SLOVENSKI STANDARD
SIST EN 1402-3:2004

01-maj-2004

Nadomeġļa:
SIST ENV 1402-3:2000

Neoblikovani ognjevzdržni izdelki - 3. del: Pripravljeni neoblikovani izdelki

Unshaped refractory products - Part 3: Characterization as received

Ungeformte feuerfeste Erzeugnisse - Teil 3: Prüfung im Anlieferungszustand

Produits réfractaires non façonnés - Partie 3: Caractérisation a l'état de réception

Ta slovenski standard je istoveten z: EN 1402-3:2003

ICS:

81.080 Ognjevzdržni materiali Refractories

SIST EN 1402-3:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1402-3

October 2003

ICS 81.080

Supersedes ENV 1402-3:1998

English version

Unshaped refractory products - Part 3: Characterization as received

Produits réfractaires non façonnés - Partie 3: Caractérisation à l'état de réception

Ungeformte feuerfeste Erzeugnisse - Teil 3: Prüfung im Anlieferungszustand

This European Standard was approved by CEN on 20 June 2003.

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 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 Management Centre 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1402-3:2003 E

Contents

Foreword

This document (EN 1402-3:2003) has been prepared by Technical Committee CEN/TC 187 "Refractory products and materials", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2004 and conflicting national standards shall be withdrawn at the latest by April 2004.

This document supersedes ENV 1402-3:1998.

EN 1402 "*Unshaped refractory products*" consists of eight parts:

— *Part 1: Introduction and classification*

— *Part 2: Sampling for testing*

— *Part 3: Characterization as received*

— *Part 4: Consistency testing*

— *Part 5: Preparation and treatment of test pieces*

— *Part 6: Measurement of physical properties*

— *Part 7: Tests on pre-formed shapes*

— *Part 8: Determination of complementary properties*

Annex A is 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This part of this European Standard specifies the methods for the characterization of unshaped refractory materials as received and for checking the homogeneity of a delivery of a product. It is applicable to castables (dense and insulating), gunning materials and ramming materials, as defined in EN 1402-1.

NOTE A check list of appropriate tests is given in annex A.

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 955-2, *Chemical analysis of refractory products - Part 2 Products containing silica and/or alumina (wet method).*

prEN 955-3, *Chemical analysis of refractory products - Part 3: Chrome-bearing materials (wet methods).*

ENV 955-4, *Chemical analysis of refractory products - Part 4: Products containing silica and/or alumina* [Analysis by Flame Atomic Absorption Spectrometry (FAAS) and Inductively Coupled Plasma Atomic Emission Spectrography (ICP)].

EN 993-3, *Methods of test for dense shaped refractory products - Part 3 Tests methods for carbon-containing refractories.*

EN 1402-1, *Unshaped refractory products - Part 1: Introduction and classification.*

EN 1402-2, *Unshaped refractory products - Part 2: Sampling for testing.*

EN ISO 10058, *Magnesites and dolomites - Chemical analysis (ISO 10058:1992).*

EN ISO 12677, *Chemical analysis of refractory products by XRF - Fused cast bead method (ISO 12677:2003).*

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings.*

3 Principle

Unshaped refractory products are characterized by making the following determinations:

a) chemical composition;

b) grain size distribution by means of sieve analysis;

c) moisture content of ramming materials;

d) workability index of wet ramming materials.

It is not necessary to carry out all of these determinations to characterize a material.

4 Sampling

Take samples in accordance with the guidance given in EN 1402-2 and prepare the quantities required by each individual determination.

5 Determination of chemical composition

5.1 Preparation of test sample

For ramming materials supplied wet, dry the samples (see clause 4) in accordance with 6.5.1. For all samples, reduce the amount by coning and quartering and grind to the particle size required for chemical analysis.

NOTE The methods of chemical analysis used include the determination of loss on ignition.

5.2 Alumina-silica products

Determine the chemical composition either in accordance with EN 955-2 (wet methods), EN ISO 12677 (X-ray fluorescence (XRF) analysis) or ENV 955-4 (Analysis by Flame Atomic Absorption Spectrometry (FAAS) and Inductively Coupled Plasma Emission Spectrometry (ICP)).

NOTE For products containing chrome, prEN 955-3 can be used in place of EN 955-2.

Report the method used.

5.3 Basic products

Determine the chemical composition in accordance with EN ISO 10058 (wet methods), prEN 955-3 for products containing chrome or EN ISO 12677 (XRF analysis).

Report the method used.

5.4 Special products

As no standard is currently available for the determination of materials other than the alumina-silica or basic series, the chemical composition shall be determined according to methods agreed between the parties.

The methods used shall be indicated in the test report.

NOTE Methods for the analysis of silicon carbide refractories are in course of preparation.

5.5 Carbon-containing products

Carry out the elemental analysis of the oxide constituents on the calcined product, in accordance with either 5.2 or 5.3. Determine the total carbon and the residual carbon in accordance with EN 993-3.

NOTE Any other non-oxide constituents should be analyzed in accordance with the guidance in 5.4.

6 Determination of grain size distribution

6.1 Principle

The grain size distribution is measured by determining the amount of material retained on the range of sieves and is expressed as a percentage of the total initial dry mass of material.

6.2 Apparatus

6.2.1 Balance, capable of reading to the nearest 0,1 g.

6.2.2 Sieves, conforming to the requirements of ISO 565 and having a diameter of 200 mm or greater.

6.2.3 Sieving apparatus. The working characteristics of the apparatus shall be indicated (e.g. vibration characteristics, amplitude and frequency).

6.2.4 Drying oven, preferably with exhaust.

6.2.5 Soxhlet apparatus

6.2.6 Electric hot plate or heating mantle

6.3 Quantity of sample

Take the following quantities of sample, from that obtained in clause 4, for a single test, selecting in accordance with the maximum size of grains:

a) maximum size up to 2 mm: 100 g;

b) maximum size up to 6 mm: 250 g;

c) maximum size up to 10 mm: 500 g;

d) maximum size above 10 mm: 1 000 g

expressed in terms of dry material.

These quantities are related to dense materials. When testing insulating materials the sample quantity may be reduced according to the bulk density without any reduction of the test accuracy. The reduced quantity shall be given in the test report.

6.4 Preparation of test samples

Reduce the sample in accordance with EN 1402-2, taking care to avoid any fragmentation, to produce the required number of test portions, each of which complies with the minimum mass given in 6.3.

In the case of ramming materials containing oil or tar submit the sample to the following preliminary treatment, taking sufficient sample to enable reduction to be carried out after the pre-treatment.

Warm the sample in an evaporating dish and break it down with a spatula, taking care not to crush any of the grains. Place the sample in filter thimbles in one or more Soxhlets. Carry out the extraction with boiling toluene, an electric hotplate or a heating mantle being used as a means of heating. The extraction is complete when the toluene siphoned over is colourless.

6.5 Procedure

6.5.1 Drying and measurement of dry sample mass

Samples of castables, gunning materials, dry mixes and ramming materials, following the removal of oil or tar shall be dried at (110 ± 5) °C to constant mass and cooled to ambient temperature.

Weigh the test sample to the nearest 0,1 g and record the mass as m_1.

Ramming materials containing fine particles and non-organic liquid are not dried before sieving in order to avoid hardening and difficult dispersion (see 6.5.2.3). A separate sample is used to determine the moisture content of the material using the method given in clause 7. Calculate the mass of dry material contained in the test sample for sieving, m_1, using the equation:

$$m_1 = m_0 - \left(\frac{m_c \cdot m_0}{100} \right)$$

where

m_0 is the mass of the test sample as received i.e. prior to any drying, in grams;

m_1 is the mass of the test sample, in grams;

m_c is the moisture content determined using a separate sample, in percent.

6.5.2 Sieving

6.5.2.1 General

Two methods may be used for sieving using sieves conforming to the requirements of ISO 565 and taken from the following range:

0,063 mm

0,125 mm

0,25 mm

0,5 mm

1,0 mm

2,0 mm

4,0 mm

8,0 mm

16,0 mm

6.5.2.2 Direct dry sieving

This is a quick method and should be used only for materials containing few particles of size less than 10 μm. The test sample, prepared and weighed in accordance with 6.5.1 is sieved using the selected sieves, a receiver and an appropriate efficient sieve shaker. The total time of sieving shall not exceed 15 min. 'Weigh the material remaining on each sieve and record the masses as m_n where n is the mesh size of the sieve.

6.5.2.3 Dry sieving after washing

This method may be used for all materials and is the preferred method for quality control and referee purposes; it is the essential method for samples of wet ramming materials containing fine particles and non-organic liquid which have not been dried prior to sieving (see 6.5.1).

The sample, prepared in accordance with 6.5.1, shall be washed on a fine sieve, of aperture 0,063 mm or 0,125 mm. Use a shower for diluting and washing the mass. Hand sieve the material under the water flow, using a to and fro movement. Stop washing as soon as the water passing through the sieve does not carry fine particles and becomes translucent.