SLOVENSKI STANDARD
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Lesne plošče - Karakteristične vrednosti za konstrukcijsko načrtovanje - 2. del: Vezane plošče

Wood-based panels - Characteristic values for structural design - Part 2: Plywood

Holzwerkstoffe - Charakteristische Werte für die Berechnung und Bemessung von Holzbauwerken - Teil 2: Sperrholz

Panneaux à base de bois - Valeurs caractéristiques pour la conception des structures - Partie 2: Contreplaqué

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English Version

Wood-based panels - Characteristic values for structural design - Part 2: Plywood

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 112.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 12369-2:2024) has been prepared by Technical Committee CEN/TC 112 “Wood-based panels”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12369-2:2011.

prEN 12369-2:2024 includes the following significant technical changes with respect to EN 12369-2:2011:

— where values required by prEN 1995-1-1 for plywood panels have been missing, this document provides additional properties in Clause 7 to be used in the structural design according to EN 1995-1-1;

— the symbols used in wood-based panels product standards, test standards and in EN 1991-1-1 do not match exactly to each other. This document gives advice how to use design properties when the structural design is performed according to EN 1995-1-1;

— normative reference to ISO 3131 replaced by reference to ISO 13061-2;

— values for classes F 35 and E 35 mentioned in EN 636 introduced by interpolation.

This document is intended to be used in conjunction with EN 1995-1-1.

The EN 12369 series *Wood-based panels — Characteristic values for structural design* is currently composed of the following parts:

— Part 1: OSB, particleboards and fibreboards;

— Part 2: Plywood;

— Part 3: Solid wood panels.

Annex A and Annex B are informative.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

1 Scope

This document 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.

When utilizing the classification system for derivation of plywood characteristic values, this document can only be applied with reference to EN 636.

This document includes the characteristic values of the mechanical properties for plywood complying with EN 636 in bending, tension, compression, panel shear and planar shear. EN 636 classifies bending properties into two sets of classes, one for stiffness and another for strength. Stiffness and strength in tension and compression are related to the same properties in bending.

For shear properties, fixed values determined by correlation to density are provided.

Where optimized values are needed, the characteristic values are determined directly by testing in accordance with EN 789 and EN 1058 or by combination of testing according to the latter two standards and calculation according to EN 14272.

This document applies to panels complying with the three following conditions:

— 5 layers or more and 6 mm overall thickness and more;

— the ratio of the cumulative thickness of veneers in alternate directions does not exceed 2,5;

— wood species with a mean density greater than 350 kg/m^3 and not exceeding 750 kg/m^3.

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.

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

EN 635-2, *Plywood — Classification by surface appearance — Part 2: Hardwood*

EN 635-3, *Plywood — Classification by surface appearance — Part 3: Softwood*

EN 1995-1-1:2004[1], *Eurocode 5: Design of timber structures — Part 1-1: General — Common rules and rules for buildings*

EN 13986:2004+A1:2015, *Wood-based panels for use in construction — Characteristics, evaluation of conformity and marking*

[1] As impacted by EN 1995-1-1:2004/A1:2008, EN 1995-1-1:2004/A2:2014 and EN 1995-1-1:2004/AC:2006.

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
characteristic value
value of a material property relating to limit state design, for use in the design of timber structures, elements, assemblies and component

Note 1 to entry: As defined in EN 1995-1-1, this value corresponds to a specified percentile of the assumed distribution of the property under consideration.

Note 2 to entry: For plywood determined as stipulated in this document.

3.2
service class 1
conditions of exposure resulting in moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air exceeding 65 % for only a few weeks per year

Note 1 to entry: In these conditions the moisture content of coniferous plywood can be expected not to exceed 12 %.

[SOURCE: EN 1995-1-1:2004, 2.3.1.3, modified – Moisture content for plywood has been added in Note 1 to entry.]

3.3
service class 2
conditions of exposure resulting in moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air exceeding 85 % for only a few weeks per year

Note 1 to entry: In these conditions the moisture content of coniferous plywood can be expected not to exceed 18 %.

[SOURCE: EN 1995-1-1:2004, 2.3.1.3, modified – Moisture content for plywood has been added in Note 1 to entry.]

3.4
service class 3
conditions of exposure resulting in higher moisture content in the materials than in service class 2

Note 1 to entry: In these conditions the moisture content of coniferous plywood can be expected to exceed 18 %.

[SOURCE: EN 1995-1-1:2004, 2.3.1.3, modified – Moisture content for plywood has been added in Note 1 to entry.]

3.5
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 to entry: 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 to entry: For strength and stiffness calculations, actions are assigned to one of the load-duration classes given in Table 1, derived from EN 1995-1-1.

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 1 week	Snow[a] and wind
Instantaneous	—	Accidental load

[a] In areas which have a heavy snow load for a prolonged period of time, part of the load should be regarded as medium-term.

3.6
lay-up
thickness and arrangement of the plies

3.7
composition
factors compounding the lay-up plus the combination of wood species

4 Symbols

4.1 Main symbols

E	Modulus of elasticity (defined as stiffness in EN 1995-1-1:2004), (N/mm^2)
f	Strength (N/mm^2)
G	Modulus of rigidity (N/mm^2)
k	Retention factor 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
ρ	Density of a wood species or of plywood (kg/m^3)
0	In the direction of the grain of the outer layer of plywood
90	Perpendicular to the grain of the outer layer of plywood

4.2 Subscripts

c	Compression
k	or 05 Characteristic (5^{th} percentile)
m	Bending
r	Planar shear
t	Tension
v	Panel shear
w	Wood species
p	Panel
mean	or 50 Mean (50^{th} percentile)
mod	related to modification factor for strength
def	related to modification factor for deflection

5 General

In this document the 5th percentile defines the characteristic value for:

— strength;

— density;

— modulus of elasticity where buckling, as an example, may be expected in service.

Otherwise the population 50^{th} percentile defines the characteristic mean value of the modulus of elasticity and modulus of rigidity (shear).

The strength properties are log-normally distributed. Stiffness properties and density are normally distributed.

The characteristic value is derived in panels with moisture content as determined by a temperature of 20 °C and a relative humidity of 65 %.

The characteristic value of a property is to be used in design according to EN 1995-1-1.

Where panels are structurally used under service class 1, 2 and 3 conditions, performance values inferred by the classification and listed in Table 2 and 3 shall be modified according to the service class and the duration of load (k_{mod}, k_{def}).

Manufacturers utilizing the EN 636 classification system for determination of characteristic values may present these values in a format similar to that in Annex A.

The characteristic values shall be supported by the following information:

— product description;

— product specifications;

— service class or classes in which the panel can be used;

— details of the veneer species and grade, and of the composition;

— density of the panel.

6 Characteristic values for plywood

6.1 Introduction

Characteristic values for plywood can be determined by one of two distinct methods as described in Clause 1. The following tables in this clause provide the characteristic values for plywood based on the EN 636 Classification System.

The class values given in these tables shall be modified appropriately for service class and load duration in accordance with the requirements of EN 1995-1-1.

NOTE A data analysis has provided a conservative property relationship:

— to bending for tension and compression values and;

— to density for shear values.

See Annex B for more information on this relationship.

6.2 Bending, tension and compression

6.2.1 General

Testing according to EN 310 and application of the procedure in EN 326-2 for internal control enables the classification of the panels according to their composition and performances.

Characteristic values are provided for bending strength (see Table 2) and bending stiffness (see Table 3) for the classes as defined by the EN 636 Classification System. Tables 1 and 2 in EN 636:2012+A1:2015 give the current threshold performance levels required to be achieved for the purpose of classification.

Although classification for strength and stiffness are independent of each other, the characteristic values for tension and compression in both cases are derived from bending strength.

The surface appearance class, as defined in EN 635-2 and EN 635-3, shall be taken into account both for modulus and strength. Declared characteristic values shall also make reference to these surface appearance classes.

6.2.2 Strength

Class characteristic values for strength in bending, tension and compression, based on class limits as defined in EN 636 are listed in Table 2.