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Bamboo floorings —

Part 1: Indoor use

Planchers en bambou —

Partie 1: Utilisation en intérieur

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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This document was prepared by Technical Committee ISO/TC 296, *Bamboo and Rattan.*

A list of all parts in the ISO 21629 series can be found on the ISO website.

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.

Bamboo floorings —

Part 1:
Indoor use

1 Scope

This document specifies the technical requirements and test methods for indoor bamboo flooring for internal use.

This document also specifies handling, storage, packaging and marking requirements.

It is applicable to unfinished and finished indoor bamboo flooring. This includes laminated bamboo flooring, bamboo scrimber flooring, bamboo - wood composite flooring, and flattened bamboo flooring.

2 Normative references

The following documents are referred to in the text in such a way that some or all 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 2409, *Paints and varnishes — Cross-cut test*

ISO 4586-2, *High-pressure decorative laminates (HPL, HPDL) — Sheets based on thermosetting resins (Usually called Laminates) — Part 2: Determination of properties*

ISO 7784-2, *Paints and varnishes — Determination of resistance to abrasion — Part 2: Method with abrasive rubber wheels and rotating test specimen*

ISO 9426, *Wood-based panels — Determination of dimensions of panels*

ISO 9427, *Wood-based panels — Determination of density*

ISO 15184, *Paints and varnishes — Determination of film hardness by pencil test*

ISO 16978, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*

ISO 16979, *Wood-based panels — Determination of moisture content*

ISO 16983, *Wood-based panels — Determination of swelling in thickness after immersion in water*

ISO 17959, *General requirements for solid wood flooring*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

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

3.1
bamboo flooring
assembled bamboo-based panel used as floor boards

3.2
finished indoor bamboo flooring
bamboo flooring (3.1) with surface treatment such as coating, lacquering or oil-treatment

3.3
unfinished indoor bamboo flooring
bamboo flooring (3.1) without surface treatment such as coating, lacquering or oil-treatment

3.4
laminated bamboo flooring
flooring product made from laminated bamboo strips

3.5
bamboo scrimber flooring
flooring product made of *bamboo scrimber* (3.8)

3.6
bamboo - wood composite flooring
flooring made of bamboo as a surface layer and wood or wood-based panel as the core

3.7
flattened bamboo flooring
flooring with surface layer made of flattened bamboo board

3.8
bamboo scrimber
panel or lumber made of compressed bamboo fibre bundle strips or compressed bamboo fibre bundle sheet

3.9
flattened bamboo
piece of bamboo culm pressed to level the surface

3.10
bamboo outer layer
hard, compact sheath of bamboo culm which is exposed to the external environment

3.11
bamboo inner layer
soft inside layer of the bamboo culm, serving as boundary to the hollow central portion of the culm

3.12
squareness
the distance, δ_1, between the panel edge and the side of the other arm of the square

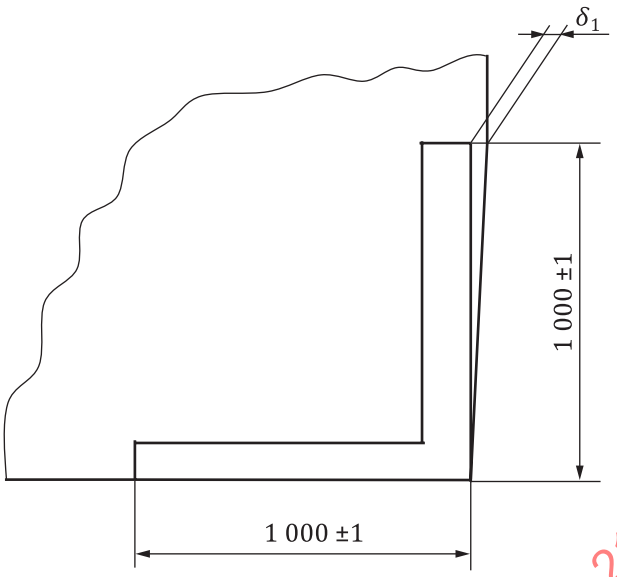


Figure 1 — Example of squareness

3.13
assembly gap
space between adjacent surfaces of assembled *bamboo flooring* (3.1)

3.14
decay
decomposition of bamboo by fungi or other micro-organisms resulting in softening, progressive loss of mass and strength, and often a change of texture and colour

3.15
crack
lengthwise separation of the bamboo fibres caused chiefly by shrinkage in drying and / or mechanical damage

3.16
gap
opening on the face or bottom of the *bamboo flooring* (3.1) product

3.17
splinter
filament protrusion on the surface of *bamboo scrimber* (3.8)

3.18
blister
presence of trapped air underneath the coating of the *finished indoor bamboo flooring* (3.2) resulting to bubbles on the face of the product

3.19
swollen edge
strip thickening part around the paint film

4 Requirements

4.1 Appearance requirements

The material used for the bamboo flooring shall be free from physical damage, decay and insect attack. There will be variations from element to element, but the total impression of the installed floor shall show a homogeneous character.

Any part of the material that impedes preservation, bonding and finishing shall be removed entirely.

As bamboo is a natural material, colour variations may occur, also due to an effect of light over time.

Table 1 — Appearance requirements

Types of defects	Face layer			Sub layer(s)
	Laminated bamboo flooring	Bamboo scrimber flooring	Flattened bamboo flooring	
Bamboo outer layer	Not permitted		Permitted as long it's used as the face layer	Not permitted
Bamboo inner layer			Not permitted	Permitted if this does not impair the bonding strength between the strips and/or the layers of the bamboo flooring[a]
Splinters	Not permitted			Permitted as long as these splinters do not impair the use quality of the bamboo flooring[b]
Cracks	Permitted for unfinished flooring as long as these cracks do not impair the wearing quality of the bamboo flooring[c] Not permitted for finished flooring			Permitted as long as these cracks do not impair the wearing quality of the bamboo flooring[c]
Gaps	Permitted for unfinished flooring as long as these gaps do not impair the wearing quality of the bamboo flooring[c] Not permitted for finished flooring			Permitted as long as these gaps do not impair the wearing quality of the bamboo flooring[c]
Blister	Diameter ≤0,5 mm; maximum 5 per sheet[d]			NA
Swollen edge	Permitted as it does not impair the installation precision[d]			

NOTE This table illustrates the appearance requirements for the face of indoor bamboo flooring.

[a] If the bonding strength between the strips and/or the layers of the bamboo flooring is impaired by bamboo inner layer, they shall be removed.

[b] If the use quality of the bamboo flooring is impaired by splinters, they shall be removed.

[c] If the wearing quality of the bamboo flooring is impaired by cracks and/or gaps, they shall be filled.

[d] Blister and swollen edge is inspected for the lacquered bamboo flooring.

4.2 Dimension requirements

Table 2 — Dimension requirements

Parameters	Test method	Common product dimensions		Requirements			
				Laminated bamboo flooring	Bamboo scrimber flooring	Flattened bamboo flooring	Bamboo - wood composite flooring
Length (mm)	ISO 9426	450 ~ 2 400	≤1 500	±0,5			
			>1 500	±1,0			
Width (mm)	ISO 9426	60 ~ 220		±0,2			
Thickness (mm)	ISO 9426	8 ~ 25		±0,3		±0,5	±0,3
Squareness (mm/m)	ISO 9426	—		≤0,2			
Spring (%)	ISO 9426			≤0,2			
Cup (%)	ISO 17959	convex		≤0,2			
		concave		≤0,2			
Bow (%)		convex		≤0,5	≤1,0	≤0,5	≤0,5
		concave		≤0,5			≤0,3
Assembly gap (mm)	Annex A	average		≤0,15	≤0,20	≤0,25	≤0,15
		max		≤0,20	≤0,40	≤0,50	≤0,20
Lipping (mismatch) (mm)	ISO 17959	average		≤0,15	≤0,20	≤0,30	≤0,15
		max		≤0,20	≤0,30	≤0,50	≤0,20

NOTE 1 This table illustrates the common dimension requirements for indoor bamboo flooring.

NOTE 2 Other specific dimensions of the product are permitted upon agreement of both supplier and buyer.

4.3 Property requirements

4.3.1 Physical and mechanical requirements

For sublayer materials such as solid wood, laminated board, plywood, fibreboard, oriented strand board, and any other sublayer materials not being made of bamboo; physical and mechanical properties shall meet the requirements given in their specific product standards.

Table 3 — Physical and mechanical requirements

Parameters	Test method	Laminated bamboo flooring	Bamboo scrimber flooring	Flattened bamboo flooring	Bamboo-wood composite flooring
MC (%)	Annex B	5,0 ≤ MC ≤ EMC			
Density (kg/m^3)	ISO 9427	≥500	≥800	≥500	≥500
24h Thickness swelling (%)	ISO 16983	NA	≤3,0	NA	
MoR[a] (MPa)	ISO 16978	≥70	≥90	≥70	≥40
Bonding quality (%)	Annex C	not exceeding 1/3[c]	NA	not exceeding 1/3[c]	
ARS[b] (g/100 r)	ISO 7784-2	≤0,12	≤0,15	≤0,12	≤0,15
SRS[b] (NA)	ISO 4586-2	NVC			

Key

MC = Moisture content

EMC = Equilibrium moisture content

MoR = Modulus of rupture

ARS = Abrasion resistance of surface

SRS = Staining resistance of surface

ASF = Adhesion of surface film

PFH = Paint film hardness

NVC = No visible change

NOTE This table illustrates the physical and mechanical property requirements of indoor bamboo flooring.

[a] Modulus of rupture needs to be tested only for flooring being installed on battens.

[b] Abrasion resistance of surface, Stain resistance, Adhesion of surface film and Paint film hardness, only applicable for lacquered bamboo flooring.

[c] The cumulative ratio of delamination in each separate individual glue line on all sides shall not exceed 1/3 of the total length of glue line.

Table 3 *(continued)*

Parameters	Test method	Laminated bamboo flooring	Bamboo scrimber flooring	Flattened bamboo flooring	Bamboo-wood composite flooring
ASF[b] (class)	ISO 2409	≤3			
PFH[b] (NA)	ISO 15184	≥H			

Key

MC = Moisture content

EMC = Equilibrium moisture content

MoR = Modulus of rupture

ARS = Abrasion resistance of surface

SRS = Staining resistance of surface

ASF = Adhesion of surface film

PFH = Paint film hardness

NVC = No visible change

NOTE This table illustrates the physical and mechanical property requirements of indoor bamboo flooring.

[a] Modulus of rupture needs to be tested only for flooring being installed on battens.

[b] Abrasion resistance of surface, Stain resistance, Adhesion of surface film and Paint film hardness, only applicable for lacquered bamboo flooring.

[c] The cumulative ratio of delamination in each separate individual glue line on all sides shall not exceed 1/3 of the total length of glue line.

4.3.2 Other declarations at the time of the first delivery

Where it is applicable, the following can refer to the wood flooring or can be declared accordingly if required by local regulations: emissions and content of dangerous substances, reaction to fire, breaking strength, slip resistance, thermal properties, biological durability.

5 Test samples

5.1 Sampling

Specimens shall be obtained at the distance of 20 mm from the edge of floor sample. The floor sample with the defects that affect the test precision shall be avoided.

5.2 Dimensions and quantity

5.2.1 Laminated bamboo flooring

Laminated bamboo flooring specimen shall be made according to Table 4 and Figure 2.

Table 4 — Dimensions and quantity of test samples

Parameters	Test sample dimension mm	Quantity (piece)
Density	50 × 50	6
MC	50 × 50	
MoR[a]	w = (50 ± 1)[b] l = (20 × t) + 50[c]	6
Bonding quality	75 × 75	6
ARS	100 × 100[d]	1
SRS	300 × w	1
ASF	250 × w	1
PFH	230 × w	3

Key

MC = Moisture content

MoR = Modulus of rupture

ARS = Abrasion resistance of surface

SRS = Staining resistance of surface

ASF = Adhesion of surface film

PFH = Paint film hardness

NOTE If the product size is smaller than the specimen dimension and quantity requirements, more floor samples will be taken.

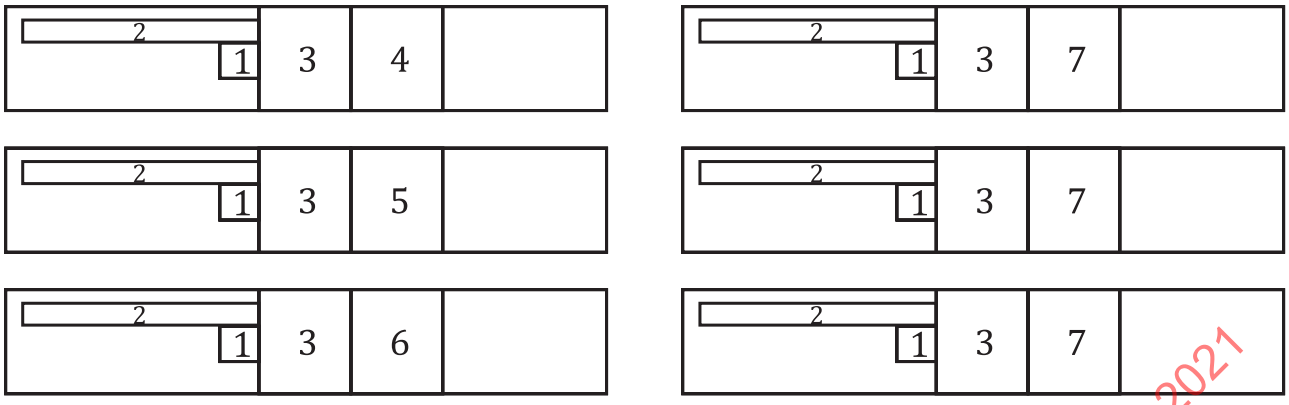
[a] The tongues and groove of specimens for modulus of rupture test shall be removed.

[b] The width, w, shall be (50 ± 1) mm.

[c] The length, l, shall be at least 20 times the nominal thickness, t, plus 50 mm.

[d] If the width of floor sample is less than 100 mm, the floor shall be assembled in width direction.

Dimension in millimetres



Key

1 density and moisture content
2 modulus of rupture
3 bonding quality
4 abrasion resistance of surface
5 staining resistance of surface
6 adhesion of surface film
7 paint film hardness

NOTE This figure shows the floor sample with a length of 920 mm and a width of 92 mm.

Figure 2 — Schematic diagram of sampling

5.2.2 Bamboo scrimber flooring

The bamboo scrimber flooring specimen shall be made according to Table 5 and Figure 3.

Table 5 — Dimensions and quantity of test samples

Parameters	Test sample dimension mm	Quantity (piece)
Density	50 × 50	6
MC	50 × 50	
24h Thickness swelling	50 × 50	6

Key

MC = Moisture content

MoR = Modulus of rupture

ARS = Abrasion resistance of surface

SRS = Staining resistance of surface

ASF = Adhesion of surface film

PFH = Paint film hardness

NOTE If the product size is smaller than the specimen dimension and quantity requirements, more floor samples will be taken.

[a] The tongues and groove of specimens for Modulus of rupture test shall be removed.

[b] The width, *w*, shall be (50 ± 1) mm.

[c] The length, *l*, shall be at least 20 times the nominal thickness, *t*, plus 50 mm.

[d] If the width of floor sample is less than 100 mm, the floor shall be assembled in width direction.

Table 5 *(continued)*

Parameters	Test sample dimension mm	Quantity (piece)
MoR[a]	$w = (50 \pm 1)$[b] $l = (20 \times t) + 50$[c]	6
ARS	100 × 100[d]	1
SRS	300 × w	1
ASF	250 × w	1
PFH	230 × w	3

Key

MC = Moisture content

MoR = Modulus of rupture

ARS = Abrasion resistance of surface

SRS = Staining resistance of surface

ASF = Adhesion of surface film

PFH = Paint film hardness

NOTE If the product size is smaller than the specimen dimension and quantity requirements, more floor samples will be taken.

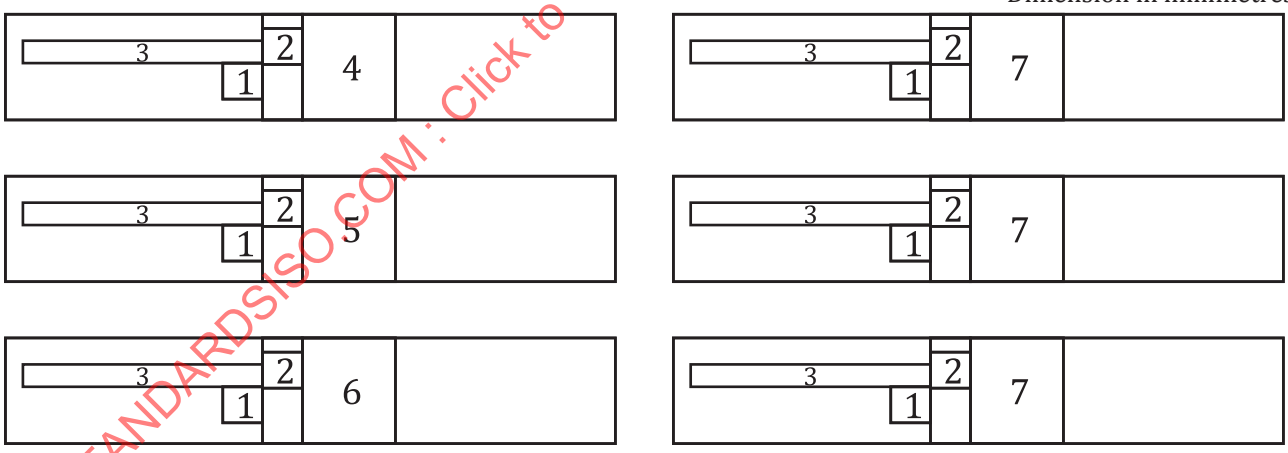
[a] The tongues and groove of specimens for Modulus of rupture test shall be removed.

[b] The width, w, shall be (50 ± 1) mm.

[c] The length, l, shall be at least 20 times the nominal thickness, t, plus 50 mm.

[d] If the width of floor sample is less than 100 mm, the floor shall be assembled in width direction.

Dimension in millimetres



Key

1 density and moisture content
2 24 h thickness swelling
3 modulus of rupture
4 abrasion resistance of surface
5 staining resistance of surface
6 adhesion of surface film
7 paint film hardness

NOTE This figure shows the floor sample with a length of 920 mm and a width of 92 mm.

Figure 3 — Schematic diagram of sampling

5.2.3 Bamboo-wood composite flooring

Sampling of bamboo - wood composite flooring shall be based on the core materials of flooring. If the core material is solid wood, laminated board or plywood et al., the sampling shall be carried out according to the sampling method of bamboo laminated flooring (see 5.2.1).

5.2.4 Flattened bamboo flooring

Sampling of flattened bamboo flooring shall be carried out according to the sampling method of bamboo laminated flooring (see 5.2.1).

6 Handling, storage, packaging and marking

6.1 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling, packaging and shall provide suitable storage areas to prevent damage or deterioration.

6.2 Marking

By agreement between buyer and supplier, the package shall be clearly marked with the following information as a minimum:

— name of manufacturer or supplier;

— tradename;

— a reference to this document, i.e. ISO 21629-1:2021;

— dimensions;

— bamboo species;

— wood species (if applicable) and type of other material (if applicable), used as bottom layer material(s);

— date of production and/or batch number;

— quantity of products and/or covered surface.

Annex A
(normative)

Test method of assembly gap

A.1 Measuring tools

Feeler gauge, readable to the nearest 0,01 mm.

A.2 Method

10 pieces of floor boards shall be assembled and placed on a horizontal test bed, as shown in Figure A.1. The values of assembly gap are of the 18 test locations shall be tested by feeler gauge. This method is revised based on GB/T 18103.

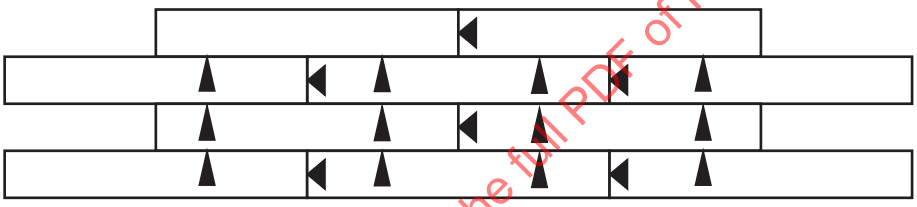


Figure A.1 — Determination scheme of Assembly gap

A.3 Expression of results

Average the 18 measurements to the nearest 0,01 mm.