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Insulating refractory products - Part 5: Determination of cold crushing strength

Feuerfeste Erzeugnisse für Isolationszwecke - Teil 5: Bestimmung der Kaltdruckfestigkeit geformter Erzeugnisse

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Produits réfractaires isolants - Méthodes d'essai - Partie 5: Détermination de la résistance a l'écrasement a température ambiante

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Ta slovenski standard je istoveten z: EN 1094-5:1995

ICS:

81.080 Ognjevzdržni materiali Refractories

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Insulating refractory products - Part 5: Determination of cold crushing strength

Produits réfractaires isolants - Méthodes d'essai - Partie 5: Détermination de la résistance à l'écrasement à température ambiante

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CEN

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

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

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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 187 "Refractory products and materials", of which the secretariat 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of an identical text or by endorsement, at the latest by February 1996, and conflicting national standards shall be withdrawn at the latest by February 1996.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Reproducibility and repeatability data are not available, but may be given in a subsequent edition.

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EN 1094 'Insulating refractory products' consists of seven Parts:

- Part 1 : Terminology for ceramic fibre products
- Part 2 : Classification of shaped products
- Part 3 : Classification of ceramic fibre products
- Part 4 : Determination of bulk density and true porosity of shaped products
- Part 5 : Determination of cold crushing strength of shaped products
- Part 6 : Determination of permanent change in dimensions on heating of shaped products
- Part 7 : Methods of test for ceramic fibre products (ENV)

1 Scope

This Part of EN 1094 specifies a method of determination of the cold crushing strength of shaped insulating refractory products.

2 Definitions

For the purposes of this Part of EN 1094, the following definitions apply.

2.1 cold crushing strength: The ultimate load per unit area, at room temperature, that a refractory will withstand before it is crushed.

2.2 shaped insulating product: A product having a true porosity of not less than 45 % (V/V).

3 Principle

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At ambient temperature, a test piece of specified dimensions is subjected in a compression test machine to a load increasing at a specified rate until either the test piece collapses or its height is reduced to 90 % of its original value. The cold crushing strength is calculated from the maximum force recorded, and the dimensions of the test piece.

4 Apparatus

4.1 Mechanical or hydraulic crushing strength machine, that will enable the load to be increased progressively and smoothly, and with a system of measurement that will enable the force exerted on the test piece to be known within ± 2 %. The range of the machine shall be such that the maximum force exerted in the test is greater than 10 % of the maximum force of which the machine is capable. One of the platens of the machine shall be mounted on a spherical seating that will compensate for any small error of parallelism between the face of the test piece and the platen. The platens of the machine shall be ground and the lower one shall be marked so as to facilitate placing the test piece at its centre.

4.2 Micrometer, or other suitable instrument, accurate to 0,1 mm to measure the deformation of the test piece.

4.3 Measuring equipment, accurate to 0,1 mm, to measure the size of each test piece and to verify its geometrical form.

4.4 Drying oven, capable of being controlled at (110 ± 5) °C.

5 Test pieces

5.1 The number of items (for example, bricks or blocks) to be tested shall be determined by agreement between the interested parties.

5.2 One test piece shall be taken from each brick of standard size.

NOTE : The number to be taken from larger items is a matter for agreement between the interested parties. To facilitate further statistical evaluation, the same number of test pieces should be taken from each item.

5.3 Each test piece shall be nominally the size of half a standard brick, i.e.:

114 mm x 114 mm x 76 mm

or

114 mm x 114 mm x 64 mm

5.4 In the case of special shapes, the test pieces shall be cut, dry, to one of the sizes specified in 5.3.

NOTE : If possible, the test report should indicate the relationship of the direction of loading to the direction of pressing during manufacture.

5.5 The load-bearing faces of each test piece shall be flat within a tolerance of 0,25 mm. This condition shall be checked across both diagonals of each load-bearing face with a steel rule and a 0,25 mm feeler gauge.

5.6 The load-bearing faces of each test piece shall be parallel within a tolerance of 1 mm. This condition shall be checked by making four measurements of the height of the test piece, one at the centre of each of its four sides; the measurements shall not differ among themselves by more than 1 mm.

5.7 The axis of each test piece shall be perpendicular to its base within a tolerance of 1 mm. This condition shall be checked by placing the test piece on a surface table or surface plate and presenting a set square to the centre of each of its four sides; any gap between the set square and the side of the test piece shall not exceed 1 mm.

6 Procedure

6.1 Measure the length and breadth of each load-bearing face of the test piece, and its height at the centre of each of its four sides, in each case to the nearest 0,5 mm.

6.2 Dry the test piece to constant mass in the drying oven (see 4.4), controlled at $(110 \pm 5) ^\circ\text{C}$, cooling it each time away from moisture.

6.3 Place the test piece in one of its larger faces (114 mm x 114 mm) in the centre of the lower platen of the testing machine (see 4.1). No packing material shall be used between the test piece and the platens. Mount the measuring instrument (see 4.2) on the lower platen to measure the deformation occurring in the test piece.

6.4 Gradually and continuously increase the load at such a rate that

a) if the expected cold crushing strength is less than 10 MPa, the rate of increase of stress in the test piece is $0,05 \pm 0,005$ MPa/s,

b) if the expected cold crushing strength is equal to or greater than 10 MPa, the rate of increase of stress in the test piece is $0,2 \pm 0,02$ MPa/s.

6.5 Continue increasing the load at the rate given in 6.4 until either the test piece collapses (fails to support the load) or its height is reduced to 90 % of its original height. Record the maximum load indicated during the test.

7 Expression of results

7.1 The cold crushing strength is given, in Megapascals, by the formula

$$S = \frac{F_{\max}}{lb}$$

where

F_{\max} is the maximum load, in newtons, indicated during the test;

l is the mean of the four measurements of the length, in millimetres, of the test piece;

b is the mean of the four measurements of the breadth, in millimetres, of the test piece.

7.2 The cold crushing strength shall be expressed in megapascals, to the nearest 0,1 MPa.