SLOVENSKI STANDARD
SIST EN 16351:2021

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Nadomešča:
SIST EN 16351:2015

Lesene konstrukcije - Križno lamelirani les - Zahteve

Timber structures - Cross laminated timber - Requirements

Holzbauwerke - Brettsperrholz - Anforderungen

Structures en bois - Bois lamellé croisé - Exigences

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ICS:

79.060.10	Vezan les	Plywood
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EUROPEAN STANDARD

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Timber structures - Cross laminated timber - Requirements

Structures en bois - Bois lamellé croisé - Exigences

Holzbauwerke - Brettsperrholz - Anforderungen

This European Standard was approved by CEN on 4 January 2021.

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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-CENELEC Management Centre has the same status as the official versions.

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

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European foreword

This document (EN 16351:2021) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by December 2022.

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

This document supersedes EN 16351:2015.

The following changes have been made:

— the standard has been adjusted to the latest versions of standards for adhesives;

— the provisions for reaction and resistance to fire have been modified;

— the provisions for gap widths and ratios of lamination width by thickness have been modified;

— missing provisions for factory production control have been added;

— the provisions for determination of strength, stiffness and density characteristics of cross laminated timber have been modified;

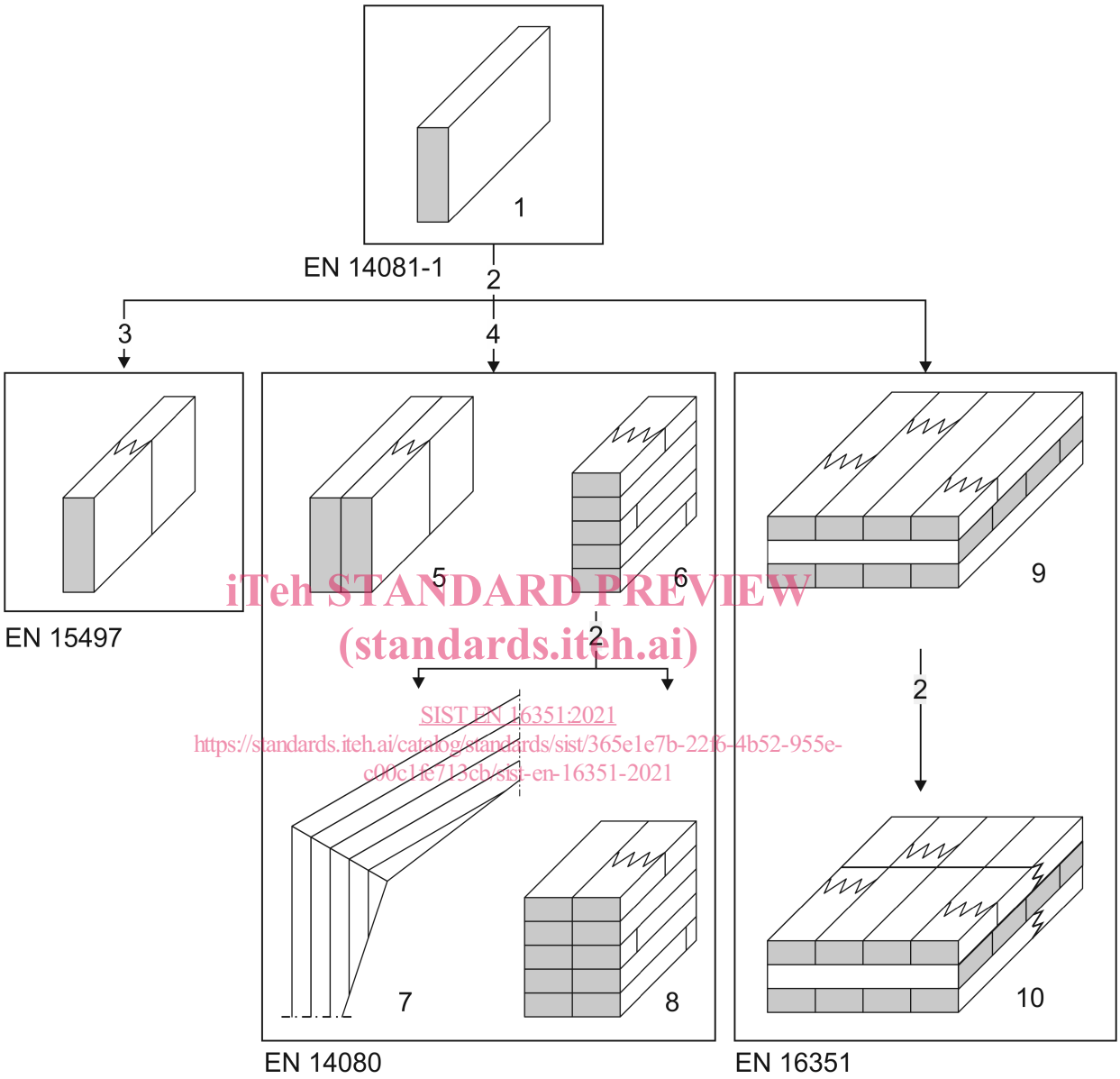
— the standard has been adjusted to the latest templates;

— Annex ZA has been deleted.

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

Introduction

Figure 1 shows the relation of some European Standards on structural timber products.



Key

1	boards	6	glued laminated timber (glulam)
2	is a component for	7	glulam with large finger joints
3	structural finger jointed timber	8	block glued glulam
4	glued laminated products	9	cross laminated timber
5	glued solid timber	10	cross laminated timber with large finger joints

Figure 1 — Relation of some European Standards on structural timber products

Cross laminated timber in accordance with this document and multilayer solid wood panels in accordance with EN 13353 may have the same layup, but for cross laminated timber the timber is strength graded according to EN 14081-1 and the adhesives are tested according to the provisions of this document.

The following standards mentioned in Clause 2, EN 13986, EN 14080, EN 14081-1, EN 14374 and EN 15497, are harmonized product standards. The applicable version cited in the Official Journal of the EU are not necessarily the latest published by CEN.

1 Scope

This document sets out provisions regarding the performance of characteristics of the following Types of cross laminated timber for use in buildings and bridges:

— Type 1: Straight or curved cross laminated timber comprising only timber layers but no large finger joints;

— Type 2: Straight cross laminated timber comprising only timber layers and large finger joints;

— Type 3: Straight cross laminated timber comprising timber and wood-based panel layers but no large finger joints.

This document covers cross laminated timber of all three Types of cross laminated timber:

— manufactured according to this document, which sets up provisions for:

  — boundary conditions during manufacture of cross laminated timber;

  — moisture content and temperature of timber to be bonded;

  — production of finger joints and bonds between layers;

— to be used in service class 1 or 2 according to EN 1995-1-1;

— made of coniferous species and poplar listed in this document;

— which may be made of layers made of different species;

— bonded with phenolic or aminoplastic or moisture curing one-component polyurethane or emulsion polymer isocyanate adhesives of adhesive Type I according to the respective standard;

— made of timber laminations having a nominal width between 40 mm (including) and 300 mm (including);

— built up of at least three orthogonally bonded layers (at least two of them timber layers);

— which may have, depending on the number of layers, adjacent layers bonded parallel to the grain;

— made of timber layers which are made of strength graded timber according to EN 14081-1;

— made of timber layers having nominal thicknesses between 6 mm (including) and 47 mm (including);

— made of timber layers which may comprise edge bonds;

— having nominal overall thicknesses up to 500 mm.

Additional provisions of this document apply for straight cross laminated timber comprising only timber layers and comprising large finger joints (Type 2):

— made from cross laminated timber pieces having the same cross-section and layup;

— made from cross laminated timber pieces having nominal cross-sectional thicknesses from 51 mm (including) up to 345 mm (including) and nominal minimum thicknesses of the outer layers not less than 17 mm (including);

— made from cross laminated timber pieces solely comprising timber layers;

— made from plane cross laminated timber pieces;

— with parallel x-axes of the jointed components;

— with large finger joints having a finger length of at least 45 mm and fingers which are visible at the two narrow sides of the components;

— having large finger joints bonded with phenolic or aminoplastic or moisture curing one-component polyurethane adhesives of adhesive Type I according to the respective standard.

Additional provisions of this document apply for straight cross laminated timber comprising timber and wood-based panel layers but no large finger joints (Type 3):

— made of structural wood-based panels specified in this document;

— made of one panel per layer and;

— having thicknesses between 6 mm (including) and 45 mm (including).

This document applies to cross laminated timber untreated or treated against biological attack.

This document does not cover:

— cross laminated timber treated with fire retardants;

— cross laminated timber which is produced from re-used timber or wood-based panels comprising re-used timber.

It also lays down procedures for assessment and verification of constancy of performance (AVPC) of cross laminated timber.

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 301:2017, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures - Classification and performance requirements*

EN 302-1, *Adhesives for load-bearing timber structures - Test methods - Part 1: Determination of longitudinal tensile shear strength*

EN 302-2, *Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination*

EN 338, *Structural timber - Strength classes*

EN 335, *Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products*

EN 350, *Durability of wood and wood-based products - Testing and classification of the durability to biological agents of wood and wood-based materials*

EN 351-1, *Durability of wood and wood-based products - Preservative-treated solid wood - Part 1: Classification of preservative penetration and retention*

EN 408:2010+A1:2012, *Timber structures - Structural timber and glued laminated timber - Determination of some physical and mechanical properties*

EN 717-1, *Wood-based panels - Determination of formaldehyde release - Part 1: Formaldehyde emission by the chamber method*

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

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

EN 1995-1-2, *Eurocode 5: Design of timber structures - Part 1-2: General - Structural fire design*

EN 12369-2, *Wood-based panels - Characteristic values for structural design - Part 2: Plywood*

EN 12369-3, *Wood-based panels - Characteristic values for structural design - Part 3: Solid-wood panels*

EN 13183-1, *Moisture content of a piece of sawn timber - Part 1: Determination by oven dry method*

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

EN 13183-3, *Moisture content of a piece of sawn timber - Part 3: Estimation by by capacitance method*

EN 13238, *Reaction to fire tests for building products - Conditioning procedures and general rules for selection of substrates*

EN 13501-1, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements - Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13823, *Reaction to fire tests for building products - Building products excluding floorings exposed to the thermal attack by a single burning item*

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

EN 14081-1, *Timber structures - Strength graded structural timber with rectangular cross-section - Part 1: General requirements*

EN 14358, *Timber structures - Calculation and verification of characteristic values*

EN 14374, *Timber structures - Structural laminated veneer lumber - Requirements*

EN 15228:2009, *Structural timber - Structural timber preservative treated against biological attack*

EN 15425:2017, *Adhesives - One component polyurethane (PUR) for load-bearing timber structures - Classification and performance requirements*

EN 16254:2013+A1:2016, *Adhesives - Emulsion polymerized isocyanate (EPI) for load bearing timber structures - Classification and performance requirements*

EN ISO 9239-1, *Reaction to fire tests for floorings - Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1)*

EN ISO 11925-2:2020, *Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2)*

3 Terms, definitions and symbols

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1 Terms and definitions

3.1.1
actual size
measured size of a cross laminated timber at a given moisture content

[SOURCE: EN 14080:2013, 3.1 - modified]

3.1.2
bonding strength
structural effectiveness of adhesives between timber pieces when subjected to stresses

[SOURCE: EN 14080:2013, 3.2]

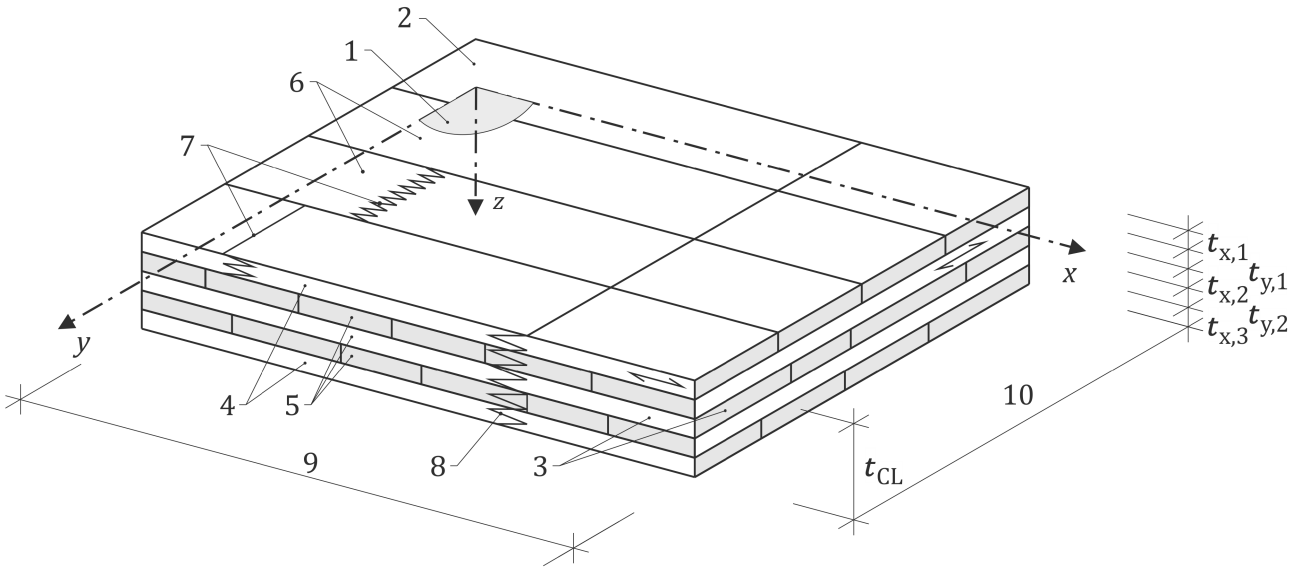
3.1.3
contact-free application
application without contact between timber and application unit

3.1.4
corrected size
size of a cross laminated timber corrected by calculation from its actual size to its size at the reference moisture content

[SOURCE: EN 14080:2013, 3.6 - modified]

3.1.5
cross laminated timber
structural timber member composed by at least three face-bonded layers which comprise solid timber laminations and may comprise wood-based panels, at least one layer orthogonally oriented to the two adjacent layers

Note 1 to entry: See also Figure 2.



Key

1	plane of the element	2	wide face	3	narrow faces	4	outer layers
5	inner layers	6	laminations	7	finger joints in lamination	8	large finger joint
9	usually the length	10	usually the width b_{CL} of a plate or height h_{CL} of a beam				

Figure 2 — Cross laminated timber

3.1.6
delamination length
sum of the lengths of delaminations in one glue line measured around the circumference of a test piece

[SOURCE: EN 14080:2013, 3.8 - modified]

3.1.7
edge bond
bond between adjacent laminations within a timber layer

3.1.8
finger angle
inclination α of each side of the fingers of a finger joint

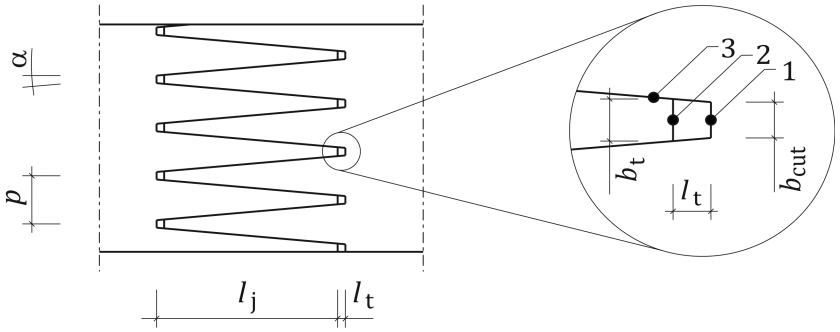
[SOURCE: EN 14080:2013, 3.10]

Note 1 to entry: See Figure 3.

3.1.9
finger joint
interlocking end joint formed by machining a number of similar, tapered, symmetrical fingers in the ends of timber components using a finger joint cutter and then bonded together

[SOURCE: EN 14080:2013, 3.11]

Note 1 to entry: In this document, the term finger joint is used for finger joints in laminations whereas finger joints between cross laminated timber are defined as large finger joints (see 3.1.13).



Key

b_{cut}	tip width of the cutter	b_t	tip width	l_j	finger length	l_t	slot base	p	pitch
α	finger angle	1	tip base	2	fingertip	3	finger flank		

Figure 3 — Typical profile of a finger joint

3.1.10
finger length
distance l_j between the finger base and the tip of the finger, measured along the centre line of the finger

[SOURCE: EN 14080:2013, 3.12]

Note 1 to entry: See Figure 3.

3.1.11
finished thickness
thickness after machining

[SOURCE: EN 14080:2013, 3.13]

3.1.12
lamination
part of a structural glued timber product consisting of one board or two or more finger-jointed boards

[SOURCE: EN 14080:2013, 3.19 - modified]

3.1.13
large finger joint
finger joint through the full cross-sectional area of two cross laminated timber components

[SOURCE: EN 14080:2013, 3.20 - modified]

Note 1 to entry: See Figure 4.

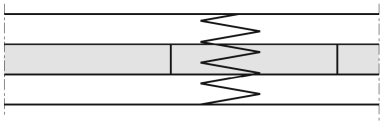


Figure 4 — Cross laminated timber with large finger joint

3.1.14
layer
courses lying over or under another

3.1.15
layup
cross-sectional arrangement of timber layers which may be assigned to different strength classes according to EN 338 or different sets of individual values of strength, stiffness and density characteristics or wood-based panel layers which may be assigned to different strength classes according to EN 12369-2 or EN 12369-3 or different sets of individual values of strength, stiffness and density characteristics

[SOURCE: EN 14080:2013, 3.21 - modified]

3.1.16
maximum delamination length
largest delamination length in any single glue line

[SOURCE: EN 14080:2013, 3.24 - modified]

3.1.17
mean moisture content
mean value of the moisture content of cross laminated timber calculated from at least two measurements

[SOURCE: EN 14080:2013, 3.25 - modified]

Note 1 to entry: See D.2.

3.1.18
minimum mean density
required mean density at reference moisture content, estimated as the weighted mean of the mean densities of the layers, if necessary

[SOURCE: EN 14080:2013, 3.26]

Note 1 to entry: Minimum mean density is used for the classification of the reaction to fire.

3.1.19
nominal size
size specified at the reference moisture content to which deviations are related

3.1.20
pitch
distance between centres of adjacent fingertips

[SOURCE: EN 14080:2013, 3.27]

Note 1 to entry: See Figure 3.

3.1.21
ratio of resin to hardener
proportion of resin to hardener by mass with the resin set at 100 parts

[SOURCE: EN 14080:2013, 3.28]