



SLOVENSKI STANDARD

SIST ENV 1402-6:1998

01-april-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

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Ta slovenski standard je istoveten z: **ENV 1402-6:1998**

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ICS:

81.080 Ognjevzdržni materiali Refractories

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en

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EUROPEAN PRESTANDARD
PRÉNORME EUROPÉENNE
EUROPÄISCHE VORNORM

ENV 1402-6

January 1998

ICS 81.080

Descriptors: refractory materials, unshaped refractories, tests, determination, physical properties, test specimen

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 Prestandard (ENV) was approved by CEN on 30 November 1997 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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ΑΝΩΤΑΤΟ ΤΕΧΝΟΛΟΓΙΚΟ ΕΚΠΑΙΔΕΥΤΙΚΟ ΙΔΡΥΜΑ
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26504 ΠΕΡΙΣΤΕΙΝΗ ΑΙΤΩΛΟΑΧΑΪΑΣ



Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 187 "Refractory products and materials", the secretariat of which is held by BSI.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

ENV 1402 'Unshaped refractory products' consists of seven Parts:

- Part 1 : Terminology and definitions
- Part 2 : Sampling
- 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 : Pre-formed shapes

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1 Scope

This Part of ENV 1402 specifies methods for the determination of properties of unshaped materials from test pieces prepared and stored according to prENV 1402-5.

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

2 Normative references

This European Prestandard 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 Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

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
prEN 993-5	Methods of test for dense shaped refractory products - Part 5: Determination of the 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 temperature
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 1094-4	Insulating refractory products - Part 4: Determination of bulk density and true porosity
EN 1094-5	Insulating refractory products - Part 5: Determination of cold crushing strength
prEN 1094-6	Insulating refractory products - Part 6: Determination of permanent linear change on heating
ENV 1402-1	Unshaped refractory products - Part 1: Terminology and definitions
prENV 1402-5	Unshaped refractory products - Part 5: Preparation and treatment of test pieces

3 Principle

To obtain properties use the following methods :

- determination of geometric bulk density ;
- determination of density and porosity;
- determination of cold modulus of rupture;
- determination of cold crushing strength;
- determination of permanent linear change;
- determination of modulus of rupture at elevated temperatures;
- determination of refractoriness under load;
- determination of creep in compression.

It is not necessary to use all the methods to characterize a material.

4 Determination of geometric bulk density

4.1 General

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

4.2 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 prENV 1402-5.

NOTE : For basic castables and mouldables, as an alternative to these shapes, cylindrical test pieces, of diameter $50 \text{ mm} \pm 1 \text{ mm}$ and height $50 \text{ mm} \pm 1 \text{ mm}$ can be used.

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

4.3 Apparatus

4.3.1 Balance, capable of measuring mass to the accuracy specified in 4.4.1.

4.3.2 Callipers, capable of measuring to the accuracy specified in 4.4.2.

4.4 Procedure

4.4.1 Determination of the mass of the test piece (m)

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

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

4.4.2 Determination of the volume of the test piece (V)

Carry 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.

For particular cases such as ramming mixes adapt the measurements.

All measurements shall be made to an accuracy of $\pm 0,1$ mm.

4.4.3 Calculation of geometric bulk density (ρ_g)

The geometric bulk density is given by : standards.iteh.ai

$$\rho_g = \frac{m}{V}$$

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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

4.5 Test results

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

The geometric bulk density shall be reported in grams per cubic centimetre to 0,01 grams per cubic centimetre, or kilograms per cubic metre by multiplying by 10^3 , to three significant figures.

5 Determination of density and porosity

5.1 General

This determination is applied to fired test pieces.

5.2 Test pieces

The test pieces shall be shapes A, B or C, prepared, stored and fired according to the relevant sections of prENV 1402-5 (see 4.2).

NOTE 1 : It is recommended that test pieces have a minimum volume of 100 cm³. The length of the test pieces can be reduced by sawing.

NOTE 2 : For basic castables and mouldables, cylindrical test pieces can be used as an alternative to shapes A, B or C (see 4.2).

5.3 Procedure

5.3.1 Determination of bulk density

5.3.1.1 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.

5.3.1.2 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.

5.3.2 Determination of true density

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

5.4 Test results

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

The bulk density and the true density shall be reported in grams per cubic centimetre rounded to 0,01 grams per cubic centimetre, or in kilograms per cubic metre to three significant figures.

The open and total porosity shall be reported in percent, rounded to 0,1 %.

6 Determination of cold modulus of rupture

6.1 General

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