INTERNATIONAL STANDARD

ISO 9477

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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

Reference number
ISO 9477:1992(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.

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.

International Standard ISO 9477 was prepared by Technical Committee ISO/TC 17, *Steel*, Sub-Committee SC 11, *Steel castings*.

It is a partial revision of ISO 3755:1976.

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High strength cast steels for general engineering and structural purposes

1 Scope

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

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

1.3 The four steel grades are intended for service at ambient temperature. However, properties at other temperatures may be agreed on through the use of the supplementary requirements in 9.4.1 or 9.4.4 of ISO 4990:1986.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4990:1986, *Steel castings — General technical delivery requirements.*

3 General conditions for delivery

Materials furnished according to this International Standard shall conform to the applicable requirements of ISO 4990, including the supplementary requirements that are indicated in the inquiry and purchase order.

4 Heat treatment

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

5 Chemical requirements

The maximum contents of silicon, sulfur and phosphorus shall be 0,60 %, 0,035 % and 0,035 %, respectively.

6 Mechanical properties

Steel used for castings shall conform to the mechanical property requirements given in table 1.

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

7 Supplementary requirements

The following supplementary requirements shall apply only when they are specified in the inquiry and purchase order and agreed upon by the manufacturer and the purchaser.

A list of standardized supplementary requirements for use at the option of the purchaser is given in clause 9 of ISO 4990:1986. Those requirements which are ordinarily considered suitable for use with this International Standard are listed below. The details of these are given in ISO 4990. Other requirements, whether included or not in ISO 4990, may be used with this International Standard, upon agreement by the manufacturer and the purchaser.

Supplementary requirements from ISO 4990:

9.1.1 Steelmaking Process

9.1.2 Reporting of the steelmaking process

9.1.3 Agreed manufacturing procedure

9.1.4 Dividing up the cast

9.1.5 Mass of test lots

9.1.6 Mass and tolerance on mass

9.2.1 Certificates

9.2.2 Test reports shall provide the required traceability of the castings they represent.

9.3 Chemical analysis for residual elements

9.4.1 Proof stress at 0,2 % at elevated temperature

9.4.2 Brinell hardness test (specific to certain products)

9.4.3 Brinell hardness test

9.4.4 Impact test at low temperatures

9.5 Homogeneity of the test lot

The homogeneity of the test lot shall be verified by hardness test carried out on 5 % of the castings (or at least five castings) per test lot.

9.6 Test blocks

9.7.1 Type of heat treatment

9.7.2 Details of the treatment

9.7.3 Quenched and tempered castings

9.8.1 Prior agreement relating to major repair welds

9.8.2 Weld maps (Sketches)

9.9.1 Liquid penetrant inspection

9.9.2 Magnetic particle inspection

9.9.3 Radiographic examination

9.9.4 Ultrasonic inspection

9.9.5 Surface roughness

9.9.6 Examination of weld preparation and repair welds

9.10.2 Magnetic tests

9.10.3 Pressure-tightness

The chemical composition may be selected by an agreement between the manufacturer and the purchaser.

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

Grade of steel	R_e min. MPa	R_m MPa	A min. %	By choice, according to order	
				Z [1] min. %	KV [1] min. J
410-620	410	620-770	16	40	20
540-720	540	720-870	14	35	20
620-820	620	820-970	11	30	18
840-1 030	840	1 030-1 180	7	22	15

R_e: if measurable the upper yield stress, otherwise the 0,2 % proof stress

R_m: tensile strength

A: percentage elongation

Z: reduction of area

KV: impact strength

1 MPa = 1 N/mm^2

NOTES

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 may be affected by solidification conditions and the rate of cooling during heat treatment, which in turn are influenced by casting thickness, size and shape. If the thickness of the casting is considerably greater than 28 mm, the application of the supplementary requirement in 9.6 of ISO 4990:1986 should be taken into consideration.

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

1) See clause 6.

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Descriptors: steels, cast steels, high yield strength steels, heat treatable steels, structural steels, specifications, mechanical properties, chemical composition.

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