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Composition cork floor tiles — Determination of dimensions and control of squareness and straightness of edges

Dalles d'aggloméré composé de liège pour revêtements des sols — Détermination des dimensions et contrôle de l'équerrage et de la rectitude des bords

Reference number
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Foreword

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Composition cork floor tiles — Determination of dimensions and control of squareness and straightness of edges

1 Scope

This International Standard specifies two methods for the determination of the dimensions of floor tiles of composition cork, for the control of their squareness and straightness of their sides.

2 Sampling

Unless otherwise specified, the tests shall be carried out on five floor tiles.

3 Method A

3.1 Principle

Measurement, by contact with the round feeler gauges of four comparators, of the plane dimensions, the deviation from straightness and the deviation from squareness of tiles.

3.2 Apparatus

See figure 1.

3.2.1 Base in acrylic glass measuring 500 mm × 500 mm × 20 mm, supported by four levelling screws.

3.2.2 Metallic ruler, in millimetres, with a saliency on one end and fixed to the base (3.2.1) by two screws.

3.2.3 Four comparators (A, B, C, D), with a 10 mm path, graduated in hundredths of millimetres, fitted with round feeler gauges with 1 cm^2 cross-section; the comparators A, B and C are for measuring dimensions and the comparator D for measuring the deviation from perpendicularity.

3.2.4 Two crossed arms with lengths l and 2 l, with roller bearings on one end, rotating about an axis and fitted with a joint on their distal ends, which is provided with

3.2.4.1 Ratchet-wheel.

3.2.4.2 Screw to adjust the pressure of the roller bearings on the tile with a constant pressure.

3.2.5 Dynamometer graduated in 10 N, 15 N and 20 N to calibrate the system 3.2.4.

3.2.6 Weight, 1,5 kg, to verify the thickness and to calibrate the dynamometer.

3.2.7 Conical base for the weight (3.2.6).

3.2.8 Standard ruler of stainless steel with a length equal to the nominal dimension of the tiles and an accuracy of ± 0,05 mm.

3.3 Procedure

3.3.1 Device calibration[1]

3.3.1.1 Place the standard ruler (3.2.8) parallel to and in contact with the ruler (3.2.2) so that one of its ends touches the saliency of the ruler (3.2.2).

3.3.1.2 Fix the comparator A when the feeler gauge is in contact with the end of standard ruler (3.2.8) and with the dial showing the reference value chosen, l_R (usually 5,00). Remove the ruler after fixing the comparator.

3.3.1.3 Place the standard ruler (3.2.8) perpendicular to and touching one end of the ruler (3.2.2) so that the other end touches the feeler gauge of comparator B. Fix the comparator when the dial shows the reference value and then remove the standard ruler (3.2.8).

3.3.1.4 Fix the comparator C when its feeler gauge is in contact with the base and its dial shows zero. Then, place the 1,5 kg weight (3.2.6) on the cone of the comparator and rotate its dial to adjust the zero. Remove the weight from the comparator.

3.3.1.5 Fix comparator D so that the mean value of its dial corresponds to the position where a perpendicular line to the metallic ruler touches the limit surface of its feeler gauge.

1) Once calibrated, the device need only be recalibrated from time to time.

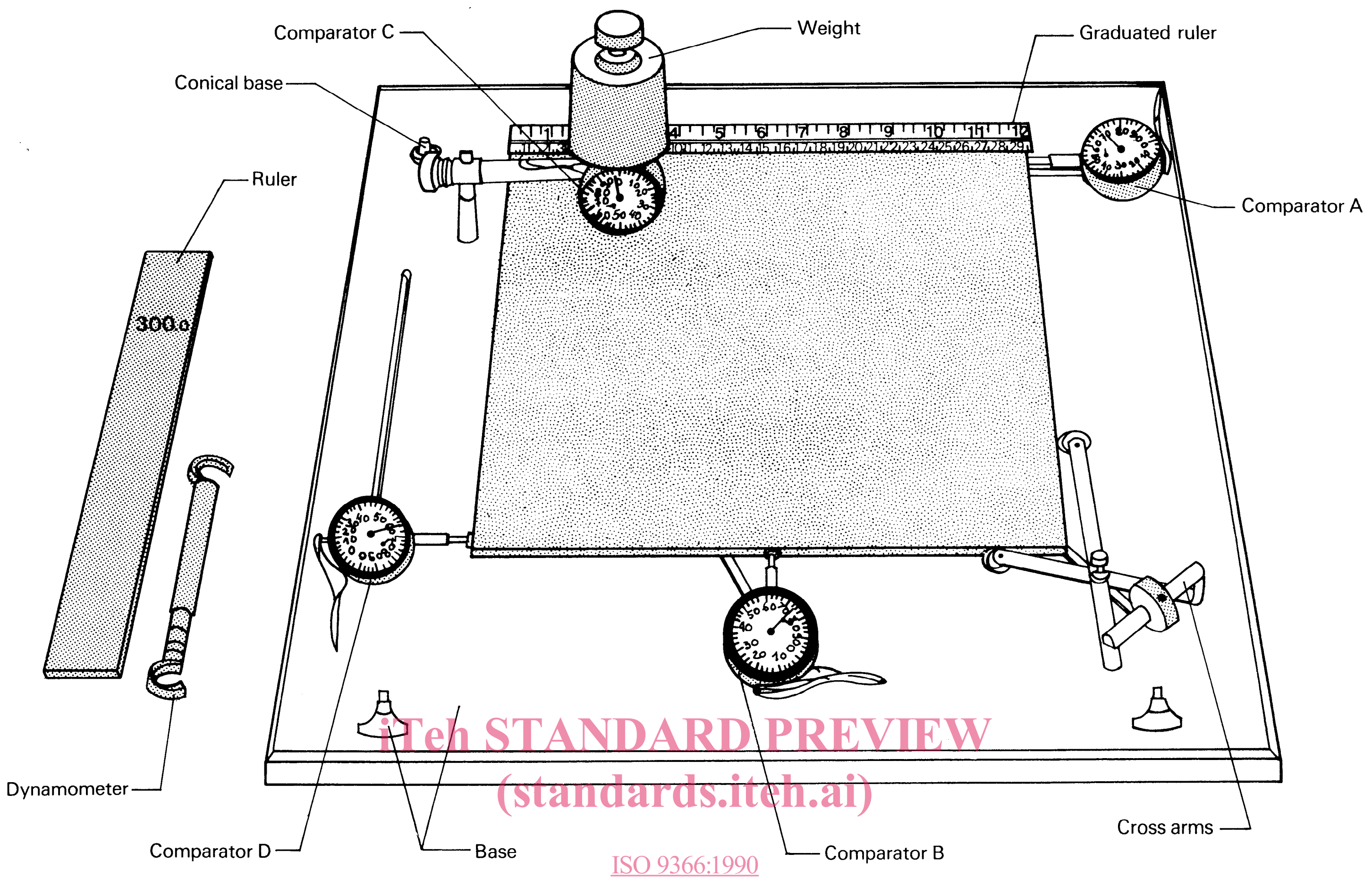


Figure 1

3.3.1.6 Fit the ends of the calibrated dynamometer on the roller bearings of the arms (3.2.4). Turn the system (3.2.4.1) so that the dynamometer indicates 15 N, using, if necessary, the screw (3.2.4.2) to fix this pressure. Remove the dynamometer.

NOTE — The dynamometer may be calibrated by substituting one of the ends of the dynamometer by the conical base, and placing the weight on this conical base; if the dynamometer does not show 15 N, remove the conical base and rotate the screw inside the dynamometer until it is adjusted.

3.3.2 Determination

3.3.2.1 Put the device on a plane and horizontal table with the dial of comparator C in front of the operator.

3.3.2.2 Mark the sides of the tile to be tested with the letters a, b, c, d, clockwise.

3.3.2.3 Raise comparator C and put the tile on the base, as shown in figure 1.

3.3.2.4 Place the weight on the metallic cone of comparator C.

3.3.2.5 Read and record the values shown by the four comparators.

3.3.2.6 Repeat the readings on the four comparators for each one of the three possible remaining positions of the tile by means of successive anti-clockwise 90° rotations about an imaginary axis through its centre, and record the values (see table 1).

3.4 Results

3.4.1 Length

The length of tile l_1, expressed in millimetres and rounded off to the nearest tenth is given by the equation

$$l_1 = \frac{2x_2 + 2x_4 + y_1 + y_3}{6} - l_R + l_o$$

where

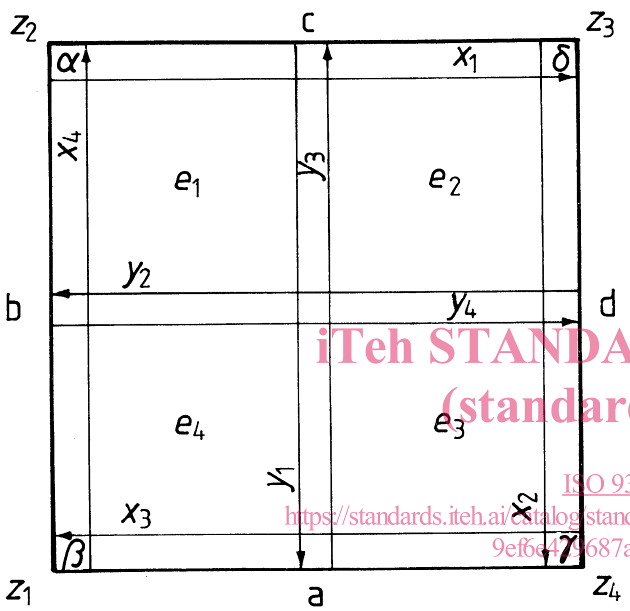
x_2 is the value shown in comparator A when side b is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

x_4 is the value shown on comparator A when side d is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

y_1 is the value shown on comparator B when side a is in contact with the feeler gauge of this comparator, in millimetres and rounded off to the nearest twentieth;

Table 1

Side annexed to feeler of comparator \ Comparator	A	B	C	D
a	x_1	y_1	e_1	z_1
b	x_2	y_2	e_2	z_2
c	x_3	y_3	e_3	z_3
d	x_4	y_4	e_4	z_4



y_3 is the value shown on comparator B when side c is in contact with the feeler gauge of this comparator, in millimetres and rounded off to the nearest twentieth;

l_o is the length of the standard ruler (3.2.8), in millimetres and rounded off to the nearest twentieth;

l_R is the reference value chosen.

3.4.2 Width

The width of tile l_2, in millimetres and rounded off to the nearest tenth is given by the equation

$$l_2 = \frac{2x_1 + 2x_3 + y_2 + y_4}{6} - l_R + l_o$$

where

x_1 is the value shown on comparator A when side a is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

x_3 is the value shown on comparator A when side c is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

y_2 is the value shown on comparator B when side b is in contact with the feeler gauge of this comparator, in millimetres and rounded off to the nearest twentieth;

y_4 is the value shown on comparator B when side d is in contact with the feeler gauge of this comparator, in millimetres and rounded off to the nearest twentieth;

l_o is the length of the standard ruler (3.2.8), in millimetres and rounded off to the nearest twentieth;

l_R is the reference value chosen.

3.4.3 Thickness

The thickness of the tile, e, in millimetres and rounded off to the nearest tenth is given by the equation

$$e = \frac{e_1 + e_2 + e_3 + e_4}{4}$$

where

e_1 is the value shown on comparator C when side a is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

e_2 is the value shown on the comparator C when side b is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

e_3 is the value shown on comparator C when side c is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth;

e_4 is the value shown on comparator C when side d is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest twentieth.

3.4.4 Deviation from nominal dimensions

3.4.4.1 Length

The deviation of length, expressed as a percentage and rounded off to the nearest hundredth is given by the formula

$$\frac{\Delta l_1}{l_1} \times 100$$

where Δl_1 is the largest of the moduli

$$|x_2 - l_o| \; |x_4 - l_o| \; |y_1 - l_o| \; |y_3 - l_o|$$

3.4.4.2 Width

The deviation of width, expressed as a percentage and rounded off to the nearest hundredth is given by the formula

$$\frac{\Delta l_2}{l_2} \times 100$$

where Δl_2 is the largest of the moduli

$$|x_1 - l_o| \; |x_3 - l_o| \; |y_2 - l_o| \; |y_4 - l_o|$$

3.4.4.3 Thickness

The deviation of thickness, expressed in millimetres and rounded off to the nearest tenth is the largest of the moduli

$$|e_1 - e_o| \ |e_2 - e_o| \ |e_3 - e_o| \ |e_4 - e_o|$$

where e_o is the nominal thickness of the tiles expressed in millimetres and rounded off to the nearest tenth.

3.4.5 Deviation from straightness

The deviation from straightness, in millimetres and rounded off to the nearest tenth, is

for side a

$$\Delta a = \frac{x_4 + x_2}{2} - y_1$$

for side b

$$\Delta b = \frac{x_1 + x_3}{2} - y_2$$

for side c

$$\Delta c = \frac{x_2 + x_4}{2} - y_3$$

for side d

$$\Delta d = \frac{x_1 + x_3}{2} - y_4$$

The deviation from straightness of the tile is given by the largest modulus of the values obtained for Δ, expressed in millimetres and rounded off of the nearest tenth.

3.4.6 Deviation from squareness

The deviation from squareness, expressed in degrees and rounded off of the nearest tenth, is

for the angle α $\quad \Delta\alpha = \arctan \frac{z_1 - z_m}{l_o}$

for the angle β $\quad \Delta\beta = \arctan \frac{z_2 - z_m}{l_o}$

for the angle γ $\quad \Delta\gamma = \arctan \frac{z_3 - z_m}{l_o}$

for the angle δ $\quad \Delta\delta = \arctan \frac{z_4 - z_m}{l_o}$

where

z_1 is the value shown on comparator D when side a is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest tenth;

z_2 is the value shown on comparator D when side b is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest tenth;

z_3 is the value shown on comparator D when side c is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest tenth;

z_4 is the value shown on comparator D when side d is in contact with the feeler gauge of comparator B, in millimetres and rounded off to the nearest tenth;

z_m is the average of the four readings of comparator D, in millimetres and rounded off to the nearest tenth.

The deviation from squareness of the tile is given by the largest value obtained for Δ.

4 Method B

4.1 Principle

Measurement, by contact, of plane dimensions, at three points for each direction.

Presentation of each angle in the plain angle of a precision square and measurement of the maximum deviation between outlines.

4.2 Apparatus

4.2.1 Vernier gauge, or any other equivalent device (table with comparators and back stop etc.) accurate to

0,02 mm for tiles $\leqslant$ 500 mm

0,05 mm for tiles $>$ 500 mm

4.2.2 Precision square, fulfilling the following criteria:

length of arms superior to that of the tiles

arms linearity error $\leqslant$ 0,01 mm

angular error $\leqslant$ 0,5 cgr or 0,02 mm to 30 cm

4.2.3 Plane surface with dimensions superior to that of the tiles preferentially: glass plate of thickness $\geqslant$ 10 mm, illuminated from below.

4.2.4 Square plate of steel or duraluminium, rigid and straight, with dimensions 5 mm to 10 mm inferior to the smallest dimension of the tiles, and with a surface mass of about 20 kg/m^2.

4.2.5 Wedge set for thickness, namely 0,20 mm; 0,25 mm; 0,30 mm; 0,35 mm; 0,40 mm; 0,45 mm; 0,50 mm.

4.3 Preparation of test pieces

Take precautions to eliminate the slightest dust due to cutting, rubbing each side, only once, against the side of another tile (recommendation applicable only to semi-flexible tiles).

4.4 Procedure

4.4.1 Determination of dimensions

Put the tile on the surface and, in order to ensure that it is absolutely plane, put over it the straight plate, parallel to the dimension to be measured and near to the line on which the measurement is to be carried out. The pressure exerted by the plate on the side of the tile should be identical for all measurements and just enough to ensure contact with the material.

In each direction, take three measurements of the distance between opposite edges, two of them about 1 cm from the edges perpendicular to these, and the third at the same distance from the other two. Use the vernier gauge flat for the measurements at the ends, with contact along the entire length of the points.

4.4.2 Control of squareness and straightness of edges

Place the square and the tile on the surface. Apply one of the tile's edges against one arm of the square and slide the tile until it is in contact with the other arm. Then, apply the straight plate over the tile. Find the thickest wedge that may be easily introduced between the second arm of the square and the tile. This wedge defines the deviation from squareness registered for the position of the tile as it was placed for this first control.

Operate in the same way for the other three edges, i.e., in the other three possible positions of the tile.

4.5 Results

4.5.1 Dimensions

For each direction, the dimension of the tile's edge is the average of the three corresponding measurements, expressed in millimetres to two decimal places.

4.5.2 Squareness and straightness of edges

Each tile is characterized by the number and wideness of the deviations superior to the specified maximum.

5 Test report

The test report shall contain, at least, the following information:

a) reference to the method carried out, A or B;

b) for each direction (dimensions);

— the difference between the largest and the smallest of the average dimensions measured on each of the tested tiles;

— the general average of results;

c) for the squareness and straightness of sides:

— the number of tiles controlled (including those taken, if the counter-test is done);

— the number of not suitable tiles, among the first five, as well as among the additional tiles, and indicating the corresponding deviations.

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Descriptors : cork, floor coverings, floor slabs, tests, dimensional measurements.

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