SLOVENSKI STANDARD
SIST EN 12513:2001

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Livarstvo - Lito železo, odporno proti obrabi

Founding - Abrasion resistant cast irons

Gießereiwesen - Verschleißbeständige Gusseisen

Fonderie - Fontes résistant a l'usure par abrasion

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77.080.10 Železo Irons

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English version

Founding - Abrasion resistant cast irons

Fonderie - Fontes résistant à l'usure par abrasion

Gießereiwesen - Verschleißbeständige Gusseisen

This European Standard was approved by CEN on 15 September 2000.

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.

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 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.

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

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

Contents

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of an identical text or by endorsement, at the latest by April 2001, and conflicting national standards shall be withdrawn at the latest by April 2001.

Within its programme of work, Technical Committee CEN/TC 190 requested CEN/TC 190/WG 2.40 "Wear resistant and abrasion resistant cast iron" to prepare the following standard:

EN 12513
Founding – Abrasion resistant cast irons

The annexes A, B and C are informative.

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.

Introduction

This European Standard deals with the classification of abrasion resistant white cast irons in accordance with their chemical composition and hardness. Such cast irons are widely used in the mining, earth moving, milling and manufacturing industries where high resistance to abrading minerals and other abrading solids is required.

The abrasion resistance of these cast irons depends on them having the appropriate structure and hardness for the application. The required structure and hardness of abrasion resistant cast irons are developed by selecting an appropriate composition and processing route.

1 Scope

This European Standard defines the grades of abrasion resistant white cast irons. It specifies the grades in terms of:

– chemical composition;

– hardness.

The types of abrasion resistant white cast irons covered by this standard are:

a) unalloyed or low alloy cast irons;

b) nickel-chromium cast irons covering two general types:

– 4 % Ni 2 % Cr cast irons;
– 9 % Cr 5 % Ni cast irons;

c) high chromium cast irons covering four ranges of chromium content:

– 11 % < Cr ≤ 14 %;
– 14 % < Cr ≤ 18 %;
– 18 % < Cr ≤ 23 %;
– 23 % < Cr ≤ 28 %;

and for each chromium content range, three ranges of carbon content.

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 (including amendments).

EN 1559-1
Founding – Technical conditions of delivery – Part 1: General

EN ISO 6507-1
Metallic materials – Vickers hardness test – Part 1: Test method (ISO 6507-1:1997)

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.

3 Terms and definitions

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

3.1 unalloyed or low alloy abrasion resistant cast iron

Cast iron having a structure which consists of eutectic iron carbides in a predominantly pearlitic matrix.

3.2 nickel-chromium abrasion resistant cast iron

Cast iron having a structure consisting of either

– eutectic carbides M_3C type (M = Fe, Cr) in a matrix which consists mainly of martensite and possibly some bainite, together with some retained austenite, referred to as 4 % Ni 2 % Cr cast irons,

or

– M_7C_3 and M_3C complex carbides in a matrix which consists mainly of martensite, possibly some bainite, together with some retained austenite, referred to as 9 % Cr 5 % Ni cast irons.

NOTE: All these grades are free from pearlite.

3.3 high chromium abrasion resistant cast iron

Cast iron having a structure consisting of complex carbides in a matrix which, in the hardened condition, is predominantly martensitic but which can also contain some austenite or other transformation products of austenite.

4 Designation

The material shall be designated either by symbol or by number (see tables 1 to 3).

5 Order information

The following information shall be supplied by the purchaser:

a) the number of this European Standard (EN 12513);

b) the designation of the material;

c) any special requirements which have to be agreed by the time of the acceptance of the order (see EN 1559-1 and EN 1559-3).

6 Manufacture

6.1 General

Unless otherwise specified by the purchaser, the method of manufacturing of abrasion resistant cast irons shall be left to the discretion of the manufacturer.

Any agreement between the manufacturer and the purchaser shall be made by the time of the acceptance of the order.

6.2 Heat treatment

Unless otherwise specified by the purchaser, the manufacturer shall supply castings in the condition which he considers to be suitable for the type of casting and the material grade specified.

When it is required to machine castings produced in the high chromium cast iron grades, they shall be ordered in the soft annealed condition. When the purchaser specifies delivery in the soft annealed condition, the subsequent hardening and tempering shall be the responsibility of the purchaser.

NOTE 1: Castings can be supplied in one of the following conditions:

- as-cast;
- as-cast and tempered;
- hardened;
- hardened and tempered;
- soft annealed;
- soft annealed and hardened;
- soft annealed, hardened and tempered.

NOTE 2: Annex A gives guidance on the types of heat treatment which can be used to obtain the required hardness, structure and properties.

7 Requirements

7.1 Chemical composition

The chemical composition of individual material grades shall be as given in tables 1, 2 or 3.

7.2 Vickers hardness

The Vickers hardness for the individual material grades shall be as given in tables 1, 2 or 3.

8 Sampling

8.1 Frequency of sampling for chemical analysis

Samples representative of the material shall be produced at a frequency in accordance with the in-process quality assurance procedures used by the manufacturer.

8.2 Number and frequency of Vickers hardness tests

Unless otherwise specified by the purchaser by the time of acceptance of the order, the number and frequency of Vickers hardness tests shall be in accordance with the in-process quality assurance procedures used by the manufacturer.

9 Test methods

9.1 Chemical composition

Analysis shall be carried out on a test piece made from the same melt as the castings the sample represents.

NOTE: Spectrographic, X-ray or wet chemical laboratory techniques are acceptable methods of analysis.

9.2 Hardness test

9.2.1 The Vickers hardness test shall be carried out in accordance with EN ISO 6507-1.

NOTE: Hardness determined by one test method is not necessarily comparable to hardness determined by other test methods. Hardness conversion from other test methods can be done by agreement between the manufacturer and the purchaser. Conversions between Vickers, Rockwell C and Brinell hardness considered to be applicable to abrasion resistant cast irons are given in annex B, for guidance only.

9.2.2 Each Vickers hardness test shall be carried out on a casting at locations agreed by the manufacturer and purchaser, or on a test block cast-on to the casting itself.

Unless otherwise specified by the purchaser, the dimensions and location of the cast-on block shall be left to the discretion of the manufacturer.

NOTE: A cast-on test block can be used when the size of the casting or the number of castings to be tested makes direct testing on the castings impracticable.

9.2.3 If the test is to be carried out on a cast-on block the latter shall not be removed until after any required heat treatment has been carried out.

9.2.4 When castings are too large or too difficult to be tested in a conventional hardness testing machine or when there is need for on-line inspection of a large number of castings, a portable hardness testing device may be used. When using portable hardness testing devices, reference shall be made to appropriately calibrated test blocks.

10 Retests

If applicable, retests shall be made in accordance with EN 1559-1.