

BS ISO 20326:2016



BSI Standards Publication

Resilient floor coverings — Specification for floor panels/ assembly for loose laying

National foreword

This British Standard is the UK implementation of ISO 20326:2016.

The UK participation in its preparation was entrusted to Technical Committee PRI/60, Resilient and Laminate Floor Coverings.

A list of organizations represented on this committee can be obtained on request to its secretary.

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© The British Standards Institution 2016.
Published by BSI Standards Limited 2016

ISBN 978 0 580 89155 7

ICS 97.150

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2016.

Amendments/corrigenda issued since publication

Date	Text affected
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INTERNATIONAL
STANDARD

ISO
20326

First edition
2016-12-15

**Resilient floor coverings —
Specification for floor panels/
assembly for loose laying**

*Revêtements de sol résilients — Spécifications des panneaux de
plancher/assemblages pour pose flottante*



Reference number
ISO 20326:2016(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.

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).

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The committee responsible for this document is ISO/TC 219, *Floor coverings*.

Resilient floor coverings — Specification for floor panels/assembly for loose laying

1 Scope

This document specifies requirements and test methods for floor panels/assembly for domestic and commercial levels of use, which have surface layers consisting of resilient floor covering.

This document is not applicable to heterogeneous polyvinyl chloride floor panels/assembly for floating installation covered by ISO 10582 or to floor panels/assembly that are subject to frequent wetting, such as bathrooms, laundry rooms and saunas.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4918, *Resilient, textile and laminate floor coverings — Castor chair test*

ISO 10581, *Resilient floor coverings — Homogeneous poly(vinyl chloride) floor covering — Specifications*

ISO 10582, *Resilient floor coverings — Heterogeneous polyvinyl chloride floor coverings — Specification*

ISO 10874, *Resilient, textile and laminate floor coverings — Classification*

ISO 10577, *Resilient floor coverings — Specification for rubber sheet floor coverings without backing.*

ISO 16581, *Resilient and laminate floor coverings — Determination of the effect of simulated movement of a furniture leg*

ISO 16905, *Resilient floor coverings — Specification for rubber floor covering — Tile/Plank*

ISO 19322, *Resilient floor coverings — Specification for floor coverings based on thermoplastic polymers*

ISO 24011, *Resilient floor coverings — Specification for plain and decorative linoleum*

ISO 24334, *Laminate floor coverings — Determination of locking strength for mechanically assembled panels*

ISO 24336, *Laminate floor coverings — Determination of thickness swelling after partial immersion in water*

ISO 24342, *Resilient and textile floor-coverings — Determination of side length, edge straightness and squareness of tiles*

ISO 24346, *Resilient floor coverings — Determination of overall thickness*

ISO 26986, *Resilient floor coverings — Expanded (cushioned) poly(vinyl chloride) floor covering — Specification*

EN 651, *Resilient floor coverings — Polyvinyl chloride floor coverings with foam layer — Specification*

EN 652, *Resilient floor coverings — Polyvinyl chloride floor coverings with cork-based backing — Specification*

EN 655, *Resilient floor coverings — Tiles of agglomerated composition cork with polyvinyl chloride wear layer — Specification*

EN 12104, *Resilient floor coverings — Cork floor tiles — Specification*

EN 13845, *Resilient floor coverings — Polyvinyl chloride floor coverings with particle based enhanced slip resistance — Specification*

EN 14565, *Resilient floor coverings — Floor coverings based upon synthetic thermoplastic polymers — Specification*

EN 16776, *Resilient floor coverings — Heterogeneous polyurethane floor coverings — Specification*

CEN/TS 16354, *Laminate floor coverings — Underlays — Specification, requirements and test methods*

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:

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

3.1 floor panel

product generally of rectangular form consisting of a compact layer of a substrate and a surface layer of a resilient floor covering

Note 1 to entry: A backing might be included.

3.2 substrate

core material of the floor panel with profiled edges to facilitate assembly at installation

Note 1 to entry: Examples are Medium Density Fibreboard (MDF), High Density Fibreboard (HDF) and Wood Plastic Composite (WPC) either with or without wood fiber.

3.3 surface layer

upper decorative layer(s) of one of the following resilient floor coverings, bonded to the substrate directly or as total product and intended to be on the visible side when the floor is installed:

- linoleum floor covering (ISO 24011);
- rubber floor covering (ISO 10577 and ISO 16905);
- polyvinyl chloride floor covering (ISO 10581, ISO 10582, EN 651, EN 652 and ISO 26986);
- cork floor covering (EN 12104 and EN 655);
- synthetic thermoplastic polymer floor covering (EN 14565 and ISO 19322);
- polyvinyl chloride floor coverings with particle based enhanced slip resistance (EN 13845);
- heterogeneous polyurethane floor covering (EN 16776)

3.4 backing

layer beneath the surface layer on the back of the substrate, e.g. cork, impregnated paper, foam

4 Requirements

4.1 Requirements for the floor panels

All classes of floor panels including the surface layer shall conform to the requirements specified in [Table 1](#) when tested in accordance with the specified test methods.

Table 1 — General requirements for the floor panels

Property	Requirement	Test method
Dimensions measured at the surface layer	Maximum deviation from the nominal	
Square panels		
Side length %	±0,10	ISO 24342
Rectangular panels		
Width %	±0,10	
Length mm	≤0,5	
Overall thickness		
Average mm	Nominal ±0,25	ISO 24346
Individual values mm	Maximum deviation from the average ±0,30	
Squareness mm	≤0,20	ISO 24342
Straightness measured at the surface layer mm	≤0,30	ISO 24342 ^a
Flatness of the panel		
Length		
Concave/convex % of the length	≤0,50/≤1,0	Annex A
Width		
Concave/convex % of the width	≤0,10/≤0,15	
Openings between panels		
Average mm	≤0,15	Annex B
Individual values mm	≤0,20	
Height difference between panels		
Average mm	≤0,10	Annex B
Individual values mm	≤0,15	
Dimensional variation caused by changes in atmospheric humidity %	≤0,25	Annex C

^a For length >0,5 m, a metal ruler may be used.

4.2 General requirements for the surface layer

All classes of floor panels shall conform to the appropriate requirements as specified below.

4.2.1 Residual indentation

Surface layers in accordance with ISO 24011, ISO 10581, ISO 10582, EN 13845, EN 14565 and EN 16776 shall conform to the respectively residual indentation requirements in these particular standards.

NOTE The residual indentation requirements for EN 651, EN 652, EN 655, EN 12104, ISO 19322 and ISO 26986 are related to the surface or wear layer thickness classes in that same standard, and are specified in [5.2](#).

4.2.2 Colour fastness to artificial light

The colour fastness to artificial light shall be in accordance with the requirements for the surface or wear layer established in the applicable specification standard (as listed in 3.3).

4.2.3 Hardness of a rubber surface layer

The hardness of a rubber surface layer shall comply with the requirements specified in ISO 10577 or ISO 16905.





5 Classification

The classification scheme for resilient floor coverings panels for loose laying is specified in ISO 10874. To classify for a certain use classification, the panels shall conform the relevant requirements for that classification in both 5.1 and 5.2. If not the same level of classification is achieved, the worst result is decisive.

5.1 General classification requirements

The panels shall conform to the requirements of Table 2 for their class, regardless of their surface layer material.

Table 2 — Classification requirements for floor panels





Class	Symbol	Intensity of use	Effect of a furniture leg ^a	Effect of a castor chair ^b	Locking strength		Thickness swelling
		Domestic					
21		Moderate/Light	No requirement	No requirement	No requirement		≤20 %
22		General/Medium					
22+		General					
23		Heavy	No disturbance to the surface other than slight change in appearance and no delaminating shall occur				
		Commercial			Hydroscopic substrate ^c	Other substrates	

^a For panels with a cork surface, the requirements for the furniture leg in EN 655 or EN 12104 shall apply.

^b The product shall be tested with the pre-attached backing or the prescribed underlay by manufacturer. In case no underlay is prescribed, the product shall be tested with an underlay with thickness = (2 ± 0,5) mm and compressive stress CS = (60 ± 10) kPa in accordance with CEN/TS 16354.

^c Only for panels with substrates with hygroscopic properties, e.g. HDF or MDF.

Table 2 (continued)

Class	Symbol	Intensity of use	Effect of a furniture leg ^a	Effect of a castor chair ^b	Locking strength		Thickness swelling
31		Moderate	No damage shall be visible when tested with foot type 0	No disturbance to the surface other than slight change in appearance and no delaminating shall occur	No requirement		≤18 %
32		General			Long side ≥1,0 kN/m	Both sides 1,5 kN/m	
33		Heavy			Short side ≥2,0 kN/m		≤15 %
34		Very Heavy			Both sides ≥3,5 kN/m	Both sides 2,0 kN/m	
Test method			ISO 16581	ISO 4918	ISO 24334	Annex D	ISO 24336
<p>^a For panels with a cork surface, the requirements for the furniture leg in EN 655 or EN 12104 shall apply.</p> <p>^b The product shall be tested with the pre-attached backing or the prescribed underlay by manufacturer. In case no underlay is prescribed, the product shall be tested with an underlay with thickness = (2 ± 0,5) mm and compressive stress CS = (60 ± 10) kPa in accordance with CEN/TS 16354.</p> <p>^c Only for panels with substrates with hygroscopic properties, e.g. HDF or MDF.</p>							

5.2 Classification requirements for the surface layer

5.2.1 General

The surface layer shall be classified in accordance with ISO 10874. The classification depends on the type of floor covering used.

5.2.2 Linoleum surface layer

Floor panels with a linoleum surface layer shall conform to the classification requirements of the surface layer thickness as specified in ISO 24011.

5.2.3 Rubber surface layer

Floor panels with a rubber surface layer shall conform to the classification requirements of the surface layer thickness as specified in ISO 10577 and ISO 16905.

5.2.4 Polyvinyl chloride surface layer

Floor panels with a polyvinyl chloride surface layer shall conform to the classification requirements of the wear layer thickness in combination with the corresponding wear group and residual indentation requirements as specified in ISO 10581, ISO 10582, EN 651, EN 652, and ISO 26986.

5.2.5 Polyvinyl chloride with enhanced slip properties surface layer

Floor panels with a polyvinyl chloride with enhanced slip properties surface layer shall conform to the classification requirements of the nominal thickness in combination with the corresponding wear resistance as specified in EN 13845.

5.2.6 Synthetic thermoplastic polymer surface layer

Floor panels with a synthetic thermoplastic polymer surface layer shall conform to the classification requirements as specified in EN 14565 and ISO 19322.

5.2.7 Cork surface layer

Floor panels with a cork surface layer shall conform to the classification requirements as specified in EN 655 or EN 12104 except the required nominal thickness that shall be as specified in [Table 3](#).

Table 3 — Nominal thickness for cork surfaces

Class	Nominal thickness
21, 22, 22+ and 23	≥2,5 mm
31, 32, 33 and 34	≥3,0 mm

5.2.8 Heterogeneous polyurethane surface layer

Floor panels with a heterogeneous polyurethane surface layer shall conform to the classification requirements as specified in EN 16776.

6 Marking, labelling and packaging

6.1 Marking and labelling

Floor panels manufactured and conforming to this specification shall show the following information clearly on the product and/ or on label or in the package:

- a) the number and date of this document, i.e. ISO 20236;
- b) the manufacturer's or supplier's identification;
- c) the product name;
- d) the colour/pattern and batch number;
- e) the classes/symbols of use level according to ISO 10874;
- f) the successive number of the package if necessary for the installation;
- g) the nominal dimensions of the panels;
- h) the covered floor area and number of panels in the package.

6.2 Packaging

Floor panels shall be delivered in packages designed to protect the corners, edges and surfaces of the product, under normal conditions of transport and handling. The product shall be accompanied by installation, cleaning and maintenance instructions.

Annex A (normative)

Determination of flatness

A.1 Sampling

From the available material, five floor panels shall be taken as specimens.

A.2 Conditioning

The specimens are measured in the received state. For type approval or verification purposes, the specimens shall be stabilized to a constant mass in an atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity. Constant mass is considered to be reached when the results of two successive weighing operations, carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass of the specimens.

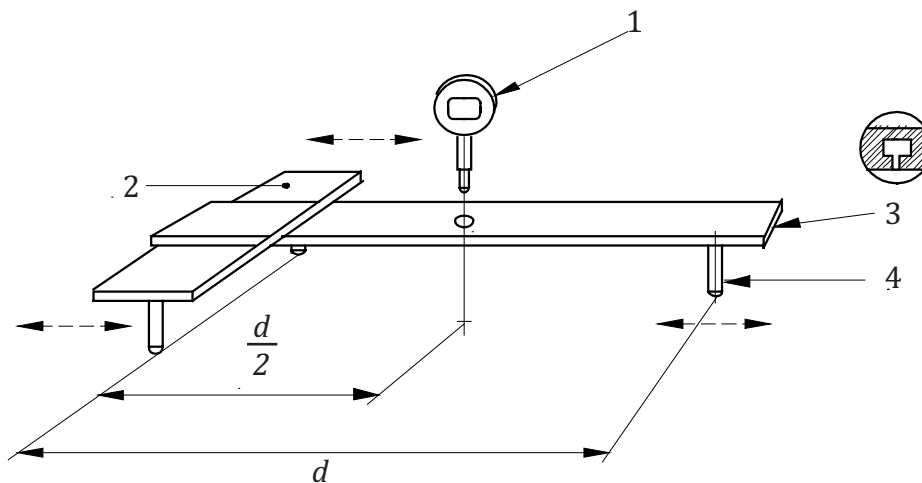
A.3 Apparatus

A.3.1 Apparatus for measuring width flatness consisting of a dial gauge accurate to $\pm 0,01$ mm with a rounded tip of radius $\leq 5,5$ mm, installed centrally in relation to three rounded supports with radii ≥ 5 mm.

The supports shall be adjustable along a T-shaped assembly of bars to provide the required gauge length. The measurement, d , shall not be less than the width, w , of the test specimen minus 10 mm. The tip of the gauge in contact with the face of the test specimen shall apply a force of $(1,0 \pm 0,5)$ N. The mass of the apparatus shall not affect the flatness of the test specimen beyond the limit of the accuracy of the gauge. See [Figure A.1](#) for illustration. The instrument shall be set to zero against a suitable reference plate.

A.3.2 A plain rigid surface, at least as long as the floor panel, having a maximum straightness deviation of 0,05 mm over 1 000 mm.

A.3.3 A feeler thickness gauge or sliding calliper, or equivalent tool to measure the deviation between the plate and the floor panel to an accuracy of 0,05 mm.



- Key**
- 1 dial gauge
 - 2 adjustable bridge
 - 3 t-groove
 - 4 adjustable pin

Figure A.1 — Example of device for measuring width flatness

A.4 Procedure

A.4.1 Determination of width flatness (f_w)

Adjust the supports along the T-shaped assembly of bars according to the width of the specimen to evaluate (see [Figure A.2](#)). Determine the maximum deviation f_w for each element. The measurement, d , shall not be less than the width, w , of the specimen minus 10 mm.

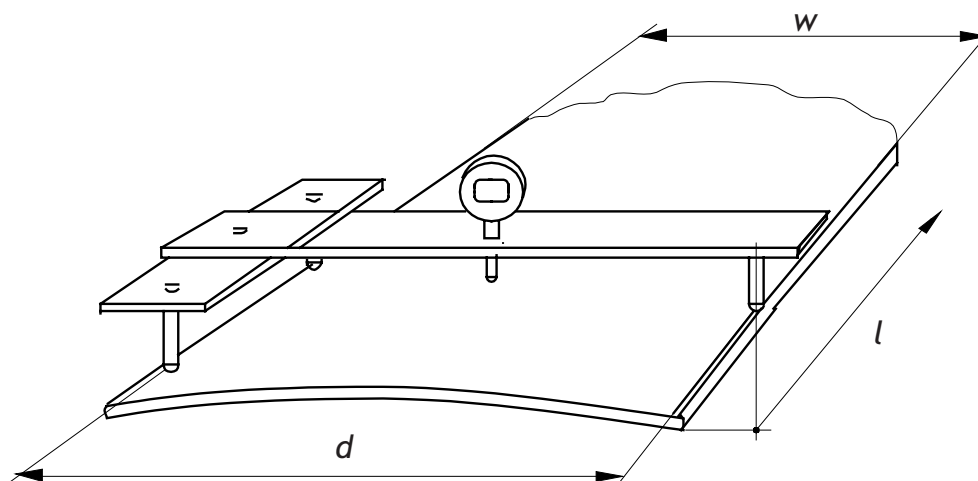
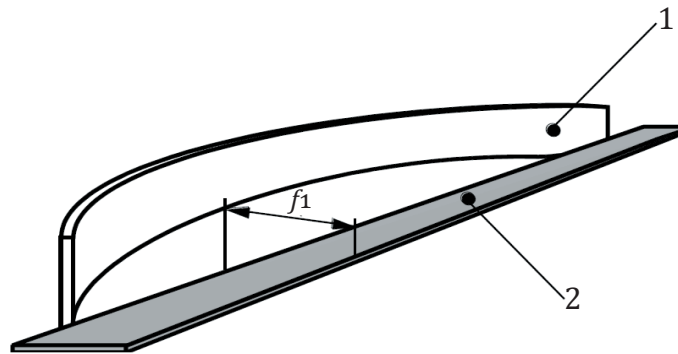


Figure A.2 — Determination of width flatness

A.4.2 Determination of length flatness (f_l)

Place the specimen against the steel ruler as shown in [Figure A.3](#). Using the thickness gauges or the calliper gauge, determine the maximum deviation f_l from the ruler for each specimen. The measured value shall be expressed as concave when the surface layer is facing towards the ruler and as convex when the surface layer is facing away from the ruler.



Key

- 1 specimen
- 2 steel ruler

Figure A.3 — Determination of length flatness

A.5 Calculation and expression of results

Report if the samples were conditioned before the test was performed.

A.5.1 Width flatness (f_w)

Record all measured values f_w and take the largest convex and concave values and divide each by the measurement, d , (see [A.4.1](#)). Express the results to the nearest 0,01 %.

A.5.2 Length flatness (f_l)

Record all measured values f_l and take the largest convex and concave values and divide each by the nominal length of the specimen. Express the result to the nearest 0,01 %.

Annex B (normative)

Determination of openings and height differences between floor panels

B.1 Sampling

From the available material, eight floor panels shall be taken as specimens.

B.2 Conditioning

The specimens are measured in the received state. For type approval or verification purposes, the specimens shall be conditioned to a constant mass in an atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity. Constant mass is considered to be reached when the results of two successive weighing operations, carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass of the specimens.

B.3 Apparatus

B.3.1 Set of thickness gauges ranging from 0,05 mm to 0,50 mm in steps of 0,05 mm.

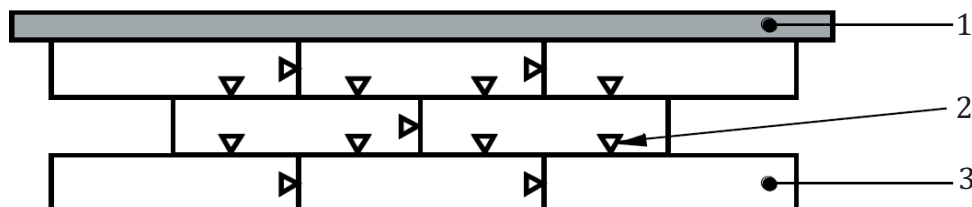
B.3.2 Calliper gauge or a depth gauge, with a scale interval of 0,05 mm.

B.3.3 Test surface of appropriate size that is rigid, horizontal and flat.

B.4 Procedure

B.4.1 Assembly

By hand force, firmly assemble the test specimens on the test surface without using any glue, as in [Figure B.1](#), using the ruler as a guide. The symbol ∇ indicates 13 measuring points.



Key

- 1 steel ruler
- 2 measuring point
- 3 specimen

Figure B.1 — Specimen assembled with indicated measuring points

B.4.2 Determination of openings between the panels

Using the thickness gauges, measure any openings between the panels at the 13 indicated points without applying any force to the panels.

B.4.3 Determination of height differences

Using the calliper or depth gauge, measure any height differences at the 13 indicated points without applying any force to the panels. Place the base of the instrument at one side of the joint, and measure the maximum height difference at the other side of the joint. Do not carry out the measurement further than 5 mm from the joint edge.

B.5 Calculation and expression of results

Calculate the mean value for the thirteen measurements of any openings between the panels and the mean value of the thirteen measurements of any height differences.

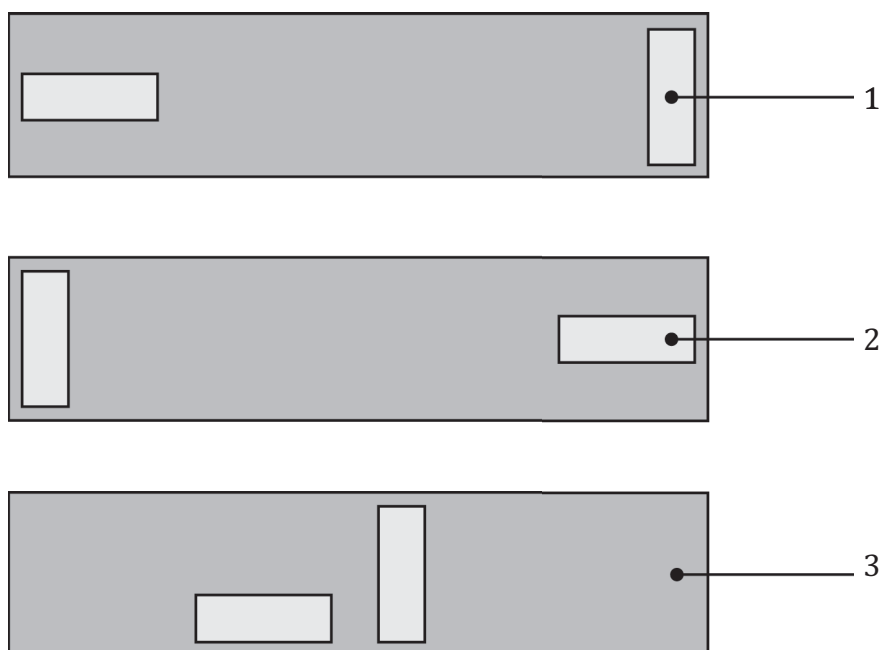
Record the maximum individual value and the mean value for both properties. Express the results in millimetres to the nearest 0,05 mm.

Annex C (normative)

Determination of dimensional variations caused by changes in humidity

C.1 Sampling

Take three floor panels and cut from each one specimen in the length direction and one in the width direction. The test specimens may be taken from any part of the panel as long as the length direction and width direction is maintained (see [Figure C.1](#)). The dimension of a specimen shall be $(180 \pm 1) \text{ mm} \times (20 \pm 1) \text{ mm}$. If the nominal width of the element is less than 180 mm, no specimen in the width direction shall be taken.



Key

- 1 specimen taken in the width direction
- 2 specimen taken in the length direction
- 3 floor panel

Figure C.1 — Example of sampling

C.2 Conditioning

The specimens shall be conditioned to a constant mass in an atmosphere of $(23 \pm 2) \text{ }^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity. Constant mass is considered to be reached when the results of two successive weighing operations carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass.

C.3 Apparatus

C.3.1 A sliding calliper gauge or an equivalent device, e.g. a table with comparators and a stop unit, of accuracy 0,05 mm.

C.3.2 A smooth flat surface with dimensions larger than those of the specimen.

C.3.3 A rigid plate, squared and finished, with dimensions 5 mm to 10 mm less than those of the specimen.

The mass per unit area of the plate shall be approximately 20 kg/m² (e.g. steel of thickness 2,5 mm or duralumin of thickness 7 mm).

C.3.4 Humidity cabinet or similar device capable of maintaining the specimen at (23 ± 2) °C and (80 ± 5) % relative humidity.

C.4 Procedure

Scribe three marks along each side of the specimen, two approximately 10 mm from the perpendicular edges and the third equidistant from the first two.

Place the specimen on the flat surface with the squared plate on top. Take three measurements of the marked distances between opposite sides.

Expose the specimen to an atmosphere of (23 ± 2) °C and (80 ± 5) % relative humidity in the humidity cabinet for $(24 \pm 0,5)$ h. Repeat the measurements within 10 min of removal from the humidity cabinet.

C.5 Calculation and expression of results

Calculate for each specimen the mean value of the three measurements in each direction before and after exposure to 23 °C and 80 % humidity.

Calculate the change from the initial length.

Calculate the mean value for the three panels for each direction expressed as a percentage rounded to the nearest 0,01 %.

Annex D (normative)

Determination of locking strength with a tensile testing machine

D.1 Sampling and conditioning of the panels

Take five panels for the preparation of five specimens each from the short and length side of the panel.

The panels from which the specimens are to be cut shall be conditioned to a constant mass in an atmosphere of (23 ± 2) °C and (50 ± 5) % relative humidity. Constant mass is considered to be reached when the results of two successive weighing operations carried out at an interval of 24 h, do not differ by more than 0,1 % of the mass. Remain the same atmosphere during testing.

D.2 Preparation of the specimen

D.2.1 Planks

D.2.1.1 Short side

Cut two specimens A1 and B1 from the middle of the edge of the short side of the panel opposite each other with a lock width of (100 ± 1) mm and a minimum length of 100 mm, as shown in [Figure D.1](#). Connect the lock of specimen A1 and B1 in accordance with the fitting instructions of the manufacturer

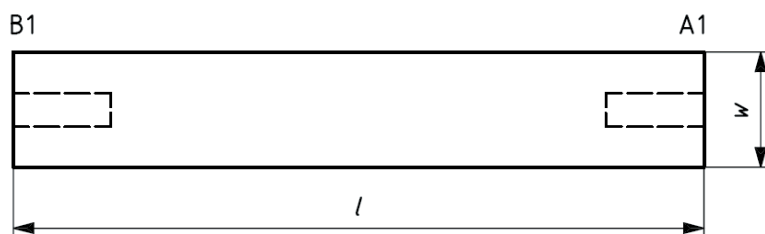


Figure D.1 — Specimen from the short side of a plank

D.2.1.2 Long side

Cut two specimen A2 and B2 from the middle of the edge of the long side of the panel opposite each other with a lock width of (100 ± 1) mm and a minimum length of 100 mm. If the width of the panel is less than 200 mm, cut the specimen out from the centre line as shown in [Figure D.2](#). Connect the lock of specimen A2 and B2 in accordance with the fitting instructions of the manufacturer.

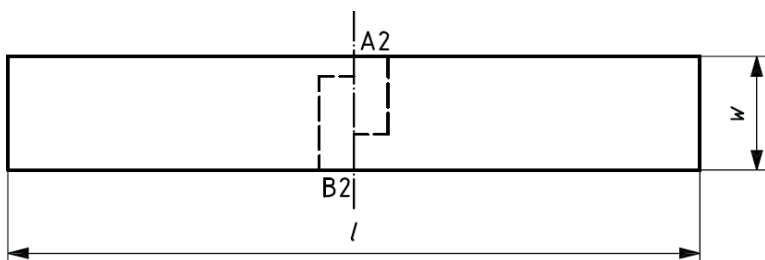


Figure D.2 — Specimen from the long side of a plank

D.2.2 Squares

Cut two specimen in both directions from the middle of the edge opposite each other A1 B1 and A2 B2 of minimum length 100 mm and width (100 ± 1) mm. Connect the lock of specimen A1 and B1 and the lock of specimen A2 and B2 in accordance with the fitting instructions of the manufacturer.

D.3 Apparatus

D.3.1 Tensile testing machine, with suitable load cell and a recording device.

The machine shall be capable of maintaining the required testing speed (see [D.4](#)).

D.3.2 Two clamping devices, attached to the tensile testing machine, capable of holding the specimen

D.3.3 Saw.

D.4 Procedure

D.4.1 General

The test atmosphere shall be (23 ± 2) °C and (50 ± 5) % RH unless the test is completed with 1 hr of removing the specimen from the conditioning atmosphere.

D.4.2 Tensile testing

Place the locked specimen AB in the two clamping devices (which are approximately 200 mm apart) of the tensile testing machine so that the tension will be applied evenly over the width of the specimen. The pulling direction shall be perpendicular to the lock. Set the machine and its recording device in operation such that the speed of separation is (100 ± 5) mm/min.

Record force F in Newton required to break the lock.

Repeat the test for all remaining specimen A1B1 and A2B2

D.5 Calculation and expression of results

Calculate for each direction the average value F of the five measurements.

The average locking strength F for the long side and short side shall be expressed in kN/m.

Annex E **(normative)**

Test report

The test report shall include at least the following information:

- a) a reference to this document, i.e. ISO 20326, and the relevant [Annexes A, B, C or D](#) and the corresponding specification standard as listed in [3.3](#);
- b) the complete identification of the product tested including type, source and manufacturer's reference number;
- c) the previous history of the sample;
- d) the number of panels tested;
- e) the test results;
- f) any deviation from the test methods which may have affected the results.

Annex F (informative)

Optional properties

When the following properties are required for specific applications, the floor covering should be tested in accordance with the appropriate methods:

- electrical resistance (see EN 1081);
- electrostatic propensity/static dissipation (see EN 1815);
- effect of stains/resistance to chemicals (see ISO 26987);
- moisture content of agglomerated cork at dispatch from the manufacturer (see EN 12105);
- reaction to fire: determination of the burning behaviour using a radiant heat source (ISO 9239-1);
- reaction to fire: ignitability when subject to direct impingement of flame (ISO 11925-2);
- standard test method for critical radiant flux of floor covering systems using a radiant heat energy source (ASTM E648);
- standard test method for specific optical density of smoke generated by solid materials (ASTM E662).

Bibliography

- [1] ISO 9239-1, *Reaction to fire tests for floorings — Part 1: Determination of the burning behaviour using a radiant heat source*
- [2] ISO 11925-2, *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test*
- [3] ISO 24343 (all parts), *Resilient and laminate floor coverings — Determination of indentation and residual indentation*
- [4] ISO 26987, *Resilient floor coverings — Determination of staining and resistance to chemicals*
- [5] ASTM E648, *Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*
- [6] ASTM E662, *Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials*
- [7] EN 1081, *Resilient floor coverings — Determination of electrical resistance*
- [8] EN 1815, *Resilient and textile floor coverings — Determination of static electrical propensity*
- [9] EN 12466, *Resilient floor coverings — Vocabulary*

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