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Wood-based panels

Characteristics values for structural design

Part 3: Solid-wood panels

F : Panneaux à base de bois — Valeurs caractéristiques pour la conception
des structures — Partie 3 : Bois panneautés

D : Holzwerkstoffe — Charakteristische Werte für die Berechnung und Bemessung
von Holzbauwerken — Teil 3: Massivholzplatten

French standard approved

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on December 26, 2008.

Correspondence

The European standard EN 12369-3:2008 has the status of French standard.

Analysis

This document is part of a series of standards finalized by CEN/TC 112 "Wood-based panels". It provides information about characteristic values for wood panels to be used in the design of building structures where these panels are used.

Descriptors

Technical International Thesaurus: wood-based panels, design, structures, characteristics, thickness, rigidity, density (mass/volume), humidity, loads: forces, tables (data).

Modifications

Corrections

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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:

<i>EN 338</i>	<i>: NF EN 338 (classification index: P 21-353)</i>
<i>EN 789</i>	<i>: NF EN 789 (classification index: P 21-304)</i>
<i>EN 1058</i>	<i>: NF EN 1058 (classification index: P 21-305)</i>
<i>EN 1195-1-1</i>	<i>: NF EN 1195-1-1 (classification index: P 21-711)</i>
<i>EN 13017-1</i>	<i>: NF EN 13017-1 (classification index: B 54-301)</i>
<i>EN 13017-2</i>	<i>: NF EN 13017-2 (classification index: B 54-302)</i>
<i>EN 13353</i>	<i>: NF EN 13353 (classification index: B 54-178)</i>



English Version

Wood-based panels - Characteristic values for structural design
- Part 3: Solid-wood panels

Panneaux à base de bois - Valeurs caractéristiques pour
conception des structures - Partie 3: Bois panneautés

Holzwerkstoffe - Charakteristische Werte für die
Berechnung und Bemessung von Holzbauwerken - Teil 3:
Massivholzplatten

This European Standard was approved by CEN on 12 October 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 12369-3:2008) 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 European Standard is intended to be used in conjunction with EN 1995-1-1.

This European Standard is one of a series specifying characteristic values of wood-based panels for structural design. The other parts of this series are listed in the Bibliography.

Annex A is informative.

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 provides information on the characteristic values for use in designing structures incorporating wood-based panels. The characteristic values given are as defined in EN 1995-1-1.

This European Standard includes the characteristic values of the mechanical properties and of the raw density for solid-wood panels complying with EN 13353:2008 technical classes SWP/1 S, SWP/2 S, SWP/3 S.

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 338, *Structural timber — Strength classes*

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

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

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

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 13353:2008, *Solid wood panels (SWP) — Requirements*

3 Terms and definitions and symbols

3.1 Terms and definitions

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

3.1.1 characteristic values

3.1.1.1 characteristic strength value

population 5-percentile value obtained from the results of tests with a duration of 300 s at an equilibrium moisture content of the test pieces relating to a temperature of 20 °C and a relative humidity of 65 %

3.1.1.2 characteristic stiffness value

either the population 5-percentile or the mean value obtained of tests with a duration of 300 s at an equilibrium moisture content of the test pieces relating to a temperature of 20 °C and a relative humidity of 65 %

NOTE The stiffness values given in the Tables are mean values as these are most commonly used in design. A note in Annex A explains how to calculate the 5-percentile value.

3.1.1.3 characteristic density

population 5-percentile value with mass and volume corresponding to equilibrium moisture content at a temperature of 20 °C and a relative humidity of 65 %

3.1.2 service classes

NOTE Three service classes are defined in EN 1995-1-1 as follows.

3.1.2.1 service class 1

class characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air exceeding 65 % only for a few weeks per year

3.1.2.2 service class 2

class characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air exceeding 85 % for a only few weeks per year

3.1.2.3 service class 3

climatic conditions leading to higher moisture contents than in service class 2

3.1.3 load duration class

class characterized by the effect of a constant load acting for a certain period of time in the life of the structure

NOTE 1 For a variable action, the appropriate class is determined on the basis of an estimate of the interaction between the typical variation of the load with time and the rheological properties of the materials.

NOTE 2 For strength and stiffness calculations, actions are assigned to one of the load-duration classes given in Table 1.

Table 1 — Load duration classes

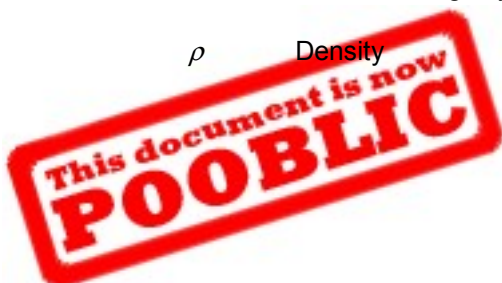
Load duration class	Order of accumulated duration of characteristic load	Examples of loading
Permanent	more than 10 years	self weight
Long-term	6 months to 10 years	storage
Medium-term	1 week to 6 months	imposed load
Short-term	less than one week	snow ^a and wind
Instantaneous	—	accidental load
^a In areas which have a heavy snow load for a prolonged period to time, part of the load should be regarded as medium-term.		

3.2 Symbols

In the Tables the following symbols are used:

3.2.1 Main Symbols

f	Strength
E	Modulus of elasticity (defined as stiffness in EN 1995-1-1)
G	Modulus of rigidity
ρ	Density



k Retention in strength (k_{mod}) or stiffness (k_{def}) after a period of time relative to initial values. Values are included in EN 1995-1-1.

// or 0 Parallel to the grain direction of the outer layer of SWP

⊥ or 90 Perpendicular to the grain direction of the outer layer of SWP

3.2.2 Subscripts

m Bending, panel

t Tension

c Compression

p Bending, planar

v Panel shear

r Planar shear

nom Nominal

mod Strength

def Deflection

4 General

The characteristic values given in this European Standard are the minimum values applicable to products conforming to EN 13353. These values may be presented in the format as shown in Annex A or similar to it.

Alternatively, characteristic values other than those contained in this standard shall be determined using sampling techniques as set out in EN 1058 and testing procedures given in EN 789, and declared in a format as shown in Annex A or similar to it.

Additionally, these characteristic values shall be supported by the following information:

- product description;
- requirement standard;
- service class or classes in which the panel can be used;
- particulars regarding the kind of wood and the appearance class as well as the panel structure.

5 Characteristic values for solid wood panels

5.1 Introduction

This clause of this European Standard gives information on the characteristic values of both mechanical properties and density for those solid wood panels the values of which, unless specified to the contrary, have

been determined using the sampling techniques as set out in EN 1058 and the testing procedures given in EN 789.

The minimum appearance class of the panels shall be class S and C according to EN 13017-1 and -2 respectively.

5.2 Load-bearing panels for use in all service classes

For load-bearing purposes under conditions of service class 1, the characteristic values of the mechanical properties and of the density as specified in Tables 2 and 3 apply. The mechanical properties require to be modified to EN 1995-1-1 for duration of load (k_{mod} , k_{def}).

For load-bearing purposes under conditions of service classes 2 and 3, the characteristic values of the mechanical properties as specified in Tables 2 and 3 require to be modified (k_{mod} , k_{def}) to EN 1995-1-1 for the service class as well as for the load duration.

In case of single-layer solid wood panels the modification factors of solid wood shall be applied. In case of multi-layer solid wood panels the modification factors of plywood shall be applied.

For chemically or thermally treated wood the k_{mod} and k_{def} factors of EN 1995-1-1 can not be used. The factors have to be found by testing according to ENV 1156.

Table 2 — Characteristic values of single-layer solid-wood panels complying with EN 13353

Thickness, mm	Characteristic density (kg/m ³) and strength (N/mm ²) values, mean modulus of elasticity (N/mm ²)		
t_{nom}	Density	Panel bending parallel to the grain direction	
	ρ	f_{m}	E_{m}
		0	0
20 to 30	410	40	10 000

The 5 % characteristic values for stiffness should be taken as 0,85 times the mean values given in Table 2. Other properties not given in Table 2 shall comply with the requirements given in EN 13353. For bending perpendicular to the grain, tension, compression and shear the characteristic values of C24 according to EN 338 shall be applied.



Table 3 — Characteristic values of multi-layer solid wood panels complying with EN 13353

Thickness, mm	Density	Characteristic density (kg/m^3) und strength (N/mm^2)											
		Panel bending		Planar bending		Tension		Compression		Panel shear		Planar shear	
		f_m		f_p		f_t		f_c		f_v		f_r	
t_{nom}	ρ	0	90	0	90	0	90	0	90	0	90	0	90
12 to 20	410	35	5	25	12	16	6	16	10	4	5	1,6	1,4
> 20 to 30	410	30	5	14	12	9	6	16	10	4	3,5	1,6	1,4
> 30 to 42	410	16	9	12	12	6	6	10	16	3,5	2,5	1,2	1,4
> 42	410	12	9	10	12	6	6	10	16	2,5	2	1,2	1,4

Thickness, mm	Mean stiffness values (N/mm^2)									
	Panel bending		Planar bending		Tension		Panel shear		Planar shear	
	E_m		E_p		E_t		G_v		G_r	
t_{nom}	0	90	0	90	0	90	0	90	0	90
12 to 20	10 000	550	4 700	3 500	4 700	2 900	470	470	41	41
> 20 to 30	8 200	550	2 900	3 500	3 500	2 900	470	470	41	41
> 30 to 42	7 600	1 500	2 400	4 700	2 400	2 900	470	470	41	41
> 42	7 100	1 500	1 800	4 700	2 400	2 900	470	470	41	41

The 5 % characteristic values for stiffness should be taken as 0,85 times the mean values given in Table 3. Other properties not given in Table 3 shall comply with the requirements given in EN 13353.

Annex A (informative)

Presentation of characteristic values

Solid wood panels complying with EN 13986
according to the technical class SWP/ _
for use in service class..... according to EN 1995-1-1
manufactured by

The characteristic values specified below have been determined pursuant to
EN 789 und EN 1058
or they are as specified in EN 12369-3
(Delete which is inapplicable.)

Thickness (mm)	Number of layers	Characteristic strength (N/mm ²) and density (kg/m ³)								
		Raw density	Bending		Tension		Compression		Shear	
			Panel	Planar					Panel	Planar
			$f_{m, 0}$	$f_{m, 90}$	$f_{p, 0}$	$f_{p, 90}$	$f_{c, 0}$	$f_{c, 90}$	f_v	f_r

Thickness (mm)	Mean stiffness values (N/mm ²)							
	Bending		Tension		Compression		Shear	
	Panel	Planar					Panel	Planar
	$E_{m, 0}$	$E_{m, 90}$	$E_{p, 0}$	$E_{p, 90}$	$E_{c, 0}$	$E_{c, 90}$	G_v	G_r

NOTE The 5 % characteristic values for stiffness should be taken as 0,85 times the above specified mean values. The mean density of the panel should be taken as 1,1 times the above specified characteristic values. The other properties are stipulated in EN 13353.



Bibliography

- [1] EN 310, *Wood-based panels — Determination of modulus of elasticity in bending and of bending strength*
- [2] EN 323, *Wood-based panels — Determination of density*
- [3] EN 1072, *Plywood — Description of bending properties for structural plywood*
- [4] EN 12369-1, *Wood-based panels — Characteristic values for structural design — Part 1: OSB, particleboards and fibreboards*
- [5] EN 12369-2, *Wood-based panels — Characteristic values for structural design — Part 2: Plywood*
- [6] prEN 13354, *Solid wood panels — Bonding quality — Test method*
- [7] EN 13986, *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking*