SLOVENSKI STANDARD
SIST EN 1402-6:2004

01-maj-2004

Nadomeġļa:
SIST ENV 1402-6:1998

Neoblikovani ognjevzdržni izdelki - 6. del: Merjenje fizikalnih lastnosti

Unshaped refractory products - Part 6: Measurement of physical properties

Ungeformte feuerfeste Erzeugnisse - Teil 6: Bestimmung der physikalischen Eigenschaften

Produits réfractaires non-façonnés - Partie 6: Détermination des propriétés physiques

Ta slovenski standard je istoveten z: EN 1402-6:2003

ICS:

81.080	Ognjevzdržni materiali	Refractories

SIST EN 1402-6:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1402-6

October 2003

ICS 81.080

Supersedes ENV 1402-6:1998

English version

Unshaped refractory products - Part 6: Measurement of physical properties

Produits réfractaires non-façonnés - Partie 6: Détermination des propriétés physiques

Ungeformte feuerfeste Erzeugnisse - Teil 6: Bestimmung der physikalischen Eigenschaften

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 1402-6:2003 E

Contents

Foreword

This document (EN 1402-6:2003) 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of an identical text or by endorsement, at the latest by April 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.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 1402-6:1998.

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: Determination of consistency of castables*

— *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*

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 methods for the determination of properties of unshaped materials from test pieces prepared and stored according to EN 1402-5.

The methods are applicable to dense and insulating castables and to ramming materials (including plastics) as defined in EN 1402-1 before and after firing.

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 993-1, *Methods of test for dense shaped refractory products - Part 1: Determination of bulk density, apparent porosity and true porosity*.

EN 993-2, *Methods of test for dense shaped refractory products - Part 2: Determination of true density.*

EN 993-5, *Methods of test for dense shaped refractory products - Part 5: Determination of cold crushing strength.*

EN 993-6, *Methods of test for dense shaped refractory products - Part 6: Determination of modulus of rupture at ambient temperature.*

EN 993-7, *Methods of test for dense shaped refractory products - Part 7: Determination of modulus of rupture at elevated temperatures.*

EN 993-8, *Methods of test for dense shaped refractory products - Part 8: Determination of refractoriness-under-load.*

EN 993-9, *Methods of test for dense shaped refractory products - Part 9: Determination of creep in compression.*

EN 1094-5, *Insulating refractory products - Part 5: Determination of cold crushing strength.*

EN 1402-5, *Unshaped refractory products - Part 5: Preparation and treatment of test pieces.*

3 Determination of geometric bulk density

3.1 Principle

This determination is carried out according to a geometric method. It can be applied to green, dried or fired test pieces. The condition of the test pieces shall be stated in the test report.

3.2 Test pieces

The test piece shape shall be one of the following:

— shape A: Length: 230 mm; width: 114 mm; thickness: 64 mm, or

— shape B: Length: 230 mm; width: 64 mm; thickness: 54 mm, or

— shape C: Length: 230 mm; width: 64 mm; thickness: 64 mm

The test pieces shall be prepared and stored according to the relevant sections of EN 1402-5.

NOTE For basic castables and ramming materials, as an alternative to these shapes, cylindrical test pieces, of diameter 50 mm ± 1 mm and height 50 mm ± 1 mm can be used.

Three test pieces produced at the same time shall be tested.

3.3 Apparatus

3.3.1 Balance, capable of measuring mass to the accuracy specified in 3.4.1.

3.3.2 Callipers, capable of measuring to the accuracy specified in 3.4.2.

3.4 Procedure

3.4.1 Determination of the mass m of the test piece

For the test pieces of shape A, B and C, determine the mass to the nearest 1 g.

For 50 mm cylinders, measure the mass to an accuracy of ± 0,1 g.

3.4.2 Determination of the volume, V, of the test piece

Determine the volume of the test piece by carrying out four measurements of each dimension along the centre line of each face:

— for rectangular test pieces, on length, width and thickness;

— for cylindrical test pieces, on height and diameter.

All measurements shall be made to an accuracy of ± 0,1 mm.

3.4.3 Calculation of geometric bulk density, ρ_g

The geometric bulk density is given by:

$$\rho_g = \frac{m}{V} \quad (1)$$

where

m is the mass of the test piece in grams;

V is the volume of the test piece obtained by calculation using the mean dimensions given in cubic centimetres.

3.5 Calculation and expression of test results

Calculate the geometric bulk density either in g/cm³ to the nearest 0,01 g/cm³, or in kg/m³ to three significant figures.

Report the test result as the mean of all determinations, including the mean value and all individual results in the test report.

4 Determination of density and porosity

4.1 Principle

This determination is applied to fired test pieces.

4.2 Test pieces

The test pieces shall be shapes A, B or C, prepared, stored and fired according to the relevant sections of EN 1402-5 (see 3.2).

NOTE For basic castables and ramming materials, cylindrical test pieces can be used as an alternative to shapes A, B or C (see 3.2).

4.3 Procedure

4.3.1 Determination of bulk density

4.3.1.1 Dense materials

Determine the bulk density, the apparent porosity and calculate the total porosity in accordance with EN 993-1.

NOTE In the presence of glazing, the firing skin should be removed.

4.3.1.2 Insulating materials

Determine the bulk density in accordance with clause 4 since it is not possible to use the water absorption method with these materials.

4.3.2 Determination of true density

Determine the true density in accordance with EN 993-2, using a liquid which will not react with the material.

4.4 Calculation

The individual values and the mean value of the properties shall be given as test results.

Calculate the bulk density and the true density in g/cm³ to the nearest 0,01 g/cm³, or in kg/m³ to three significant figures.

Calculate and report the open and total porosity in %, rounded to the nearest 0,1 %.

5 Determination of cold modulus of rupture

5.1 Principle

This determination is applied to dried or fired test pieces (shapes A, B or C).

5.2 Test pieces

Use test pieces as specified in 3.2 and with the following tolerances:

— width and height ± 0,5 mm;

— parallelism of cross-section sides ± 0,2 mm;