BRITISH STANDARD

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Agglomerated stone — Test methods —

Part 16: Determination of dimensions, geometric characteristics and surface quality of modular tiles

The European Standard EN 14617-16:2005 has the status of a British Standard

ICS 91.100.15

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 14617-16:2005.

The UK participation in its preparation was entrusted to Technical Committee B/545, Natural stone, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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Agglomerated stone - Test methods - Part 16: Determination of dimensions, geometric characteristics and surface quality of modular tiles

Pierre agglomérée - Méthodes d'essai - Partie 16: Détermination des dimensions, des caractéristiques géométriques et de la qualité de surface des tuiles modulaires

Künstlich hergestellter Stein - Prüfverfahren - Teil 16: Bestimmung der Maße, der geometrischen Merkmale und der Oberflächenqualität von Fliesen

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Foreword

This document (EN 14617-16:2005) has been prepared by Technical Committee CEN/TC 246 “Natural stones”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.

Test methods for agglomerated stones consist of the following:

EN 14617-1, *Agglomerated stone - Test methods – Part 1: Determination of apparent density and water absorption*

EN 14617-2, *Agglomerated stone – Test methods – Part 2: Determination of flexural strength (bending)*

prEN 14617-3, *Agglomerated stone - Test methods – Part 3: Determination of slipperiness*

EN 14617-4, *Agglomerated stone - Test methods – Part 4: Determination of the abrasion resistance*

EN 14617- 5, *Agglomerated stone - Test methods – Part 5: Determination of freeze and thaw resistance*

EN 14617-6, *Agglomerated stone - Test methods – Part 6: Determination of thermal shock*

prEN 14617-7, *Agglomerated stone – Test methods – Part 7: Determination of ageing*

prEN 14617-8, *Agglomerated stone – Test methods – Part 8: Determination of resistance to fixing (dowel hole)*

EN 14617-9, *Agglomerated stone - Test methods – Part 9: Determination of impact resistance*

EN 14617-10, *Agglomerated stone – Test methods – Part 10: Determination of chemical resistance*

EN 14617-11, *Agglomerated stone – Test methods – Part 11: Determination of linear thermal expansion coefficient*

EN 14617-12, *Agglomerated stone – Test methods – Part 12: Determination of dimensional stability*

EN 14617-13, *Agglomerated stone – Test methods – Part 13: Determination of electrical resistivity*

prEN 14617-14, *Agglomerated stone – Test methods – Part 14: Determination of surface hardness*

EN 14617-15, *Agglomerated stone – Test methods – Part 15: Determination of compressive strength*

EN 14617-16, *Agglomerated stone – Test methods – Part 16: Determination of dimensions, geometric characteristics and surface quality of modular tiles*

prEN 14617-17, *Agglomerated stone – Test methods – Part 17: Determination of biological resistance*

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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 agglomerated stones modular tiles.

2 Term and definition

For the purposes of this document, the following term and definition applies.

2.1
modular tile
piece of an agglomerated stone in standard sizes, generally of thickness 12 mm.

3 Measurement of length and width

3.1 Apparatus

Vernier callipers, or other suitable apparatus for linear measurement.

3.2 Test specimens

Ten whole tiles shall be submitted to measurements.

3.3 Procedure

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

3.4 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.

3.5 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of the tiles;

d) all individual measurements of length and width;

e) average size of each test specimen for square tiles, and the average length and width for each oblong tile;

f) average size of the 10 test specimens for square tiles, and the average length and width for oblong tiles;

g) deviation, as a percentage, of the average size of each tile (two sides or four sides) from the work size;

h) deviation, as a percentage, of the average size of each tile (two or four sides) from the average size of the 10 test specimens (20 sides or 40 sides).

4 Measurement of thickness

4.1 Apparatus

Micrometer screw gauge with anvils, of 5 mm to 10 mm diameter, or other suitable apparatus.

4.2 Test specimens

Ten whole tiles shall be submitted to measurements.

4.3 Procedure

For all tiles, draw diagonals between the corners and measure the thickness at the thickest point within each of the four segments. Measure, to the nearest 0,1 mm, the thickness of each tile under test in four positions.

4.4 Expression of results

For all the tiles, the average dimension of each individual tile is the average of four measurements. The average thickness of the sample is the average of 40 measurements.

4.5 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of the tiles;

d) all individual measurements of thickness;

e) average thickness of each tile;

f) the deviation, as a percentage or in millimetres (as required by the product standard), of the average thickness of each tile from the work size thickness.

5 Measurement of straightness of sides

5.1 Term and definition

For the purposes of this document, the following term and definition applies.

5.1.1
straightness of sides
The deviation from straightness of the centre of the side in the plane of the tile.

The measurement is only relevant to the straight sides of tiles (Figure 1) and is calculated as 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 length of the measured side.

5.2 Apparatus

5.2.1 Apparatus, as shown in Figure 1, or any other suitable instrument.

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

5.2.2 Calibrating plate, of accurate dimensions and with straight, flat sides.

5.3 Test specimens

Ten whole tiles shall be submitted to measurements.

5.4 Procedure

Select an apparatus of the appropriate dimensions (5.2.1) so that, when a tile is placed in the apparatus, on the supporting studs (S_A, S_B S_C), the locating studs (I_A, I_B, I_C) are 5 mm from each corner of the side being measured. (See Figure 1.)

Fit the appropriate calibrating plate (5.2.2) exactly into position on the instrument, and adjust the dial gauge reading to a suitable known value.

Remove the calibrating plate, place the proper surface of the tile on the locating studs in the apparatus, and record the dial gauge reading in the centre of the side. If the tile is square, rotate it to obtain four measurements. Repeat this procedure for each tile being tested. In the case of oblong tiles, use separate instruments of the appropriate dimensions to measure lengths and widths. Measure to the nearest 0,1 mm.

5.5 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of tiles;

d) all individual measurements of straightness of sides;

e) maximum deviation from straightness, as a percentage related to the corresponding work sizes.

6 Measurement of rectangularity

6.1 Terms and definitions

For the purposes of this document, the following term and definition applies:

6.1.1
deviation from rectangularity
If a corner of a tile is placed against the angle of an accurate calibrating plate (see Figure 3), deviation from rectangularity is calculate as a percentage, using the formula

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

where

δ is the deviation of the outer corner of the side of the tile (measured 5 mm from the corner) from the inner side of the calibrating plate;

L is the length of the adjacent side of the tile.

6.2 Apparatus

6.2.1 Apparatus, as shown in Figure 1, or any other suitable instrument.

The dial gauge (D_A) is used for measuring rectangularity.

6.2.2 Calibrating plate, of accurate dimensions and with straight, flat sides.

6.3 Test specimens

Ten whole tiles shall be submitted to measurements.

6.4 Procedure

Select an apparatus of the appropriate dimensions (6.2.1) so that, when a tile is placed in the apparatus, on the supporting studs (S_A, S_B, S_C), the locating studs (I_A, I_B, I_C) are 5 mm from each corner of the side adjacent to the side being measured. (See Figure 1.) The plunger of the dial gauge (D_A) shall also be 5 mm from the corner of the tile on the side being measured. (See Figure 1.)

Fit the appropriate calibrating plate (6.2.2) exactly into position on the instrument, and adjust the dial gauge reading to a suitable known value.

Remove the calibrating plate, place the proper surface of the tile on the locating studs in the apparatus, and record the dial gauge reading 5 mm from the corner. If the tile is square, rotate it to obtain four measurements. Repeat this procedure for each edge of a square tile. Repeat this procedure for each tile being tested. In the case of oblong tiles, use separate instruments of the appropriate dimensions to measure lengths and widths. Measure to the nearest 0,1 mm.

6.5 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of the tiles;

d) all individual measurements of rectangularity;

e) maximum deviation from rectangularity, as a percentage related to the corresponding work sizes.

7 Measurements of surface flatness (curvature and warpage)

7.1 Terms and definitions

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

7.1.1
surface flatness
defined by measurements in three positions on the surface of tiles.

7.1.2
centre curvature
departure of the centre of a tile from the plane in which three of the four corners lie. (See Figure 4)

7.1.3
edge curvature
departure of the centre of one edge of a tile from the plane in which three of the four corners lie. (See Figure 5)

7.1.4
warpage
departure of the fourth corner of the tile from the plane in which the other corners lie. (See Figure 6)

7.2 Apparatus

7.2.1 Apparatus, as shown in Figure 1, or any other suitable instrument.

In order to measure smooth-surfaced tiles, the supporting studs (S_A, S_B, S_C) shall be 5 mm in diameter. In order to obtain meaningful results for other tile surfaces, suitable supporting studs shall be used.

7.2.2 A perfectly flat calibrating plate, of metal or glass, and at least 10 mm thick for the apparatus described in 7.2.1.

7.3 Test specimens

Ten whole tiles of each type shall be submitted to measurements.

7.4 Procedure

Select an apparatus of the appropriate size (7.2.1) and place the corresponding calibrating plate (7.2.2) exactly into position on top of the three accurately positioned studs (S_A, S_B, S_C). The centre of each stud shall be 10 mm from the side of the tile, and the two outer dial gauges (D_E, D_C) shall be 10 mm from the sides of the tile.

Adjust the three dial gauges (D_D, D_E, D_C) to a suitable known value. (See Figure 1.)

Remove the calibrating plate, place a tile on the apparatus with the glaze or proper surface downwards, and record the three dial gauge readings. If the tile is square, rotate it to obtain four measurements of each property. Repeat this procedure for each tile being tested. In the case of oblong tiles, use separate instruments of the appropriate dimensions. Record the maximum centre curvature (D_D), edge curvature (D_E) and warpage (D_C) for each tile. Measure to the nearest 0,1 mm.

7.5 Expression of results

Centre curvature is expressed as a percentage of the length of the diagonal.

Edge curvature is expressed as a percentage of

— length and width for oblong tiles;

— size for square tiles.

Warpage is expressed as a percentage of the length of the diagonal. Measurements for tiles with spacer lugs shall be expressed in millimetres.

7.6 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of tiles;

d) all individual measurements of centre curvature;

e) all individual measurements of edge curvature;

f) all individual measurements of warpage;

g) maximum centre curvature, as a percentage or in millimetres (as required by the product standard), related to the diagonal calculated from the work size;

h) maximum edge curvature, as a percentage or in millimetres (as required by the product standard), related to the corresponding work size;

i) maximum warpage, as a percentage or in millimetres (as required by the product standard), related to the diagonal calculated from the work sizes.

8 Surface quality

8.1 Terms and definitions of surface defects and intentional effects

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

8.1.1
cracks
any fracture in the body of the tile visible on the face or the back or both.

8.1.2
detachements
any discontinuity at the interface between aggregates and binder which is visually relevant.

8.1.3
dry spots
areas on the face of a tile which have an evident micro-porosity.

8.1.4
pin hole
tiny pit in the surface of a tile.

8.1.5
polluting materials
any unintentional intrusion which is visually apparent.

8.1.6
specks or spots
any unintentional visually contrasting areas in the tile face.

8.1.7
decorating fault
any apparent fault in decoration, respect to a standard colour or design.

8.1.8
chip
fragment broken off from the edges, corners or surface of a tile.

8.1.9
irregular edge
any unintentional irregularity along the edge of a tile, a bevel which is out of tolerance in particular.

8.1.10
polishing defect (only for polished surfaces):
any evident unintentional visually less reflecting areas in the glossy surface.

NOTE In order to judge whether an intentional decorative effect is acceptable or whether there is a defect, the relevant clause of the product standard should be referred to. Cracks, nipped edges and nipped corners cannot be intentional effects.

8.2 Apparatus

8.2.1 A light source representing the average daylight, such as the source CIE[1] D 65, 70 W-R75/WDL-UVS (for example ty OSRAM 4QI-TS).

8.2.2 **A 1 m ruler**, or other suitable means of measuring distance.

8.3 Test specimens

At least ten tiles shall be examined.

8.4 Procedure

Place the tiles, with the proper surface under observation, so that they can be viewed perpendicularly to the surface at a distance of 1 m. Illuminate them with the above described light source.

View the tiles with the naked eye or with spectacles if usually worn.

The preparation of the test area and the viewing for the test shall not be performed by the same person.

Intentional effects in the surface shall not be regarded as defects.

8.5 Expression of results

Surface quality is expressed as the percentage of tiles without defects. Colour variation in the natural stone aggregate cannot be considered "decorative fault".

8.6 Test report

The test report shall include the following information:

a) reference to this document;

b) name of the manufacturer and/or the supplier;

c) description of tiles;

d) number of tiles examined;

e) assessment of criteria used;

f) percentage of tiles without defects.

[1] Commission Internationale de l'Eclairage (Central Bureau, Kagelpasse 27, A-1030 Vienna-AT)

EN 14617-1

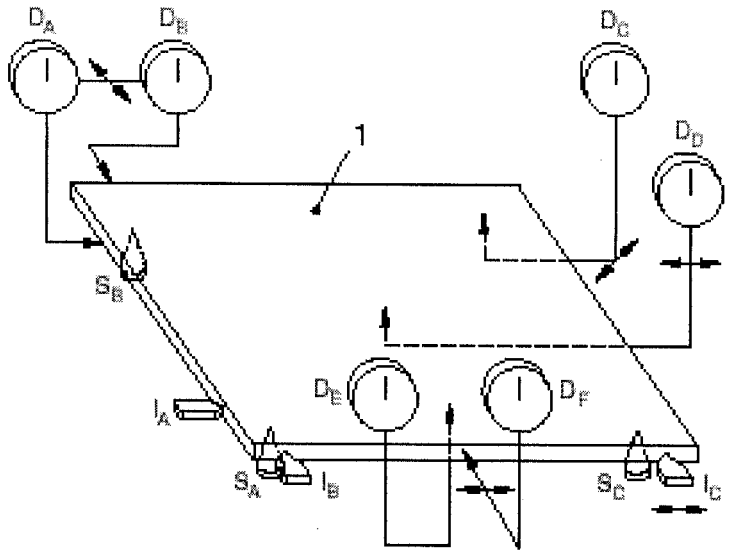

Figure 1 — Apparatus for the measurement of straightness of sides, rectangularity and surface flatness

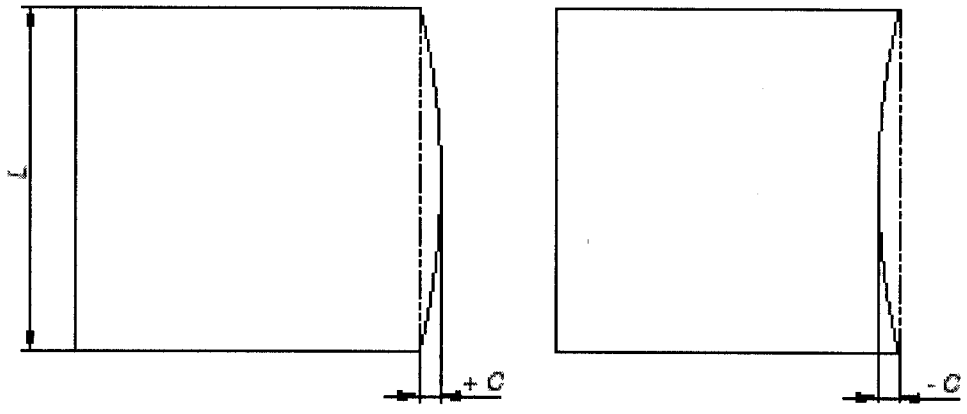

Figure 2 — Straightness of sides

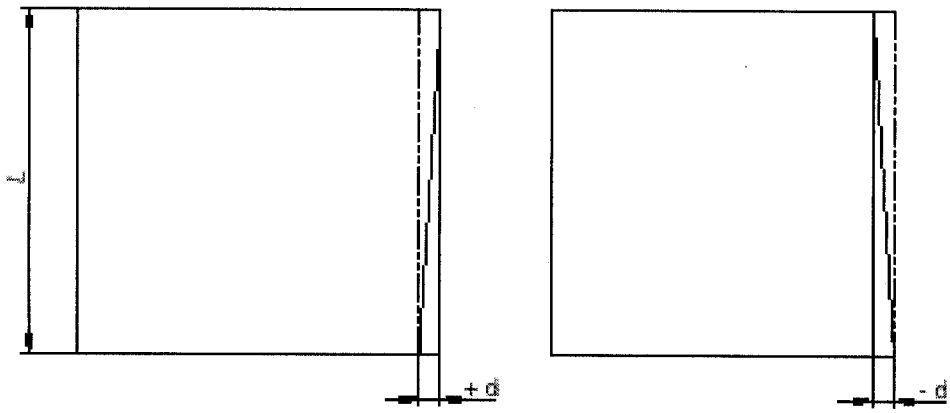

Figure 3 — Rectangularity

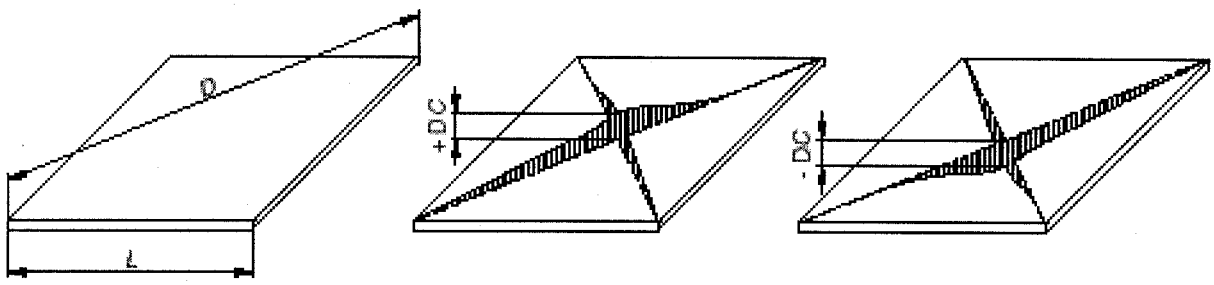

Figure 4 — Centre curvature

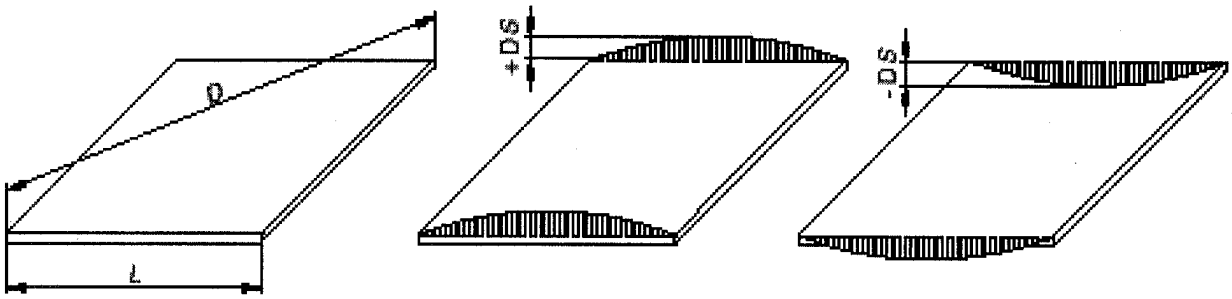

Figure 5 — Edge curvature

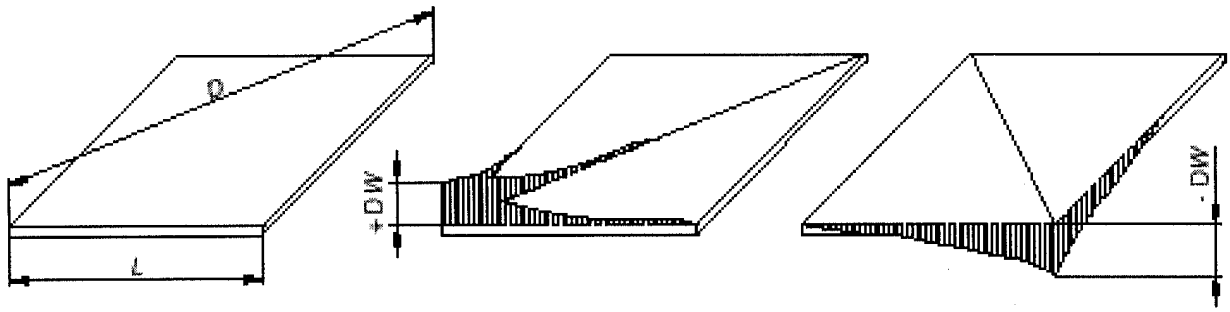

Figure 6 — Warpage

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