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**Ceramic tiles —**

**Part 2:**

**Determination of dimensions and  
surface quality**

*Carreaux et dalles céramiques —*

*Partie 2: Détermination des caractéristiques dimensionnelles et de la  
qualité de surface*  
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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

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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 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 10545-2:1995) which has been technically revised. It also incorporates the Technical Corrigendum ISO 10545-2:1995/Cor 1:1997.

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

- for the measurement of length and width, the deviation shall be reported as a percentage and in millimetres;
- for the measurement of thickness, the deviation shall be reported as a percentage and in millimetres;
- for the measurement of straightness of sides, the deviation shall be reported as a percentage and in millimetres;
- for the measurement of the centre curvature, edge curvature and warpage, the deviation shall be reported as a percentage and in millimetres;
- tests specimens sampling has been changed;
- for rectangularity measurements of oblong tiles with longer edge  $\geq 60$  cm, and ratio between longer edge and shorter edge  $\geq 3$ , only  $\delta_L$  and percent deviation shall be determined; as a consequence, the test report is modified accordingly.

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Ceramic tiles —

## Part 2: Determination of dimensions and surface quality

### 1 Scope

This document specifies methods for determining the dimensional characteristics (length, width, thickness, straightness of sides, rectangularity, surface flatness) and the surface quality of ceramic tiles.

Tiles with areas less than 4 cm<sup>2</sup> are excluded from measurements of length, width, straightness of sides, rectangularity and surface flatness.

**NOTE** Spacer lugs and glaze blobs and other irregularities of the sides are intended to be ignored when measuring length, width, straightness of sides, rectangularity, if these are subsequently hidden in the joints after fixing (installation).

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1

##### **straightness of sides**

deviation from straightness of the centre of the side in the plane of the tile

Note 1 to entry: See [Figure 1](#).

#### 3.2

##### **deviation from rectangularity**

measurement of the departure from squareness of each corner of a tile

Note 1 to entry: It is expressed in millimetres.

Note 2 to entry: See [Figures 3 a\) and b\)](#).

#### 3.3

##### **surface flatness measurement**

measurements in three positions on the surface of tiles

Note 1 to entry: Tiles that have relief on the proper surface preventing measurement on that surface shall, where possible, be measured on the back.

**3.4  
centre curvature**

departure of the centre of a tile from the plane in which three of the four corners lie

Note 1 to entry: See [Figure 4](#).

**3.5  
edge curvature**

departure of the centre of one edge of a tile from the plane in which three of the four corners lie

Note 1 to entry: See [Figure 5](#).

**3.6  
warpage**

departure of the fourth corner of the tile from the plane in which the other corners lie

Note 1 to entry: See [Figure 6](#).

**3.7  
crack**

fracture in the body of the tile visible on the face or the back or both

**3.8  
crazing**

fracture of the glaze that appears as irregular hairline *cracks* ([3.7](#))

**3.9  
dry spot**

area on the face of a glazed tile which has no glaze

**3.10  
unevenness**

depression in the surface of a tile or a glaze

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**3.11  
pin hole**

tiny pit in the surface of a glazed tile

**3.12  
glaze devitrification**

crystallization of the glaze which is visually apparent

**3.13  
speck  
spot**

visually contrasting area in the tile face

**3.14  
underglaze fault**

apparent fault covered by glaze

**3.15  
decorating fault**

apparent fault in decoration

**3.16  
chip**

fragment broken off from the edges, corners or surface of a tile

**3.17  
blister**

small surface bubble or blow-out resulting from the expulsion of gas during firing

**3.18****rough edge**

irregularity along the edge of a tile

**3.19****welt**

unusually heavy accumulation of glaze in the form of a ridge along the edge

**3.20****polishing defect****polishing effect**

visual inconsistency resulting from the polishing process Note 1 to entry: Polishing defects include, but are not limited to, uneven polishing, inconsistent reflectivity, abrasive mark or grinder mark not fully removed from polishing, etc.

Note 1 to entry: Some optical characteristics are not included and are determined with specialized equipment.

**4 Measurement of length and width****4.1 Apparatus**

**Vernier calipers**, or other suitable apparatus for linear measurement.

**4.2 Test specimens**

Sampling is done as follows:

- for tiles with area,  $A \leq 0,04 \text{ m}^2$ , ten whole tiles in each type shall be tested;
- for tiles with area,  $0,04 \text{ m}^2 < A \leq 0,36 \text{ m}^2$ , seven whole tiles in each type shall be tested;
- for tiles with area,  $A > 0,36 \text{ m}^2$ , five whole tiles in each type shall be tested.

**4.3 Procedure**

Measure, to the nearest 0,1 mm, each side of the tile under test, at positions 5 mm from the corners.

**4.4 Expression of results**

The average dimension of square tiles is the average of four measurements. The average dimension of the sample is the average of 40 measurements.

For oblong tiles, each similar pair of sides of a tile provides the appropriate average dimension of the tile, i.e. an average of two measurements. The average dimensions for length and width of the sample are the average of 20 measurements each.

**4.5 Test report**

The test report shall include the following information:

- a) reference to this document;
- b) a description of the tiles;
- c) all individual measurements of length and width;
- d) the average size of each test specimen for square tiles, and the average length and width for each oblong tile;

- e) the average size of the whole sampling for square tiles, and the average length and width for oblong tiles;
- f) the deviation, as a percentage and in millimetres, of the average size of each tile (two or four sides) from the work size;
- g) the deviation, as a percentage and in millimetres, of the average size of each tile (two or four sides) from the average size determined in (e).

## 5 Measurement of thickness

### 5.1 Apparatus

**Micrometer screw gauge with anvils**, of 5 mm to 10 mm diameter, or any other suitable instruments that can reproduce the measurements procedure described in [5.3](#).

### 5.2 Test specimens

Sampling is done as follows:

- For tiles with area,  $A \leq 0,04 \text{ m}^2$ , ten whole tiles in each type shall be tested.
- For tiles with area,  $0,04 \text{ m}^2 < A \leq 0,36 \text{ m}^2$ , seven whole tiles in each type shall be tested.
- For tiles with area,  $A > 0,36 \text{ m}^2$ , five whole tiles in each type shall be tested.

### 5.3 Procedure

For all tiles, except those with uneven surfaces, draw diagonals between the corners and measure the thickness at the thickest point within each of the four segments. All thickness measurements should include the dimensions of the ribs/panel mark or back-feet present at the back of the tile. Measure, to the nearest 0,1 mm, the thickness of each tile under test in four positions.

For tiles with uneven surfaces, draw four lines at right angles across the face at distances of 0,125; 0,375; 0,625 and 0,875 times the length measured from the end. Measure the thickness at the thickest point on each line.

### 5.4 Expression of results

For all the tiles, the average dimension of each individual tile is the average of four measurements.

### 5.5 Test report

The test report shall include the following information:

- a) reference to this document;
- b) a description of the tiles;
- c) all individual measurements of thickness;
- d) the average thickness of each tile;
- e) the deviation, as a percentage and in millimetres, of the average thickness of each tile from the work size thickness.



## 6 Measurement of straightness of sides

### 6.1 Calculation

The measurement is only relevant to the straight sides of tiles ([Figure 1](#)) and is expressed as:

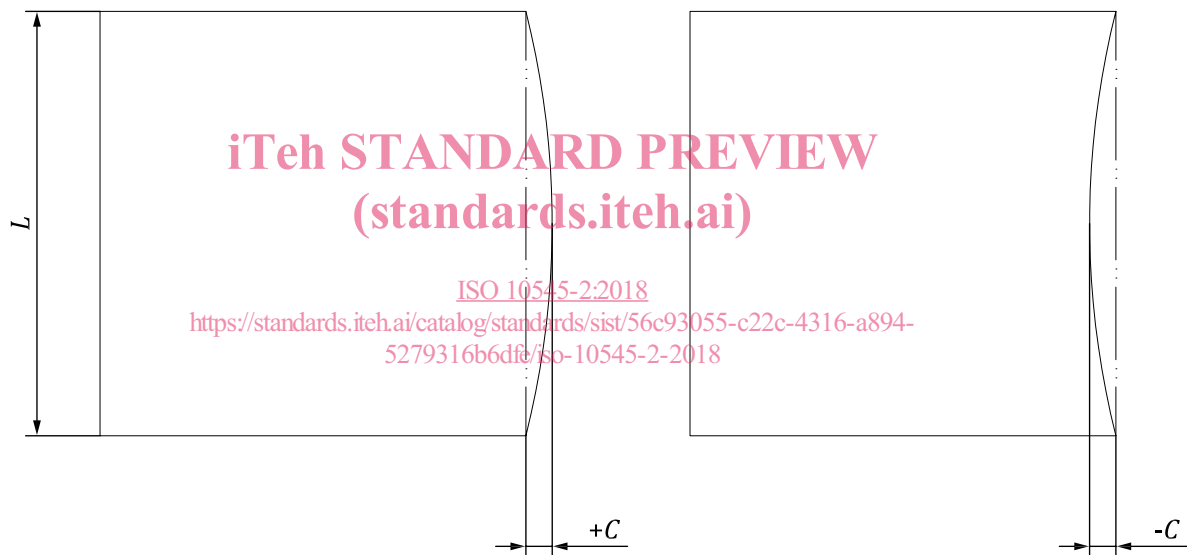
- deviation,  $C$ , in millimetres;
- a percentage, using the formula.

$$\frac{C}{L} \times 100$$

where

$C$  is the deviation from straightness at the centre of the measured side;

$L$  is the work size of the measured side.



**Figure 1 — Straightness of sides**

### 6.2 Apparatus

**6.2.1 Apparatus**, any suitable instrument that can reproduce the measurements procedure described in [6.4](#) (example of an apparatus is shown in [Figure 2](#)).

The dial gauge ( $D_F$ ) is used for measuring the straightness of sides.