GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 81.060.20

CCS Y 24

GB/T 4736-2022

Replacing GB/T 4736-1984

Test method for permeability gas of daily-use pottery

日用陶器透气性测定方法

Issued on: April 15, 2022 **Implemented on: November 01, 2022**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

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Foreword

This document was drafted in accordance with the rules given in GB/T 1.1-2020, "Directives for standardization - Part 1: Rules for the structure and drafting of standardizing documents".

This document replaces GB/T 4736-1984 "Standard test method for permeability gas of pottery ware of daily use"; compared with GB/T 4736-1984, in addition to structural adjustments and editorial changes, the main technical changes are as follows:

-- Change equipment and utensils (see 5.1, 5.2; Chapter 2 of the 1984 edition);

-- Change sample preparation (see Chapter 6; Chapter 3 of the 1984 edition);

-- Change test procedures (see Chapter 7; Chapter 4 of the 1984 edition);

-- Change test data processing (see Chapter 8; Chapter 5 of the 1984 edition);

-- Change test report (see Chapter 9; Table 3 of the 1984 edition);

-- Add dynamic viscosity of nitrogen (see Appendix A).

Please note that some of the contents of this document may involve patents. The issuing organization of this document is not responsible for identifying patents.

This document was proposed by China National Light Industry Council.

This document shall be under the jurisdiction of National Technical Committee 405 on Daily-use Pottery of Standardization Administration of China (SAC/TC 405).

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The previous versions of this document and the documents which are replaced by this document are as follows:

-- It was first released in 1984 as GB/T 4736-1984;

-- This is the first revision.

Test method for permeability gas of daily-use pottery

1 Scope

This document specifies the principle, equipment and utensils, sample preparation, test procedures, test data processing and test report of the test method for permeability gas of daily-use pottery.

This document applies to the determination of permeability gas of daily-use pottery products; it can be referred to by other types of pottery products.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 3303, Terminology of defects for domestic ceramics

GB/T 5000, Terminology for domestic ceramics

GB/ T8979, Pure nitrogen and high purity nitrogen and ultra pure nitrogen

3 Terms and definitions

Terms and definitions determined by GB/T 3303 and GB/T 5000 are applicable to this document.

4 Principle

Under the specified pressure difference, the nitrogen flow rate through the sample characterizes the permeability gas.

5 Equipment and utensils

5.1 Air permeability tester: See Figure 1 for the schematic diagram of the equipment connection. It consists of gas storage tank (containing high-purity nitrogen in accordance with GB/T 8979), gas pressure gauge (0 MPa ~ 0.1 MPa, accuracy 1%), gas flow measuring equipment (accuracy 2%), sample holder (which can hold a set of samples of 50 mm and 25 mm in diameter), automatic measurement and control system;

than 20 cm × 30 cm. The test piece is not allowed to have defects such as incomplete edges, visible cracks, and molten holes.

6.2 The surface layer of the test piece shall be ground with a surface grinding machine or a surface grinder; the glaze layer and intermediate layer of the test piece with glaze shall also be ground, until the surface of the test piece is basically flat and the thickness is basically the same as that of the bottom of the sample. The thickness difference between the 5 test pieces shall be less than 0.5 mm.

6.3 Use water to rinse the test piece; dry it in an electric heating drying oven at (110±5) °C for 2 h; put it in a desiccator and cool it to room temperature of (20±5) °C.

7 Test procedures

7.1 Use an aluminum alloy cylinder for air tightness inspection; when the pressure drop rate is less than 15 Pa/min, it is considered that the air tightness is qualified.

7.2 Measure the diameter and thickness of the test piece, accurate to 0.1 mm.

7.3 Put the test piece into the sample holder; adjust the test piece to the center position; then, fix the sample holder on the air intake seat. If the thickness of the test piece is insufficient, add a gasket to adjust the height to inflate the latex liner, making sure that the pressure on the latex liner is sufficient to keep the surface airtight.

7.4 Adjust the gas path pressure reducing valve of the instrument. After the inlet and outlet systems are stable, record the gas pressure difference, gas flow rate, temperature and atmospheric pressure data during measurement. Measure each test piece under at least three different pressure differences, where the ratio of the two pressure differences before and after the increase shall be the same; calculate the permeability gas of the test piece separately.

8 Test data processing

8.1 With reference to Darcy's law, calculate the permeability gas of the sample according to Formula (1).

$$K = Q \times \eta \times \frac{H}{A} \times \frac{1}{\Delta P} \times \frac{2(\Delta P + P_0)}{(\Delta P + 2P_0)} \qquad \cdots\cdots (1)$$

Where:

K – permeability gas of the test piece, in square meters (m^2);

Q – inlet air flow through the test piece, in cubic meters per second (m^3/s);

η – dynamic viscosity of the gas used at the test temperature, in Pascal seconds (Pa·s);

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