International Standard

ISO 24342

Fourth edition
2024-06

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

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

Reference number
ISO 24342:2024(en)

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Published in Switzerland

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Foreword

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This document was prepared by Technical Committee ISO/TC 219, *Floor coverings,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 134, *Resilient and textile floor coverings,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 24342:2018), which has been technically revised.

The main changes are as follows:

— procedures have been modified to allow for differences between planks and tiles. Clauses 3, 4, 5, 8 and 9 have therefore been updated;

— uncertainty of measurement of the records defined by dial gauges method has been changed from 0,02 mm into 0,01 mm.

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.

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

1 Scope

This document specifies methods for determining side lengths, straightness of edges and squareness of square and/or rectangular resilient or textile floor tiles and planks.

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 terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
squareness
measurement of the amount the corner of the tile/plank deviates from 90°

Note 1 to entry: See Figure 1.

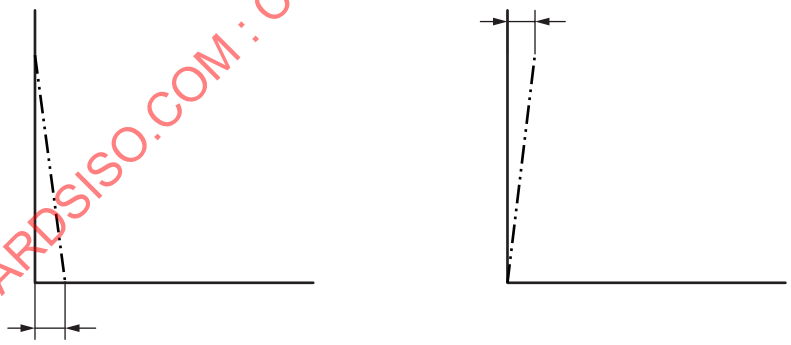


Figure 1 — Definition of squareness

3.2
straightness
property of an edge to be straight, unbent

Note 1 to entry: Some examples are shown in Figure 2.

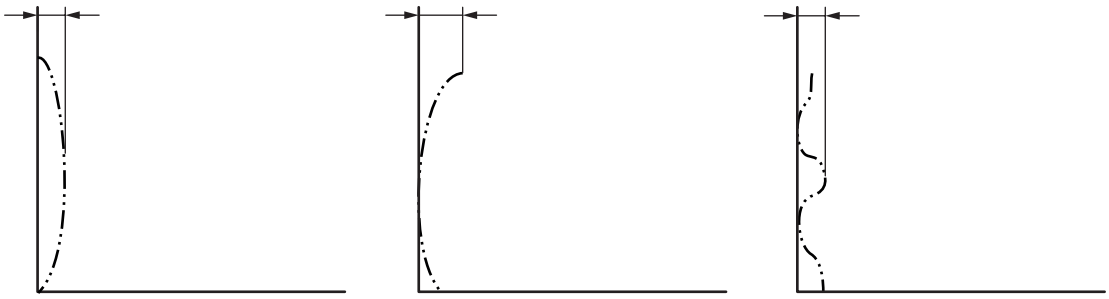


Figure 2 — Examples of straightness – Curved and S-Bow cases

3.3
tile
plank
type of resilient or textile flooring of predetermined shape intended to be used in a modular mode

Note 1 to entry: Tiles are usually square. Planks have a ratio length divided by width superior or equal to 1,3. A modular product with a ratio inferior to 1,3 has to be considered as a tile.

4 Principle

The side lengths, straightness and squareness of resilient or textile floor tiles and planks are important considerations because installed flooring will have an objectionable appearance if these performance criteria are not followed. This can cause the installed tiles/planks to line up unevenly, producing unsightly seams and corners that do not match. The surface dimensions of a tile/plank are measured by a contact method at defined positions in each direction.

To assess the squareness of a tile, 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 end 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.

To assess the squareness of a plank, place one side of the plank against a square/rectangle and slide it up to touch the other arm. Using the thickness gauges, determine the maximum deviation from square at the small side. The procedure is repeated on the diagonally opposite corner. The maximum opening between the arm and the edge is measured at defined points along the edge to assess the straightness.

NOTE For systems with edge connection systems, the visible area of the tile/plank is considered. The devices can be modified for products with edge connection systems to ensure that only the visible area is considered.

5 Apparatus

The use of other measuring methods or devices is permitted when it can be demonstrated that we obtain the same results with the same accuracy as the devices and methods defined below.

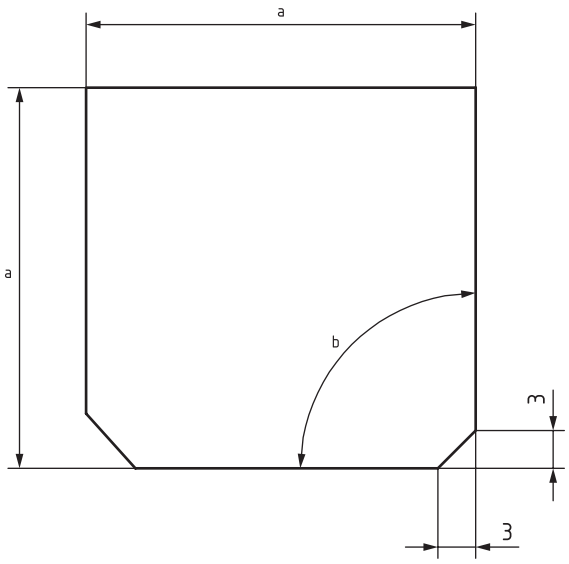
5.1 Reference plate

Reference plate, also referred to as a “calibration plate”, made to the target dimensions of the manufactured tile/plank.

The length and width dimensions shall be within 0,01 mm of the specified dimensions of the resilient or textile tiles/planks. The reference plate shall contain at least two sides that are perpendicular to [±0,000 18 rad (0,01°)] one another. These are used to set the squareness gauge to zero (in the case of tile, see Figure 3 as example).

One corner of the reference plate shall be truncated by 3 mm (see Figure 3) to ensure good visual contact between the sample and the arms of the flat bedplate apparatus (see 5.3).

Dimensions in millimetres



Key

a Tile target dimension ±0,01 mm.

b 1,570 80 rad ± 0,000 18 rad.

Figure 3 — Reference plate (case of tile)

5.2 Rigid metal or glass plate

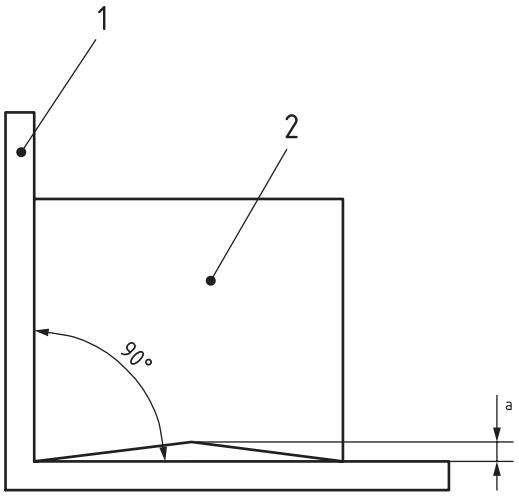
Rigid metal or glass plate having a similar shape to the tile/plank but with dimensions 5 mm to 10 mm less.

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

5.3 Flat bedplate apparatus

Apparatus for measuring the squareness and straightness of floor tiles/planks.

This apparatus shall be an L-shaped steel device having an angle of 1,570 80 rad (90°) with a tolerance of ±0,000 18 rad (0,01°), as shown in Figures 4, 5 and 6 with the length of both reference strips larger than the largest dimension of the tile/plank.



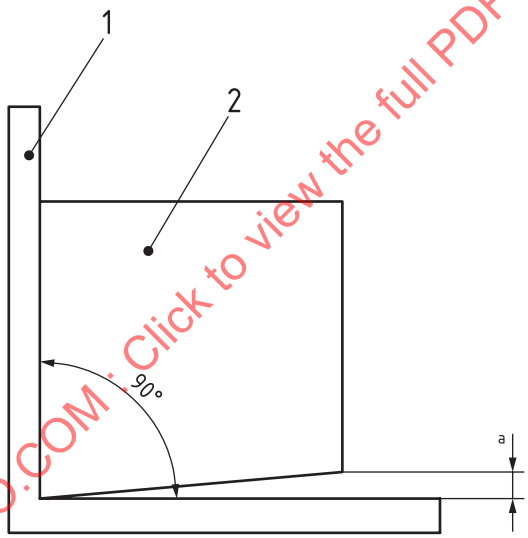
Key

1 measuring tool

2 tile/plank

a Maximum length of gap.

Figure 4 — Apparatus and position of tile/plank for measuring straightness



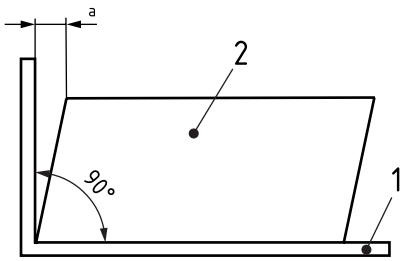
Key

1 measuring tool

2 tile

a Out of squareness.

Figure 5 — Apparatus and position of tile for measuring squareness



Key

1 measuring tool
2 plank
a Out of squareness.

Figure 6 — Apparatus and position of plank for measuring squareness

To measure the side length, place a dial gauge (5.4) on the flat bedplate as shown in Figure 7.

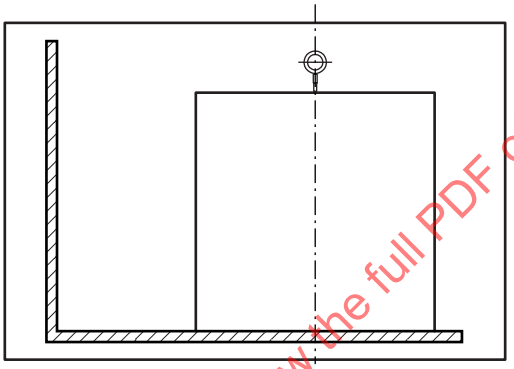


Figure 7 — Apparatus for measuring side length

5.4 Dial gauge, calliper gauge and/or thickness gauges

Use a dial gauge, a sliding calliper gauge or equivalent device having an accuracy of 0,05 mm to measure the length of the tiles/planks. Alternatively, use a set of thickness gauges in steps of 0,05 mm, which can be easily inserted at any point between the "L" shaped steel device (5.3) and the edge of the tile/plank.

The use of other measuring methods or devices is permitted when it can be demonstrated that we have the same results with the same accuracy as dial gauge, calliper gauge or thickness gauges defined above.

5.5 Movable dial gauges apparatus

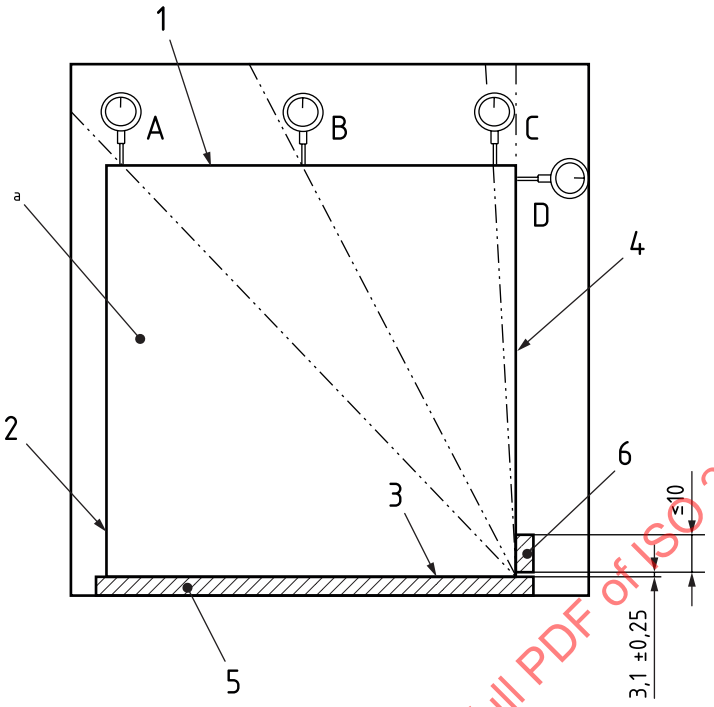
Movable dial gauges apparatus containing two fixed index strips according to Figure 8 (see Key 5 and 6).

A horizontal index strip shall be mounted parallel to and just inside the lower edge of the bedplate (5.3). It shall be 38 mm ± 3 mm greater in length and a minimum of twice the thickness of the largest resilient or textile tile/plank to be tested. A second index strip shall be mounted 1,570 80 rad ± 0,000 18 rad (90° ± 0,01°) 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/plank. The length of the second index strip shall be maximum 10 mm.

The four dial gauges are mounted allowing for measurement of various tiles/planks side lengths while remaining within 10 % of the corner of the tile/plank edge (for the two corner gauges and one squareness gauge) or within the central 10 % of the tile/plank edge (for the centre gauge only). Dial gauges may report measurements using electrical or mechanical means, but they shall be graduated to read 0,01 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 (5.1) is in place, the contact foot is extended approximately 50 % of its full travel.

Dimensions in millimetres



Key

1	edge 1	a	Template 610 mm × 610 mm.
2	edge 2		
3	edge 3		
4	edge 4		
5	horizontal index strip		
6	second index strip		
A, B, C, D	dial gauges		

Figure 8 — Example of apparatus for measuring side length, straightness and squareness for a template 610 mm × 610 mm

6 Sampling and selection of specimens

Five tiles/planks shall be taken from the product. Where a pack of tiles/planks comprises the sample, ensure that the first and the last tiles/planks are not selected for testing. Mark the machine direction (MD) on every tile/plank. 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.

7 Atmosphere for conditioning and testing

7.1 Resilient floor coverings

Condition the test specimen at (23 ± 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 (5.3) uniformly during measurement.

7.2 Textile floor coverings

Condition the test specimen at (20 ± 2) °C and (65 ± 4) % 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 (5.3) uniformly during measurement.

8 Procedure

8.1 General

The use of other measuring methods or devices is permitted when it can be demonstrated that we obtain the same results with the same accuracy as the devices and methods defined below.

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.

Options are given for methods for determining the side length (8.2), squareness (8.3) and straightness (8.4).

8.2 Side length

8.2.1 Gauge method

Place the appropriate reference plate (5.1) onto the bedplate apparatus (5.3) (see Figure 7). Set the dial indicator to zero. Remove the reference plate. Place the tile/plank on the flat bedplate, with the rigid square/rectangle plate (5.2) 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.

8.2.2 Movable dial gauge method

8.2.2.1 Tiles

Place the appropriate reference plate (5.1) onto the bedplate surface (5.3) 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 (5.3) 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 0,01 mm (see Table 1) as they will be used for the side length, straightness and squareness calculations (see Table 2).

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.

8.2.2.2 Planks

8.2.2.2.1 Width size

Place the appropriate reference plate (5.1) onto the bedplate surface (5.3) and slide firmly against the two index strips. A long side of the reference plate shall be in contact with the horizontal index strip. 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 counterclockwise from zero.

Identify one long edge of the sample as edge 2 by attaching a label to the face of the plank near that edge. Place the plank into the apparatus (5.5) 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 0,01 mm (see Table 3) as they will be used for the side length, straightness and squareness calculations (see Table 4).

Remove the plank from the bedplate and rotate it 180° in the clockwise direction in order to characterize edge 4. Repeat the process described in preceding paragraph and record the four gauge readings.

8.2.2.2.2 Length size

Place the appropriate reference plate (5.1) onto the bedplate surface (5.3) and slide firmly against the two index strips. A short side of the reference plate shall be in contact with the horizontal index strip. 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 short edge of the sample as edge 1 by attaching a label to the face of the plank near that edge. Place the plank into the apparatus (5.5) and carefully move it into position such that it will depress the three dial gauges A, B, C and that there is firm contact with both index strips. Record the measurements on these three gauges to the nearest 0,01 mm (see Table 3) as they will be used for the side length and straightness calculations (see Table 4).

Remove the plank from the bedplate and rotate it 180° in the clockwise direction in order to characterize edge 3. Repeat the process described in preceding paragraph and record the three gauge readings.

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.

8.2.3 Sliding calliper method

With a sliding calliper gauge (see 5.4), 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.

8.3 Edge straightness

8.3.1 Thickness gauge method

The straightness of a tile/plank is the largest gap existing at the edge of the tile/plank (see Figure 2). Measure this gap by inserting the dial gauge or the thickness gauge (5.4) between the L-shaped steel device (5.3) and the edge of the tile/plank.

8.3.2 Movable dial gauge method

Lay the specimen on a flat table against a flat bar/reference edge such that a digital indicator or caliper reads zero (or approximately zero) at both ends of the specimen. Move the indicator/caliper down the length of the specimen and record the maximum deflection. If the specimen ends do not touch the bar/reference edge, flip the specimen over to take measurements. Record the measurements to the nearest 0,01 mm. See 8.2.2.

8.4 Squareness

8.4.1 Thickness gauge method

To measure the squareness of a floor tile using a thickness gauge (5.4), place one edge of the tile against an arm of the square/rectangle and slide it up to touch the other arm. Then place the rigid plate (5.2) on top without moving the tile. Determine the thickest gauge which can be easily inserted between the second arm of the square/rectangle and the tile at the end of the edge to assess the deviation from the squareness (see Figure 5). Rotate the tile by 90° and repeat for all 4 sides.

To measure the squareness of a floor plank using a thickness gauge (5.4), place the long edge of the plank against an arm of the square/rectangle and slide it up to touch the other arm. Then place the rigid plate (5.2) on top without moving the plank. Determine the thickest gauge which can be easily inserted between the second arm of the square/rectangle and the plank at the short end of the edge to assess the deviation from the squareness (see Figure 6). Rotate the plank by 180° and repeat.

Do not force the thickness gauges.

8.4.2 Movable dial gauge method

See 8.2.2.1 for tiles and 8.2.2.2 for planks.

9 Calculation and expression of the results

9.1 For flat bedplate apparatus (5.3) and thickness gauge (5.4)

9.1.1 Side length

Calculate the average of the deviations in each direction per tile/plank and the measured average lengths. The side lengths shall be reported to 0,1 mm.

9.1.2 Edge straightness

Calculate the greatest deviation at any point along the edge for straightness. Report to the nearest 0,05 mm.

9.1.3 Squareness

Calculate the greatest deviation at the end of the edge for squareness. Report to the nearest 0,05 mm.

9.2 For the movable dial gauge apparatus

9.2.1 Tiles

Record all tile size measurements in the format shown in Table 1. Measurements shall be recorded to the nearest 0,01 mm for all gauges. The four rotations provide two measurements of the length and width of the tile specimens. Report the side lengths, straightness and squareness for each specimen using the formulae in Table 2.

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

9.2.2 Planks

Record all plank size measurements in the format shown in Table 3. Measurements shall be recorded to the nearest 0,01 mm for all gauges. The four rotations provide two measurements of the length and width of the plank specimens. Report the dimensions, straightness and squareness for each specimen using the formulae in Table 4.

Perform the calculations using Table 4 data to determine length, width and squareness deviations for the sample plank. The final report shall include test date, side length, straightness and squareness deviations

9.3 For the sliding calliper apparatus

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

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) a reference to this document, i.e. ISO 24342:2024, and the method used for each characteristics;

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 and the measured average side lengths to the nearest 0,1 mm;

g) the out-of-squareness to the nearest 0,05 mm;

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

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

Table 1 — Format for reporting the measurement data (using example values for the data) for tile

Edges no.	Gauges			
	A	B	C	D
	mm			
1 (length)	0,02	0,00	−0,02	0,02
2 (width)	0,03	0,02	0,02	−0,03
3 (length)	0,04	0,03	0,03	0,02
4 (width)	0,04	0,02	0,05	−0,04

Table 2 — Calculations for tiles

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