

European standard

French standard

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Solid wood panels (SWP)

Requirements

F : Bois panneautés (SWP) — Exigences
D : Massivholzplatten (SWP) — Anforderungen

French standard approved

by decision of the Director General of AFNOR on January 14, 2009 taking effect on February 14, 2009.

Replaces the approved standard NF EN 13353, dated November 2003.

Correspondence

The European standard EN 13353:2008 has the status of French standard.

Analysis

This document specifies requirements for wood panels as defined in NF EN 12775 for use in dry, humid and exterior conditions as defined in service classes 1, 2 and 3 of EN 1995-1-1 and gives additional information on characteristics concerning certain applications.

Descriptors

Technical International Thesaurus: wood, wooden boards, use, environments, exterior, humidity, dimensional tolerances, tests, marking.

Modifications

With respect to the previous version, the main changes are the following:

- Introduction of a classification according to the use;
- information added on the moisture content of chemically or thermally treated wood;
- a relationship added between the shear strength and rupture percentage;
- data added related to adhesives other than thermosetting ones;
- details added on the requirements of single layer and multilayer wood panels for structural applications.

Corrections



National foreword*References to French standards*

The correspondence between the standards figuring in the clause "Normative references" and the identical French standards is as follows:

EN 301	: NF EN 301 (classification index: T 76-151)
EN 310	: NF EN 310 (classification index: B 51-124)
EN 318	: NF EN 318 (classification index: B 51-141)
EN 322	: NF EN 322 (classification index: B 51-121)
EN 323	: NF EN 323 (classification index: B 51-122)
EN 324-1	: NF EN 324-1 (classification index: B 51-240-1)
EN 324-2	: NF EN 324-2 (classification index: B 51-240-2)
EN 326-1	: NF EN 326-1 (classification index: B 51-190-1)
EN 326-2	: NF EN 326-2 (classification index: B 51-190-2)
EN 335-2	: NF EN 335-2 (classification index: B 50-100-2)
EN 594	: NF EN 594 (classification index: P 21-382)
EN 596	: NF EN 596 (classification index: P 21-374)
CEN/TS 635-4	: XP CEN/TS 635-4 (classification index: B 54-170-4)
EN 717-2	: NF EN 717-2 (classification index: B 51-272-2)
EN 789	: NF EN 789 (classification index: P 21-304)
EN 1058	: NF EN 1058 (classification index: P 21-305)
ENV 1156	: XP ENV 1156 (classification index: B 51-153)
EN 1995-1-1	: NF EN 1995-1-1 (classification index: P 21-711)
EN 12275	: NF EN 12275 (classification index: B 54-300)
EN 12871	: NF EN 12871 (classification index: B 54-074)
EN 13017-1	: NF EN 13017-1 (classification index: B 54-301)
EN 13017-2	: NF EN 13017-2 (classification index: B 54-302)
EN 13183-2	: NF EN 13183-2 (classification index: B 53-611-2)
EN 13354	: NF EN 13354 (classification index: B 54-179)
EN 13446	: NF EN 13446 (classification index: B 51-166)
EN 13986	: NF EN 13986 (classification index: B 54-250)
EN 15416-3	: NF EN 15416-3 (classification index: T 76-336-3)



English Version

Solid wood panels (SWP) - Requirements

Bois panneautés (SWP) - Exigences

Massivholzplatten (SWP) - Anforderungen

This European Standard was approved by CEN on 18 October 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 13353:2008) has been prepared by Technical Committee CEN/TC 112 “Wood-based panels”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by May 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13353:2003.

Compared to EN 13353:2003 the following changes have been made:

- a) classification introduced according to non-structural use, structural use and declared values;
- b) information on moisture content of chemically or thermally treated wood added in 4.2;
- c) relationship between shear strength and wood failure percentage in introduced in 4.3.3;
- d) provisions for adhesives other than thermosetting for structural applications added in 4.3.4;
- e) different requirements for single and multi layer solid wood panels for structural applications specified in 4.5.2;
- f) footnote regarding alternative test methods for the determination of the bonding quality added in Table 5.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.



1 Scope

This European Standard specifies requirements for solid wood panels as defined in EN 12775 for use in dry, humid and exterior conditions as defined in service classes 1, 2 and 3 of EN 1995-1-1.

Additional information on supplementary properties for certain applications is also given.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 301:2006, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures — Classification and performance requirements*

EN 310, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*

EN 318, *Wood-based panels — Determination of dimensional changes associated with changes in relative humidity*

EN 322, *Wood-based panels — Determination of moisture content*

EN 323, *Wood-based panels — Determination of density*

EN 324-1, *Wood-based panels — Determination of dimensions of boards — Part 1: Determination of thickness, width and length*

EN 324-2, *Wood-based panels — Determination of dimensions of boards — Part 2: Determination of squareness and edge straightness*

EN 326-1, *Wood-based panels — Sampling, cutting and inspection — Part 1: Sampling and cutting of test pieces and expression of test results*

EN 326-2, *Wood-based panels — Sampling, cutting and inspection — Part 2: Quality control in the factory*

EN 335-2, *Durability of wood and wood-based products — Definition of use classes — Part 2: Application to solid wood*

EN 594, *Timber structures — Test methods — Racking strength and stiffness of timber frame wall panels*

EN 596, *Timber structures — Test methods — Soft body impact test of timber framed walls*

CEN/TS 635-4, *Plywood — Classification by surface appearance — Part 4: Parameters of ability for finishing, guideline*

EN 717-2, *Wood-based panels — Determination of formaldehyde release — Part 2: Formaldehyde release by the gas analysis method*

EN 789, *Timber structures — Test methods — Determination of mechanical properties of wood-based panels*

EN 1058, *Wood-based panels — Determination of characteristic values of mechanical properties and density*

ENV 1156, *Wood-based panels — Determination of duration of load and creep factors*

EN 1195, *Timber structures — Test methods — Performance of structural floor decking*

EN 1995-1-1, *Eurocode 5: Design of timber structures — Part 1-1: General — Common rules and rules for buildings*

EN 12775, *Solid wood panels — Classification and terminology*

EN 12871, *Wood-based panels — Performance specifications and requirements for load bearing boards for use in floors, walls and roofs*

EN 13017-1, *Solid wood panels — Classification by surface appearance — Part 1: Softwood*

EN 13017-2, *Solid wood panels — Classification by surface appearance — Part 2: Hardwood*

EN 13183-2, *Moisture content of a piece of sawn timber — Part 2: Estimation by electrical resistance method*

EN 13354, *Solid wood panels — Bonding quality — Test method*

EN 13446, *Wood-based panels — Determination of withdrawal capacity of fasteners*

EN 13986, *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking*

EN 15416-3, *Adhesives for load bearing timber structures other than phenolic and aminoplastic — Test methods — Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear*

3 Terms, definitions and classes

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12775 and the following apply.

3.1.1

solid wood panel for use in dry conditions

panel intended for use in interior applications with no risk of wetting as defined in service class 1 of EN 1995-1-1 and use class 1 of EN 335-2

NOTE Service class 1 is characterised by a moisture content of the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air exceeding 65 % for only a few weeks per year.

3.1.2

solid wood panel for use in humid conditions

panel intended for use in protected external applications as defined in service class 2 of EN 1995-1-1 (e. g. behind cladding or under roof coverings) and use class 2 of EN 335-2

NOTE 1 It is also capable of resisting weather exposure for short periods (e.g. when exposed during construction).

NOTE 2 Service class 2 is characterised by a moisture content of the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air exceeding 85 % for only a few weeks per year.

3.1.3

solid wood panel for use in exterior conditions

panel intended for use in unprotected external applications as defined in service class 3 of EN 1995-1-1 and use class 3 of EN 335-2

NOTE 1 It is also capable of withstanding exposure to weathering conditions and liquid water, or water vapour in a damp but ventilated location where it can frequently attain a moisture content above 20 %.

NOTE 2 Service class 3 is characterised by a moisture content of the material higher than service class 2.

3.2 Classes for solid wood panels indicating their intended use

3.2.1 Technical classes for non-structural use

SWP/1 NS: Solid wood panel for non-structural use in dry conditions according to 3.1.1

SWP/2 NS: Solid wood panel for non-structural use in humid conditions according to 3.1.2

SWP/3 NS: Solid wood panel for non-structural use in exterior conditions according to 3.1.3

3.2.2 Technical classes for structural use

SWP/1 S: Solid wood panel for structural use in dry conditions according to 3.1.1

SWP/2 S: Solid wood panel for structural use in humid conditions according to 3.1.2

SWP/3 S: Solid wood panel for structural use in exterior conditions according to 3.1.3

3.2.3 Classes for structural use based on declared values

SWP/1 SD: Solid wood panel for structural use in dry conditions according to 3.1.1

SWP/2 SD: Solid wood panel for structural use in humid conditions according to 3.1.2

SWP/3 SD: Solid wood panel for structural use in exterior conditions according to 3.1.3

NOTE Technical classes are intended to simplify the use of standardised solid wood panels by providing supporting data e.g. in EN 12369-3 as well as simplifying marking in accordance with EN 13986. Nevertheless products should not be limited by the requirements according to the technical classes. Therefore classes based on declared values may be used for such products.

4 Requirements

4.1 Dimensional tolerances

The tolerances for the nominal length, width and thickness, thickness within the panel, edge straightness and squareness are given in Table 1. They relate to the moisture content at time of despatch for large and medium sized panels according to EN 12775 and shall be determined in accordance with EN 324-1 and EN 324-2 as appropriate.

Table 1 — Dimensional tolerances for both large and medium sized panels

Tolerances on nominal length and width ^a	Thickness ^a		Tolerance ^b for	
	Tolerance within an single panel	Tolerance on nominal thickness	Edge straightness	Squareness
$\pm 2,0$ mm	0,5 mm	$\pm 1,0$ mm	1,0 mm/m	1,0 mm/m
^a Determined in accordance with EN 324-1				
^b Determined in accordance with EN 324-2				

4.2 Moisture content at despatch

At time of despatch the moisture content according to EN 322 shall be (8 ± 2) % for use in dry conditions, (10 ± 3) % for use in humid conditions and (12 ± 3) % for use in exterior conditions.

If chemically or thermally treated wood is used, the equilibrium moisture content of the panels can differ significantly to those made of natural wood. In that case a deviation from the above mentioned requirements concerning moisture content is possible.

If another moisture content is necessary e.g. due to regional climatic condition the appropriate moisture content has to be specified explicitly.



4.3 Bonding quality

4.3.1 General

The bonding quality shall be determined in accordance with EN 13354 after the appropriate pre-treatment for use in dry, humid or exterior condition.

4.3.2 Single layer solid wood panel

The lower 5-percentile of the shear strength, calculated in accordance with EN 326-1, shall not be less than 2,5 N/mm².

The mean wood failure percentage of each panel shall be more than 40 % except if the density is more than 600 kg/m³.

4.3.3 Multi layer solid wood panel

The lower 5-percentile of the shear strength f_v calculated in accordance with EN 326-1 and the mean percentage wood failure of each panel shall comply with Table 2.

Table 2 — Requirements

Shear strength N/mm ²	Wood failure %
$0,4 \leq f_v < 0,8$	≥ 40
$0,8 \leq f_v < 1,2$	≥ 20
$f_v \geq 1,2$	no requirement

4.3.4 Adhesive for solid wood panels in structural applications

Where panels are intended for structural applications, a thermosetting adhesive (phenolic or aminoplastic type) shall be used for the bonding of the layers to each other. Other adhesives have to show their suitability by fulfilling the requirements to thin glue line (0,1 mm) according to EN 301:2006, 5.2 regarding tensile shear and according to EN 301:2006, 5.3 regarding delamination, and with regard to creep according to EN 15416-3 or ENV 1156.

4.4 Biological durability

The risk of attack for uses in dry, humid and exterior conditions is outlined in use classes 1, 2 and 3 of EN 335-2. Guidance on factors affecting durability and on precautionary measures which may be considered necessary can be found in EN 335-2 and EN 460.

4.5 Mechanical characteristics

4.5.1 General

The mechanical properties of solid wood panels are determined according to their application.

For structural applications refer to 4.5.2.

For non-structural applications refer to 4.5.3.

4.5.2 Structural applications

Single-layer solid wood panels for use in structural applications as defined in 3.2.2, shall comply with the requirements given in Table 3. For single-layer solid wood panels based on declared values as defined in 3.2.3 the properties given in Table 3 shall comply with the corresponding declared value of the manufacturer. Declared values may also be used for single layer SWP out of the thickness range given in Table 3 up to a thickness of 60 mm.

Multi-layer solid wood panels for use in structural applications as defined in 3.2.2 shall comply with the requirements of Table 4. For multi-layer solid wood panels based on declared values as defined in 3.2.3 the properties given in Table 4 shall comply with the corresponding declared value of the manufacturer.

The values in Tables 3 and 4, shall be determined as lower 5-percentile following the principles of EN 326-1. Sampling of test pieces shall be carried out in accordance with the given test method.

NOTE Since according to EN 789 the number of test pieces of each panel is one, the value of this test piece represents the mean value of the panel and can be used for all statistical calculations where the mean value and the variation of the mean values of the panels are used. The variation within a panel and the according calculations cannot be done.

For determination of density the test piece for bending, as defined in EN 789, may be used instead of the small size test pieces as defined in EN 323.

Other properties for structural applications shall be determined in accordance with Annex A.

Table 3 — Density, bending strength and modulus of elasticity in bending of single-layer solid wood panels

Property	Test method	Nominal thickness mm
		20 to 30
Density (kg/m ³)	EN 323	410
Bending strength perpendicular to the plane (N/mm²)		
Parallel to the grain direction	EN 789	40
Modulus of elasticity in bending perpendicular to the plane (N/mm²)		
Parallel to the grain direction	EN 789	8 500
NOTE The 5%-quantile of the modulus of elasticity given in the table is related to 85% of the mean modulus of elasticity.		

Table 4 — Density, bending strength and modulus of elasticity in bending of multi-layer solid wood panels

Property	Test method	Nominal thickness mm			
		12 to 20	> 20 to 30	> 30 to 42	> 42
Density (kg/m ³)	EN 323	410	410	410	410
Bending strength perpendicular to the plane (N/mm²)					
Parallel to the grain direction of the outer layer	EN 789	35	30	16	12
Perpendicular to the grain direction of the outer layer	EN 789	5	5	9	9
Modulus of elasticity in bending perpendicular to the plane (N/mm²)					
Parallel to the grain direction of the outer layer	EN 789	8 500	7 000	6 500	6 000
Perpendicular to the grain direction of the outer layer	EN 789	470	470	1 300	1 300

4.5.3 Non-structural applications

If mechanical properties are required they shall be provided according to Annex A.

4.6 Formaldehyde release

For solid wood panels the formaldehyde release class E 1 or E 2 shall be given as specified in EN 13986.

The test pieces for the determination of formaldehyde release shall be taken perpendicular to the grain of the outer layer.

NOTE In certain countries only products of formaldehyde class E1 are allowed.

5 Supplementary properties

For certain applications information on some supplementary properties can be required. Some of these properties are listed in Table A.1. On request this information shall be provided by the supplier.

These properties shall be determined according to European Standards listed in Table A.1.

6 Verification of compliance

6.1 General

Verification of compliance with this European Standard shall be carried out using the test methods listed in Table 5.

For panels for use in construction EN 13986 shall be applied. For all other products 6.2 to 6.3 shall be applied.

6.2 External control

External control of the factory, if necessary, shall be carried out according to EN 326-2.

For bonding quality and initial inspection in the factory, the size of the inspection lot from which testing samples are taken shall be at least 200 panels.

In the case of formaldehyde release for both external control and inspection of a consignment of panels, the respective requirement set out in EN 13986 shall be met by the average value of at least three boards controlled. Additionally, no individual board is allowed to exceed an upper deviation of + 10 %.

If a high level of reliability is proved by the factory production control records, the size of the initial sampling may be reduced in agreement with the inspection agency.

6.3 Factory production control

Factory production control shall be carried out following the principles of EN 326-2.

The properties listed in Table 5 shall be controlled using at least the frequencies of testing given in Table 5. Sampling shall be carried out at random. Alternative test methods and/or unconditioned test pieces may be used if a valid correlation to the specified test methods can be proven (see EN 326-2). The frequencies of testing given in Table 5 are related to a production under statistical control.

Compliance of a produced batch with the requirements listed in Tables 3 and 4 can be assumed, if the determined values of the test piece are at least as high as the lower 5-percentile values given in Tables 3 and 4.

If a given property does not meet the requirements, the relevant principles of EN 326-2 shall be applied. Furthermore the testing frequency shall be increased in accordance with internal procedures in the factory, or those specified by an external inspection agency, if any. For the properties listed in Tables 3 and 4 compliance of a produced batch with the requirements can be assumed, if the mean values calculated from the initial test piece and the additional one or two test pieces are at least as high as the lower 5-percentile values given in Tables 3 and 4.



Table 5 — Minimum frequencies of testing for each production line for the factory production control

Property	Test method	Minimum frequency of testing
Dimensional tolerances	EN 324-1 EN 324-2	One panel per shift
Moisture content	EN 322 (Reference Method) or EN 13183-2	One panel per 1 000 panels produced, but not less than one per shift
Surface appearance	EN 13017-1 EN 13017-2	One panel per 1 000 panels produced, but not less than one per shift
Bonding quality	EN 13354 ^d	One panel per day
Density ^{a b}	EN 323	One panel per shift
Bending strength ^a	EN 789	One panel per shift
Modulus of elasticity ^a	EN 789	One panel per shift
Formaldehyde release	EN 717-2	One panel per week ^c

^a Only for panels for structural applications

The minimum testing frequency of the bending properties perpendicular to the grain direction of the outer layer may be reduced, if a considerable high threshold of the required values can be proven.

^b For determination of density the test piece for bending, as defined in EN 789, may be used instead of the small size test piece as defined in EN 323

^c Certain types of solid wood panels release little or no formaldehyde. In this case, the test intervals may be increased. However, it remains the responsibility of the manufacturer to ensure compliance with the declared formaldehyde class.

^d If it is proven by a test of a representative sample (Initial type testing – at least 12 boards) that due to production parameters used (adhesive, wood, press parameters etc.) the requirements of the bonding quality is fulfilled an alternative test method may be used as internal quality control. Every alteration of parameters relevant for bonding quality have to be proven by a new initial type testing.

NOTE As an alternative test method e.g. the delamination test gives appropriate results.

7 Marking

7.1 Boards marketed within the European Economic Area for construction applications

Boards produced in conformity with this European Standard and marketed in any of the territories of the European Economic Area for use in construction as defined in the Construction Products Directive (89/106/EEC) shall be marked according to the requirements of EN 13986.

7.2 Other boards

In the case of other boards produced in conformity within this European Standard, the information listed in points a) to i) shall be marked on each package of solid wood panels, and each individual panel shall be marked with the information in points a), e) and i):

- a) manufacturer's name, his code or logo;
- b) number of this European Standard EN 13353;
- c) designation of panel type, either multi, or single layer:

Multi-layer solid wood panels shall be marked with the letter "L" and a number, indicating the number of layers. Single-layer solid wood panels shall be marked with the symbol "L1" with the addition of the letter "NC" for panels which have not been cut to length or with the letters "SC" for panels which have been cut to length (see definition in EN 12775);

d) wood species;

NOTE Common species are listed in EN 13556

e) surface appearance classes. In the case of multi-layer panels, the appearance class of face and back shall be given;

f) nominal dimensions in millimetres (thickness, width, length);

g) service class 1, 2 or 3 according to EN 1995-1-1 or class as defined in 3.2.1, 3.2.2 or 3.2.3;

h) formaldehyde release class according to EN 13986;

i) date (or code of date) of manufacture.



Annex A (normative)

Properties for structural and non-structural applications

Table A.1 — Supplementary properties

Physical properties	Test method	Reference document
— Dimensional changes	EN 318	—
— Classification by surface appearance	—	EN 13017-1 EN 13017-2
— Ability for finishing	—	CEN/TS 635-4

Mechanical properties	Test method	Reference document
— Bending properties non-structural	EN 310	EN 326-1
— Bending properties structural	EN 789	EN 1058
— Tension properties	EN 789	EN 1058
— Shear properties	EN 789	EN 1058
— Compression properties	EN 789	EN 1058
— Withdrawal capacity of fasteners	EN 13446	—

Performance properties	Test method	Reference document
— Flooring	EN 1195	EN 12871
— Walling	EN 594 and EN 596	EN 12871
— Roofing	EN 12871	EN 12871
NOTE For certain applications, information on additional properties not specified in Table A.1 can be required.		

Bibliography

- [1] EN 315, *Plywood — Tolerances for dimensions*
- [2] EN 320, *Fibreboards — Determination of resistance to axial withdrawal of screws*
- [3] EN 326-3, *Wood-based panels — Sampling, cutting and inspection — Part 3: Inspection of an isolated lot of panels*
- [4] EN 460, *Durability of wood and wood-based products — Natural durability of solid wood — Guide to the durability requirements for wood to be used in hazard classes*
- [5] EN 635-1, *Plywood — Classification by surface appearance — Part 1: General*
- [6] EN 635-2, *Plywood — Classification by surface appearance — Part 2: Hardwood*
- [7] EN 635-3, *Plywood — Classification by surface appearance — Part 3: Softwood*
- [8] EN 12369-3, *Wood-based panels — Characteristic values for structural design — Part 3: Solid wood panels*
- [9] EN 13556, *Round and sawn timber — Nomenclature of timbers used in Europe*
- [10] DIN 53255, *Testing of wood adhesives and glued wood joints — Shear and delamination tests for determining the failing strength of plywood bonds (plywood and coreboard)*

