INTERNATIONAL STANDARD

ISO 10545-8

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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
ISO 10545-8:1994(E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10545-8 was prepared by Technical Committee ISO/TC 189, *Ceramic tile*.

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*

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— *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: Extraction of lead and cadmium from glazed tiles*

— *Part 16: Determination of colour differences*

— *Part 17: Determination of coefficient of friction*

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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.

NOTE 1 ISO 13006:—, *Ceramic tiles — Definitions, classification, characteristics and marking* (to be published), provides property requirements for tiles and other useful information on these products.

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 to a test specimen. 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 50 mm. In the case of glazed tiles, the glaze shall not be ground off the test specimens.

5 Procedure

Dry the test specimens at (110 ± 5) °C until they reach constant mass; i.e. when the difference between two successive weighings 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

$$\alpha_l = \frac{1}{L_o} \times \frac{\Delta L}{\Delta t}$$

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;

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

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