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**Laminated products made of bamboo  
strips for indoor furniture purposes —  
Requirements and test methods**

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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 document 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)).

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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).

## Introduction

Laminated bamboo products are used for purposes such as construction, furniture, handicrafts and novelty items. These products, such as floor planks or boards, have a large market in the construction industry. Furniture for the “high end” and “do-it-yourself” markets has also found an application of laminated bamboo products. These products are one of the main materials for bamboo furniture. Accordingly, the market for laminated bamboo furniture is growing steadily. In 2018, the market size for bamboo furniture was valued at USD 10,09 billion and is expected to grow at a compound annual growth rate (CAGR) of 5,2 % from 2019 to 2025.

In view of the above, such applications of laminated bamboo in the furniture industry warrant the development of a standard testing procedure and property requirements. This document aims to address the need for a standard for laminated products made of bamboo strips for indoor furniture purposes.

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# Laminated products made of bamboo strips for indoor furniture purposes — Requirements and test methods

## 1 Scope

This document specifies the requirements and test methods for laminated products made of bamboo strips for indoor furniture purposes.

It also specifies handling, storage, packaging and marking requirements.

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

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

ISO 12466-1, *Plywood — Bonding quality — Part 1: Test methods*

ISO 12466-2, *Plywood — Bonding quality — Part 2: Requirements*

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

ISO 13061-12, *Physical and mechanical properties of wood — Test methods for small clear wood specimens — Part 12: Determination of static hardness*

ISO 21625, *Vocabulary related to bamboo and bamboo products*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21625 and the following 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

#### **plank**

flat and rectangular piece of board which is longer than it is wide (narrow), typically used for flooring

### 3.2

#### **panel**

rectangular thin sheet, typically used for panelling

### 3.3

#### **lumber**

long, rectangular cross-section members, commonly used for framing

### 3.4

#### **construction**

arrangement of the strips in a *plank* (3.1), *panel* (3.2), or *lumber* (3.3)

## 4 Requirements

### 4.1 Appearance requirements

The material used for laminated bamboo products for indoor furniture purposes shall be free from physical damage, decay and insect attack.

There are variations from element to element, but the total impression of laminated bamboo products 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 the effect of light over time.

The appearance requirements of laminated bamboo shall be as indicated in [Table 1](#).

**Table 1 — Appearance requirements**

Types of defects	Face layer	Sub/ middle layer(s)
Bamboo outer layer	Not permitted	Not permitted
Bamboo inner layer		Permitted if this does not impair the bonding strength between the strips and/or the layers of the laminated bamboo product <sup>a</sup>
Splinters	Not permitted	Permitted as long as these splinters do not impair the use quality of the laminated bamboo product <sup>b</sup>
Cracks	Permitted as long as these cracks and/or gaps do not impair the use quality of the laminated bamboo product <sup>c</sup>	
Gaps		
Delamination	Not permitted	Not permitted
Glue penetration	Not permitted	Permitted as long as the glue penetration does not impair the use quality of the laminated bamboo product <sup>d</sup>

<sup>a</sup> If the bonding strength between the strips and/or the layers of the laminated bamboo product is impaired by the bamboo inner layer, they shall be removed.

<sup>b</sup> If the use quality of the laminated bamboo product is impaired by splinters, they shall be removed.

<sup>c</sup> If the use quality of the laminated bamboo product is impaired by cracks and/or gaps, they shall be filled.

<sup>d</sup> If the use quality of the laminated bamboo product is impaired by glue penetration, the glue marks shall be removed.

### 4.2 Dimension requirements

The common dimension requirements for laminated bamboo shall be as specified in [Table 2](#). Other specific dimensions of the product are permitted upon agreement of both the supplier and buyer.



**Table 2 — Dimension requirements**

Parameters	Test method	Product	Common product dimensions	Number of layers	Requirements
Length (mm)	ISO 9426	Plank	1 000 ~ 3 000	—	+5
		Panel	1 000 ~ 4 000	—	
		Lumber	1 000 ~ 5 800	—	
Width (mm)	ISO 9426	Plank	60 ~ 300	—	+2
		Panel	600 ~ 1 200	—	
		Lumber	50 ~ 200	—	
Thickness (mm)	ISO 9426	Plank / Panel	3 ~ 20	1	±0,5
			7 ~ 40	2-5	
		Lumber	40 ~ 200	>2	
Squareness (mm/m)	ISO 9426	—			<1
Edge straightness (mm)					±1
Flatness (mm/m)					<3

### 4.3 Property requirements

#### 4.3.1 Physical properties requirements

The physical requirements for laminated bamboo shall be as indicated in [Table 3](#).

**Table 3 — Physical requirements**

Parameters	Test method	Requirements
MC (%)	<a href="#">Annex A</a>	$5,0 \leq MC \leq EMC$ or agreement between supplier and customer
Density (kg/m <sup>3</sup> )	ISO 9427	≥500
<b>Key</b> MC Moisture content EMC Equilibrium Moisture Content		

#### 4.3.2 Mechanical properties requirements

The mechanical properties of the laminated bamboo and the minimum requirements depend on the design of the final use of the product. The information shall be provided by the supplier of the laminated bamboo. The mechanical requirements for laminated bamboo shall be as indicated in [Table 4](#), which illustrates the mechanical property requirements of laminated bamboo products for indoor furniture purposes.

**Table 4 — Mechanical requirements**

Parameters	Test method	Requirements
Hardness (N)	ISO 13061-12	≥ 4 000
Bonding quality	ISO 12466-1	Class 1 or Class 2 (as per ISO 12466-2)

#### 4.4 Formaldehyde emission

It is expected that formaldehyde emission of laminated bamboo complies with the requirements of the country/locality where it will be used.

#### 4.5 Treatment and durability

In case the durability of the final product shall be improved, the bamboo strips can be treated with environment-friendly processes and/or preservatives such as, but not limited to, those without heavy metals that can harm the environment.

#### 4.6 Other declarations at the time of the first delivery

Where it is applicable, the following can be applicable to the bamboo furniture or can be declared accordingly if required by local regulations: emissions and content of dangerous substances, reaction to fire, thermal properties, and biological durability.

### 5 Handling, storage, packaging and marking

#### 5.1 Handling, storage and packaging

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

#### 5.2 Marking

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

- name and address of the manufacturer or supplier;
- trade name;
- reference to this document, i.e. ISO 6128:2023;
- dimensions;
- construction (see examples in [Annex B](#));
- category: plank/panel/lumber (optional);
- bamboo species;
- date of production and/or batch number;
- quantity of products.

## **Annex A**

### **(normative)**

## **Determination of moisture content**

### **A.1 Principle**

The moisture content shall be measured with an electric moisture meter. The moisture meter, of any design, shall be calibrated for the species of wood or bamboo concerned, and capable of making an individual measurement with an error of  $\pm 2\%$  at moisture contents from 7 % to 28 %.

NOTE Electric moisture measurement can only be used for an estimation of the moisture content.

In case of dispute, the moisture content shall be determined by the oven drying method in accordance with ISO 16979. The following modifications for bamboo flooring with a bamboo scrimber component shall be made.

### **A.2 Method**

- The oven dry test shall be performed beginning with 48 h of continuous drying.
- After this 48-hour period, weighing shall be conducted with an interval of 6 h until a difference between two successive weighings is less than 0,1% in mass.