SLOVENSKI STANDARD

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Sodobna tehniļna keramika ï Preskusne metode za keramiļne praġke ï 8. del: Ugotavljanje prostorninske mase po stiskanju (s potresanjem)

Advanced technical ceramics - Methods of test for ceramic powders - Part 8: Determination of tapped bulk density

Hochleistungskeramik - Prüfverfahren für keramische Pulver - Teil 8: Bestimmung der geklopften Schüttdichte

Céramiques techniques avancées - Méthodes d'essai pour poudres céramiques - Partie 8: Détermination de la masse volumique apres tassement

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Advanced technical ceramics - Methods of test for ceramic powders - Part 8: Determination of tapped bulk density

Céramiques techniques avancées - Méthodes d'essai pour poudres céramiques - Partie 8: Détermination de la masse volumique après tassement

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This European Standard was approved by CEN on 3 February 2006.

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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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 725-8:2006) has been prepared by Technical Committee CEN/TC 184 “Advanced technical ceramics”, 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of an identical text or by endorsement, at the latest by September 2006, and conflicting national standards shall be withdrawn at the latest by September 2006.

This European Standard supersedes EN 725-8:1997.

The main changes in the new edition are:

- revision of the Foreword to reflect changes in the EN 725 series;

- addition of normative references;

- modifications to the apparatus specification;

- modifications to the test report requirements.

EN 725 *Advanced technical ceramics — Methods of test for ceramic powders* was prepared in Parts as follows:

Part 1: *Determination of impurities in alumina*

Part 2: *Determination of impurities in barium titanate*

Part 3: *Determination of oxygen content of non-oxides by thermal extraction with a carrier gas*

Part 4: *Determination of oxygen content in aluminium nitride by XRF analysis*

Part 5 *Determination of particle size distribution*

Part 6: *Determination of specific surface area* [withdrawn]

Part 7: *Determination of absolute density* [withdrawn]

Part 8: *Determination of tapped bulk density*

Part 9: *Determination of un-tapped bulk density*

Part 10: *Determination of compaction properties*

Part 11: *Determination of densification on natural sintering*

Part 12: *Chemical analysis of zirconia*

Parts 6 and 7 of the series were superseded in 2005 by EN ISO 18757 and EN ISO 18753 respectively.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies a method for the determination of the tapped bulk density of granulated or un-granulated ceramic powders.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:2005)*

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

3 Principle

The mass of a known volume of the powder is determined after it has been allowed to fall freely into a stationary container and then tapped under specified conditions.

The tapped bulk density is expressed by division of this mass by the volume of the container.

4 Apparatus

4.1 Stainless steel cylindrical container (see Figure 1) of volume approximately 100 cm^3 and a diameter to height ratio in the range 0,9 to 1,1. The exact volume of the container shall be measured to the nearest 0,2 cm^3.

4.2 Sieve, with an aperture size of 710 µm as specified in ISO 565 and with a typical diameter of 80 mm.

4.3 Balance with a resolution of 0,01 g.

4.4 Tray, to collect the powder during the filling of the container.

4.5 Suitable assembly for allowing the powder to flow and fill the container (4.1) evenly, including a fixing system for the sieve (4.2) with a cone in its lower part to allow the sieve and the cone to be set to a predetermined height above the top level of the ring (4.6), and a system to regulate the vibration of the sieve (see Figure 1).

4.6 Ring, height 50 mm (see Figure 1), which can be fitted to the top of the stainless steel cylindrical container to increase its height.

4.7 Tapping system, which permits the tapping of the cylinder and its ring. The stroke shall be 20 mm and the tapping frequency shall be 50 taps/min (see Figure 2).

5 Procedure

5.1 Sample treatment

If there is any treatment of the sample before measurement (e.g. drying), this shall be recorded in the test report.

5.2 Measurement

Weigh the cylindrical container (4.1). Place the ring (4.6) on the top of the cylindrical container. Set the cylindrical container with its ring in the tray (4.4) so that its axis coincides with that of the cone, with the level of the sieve at a height of 190 mm above the top of the container.

Fill the sieve with the sample. If necessary start the vibration system (4.5) and regulate it to allow the powder to flow evenly. Fill the cylindrical container and its ring in between 40 s and 60 s. Stop the feed when the powder has formed a cone above the top of the ring and is spilling over.

Place the cylindrical container with its ring, filled with the powder, on the tapping device. Start the tapping at a rate of 50 taps/min and maintain for 180 s. Remove the cylindrical container and its ring from the tapping device without vibration. Carefully remove the ring from the cylindrical container.

Remove the cone of surplus powder by gently drawing a straight edge across the top rim of the cylindrical container, without communicating any vibration to the latter.

Weigh the cylindrical container and its contents.

6 Expression of results

The tapped bulk density ρ_{tap} is given by the following equation:

$$\rho_{tap} = \frac{m_1 - m_0}{V} \quad (1)$$

where

m_0 is the mass, in grams, of the empty cylindrical container;

m_1 is the mass, in grams, of the cylindrical container full of powder after tapping;

V is the volume, in cubic centimetres, of the cylindrical container.

Calculate the density in grams per cubic centimetre and then convert the answer to kilograms per cubic metre, to the nearest 5 kg/m³.

Information on the probable repeatability and reproducibility of results is given in Annex A.

7 Test report

The test report shall be in accordance with the reporting provisions of EN ISO/IEC 17025 and shall include at least the following information:

a) name and address of the testing establishment;

b) date of the test;

c) on each page, a unique report identification and page number;

d) customer name and address;

e) reference to this European Standard, i.e. determined in accordance with EN 725-8;

f) authorising signature;

g) any deviation from the method described, with appropriate validation, i.e. demonstrated to be acceptable to the parties involved;

h) description of the powder (e.g. material type, manufacturer code, batch or code number);

i) any pre-treatment of the powder such as drying;

j) results;

k) any unusual features noted during the determination;

l) any comments about the test or test results.