

Founding — Spheroidal graphite cast irons

The European Standard EN 1563:1997, with the incorporation of amendments A1:2002 and A2:2005 has the status of a British Standard

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National foreword

This British Standard is the English language version of EN 1563:1997, including amendments A1:2002 and A2:2005. It supersedes BS 2789:1985, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee ISE/35, Cast iron, which has the responsibility to:

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English version

Founding— Spheroidal graphite cast irons

(includes amendment A1:2002)

Fonderie —
Fonte à graphite sphéroïdal
(inclut l'amendement A1:2002)

Gießereiwesen —
Gußeisen mit Kugelgraphit
(enthält Änderung A1:2002)

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CEN

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

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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of an identical text or by endorsement, at the latest by December 1997, and conflicting national standards shall be withdrawn at the latest by December 1997.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*.

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Foreword to amendment A1

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Foreword to amendment A2

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This Amendment to the European Standard EN 1563:1997 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2006, and conflicting national standards shall be withdrawn at the latest by January 2006.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of a EU Directive.

For relationship with the EU Directive, see informative Annex ZA, which is an integral part of this European Standard.

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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.

A₂ Spheroidal graphite cast iron can be used for pressure equipment, e.g. for:

- compressor housings;
- industrial valves (bodies, bonnets, covers), check valves, building valves, diaphragm valves, pressure relief valves, valves for chemical and petrochemical process industries;
- shell boilers.

The suitable material grades for pressure applications and the conditions for their use are given in specific product or application standards.

For the design of pressure equipment, specific design rules apply. **A₂**

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.*

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)

EN 10204, *Metallic products — Types of inspection documents* 

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

4 Designation

The material shall be designated either by symbol or by number as given in Table 1, Table 2, Table 3 and Table 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 Table 1 and Table 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.

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 Table 3 and Table 4, and, if applicable, in accordance with the requirements given in 7.2.2.

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

Material designation		Tensile strength R_m N/mm ² min.	0,2 % proof stress $R_{p0,2}$ N/mm ² min.	Elongation A % min.
Symbol	Number			
EN-GJS-350-22-LT ^a	EN-JS1015	350	220	22
EN-GJS-350-22-RT ^b	EN-JS1014	350	220	22
EN-GJS-350-22	EN-JS1010	350	220	22
EN-GJS-400-18-LT ^a	EN-JS1025	400	240	18
EN-GJS-400-18-RT ^b	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

^a LT for low temperature.
^b 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/mm² is equivalent to 1 MPa.

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

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

Material designation		Minimum impact resistance values (in J)					
Symbol	Number	At room temperature (23 ± 5) °C		At (−20 ± 2) °C		At (−40 ± 2) °C	
		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 ^a	EN-JS1015	—	—	—	—	12	9
EN-GJS-350-22-RT ^b	EN-JS1014	17	14	—	—	—	—
EN-GJS-400-18-LT ^a	EN-JS1025	—	—	12	9	—	—
EN-GJS-400-18-RT ^b	EN-JS1024	14	11	—	—	—	—

^a LT for low temperature.
^b 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.