

**Methods of test for dense shaped
refractory products - Part 20:
Determination of resistance to abrasion
at ambient temperature**

Methods of test for dense shaped refractory
products - Part 20: Determination of resistance to
abrasion at ambient temperature

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 993-20:2004 sisaldab Euroopa standardi EN 993-20:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.09.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 993-20:2004 consists of the English text of the European standard EN 993-20:2004.</p> <p>This document is endorsed on 23.09.2004 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala: This European Standard specifies a method for the determination of the abrasion resistance of shaped and unshaped refractory materials at ambient temperature. It provides an indication of its suitability for service in abrasive or erosive conditions.</p>	<p>Scope: This European Standard specifies a method for the determination of the abrasion resistance of shaped and unshaped refractory materials at ambient temperature. It provides an indication of its suitability for service in abrasive or erosive conditions.</p>
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ICS 81.080

Võtmesõnad: abrasion r, ambient temperatures, definition, definitions, determination, erosion, materials, materials testing, mathematical calculations, measuring techniques, refractory, refractory materials, refractory products, samples, test equipment, test specimens, testing

English version

Methods of test for dense shaped refractory products

Part 20: Determination of resistance to abrasion at ambient temperature

Méthodes d'essai pour produits réfractaires façonnés denses – Partie 20: Détermination de la résistance à l'abrasion à température ambiante

Prüfverfahren für dichte geformte feuerfeste Erzeugnisse – Teil 20: Bestimmung der Beständigkeit gegen Abrieb bei Raumtemperatur

This European Standard was approved by CEN on 2004-03-24.

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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.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This document (EN 993-20:2004) 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 November 2004, and conflicting national standards shall be withdrawn at the latest by November 2004.

EN 993 with the general title "*Methods of test for dense shaped refractory products*" consists of 20 Parts:

- Part 1: Determination of bulk density, apparent porosity and true porosity
- Part 2: Determination of true density
- Part 3: Test methods for carbon-containing refractories
- Part 4: Determination of permeability to gases
- Part 5: Determination of cold crushing strength
- Part 6: Determination of modulus of rupture at ambient temperature
- Part 7: Determination of modulus of rupture at elevated temperatures
- Part 8: Determination of refractoriness-under-load
- Part 9: Determination of creep in compression
- Part 10: Determination of permanent change in dimensions on heating
- Part 11: Determination of resistance to thermal shock¹
- Part 12: Determination of pyrometric cone equivalent (refractoriness)
- Part 13: Specification for pyrometric reference cones for laboratory use
- Part 14: Determination of thermal conductivity by the hot-wire (cross-array) method
- Part 15: Determination of thermal conductivity by the hot-wire (parallel) method
- Part 16: Determination of resistance to sulphuric acid
- Part 17: Determination of bulk density of granular materials by the mercury method with vacuum
- Part 18: Determination of bulk density of granular materials by the water method with vacuum
- Part 19: Determination of thermal expansion by a differential method
- Part 20: Determination of resistance to abrasion at ambient temperature

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

¹ Published as a TS with the general title "*Dense shaped refractory products*"

1 Scope

This European Standard describes a method for the determination of the abrasion resistance of shaped refractory materials at ambient temperature. It provides an indication of its suitability for service in abrasive or erosive conditions. It can also be used for unshaped refractory materials.

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

EN 1402-6, *Unshaped refractory products — Part 6: Measurement of physical properties.*

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

3 Terms and definitions

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

- 3.1**
resistance to abrasion
resistance of refractory test-pieces to the surface wear caused by the mechanical action of moving solids
- 3.2**
resistance to erosion
resistance of refractory test-pieces to the surface wear caused by the mechanical action of a fluid, whether or not it contains solid material

4 Principle

Determination of the volume of material abraded from a flat surface of the test-piece placed at a right angle to a nozzle through which 1000 g of size-graded silicon carbide is blasted by air at 450 kPa.

5 Apparatus

5.1 Abrasion tester

An abrasion tester shall consist of the following equipment (see Figures 1 to 3).

- a) Blast gun, (see Figure 1) consisting of a pistol type housing with an air nozzle delivering air into the barrel of the gun which acts as a venturi with the abrasive medium entering the barrel at the side. The air delivery nozzle shall have an inlet inside diameter between 2,84 mm and 2,92 mm and an outlet inside diameter between 2,36 mm and 2,44 mm. The air nozzle may be protected from abrasion by covering it with a nominal 9,4 mm long piece of vinyl tubing, 4,7 mm inside diameter with a 1,5 mm wall thickness. The inside diameter of the barrel of the gun shall not exceed 10 mm and should be checked periodically for wear.