Puitkonstruktsioonid. Lamell-liimpuit ja plankliimpuit. Nõuded

Timber structures - Glued laminated timber and glued solid timber - Requirements

EESTI STANDARDIKESKUS
ESTONIAN CENTRE FOR STANDARDISATION

EESTI STANDARDI EESSÕNA	NATIONAL FOREWORD
See Eesti standard EVS-EN 14080:2013 sisaldab Euroopa standardi EN 14080:2013 ingliskeelset teksti.	This Estonian standard EVS-EN 14080:2013 consists of the English text of the European standard EN 14080:2013.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 26.06.2013.	Date of Availability of the European standard is 26.06.2013.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

ICS 79.060.99

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14080

June 2013

ICS 79.060.99

Supersedes EN 1194:1999, EN 14080:2005, EN 385:2001, EN 386:2001, EN 387:2001, EN 390:1994, EN 391:2001, EN 392:1995

English Version

Timber structures - Glued laminated timber and glued solid timber - Requirements

Structures en bois - Bois lamellé collé et bois massif reconstitué - Exigences

Holzbauwerke - Brettschichtholz und Balkenschichtholz - Anforderungen

This European Standard was approved by CEN on 1 May 2013.

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-CENELEC 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-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.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 14080:2013: E

Contents

Page

Foreword 6

1 Scope 10

2 Normative references 10

3 Terms and definitions 11

4 Symbols 17
4.1 Main symbols 17
4.2 Subscripts 18

5 Requirements for glued laminated products 19
5.1 Mechanical resistance of glued laminated timber 19
5.1.1 General 19
5.1.2 Timber 19
5.1.3 Related material properties 19
5.1.4 Verification from classification of standardised beam lay-ups and lamination properties of glued laminated timber 20
5.1.5 Verification from cross sectional layup and properties of boards and finger joints 24
5.1.6 Verifications from full scale tests with glued laminated timber 26
5.1.7 Resawn glulam 26
5.2 Mechanical resistance of glued solid timber 28
5.2.1 General 28
5.2.2 Timber 28
5.2.3 Related material properties 28
5.2.4 Verification from classification of lamination properties of glued solid timber 28
5.2.5 Verifications from full scale tests with glued solid timber 29
5.3 Additional requirement for mechanical resistance of glulam with large finger joints 30
5.4 Additional requirement for mechanical resistance of block glued glulam 30
5.5 Bonding strength and durability of bonding strength of glued laminated products 30
5.5.1 General 30
5.5.2 Species 30
5.5.3 Adhesives for the production of glued laminated products 31
5.5.4 Finger joints in laminations 33
5.5.5 Bonding of laminations 33
5.5.6 Bonding of large finger joints 35
5.5.7 Bonding of block glued glulam 35
5.6 Durability of other characteristics against biological attack 35
5.6.1 Glued laminated products without preservative treatment 35
5.6.2 Glued laminated products with preservative treatment 35
5.7 Resistance to fire 35
5.8 Reaction to fire 36
5.9 Formaldehyde emission 37
5.10 Release/content of other dangerous substances 37
5.11 Deviation in sizes 37
5.11.1 Maximum deviations 37
5.11.2 Corrected sizes and moisture deformation factor 39

6 Evaluation of conformity 40
6.1 General 40
6.2 Initial Type Testing 40
6.2.1 General 40
6.2.2 Test samples, testing and compliance criteria 41
6.2.3 Test reports 46
6.3 Factory production control (FPC) 46

6.3.1 General **46**
6.3.2 Requirements **47**
6.3.3 Product specific requirements **52**
6.4 Initial inspection of factory and of FPC **53**
6.5 Continuous surveillance of FPC **54**
6.6 Procedure for modifications **54**

7 Marking and labelling **54**
7.1 General **54**
7.2 Glued laminated products **54**
7.3 Additional for glulam with large finger joints **55**

Annex A (normative) **Release of Formaldehyde** **56**
A.1 General **56**
A.2 Classification **56**
A.2.1 Glued laminated timber or glued solid timber **56**
A.2.2 Classification for glulam with large finger joints and block glued glulam **57**

Annex B (normative) **Additional test methods and requirements for adhesives** **58**
B.1 General **58**
B.2 Long-term sustained load test at cyclic climate conditions with specimens loaded perpendicular to the glue line for moisture curing one-component polyurethane and emulsion polymer isocyanate adhesives **58**
B.2.1 General description **58**
B.2.2 Production of the specimens **58**
B.2.3 Test procedure and climate conditions **59**
B.2.4 Requirements **60**
B.2.5 Report **60**
B.3 Delamination test for finger joints in laminations **60**
B.3.1 Production of the specimens **60**
B.3.2 Testing **61**
B.3.3 Results **61**
B.3.4 Report **61**

Annex C (normative) **Delamination test of glue lines** **63**
C.1 Principle **63**
C.2 Apparatus **63**
C.2.1 Pressure vessel **63**
C.2.2 Drying duct **63**
C.2.3 Balance **63**
C.2.4 Metal wedge and hammer **63**
C.3 Sampling and preparation of test pieces **63**
C.4 Procedures **64**
C.4.1 General **64**
C.4.2 Measurement and evaluation of delamination **64**
C.4.3 Test cycle for method A **65**
C.4.4 Test cycle for method B **65**
C.4.5 Test cycle for method C **66**
C.5 Results **66**
C.5.1 General **66**
C.5.2 Total delamination **66**
C.5.3 Maximum delamination **66**
C.6 Report **67**

Annex D (normative) **Shear test of glue lines** **68**
D.1 Principle **68**
D.2 Apparatus **68**
D.2.1 Testing machine **68**
D.2.2 Shearing tool **68**
D.3 Test pieces for glulam and glued solid timber **69**
D.3.1 Preparation of test pieces **69**
D.3.2 Sampling of test pieces (test bars) **70**
D.3.3 Marking of test pieces (test bars) **71**

D.4 Test pieces for glue lines between glulam components of block glued glulam ... 72
D.5 Procedure ... 72
D.6 Results ... 73
D.7 Report ... 73

Annex E (normative) **Tests with laminations with or without finger joints (including compliance criteria) ... 74**
E.1 Sampling of finger joints in laminations ... 74
E.1.1 General ... 74
E.1.2 For Initial type testing ... 74
E.1.3 For Factory production control ... 74
E.2 Testing of finger joints in laminations ... 74
E.2.1 General ... 74
E.2.2 Additionally for initial type testing ... 74
E.2.3 Additionally for factory production control ... 74
E.3 Compliance criteria of finger joints in laminations ... 75
E.3.1 For Initial type testing ... 75
E.3.2 For factory production control ... 75
E.4 Report of tests with finger joints in laminations ... 75
E.5 Tests with laminations without finger joints ... 76

Annex F (normative) **Bending tests with glued laminated timber, glued solid timber and glulam with large finger joints (including compliance criteria) ... 77**
F.1 Sampling ... 77
F.2 Testing ... 77
F.3 Evaluation ... 77
F.4 Compliance criteria ... 77
F.5 Report ... 78

Annex G (normative) **Measurement of moisture content ... 79**
G.1 General ... 79
G.2 Measurement of moisture content of boards during production ... 79
G.3 Mean moisture content of glued laminated timber and glulam components for the production of glulam with large finger joints and block glued glulam ... 79
G.4 Moisture content of glued solid timber ... 79

Annex H (normative) **Equipment ... 80**
H.1 General ... 80
H.2 Additionally for the production of glued laminated timber and glued solid timber ... 80
H.3 Additionally for the production of glulam with large finger joints ... 80
H.4 Additionally for the production of block glued glulam ... 80

Annex I (normative) **Minimum production requirements ... 81**
I.1 Personnel ... 81
I.2 Production and storage facilities ... 81
I.2.1 General ... 81
I.2.2 Facilities for drying and storage of timber ... 81
I.2.3 Facilities for processing and storage of adhesives ... 81
I.2.4 Facilities for production and curing ... 81
I.3 Equipment ... 81
I.4 Finger joints in laminations ... 82
I.4.1 Wane and edge damages ... 82
I.4.2 Finger joint geometry ... 82
I.4.3 Knots and local grain deviation ... 82
I.4.4 Moisture content at bonding ... 83
I.4.5 Bonding surface and application of the adhesive ... 83
I.4.6 Time between cutting and bonding ... 84
I.4.7 Pressure ... 84
I.4.8 Curing ... 84
I.5 Bonding of laminations ... 85
I.5.1 Permissible finished lamination sizes and radius of curvature ... 85
I.5.2 Laminations made of two boards side by side ... 85
I.5.3 Grooves in laminations ... 85

I.5.4 Orientation of laminations in the cross section 86
I.5.5 Moisture content at bonding 86
I.5.6 Planing of laminations 86
I.5.7 Bonding surface and adhesive application 87
I.5.8 Glue line thickness 87
I.5.9 Cramping 87
I.5.10 Curing 87
I.6 Glulam with large finger joints 88
I.6.1 Moisture content at bonding 88
I.6.2 Finger joint geometry 88
I.6.3 Machining of the fingers 88
I.6.4 Bonding surface and adhesive application 88
I.6.5 Cramping 88
I.6.6 Glue line thickness 89
I.6.7 Curing 89
I.7 Block glued glulam 89
I.7.1 Moisture content at bonding 89
I.7.2 Bonding surface and adhesive application 89
I.7.3 Cramping 89
I.7.4 Glue line thickness 89
I.7.5 Curing 89

Annex ZA (informative) **Clauses of this European Standard addressing the provisions of the EU Construction Products Directive 90**
ZA.1 Scope and relevant characteristics 90
ZA.2 Procedures for the attestation of conformity of glued laminated products 92
ZA.2.1 System of attestation of conformity 92
ZA.2.2 EC certificate of conformity 93
ZA.3 CE marking and labelling 94
ZA.3.1 General 94
ZA.3.2 CE marking on the product 94
ZA.3.3 CE marking in the accompanying documents 97

Bibliography 103

Foreword

This document (EN 14080:2013) 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 December 2013, and conflicting national standards shall be withdrawn at the latest by December 2013.

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 391:2001, EN 392:1995, EN 14080:2005, EN 387:2001, EN 385:2001, EN 390:1994, EN 1194:1999 and EN 386:2001 (see below).

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 standard supersedes the following standards:

— EN 387:2001, *Glued laminated timber — Large finger joints — Performance requirements and minimum production requirements*;

— EN 390:1994, *Glued laminated timber — Sizes, permissible deviations*;

— EN 1194:1999, *Timber structures — Glued laminated timber — Strength classes and determination of characteristic values*;

— EN 14080:2005, *Timber structures — Glued laminated timber — Requirements*.

Regarding glued laminated timber this standard supersedes the following standards:

— EN 385:2001, *Finger jointed structural timber — Performance requirements and minimum production requirement* (superseded by the present document and prEN 15497);

— EN 386:2001, *Glued laminated timber — Performance requirements and minimum production requirements*;

NOTE For glulam made of hardwood species a European Standard is under preparation.

— EN 391:2001, *Glued laminated timber — Delamination test of glue lines*;

— EN 392:1995, *Glued laminated timber — Shear test of glue lines*.

The above standards have been merged into this standard and changed considerably. The list below shows the relevant changes and amendments.

The following have been included:

— Block glued glulam and glued solid timber;

— Requirements for emulsion polymer isocyanate adhesives and for gap-filling adhesives;

— A uniform denomination for lamination strength classes has been included. These T-classes are related to strength classes given in other European Standards;

— Rules for estimation mechanical properties of glued laminated timber resawn by length;

— Provisions for Resistance to fire;

— Maximum deviations for curved glued laminated products;

— New values for tensile and compression strength perpendicular to the grain, for shear strength and shear modulus, modulus of elasticity parallel and perpendicular to the grain for glued laminated timber with values for rolling shear strength and modulus.

The scope covers glued laminated products made from coniferous species listed in this standard and poplar.

For moisture curing one-component polyurethane adhesives normative reference is now made to EN 15416-5 and EN 15425.

For phenolic and aminoplastic adhesives reference is made to prEN 301 and prEN 302.

With respect to durability against biological attack reference is made to EN 15228.

The performance requirements for finger joints in laminations have been changed.

Requirements have been introduced for the machinery for the separate application of resin and hardener to finger joints in laminations.

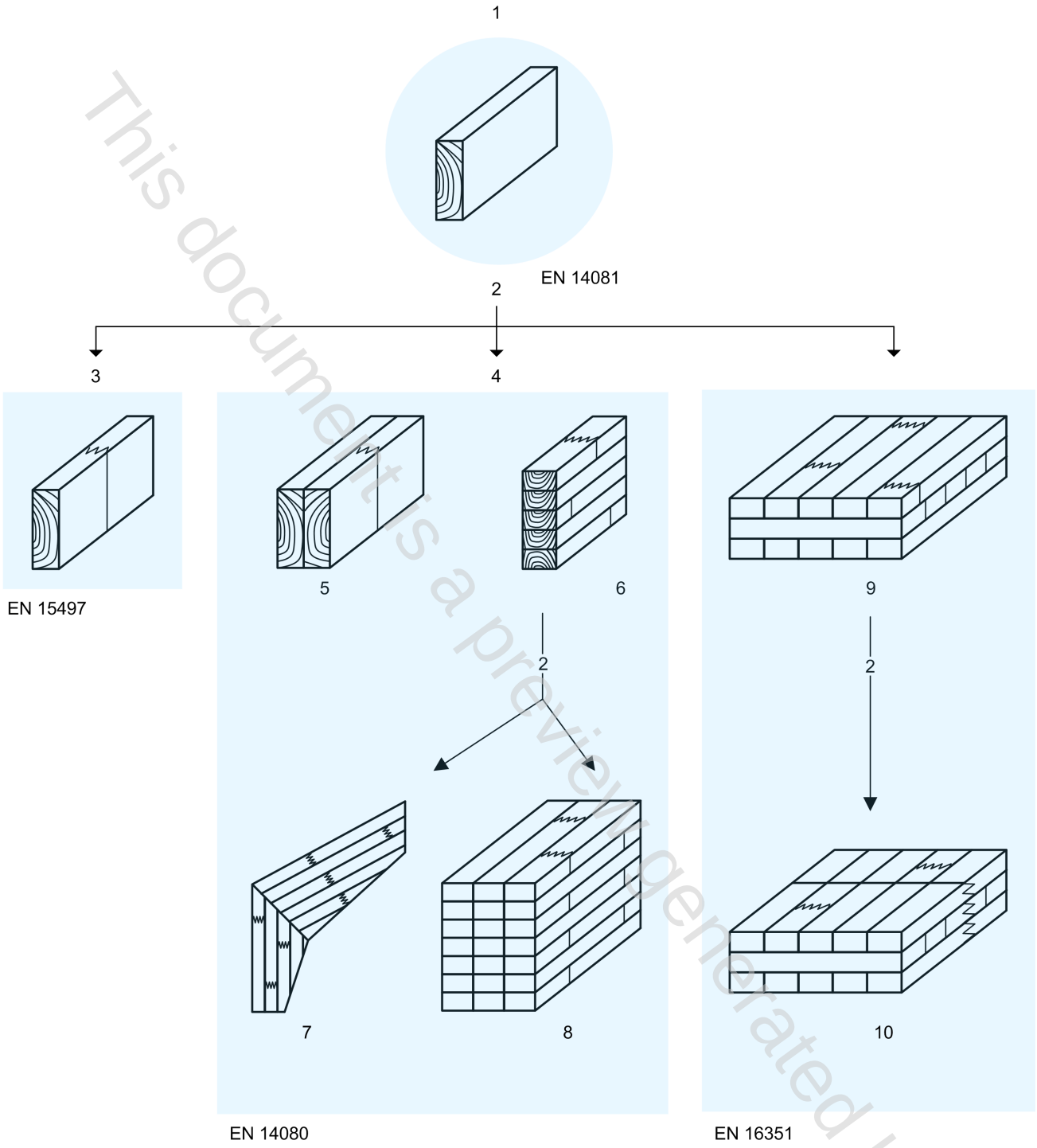
The rules for laminations laid side by side and for grooves in laminations have been changed.

The required cramping pressure for the production of large finger joints has been changed.

The evaluation of conformity section and the Annex ZA has been changed according to the revised answer to the mandate.

The rules for marking and labelling have been adopted to the changes mentioned above.

Figure 1 shows the relation of European Standards for structural timber products prepared by CEN/TC 124.



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 (X-Lam)
5	glued solid timber	10	cross laminated timber (X-Lam) with large finger joints

Figure 1 — Relation of European Standards for structural timber products prepared by CEN/TC 124

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, 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 the United Kingdom.

1 Scope

This European Standard sets the performance requirements of the following glued laminated products:

— Glued laminated timber (glulam);

— Glued solid timber;

— Glulam with large finger joints;

— Block glued glulam

for use in buildings and bridges.

It also lays down minimum production requirements, provisions for evaluation and attestation of conformity and marking of glued laminated products.

This European Standard is applicable for glued laminated timber made of coniferous species listed in this standard or poplar consisting of two or more laminations having a thickness from 6 mm up to 45 mm (inclusive).

It may be possible to produce glulam made from specific hardwood species based on some provisions of this European Standard. In this case, Annex ZA does not apply.

This European Standard is applicable for glued solid timber made of coniferous species listed in this standard or poplar consisting of two to five laminations having a thickness greater than 45 mm and less than or equal to 85 mm.

This European Standard is applicable for large finger joints in glued laminated timber with a finger length of at least 45 mm.

This European Standard is applicable for block glued glulam having solid rectangular cross sections.

This European Standard also gives the requirements for glued laminated products treated against biological attack. Glued laminated products treated with fire retardants are not covered.

2 Normative references

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.

prEN 301:2011, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures — Classification and performance requirements*

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

prEN 302-2:2011, *Adhesives for load-bearing timber structures — Test methods — Part 2: Determination of resistance to delamination*

prEN 302-3:2011, *Adhesives for load-bearing timber structures — Test methods — Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength*

prEN 302-4, *Adhesives for load-bearing timber structures — Test methods — Part 4: Determination of the effect of wood shrinkage on the shear strength*

prEN 302-5:2011, *Adhesives for load-bearing structures — Test methods — Part 5: Determination of maximum assembly time under referenced conditions*

prEN 302-6, *Adhesives for load-bearing timber structures — Test methods — Part 6: Determination of the minimum pressing time under referenced conditions*

EN 338:2009, *Structural timber — Strength-classes*

EN 350-2, *Durability of wood and wood-based products — Natural durability of solid wood — Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe*

EN 384, *Structural timber — Determination of characteristic values of mechanical properties and density*

EN 408, *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 1995-1-1:2004, *Eurocode 5 — Design of timber structures — Part 1-1: General — Common rules and rules for buildings*

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 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 test data from reaction to fire tests*

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

EN 14081-1:2005+A1:2011, *Timber structures — Strength graded structural timber with rectangular cross section — Part 1: General requirements*

EN 14358, *Timber structures — Calculation of characteristic 5-percentile values and acceptance criteria for a sample*

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

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*

EN 15416-5, *Adhesives for load bearing timber structures other than phenolic and aminoplastic — Test methods — Part 5: Determination of conventional pressing time*

EN 15425:2008, *Adhesives — One-component polyurethane adhesives for load bearing timber structures — Classification and performance requirements*

3 Terms and definitions

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