



SLOVENSKI STANDARD
oSIST prEN 14374:2016
01-julij-2016

Lesene konstrukcije - Slojnat furnirni les (LVL) - Zahteve

Timber structures - Laminated veneer lumber (LVL) - Requirements

Holzbauwerke - Furnierschichtholz (LVL) - Anforderungen

Structures en bois - Lamibois (LVL) - Exigences

Ta slovenski standard je istoveten z: prEN 14374

<https://standards.iteh.ai/catalog/standards/sist/fb9f75c2-405e-4dc5-9d33-33afa3a1c255/ksist-fpren-14374-2019>

ICS:

79.080	Polizdelki iz lesa	Semi-manufactures of timber
91.080.20	Lesene konstrukcije	Timber structures

oSIST prEN 14374:2016

en,fr,de

iTeh STANDARD PREVIEW (standards.iteh.ai)

[kSIST FprEN 14374:2019](https://standards.iteh.ai/catalog/standards/sist/fb9f75c2-405e-4dc5-9d33-33afa3a1c255/ksist-fpren-14374-2019)

<https://standards.iteh.ai/catalog/standards/sist/fb9f75c2-405e-4dc5-9d33-33afa3a1c255/ksist-fpren-14374-2019>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 14374

May 2016

ICS 79.080; 91.080.20

Will supersede EN 14279:2004+A1:2009,
EN 14374:2004

English Version

Timber structures - Laminated veneer lumber (LVL) - Requirements

Structures en bois - Lamibois (LVL) - Exigences

Holzbauwerke - Furnierschichtholz (LVL) -
Anforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 124.

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.

This draft European Standard was established by CEN 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions	8
4 Symbols	10
4.1 Main symbols.....	10
4.2 Subscripts	11
5 Classification.....	11
6 Material characteristics and testing, assessment and sampling methods.....	12
6.1 Modulus of elasticity, bending, compressive, tensile and shear strength of structural LVL.....	12
6.2 Strength and stiffness under point load of structural LVL (punching shear)	12
6.3 Racking resistance of structural LVL	12
6.4 Impact resistance of structural LVL	13
6.5 Embedment strength of fasteners in structural LVL.....	13
6.6 Mechanical durability (i.e. duration of load and creep) of structural LVL.....	13
6.7 Bonding strength and durability of bonding strength (also covering moisture resistance) of structural and non-structural LVL	13
6.8 Dimensional stability of structural and non-structural LVL (also covering durability-swelling in thickness).....	14
6.9 Durability of other characteristics against biological attack of structural and non-structural LVL.....	15
6.10 Resistance to fire of structural LVL	16
6.11 Reaction to fire of structural and non-structural LVL	16
6.12 Fire protection ability	19
6.13 Release of formaldehyde of structural and non-structural LVL	19
6.14 Release/content of other dangerous substances (also covering release/content of pentachlorophenol (PCP)) of structural and non-structural LVL.....	20
6.15 Water vapour permeability of structural and non-structural LVL	20
6.16 Airborne sound insulation (surface mass) of structural and non-structural LVL	20
6.17 Sound adsorption of structural and non-structural LVL	21
6.18 Thermal conductivity of structural and non-structural LVL.....	21
6.19 Air permeability of structural and non-structural LVL.....	21
6.20 Supplementary properties of structural and non-structural LVL.....	21
7 Assessment and Verification of Constancy of Performance (AVCP).....	21
7.1 General.....	21
7.2 Type testing.....	22
7.3 Factory production control (FPC)	30
8 Marking and labelling	42
Annex A (normative) Testing of strength, stiffness and density properties of laminated veneer lumber.....	43
A.1 General.....	43

A.2	Edgewise bending strength and edgewise modulus of elasticity in bending parallel to the grain of the face veneers	45
A.3	Edgewise bending strength, edgewise modulus of elasticity and edgewise shear strength in bending perpendicular to the grain of the face veneers	45
A.4	Flatwise bending strength and flatwise modulus of elasticity in bending parallel to the grain of the face veneers	46
A.5	Flatwise bending strength and flatwise modulus of elasticity in bending perpendicular to the grain of the face veneers	46
A.6	Tension strength and modulus of elasticity in tension parallel to the grain of the face veneers	46
A.7	Edgewise tension strength in plane of the veneers and perpendicular to the grain of the face veneers	46
A.8	Compression strength and modulus of elasticity in compression parallel to the grain of the face veneers	47
A.9	Edgewise compression strength and edgewise modulus of elasticity in compression in plane of the veneers and perpendicular to the grain of the face veneers	47
A.10	Flatwise compression strength and flatwise modulus of elasticity perpendicular to the plane of the veneers	47
A.11	Edgewise shear strength and edgewise shear modulus parallel to the grain of the face veneers	47
A.12	Flatwise shear strength and flatwise shear modulus parallel to the grain of the face veneers	47
A.13	Flatwise shear strength and flatwise shear modulus perpendicular to the grain of the face veneers	48
A.14	Density	48
A.15	Moisture content	48
Annex B (normative)	Strength classes for structural laminated veneer lumber	49
B.1	General	49
B.2	LVL without cross-band veneers	49
B.3	LVL with crossband veneers	51
Annex C (normative)	Layup factors for laminated veneer lumber with cross-band veneers	53
C.1	General	53
C.2	Determination of layup factors for LVL made from one species	54
C.3	Layup factors for LVL made of different species	55
Annex D (normative)	Testing of bonding quality for structural LVL	56
D.1	Specimens	56
D.2	Tests	56
D.3	Report	56
Annex E (normative)	Testing of bonding strength for non-structural LVL	57
E.1	General	57

prEN 14374:2016 (E)

E.2	Test pieces	57
E.3	Apparatus	64
E.4	Procedure	64
E.5	Evaluation of test results	64
Annex F (normative)	Release of formaldehyde	65
F.1	General	65
F.2	Classification	65
F.3	Test procedure and test report	65
Annex G (informative)	Supplementary characteristics	66
G.1	General	66
Annex H (informative)	Supplementary design rules	67
H.1	General	67
H.2	Deformation factors k_{def}	67
H.3	Provisions for compression perpendicular to the grain	67
H.4	Charring rate	68
Annex ZA (informative)	Relationship of this European Standard with Regulation (EU) No. 305/2011	69
ZA.1	Scope and relevant characteristics	69
ZA.2	System of Assessment and Verification of Constancy of Performance (AVCP)	73
ZA.3	Assignment of AVPC tasks	73
Bibliography	76

European foreword

This document (prEN 14374:2016) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document will supersede EN 14374:2004 and EN 14279:2004+A1:2009.

Compared to EN 14374:2004 and EN 14279: 2004+A1:2009, the following changes have been made:

- both standards have been merged and completely revised;
- the merged standard has been written according to the latest CEN-Template, i.e. each mandated characteristic is addressed in a separate subclause;
- a universal classification for structural and non-structural LVL has been introduced;
- specific rules for LVL with crossband veneers are given;
- layup factors for LVL with crossband veneers for the determination of properties from tests are given;
- more strength and stiffness properties are defined and the respective test methods have been introduced;
- strength classes for structural LVL have been introduced;
- tolerances have been modified;
- provisions regarding resistance to fire and fire protection ability have been introduced.

1 Scope

This European Standard sets out provisions regarding the performance characteristics of structural laminated veneer lumber (LVL) for use in buildings and bridges and non-structural laminated veneer lumber for internal and external applications in construction.

It also lays down procedures for Assessment and Verification of Constancy of Performance of laminated veneer lumber.

This European Standard covers laminated veneer lumber

- made of at least five veneers having a maximum veneer thickness of 6 mm;
- which may comprise crossband veneers;
- which may comprise veneers made from different species;
- being preservative treated or untreated against biological attack or treated to improve the reaction to fire.

This European Standard defines provisions for bonding strength and durability of bonding strength in dry, humid and exterior conditions. It covers structural LVL to be used in all conditions and non-structural LVL to be used in the respective conditions for which bonding strength tests have been performed.

This European Standard defines strength classes for structural laminated veneer lumber.

2 Normative references

(standards.iteh.ai)

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

EN 314-1, *Plywood - Bonding quality - Part 1: Test methods*

EN 314-2, *Plywood - Bonding quality - Part 2: Requirements*

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

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

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

EN 351-2, *Durability of wood and wood-based products - Preservative-treated solid wood - Part 2: Guidance on sampling for the analysis of preservative-treated wood*

EN 383, *Timber Structures - Test methods - Determination of embedment strength and foundation values for dowel type fasteners*

EN 408, *Timber structures — Structural timber and glued laminated timber - Determination of some physical and mechanical properties*

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*

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

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

EN 12114, *Thermal performance of buildings - Air permeability of building components and building elements - Laboratory test method*

EN 12664, *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Dry and moist products of medium and low thermal resistance*

EN 12871, *Wood-based panels - Determination of performance characteristics for load bearing panels for use in floors, roofs and walls*

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 test data from reaction to fire tests*

EN 13501-2, *Fire classification of construction products and building elements - Part 2: Classification using data from Resistance to fire 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 14358, *Timber structures - Calculation of characteristic 5-percentile values and acceptance criteria for a sample*

CEN/TS 16516, *Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air*

EN ISO 354, *Acoustics - Measurement of sound absorption in a reverberation room (ISO 354)*

prEN 14374:2016 (E)

EN ISO 717-1, *Acoustics - Rating of sound insulation in buildings and of building elements - Part 1: Airborne sound insulation (ISO 717-1)*

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 10140-2, *Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

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

EN ISO 12460-3, *Wood-based panels - Determination of formaldehyde release - Part 3: Gas analysis method (ISO 12460-3)*

EN ISO 12572, *Hygrothermal performance of building materials and products - Determination of water vapour transmission properties (ISO 12572)*

3 Terms and definitions

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

3.1

crossband veneer

veneer whose fibres are oriented perpendicular to the fibres of the face veneers

3.2

dry conditions

conditions corresponding to service class 1 of EN 1995-1-1 which is characterised by a moisture content in the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air only exceeding 65 % for a few weeks per year

3.3

exterior conditions

conditions corresponding to service class 3 of EN 1995-1-1 which is characterised by climatic conditions leading to higher moisture contents than in service class 2

3.4

humid conditions

conditions corresponding to service class 2 of EN 1995-1-1 which is characterised by a moisture content in the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air only exceeding 85 % for a few weeks per year

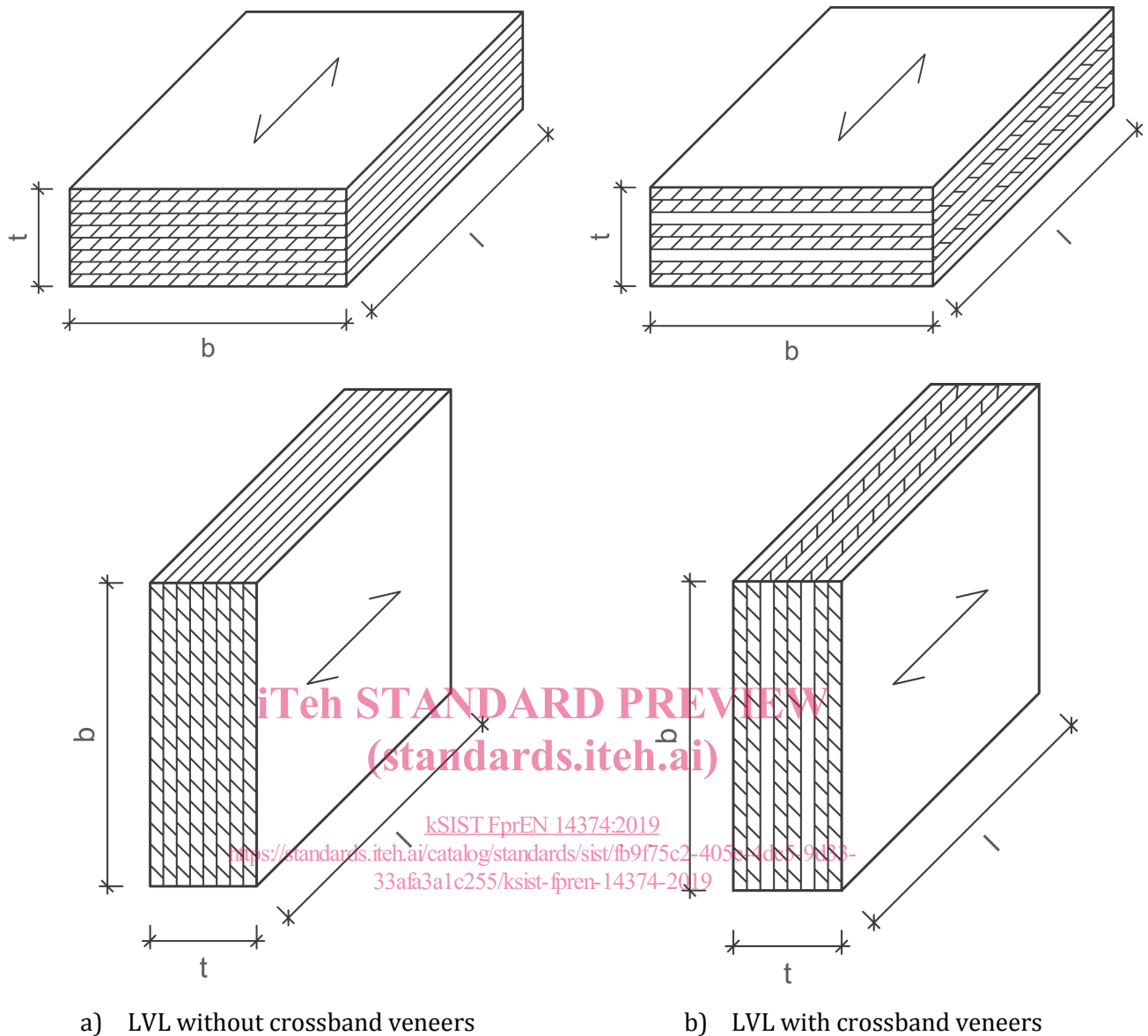
3.5

laminated veneer lumber

LVL

wood based composite consisting of veneers, glued together predominantly parallel to the direction of the grain in adjacent layers which may have crossband veneers

Note 1 to entry: See Figure 1.

**Key** b width l length t thickness**Figure 1 — Laminated veneer lumber without and with crossband veneers****3.6****layup**

cross sectional arrangement of veneers

3.7**length**

the dimension parallel to the plane of the veneers and parallel to the direction of the fibres of the face veneers

Note 1 to entry: See Figure 1.

prEN 14374:2016 (E)**3.8****nominal size**

size specified at a reference moisture content to which deviations are to be related

3.9**product type**

product defined by layup, thickness range, species or species combination, adhesive, bonding and strength characteristic

3.10**reference moisture content**

equilibrium moisture content at a temperature of 20 °C and a relative humidity of 65 %

3.11**thickness**

the cross sectional dimension perpendicular to the plane of the veneers

Note 1 to entry: See Figure 1.

3.12**width**

the cross sectional dimension parallel to the plane of the veneers and perpendicular to the direction of the fibres of the face veneers

Note 1 to entry: See Figure 1.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

4 Symbols**4.1 Main symbols**

<https://standards.iteh.ai/catalog/standards/sist/fb9f75c2-405e-4dc5-9d33-33afa3a1c255/ksist-fpren-14374-2019>

<i>b</i>	width, in mm;
<i>f</i>	strength, in N/mm ² ;
<i>E</i>	modulus of elasticity, in N/mm ² ;
<i>G</i>	shear modulus, in N/mm ² ;
<i>k</i>	factor;
<i>l</i>	length, in mm;
<i>m</i>	effective number of veneers;
<i>N</i>	number of single layers;
<i>P</i>	number of pretreatments;
<i>q</i>	number of test pieces;
<i>R</i>	airborne sound insulation, in dB;
<i>s</i>	size effect parameter;
<i>t</i>	thickness, in mm;

u	moisture content, in %;
V	coefficient of variation, in %;
X_i	characteristic value for layup i ;
α	deviation from the right angle, in °;
α	sound absorption factor;
$\alpha_i, \gamma_i, \delta_i$	layup factors for layup i ;
λ_d	thermal conductivity, in W/mK;
μ	water vapour resistance factor;
ρ	density, in kg/m ³ .

4.2 Subscripts

c	compression;
cor	corrected;
edge	loaded parallel to the glue lines between the veneers;
flat	loaded perpendicular to the glue lines between the veneers;
k	characteristic;
lay	layer;
m	bending;
mean	mean value;
t	tension;
v	shear;
0	parallel to the grain of the face veneers;
90	perpendicular to the grain of the face veneers.

5 Classification

Laminated veneer lumber shall be classified as follows:

- the abbreviation "LVL" shall be given;
- the abbreviation "S" for structural LVL and "NS" for non-structural LVL shall be given;
- crossband veneers shall be indicated by "cross";
- for structural LVL assigned to a class according to Annex B the class name shall be given. The class name comprises the abbreviations "LVL", "S" and "cross" (if relevant) and also indicates the characteristic value for flatwise bending parallel to the grain of the face veneer in N/mm² shall be

given. For structural LVL not assigned to a class according to Annex B and for non-structural LVL no characteristic value shall be given as part of the designation.

NOTE For structural LVL not assigned to a class according to Annex B, all strength, stiffness and density values are declared within the markings, see Clause 8 and Annex ZA.

The classification mentioned above may be combined with a manufacturer specific brand-name, if, in the case of structural LVL, that brand-name cannot be mixed up with the denomination of strength classes according to Annex B.

6 Material characteristics and testing, assessment and sampling methods

6.1 Modulus of elasticity, bending, compressive, tensile and shear strength of structural LVL

Modulus of elasticity and bending, compressive, tensile and shear strength shall be determined by tests according to Annex A and declared as strength classes according to Annex B or as individual values.

Results from tests with specimens from laminated veneer lumber without crossband veneers being representative for the respective thickness range (either $t \leq 75\text{mm}$ or $t > 75\text{mm}$) may be applied for any thicknesses within that range.

For shear strengths, shear moduli, flatwise compression strength perpendicular to the grain and density the results from tests with specimens from laminated veneer lumber with crossband veneers being representative for the respective thickness range (see A.1) may be applied for any thickness within that range. For all other mechanical properties the test results obtained with the tested layup shall be adjusted for all other layups by the ratio of the layup factors according to Annex C.

The characteristic edgewise bending strength parallel to the fibres of the face veneers $f_{m,0,edge,k}$ shall be valid for laminated veneer lumber with a depth h of 300 mm.

The characteristic tension strength parallel to the fibres of the face veneers $f_{t,0,k}$ shall be valid for laminated veneer lumber with a length l of 3 000 mm.

For non-structural laminated veneer lumber, the flatwise bending strength parallel and perpendicular to the fibres of the face veneers shall be tested according to EN 310 or Annex A. The bending strengths are determined for purposes of quality control. They are not declared, see Clauses 5 and 8.

6.2 Strength and stiffness under point load of structural LVL (punching shear)

The strength and stiffness under point load for floor or roof deckings on joists of structural LVL shall be tested according to EN 1195 with a loading pad of 50mm x 50mm, evaluated according to EN 12871 and expressed as characteristic value of resistance (N) and mean value of stiffness (N/mm).

6.3 Racking resistance of structural LVL

Racking resistance of wall sheatings on studs shall be either:

- expressed as modulus of elasticity, bending, compressive, tensile and shear strength of structural LVL according to 6.1 and embedment strength according to 6.5; or

NOTE 1 The above information enables the designer to calculate the racking resistance for a specific end-use situation taking into account additional parameters, e.g. strength, stiffness and density properties of studs, strength properties of fasteners and geometrical data.

- tested according to EN 594, evaluated according to EN 12871, and expressed as characteristic value of racking resistance (N) and mean value of racking stiffness (N/mm) under point load.

NOTE 2 The value can only be used for the tested system.

6.4 Impact resistance of structural LVL

The impact resistance of floor and roof deckings on joists shall be tested according to EN 1195 and declared as class according to EN 12871.

The impact resistance of wall sheatings on studs shall be tested according to EN 596 and declared as class according to EN 12871.

6.5 Embedment strength of fasteners in structural LVL

Embedment strength of fastener in structural LVL shall be either

- expressed as characteristic density declared as strength class according to Annex B or as single value; or

NOTE 1 The above information enables the designer to calculate the embedment strengths for a specific end-use situation taking into account additional parameters, e.g. diameter of fastener, according to EN 1995-1-1.

NOTE 2 EN 1995-1-1 only provides embedment strengths for dowel type fasteners having their axis perpendicular to the plane of the face veneers.

- tested according to EN 383, evaluated according to EN 14358 and expressed as characteristic value of embedment strength and relevant test parameters (thickness, layup and species of LVL, diameter of the fastener, yield moment of dowel type fastener and angle between load direction and grain direction of the face veneers).

NOTE 3 The value can only be used for the tested combination of fastener, LVL and angle between load direction and grain direction of the face veneers.

6.6 Mechanical durability (i.e. duration of load and creep) of structural LVL

Mechanical durability (i.e. duration of load and creep) of structural LVL shall either:

- be taken from EN 1995-1-1 and expressed as “EN 1995-1-1” or individual values; or

NOTE For structural LVL without crossband veneers and structural LVL with crossband veneers subjected to edgewise bending, values can be directly taken from EN 1995-1-1. For structural LVL with crossband veneers subjected to flatwise bending, the values for structural plywood apply. The values can also be taken from Table H.1.

- be determined and declared as individual values derived from tests according to EN 1156 and relevant test parameters (thickness, layup and species of LVL, service class duration of load class, stresses, for which factors apply).

6.7 Bonding strength and durability of bonding strength (also covering moisture resistance) of structural and non-structural LVL

NOTE The term bonding strength has been taken from the mandate. In some cases, no strengths are to be determined, so the term bonding quality would be more appropriate.

6.7.1 Bonding strength and durability of bonding strength of structural LVL

Bonding strength and durability of bonding strength of structural LVL shall be determined from a cleavage test according to Annex D and declared as bonding class exterior. In each tested glue line the apparent cohesive wood failure percentage estimated according to Annex D shall be at least 70 %.