INTERNATIONAL STANDARD

ISO 1083

Fourth edition
2018-04

Spheroidal graphite cast irons — Classification

Fontes à graphite sphéroïdal — Classification

Reference number
ISO 1083:2018(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 25, *Cast irons and pig irons*.

This fourth edition cancels and replaces the third edition (ISO 1083:2004), which has been technically revised with the following changes:

— solid-solution strengthened ferritic spheroidal graphite cast irons grades have been added;

— side-by-side cast samples have been added;

— several definitions have been added;

— the relation between mechanical properties and wall thickness has been added;

— figures for separately cast or side-by-side cast samples have been updated;

— the tensile test piece figure has been updated and the Charpy V-notched impact test piece figure has been removed;

— Annex A has been partially reworded;

— Annex C has been entirely reworded;

— Annex D has been developed;

— Annex E has become informative;

— Annex G has been developed;

— Annex H has been added.

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Introduction

The properties of spheroidal graphite cast irons depend on their structure.

Spheroidal graphite cast irons covered by this document are divided into two groups:

a) ferritic to pearlitic spheroidal graphite cast irons;

b) solid-solution strengthened ferritic spheroidal graphite cast irons.

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

— separately cast samples;

— side-by-side cast samples;

— cast-on samples;

— samples cut from a casting.

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

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

It is well known that tensile properties and hardness of spheroidal graphite cast irons are interrelated. When considered by the purchaser as being important for the application, both tensile and hardness properties may be specified.

Some material grades can be suitable for pressure applications.

Further technical data on spheroidal graphite cast irons is given in Annexes C and G.

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Spheroidal graphite cast irons — Classification

1 Scope

This document defines the grades and the corresponding requirements for spheroidal graphite cast irons.

This document specifies two groups of spheroidal graphite cast iron grades by a classification based on mechanical properties measured on machined test pieces prepared from cast samples. The first group deals mainly with ferritic to pearlitic grades. The second group deals with solid-solution strengthened ferritic grades.

This document also gives an informative classification as a function of hardness.

This document does not apply to the following:

— spheroidal graphite cast irons used for pipes, fittings and accessories which are specified in accordance with ISO 2531 and ISO 7186;

— highly alloyed (austenitic) spheroidal cast irons which are specified in accordance with ISO 2892;

— ausferritic cast irons which are specified in accordance with ISO 17804.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 945-1, *Microstructure of cast irons — Part 1: Graphite classification by visual analysis*

ISO 6506-1, *Metallic materials — Brinell hardness test — Part 1: Test method*

ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO/TR 15931, *Designation system for cast irons and pig irons*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
spheroidal graphite cast iron
cast material, iron, carbon and silicon-based, the carbon being present mainly in the form of spheroidal graphite particles

Note 1 to entry: Spheroidal graphite cast iron is also known as ductile iron, and less commonly as nodular iron.

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3.2
ferritic to pearlitic spheroidal graphite cast iron
spheroidal graphite cast iron (3.1) with a matrix containing ferrite or pearlite or a combination of both

Note 1 to entry: Pearlite can be partially or totally replaced by quenched microstructures in grades having higher strength.

3.3
solid-solution strengthened ferritic spheroidal graphite cast iron
spheroidal graphite cast iron (3.1) with a matrix mainly consisting of ferrite, solution strengthened by increasing the amount of silicon compared to *ferritic to pearlitic spheroidal graphite cast iron* (3.2)

3.4
graphite spheroidizing treatment
process that brings the liquid iron into contact with a substance to produce graphite in the predominantly spheroidal (nodular) form during solidification

Note 1 to entry: This process is often followed by a second process called inoculation.

3.5
cast sample
quantity of material cast to represent the cast material, including *separately cast sample* (3.6), *side-by-side cast sample* (3.7) and *cast-on sample* (3.8)

3.6
separately cast sample
sample cast in a separate sand mould under representative manufacturing conditions and material grade

3.7
side-by-side cast sample
sample cast in the mould alongside the casting, with a joint running system

3.8
cast-on sample
sample attached directly to the casting

3.9
sample cut from a casting
sample obtained directly from the casting

3.10
relevant wall thickness
section of the casting, agreed between the manufacturer and the purchaser, to which the determined mechanical properties shall apply

3.11
test unit
number of pieces or the tonnage of castings to be accepted or rejected together, on the basis of the tests carried out on test pieces in accordance with the requirements of the relevant specification, material standard or order

Note 1 to entry: This term is sometimes referred to as “inspection lot” or “test batch”.

[SOURCE: EN 1559-1:2011, 3.12]

4 Designation

The material shall be designated in accordance with ISO/TR 15931. The relevant designations are given in Tables 1 to 3.

NOTE Further information on designation is given in Annex I.

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