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# INTERNATIONAL STANDARD



# 3755

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

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## Cast steels for general engineering purposes

*Aciers moulés pour construction mécanique d'usage général*

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## FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up 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.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3755 was drawn up by Technical Committee ISO/TC 17, *Steel*, and was circulated to the Member Bodies in April 1975.

It has been approved by the Member Bodies of the following countries:

Australia	Ireland	Spain
Austria	Italy	Sweden
Belgium	Netherlands	Switzerland
Bulgaria	New Zealand	Turkey
Czechoslovakia	Norway	United Kingdom
Denmark	Poland	U.S.A.
France	Romania	Yugoslavia
Iran	South Africa, Rep. of	

No Member Body expressed disapproval of the document.

# Cast steels for general engineering purposes

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies requirements for four grades of cast steel for general engineering purposes, after heat treatment. The castings manufactured from these grades of cast steel are generally used in the temperature range  $-10^{\circ}\text{C}$  to  $+300^{\circ}\text{C}$ .

## 2 REFERENCES

ISO 82, *Steel – Tensile testing.*

ISO 148, *Steel – Beam impact test (V-notch)*<sup>1)</sup>.

ISO 4990, *Steel castings – General technical delivery conditions.*<sup>2)</sup>

## 3 MANUFACTURE AND CASTING

The chemical composition of the steel (other than the requirements of clause 4), the steelmaking process, the type of heat treatment and the method of manufacture are left to the discretion of the manufacturer.

## 4 CHEMICAL COMPOSITION – LIMITS

The sulphur and phosphorus contents of all grades shall be restricted to 0,040 % maximum. The carbon content of grade 20-40 shall be limited to 0,18 % maximum and the carbon content of grade 23-45 shall be restricted to 0,25 % maximum.

## 5 CAST SAMPLES

5.1 The test pieces used for the mechanical tests specified in clause 6 shall be taken either from separately cast samples or from samples attached to the casting. The axis of the test piece shall be approximately 14 mm below the surface of the cast sample.

5.2 The cast samples shall be heat treated with the castings they represent.

5.3 Unless otherwise specified on the order, the thickness of the cast sample shall be 28 mm approximately<sup>3)</sup>.

## 6 MECHANICAL TEST METHODS

### 6.1 Tensile test

The tensile test shall be carried out in accordance with the requirements of ISO 82.

### 6.2 Impact test

The impact test shall be carried out in accordance with the requirements of ISO 148. The reported value shall be the average of three tests.

1) At present at the stage of draft. (Revision of ISO/R 148.)

2) In preparation.

3) Other thicknesses together with the corresponding required mechanical properties shall form the subject of an agreement at the time of enquiry and order.

**7 MECHANICAL PROPERTIES**

The mechanical properties, at ambient temperature<sup>1)</sup>, measured on test pieces selected from cast samples as specified in clause 5 and tested in accordance with clause 6, shall be in accordance with the values given in the table.

The purchaser shall state on his enquiry and order whether the reduction of area or the impact strength is to be determined.

TABLE – Mechanical properties\*)\*\*

Grade of steel	$R_{eH}$ or $R_{p0,2}$ min.	$R_m$	A min.	By choice according to the order	
				Z min.	KVmin.
	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	%	J
20-40	200	400 to 550	25	40	30
23-45	230	450 to 600	22	31	25
26-52	260	520 to 670	18	25	22
30-57	300	570 to 720	15	21	***

\* Refer to annex A for additional information regarding mechanical properties.

- \*\*  $R_{eH}$  = Upper yield stress
- $R_{p0,2}$  = 0,2 % proof stress
- $R_m$  = Tensile strength
- A = Elongation
- Z = Reduction of area
- KV = Impact strength
- 1 N/mm<sup>2</sup> = 1 MPa

\*\*\* This value to be the subject of agreement between the manufacturer and purchaser at the time of ordering.

**8 HEAT TREATMENT**

The heat treatment generally applied is one of the following :

- annealing;
- normalizing,
- normalizing and tempering;
- quenching and tempering.

Refer to annex B for the details of these heat treatments.

**9 DELIVERY CONDITIONS**

The delivery conditions, including the formation of batches, number of tests per batch, etc., shall be in accordance with ISO 4990.

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1) Ambient temperature taken as 23 ± 5 °C.

## ANNEX A

**ADDITIONAL DATA ON MECHANICAL PROPERTIES**

For the basic information regarding mechanical properties, see clause 7.

For the grades of cast steels covered by this International Standard, all requirements given in the table apply to product thicknesses of up to and including 28 mm, in cases where the test piece is taken from cast samples in accordance with clause 5. These values are representative of the mechanical properties that may be expected in casting thicknesses of up to approximately 100 mm.

For thicknesses of over 100 mm, only the required 0,2 % proof stress value in the table may be considered as applicable for design purposes.

If a cast sample of a size other than as specified in clause 5 is required, the values for the mechanical properties shall be agreed between the manufacturer and the purchaser.

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ANNEX B

**GUIDANCE ON THE HEAT TREATMENTS LISTED IN CLAUSE 8**

These heat treatments are carried out as follows :

- Annealing : heat above  $AC_3$ , furnace cool;
- Normalizing : heat above  $AC_3$ , air cool;
- Quenching : heat above  $AC_3$ , accelerated cooling;
- Tempering : heat under  $AC_1$ .