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

GB/T 3810.3-2006

**Test methods of ceramic tiles -- Part 3: Determination of water
absorption, apparent porosity, apparent relative density and
bulk density**

(English Translation)

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Foreword

This document was drafted in accordance with the provisions of GB/T 1.1-2020

"Directives for standardization - Part 1.Rules for the structure and drafting of standardizing documents".

This document is Part 3 of GB/T 3810 "Test method of ceramic tiles". GB/T 3810 has issued the following parts.

- Part 1.Sampling and basis for acceptance;
- Part 2.Determination of dimensions and surface quality;

- Part 3.Determination of water absorption, apparent porosity, apparent relative density and bulk density;
- Part 4.Determination of modulus of rupture and breaking strength;
- Part 5.Determination of impact resistance by measurement of coefficient of restitution;
- Part 6.Determination of resistance to deep abrasion for unglazed tiles;
- Part 7.Determination of resistance to surface abrasion for glazed tiles;
- Part 8.Determination of linear thermal expansion;
- Part 9.Determination of resistance to thermal shock;
- Part 10.Determination of moisture expansion;
- Part 11.Determination of crazing resistance for glazed tiles;
- Part 12.Determination of frost resistance;
- Part 13.Determination of chemical resistance;
- Part 14.Determination of resistance to stains;
- Part 15.Determination of lead and cadmium given off by tiles;
- Part 16.Determination of small colour differences;
- Part 18.Determination of light reflectance value (LRV);
- Part 20.Determination of deflection of ceramic tiles for calculating their radius of curvature.

Test method of ceramic tiles - Part 3.Determination of water absorption, apparent porosity, apparent relative density and bulk density

1 Scope

This document describes a method for determining water absorption, apparent porosity, apparent relative density, and bulk density of ceramic tiles.

This document is applicable to the testing of water absorption, apparent porosity, apparent relative density, and bulk density of ceramic tiles, as well as the classification and description of these products.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

There are no terms and definitions to be defined in this document.

4 Principle

A dry ceramic tile is placed in water until saturated. The relevant characteristic parameters are calculated using the dry mass, the mass after water saturation, and the mass suspended in water.

5.1 Drying oven. Operating temperature $(110 \pm 5) ^\circ\text{C}$; microwave, infrared, or other

drying systems that achieve the same test results may also be used.

5.2 Balance. The weighing precision of the balance is 0.01 % of the mass of the specimen being tested.

5.7 Glass beaker, or a container of similar size and shape. The specimen is suspended

from one end of the balance (5.2) using a wire loop (5.6), ensuring the specimen is completely submerged in water, with neither the specimen nor the wire loop in contact with any part of the container.

5.8 Vacuum container and vacuum system. A vacuum container of sufficient capacity

to hold the required number of specimens and a vacuum system capable of achieving $(10 \pm 5) \text{ kPa}$ [$(91 \pm 5) \text{ kPa}$ lower than standard atmospheric pressure 101 kPa] and maintaining it for 30 min.

6.1 Sampling

Sampling shall be carried out according to the sample area in Table 1. Examples of sampling of commonly used ceramic tile sizes are shown in Table 2. The number of

whole tiles and the number of specimens depend on the size of the whole tiles. Ceramic tiles and specimens shall be untested and free from visible damage or cracks. Any loose or contaminated materials, including mesh, paper, and adhesives used for mosaic tiling, shall be removed.

If the mass of a single ceramic tile is less than 50 g, a sufficient number of ceramic tiles shall be taken so that the mass of each specimen reaches 50 g ~ 100 g. For these specimens, 6.2 does not apply.

The dried specimens are placed in a desiccator (5.4) containing silica gel or other desiccants, but not acidic desiccants, to cool to room temperature.

Weigh the dried mass (m_1) of each specimen, with a measurement accuracy of 0.01 % of the specimen mass.

7.2 Water saturation

Place the specimens vertically with the cut edge facing down, and the specimens are not in contact with the vacuum container (5.8). Evacuate to a pressure of (10 ± 5) kPa [(91 ± 5) kPa lower than standard atmospheric pressure 101 kPa] and maintain it for (30 ± 2) min. Then, while maintaining the vacuum, slowly inject sufficient water over a period not exceeding 10 min to cover the specimens and extend it at least 5 cm beyond. Release the vacuum, submerge the specimens for (15 ± 2) min, and then remove them. Determine the suspended mass of the specimens according to 7.3. After determining the suspended mass, remove the specimens. If the suspended mass does not need to be determined, the specimens can be removed after submerging. Gently wipe each specimen with a damp microfiber cloth to remove all visible water droplets from the surface, and determine the saturated mass (m_2) of each specimen, with a measurement accuracy of 0.01 % of the specimen mass. A dry microfiber cloth shall be submerged in water equal to two times its dry mass (e.g., 100 g of water for 50 g of cloth). This can be done by placing the microfiber cloth in a bowl, adding the required amount of water, squeezing the cloth to ensure all of the water is absorbed, and the cloth is saturated with water, without any dry areas. The surface area of the microfiber cloth shall be at least