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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 2997-2015

**Test method for bulk density, apparent porosity and true
porosity of dense shaped refractory products**
(English Translation)

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Table of Contents

Foreword...	3
1 Scope...	5
2 Normative references...	5
3 Terms and definitions...	5
4 Principle...	7
5 Apparatus and materials...	7
6 Test pieces...	9
7 Procedure...	9
8 Expression of results...	11
9 Test errors...	12
10 Test report...	12

Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaced GB/T 2997-2000, Test method for bulk density, apparent porosity and true porosity of dense shaped refractory products; compared with GB/T 2997-2000, the main changes are as follows.

- it deletes the conventional method (see 7.2.1 of Edition 2000);
- it adds the content of the note in the determination of the mass of dry test piece (m₁) (see NOTE to 7.1);
- it modifies the liquid for the immersion of test pieces (see 5.6; 5.8 of Edition 2000);
- it modifies the provision on the number of items to be tested (see 6.1; 6.1 of Edition 2000); and
- it modifies the tools used when the mass of immersed test piece is determined (see 7.4; 7.4 of Edition 2000).

This Standard was redrafted by modifying and adopting ISO 5017.2013, Dense shaped refractory products - Determination of bulk density, apparent porosity and true porosity.

Many adjustments are made in this Standard, compared with ISO 5017.2013; Annex

A lists the paragraph numbers of this Standard and ISO 5017.2013.

There are technical differences between this Standard and ISO 5017.2013. The technical differences are marked with vertical single line (|) in the page margin of the provisions concerned in this Standard. Annex B lists the technical differences between this Standard and ISO 5017.2013. Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The issuing organization of this document shall not be held responsible for identifying any or all such patent rights.

This Standard was proposed by and shall be under the jurisdiction of the Technical Committee 193 on Refractories of Standardization Administration of China.

The drafting organizations of this Standard. Sinosteel Luoyang Institute of Refractories Research Co., Ltd., Jiangsu Yuezhao New Material Co., Ltd., Zhejiang Ruitai Refractory Technology Co. Ltd., Zhengzhou Zhendong Wear-resistant Materials Co., Ltd., Anhehui Industrial Co., Ltd and China University of Geosciences (Beijing).

The drafters of this Standard. Zhang Yi, Mao Qinghui, Fan Shengliang, Li Fuchao, Hou Huifeng, Huang Zhaohui, Wu Jiaxuan, Sun Yang, Wang Junchao, and Sun Juchen.

Test method for bulk density, apparent porosity and true porosity of dense shaped refractory products

1 Scope

This Standard specifies the terms and definitions, principle, apparatus and materials, test pieces, procedure, expression of results, test errors and test report for the determination of the bulk density, apparent porosity and true porosity of dense shaped refractory products.

This Standard applies to the determination of the bulk density, apparent porosity and true porosity of dense shaped refractory products.

2 Normative references

The provisions in the following documents become part of this Standard through reference in this Standard. For dated documents, the subsequent amendments

(excluding corrigenda) or revisions do not apply to this Standard. However, all parties who enter into agreement based on this Standard are encouraged to study whether the latest versions of these documents are applicable. For undated documents, the latest versions apply to this Part.

GB/T 5071, Refractory materials - Determination of true density (GB/T 5071-2013, ISO 5018.1983, MOD)

GB/T 8170, Rules of rounding off for numerical values and expression and judgement of limiting values

GB/T 10325, Shaped refractory products - Rule of acceptance, sampling and inspection (GB/T 10325-2012, ISO 5022.1979, NEQ)

GB/T 22230, Liquid chemical products for industrial use - Determination of density at 20°C (GB/T 22230-2008, ISO 758.1976)

3 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1

5.6 Immersion liquid. For materials that do not react with water, the immersion liquid

may be cold distilled water or deionized water. For materials that are sensitive to contact with water, distilled kerosene or other suitable organic liquid shall be used. The immersion liquid shall not fractionate at a pressure above the absolute pressure attained in the test.

6.1 The number of items to be tested shall be as specified in GB/T 10325 or determined by agreement between the interested parties.

6.2 Generally, one test piece is taken from each item. The number of test pieces to

be tested per item can also be agreed between the parties and shall be stated in the test report. If the test pieces are cut out of bricks or blocks, the same number shall be cut from each one, in order to facilitate statistical analysis.

6.3 Test pieces shall be cut in the form of prisms or cylinders. The bulk volume of a

test piece shall be not less than 50 cm³, and shall be not more than 200 cm³. The ratio of the longest to the shortest dimension of a test piece shall not exceed 2.1.

NOTE 1 Where it is not possible to obtain the given size and volume from the item, test pieces of other dimensions and volume may be used by agreement between parties, and are to be reported.

NOTE 2 If test pieces are to be cut from an item in which variations in density could occur, the position of the test pieces should be agreed between parties and stated in the report.

7.1 Determination of mass of dry test piece (m₁)

Before weighing, clean the dust and debris on the surface of test pieces. Dry the test piece at 110°C ± 5°C to constant mass, i.e. until two successive weighings made before and after at least 2 h in the oven (5.1) do not differ by more than 0.1%.

Before each weighing, place the test piece in a desiccator until it has cooled to room temperature. Weigh the mass (m₁) of each test piece to the nearest 0.01 g.

5 Bridge

Figure 2 - Example of arrangement for the determination of apparent mass (m₂) of immersed test piece using single- and double-pan balances

7.4 Determination of mass of soaked test piece (m₃)

Prepare a linen cloth by saturating it in the immersion liquid and lightly wringing it out by hand before each use. Fold the cloth and lay flat on a bench.

Remove the test piece from the liquid and immediately remove the excess liquid by quickly rolling the test piece over a damp cloth on all four sides and then blot the two ends. The aim of undertaking this action quickly is to ensure that liquid is not drawn out of the pores.

Immediately weigh the test piece in air to the nearest 0.01g. In this way, the mass of