INTERNATIONAL STANDARD

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Ceramic tiles —

Part 8: Determination of linear thermal expansion

Carreaux et dalles céramiques —

Partie 8: Détermination de la dilatation linéique d'origine thermique

Reference number
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Contents

Page

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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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

This second edition cancels and replaces the first edition (ISO 10545-8:1994), 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 8:
Determination of linear thermal expansion

1 Scope

This part of ISO 10545 defines a test method for determining the coefficient of linear thermal expansion of ceramic tiles.

2 Principle

Determination of the linear thermal expansion coefficient for the temperature range from ambient temperature to 100 °C.

3 Apparatus

3.1 Suitable thermal expansion apparatus, capable of a rate of heating of (5 ± 1) °C/min with uniform distribution of heat. Certain types of apparatus require a soaking time at 100 °C.

3.2 Vernier calipers, or other suitable device.

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

3.4 Desiccator

4 Test specimens

Cut two test specimens at right angles from the central portion of one tile so that their lengths are suitable for the apparatus. The ends of the test specimens shall be ground flat and parallel.

If necessary, grind the test specimens so that the length of any side in cross-section is less than 6 mm and the area of cross-section is greater than 10 mm^2. The minimum length of the test specimens should be 25 mm. In the case of glazed tiles, the glaze shall not be ground off the test specimens.

5 Procedure

It is necessary to make a previous calibration of the apparatus with a standard test specimen. The dimensions of the standard test specimen shall be the same as the dimensions of the test specimen.

Dry the test specimens at (110 ± 5) °C until they reach constant mass, i.e. when the difference between two successive weightings at intervals of 24 h is less than 0,1 %. Allow them to cool in the desiccator (3.4) at ambient temperature.

Using vernier calipers (3.2), determine the lengths to an accuracy of 0,002 times the length.

Place a test specimen in the apparatus (3.1) and record the ambient temperature.

Initially, and throughout the heating procedure, measure the length to an accuracy of 0,01 mm. Take temperature and length measurements at temperature intervals of no more than 15 °C.

The rate of heating shall be (5 ± 1) °C/min.

6 Expression of results

The linear thermal expansion coefficient, α_l, is expressed in 10^{-6} per degree Celsius (10^{-6}/°C), to the first decimal place, in accordance with the expression:

$$\alpha_l = \frac{1}{L_o} x \frac{\Delta L}{\Delta T}$$

where

L_o is the length of the test specimen at the ambient temperature;

ΔL is the increase in length of the test specimen between ambient temperature and 100 °C;

ΔT is the rise in temperature.

7 Test report

The test report shall specify the following:

a) reference to this part of ISO 10545, i.e. ISO 10545-8;

b) a description of the tiles, including sample preparation;

c) the linear thermal expansion coefficient for both test specimens.