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Second edition
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Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles

Revêtements de sol résilients ou textiles — Détermination de la longueur des bords, de la rectitude des arêtes et de l'équerrage des dalles

Reference number
ISO 24342:2007(E)

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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.

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The main task of technical committees is to prepare International Standards. 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.

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.

ISO 24342 was prepared by Technical Committee ISO/TC 219, *Floor coverings*.

This second edition cancels and replaces the first edition (ISO 24342:2006), of which it constitutes a minor revision, with a view to include textile floor coverings in the scope. It also cancels and replaces ISO 13747:1999.

Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles

1 Scope

This International Standard describes methods for determining side lengths, straightness of edges and squareness of resilient or textile floor tiles.

The side lengths, straightness and squareness of resilient or textile floor tiles are important considerations because installed flooring will have an objectionable appearance if these performance criteria are not followed. This may cause the installed tiles to line up unevenly, producing unsightly seams and corners that do not match.

2 Terms and definitions

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

2.1
squareness
measurement of the amount each corner of the tile deviates from 90°

See Figure 1.

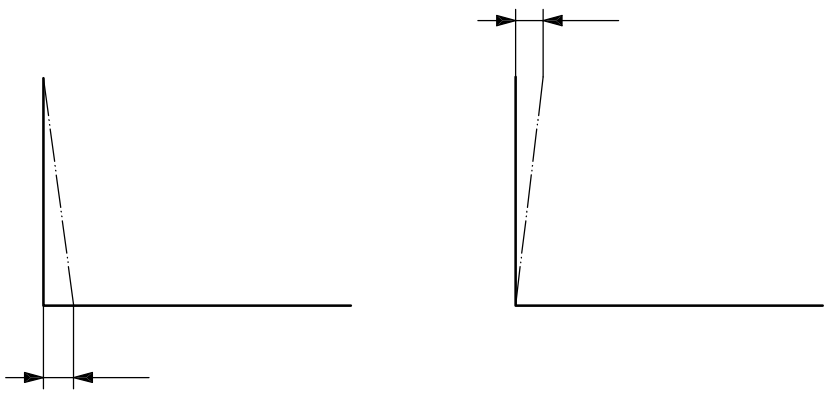


Figure 1 — Definition of squareness

2.2
straightness
property of an edge to be straight, unbent

See Figure 2.

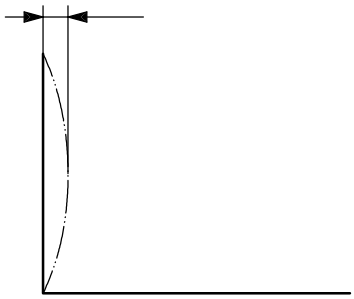


Figure 2 — Definition of straightness

2.3
tile
type of resilient or textile flooring of predetermined shape intended to be used in a modular mode

NOTE Tiles are usually square, but can also be rectangular, e.g. “plank”, “panel”.

3 Principle

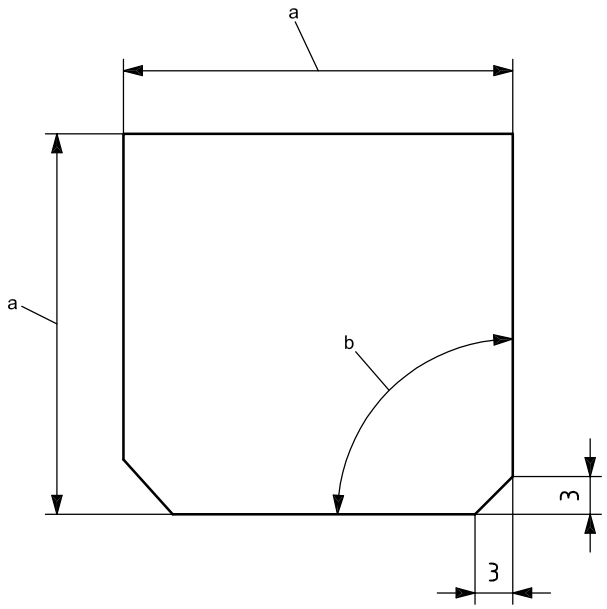
The surface dimensions of a tile are measured by a contact method at defined positions in each direction. To assess the squareness, each corner of a right-angled tile is fitted into the dihedral angle of a precision square and the maximum gap between the arm of the square and the ends of the tile is measured. The maximum opening between the arm and the edge is measured at defined points along the edge to assess the straightness.

4 Apparatus

4.1 Reference plate (calibration plate), made to the target dimensions of the manufactured tile.

The length and width dimensions shall be within 0,02 mm of the specified dimensions of the resilient or textile tiles. The reference plate shall contain at least two sides that are perpendicular to $\pm$ 0,000 05 rad (0,003°) to one or another and are used to set squareness gauge to zero (see Figure 3).

Dimensions in millimetres



[a] Tile target dimension ± 0,02 mm.

[b] 1,570 80 rad ± 0,000 05 rad.

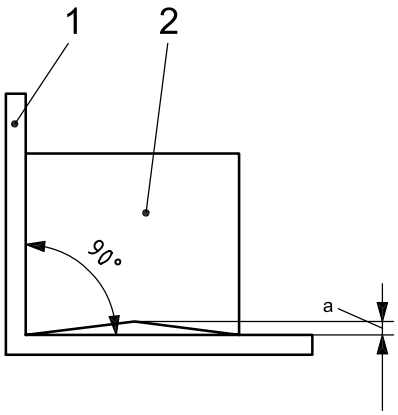
Figure 3 — Reference plate

4.2 Rigid metal or glass plate, squared and finished, with dimensions 5 mm to 10 mm less than those of the tile, for the thickness gauge method.

The mass per unit area of the plate shall be approximately 20 kg/m^2.

4.3 Flat bedplate apparatus, for measuring squareness and straightness of floor tiles.

This apparatus shall be an “L” shaped steel device having an angle of 1,570 80 rad (90°) with a tolerance of ± 0,000 05 rad (0,003°), as shown in Figures 4 and 5 with the length of both reference strips larger than the largest dimension of the tile. For measuring side length, a dial gauge is also placed on the flat bedplate according to Figure 6.



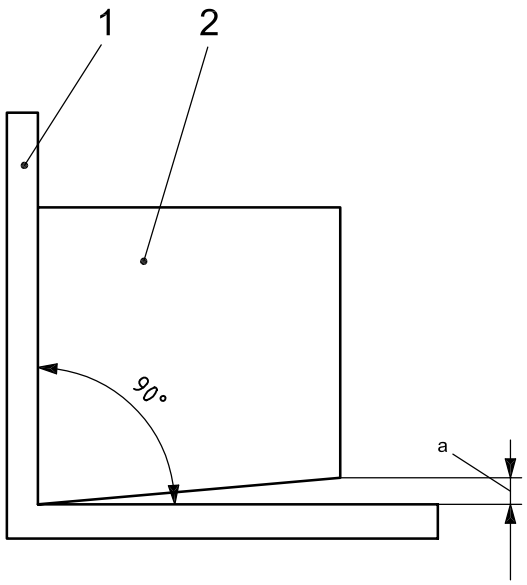
Key

1 measuring tool

2 tile

a Maximum length of gap.

Figure 4 — Apparatus and position of tile for measuring straightness



Key

1 measuring tool

2 tile

a Out-of-squareness.

Figure 5 — Apparatus and position of tile for measuring squareness

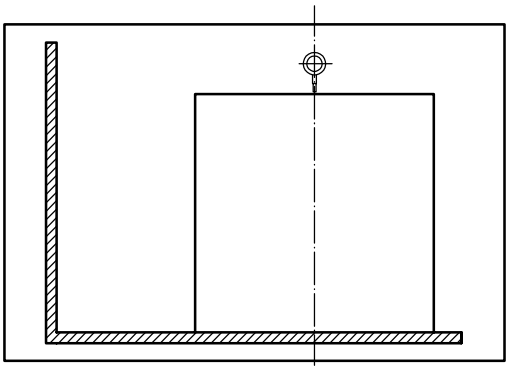


Figure 6 — Apparatus for measuring side length

4.4 Gauge and/or calliper, for the measurement of the length of the tiles up to 610 mm.

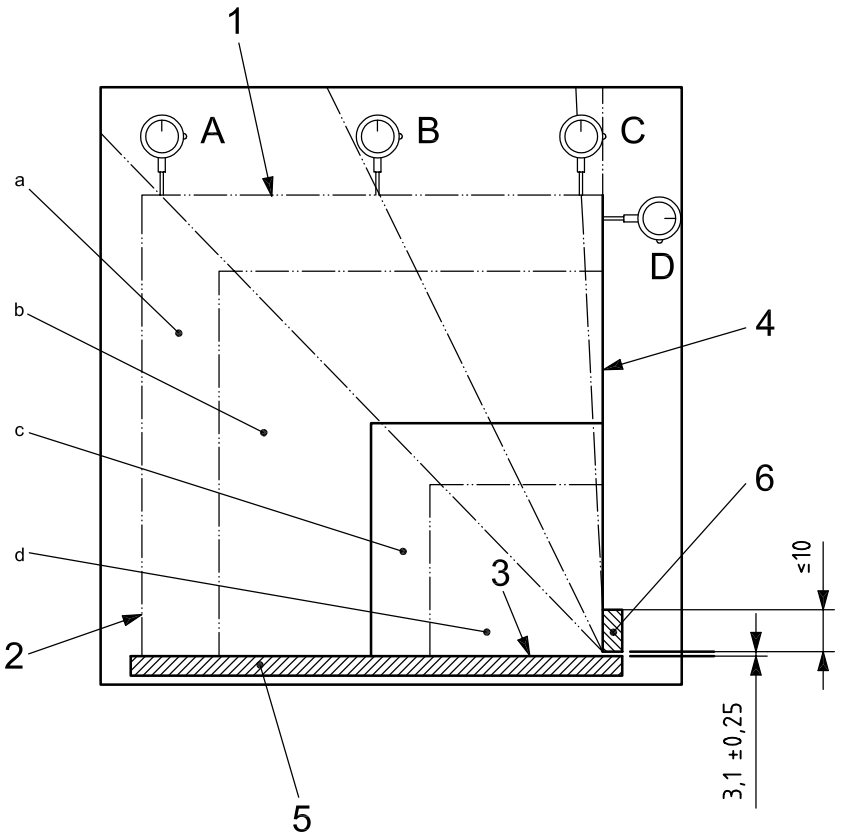
A dial gauge, a sliding calliper gauge or equivalent device with an accuracy of 0,05 mm or a set of thickness gauges in steps of 0,05 mm that can be easily inserted at any point between the “L” shaped steel device and the edge of the tile.

4.5 Movable dial gauges apparatus, containing two fixed index strips according to Figure 7.

A horizontal index strip shall be mounted parallel to and just inside the lower edge of the bedplate. It shall be 38 mm ± 3 mm greater in length and a minimum of twice the thickness of the largest resilient or textile tile to be tested. A second index strip shall be mounted 1,570 80 ± 0,000 05 rad (90 ± 0,003°) to the horizontal index strip. The lower end of this index strip shall be 3,1 mm ± 0,25 mm above the right end of the horizontal index strip and is used to locate one corner of the sample tile. The length of the second index strip shall be maximum 10 mm.

The four dial gauges are mounted allowing for measurement of various tiles side lengths while remaining within 10 % of the corner of the tile edge (for the two corner gauges and one squareness gauge) or within the central 10 % of the tile edge (for the centre gauge only). Dial gauges may report measurements using electrical or mechanical means, but they shall be graduated to read 0,02 mm and have a stem travel greater than 6 mm. The contact foot of the dial gauge stem shall be flat, 12,7 mm to 19,1 mm in diameter and exert a total force of not more than 1,0 N. Dial gauges shall be securely positioned so that when the reference plate is in place, the contact foot is extended approximately 50 % of its full travel.

Dimensions in millimetres



Key

1 edge 1
2 edge 2
3 edge 3
4 edge 4
5 horizontal index strip
6 second index strip
A,B,C,D dial gauges

[a] Template 610 mm × 610 mm.
[b] Template 508 mm × 508 mm.
[c] Template 305 mm × 305 mm.
[d] Template 229 mm × 229 mm.

Figure 7 — Apparatus for measuring side length, straightness and squareness

5 Sampling and selection of specimens

Five tiles shall be taken from the product. Where a pack of tiles comprises the sample, ensure that the first and the last tiles are not selected for testing. Mark the machine direction (MD) on every tile. If the machine direction cannot be determined by the appearance of the material, mark one direction. Report that the machine direction could not be determined.

6 Atmosphere for conditioning and testing

Condition the test specimen at 23 °C ± 2 °C and (50 ± 5) % relative humidity for at least 24 h and test in the same conditions. Specimens shall be conditioned on a flat surface such as a table or floor surface to ensure they will contact the bedplate uniformly during measurement.

7 Procedure

7.1 General

Dirt and foreign particles may collect along the upper face of the index strip and affect the zero set point. Use a small brush to maintain the cleanliness of the index strip surfaces before and after each use.

In the following subclauses, options are given for methods for determining the side length (7.2), squareness (7.3) and straightness (7.4).

7.2 Side length

7.2.1 Gauge method

Place the appropriate reference plate onto the bedplate apparatus (see Figure 6). Set the dial indicator to zero. Remove the reference plate. Place the tile on the flat bedplate, with the rigid square plate on top. Take three measurements of the distance between the opposite sides in each direction, two of these measurements approximately 10 mm from the perpendicular edges and the third equidistant from the first two.

7.2.2 Movable dial gauge method

Place the appropriate reference plate onto the bedplate surface and slide firmly against the two index strips. Set each of the four dial indicators to zero. Remove the reference plate. All dial indicators will now reflect their fully extended measurements. In the case of digital indicators, the display will indicate a negative number. In the case of mechanical dial indicators, the display will move counter-clockwise from zero.

Identify one edge of the sample tile as edge 1 by attaching a label to the face of the tile near that edge. Place the tile into the apparatus and carefully move it into position such that it will depress all four dial gauges and that there is firm contact with both index strips. Record the measurements on all four gauges to the nearest 0,02 mm as they will be used for the side length, straightness and squareness calculations (see Table 1).

Remove the tile from the bedplate and rotate it 90° in the clockwise direction. Repeat the process described in preceding paragraph and record the four gauge readings. Repeat for each of the two remaining sides.

After all samples have been measured, place the reference plate back on the bedplate to verify that no movement of the dial gauges has occurred. If the movement is greater than 0,02 mm, repeat the measurement process.

7.2.3 Sliding calliper method

Take three measurements of the distance between the opposite sides in each direction, two of these measurements approximately 10 mm from the perpendicular edges and the third equidistant from the first two.

7.3 Squareness

7.3.1 Thickness gauge method

To measure squareness of floor tiles by thickness gauge (4.4), place one edge of the tile against an arm of the square and slide it up to touch the other arm. Then place the rigid plate on top without moving the tile. Determine the thickest gauge, which can be easily inserted between the second arm of the square and the tile at the end of the edge to assess the deviation from the squareness (see Figure 5).

7.3.2 Movable dial gauge method

See 7.2.2.

7.4 Straightness

7.4.1 Thickness gauge method

The straightness of a tile is the largest gap existing at the middle of the edge of the tile (see Figure 2). Measure this largest gap by inserting the dial gauge or the thickness gauge between the “L” shaped steel device and the edge of the tile.

7.4.2 Movable dial gauge method

See 7.2.2.

8 Calculation and expression of the results

8.1 For thickness gauge apparatus

8.1.1 Side length

Report the average of the deviations in each direction per tile. The side lengths shall be reported to 0,1 mm.

8.1.2 Squareness

Report the greatest deviation at the end of the edge for squareness.

8.1.3 Straightness

Report the greatest deviation at any point along the edge for straightness.

8.2 For movable dial gauge apparatus

Record all tile size measurements in the format shown in Table 1. Measurements shall be recorded to the nearest 0,02 mm for all gauges. The four rotations provide two measurements of the length and width of the tile specimens. Report the dimensions and squareness for each specimen using the formulae in Table 2.

Perform the calculations using Table 2 data to determine length, width, and squareness deviations for the sample tile. The final report shall include test date, side length, straightness and squareness deviations.

8.3 For the sliding calliper apparatus

Report the average of the deviations in each direction per tile. The side lengths shall be reported to 0,1 mm.

9 Precision statement

An interlaboratory test will be conducted to determine the precision of this method.

10 Test report

The test report shall contain the following information:

a) all details necessary for identification of the specimens, including type, source, manufacturer and colours;

b) reference to this International Standard, i.e. ISO 24342, and the method used;

c) previous history of the sample;

d) date the test was completed;

e) the atmosphere for conditioning and testing;

f) the deviation of the side lengths of the test unit to the nearest 0,02 mm;

g) the out-of-squareness of the test unit to the nearest 0,02 mm;

h) maximum deviation (straightness) for each side of tile in millimetres, to the nearest 0,05 mm;

i) any deviation from this International Standard that can affect the results.

Table 1 — Typical measurement data

Rotation No.	Gauges			
	A	B	C	D
	mm			
1	0,02	0,00	−0,02	0,02
2	0,03	0,02	0,02	−0,03
3	0,04	0,03	0,03	0,02
4	0,04	0,02	0,05	−0,04

Table 2 — Calculations

Length and width deviation	Squareness deviation
Length deviation, Left side = (1A + 3C)/2	Corner 1 = (D1)
Length deviation, Centre = (1B + 3B)/2	Corner 2 = (D2)
Length deviation, Right side = (1C + 3A)/2	Corner 3 = (D3)
Width deviation, Left side = (2A + 4C)/2	Corner 4 = (D4)
Width deviation, Centre = (2B + 4B)/2	
Width deviation, Right side = (2C + 4A)/2	
Straightness of edge 1 = the maximum of (1A − 1B, 1A − 1C ,1B − 1C)	

Bibliography

[1] ASTM F2055, *Standard Test Method for Size and Squareness of Resilient Floor Tile by Dial Gage Method*

[2] EN 427, *Resilient floor coverings — Determination of the side length, squareness and straightness of tiles*

[3] JIS A 1454, *Test Methods — Resilient floor coverings, section 6.3 — Dimension, Straightness and Squareness of Floor Tile*

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