INTERNATIONAL STANDARD

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Ceramic tiles —

Part 9: Determination of resistance to thermal shock

Carreaux et dalles céramiques —

Partie 9: Détermination de la résistance aux chocs thermiques

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 189, *Ceramic tile*.

This third edition cancels and replaces the second edition (ISO 10545-9:2004), which has been technically revised.

ISO 10545 consists of the following parts, under the general title *Ceramic tiles*:

— *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 glazed tiles*

— *Part 16: Determination of small colour differences*

Ceramic tiles —

Part 9:
Determination of resistance to thermal shock

1 Scope

This part of ISO 10545 specifies a test method for determining the resistance to thermal shock of all ceramic tiles under normal conditions of use.

Depending on the water absorption of the tiles, different procedures (tests with or without immersion) are used unless there is an agreement to the contrary.

NOTE ISO 13006 provides property requirements for tiles and other useful information on these products.

2 Normative References

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

ISO 10545-3, *Ceramic tiles — Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density*

3 Principle

Determination of the resistance to thermal shock of a whole tile by cycling 10 times between the temperatures of 15 °C and 145 °C.

4 Apparatus

4.1 Low-temperature water bath, through which cold water flows at (15 ± 5) °C.

One example is a bath 55 cm long, 35 cm wide and 20 cm deep, with a water flowrate of 4 l/min. Any other suitable apparatus may be used.

For the case of testing with immersion, applicable to all tiles having a water absorption coefficient less than or equal to a mass fraction of 10 % (determined in accordance with ISO 10545-3), the bath shall not be covered and shall be of sufficient depth to allow the tiles to be placed vertically and immersed completely.

For the case of testing without immersion, applicable to glazed tiles having a water absorption coefficient greater than a mass fraction of 10 % (determined in accordance with ISO 10545-3), the bath shall be covered with a thick aluminium plate in such a manner that the water, directed towards the surface, is in contact with the plate. The aluminium plate shall be covered with a layer approximately thick of 5 mm aluminium granules with diameters in the range of 0,3 mm to 0,6 mm.

4.2 Oven, capable of being operated at 145 °C to 150 °C.

5 Test specimens

Test specimens shall be selected at random from the lot to be tested. A minimum of five whole tiles shall be tested.

6 Procedure

6.1 Preliminary check of the test specimens

First examine the tiles for visible defects by viewing them with the naked eye (or with the aid of spectacles if usually worn) from a distance of 25 cm to 30 cm under a minimum illumination of 300 lux. All test specimens shall be free from defects at the commencement of the test. The methylene blue solution described in 6.5 may be used to detect pre-test defects.

6.2 Test with immersion

In the case of low-porosity tiles having a water absorption coefficient less than or equal to 10 % of their dry masses, immerse them vertically in cold water at (15 ± 5) °C so that the tiles are not in contact with each other.

6.3 Test without immersion

In the case of glazed tiles having a water absorption coefficient greater than 10 % of their dry mass fractions, place the glazed face downwards in contact with the aluminium granules over the cold-water bath (4.1) maintained at (15 ± 5) °C.

6.4 Temperature cycling

For both tests, after 15 min at the low temperature, immediately transfer the test specimens to the oven (4.2) maintained at (145 ± 5) °C until a uniform temperature is achieved (usually 20 min), then immediately transfer them back to the low-temperature conditions.

Repeat this process 10 times.

6.5 Examination

Then examine the test specimens for visible defects by viewing them with the naked eye (or with the aid of spectacles if usually worn) from a distance of 25 cm to 30 cm under a minimum illumination of 300 lux. To assist in detecting defects, a suitable stain (such as a 1 % aqueous solution of methylene blue containing a small quantity of wetting agent) may be brushed onto the proper surfaces of the test specimens. After 1 min, wipe off the stain with a damp cloth.

7 Test report

The test report shall include the following information:

a) reference to this part of ISO 10545, i.e. ISO 10545-9:2013;

b) a description of the tiles;

c) the water absorption coefficient of the tiles;

d) the type of test performed (with or without immersion);

e) the number of test specimens with visible defects.

Bibliography

ISO 13006, *Ceramic tiles — Definitions, classification, characteristics and marking*

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