



**SLOVENSKI STANDARD**  
**SIST EN 1563:1998**  
**01-avgust-1998**

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**Livarstvo - (Siva) litina s kroglastim grafitom**

Founding - Spheroidal graphite cast irons

Gießereiwesen - Gußeisen mit Kugelgraphit

Fonderie - Fonte a graphite sphéroidal

**Ta slovenski standard je istoveten z: EN 1563:1997**

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EUROPEAN STANDARD

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Descriptors: foundry engineering, cast iron, castings, spheroidal graphite cast iron, grades: quality, designation, classifications, mechanical properties, tensile strength, elongation, hardness, sampling, mechanical tests

English version

## Founding - Spheroidal graphite cast irons

Fonderie - Fonte à graphite sphéroïdal

Gießereiwesen - Gußeisen mit Kugelgraphit

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.

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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of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.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 2.30 "Spheroidal graphite and austempered ductile iron" to prepare the following standard:

EN 1563

Founding – Spheroidal graphite 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 spheroidal graphite cast iron in accordance with the mechanical properties of the material.

The properties of spheroidal graphite cast iron depend on its structure.

The mechanical properties of the material can be evaluated on machined test pieces prepared from:

- separately cast samples;
- samples cast onto either the casting or the running system, hereafter referred to as cast-on sample;
- samples cut from a casting (only when an agreement is made between the manufacturer and the purchaser).

The grade of the material is defined from the mechanical properties measured on machined test pieces prepared from separately cast samples.

If hardness is a requirement of the purchaser as being important for the application, then annex A provides means for its determination.

Further technical data on spheroidal graphite cast iron are given in annex B.

## 1 Scope

This European Standard defines the grades and the corresponding requirements of spheroidal graphite cast irons.

This European Standard specifies a classification based on mechanical properties measured on machined test pieces prepared from:

- separately cast samples;
- cast-on samples;
- samples cut from a casting.

This standard also specifies a classification as a function of hardness.

This standard does not cover technical delivery conditions for spheroidal graphite iron castings, see EN 1559-1 and EN 1559-3.

This standard does not apply to spheroidal graphite cast iron used for pipes, fittings and accessories which are the subject of EN 545, EN 598, EN 969 and ISO 2531.

## 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.

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

EN 10045-1

Metallic materials – Charpy impact test – Part 1: Test method

EN ISO 945 : 1994

Cast iron – Designation of microstructure of graphite (ISO 945 : 1975)

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 C.

## 3 Definitions

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

### 3.1 spheroidal graphite cast iron

Cast material, iron and carbon based, the latter element being present mainly in the form of spheroidal graphite particles.

NOTE: Spheroidal graphite cast iron is also known as ductile iron.

### 3.2 graphite spheroidizing treatment

Treatment which brings the liquid iron into contact with a substance to produce graphite in the spheroidal form during solidification.

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## 4 Designation

The material shall be designated either by symbol or by number as given in tables 1 to 4.

## 5 Order information

The following information shall be supplied by the purchaser:

- a) the number of this European Standard (EN 1563);
- b) the designation of the material;
- c) any special requirements which have to be agreed by the time of acceptance of the order.

## 6 Manufacture

The method of manufacturing of spheroidal graphite cast iron as well as its chemical composition and any heat treatment, unless specified by the purchaser, shall be left to the discretion of the manufacturer.

All agreements between the manufacturer and the purchaser shall be made by the time of the acceptance of the order.

## 7 Requirements

### 7.1 Test pieces machined from separately cast samples

#### 7.1.1 General

The mechanical properties of spheroidal graphite cast iron shall be as specified in tables 1 and 2, and, if applicable, in accordance with the requirements given in 7.1.2.

#### 7.1.2 Impact test

The particular impact resistance values given in table 2 for room and low temperature applications, if applicable, shall only be determined if specified by the purchaser by the time of acceptance of the order.

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Table 1: Mechanical properties measured on test pieces machined from separately cast samples

Material designation		Tensile strength $R_m$ N/mm <sup>2</sup>	0,2% proof stress $R_{p0,2}$ N/mm <sup>2</sup>	Elongation $A$ %
Symbol	Number	min.	min.	min.
EN-GJS-350-22-LT <sup>1)</sup>	EN-JS1015	350	220	22
EN-GJS-350-22-RT <sup>2)</sup>	EN-JS1014	350	220	22
EN-GJS-350-22	EN-JS1010	350	220	22
EN-GJS-400-18-LT <sup>1)</sup>	EN-JS1025	400	240	18
EN-GJS-400-18-RT <sup>2)</sup>	EN-JS1024	400	250	18
EN-GJS-400-18	EN-JS1020	400	250	18
EN-GJS-400-15	EN-JS1030	400	250	15
EN-GJS-450-10	EN-JS1040	450	310	10
EN-GJS-500-7	EN-JS1050	500	320	7
EN-GJS-600-3	EN-JS1060	600	370	3
EN-GJS-700-2	EN-JS1070	700	420	2
EN-GJS-800-2	EN-JS1080	800	480	2
EN-GJS-900-2	EN-JS1090	900	600	2

<sup>1)</sup> LT for low temperature

<sup>2)</sup> RT for room temperature

NOTE 1: The values for these materials apply to castings cast in sand moulds of comparable thermal diffusivity. Subject to amendments to be agreed upon in the order, they can apply to castings obtained by alternative methods.

NOTE 2: Whatever the method used for obtaining the castings, the grades are based on the mechanical properties measured on test pieces taken from samples separately cast in a sand mould or a mould of comparable thermal diffusivity.

NOTE 3: 1 N/mm<sup>2</sup> is equivalent to 1 MPa.

NOTE 4: The material designation is in accordance with EN 1560.

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**Table 2: Minimum impact resistance values measured on V-notched test pieces machined from separately cast samples**

Material designation		Minimum impact resistance values in Joules					
		at room temperature (23 ± 5) °C		at (−20 ± 2) °C		at (−40 ± 2) °C	
Symbol	Number	mean value from 3 tests	individual value	mean value from 3 tests	individual value	mean value from 3 tests	individual value
EN-GJS-350-22-LT <sup>1)</sup>	EN-JS1015	–	–	–	–	12	9
EN-GJS-350-22-RT <sup>2)</sup>	EN-JS1014	17	14	–	–	–	–
EN-GJS-400-18-LT <sup>1)</sup>	EN-JS1025	–	–	12	9	–	–
EN-GJS-400-18-RT <sup>2)</sup>	EN-JS1024	14	11	–	–	–	–

<sup>1)</sup> LT for low temperature

<sup>2)</sup> RT for room temperature

NOTE 1: The values for these materials apply to castings cast in sand moulds of comparable thermal diffusivity. Subject to amendments to be agreed upon in the order, they can apply to castings obtained by alternative methods.

NOTE 2: Whatever the method used for obtaining the castings, the grades are based on the mechanical properties measured on test pieces taken from samples separately cast in a sand mould or a mould of comparable thermal diffusivity.

NOTE 3: The material designation is in accordance with EN 1560.

## 7.2 Test pieces machined from cast-on samples

### 7.2.1 General

The mechanical properties of spheroidal graphite cast iron test pieces shall be as specified in tables 3 and 4, and, if applicable, in accordance with the requirements given in 7.2.2.

### 7.2.2 Impact test

The particular impact resistance values given in table 4 for room and low temperature applications, if applicable, shall only be determined if specified by the purchaser by the time of acceptance of the order.

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Table 3: Mechanical properties measured on test pieces machined from cast-on samples

Material designation		Relevant wall thickness $t$ mm	Tensile strength $R_m$ N/mm <sup>2</sup> min.	0,2% proof stress $R_{p0,2}$ N/mm <sup>2</sup> min.	Elongation $A$ % min.
EN-GJS-350-22U-LT <sup>1)</sup>	EN-JS1019	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	350 330 320	220 210 200	22 18 15
EN-GJS-350-22U-RT <sup>2)</sup>	EN-JS1029	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	350 330 320	220 220 210	22 18 15
EN-GJS-350-22U	EN-JS1032	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	350 330 320	220 220 210	22 18 15
EN-GJS-400-18U-LT <sup>1)</sup>	EN-JS1049	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	400 390 370	240 230 220	18 15 12
EN-GJS-400-18U-RT <sup>2)</sup>	EN-JS1059	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	400 390 370	250 250 240	18 15 12
EN-GJS-400-18U	EN-JS1062	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	400 390 370	250 250 240	18 15 12
EN-GJS-400-15U	EN-JS1072	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	400 390 370	250 250 240	15 14 11
EN-GJS-450-10U	EN-JS1132	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	450 to be agreed between the manufacturer and the purchaser	310	10
EN-GJS-500-7U	EN-JS1082	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	500 450 420	320 300 290	7 7 5
EN-GJS-600-3U	EN-JS1092	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	600 600 550	370 360 340	3 2 1
EN-GJS-700-2U	EN-JS1102	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	700 700 660	420 400 380	2 2 1
EN-GJS-800-2U	EN-JS1112	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	800 to be agreed between the manufacturer and the purchaser	480	2
EN-GJS-900-2U	EN-JS1122	$t \leq 30$ $30 < t \leq 60$ $60 < t \leq 200$	900 to be agreed between the manufacturer and the purchaser	600	2

<sup>1)</sup> LT for the low temperature

<sup>2)</sup> RT for room temperature

NOTE 1: The properties of a cast-on test piece cannot reflect exactly the properties of the casting itself, but can be a better approximation than those obtained on a separately cast sample. Further values are given in annex D for guidance.

NOTE 2: 1 N/mm<sup>2</sup> is equivalent to 1 MPa.

NOTE 3: The material designation is in accordance with EN 1560.