



SLOVENSKI STANDARD
SIST EN 1562:1998
01-avgust-1998

Livarstvo - Temprana litina

Founding - Malleable cast irons

Gießereiwesen - Temperguß

Fonderie - Fonte malléable

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Ta slovenski standard je istoveten z: EN 1562:1997

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ICS:

77.140.80 Železni in jekleni ulitki Iron and steel castings

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EUROPEAN STANDARD

EN 1562

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1997

ICS 77.140.80

Descriptors: foundry engineering, cast iron, castings, malleable cast iron, designation, classifications, mechanical properties, tensile strength, elongation, hardness, sampling, mechanical tests

English version

Founding - Malleable cast irons

Fonderie - Fonte malléable

Gießereiwesen - Temperguß

This European Standard was approved by CEN on 1997-05-02. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 190 "Foundry technology", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 2.20 "Malleable cast iron" to prepare the following standard:

EN 1562

Founding – Malleable cast irons

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard deals with the classification of malleable cast irons. Malleable cast irons covered by this standard are classified into two groups. The first group is concerned with decarburized irons referred to as whiteheart malleable cast iron. The second group is non-decarburized irons referred to as blackheart malleable cast iron. Both groups, except completely decarburized whiteheart malleable cast iron, contain free carbon as graphite, called temper carbon. Both groups have grades with structures that can range from ferrite to pearlite and/or other transformation products of austenite.

Materials are designated in terms of tensile strength and percentage elongation relative to a 12 mm diameter test piece for whiteheart malleable cast iron and 12 mm or 15 mm diameter test pieces for blackheart malleable cast iron. However, comparative values of tensile strength and percentage elongation after fracture are given for other test piece diameters.

Castings having small wall thicknesses form a significant sector of the market. In order to represent their mechanical properties in this material standard, values for these properties, based on 6 mm diameter test pieces, have been included.

Annex A gives the requirements for the determination of 0,2% proof stress.

Annex B gives testing methods for the determination of Brinell hardness (HB) of malleable cast iron.

Annex C gives further information on impact resistance and ductility especially at low temperatures and recommends restricting the phosphorous content as an aid to improving impact resistance and ductility of the cast material.

1 Scope

This European Standard specifies requirements for malleable cast iron used in the manufacture of castings.

This standard specifies two groups of material, namely whiteheart malleable cast iron and blackheart malleable cast iron. Each group is represented by several grades of material.

Classification is given on the basis of mechanical properties determined on separately cast test pieces.

This standard specifies 0,2% proof stress values determined only when these values are requested by the purchaser.

This standard specifies Brinell hardness values determined only when these values are requested by the purchaser.

This standard does not cover technical delivery conditions for malleable iron castings. Reference should be made to EN 1559-1 and EN 1559-3.

This standard does not cover chemical composition, except phosphorous (see annex C).

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- <https://standards.iteh.ai/catalog/standards/sist/3c4e695d-6453-4c9f-8ce1-028e7095b4f6/sist-en-1562-1998>
- EN 1559-1
Founding – Technical conditions of delivery – Part 1: General
- EN 1559-3
Founding – Technical conditions of delivery – Part 3: Additional requirements for iron castings
- EN 10002-1
Metallic materials – Tensile testing – Part 1: Method of test (at ambient temperature)
- EN 10003-1
Metallic materials – Brinell hardness test – Part 1: Test method

NOTE: Informative references to documents used in the preparation of this standard, and cited at the appropriate places in the text, are listed in a bibliography, see annex D.

3 Definitions

For the purposes of this standard, the following definitions apply:

3.1 whiteheart malleable (decarburized) cast iron

Cast iron which is cast white and then given a heat treatment in a decarburizing atmosphere to produce a material which is partially or entirely decarburized. Any remaining graphite is in the form of temper carbon.

3.2 blackheart malleable (non-decarburized) cast iron

Cast iron which is cast white and then given a non-decarburizing heat treatment, and it contains graphite all of which is in the form of temper carbon.

NOTE to 3.1 and 3.2: To produce structures such as ferrite, pearlite or other transformation products of austenite, both groups depend upon either the malleablizing heat treatment, the subsequent additional heat treatment and/or additions of alloying elements.

3.3 primary graphite

Graphite which occurs in a flake form.

NOTE: Primary graphite is more correctly referred to as eutectic graphite.

4 Designation

The material shall be designated either by symbol or by number as given in either table 1 or table 2.

5 Order information

The following information shall be supplied by the purchaser:

- a) the number of this European Standard (EN 1562);
- b) the designation of the material;
- c) any special requirements which have to be agreed by the time of acceptance of the order (see EN 1559-1 and EN 1559-3).

6 Manufacture

The method of manufacture of malleable cast iron as well as its chemical composition and heat treatment shall be left to the discretion of the manufacturer, who shall ensure compliance with the property requirements given in this standard for the material ordered.

NOTE: For malleable cast iron materials to be used in special applications, the chemical composition and any special heat treatment may be the subject of an agreement between the manufacturer and the purchaser by the time of acceptance of the order.

7 Requirements

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7.1 Mechanical properties of whiteheart malleable cast iron

7.1.1 Tensile strength and elongation

When tested in accordance with clause 9, the values of tensile strength and percentage elongation after fracture (hereafter referred to as elongation) shall be in accordance with the requirements specified in table 1.

7.1.2 0,2% proof stress

When requested by the purchaser and agreed by the time of acceptance of the order, 0,2% proof stress shall be determined in accordance with the requirements of annex A and the 0,2% proof stress values shall be in accordance with the requirements specified in table 1.

Table 1: Mechanical properties of whiteheart malleable cast irons

| Material designation | | Nominal diameter of test piece d | Tensile strength R_m | Elongation $A_{3,4}$ | 0,2% proof stress $R_{p0,2}$ | Brinell hardness (for information only) |
|------------------------------|-------------------------|------------------------------------|---------------------------------|----------------------------|---|---|
| Symbol | Number | mm | N/mm ² | % | N/mm ² | HB |
| | | | min. | min. | min. | max. |
| EN-GJMW-350-4 | EN-JM1010 | 6 9 12 15 | 270 310 350 360 | 10 5 4 3 | - ¹⁾ - - - | 230 |
| EN-GJMW-360-12 ²⁾ | EN-JM1020 ²⁾ | 6 9 12 15 | 280 320 360 370 | 16 15 12 7 | - ¹⁾ 170 190 200 | 200 |
| EN-GJMW-400-5 | EN-JM1030 | 6 9 12 15 | 300 360 400 420 | 12 8 5 4 | - ¹⁾ 200 220 230 | 220 |
| EN-GJMW-450-7 | EN-JM1040 | 6 9 12 15 | 330 400 450 480 | 12 10 7 4 | - ¹⁾ 230 260 280 | 220 |
| EN-GJMW-550-4 | EN-JM1050 | 6 9 12 15 | - 490 550 570 | - 5 4 3 | - ¹⁾ 310 340 350 | 250 |

¹⁾ Because of the difficulty in determining the proof stress of small test pieces the values and the method of measurement shall be agreed between the manufacturer and the purchaser by the time of acceptance of the order.

²⁾ Material most suitable for welding

NOTE 1: 1 N/mm² is equivalent to 1 MPa.

NOTE 2: The material designation is in accordance with EN 1560.

NOTE 3: The figures given in bold indicate the minimum tensile strength and minimum elongation $A_{3,4}$ to which the symbol of the grade is related and the preferred nominal diameter of the test piece and the corresponding minimum 0,2% proof stress.

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7.1.3 Brinell hardness

When requested by the purchaser and agreed by the time of acceptance of the order, Brinell hardness values shall be determined. The method of testing and sampling shall be agreed in accordance with one of the methods specified in annex B.

7.1.4 Impact resistance and ductility

In order to optimize impact resistance and ductility, the maximum phosphorous content in the malleable iron shall be as indicated in annex C.

7.2 Mechanical properties of blackheart malleable cast iron

7.2.1 Tensile strength and elongation

When tested in accordance with clause 9, the tensile strength and elongation shall be in accordance with the requirements specified in table 2.

7.2.2 0,2% proof stress

When requested by the purchaser and agreed by the time of acceptance of the order, 0,2% proof stress shall be determined in accordance with the requirements of annex A and the 0,2% proof stress values shall be in accordance with the requirements specified in table 2.

Table 2: Mechanical properties of blackheart malleable cast irons

| Material designation | | Nominal diameter of test piece ¹⁾ <i>d</i> mm | Tensile strength <i>R_m</i> N/mm ² min. | Elongation <i>A_{3,4}</i> % min. | 0,2% proof stress <i>R_{p0,2}</i> N/mm ² min. | Brinell hardness (for information only) HB |
|-----------------------------|-------------------------|--|---|---|---|--|
| Symbol | Number | | | | | |
| EN-GJMB-300-6 ²⁾ | EN-JM1110 ²⁾ | 12 or 15 | 300 | 6 | – | 150 max. |
| EN-GJMB-350-10 | EN-JM1130 | 12 or 15 | 350 | 10 | 200 | 150 max. |
| EN-GJMB-450-6 | EN-JM1140 | 12 or 15 | 450 | 6 | 270 | 150 to 200 |
| EN-GJMB-500-5 | EN-JM1150 | 12 or 15 | 500 | 5 | 300 | 165 to 215 |
| EN-GJMB-550-4 | EN-JM1160 | 12 or 15 | 550 | 4 | 340 | 180 to 230 |
| EN-GJMB-600-3 | EN-JM1170 | 12 or 15 | 600 | 3 | 390 | 195 to 245 |
| EN-GJMB-650-2 | EN-JM1180 | 12 or 15 | 650 | 2 | 430 | 210 to 260 |
| EN-GJMB-700-2 | EN-JM1190 | 12 or 15 | 700 | 2 | 530 | 240 to 290 |
| EN-GJMB-800-1 | EN-JM1200 | 12 or 15 | 800 | 1 | 600 | 270 to 320 |

¹⁾ Where a 6 mm diameter test piece is representative of the relevant wall thickness of a casting, this size of the test piece may be used by agreement between the manufacturer and the purchaser by the time of acceptance of the order. The minimum properties given in this table shall apply.

²⁾ Material intended particularly for applications in which pressure tightness is more important than a high degree of strength and ductility.

NOTE 1: 1 N/mm² is equivalent to 1 MPa.

NOTE 2: The material designation is in accordance with EN 1560.

NOTE 3: The figures given in bold are related to the minimum tensile strength and minimum elongation *A_{3,4}* of the grade.