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**Bamboo floorings —**

**Part 2:  
Outdoor use**

*Planchers en bambou —*

*Partie 2: Utilisation en extérieur*

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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

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](http://www.iso.org/members.html).

# Bamboo floorings —

## Part 2: Outdoor use

### 1 Scope

This document specifies the technical requirements, test methods and requirements for the handling, storage, packaging and marking of outdoor bamboo flooring.

It is applicable to outdoor bamboo flooring including bamboo laminated flooring and bamboo scrimber flooring.

### 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 9424, *Wood-based panels — Determination of dimensions of test pieces*

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

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

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 17959, *General requirements for solid wood flooring*

ISO 20585:2005, *Wood-based panels — Determination of wet bending strength after immersion in water at 70 degrees C or 100 degrees C (boiling temperature)*

EN 17009:2019, *Flooring of lignified materials other than wood — Characteristics, assessment and verification of constancy of performance and marking*

### 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

##### **bamboo flooring**

assembled bamboo-based panel used as floor boards

[SOURCE: ISO 21625: 2020, 3.3.4]

**3.2 bamboo scrimber**

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

[SOURCE: ISO 21625: 2020, 3.2.17]

**3.3 laminated bamboo flooring**

flooring product made from laminated bamboo strips

[SOURCE: ISO 21625: 2020, 3.3.4.2]

**3.4 bamboo scrimber flooring**

flooring product made of *bamboo scrimber* (3.2)

[SOURCE: ISO 21625: 2020, 3.3.4.3]

**3.5 bamboo outer layer**

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

[SOURCE: ISO 21625: 2020, 3.1.3]

**3.6 bamboo inner layer**

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

[SOURCE: ISO 21625: 2020, 3.1.4]

**3.7 squareness**

distance,  $d_1$ , between the panel edge and the side of the other arm of the square

Note 1 to entry: The squareness is shown in [Figure 1](#).

Dimensions in millimetres

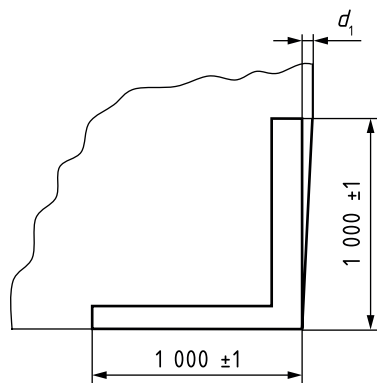


Figure 1 — Example of squareness

**3.8 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

**3.9****crack**

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

**3.10****gap**

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

**3.11****splinter**

filament protrusion on the surface of *bamboo scrimber* (3.2)

**4 Requirements****4.1 Appearance requirements**

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

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

As bamboo is a natural material, colour variations can occur naturally or due to exposure to light over time.

The appearance requirements of bamboo flooring for outdoor use are indicated in [Table 1](#).

**Table 1 — Appearance requirements**

Types of defects	Laminated bamboo flooring	Bamboo scrimber flooring
Bamboo outer layer	Not permitted	Permitted if this does not impair the bonding strength between the bundles of the bamboo flooring <sup>a</sup>
Bamboo inner layer		
Splinter		Not permitted
Cracks		
Gaps		
<sup>a</sup> If the bonding strength between the bundles of the bamboo flooring is impaired by outer layer and inner layer, they shall be removed.		

**4.2 Dimension requirements**

The dimension requirements of bamboo flooring for outdoor use are indicated in [Table 2](#).

Table 2 — Dimension requirements

Parameters	Test method	Common product dimensions		Requirements	
				Laminated bamboo flooring	Bamboo scrimber flooring
$L_s$ (mm)	ISO 9426	450 ~ 5 800	≤2 000	±1,0	
			>2 000	±2,0	
$W_s$ (mm)	ISO 9426	60~220	≤200	±0,5	
			>200	±1,0	
$e$ (mm)	ISO 9426	8 ~ 38	≤20	±0,5	
			>20	±1,0	
$S_q$ (mm/m)	ISO 9426	—	—	≤0,2	
$S_p$ (%)	ISO 9426		—	≤0,2	
$C$ (%)	ISO 17959		convex	—	≤0,2
			concave		
$B$ (%)		convex	≤1,0		
		concave	≤0,5		

**Key** $L_s$  = length (of surface layer) $W_s$  = width (of surface layer) $e$  = thickness $S_q$  = squareness $S_p$  = spring $C$  = cup $B$  = bow

NOTE 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**The physical and mechanical requirements of bamboo flooring for outdoor use are indicated in [Table 3](#).



Table 3 — Physical and mechanical requirements

Parameters	Test method	Unit	Laminated bamboo flooring	Bamboo scrimber flooring
$w_M$ (%)	<a href="#">Annex A</a>	%	$6,0 \leq w_M \leq w_{EM}$	
$\delta$ (kg/m <sup>3</sup> )	ISO 9427	kg/m <sup>3</sup>	≥500	≥800
$e_s$ (%)	<a href="#">Annex B</a>	%	N/A	≤10 %
$W_s$ (%)	<a href="#">Annex B</a>	%	N/A	≤2,0
$B_q$	<a href="#">Annex C</a>	%	not exceed 1/3 <sup>c</sup>	N/A
$M_{oR}$ <sup>a</sup>	ISO 16978	MPa	≥60	≥60
$M_{oE}$ <sup>a</sup>	ISO 16978	MPa	≥6 000	≥6 000
$F_{bs}$	ISO 20585:2005, Method A	MPa	≥35	≥35
$D_p$ (class)	EN 17009:2019, Annex B	N/A	DC 2 <sup>b</sup>	DC 2 <sup>b</sup>

**Key** $w_M$  = moisture content $w_{EM}$  = equilibrium moisture content $\delta$  = density $e_s$  = thickness swelling $W_s$  = width swelling $B_q$  = bonding quality $M_{oR}$  = modulus of rupture $M_{oE}$  = modulus of elasticity $F_{bs}$  = wet bending strength $D_p$  = decay prevention<sup>a</sup> Modulus of rupture and modulus of elasticity shall be tested only for flooring installed on battens.<sup>b</sup> The durability class of bamboo flooring is defined as DC 1, DC 2, DC 3, DC 4, and DC5 based on the mass loss of bamboo flooring after laboratory decay tests. The mass loss is 5 % ~10 % for DC 2.<sup>c</sup> The cumulative ratio of delamination in each separate individual glueline on all sides shall not exceed 1/3 of the total length of glueline.**4.3.2 Other declarations at the time of the first delivery**

Where it is applicable, the following can be declared accordingly, if required by regulations: emissions and content of dangerous substances, reaction to fire, slip resistance and sound absorption quality.

**5 Test samples****5.1 Sampling**

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

## 5.2 Dimensions and quantity

### 5.2.1 Laminated bamboo flooring

Laminated bamboo flooring specimens shall be made according to [Table 4](#) and [Figure 2](#). The schematic diagram of sampling ([Figure 2](#)) shows the flooring sample with a length of 1 860 mm and a width of 137 mm. If the product size is smaller than the specimen dimension requirement or the quantity requirement is not met, extra flooring samples shall be taken.

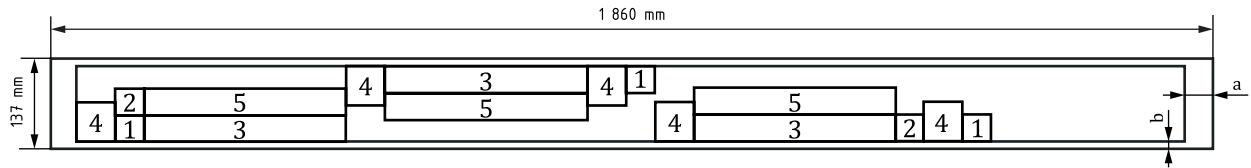
**Table 4 — Dimensions and quantity of test samples**

Parameters	Test sample dimension (mm)	Quantity (piece)
$\delta$	50 × 50	6
$w_M$	50 × 50	4
$M_{oR}^a$	$W: (50 \pm 1)^b$	6
$M_{oE}^a$	$l: 20 \times e + 50^c$	
$B_q$	75 × 75	10
$F_{bs}$	$W: (50 \pm 1)^b$ $l: 20 \times e + 50^c$	6

**Key**

$\delta$  = density  
 $w_M$  = moisture Content  
 $M_{oR}$  = modulus of rupture  
 $M_{oE}$  = modulus of elasticity  
 $B_q$  = bonding quality  
 $F_{bs}$  = wet bending strength  
 $W$  = width  
 $l$  = length  
 $e$  = thickness

<sup>a</sup> The tongues and grooves of specimens for modulus of rupture and modulus of elasticity test shall be removed.  
<sup>b</sup> The width,  $W$ , shall be  $(50 \pm 1)$  mm.  
<sup>c</sup> The length shall be at least 20 times the nominal thickness plus 50 mm.



**Key**

- 1 density
- 2 moisture content
- 3 modulus of rupture and modulus of elasticity
- 4 bonding quality
- 5 wet bending strength
- a Outer edge trimmed in length of 50 mm.
- b Outer edge trimmed in width of 5 mm.

NOTE This figure shows the flooring sample with a length of 1 860 mm and a width of 137 mm.

**Figure 2 — Schematic diagram of sampling**

**5.2.2 Bamboo scrimber flooring**

The bamboo scrimber flooring specimens shall be taken according to [Table 5](#) and [Figure 3](#). If the product size is smaller than the specimen dimension requirement or the quantity requirement is not met, extra flooring samples shall be taken.

**Table 5 — Dimensions and quantity of test samples**

Parameters	Test sample dimension (mm)	Quantity (piece)
$\delta$	50 × 50	6
$w_M$	50 × 50	4
$e_s$	50 × 50	8
$W_s$	50 × 50	

**Key**

$\delta$  = density  
 $w_M$  = moisture Content  
 $e_s$  = thickness swelling  
 $W_s$  = width swelling  
 $M_{oR}$  = modulus of rupture  
 $M_{oE}$  = modulus of elasticity  
 $B_q$  = bonding quality  
 $F_{bs}$  = wet bending strength  
 $w$  = width  
 $l$  = length  
 $e$  = thickness

a The tongues and grooves of specimens for modulus of rupture and modulus of elasticity test shall be removed.  
b The width,  $W$ , shall be (50 ± 1) mm.  
c The length shall be at least 20 times the nominal thickness plus 50 mm.