SLOVENSKI STANDARD
SIST EN 16482:2014

01-september-2014

Livarstvo - Palice iz litega železa

Founding - Continuous cast iron bars

Gießereiwesen - Gusseisen-Strangguss

Fonderie - Barres de fonte par coulée continue

Ta slovenski standard je istoveten z: **EN 16482:2014**

ICS:

77.140.80	Železni in jekleni ulitki	Iron and steel castings

SIST EN 16482:2014 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16482

June 2014

ICS 77.080.10

English Version

Founding - Continuous cast iron bars

Fonderie - Barres de fonte par coulée continue

Gießereiwesen - Gusseisen-Strangguss

This European Standard was approved by CEN on 28 February 2014.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword

This document (EN 16482:2014) 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of an identical text or by endorsement, at the latest by December 2014 and conflicting national standards shall be withdrawn at the latest by December 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 7 “Spheroidal graphite, silicon molybdenum and ausferritic cast iron” to prepare the following standard:

EN 16482, *Founding — Continuous cast iron bars*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The European Standards EN 1561 [4] and EN 1563 [5] classify grey cast irons and spheroidal graphite cast irons respectively, which are cast in sand moulds or moulds of comparable thermal behaviour.

This European Standard classifies grey cast iron and spheroidal graphite cast iron bars, which are produced by the continuous casting process.

Due to the high cooling rate during solidification and further cooling, both graphite and matrix structure differ from those obtained by sand casting and consequently the mechanical properties in relation to section thickness [8], [9].

The mechanical properties of continuous cast iron bars are evaluated on machined test pieces prepared from samples cut from the bars.

However, for many applications tensile strength or hardness are not the only interesting or determining properties. Other mechanical or physical properties can be decisive for the use of grey cast iron or spheroidal graphite cast iron, for example: thermal capacity, thermal diffusivity, damping capacity, thermo-cycle fatigue and toughness.

Additional technical data for grey cast irons is given in EN 1561 and for spheroidal graphite cast irons in EN 1563 and Annex D of this European Standard.

1 Scope

This European Standard defines the grades of grey cast iron and spheroidal graphite cast iron bars, which have been produced by the continuous casting process.

This European Standard specifies the characterizing properties of grey cast iron bars by either:

a) the tensile strength measured on machined test pieces prepared from samples cut from the bars, or

b) the hardness measured on the bars.

If agreed by the manufacturer and the purchaser, the combination of both tensile strength from option a) and hardness from option b) may be specified.

This European Standard specifies the characterizing properties of spheroidal graphite cast iron bars by the tensile strength measured on machined test pieces prepared from samples cut from the bars.

This European Standard specifies 4 grades of grey cast iron and 14 grades of spheroidal graphite cast iron by a classification based on tensile strength and 4 grades of grey cast iron by a classification based on Brinell hardness.

This European Standard specifies also the straightness of the bars.

This European Standard does not cover technical delivery conditions for iron castings (see EN 1559-1 [1] and EN 1559-3 [2]).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

EN ISO 6506-1, *Metallic materials - Brinell hardness test - Part 1: Test method (ISO 6506-1)*

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

3 Terms and definitions

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

3.1
grey cast iron
cast material, mainly iron and carbon based, carbon being present mainly in the form of flake (lamellar) graphite particles

Note 1 to entry: Grey cast iron is also known as flake graphite cast iron, and less commonly as lamellar graphite cast iron.

[SOURCE: EN 1561:2011, 3.1]

3.2
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.

[SOURCE: EN 1563:2011, 3.1]

3.3
ferritic to pearlitic cast irons
grey cast iron and spheroidal graphite cast iron with a matrix containing ferrite or pearlite or a combination of both

3.4
solid-solution strengthened ferritic spheroidal graphite cast iron
spheroidal graphite cast iron with a matrix mainly consisting of ferrite, solution strengthened mainly by silicon

3.5
graphite spheroidizing treatment
operation 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 operation is often followed by a second one called inoculation.

[SOURCE: EN 1563:2011, 3.4]

3.6
sample
quantity of material cut from the continuous cast bar to represent the cast material

4 Designation

The material shall be designated in accordance with Table 1, Table 2, or Table 3.

NOTE The designation system is specified in EN 1560 [3].

5 Order information

The following information shall be supplied by the purchaser:

a) the number of this European Standard;

b) the designation of the material;

c) the dimensions of the bar;

d) any special requirements.

All requirements shall be agreed between the manufacturer and the purchaser by the time of acceptance of the order, e.g. technical delivery conditions according to EN 1559-1 and EN 1559-3.

6 Manufacture

The methods of producing grey cast iron and spheroidal graphite cast iron continuous cast bars and their chemical compositions shall be left to the discretion of the manufacturer who shall ensure that the requirements of this European Standard are met for the material grade specified in the order.

For the cast irons to be used in special applications, the chemical composition and the heat treatment may be the subject of an agreement between the manufacturer and the purchaser.

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

7 Requirements

7.1 Characterizing properties

The order shall specify in an unambiguous manner whether the tensile strength measured on a test piece machined from samples cut from the continuous cast bars or the Brinell hardness measured on the bars is the characterizing property. If it does not do so, then the manufacturer shall characterize the material according to tensile strength.

7.2 Tensile properties

7.2.1 General

The property values apply to grey cast iron and spheroidal graphite cast iron bars produced by the continuous casting process.

Tensile properties are dependant of the bar diameter as shown in Table 1 and Table 2.

For rectangular bars, the corresponding diameter D for the determination of the minimum tensile properties shall be calculated with Formula (1):

$$D = \frac{2 \times (H \times B)}{(H + B)} \quad (1)$$

where

D is the corresponding bar diameter in millimetres (mm);

H is the height of the bar in millimetres (mm);

B is the width of the bar in millimetres (mm).

NOTE Tensile testing requires sound test pieces in order to guarantee pure uni-axial stress during the test.

For bar diameters > 400 mm, the minimum tensile properties to be obtained shall be agreed between the manufacturer and the purchaser by the time of acceptance of the order.

7.2.2 Test pieces machined from samples cut from the bar

The tensile properties, when measured in accordance with 9.1 using test pieces machined from samples cut from the bar, shall be in accordance with the requirements of Table 1 for grey cast irons or Table 2 for spheroidal graphite cast irons.

Table 1 — Tensile properties of continuous cast grey cast iron bars

Material designation		Bar diameter	Tensile strength	Matrix structure
Symbol	Number	D mm	R_m MPa min.	(for information only)
EN-GJL-150C	5.1102	20 < D ≤ 50	110	ferritic, annealed
		50 < D ≤ 100	100	
		100 < D ≤ 200	90	
		200 < D ≤ 400	80	
EN-GJL-200C	5.1202	20 < D ≤ 50	155	ferritic-pearlitic
		50 < D ≤ 100	140	
		100 < D ≤ 200	125	
		200 < D ≤ 400	115	
EN-GJL-250C	5.1203	20 < D ≤ 50	195	pearlitic-ferritic
		50 < D ≤ 100	180	
		100 < D ≤ 200	165	
		200 < D ≤ 400	155	
EN-GJL-300C	5.1308	20 < D ≤ 50	220	predominantly pearlitic
		50 < D ≤ 100	205	
		100 < D ≤ 200	195	
		200 < D ≤ 400	185	

Table 2 — Tensile properties of continuous cast spheroidal graphite cast iron bars

Material designation		Bar diameter	0,2 % proof strength	Tensile strength	Elongation after fracture	Matrix structure
		D	$R_{p0,2}$	R_m	A	
		mm	MPa	MPa	%	
Symbol	Number		min.	min.	min.	
EN-GJS-350-22C-LT	5.3120	$20 < D \leq 60$	220	350	22	ferritic
		$60 < D \leq 120$	210	330	18	
		$120 < D \leq 400$	200	320	15	
EN-GJS-350-22C-RT	5.3121	$20 < D \leq 60$	220	350	22	ferritic
		$60 < D \leq 120$	220	330	18	
		$120 < D \leq 400$	210	320	15	
EN-GJS-350-22C	5.3122	$20 < D \leq 60$	220	350	22	ferritic
		$60 < D \leq 120$	220	330	18	
		$120 < D \leq 400$	210	320	15	
EN-GJS-400-18C-LT	5.3123	$20 < D \leq 60$	240	400	18	ferritic
		$60 < D \leq 120$	230	380	15	
		$120 < D \leq 400$	220	360	12	
EN-GJS-400-18C-RT	5.3124	$20 < D \leq 60$	250	400	18	ferritic
		$60 < D \leq 120$	250	390	15	
		$120 < D \leq 400$	240	370	12	
EN-GJS-400-18C	5.3125	$20 < D \leq 60$	250	400	18	ferritic
		$60 < D \leq 120$	250	390	15	
		$120 < D \leq 400$	240	370	12	
EN-GJS-400-15C [a]	5.3126	$20 < D \leq 60$	250	400	15	ferritic
		$60 < D \leq 120$	250	390	14	
		$120 < D \leq 400$	240	370	11	
EN-GJS-400-7C [a]	5.3202	$20 < D \leq 60$	250	400	7	ferritic-pearlitic
		$60 < D \leq 120$	250	390	7	
		$120 < D \leq 400$	240	370	11	
EN-GJS-450-18C [b]	5.3127	$20 < D \leq 60$	350	450	18	ferritic
		$60 < D \leq 120$	340	430	14	
		$120 < D \leq 400$	to be agreed upon between the manufacturer and purchaser			
EN-GJS-450-10C [a]	5.3128	$20 < D \leq 60$	310	450	10	predominantly ferritic
		$60 < D \leq 120$	to be agreed upon between the manufacturer and purchaser			
		$120 < D \leq 400$				
EN-GJS-500-14C [b]	5.3129	$20 < D \leq 60$	400	500	14	ferritic
		$60 < D \leq 120$	390	480	12	
		$120 < D \leq 400$	360	470	10	
EN-GJS-500-7C [a]	5.3203	$20 < D \leq 60$	320	500	7	ferritic-pearlitic
		$60 < D \leq 120$	300	450	7	
		$120 < D \leq 400$	290	420	5	
EN-GJS-600-3C [a]	5.3204	$20 < D \leq 60$	370	600	3	pearlitic-ferritic
		$60 < D \leq 120$	360	600	2	
		$120 < D \leq 400$	340	550	1	
EN-GJS-700-2C [a]	5.3303	$20 < D \leq 60$	420	700	2	predominantly pearlitic
		$60 < D \leq 120$	400	700	2	
		$120 < D \leq 400$	380	650	1	

[a] Depending on the process, these materials may contain minor quantities of free carbides.

[b] Solid-solution strengthened ferritic spheroidal graphite cast iron.