
Wood-based panels — Wet process fibreboard

*Panneaux à base de bois — Panneau de fibres obtenu par procédé
humide*





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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).

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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 89, *Wood-based panels*, Subcommittee SC 01, *Fibre boards*.

This first edition cancels and replaces ISO 27769-1:2009 and ISO 27769-2:2009, which have been technically revised.

Wood-based panels — Wet process fibreboard

1 Scope

This document provides a classification matrix and related mandatory tests for two types of wet process fibreboard made from wood: softboards and hardboards and specifies the relevant manufacturing property requirements.

NOTE 1 Wet process fibreboards are divided into three types: softboards, medium boards and hardboards. This document is not applicable to medium boards.

NOTE 2 Fibreboards are broadly divided into two groups based on the manufacturing process, namely the dry-process group and the wet process group. This document is not applicable to dry-process fibreboards (see ISO 16895).

NOTE 3 The values listed in this document relate to product properties used to classify fibreboards into one of the different types. The values are not characteristic values to be used for design purposes. When fibreboard is classified as load-bearing and nominated for structural applications, characteristic strength and stiffness values are established based upon testing in accordance with ISO 16572 or equivalent ASTM or EN Standards. Alternatively, for specific load-bearing applications (e.g. walls, roofs, floors and I-joist webs), the load-bearing fibreboard would meet the specific performance requirements for that intended application.

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 3340, *Fibre building boards — Determination of sand content*

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 16981, *Wood-based panels — Determination of surface soundness*

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

ISO 16984, *Wood-based panels — Determination of tensile strength perpendicular to the plane of the panel*

ISO 16985, *Wood-based panels — Determination of dimensional changes associated with changes in relative humidity*

ISO 16998, *Wood-based panels — Determination of moisture resistance — Boil test*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17064 and the following 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 <http://www.iso.org/obp>

3.1 wet process fibreboard

wood fibreboard with a forming line moisture content of greater than 20 % and whose primary bonding results from the felting of the wood fibres and their inherent adhesive properties

Note 1 to entry: According to the density, the types of fibreboard are the following:

- a) softboards, of density $<400 \text{ kg/m}^3$;
- b) medium boards, of density $\geq 400 \text{ kg/m}^3$ to $<840 \text{ kg/m}^3$;
- c) hardboards, of density $\geq 800 \text{ kg/m}^3$.

Note 2 to entry: Tables for the classification of medium boards are not included in this document. They can be included as they become available on the international market.

Note 3 to entry: Density ranges given in product descriptions in 5.2 and 5.3 are a guide. Manufacturers can classify a product as a particular type if the product is within 20 % of the nominated density range and if it has all of the properties of the nominated type.

4 Abbreviated terms

The following abbreviated terms are used in the preparation of the classification matrices:

REG	regular	for use in dry conditions only
MR	moisture resistant	for use in humid conditions
HMR	high moisture resistant	for use in high-humidity conditions
EXT	exterior	for exterior use above ground
LB	load-bearing	for structural or load-bearing use
GP	general purpose	for use in general applications and furniture, not requiring the specific properties of load-bearing grades
DIY	do-it-yourself	for use in home projects, rather than by professional tradespersons

NOTE For definitions of the terms dry, humid, high humid, load-bearing and structural, see ISO 17064.

5 Classifications, designation and coding

5.1 General

5.1.1 Classification matrices

Overall classification matrices, which include all major classes available at the time of publication, are given in [Table 1](#) for softboards and in [Table 2](#) for hardboards.

5.1.2 Structural grades

When a product is used in a complex load-bearing or structural application, additional information shall be available in the form of characteristic values derived from structural testing (see ISO 16572), experimental test results or history of use to validate its performance under the proposed conditions.

5.2 Softboards

An overall classification matrix, which includes all major classes available at the time of publication, is shown in [Table 1](#). [Table 1](#) allows for future grades to be included as they become available on the international markets.

Table 1 — Classification matrix for softboards

Softboard type	Conditions of use			
	Dry, regular	Humid	High humid	Exterior
SB-GP	REG General purpose softboard	MR General purpose softboard	HMR General purpose softboard	EXT General purpose softboard
Application examples	Partitions, acoustic	Partitions, acoustic, rigid underlays	Advertising	Joints
SB-LB	No existing product	MR load-bearing softboard	No existing product	No existing product
Application examples		Rigid underlays		
Additional attributes such as fire retardant (FR), insect retardant (I) and fungi retardant (F), may be added to the softboard classification of Table 1 .				

5.3 Hardboards

An overall classification matrix, which includes all major classes available at the time of publication, is shown in [Table 2](#). This table allows for future grades to be included as they become available on the international markets.

Table 2 — Classification matrix for hardboards

Hardboard type	Conditions of use			
	Dry, regular	Humid	High humid	Exterior
HB-GP	REG General purpose hardboard	MR General purpose hardboard	HMR General purpose hardboard	EXT General purpose hardboard
Application examples	Furniture, doors, packaging, DIY uses	Furniture, doors, packaging, DIY uses, overlay floors	Backer-boards	Siding
HB-LB	REG load-bearing hardboard	MR load-bearing hardboard	No existing product	No existing product
Application examples	Shelving, general construction	General construction		
Additional attributes such as fire retardant (FR), insect retardant (I) and fungi retardant (F), may be added to the hardboard classification of Table 2 .				

6 Mandatory tests relating to each grade

6.1 General

The following mandatory tests shown in [Tables 3](#) and [4](#) shall be applied to the various fibreboard grades identified in [Tables 1](#) and [2](#), respectively.

All property requirements shall be met at dispatch from the factory.

6.2 Softboards

Table 3 — Tests relating to softboard grades

Property	Method	SB-GP	SB-LB
Dimensions tolerance	ISO 9426	DHME	DH
Density variation	ISO 9427	DHME	DH
Moisture content	ISO 16979	DHME	DH
Bending strength (MOR)	ISO 16978	DHME	DH
Modulus of elasticity (MOE)	ISO 16978	—	DH
Thickness swelling after 2 h	ISO 16983	DHME	DH
D Dry conditions. H Humid conditions. M High humid conditions. E Exterior conditions.			

6.3 Hardboards

Table 4 — Tests relating to hardboard grades

Property	Method	HB-GP	HB-LB
Dimensions tolerance	ISO 9426	DHME	DH
Density variation	ISO 9427	DHME	DH
Moisture content	ISO 16979	DHME	DH
Internal bond strength (IB)	ISO 16984	DHME	DH
Bending strength (MOR)	ISO 16978	DHME	DH
Modulus of elasticity (MOE)	ISO 16978	ME	DH
Thickness swelling after 24 h	ISO 16983	DHME	DH
Moisture resistance	ISO 16998 ISO 20585	HME	H
D Dry conditions. H Humid conditions. M High humid conditions. E Exterior conditions.			

6.4 Supplementary properties

If information on supplementary properties is agreed between the user and the manufacturer, it shall be determined using the test methods given in [Table 5](#).

Table 5 — Supplementary properties and test methods

Property	Test method
Surface soundness	ISO 16981
Dimensional changes associated with changes in relative humidity	ISO 16985
Sand content	ISO 3340

7 Thickness ranges

7.1 Specification values

Specification values shall be related to the ranges of thickness given in [7.2](#) and [7.3](#).

7.2 Softboards

For softboards, the specification of a particular thickness of product shall be determined by consulting the correct thickness range as follows:

- a) ≤ 10 mm;
- b) > 10 mm to ≤ 19 mm;
- c) > 19 mm to ≤ 36 mm;
- d) > 36 mm.

7.3 Hardboards

For hardboards, the specification of a particular thickness of product shall be determined by consulting the correct thickness range as follows:

- a) $\leq 3,5$ mm;
- b) $> 3,5$ mm to $\leq 5,5$ mm;
- c) $> 5,5$ mm to $\leq 9,0$ mm;
- d) $> 9,0$ mm.

8 Expression of specification limits and general requirements

8.1 Expression of specification limits

This document may be used to evaluate groups of panels or production batches. To evaluate a group of panels in accordance with this document, the following shall be required.

- a) The mandatory tests of this document, [Tables 8](#) and [9](#) shall be carried out on samples of the group. The test specimens shall be conditioned as specified in each test method.
- b) The results of the tests shall be evaluated against the appropriate specification limits given in [Tables 6](#) to [18](#), according to the grade and thickness range of the panels. [Table 6](#) applies to all classes and thickness ranges of panels.

For density variation and dimensions (see [Table 6](#)), the specification limits are based on the mean values for individual panels (calculated in accordance with [Annex A](#)) and are the maximum tolerances for density variation and dimensions.

The specification limits given in [Tables 7](#) to [18](#) are based on 5 (lower) or 95 (upper) percentile expressions, according to [8.2](#) and [8.3](#).

NOTE This document cannot be used to properly evaluate single panels, but can be used as an approximation. The upper or lower specification limits can be taken as maximum or minimum values.

8.2 Lower specification limits

The requirements in [Tables 7](#) to [18](#) are the lower specification limits for the following properties:

- a) bending strength/modulus of rupture (MOR);
- b) modulus of elasticity (MOE);
- c) internal bond;
- d) internal bond after boil test;
- e) wet bending strength (MOR).

The 5-percentile values based on the mean values for individual panels and calculated in accordance with [Annex A](#) shall be equal to or greater than the lower specification limits in [Tables 7](#) to [18](#).

8.3 Upper specification limits

The requirements in [Tables 7](#) to [18](#) are the upper specification limits for the following properties:

- a) thickness swelling after 2 h (softboards);
- b) thickness swelling after 24 h (hardboards).

The 95-percentile values based on the mean values for individual panels and calculated in accordance with [Annex A](#) shall be equal to or less than the upper specification limits in [Tables 7](#) to [18](#).

8.4 Density variation, dimension and moisture content requirements

At least 95 % of the mean values of the individual panels shall be within the maximum tolerances stated in [Table 6](#).

Table 6 — Requirements for density variation, dimensions and moisture content

Tolerance on nominal dimensions	Test method	Requirement			
Density variation within panel	ISO 9427	±10 % max from mean			
Length and width	ISO 9426	±2 mm/m, max ±5 mm			
Squareness	ISO 9426	≤2 mm/m			
Thickness	ISO 9426	Thickness range, nominal (mm)			
Softboard		≤10	>10 to ≤19	>19 to ≤36	>36
Unsanded board		±1,0	±1,2	±1,8	±1,8
		Thickness range, nominal (mm)			
Hardboard		≤3,5	>3,5 to ≤5,5	>5,5 to ≤9,0	>9,0
Unsanded board		±0,4	±0,5	±0,7	±0,7
Sanded board		±0,3	±0,3	±0,3	±0,3
Decorative board		±0,6	±0,6	±0,6	±0,6
Moisture content (advisory only)	ISO 16979	4 % to 13 %			

9 Requirements for softboards

9.1 Requirements for general purpose softboard for use in dry conditions

Requirements for SB-GP REG (regular general purpose softboard) are listed in [Table 7](#).

Table 7 — Requirements for SB-GP REG

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	0,9	0,8	0,7	0,4
Thickness swelling after 2 h	ISO 16983	%	10	10	10	10

9.2 Requirements for general purpose softboard for use in humid conditions

The requirements for SB-GP MR (moisture resistant general purpose softboard) are given in [Table 8](#).

Table 8 — Requirements for SB-GP MR

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	1,1	1,0	0,8	0,4
Thickness swelling after 2 h	ISO 16983	%	8	8	8	8

9.3 Requirements for general purpose softboard for use in high-humidity conditions

The requirements for SB-GP HMR (high moisture resistant general purpose softboard) are given in [Table 9](#).

Table 9 — Requirements for SB-GP HMR

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	1,2	1,1	0,9	0,5
Thickness swelling after 2 h	ISO 16983	%	7	7	7	7

9.4 Requirements for general purpose softboard for use in exterior conditions

The requirements for SB-GP EXT (exterior general purpose softboard) are given in [Table 10](#).

Table 10 — Requirements for SB-GP EXT

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	1,3	1,2	1,0	0,4
Thickness swelling after 2 h	ISO 16983	%	6	6	6	6

9.5 Requirements for load-bearing softboard for use in dry conditions

The requirements for SB-LB REG (regular load-bearing softboard) used for instantaneous or short-term load duration only are given in [Table 11](#).

Table 11 — Requirements for SB-LB REG

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	1,2	1,1	1,0	0,4
Modulus of elasticity (MOE)	ISO 16978	MPa	150	140	120	100
Thickness swelling after 2 h	ISO 16983	%	8	8	8	8

9.6 Requirements for load-bearing softboard for use in humid conditions

The requirements for SB-LB MR (moisture resistant load-bearing softboard) used for instantaneous or short-term load duration only are given in [Table 12](#).

Table 12 — Requirements for SB-LB MR

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤10	>10 to ≤19	>19 to ≤36	>36
Bending strength (MOR)	ISO 16978	MPa	1,3	1,2	1,1	0,5
Modulus of elasticity (MOE)	ISO 16978	MPa	180	170	150	120
Thickness swelling after 2 h	ISO 16983	%	6	6	6	6

10 Requirements for hardboards

10.1 Requirements for general purpose hardboard for use in dry conditions

The requirements for HB-GP REG (regular general purpose hardboard) are given in [Table 13](#).

Table 13 — Requirements for HB-GP REG

Property	Test method	Unit	Requirement		
			Thickness range nominal (mm)		
			≤3,5	>3,5 to ≤5,5	>5,5
Bending strength (MOR)	ISO 16978	MPa	28	28	25
Internal bond	ISO 16984	MPa	0,45	0,45	0,45
Thickness swelling after 24 h	ISO 16983	%	35	30	25

10.2 Requirements for general purpose hardboard for use in humid conditions

The requirements for HB-GP MR (moisture resistant general purpose hardboard) are given in [Table 14](#).

Table 14 — Requirements for HB-GP MR

Property	Test method	Unit	Requirement		
			Thickness range nominal (mm)		
			≤3,5	>3,5 to ≤5,5	>5,5
Bending strength (MOR)	ISO 16978	MPa	32	32	30
Internal bond	ISO 16984	MPa	0,55	0,55	0,50
Thickness swelling after 24 h	ISO 16983	%	22	18	15
Moisture resistance Option 1: Internal bond strength after boil test	ISO 16998	MPa	0,25	0,25	0,25

10.3 Requirements for general purpose hardboard for use in high-humidity conditions

The requirements for HB-GP HMR (high moisture resistant general purpose hardboard) are given in [Table 15](#).

Table 15 — Requirements for HB-GP HMR

Property	Test method	Unit	Requirement		
			Thickness range nominal (mm)		
			≤3,5	>3,5 to ≤5,5	>5,5
Bending strength (MOR)	ISO 16978	MPa	32	32	30
Modulus of elasticity (MOE)	ISO 16978	MPa	2 500	2 500	2 300
Internal bond	ISO 16984	MPa	0,60	0,60	0,50
Thickness swelling after 24 h	ISO 16983	%	17	15	12
Moisture resistance Option 1: Internal bond strength after boil test	ISO 16998	MPa	0,30	0,30	0,30

10.4 Requirements for general purpose hardboard for use in exterior conditions

The requirements for HB-GP EXT (exterior general purpose hardboard) are given in [Table 16](#).

Table 16 — Requirements for HB-GP EXT

Property	Test method	Unit	Requirement			
			Thickness range nominal (mm)			
			≤3,5	>3,5 to ≤5,5	>5,5 to ≤9,0	>9,0
Bending strength (MOR)	ISO 16978	MPa	40	35	32	20
Modulus of elasticity (MOE)	ISO 16978	MPa	3 600	3 100	2 900	2 900
Internal bond	ISO 16984	MPa	0,70	0,60	0,50	0,40
Thickness swelling after 24 h	ISO 16983	%	12	10	8	8
Moisture resistance						
Option 1: Internal bond strength after boil test	ISO 16998	MPa	0,40	0,35	0,30	0,25
Option 2: Wet bending strength	ISO 20585 Method A	MPa	8	7	6	6

10.5 Requirements for load-bearing hardboard for use in dry conditions

The requirements for HB-LB REG (regular load-bearing hardboard) are given in [Table 17](#).

Table 17 — Requirements for HB-LB REG

Property	Test method	Unit	Requirement		
			Thickness range nominal (mm)		
			≤3,5	>3,5 to ≤5,5	>5,5
Bending strength (MOR)	ISO 16978	MPa	32	32	30
Modulus of elasticity (MOE)	ISO 16978	MPa	2 500	2 500	2 300
Internal bond	ISO 16984	MPa	0,60	0,60	0,60
Thickness swelling after 24 h	ISO 16983	%	35	30	25

10.6 Requirements for load-bearing hardboard for use in humid conditions

The requirements for HB-LB MR (moisture resistant load-bearing hardboard) are given in [Table 18](#).

Table 18 — Requirements for HB-LB MR

Property	Test method	Unit	Requirement		
			Thickness range nominal (mm)		
			≤3,5	>3,5 to ≤5,5	>5,5
Bending strength (MOR)	ISO 16978	MPa	38	34	32
Modulus of elasticity (MOE)	ISO 16978	MPa	3 700	3 100	2 900
Internal bond	ISO 16984	MPa	0,80	0,70	0,65
Thickness swelling after 24 h	ISO 16983	%	17	15	12
Moisture resistance					
Option 1: Internal bond strength after boil test	ISO 16998	MPa	0,40	0,35	0,32
Option 2: Wet bending strength	ISO 20585 Method A	MPa	8	7	6

Annex A (normative)

Calculation of 5-percentile and 95-percentile values

A.1 General

This annex specifies a method of calculating the 5-percentile and 95-percentile values, as given in [A.3](#).

A.2 Notation symbols

The general notation symbols used in this annex are as follows:

m	number of test pieces cut from each single panel of the sample, in each direction
n	number of panels taken as sample, i.e. size of the sample
s	estimate of the standard deviation calculated from test values or measurements
$s_{w,j}$	estimate of the standard deviation within a panel, j , of the sample
$s_{\bar{x}}$	estimate of the standard deviation between panel means
\bar{s}_w	estimate of the mean standard deviation between panels
t_n	single-sided 5 %- t -value of a normally distributed sample of n panels (see Table A.1)
$x_{5\%}$	lower 5-percentile values of the sample
$x_{95\%}$	upper 95-percentile values of the sample
x_{ij}	single test value or measurement
\bar{x}_i	mean value (arithmetic mean) of the m single test values, or measurements, obtained from a single panel, j
$\bar{\bar{x}}$	grand mean, i.e. mean value (arithmetic mean) of all $(m \times n)$ test values, or measurements, obtained from a sample

A.3 Calculations

A.3.1 Mean value of each individual panel

For each group of test pieces, or measurements, the mean value of each individual panel (panel mean), \bar{x}_j , shall be calculated using [Formula \(A.1\)](#):

$$\bar{x}_j = \frac{\sum_{i=1}^m x_{ij}}{m} \quad (\text{A.1})$$

A.3.2 Standard deviation within each panel

For each group of test pieces, or measurements, the standard deviation within each panel, $s_{w,j}$, shall be calculated using [Formula \(A.2\)](#):

$$s_{w,j} = \frac{\sqrt{\sum_{i=1}^m (x_{ij} - \bar{x}_j)^2}}{m-1} \quad (\text{A.2})$$

A.3.3 Grand mean

The grand mean (mean of panel means), $\bar{\bar{x}}$, of all test pieces, or all of a group of test values, from the sample shall be calculated using [Formula \(A.3\)](#):

$$\bar{\bar{x}} = \frac{\sum_{j=1}^n \sum_{i=1}^m x_{ij}}{m n} = \frac{\sum_{j=1}^n \bar{x}_j}{n} \quad (\text{A.3})$$

A.3.4 Standard deviation of panel means

The standard deviation between panel means, $s_{\bar{x}}$, shall be calculated using [Formula \(A.4\)](#):

$$s_{\bar{x}} = \frac{\sqrt{\sum_{j=1}^n (\bar{x}_j - \bar{\bar{x}})^2}}{(n-1)} \quad (\text{A.4})$$

A.3.5 Mean standard deviation of the test values within panels

The mean standard deviation of the test values within panels, \bar{s}_w , shall be calculated using [Formula \(A.5\)](#):

$$\bar{s}_w = \frac{\sum_{j=1}^n s_{w,j}}{n} \quad (\text{A.5})$$

A.3.6 The 5- and 95-percentile of a normally distributed panel property

The 5-percentile of a normally distributed panel property shall be calculated in accordance with [Formula \(A.6\)](#) and [Formula \(A.7\)](#):

$$x_{5\%} = \bar{\bar{x}} - t_n s_{\bar{x}} \quad (\text{A.6})$$

$$x_{95\%} = \bar{\bar{x}} + t_n s_{\bar{x}} \quad (\text{A.7})$$

Table A.1 — Single-sided t -values in relation to the sample size n

Sample size n	4	6	8	10	12	15	20	25	30	35	40	60	100
t_n	2,35	2,02	1,89	1,83	1,80	1,76	1,72	1,71	1,70	1,69	1,68	1,67	1,65

NOTE t_n values for sample sizes between those in [Table A.1](#) may be determined by linear interpolation.

Bibliography

- [1] ISO 16572, *Timber structures — Wood-based panels — Test methods for structural properties*
- [2] ISO 16895, *Wood-based panels — Dry-process fibreboard*
- [3] ISO 17064, *Wood-based panels — Fibreboard, particleboard and oriented strand board (OSB) — Vocabulary*

