INTERNATIONAL STANDARD

ISO 10545-3

Second edition
2018-02

Ceramic tiles —

Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density

Carreaux et dalles céramiques —

Partie 3: Détermination de l'absorption d'eau, de la porosité ouverte, de la densité relative apparente et de la masse volumique globale

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ISO 10545-3:2018
https://standards.iteh.ai/catalog/standards/sist/030073f3-8cec-40ec-886d-3e4823ddfcd6/iso-10545-3-2018

Reference number
ISO 10545-3:2018(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 189, *Ceramic tiles*.

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This second edition cancels and replaces the first edition (ISO 10545-3:1995 which has been technically revised. It also incorporates ISO 10545-3:1995/Cor.1:1997.

The main changes compared to the previous edition are as follows:

— The impregnation of the samples is now only done by vacuum.

— The boiling method for impregnation of the samples has been removed.

— Sampling guidelines according to the dimension of tiles are provided.

A list of all parts in the ISO 10545 series can be found on the ISO website.

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Introduction

For ceramic tiles, water absorption is used to classify products. This document outlines the procedures for the measurement of water absorption and related properties using classical Archimedean techniques. Impregnation of the open porosity is achieved by a vacuum method only. Accommodations are provided for large or irregularly shaped ceramic tile.

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Ceramic tiles —

Part 3:
Determination of water absorption, apparent porosity, apparent relative density and bulk density

1 Scope

This document specifies a method for determining water absorption, apparent porosity, apparent relative density and bulk density of ceramic tiles. This method is applicable to classification of tiles and product specifications.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

4 Principle

Impregnation of dry tiles with water and then suspension in water. Calculation of the listed properties using the relationships between dry, saturated and suspended masses.

5 Apparatus

5.1 Drying oven, capable of being operated at least at (110 ± 5) °C. Microwave, infrared, or other drying systems may be used provided that it has been determined that the same results are obtained.

5.2 Balance, accurate to 0,01 % of the mass of a test specimen.

5.3 Deionized or distilled water

5.4 Dessicator

5.5 Microfibre cloth

5.6 Wire loop, halter or basket, capable of supporting specimens under water for making suspended mass measurements.

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5.7 Glass beaker, or similar container of size and shape such that the sample, when suspended from the balance (5.2) by the wire loop (5.6), is completely immersed in water, with the test specimen and the wire loop being completely free of contact with any part of the container.

5.8 Vacuum chamber and vacuum system, of sufficient capacity to accommodate the test specimens and evacuate to a pressure of 10 ± 5 kPa (91 ± 5 kPa below standard atmospheric pressure of 101 kPa) for 30 min.

6 Test specimens

6.1 Sampling

Sampling shall be carried out according to the dimension of tiles as reported in Table 1. In Table 2 some examples of different common sizes are reported. The number of the specimens to be tested for each tile as well the number of tiles are function of the tile dimension. Tiles and relevant specimens shall not contain visible damage or cracks prior to testing and shall not have been previously tested. Any loose or contaminating material shall be removed. This includes any mesh, paper and adhesive that has been applied to mosaics.

When the mass of each individual tile is below 50 g, a sufficient number of tiles shall be taken so that each test specimen reaches a mass of 50 g to 100 g. For those specimens, 6.2 is not applicable.

Table 1 — Sampling

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Maximum area A cm^2	Reference paragraph for sample cutting	n° of specimens per tile to be tested	Total n° of tiles	Total n° of specimens
A ≤ 400	6.2.2	1	5	5
400 < A ≤ 3 600 (with x and y > 20 cm)	6.2.3	1	5	5
400 < A ≤ 3 600 (with minor edge y ≤ 20 cm, and major edge x < 100 cm)	6.2.4	1	5	5
400 < A ≤ 3 600 (with minor edge y ≤ 20 cm, and major edge x ≥ 100 cm)	6.2.4	2	5	10
A > 3 600 (with minor edge y ≤ 20 cm, and major edge x ≥ 100 cm)	6.2.5	2	3	6
A > 3 600 (with minor edge y > 20 cm)	6.2.5	4	3	12
NOTE For non-rectangular tile, consider the area of the minimum rectangle in which the tile can be fit.				

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Table 2 — Examples of sampling for different common sizes

Maximum area A cm^2	Example of nominal size cm	n° of specimens per tile to be tested	Total n° of tiles	Total n° of specimens
400	20 × 20	1	5	5
600	10 × 60	1	5	5
900	30 × 30	1	5	5
1 350	15 × 90	1	5	5
2 160	18 × 120	2	5	10
2 250	15 × 150	2	5	10
2 500	50 × 50	1	5	5
3 600	60 × 60	1	5	5
4 500	18 × 250	2	3	6
8 100	90 × 90	4	3	12
7 200	60 × 120	4	3	12
16 200	90 × 180	4	3	12
14 400	120 × 120	4	3	12
28 800	120 × 240	4	3	12
30 000	100 × 300	4	3	12
>30 000	120 × 300	4	3	12

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6.2 Sample cutting

6.2.1 General

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Each tile shall be cut into smaller pieces as described in 6.2.2 through 6.2.5 where some common examples are reported. Cutting of specimens shall consist of scoring and snapping, or sawing when impossible to score and snap with conventional tile-scoring equipment (as can be the case with highly textured and structured porcelain tiles). Cutting may be performed at the factory following the sampling criteria described where the sample being cut is at least 10 cm bigger on each cut side. At the testing facility, cutting shall be done no more than four hours before the specimens are placed in the dryer. Specimens shall be kept clean with no contaminating material after cutting.

6.2.2 Tiles less than or equal to 400 cm^2

Specimens shall be cut in half, within 1 cm. Specimens shall be cut perpendicular to the longest side if the specimen has unequal sides. Select one half at random from each specimen for testing (see Figure 1).

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