in ISO 4990.

[a] 2 mm notch unless agreed upon unless the purchaser and manufacturer agree upon another notch size.

[b] R_{eH}(the beginning of the yield point elongation) can be used if R_p cannot be used.

8 Supplementary requirements

A list of standardized supplementary requirements for use at the option of the purchaser is given in ISO 4990.