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

Holzbauwerke — Brettschichtholz und Balkenschichtholz — Anforderungen

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

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Foreword

This document (EN 14080:2005+A1:2014) has been prepared by Technical Committee CEN/TC 124 "Timber structures", the secretariat of which is held by AFNOR.

This document is currently submitted for enquiry.

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 will amend EN 14080 :2013.

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.

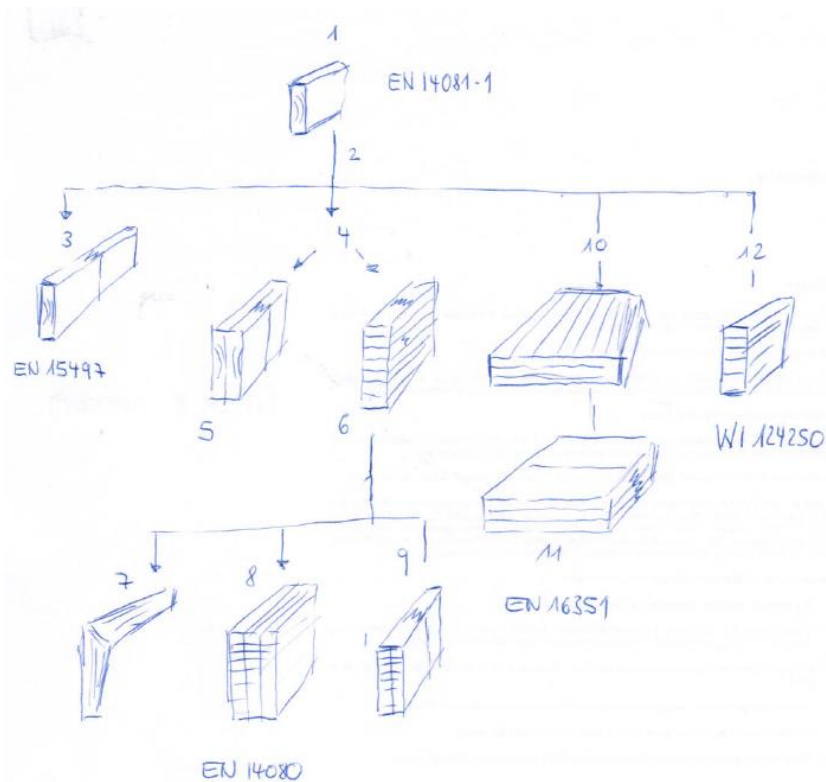
According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany,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

The list below shows the relevant changes and amendments.

- The standard has been adapted to the CPR.
- [Rules for the declaration of mechanical resistance and resistance to fire by means of design are added.](#)
- Requirements for adhesives, adhesive application, bonding operations, bonding strength and durability of bonding strength and formaldehyde emission have been moved to EN xxx.
- For phenolic and aminoplastic adhesives reference is now made to EN 301: 2013 and EN 302-1 to -7: 2013.
- [For moisture curing one component polyurethane adhesive reference is now made to prEN 15425: 2015.](#)
- For emulsion-polymerized-isocyanate adhesives reference is now made to EN 16254.
- Requirements for large finger joints in block glued glulam have been added.
- The rules for marking and labelling have been adopted to the changes mentioned above.

Introduction

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



Key

- | | |
|------------------------------------|--|
| 1 boards | 7 glulam with large finger joints |
| 2 is a component for | 8 block glued glulam |
| 3 structural finger jointed timber | 9 block glued glulam with large finger joints |
| 4 glued laminated products | 10 cross laminated timber (X-Lam) |
| 5 glued solid timber | 11 cross laminated timber (X-Lam) with large finger joints |
| 6 glued laminated timber (glulam) | 12 hardwood glulam |

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

1 Scope

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

- Glued laminated timber (glulam);
- Glued solid timber;
- Glulam with large finger joints;
- Block glued glulam;
- Block glued glulam with large finger joints;

for use in buildings and bridges.

It also lays down minimum production requirements and procedures for Assessment and Verification of Constancy of Performance for glued laminated products.

This European Standard sets out requirements 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).

NOTE Glulam made from specific hardwood species other than poplar will be covered in a separate standard.

This European Standard sets out requirements 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 sets out requirements for large finger joints in glued laminated timber and block glued glulam with a finger length of at least 45 mm.

This European Standard sets out requirements for block glued glulam having solid rectangular cross sections.

This European Standard also sets out 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.

EN xxx:2014, *Timber structures – Adhesives, adhesive application, minimum production requirements and test methods for bonds in structural glued timber products and elements*

EN 301:2013, *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 302-2:2013, *Adhesives for load-bearing timber structures — Test methods — Part 2: Determination of resistance to delamination*

- EN 302-3, *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*
- EN 302-4, *Adhesives for load-bearing timber structures — Test methods — Part 4: Determination of the effect of wood shrinkage on the shear strength*
- EN 302-5, *Adhesives for load-bearing structures — Test methods — Part 5: Determination of maximum assembly time under referenced conditions*
- EN 302-6, *Adhesives for load-bearing timber structures — Test methods — Part 6: Determination of the minimum pressing time under referenced conditions*
- EN 302-7, *Adhesives for load-bearing timber structures — Test methods — Part 7: Determination of the conventional working life*
- EN 338:2009, *Structural timber — Strength-classes*
- EN 350-1, *Durability of wood and wood based products - Natural durability of solid wood - Part 1: Guide to the principles of testing and classification of the natural durability of wood*
- 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 1995-1-1, *Eurocode 5 — Design of timber structures — Part 1-1: General — Common rules and rules for buildings*
- 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 15416-5, *Adhesives for load bearing timber structures other than phenolic and aminoplastic — Test methods — Part 5: Determination of conventional pressing time*
- EN 15425, *Adhesives — One-component polyurethane adhesives for load bearing timber structures — Classification and performance requirements*
- EN 16254, *Emulsion polymerized isocyanate (EPI) for load bearing timber structures — Classification and performance requirements*
- CEN/TS 16516, *Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air*

3 Terms and definitions

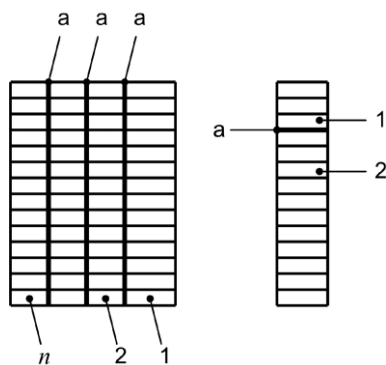
For the purposes of this document, the terms and definitions from EN xxx and the following terms and definitions apply.

3.1 actual size
measured size of a glued laminated product at a related measured/estimated moisture content

3.2 bonding strength
[taken from EN xxx]
structural effectiveness of adhesives between timber components when subjected to stresses

3.3 block glued glulam
structural member having a solid rectangular cross section comprising two or more glulam components bonded together with a gap filling adhesive

Note 1 to entry: See Figure 2.



Key

- 1 glulam component 1
- 2 glulam component 2
- n glulam component n
- a glue line between glulam components

Figure 2 — Examples for block glued glulam

3.4 combined glued laminated timber
glued laminated timber with a cross section comprising inner and outer laminations of different strength classes or manufacturer specific strength class

3.5 combined glulam with asymmetrical layup
combined glued laminated timber having an asymmetrical cross sectional layup

3.6**corrected size**

size of a glued laminated product corrected by calculation from its actual size to its size at the reference moisture content

3.7**curved glued laminated member**

member made of glulam or glulam with large finger joints or block glued glulam having a precamber greater than 1 % of its span

Note 1 to entry: See Figure 11.

3.8**developed length**

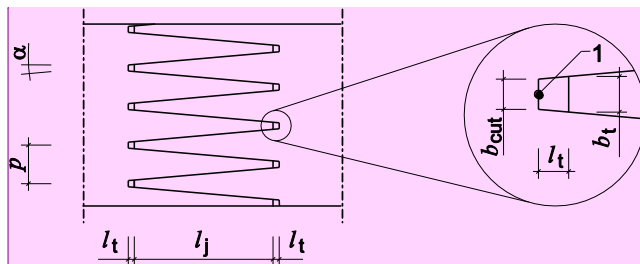
length of a curved member measured at the outermost side of the lamination having the largest radius

3.9**finger joint**

[taken from EN xxx]

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

Note 1 to entry: In this European Standard the term finger joint is used for finger joints in laminations whereas finger joints between glued laminated timber components are defined as large finger joints (see also 3.16).



Kommentar [W1]: Delete "1" in the Figure

Key

l_j	finger length
p	pitch
α	finger angle
l_t	tip gap
b_{cut}	tip width of the cutter
b_t	tip width

Figure 3 — Typical profile of a finger joint

3.10**finished thickness**

thickness after planing

3.11**glued laminated timber**

glulam

structural timber member composed by at least two essentially parallel laminations which may comprise of one or two boards side by side having finished thicknesses from 6 mm up to 45 mm (inclusive)

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Note 1 to entry: See Figure 4.

Note 2 to entry: Due to planing of the glued laminated timber member an outermost lamination may have reduced thicknesses compared to the inner laminations.

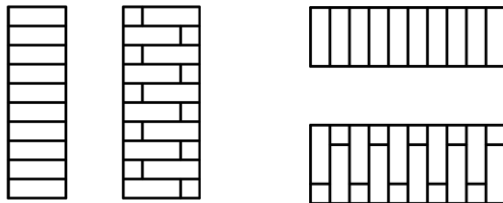


Figure 4 — Glued laminated timber

**3.12
glued laminated products**

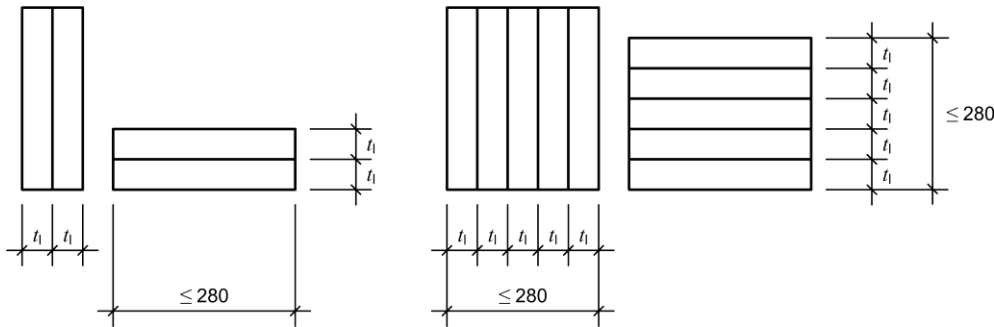
glued laminated timber (glulam), glulam with large finger joints, block glued glulam, block glued glulam with large finger joints and glued solid timber for structural uses

**3.13
glued solid timber**

structural timber member with overall cross-sectional sizes not exceeding 280 mm comprising two to five essentially parallel laminations bonded having the same strength class or manufacturer specific strength class and a finished lamination thickness greater than 45 mm up to 85 mm (inclusive)

Note 1 to entry: See Figure 5.

Note 2 to entry: Due to planing of the glued solid timber member an outermost lamination may have reduced thicknesses compared to the inner laminations.



Key

t_1 lamination thickness

$45 < t_1 \leq 85$

Figure 5 — Examples for glued solid timber made of two and five laminations

**3.14
homogeneous glued laminated timber**

glued laminated timber with a cross section whose laminations are a single strength class or a manufacturer specific strength class

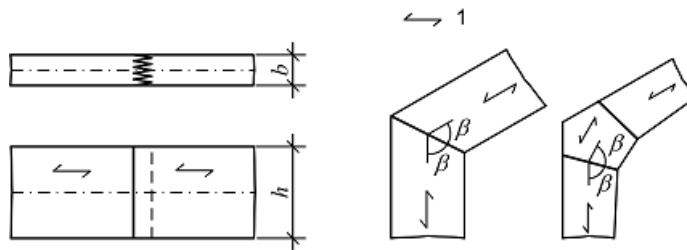
3.15 laminations

boards, usually finger jointed, being part of glued laminated timber or glued solid timber

3.16 large finger joint

finger joint through the full cross sectional area at the ends of components made of glulam or block glued glulam bonded together at any angle β from 45° up to 90°(inclusive)

Note 1 to entry: See Figure 6.



Key

1 direction of grain

β angle between the large finger joint and the grain direction

Figure 6 — Large finger joints in a beam and in frame corners

3.17

lay up

cross sectional arrangement of laminations

3.18

manufacturer specific strength class

set of characteristic strength, stiffness and density properties declared by a manufacturer

3.19

longitudinal warping

maximum gauge of a member or component measured over a length of 2 000 mm

3.20

minimum mean density

required mean density value at the reference moisture content, estimated as the weighted mean of the mean densities of the lamination zones, if necessary

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

3.21

reference moisture content

moisture content at which target sizes are established

3.22

resawn glulam

glued laminated timber resawn into parts by length

Kommentar [W2]: The Netherlands have asked for smaller angles β . WIEGAND has asked representatives from Netherlands to send documentations.

EN 14080:2014 (E)

3.23

target size

size specified (at the reference moisture content) to which deviations are to be related

3.24

T-class

strength class defined by the characteristic tensile strength parallel to the grain, the mean modulus of elasticity parallel to the grain and the characteristic density

Note 1 to entry: The required values are given in Table 1.

Note 2 to entry: T-classes may for example be achieved from specific settings for machine grading or by relation to C-Classes according to EN 338.

4 Symbols

4.1 Main symbols

b	width of cross section, in mm;
E	modulus of elasticity, in N/mm ² ;
f	strength, in N/mm ² ;
G	shear modulus, in N/mm ² ;
h	height of cross section, in mm;
k	moisture deformation factor;
l	length, in mm;
l_a	actual size, in mm;
l_{cor}	corrected size, in mm;
l_j	finger joint length, in mm;
r	radius of curvature, in mm;
t	lamination thickness, in mm;
u	moisture content, in %;
u_a	actual moisture content, in %;
u_{ref}	reference moisture content, in %;
β	angle between the large finger joint and the grain in degree (see Figure 6);
ρ	density, in kg/m ³ .

4.2 Subscripts

c	compression;
dc	declared value;

g	properties of glued laminated timber;
gs	properties of glued solid timber;
h	height effect;
j	properties of finger joints in laminations;
k	characteristic;
l	properties of laminations;
lfj	properties of large finger joints;
m	bending;
mean	mean value;
r	rolling shear;
s	properties of resawn glulam;
t	tensile;
v	shear;
0	parallel to the grain;
05	5 %-fractile;
90	perpendicular to the grain.

5 Product characteristics and testing, assessment and sampling methods

5.1 Mechanical resistance of glued laminated timber

5.1.1 General

In this European Standard “Mechanical resistance” covers the following mechanical resistance characteristics: modulus of elasticity and bending, compressive, tensile and shear strength. Mechanical resistance shall be determined by design taking into account the material properties (strength, stiffness and density properties and strength properties of large finger joints, if any) of the glued laminated timber.

NOTE Material properties of glued laminated timber may be derived from full scale testing, see 5.1.7.

5.1.2 Methods for the determination of mechanical resistance

One of the following methods shall apply:

Method M1: This declaration method is applied when the final place of destination is not known, the manufacturer finds it difficult to provide information on the mechanical resistance and fire resistance performances of the glued laminated products without knowing the final structural requirements and conditions of use (e.g. off-the-shelf or catalogued structural products).

In this case the manufacturer has to declare the mechanical resistance and fire resistance performances of the glued laminated products by reference to the performance characteristics of the materials allowing subsequent structural design by the purchaser.

EN 14080:2014 (E)

Method M2: This declaration method is applied when the final place of destination is not known but the manufacturer wishes to provide information on the mechanical and fire resistance performances, under certain assumptions, of the glued laminated products (e.g. off-the-shelf or catalogued structural products) and the design methods of the Eurocodes (with the relevant NDPs) are used.

In this case the manufacturer has to declare the mechanical resistance and fire resistance performances of the glued laminated products, expressed as characteristic or design values and all parameters relevant for the determination of these values (e.g. partial safety parameters, configuration of loads and supports etc.).

Method M3a: This declaration method is applied when the intended place of destination is known, the design documentation of the product is prepared by the designer of the works of destination and made available by the client and the manufacturing order requires the relevant production documentation to be prepared by the manufacturer for a specific works of destination.

In this case the manufacturer has to declare the mechanical and fire resistance performances of the glued laminated products by reference, in an unambiguous way, to both:

- the design documentation of the glued laminated product(s) (drawings, material specifications, etc.) provided by the client; and
- the production documentation prepared by the manufacturer on the basis of the relevant design documentation.

In addition, the position of the glued laminated products in the works has to be specified.

Method M3b: This declaration method is applied when the intended place of destination is known, and the manufacturing order requires design and production documentations of the product to be prepared by the manufacturer for a specific works of destination.

In this case the manufacturer has to declare the mechanical and fire resistance performances of the structural element by reference, in an unambiguous way, to both:

- the design documentation prepared by the manufacturer, on the basis of data (e.g. drawings, including specific geometric details, loads, safety factors, etc.) provided by the client and using the design method (EN Eurocodes, or others) required in the contract by the client; and
- the production documentation prepared also by the manufacturer on the basis of the relevant design documentation.

In addition, the position of the glued laminated products in the works has to be specified.

5.1.3 Timber

The timber shall comply with EN xxx, Clause 5.

5.1.4 Material properties

The characteristic strength, stiffness and density properties of glued laminated timber shall be verified either:

- from classifications from layups and lamination properties according to 5.1.5, or
- from calculations taking into account the cross sectional layup and documented properties of boards and finger joints according to 5.1.6 or
- from full scale tests according to 5.1.7.

The characteristic strength, stiffness and density properties may be declared by reference to a strength class according to Table 3 or 4 or to a manufacturer's specific strength class.

The characteristic bending strength shall be valid for glulam with a height h of 600 mm and a lamination thickness of $t = 40$ mm. If the lamination thickness is less than 40 mm, the glulam manufacturer may multiply the bending strength determined according to 5.1.5 or 5.1.6 by k as given in Formula (1). For lamination thicknesses $40 \text{ mm} < t \leq 45 \text{ mm}$ it is not necessary to take any strength modification into account.

$$k = \min \left\{ \left(\frac{40}{t} \right)^{0,1}, 1,05 \right\} \quad (1)$$

where

t is the lamination thickness in mm.

The characteristic tensile strength parallel to the grain shall be valid for glulam with height h of 600 mm or width b of 600 mm.

The characteristic tensile strength perpendicular to the grain shall be valid for glulam with a stressed volume of $0,01 \text{ m}^3$.

The 5%-fractile of a shear modulus or a modulus of elasticity shall be estimated from the mean value by applying the ratio of $G_{g,k}/G_{g,\text{mean}} = 5/6$ and $E_{0,g,k}/E_{0,g,\text{mean}} = 5/6$, respectively.

For glued laminated timber members made of at least ten laminations the product ($E_{0,g,k} G_{g,k}$) may be increased by a factor $k = 1,40$.

Kommentar [W3]: To be moved to EC 5-1-1 later!

5.1.5 Verification from classification of standardised beam lay-ups and lamination properties of glued laminated timber

5.1.5.1 Properties of boards

The requirements for boards given in Table 1 shall be fulfilled.

Kommentar [W4]: To be checked: will the revised EN 338 be available in due time. In that case we could refer to that standard

Table 1 — Characteristic strength and stiffness properties for T-classes in N/mm² and densities in kg/m³ for boards or planks for glued laminated timber

T - class of boards ^a	$f_{t,0,l,k}$	$E_{t,0,l,mean}$	$\rho_{l,k}$
T8 (C14)	8	7 000	290
T9	9	7 500	300
T10 (C16)	10	8 000	310
T11 (C18)	11	9 000	320
T12 (C20)	12	9.500	330
T13 (C22)	13	10 000	340
T14 (C24)	14	11 000	350
T14,5	14,5	11 000	350
T15	15	11 500	360
T16 (C27)	16	11 500	370
T18 (C30)	18	12 000	380
T21 (C35)	21	13 000	390
T22	22	13 000	390
T24 (C40)	24	13 500	400
T26	26	14 000	410
T27 (C45)	27	15 000	410
T28	28	15 000	420
T30 (C50)	30	15 500	430

^a The C-Classes according to EN 338:2009 meet at least the required values of the respective T-classes.

5.1.5.2 Strength of finger joints

The required characteristic values of the flat wise bending strength of finger joints $f_{m,j,k}$ in laminations shall be taken from Table 2 or 3. If the finger joints are tested in tension the required characteristic value of the tensile strength of finger joints shall be taken as $f_{t,0,j,k} = f_{m,j,k} / 1,4$. The finger joints shall fulfil the respective requirements given in EN xxx, Clause 9, and the declared strength of finger joints shall be verified by tests in accordance with EN xxx, 9.3.

5.1.5.3 Beam lay-up and strength class

Provided the beam lay-up is in accordance with Table 2 or 3 the glued laminated timber fulfils the requirements of a strength class given in Table 4 or 5.

The zones of the cross section are defined in Figure 7.

Dimensions in millimetres

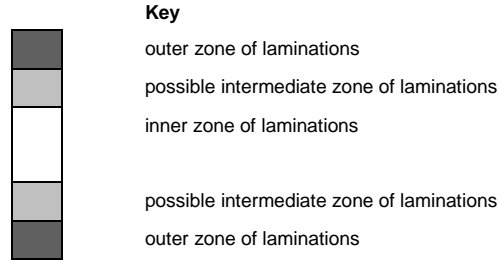


Figure 7 — Example of a beam lay-up of combined glued laminated timber

For combined glued laminated timber the outer zones of lamination grades (see Figure 7) shall be at least the proportion given in Table 2, but at least two laminations for glulam with more than 10 laminations and at least one lamination for glulam with up to 10 laminations.

Table 2 — Beam lay-up of combined glued laminated timber and minimum values for bending strength of finger joints in laminations in N/mm^2

Glued laminated timber Strength class	Outer zones of laminations			Intermediate zones of laminations			Inner zone of laminations		
	Strength class	Proportion [%]	$f_{m,j,k}$ [N/mm^2]	Strength class	Proportion [%]	$f_{m,j,k}$ [N/mm^2]	Strength class ^a	Proportion [%]	$f_{m,j,k}$ [N/mm^2]
GL 20c	T13	2x33	21	-	-	-	T8	34	18
GL 22c	T13	2x33	26	-	-	-	T8	34	18
GL 24c	T14	2x33	31	-	-	-	T9	34	19
GL 26c	T16	2x33	34	-	-	-	T11	34	22
GL 28c	T18	2x25	37	-	-	-	T14	50	28
GL 28c	T21	2x17	36	-	-	-	T14	66	26
GL 28c	T21	2x17	38	-	-	-	T13	66	25
GL 28c	T21	2x25	35	-	-	-	T11	50	22
GL 28c	T21	2x20	35	T14	2x20	28	T11	20	22
GL 28c	T22	2x20	35	-	-	-	T13	60	25
GL 30c	T22	2x17	40	-	-	-	T15	66	27
GL 30c	T22	2x17	41	-	-	-	T14	66	28
GL 30c	T22	2x20	40	T14	2x20	30	T11	20	22
GL 30c	T22	2x17	42	T14	2x23	31	T11	20	22
GL 32c	T24	2x17	44	-	-	-	T18	66	31
GL 32c	T26	2x17	45	-	-	-	T14	66	26
GL 32c	T26	2x10	48	T18	2x20	32	T11	40	22

Table 3 — Beam lay-up of homogeneous glued laminated timber and minimum values for bending strength of finger joints in laminations in N/mm²

Strength class glued laminated timber	Strength class laminations	$f_{m,j,k}$
GL 20h	T10	25
GL 20h	T11	22
GL 22h	T13	25
GL 24h	T14	30
GL 26h	T16	33
GL 28h	T18	36
GL 30h	T21	38
GL 30h	T22	37
GL 32h	T24	41
GL 32h	T26	38

Table 4 — Characteristic strength and stiffness properties in N/mm² and densities in kg/m³ for combined glulam

Property ^a	Symbol	Glulam strength class						
		GL 20c	GL 22c	GL 24c	GL 26c	GL 28c	GL 30c	GL 32c
Bending strength ^b	$f_{m,g,k}$	20	22	24	26	28	30	32
Tensile strength	$f_{t,0,g,k}$	15	16	17	19	19,5	19,5	19,5
	$f_{t,90,g,k}$	0,5						
Compression strength	$f_{c,0,g,k}$	18,5	20	21,5	23,5	24	24,5	24,5
	$f_{c,90,g,k}$	2,5						
Shear strength (shear and torsion)	$f_{v,g,k}$	3,5						
Rolling shear strength	$f_{r,g,k}$	1,2						
Modulus of elasticity	$E_{0,g,mean}$	10 400	10 400	11 000	12 000	12 500	13 000	13 500
	$E_{0,g,05}$	8 600	8 600	9 100	10 000	10 400	10 800	11 200
	$E_{90,g,mean}$	300						
	$E_{90,g,05}$	250						
Shear-modulus	$G_{g,mean}$	650						
	$G_{g,05}$	540						
Rolling shear modulus	$G_{r,g,mean}$	65						
	$G_{r,g,05}$	54						
Density ^c	$\rho_{g,k}$	355	355	365	385	390	390	400
	$\rho_{g,mean}$	390	390	400	420	420	430	440

^a Properties given in this table have been calculated according to 5.1.6 on the basis of the layups given in Table 2. If different layups for a certain strength class lead to different characteristic values the lowest values are given

^b For edgewise bending (moment vectors parallel to the glue lines). For flat wise bending (moment vectors perpendicular to the glue lines) $f_{m,g,k}$ shall be taken as $f_{m,g,k} = f_{c,0,g,k}$.

^c Calculated as the weighted mean of the densities of the different lamination zones, see 5.1.6.3, 5th paragraph.

Table 5 — Characteristic strength and stiffness properties in N/mm² and densities in kg/m³ for homogeneous glulam

Property	Symbol	Glulam strength class						
		GL 20h	GL 22h	GL 24h	GL 26h	GL 28h	GL 30h	GL 32h
Bending strength	$f_{m,g,k}$	20	22	24	26	28	30	32
Tensile strength	$f_{t,0,g,k}$	16	17,6	19,2	20,8	22,3	24	25,6
	$f_{t,90,g,k}$	0,5						
Compression strength	$f_{c,0,g,k}$	20	22	24	26	28	30	32
	$f_{c,90,g,k}$	2,5						
Shear strength (shear and torsion)	$f_{v,g,k}$	3,5						
Rolling shear strength	$f_{r,g,k}$	1,2						
Modulus of elasticity	$E_{0,g,mean}$	8 400	10 500	11 500	12 100	12 600	13 600	14 200
	$E_{0,g,05}$	7 000	8 800	9 600	10 100	10 500	11 300	11 800
	$E_{90,g,mean}$	300						
	$E_{90,g,05}$	250						
Shear modulus	$G_{g,mean}$	650						
	$G_{g,05}$	540						
Rolling shear modulus	$G_{r,g,mean}$	65						
	$G_{r,g,05}$	54						
Density	$\rho_{g,k}$	340	370	385	405	425	430	440
	$\rho_{g,mean}$	370	410	420	445	460	480	490

5.1.6 Verification from cross sectional layup and properties of boards and finger joints

5.1.6.1 Properties of the boards

If the boards comply with one of the relevant strength classes, the strength, stiffness and density properties may be taken from Table 1.

If the boards or planks do not comply with Table 1, the characteristic values of the tensile strength parallel to the grain $f_{t,0,l,k}$, the mean modulus of elasticity parallel to the grain $E_{t,0,l,mean}$ and the characteristic density $\rho_{l,k}$ shall be derived from tests according to EN 408 and calculated in accordance with EN 384.

5.1.6.2 Strength of finger joints

The characteristic flat wise bending strength or tensile strength of the finger joints shall be declared by the glued laminated timber manufacturer. The finger joints shall fulfil the respective requirements given in EN xxx, Clause 9, and the declared strength of finger joints shall be verified by tests in accordance with EN xxx, 9.3.

5.1.6.3 Determination of characteristic values for glued laminated timber

The strength and stiffness properties of homogeneous glued laminated timber shall be determined from the strength and stiffness properties of the laminations using the formulae given in Table 6.

The characteristic bending strength, the characteristic tensile and compression strengths parallel to the grain, the mean modulus of elasticity and the characteristic density of a combined glued laminated timber shall be

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determined from the respective values of the different lamination zones considered as homogeneous glued laminated timber by means of the elastic composite beam theory.

For combined glued laminated timber the outer zones of lamination grades shall be at least two laminations for glulam with more than 10 laminations and at least one lamination for glulam with up to 10 laminations.

The strength verification shall be made at all relevant points of the cross section.

Table 6 — Characteristic strength and stiffness properties in N/mm² and densities in kg/m³ of homogeneous glued laminated timber

Property	Characteristic values
Bending strength (N/mm ²) $f_{m,g,k}$	<p>The characteristic bending strength in edgewise bending (moment vectors parallel to the glue lines) shall be calculated using the following expression.</p> $f_{m,g,k} = -2,2 + 2,5 f_{t,0,l,k}^{0,75} + 1,5 \left(f_{m,j,k} / 1,4 - f_{t,0,l,k} + 6 \right)^{0,65}$ <p>The expression shall only be used for a characteristic flat wise bending strength of the finger joint in the range:</p> $1,4 f_{t,0,l,k} \leq f_{m,j,k} \leq 1,4 f_{t,0,l,k} + 12$ <p>The formula is also applicable to glulam without finger joints provided $f_{m,j,k}$ is taken as:</p> $f_{m,j,k} = 1,4 f_{t,0,l,k} + 12$ <p>For flat wise bending (moment vectors perpendicular to the glue lines) $f_{m,g,k}$ shall be taken as $f_{m,g,k} = f_{c,0,g,k}$.</p>
Tensile strength (N/mm ²) $f_{t,0,g,k}$	The characteristic tensile strength shall be taken as 80 % of the characteristic values of the bending strength $f_{m,g,k}$.
$f_{t,90,g,k}$	0,5
Compression strength (N/mm ²) $f_{c,0,g,k}$	The characteristic compression strength shall be taken as $f_{m,g,k}$ in N/mm ² where $f_{m,g,k}$ is the characteristic bending strength of the glued laminated timber.
$f_{c,90,g,k}$	2,5
Shear strength (N/mm ²) $f_{v,g,k}$	3,5
$f_{r,g,k}$	1,2
Modulus of elasticity (N/mm ²) $E_{0,g,mean}$	The mean modulus of elasticity shall be taken as $E_{0,g,mean} = 1,05 E_{t,0,l,mean}$.
$E_{90,g,mean}$	300
Shear modulus (N/mm ²) $G_{g,mean}$	650
$G_{r,mean}$	65
Density (kg/m ³) $\rho_{g,k}$	1,1 $\rho_{l,k}$
$\rho_{g,mean}$	$\rho_{l,mean}$

Glulam may have an asymmetrical layup. In that case, the verification of the bending strength in the outer compressive zone may be disregarded if the followings conditions are met:

- the difference in nominal bending strength between the outer compressive zone and the adjacent zone of laminations (see Figure 7) does not exceed 8 N/mm²;

- the ratio of the moduli of elasticity $E_{0,g,mean}$ of the outer tensile and compressive zone of laminations, respectively, does not exceed 1,3.

The density of a combined glulam shall be taken as the weighted densities of the lamination zones estimated as the densities of homogeneous glulam according to Table 6.

5.1.7 Verifications from full scale tests with glued laminated timber

5.1.7.1 Properties of the boards

The characteristic values of the tensile strength parallel to the grain $f_{t,0,l,dc,k}$, the mean modulus of elasticity parallel to the grain $E_{m,0,l,dc,mean}$ and the characteristic density $\rho_{l,dc,k}$ of the boards shall be tested according to EN 408 and verified in analogy with EN xxx, 9.3. The specimens for the tests shall be representative for the boards from which the glulam specimens for the full scale tests are produced.

5.1.7.2 Strength of finger joints

The finger joints shall fulfil the respective requirements given in EN xxx, Clause 9, and the characteristic flatwise bending strength of the finger joints $f_{m,j,dc,k}$ shall be estimated and declared by tests according to EN xxx, 9.3. The declared characteristic flatwise bending strength of the finger joints $f_{m,j,dc,k}$ shall be greater than or equal to $1,4 f_{t,0,j,dc,k}$.

The specimens for the tests shall be representative for the finger joints which the glulam specimens for the full scale tests comprise.

5.1.7.3 Strength, stiffness and density properties of glued laminated timber derived from testing

5.1.7.3.1 Combined glued laminated timber

Combined glued laminated timber shall be assigned to one of the strength classes given in Table 4 or to any other manufacturer specific strength class if

- the characteristic bending strength parallel to the grain $f_{m,g,k}$;
- the mean modulus of elasticity parallel to the grain $E_{0,g,mean}$ and
- the characteristic density derived from full scale tests according to Annex A and
- the characteristic tensile strength $f_{t,0,g,k}$ and the compression strength $f_{c,0,g,k}$ parallel to the grain tested according to EN 408 and derived according to EN 14358 are not less than the declared values.

Declared characteristic compression strengths derived by full scale test shall be less than or equal to the declared characteristic bending strength.

Characteristic tensile strength $f_{t,0,g,k}$ and compression strength $f_{c,0,g,k}$ parallel to the grain may be taken as the values for the lamination zone having the lowest characteristic tensile strength parallel to the grain $f_{t,0,l,k}$.

The other strength and stiffness properties of a manufacturer specific strength class shall be calculated using the expressions given in Table 6.

5.1.7.3.2 Homogeneous glued laminated timber

Homogenous glued laminated timber shall be assigned to one of the strength classes given in Table 5 or to any other manufacturer specific strength class if the characteristic bending strength parallel to the grain $f_{m,g,k}$, the mean modulus of elasticity parallel to the grain $E_{0,g,mean}$ and the characteristic density $\rho_{g,k}$ derived from full scale tests according to Annex A are not less than the declared values.

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The other strength and stiffness properties of a manufacturer specific strength class shall be calculated using the formulae given in Table 6.

5.1.8 Resawn glulam

Glulam may be sawn perpendicular to the glue lines into 2 or 3 parts of equal width (resawn glulam) (see Figure 8).

Each part shall have a minimum width b_s of 38 mm and a maximum height to width ratio of $h/b_s \leq 8$.

Kommentar [W5]: Must not the glulam be cut into parts having the same widths? Is it allowed to cut a width of 200mm e.g. into 38 mm and 158mm? Wiegand will ask Riberholt.

Dimensions in mm

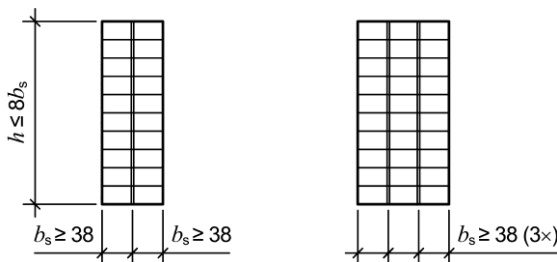


Figure 8 — Cross sections in resawn glulam

Depending on the grading procedure and the lay-up the characteristic strength properties of the resawn glulam shall be determined by either method a) or b), as follows.

- a) If the grading procedures reliably ensure that all laminations of the resawn glulam meet the declared properties, the strength, stiffness and density properties of the resawn glulam shall be determined from these declared properties of the laminations;
- b) If the following two requirements are fulfilled, then the characteristic bending strength $f_{m,s,k}$ of the resawn glulam in bending shall be determined from the characteristic bending strength $f_{m,g,k}$ of the full-size glulam by either Formula (2) or (3):
 - 1) the characteristic tensile strength of the lamination is at least 18 N/mm^2 and maximum 30 N/mm^2 , and;
 - 2) the characteristic tensile strength of the inner laminations is not more than 8 N/mm^2 smaller than the characteristic tensile strength of the outer laminations.

$$f_{m,s,k} = f_{m,g,k} - \frac{96}{f_{t,0,l,k} - 6} + 4 \text{ (in N/mm}^2\text{) for 1 cut} \tag{2}$$

$$f_{m,s,k} = f_{m,g,k} - \frac{96}{f_{t,0,l,k} - 6} \text{ (in N/mm}^2\text{) for 2 cut} \tag{3}$$

where

- $f_{m,s,k}$ is the characteristic bending strength of the resawn glulam;
- $f_{m,g,k}$ is the characteristic bending strength of glulam before it has been resawn;
- $f_{t,0,l,k}$ is the characteristic tensile strength of the outer laminations.

The mean modulus of elasticity parallel to the grain $E_{0,s,mean}$ of the resawn glulam shall be determined from the mean modulus of elasticity $E_{0,g,mean}$ of the full-size glulam from Formula (4)

$$E_{0,s,mean} = E_{0,g,mean} - 500 \text{ (in N/mm}^2\text{)} \quad (4)$$

The other mechanical properties shall be determined from Table 6. The density values are equal to those of the full-size glulam.

5.2 Mechanical resistance of glued solid timber

5.2.1 General and methods for the determination of mechanical resistance

5.1.1 and 5.1.2 apply.

5.2.2 Timber

The timber shall comply with EN xxx, Clause 5.

5.2.3 Related material properties

Glued solid timber is made of laminations complying with one declared strength class or manufacturer specific strength class.

The characteristic strength, stiffness and density properties of the glued solid timber shall be verified from classifications from lamination properties or from full scale tests.

The characteristic tensile strength perpendicular to the grain shall be valid for glued solid timber with a stressed volume of $0,01 \text{ m}^3$.

The 5%-fractile of a shear modulus or a modulus of elasticity shall be estimated from the mean value by applying a ratio of $G_{gs,k}/G_{gs,mean} = 5/6$ and $E_{0,gs,k}/E_{0,gs,mean} = 5/6$, respectively.

The characteristic rolling shear strength shall be taken as $f_{r,gs,k} = 1 \text{ N/mm}^2$.

The characteristic rolling shear modulus shall be taken as $G_{r,gs,mean} = 0,1 G_{gs,mean}$.

5.2.4 Verification from classification of lamination properties of glued solid timber

5.2.4.1 Properties of the laminations

If the laminations comply with one of the relevant strength classes the strength, stiffness and density properties shall be taken from EN 338.

If laminations are used, which do not comply with EN 338, the characteristic values of the bending strength $f_{m,l,dc,k}$ and the density $\rho_{l,dc,k}$ and the mean value of the modulus of elasticity parallel to the grain $E_{0,l,dc,mean}$ shall be derived from tests according to EN 408 and calculated according to the principles given in EN 384.

5.2.4.2 Strength of finger joints

The finger joints shall fulfil the respective requirements given in EN xxx, Clause 9, and the finger joints tested according to EN xxx, 9.3, shall fulfil the requirements given in Formula (5).

$$f_{m,j,k} \geq k_f f_{m,l,k} \quad (5)$$

where

$f_{m,j,k}$ is the characteristic bending strength of the finger joints (in N/mm^2);

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k_f is a factor taking into account the direction of the load;

k_f is 1 for edge-wise bending;

k_f is 1,2 for flat-wise bending;

$f_{m,l,k}$ is the characteristic edge-wise bending strength of the laminations (in N/mm²).

Kommentar [W6]: Is not it 1,25 in EN 15497?

5.2.4.3 Strength, stiffness and density properties of glued solid timber

The characteristic strength and stiffness properties as well as the density of the glued solid timber shall be taken as the properties of the laminations.

5.2.5 Verifications from full scale tests with glued solid timber

5.2.5.1 Properties of the laminations

The properties of the boards shall be declared. The declared characteristic values of the edgewise bending strength $f_{m,l,dc,k}$, the mean modulus of elasticity parallel to the grain $E_{m,0,l,dc,mean}$ and the characteristic density $\rho_{l,dc,k}$ shall be tested according to EN 408 and verified analogously to EN xxx, 9.3.

5.2.5.2 Strength of finger joints

The properties of the finger joints shall be declared. The declared characteristic flat wise bending strength of the finger joints $f_{m,j,dc,k}$ shall be estimated and verified by tests according to EN xxx, 9.3 .

The declared characteristic flatwise bending strength of the finger joints $f_{m,j,dc,k}$ shall be not less than $k_f f_{m,l,k}$, where $k_f f_{m,l,k}$ is defined as in 5.2.4.2.

5.2.5.3 Strength, stiffness and density properties of glued solid timber derived from testing

Glued solid timber can be assigned to one of the strength classes given in EN 338 or to a manufacturer specific strength class if

- its characteristic bending strength parallel to the grain $f_{m,gs,k}$;
- its modulus of elasticity parallel to the grain $E_{0,gs,mean}$ and
- its density $\rho_{gs,k}$ derived from tests according to Annex A are not less than the declared values.

If assigned to a strength class corresponding to the values of a strength class given in EN 338, the other strength and stiffness properties shall be taken from EN 338:2009, Annex A.

If assigned to a manufacturer specific strength class, the other strength and stiffness properties shall either be determined by testing or shall be taken from EN 338:2009, Annex A. For the determination of $f_{v,k}$ according to EN 338:2009, Annex A, the lowest value derived by a classification by either $f_{m,l,k}$ or $\rho_{l,k}$ or $E_{0,l,mean}$ shall be taken. If the declared characteristic compression strength is determined by testing, it shall be limited by the declared characteristic bending strength.

5.3 Additional requirement for mechanical resistance of block glued glulam

The mechanical resistance of block glued glulam shall be declared as the mechanical resistance of its glulam components.

5.4 Additional requirement for mechanical resistance of glulam or block glued glulam with large finger joints

The mechanical resistance of glulam or block glued glulam with large finger joints shall be declared as the mechanical resistance of its glulam or block glued glulam components, the characteristic bending strength of the large finger joints.

The declared characteristic bending strength $f_{m,lfi,dc,k}$ of a large finger joint in a straight beam shall be verified by edge-wise bending tests with large finger joints in straight beams in accordance with EN xxx, 11.3.

5.5 Bonding strength and durability of bonding strength of glued laminated products

5.5.1 General

Durable and reliable bonds can only be achieved under accurately defined conditions of production. That general requirement shall be considered satisfied, if the respective limitations given in EN xxx are taken into account and the minimum production requirements given in EN xxx and the additional requirements regarding the layup according to Annex B are fulfilled.

Bonding strength is declared as:

- bending or tension strength of finger joints according to EN xxx, 9.3 declared as bending strength of the glued laminated timber or glued solid timber;
- and glue line integrity of glue lines between laminations according to EN xxx, 10.2.1.2 or shear strength of glue lines between laminations according to EN xxx, 10.2.1.3;
- and bending strength of large finger according to EN xxx, 11.3, if relevant;
- and glue line integrity or shear strength of glue lines between glulam components of block glued glulam according to EN xxx, 12.3, if relevant.

Durability of bonding strength is declared as:

- species according to EN xxx, Clause 5;
- adhesive type (including subclasses, if relevant), according to EN xxx, 7;
- and adhesive family according to EN xxx, 7.

5.5.2 Additional requirements regarding species

Glued laminated products may be produced from mixed species if

- the requirements for each species according to EN xxx, 7 and
- for the species combination according to EN 301 based on tests according to EN 302-2 are fulfilled.

Kommentar [st7]: To be moved to reference standard EN 302-2 with alternating species in the specimen

5.6 Durability of other characteristics against biological attack

5.6.1 Glued laminated products without preservative treatment

The natural durability of the glued laminated products shall be taken as the natural durability according to EN 350-2 of the timber from which they are made. For species not listed in EN 350-2, the natural durability shall be assessed according to EN 350-1.

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5.6.2 Glued laminated products with preservative treatment

Only treatments according to EN 15228:2009, 4.5, which do not affect the strength, stiffness and density properties shall be used.

If either preservative treated timber is used for the components of the glued laminated product, or the glued laminated product itself is preservative treated, the information given in EN 15228:2009, Clause 6, shall be declared.

The use of timber preservatives may be restricted by requirements valid in the place of use.

Provisions according to EN 15228 apply to the structural glued laminated product as supplied, e.g. planing needs to be taken into account regarding retention and penetration depth.

5.7 Resistance to fire

The resistance to fire of glued laminated products shall be declared by material properties (strength, stiffness, density and charring rate). The charring rate is indirectly declared by species and density.

NOTE Resistance to fire of glued laminated products is indirectly declared. It can be calculated under a fire engineering design for specific end-use situation taking into account additional parameters given in the respective fire design code.

One of the methods given in 5.1.2 shall apply.

5.8 Reaction to fire

The class of reaction to fire performance (including the additional classification on smoke production and flaming droplets/particles, if any) of glued laminated products, either preservative treated against biological attack or not, shall be determined and declared by either method a) or b), as follows:

- a) without the need for further testing (conformity without further testing - CWFT), as given in Table 7, if the glued laminated product concerned is proved to meet the requirements of the class given therein; or
- b) based on testing of the glued laminated product concerned according to the standards referred to in EN 13501-1, when such a product does not meet the requirements of Table 7 or where a higher classification than the one in a) is sought.

The influence of a preservative treatment against biological attack on the performance of reaction to fire shall be taken into account as laid down in EN 15228:2009, 4.4.

For reaction to fire glued solid timber is considered as glulam with larger lamination thickness.¹⁾

Reaction to fire class of glulam with large finger joints, block glued glulam or block glued glulam with large finger joints shall be considered as the reaction to fire class of the glulam components.²⁾

¹⁾ A Commission's decision on the applicability of Table 7 for glued solid timber has been filed.

²⁾ A Commission's decision on the applicability of Table 7 for glulam with large finger joints and block glued glulam has been filed.

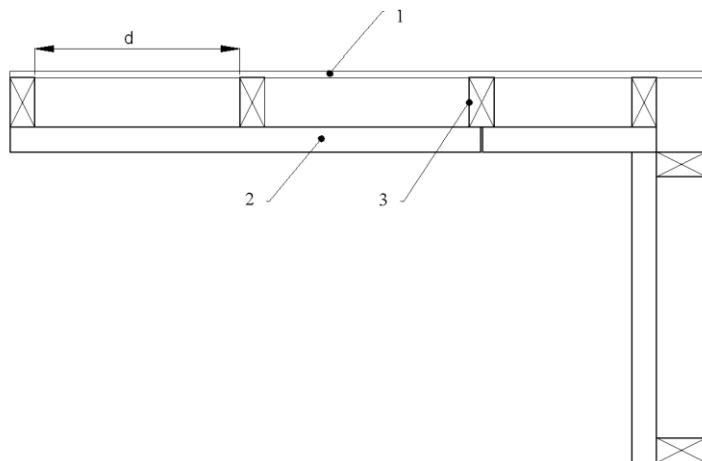
Table 7³⁾ — Classes of reaction to fire performance for glulam^a

Product	Product details	Minimum mean density ^b (kg/m ³)	Minimum overall thickness (mm)	Class ^c (excluding floorings)
Glulam	Glued laminated timber products in accordance with EN 14080	380	40	D-s2, d0
^a Applies to all species and adhesives covered by the product standards. ^b Conditioned according to EN 13238. ^c Class as provided for in Table 1 of the Annex to Decision 2000/147/EC.				

When Reaction to Fire is determined by testing the product shall be tested according to EN 13823 (SBI test) and mounted and fixed in accordance with the following:

- the whole area of both wings in the SBI apparatus shall be covered with pieces of the product concerned, mounted edge to edge (butt jointed), without jointing or bonding and orientated horizontally or vertically;
- supported by battens of the product concerned of a size minimum (40 × 80) mm, fixed to the test backing boards at 400 mm to 600 mm centres horizontally or vertically (perpendicular to the orientation of the product pieces), so that the resulting spacing between backing board and product is 80 mm;
- see also Figure 9.

NOTE Test results are valid for glued laminated products having at least the density and the minimum overall thickness of the specimens tested.



Key

- | | | | |
|---|-------------------------|---|---------------------------------------|
| 1 | backing board | 3 | batten (cross section of 40mm x 80mm) |
| 2 | glued laminated product | | 400 mm ≤ d ≤ 600 mm |

Figure 9 — Top view of fixing system for Reaction to Fire test according to EN 13823

3) This table is the same as given in Table 1 in the Commission Decision 2005/610/EC of 2005-08-09 (see OJEU L208 of 2005-08-11).

5.9 Formaldehyde emission

The release of formaldehyde shall be declared as formaldehyde emission class E1 or E2 according to EN xxx, Clause 13.

NOTE Products of Class E2 are banned in some Member States.

5.10 Release/content of other dangerous substances

National regulations on dangerous substances may require verification and declaration on release and sometimes on content of other dangerous substances in addition to those dealt with in other clauses when construction products covered by this standard are placed on those markets.

In case of national regulations, verification and declaration on release/content shall be done according to CEN/TS 16516 taking into account national requirements in the place of use.

NOTE An informative database covering European and national requirements on dangerous substances is available at the Construction web site on EUROPA accessed through: <http://ec.europa.eu/enterprise/construction/cpd-ds/>.

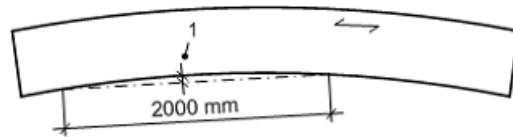
5.11 Deviation in sizes

5.11.1 Maximum deviations

Any corrected sizes (see 5.11.2) for glued laminated timber, glulam or block glued glulam with large finger joints and block glued glulam shall deviate from the nominal sizes by not more than stated in Table 8.

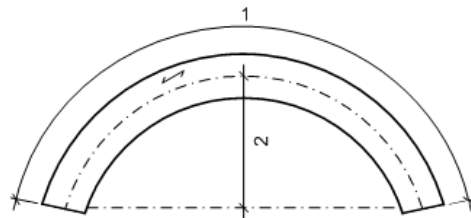
Table 8 — Maximum deviations from nominal sizes for glued laminated timber, glulam with large finger joints and block glued glulam

Nominal sizes for	Maximum deviations	
	Straight members	Curved members
Width of cross section for all widths	± 2 mm	
Height of cross section	$h \leq 400$ mm	
	$h > 400$ mm	
Maximum deviation of the angles of the cross section from the right angle	1:50	
Length of a straight member or developed length of a curved member	$l \leq 2$ m	
	$2 \text{ m} \leq l \leq 20$ m	
	$l > 20$ m	
Longitudinal warping measured as the maximum gauge over a length of 2 000 mm disregarding precamber (see Figure 10)	4 mm	–
Gauge per m developed length (see Figure 11)	≤ 6 Laminations	
	> 6 Laminations	

**Key**

1 gauge

Figure 10 — Longitudinal warping of straight glued laminated timber, glulam with large finger joints and block glued glulam

**Key**

1 developed length

2 gauge

Figure 11 — Basic dimensions of curved glued laminated members

Any corrected sizes for glued solid timber shall deviate from the nominal sizes by not more than the values given in Table 9.

Table 9 — Maximum deviations from nominal sizes for glued solid timber

Nominal sizes for		Maximum deviations
Thicknesses and widths	≤ 100 mm	± 1 mm
	> 100 mm	$\pm 1,5$ mm
Maximum deviation of the angles of the cross section from the right angle		1:50
Length	$l \leq 10$ m	± 3 mm
	$l > 10$ m	± 5 mm

5.11.2 Corrected sizes and moisture deformation factor

The actual sizes of glued laminated products are influenced by swelling and shrinkage due to changes of moisture content.

The swelling and shrinkage ratios of a certain species can be regarded as constant values in the perpendicular to grain and parallel to grain directions of the timber.

If the actual moisture content of the glued laminated products differs from the reference moisture content, a corrected size shall be calculated from the actual size by Formula (6):

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$$l_{\text{cor}} = l_a (1 + k (u_{\text{ref}} - u_a)) \quad (6)$$

where

l_{cor} is the corrected size (in mm);

l_a is the actual size (in mm);

k is the moisture deformation factor according to Table 10 to take into account deformations by moisture changes;

$u_{\text{ref}} = 12\%$ for all glued laminated products

Specific end-uses may require to deliver the glued laminated products with a moisture content different from the reference moisture content u_{ref} .

u_a is the actual moisture content measured according to EN xxx, Annex B (in %).

Table 10 — Moisture deformation factor k for a change in moisture content of 1 %^a

Direction of grain	Moisture deformation factor k
perpendicular	0,0025
parallel	0,0001

^a The values are valid for coniferous wood and poplar having a moisture content from 6 % up to 25 % (inclusive). The moisture deformation factor k perpendicular to the grain is an average of both tangential and radial deformation.

6 Assessment and Verification of Constancy of Performance (AVCP)

6.1 General

The compliance of structural glued laminated products with the requirements of this standard and with the performances declared by the manufacturer in the Declaration of Performance (DoP) shall be demonstrated by:

- determination of the product-type on the basis of type testing;
- factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to essential characteristics in Table 11 of this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives requirements for declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessments previously performed in accordance with the requirements of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

NOTE 1 Same AVCP system means testing by an independent third party, under the responsibility of a notified product certification body.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family

NOTE 2 Products may be grouped in different families for different characteristics.

NOTE 3 Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product-type shall be carried out for all characteristics included in the standard for which the manufacturer declares the performance:

- at the beginning of the production of a new or modified structural glued laminated product (unless a member of the same product range), or
- at the beginning of a new or modified method of production (where this may affect the stated properties); or
- they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the structural glued laminated products design, in the raw material or in the supplier of the components, or in the method of production (e.g. production on a new production line), which would affect significantly one or more of the characteristics.

NOTE 4 In this context "design" means "product design".

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the structural glued laminated product manufacturer to ensure that the structural glued laminated product as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples to be tested/assessed shall be in accordance with Table 11.

Table 11 — Numbers of samples to be tested and compliance criteria

Characteristics ^a	Requirements / testing clause	Assessment method	Number of specimens	Compliance criteria	
Mechanical resistance of structural glued laminated timber (glulam) expressed as bending strength, compressive strength, tensile, shear strength and design documentation					
Strength, stiffness and density properties of timber	5.1.3	EN 14081-1 (test or measurement)	For timber graded by the manufacturer of the glulam: EN 14081-1:2005+A1:2011, 6.2	For any of the methods given in 5.1.2	EN 14081-1:2005+A1:2011, 6.2
			For timber not graded by the manufacturer of the glulam: none		Check labelling of timber according to EN 14081-1:2005 + A1:2011, Clause 7
			For each grade and species at least 30 boards shall be tested according to EN 408 and $f_{m,1,dc,k}$; $E_{t,0,1,dc,mean}$ and $\rho_{t,dc,k}$ shall be determined according to EN 14358.	For any of the methods given in 5.1.2 Only for glulam for which material properties are derived from full scale tests	5.1.7.1
Bending strength, compressive strength, tensile strength, shear strength of glulam	5.1.7.3	5.1.7.3 (test)	At least 30 specimens		5.1.7.3
Finger joints in laminations	5.1.5.2 or 5.1.6.2 or 5.1.7.2	EN xxx, 9.3	For each combination of species, adhesive at nominal ratio of resin and hardener (if relevant) and declared strength value: – For laminations complying with Table 1: 15 finger joints in laminations – For laminations not complying with Table 1: 100 finger joints in laminations from at least three batches	For any of the methods given in 5.1.2	5.1.5.2 or 5.1.6.2 or 5.1.7.2
Additionally for resawn glulam	5.1.8	5.1.8 (check)	-	For any of the methods given in 5.1.2	Check calculation of bending strength of resawn glulam

Kommentar [st8]: If the requirement is for any of the methods it can be deleted in the final version?

Table 11 — Numbers of samples to be tested and compliance (continued)

Characteristics ^a	Requirements / testing clause	Assessment method	Number of specimens	Compliance criteria	
Mechanical resistance of glued laminated timber expressed as bending strength, compressive strength, tensile strength and shear strength and design documentation					
Design documentation	5.1.2	5.1.2 (check)	none	For methods 2, 3a and 3b given in 5.1.2	Check the compliance of declared values with the required values given in the design documentation
				Additionally for methods 3a and 3b given in 5.1.2	Check the compliance of the geometry and layup with the design documentation
Mechanical resistance of structural glued solid timber expressed as bending strength, compressive strength, tensile strength and shear strength and design documentation					
Strength, stiffness and density properties of timber	5.2.2	EN 14081-1 (test or measurement)	General, for timber graded by the manufacturer of the glued solid timber: EN 14081-1:2005+A1:2011, 6.2	For any of the methods given in 5.1.2	EN 14081-1:2005+A1:2011, 6.2
			General, for timber not graded by the manufacturer of the glued solid timber: none		Check labelling of timber according to EN 14081-1:2005+A1:2011, Clause 7
			For each grade and species at least 30 boards shall be tested according to EN 408 and $f_{m,1,dc,k}$; $E_{t,0,1,dc,mean}$ and $\rho_{d,dc,k}$ shall be determined according to EN 14358.		For any of the methods given in 5.1.2 Only for glued solid timber for which material properties are derived from full scale tests
Bending strength, compressive strength, tensile strength, shear strength of glued solid timber	5.2.5.3	5.2.5.3 (test)	At least 30 specimens		5.2.5.3

Table 11 — Numbers of samples to be tested and compliance criteria (continued)

Characteristics ^a	Requirements / testing clause	Assessment method	Number of specimens	Compliance criteria	
Mechanical resistance of structural glued solid timber expressed as bending strength, compressive strength, tensile strength and shear strength and design documentation					
Strength of finger joints in laminations	5.2.4.2 or 5.2.5.2	EN xxx, 9.3 (test)	For each combination of species, adhesive, nominal ratio of resin and hardener, if relevant and declared strength value – for laminations complying with Table 1: 15 finger joints in laminations – for laminations not complying with Table 1: 100 finger joints in laminations from at least three batches	For any of the methods given in 5.1.2	5.2.4.2 or 5.2.5.2
Design documentation	5.1.2	5.1.2 (check)	none	For methods 2 and 3b given in 5.2.1	Check the compliance of declared values with the required values given in the design documentation
				Additionally for methods 3a and 3b given in 5.2.1	Check the compliance of the geometry and layup with the design documentation
Mechanical resistance of glulam with large finger joints expressed as bending strength, compressive strength, tensile strength and shear strength of glulam components and bending strength of large finger joints and design documentation					
Mechanical resistance of glulam components and geometrical data	5.3	As for mechanical resistance of glulam (see 5.1)			
Bending strength of large finger joints	5.3	EN xxx, 11.3 (test)	10 straight specimens for each combination of adhesive and declared strength value	EN xxx, 11.3	
Mechanical resistance of block glued glulam expressed as modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength of glulam components					
Mechanical resistance of glulam components and geometrical data	5.4	As for mechanical resistance of glulam (see 5.1)			

Table 11 — Numbers of samples to be tested and compliance criteria (continued)

Characteristics ^a	Requirements / testing clause	Assessment method	Number of specimens	Compliance criteria
Bonding strength expressed as strength of finger joints in laminations, glue line integrity of laminations, bending strength of large finger joints, glue line integrity or shear strength of glue lines of block glued glulam and design documentation				
Strength of finger joints in laminations for glulam	5.1.4.2 or 5.1.5.2 or 5.1.6.2	As for mechanical resistance of glulam		
Strength of finger joints in laminations for glued solid timber	5.5.4.2 or 5.2.5.2.	As for mechanical resistance of glued solid timber		
Glue line integrity of laminations in glued laminated timber or glued solid timber	5.5	EN xxx, 12.2 (test)	for each combination of species and adhesive 10 full cross sectional specimens	EN xxx, 10.2.1.2
Bending strength of large finger joints	5.3	As for mechanical resistance of glulam with large finger joints		
Glue line integrity or shear strength of glue lines of block glued glulam	5.5	EN xxx, 12.2 (test)	2 specimens	EN xxx, 10.2.1.2 or
				EN xxx, 10.2.1.3
Durability of bonding strength expressed as species, adhesive type and family				
Species	5.5	EN xxx, Clause 5 (check)	-	EN xxx, Clause 5
		Moisture content of timber to be bonded according to EN xxx, B.1 (test) ^b	100 timber pieces for each species	EN xxx, B.1
Adhesive type and family	EN xxx, 7 for phenolic and aminoplastic adhesives ^b	EN 302-1 to EN 302-4 (test) and EN 302-6 (test), if required at the place of use	according to EN 302-1 to EN 302-4 and EN 302-6	The provisions for the respective adhesive type class and subclasses given in EN 301: 2013 shall be fulfilled The characteristics according to EN 302-6 shall be declared, if required at the place of use
	EN xxx, 7 for moisture curing one-component polyurethane adhesives ^b	EN 15425 (test)	EN 15425	EN 15425
		and EN 15416-5 (test), if required at the place of use	EN 15416-5	The conventional pressing time according to EN 15416-5 shall be declared, if required at the place of use

Kommentar [st9]: Should be moved to another line in order to avoid the declaration in the CE-mark

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Table 11 — Numbers of samples to be tested and compliance criteria (continued)

Characteristics ^a	Requirements / testing clause	Assessment method	Number of specimens	Compliance criteria	
Durability of bonding strength as expressed as species, adhesive type and family					
Adhesive type and family	EN xxx, 7 for emulsion polymer isocyanate adhesives ^b	EN 16254 (test)	EN 16254	EN 16254	
		and EN 302-6 (test), if required at the place of use	EN 302-6	The conventional pressing time according to EN 302-6 shall be declared. If required at the place of use	
Durability of other characteristics against biological attack either as natural durability or as properties of preservative treatment according to EN 15229: 2008, Clause 6					
Without preservative treatment	5.6.1	5.6.1 (check) or	–	Requirements for the declared durability-class(es) according to EN 350-2 shall be fulfilled	
		5.6.2 (test)	EN 350-1	EN 350-1	
With preservative treatment	5.6.2	5.6.2 (test)	according to EN 15228	according to EN 15228	
Resistance to fire as density, species and reference to design documentation					
Density properties of timber ^c	5.1.3	EN 14081–1	EN 14081–1:2005+A1:2011, 6.2	For any of the methods given in 5.1.2	EN 14081–1:2005+A1:2011, 6.2
Species ^d	5.5	EN xxx, Clause 5 (check)	none		EN xxx, Clause 5
Design documentation	5.1.2	5.1.2 (check)	none	For methods 2 and 3b given in 5.2.1	Check the compliance of declared values and design documentation
				For methods 3a and 3b given in 5.2.1	Check the compliance of the production document with the design documentation
Release of formaldehyde					
Formaldehyde emission	5.9	Annex A	Annex A	Class E1 or E2	
Release of other dangerous substances					
Release of other dangerous substances	5.10	As relevant, according to 5.10			
^a Where further references to EN xxx and Annex B are made in Clause 5, the corresponding requirements shall also be included into the Type Testing.					
^b The manufacturer of the adhesive or the moisture meter, respectively, usually provides the manufacturer of the glued laminated product with some documentations on tests previously performed (shared Type Testing results).					

6.2.3 Test reports

The results of the determination of the product-type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the structural glued laminated products to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product-type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind, provided that:

- the results are known to be valid for products with the same essential characteristics relevant for the product performance;
- in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product-type concerned or has had it carried out, has expressly accepted⁴ to transmit to the manufacturer the results and the test report to be used for the latter's product-type determination, as well as information regarding production facilities and the production control process that can be taken into account for Factory Production Control (FPC);
- the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:
 - ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product-type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product-type; and
 - keeps available a copy of the determination of the product-type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called "system houses") which supply or ensure the supply of, on the basis of an agreement⁵, some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)⁶ to an assembler who then manufactures the finished product (referred to below as the "assembler") in his factory.

Provided that the activities for which such a system house is legally established include manufacturing/assembling of products as the assembled one, the system house may take the responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an "assembled product" using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

⁴ The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

⁵ This can be, for instance, a contract, license or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand).

⁶ These companies may produce components but they are not required to do so.

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To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

- the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;
- the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;
- the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;
- the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;
- the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);
- regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product.

6.2.6 Additional provisions for declaration of mechanical resistance and resistance to fire by design methods

Regarding the product-type determination of structural glued laminated products in relation to mechanical and fire resistance under AVCP system 1 the following shall apply:

6.2.6.1 When mechanical and fire resistance performances are to be declared using either method M1 or method M3a:

- a) A verification of the correct application of methods and procedures applied for the determination of the geometrical data, including sampling, of the glued laminated products
- b) verification of the correct application of methods and procedures applied for the determination of the properties, including sampling, of the structural materials and constituent products used; and
- c) elaboration of product-type determination report for reference in the certificate of constancy of performance of the product.

6.2.6.2 When mechanical and fire resistance performances are to be declared using either method M2 or method M3b

- a) verification of the correctness of the methods and procedures applied for the determination of the geometrical data of the structural products;
- b) verification of the correctness of the methods and procedures applied for the determination of the properties of the materials and constituent products used;
- c) verification that the calculation method applied to determine the declared performances of mechanical strength for a product range complies with the requirements given in this European standard;
- d) validation of the input data for calculations (material and constituent product properties, partial factors for materials applied in resistance calculation) and, where relevant, that it has been processed with the correct tools (e.g. correct computer software);
- e) validation of the results of the product-type calculation;
- f) elaboration of a product-type calculation report.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics and that the minimum production requirements of Annex G are fulfilled.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and requirements adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This FPC system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. FPC therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product-type results, the FPC shall also include the appropriate documentation as foreseen in clause 6.2.4.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

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In each factory the manufacturer may delegate the action to a person having the necessary authority to:

- identify procedures to demonstrate constancy of performance of the product at appropriate stages;
- identify and record any instance of non-constancy;
- identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the FPC. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

- a) the preparation of documented procedures and instructions relating to FPC operations, in accordance with the requirements of the technical specification to which reference is made;
- b) the effective implementation of these procedures and instructions;
- c) the recording of these operations and their results;
- d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the requirements of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment according to EN xxx, 8.4 shall be calibrated or verified and regularly inspected according to documented procedures, frequencies and criteria. The results shall be documented.

6.3.2.2.2 Manufacturing

All equipment according to Annex E used in the manufacturing process should be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials

The specifications of all incoming raw materials shall be documented, as shall the inspection scheme for ensuring their compliance.

6.3.2.4 Traceability and marking

Individual structural glued laminated products shall be identifiable and traceable with regard to its production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

The manufacturer's documentation, procedures and instructions shall be relevant to the production and process control of the products, and shall be adequately described in a works' quality manual, covering:

- quality aims and organisational structure, responsibilities and powers of the management with regard to conformity of the products;
- procedures for specifying and verifying the compliance of the timber and the bonding;
- manufacturing, production control and other techniques, processes and systematic actions to be taken.

For the bonding processes the following shall be recorded:

- production line;
- date and number of production;
- species;
- strength class or manufacturer specific strength class;
- dimensions of the member;
- moisture content of individual boards;
- time for start of adhesive application;
- time for start and end of cramping procedure;
- cramping pressure;
- adhesive, e.g. resin and hardener;
- mixing ratio, if relevant;
- quantity of adhesive applied (g/m²);
- information on preservative treatment in accordance with EN 15228 if the laminations have been treated with a preservative against biological attack of timber;
- temperature and relative humidity for the timber storage facilities, the facilities for the production of the bonds and the facilities for the adhesive application and the curing;
- adjustment of the moisture meter according to the specification of the moisture meter manufacturer;
- name of the responsible member of the personnel.

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All documentation shall be registered so that the raw materials and production conditions for the products are traceable, at least to the production week and year. All documentation shall be kept for at least 10 years. The documentation of the different tests may be kept separately.

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained and the minimum production requirements of Annex B and EN xxx are fulfilled. The characteristics and the means of control shall be as given in Table 12.

Table 12 — Factory production control for structural glued laminated products and components

Characteristics	Clause, indicating the relevant test or evaluation method	Compliance criteria	Minimum frequency	Evaluation method
Mechanical resistance of glued laminated products				
For any of the methods given in 5.1.2: Strength, stiffness and density properties of timber	General 5.1.3	For timber graded by the manufacturer of the glued laminated products: EN 14081-1:2005+A1:2011, 6.3	According to EN 14081-1:2005+A1:2011, 6.3	According to EN 14081-1:2005+A1:2011, 6.3
		For timber not graded by the manufacturer of the glued laminated products: none	On receipt	Check suppliers declaration according to EN 14081-1:2005+A1:2011, Clause 7
	Additionally for glulam for which material properties have been derived from full-scale tests: 5.1.7.1	$f_{m,k,l,dc}$ shall fulfil the requirements given in EN xxx, B.3	2 boards per shift and line, layup, strength class or manufacturer specific strength class	Test in analogy with EN xxx, Annex B
Mechanical resistance of glued laminated products				
For any of the methods given in 5.1.2: Finger joints in laminations	5.1.5.2 or 5.1.6.2 or 5.1.7.2 (glulam) or 5.2.4.2 or 5.2.5.2 (glued solid timber)	EN xxx, B.3	At least 3 per shift and line, highest strength class or manufacturer specific strength class and adhesive	Test according to EN xxx, Annex B
For methods 2, 3a and 3b given in 5.1.2: Design documentation	5.1.2	5.1.2	Once per shift in which one of the methods is applied	Check compliance of production with design documentation

Table 12 — Factory production control for structural glued laminated products and components

Characteristics	Clause, indicating the relevant test or evaluation method	Compliance criteria	Minimum frequency	Evaluation method
Bonding strength				
Finger joints in timber	5.5	As for mechanical resistance		
Glue line integrity or shear strength of glue lines in glulam or glued solid timber	5.5	EN xxx, 10.2.1.2 or	For each shift in which gluing is carried out one full cross sectional specimen for each 20 m ³ of production or part thereof. ^a	Delamination test according to EN xxx, 10.2.1.2 or
		EN xxx, 10.2.1.3		Shear test according to EN xxx, 10.2.1.3
		EN xxx, 10.1.4	Once per shift ^c	Measure the glue line thickness according to EN xxx, 10.1.4
Large finger joints	5.5	EN xxx, 11.2.6	At each change of dimension, at least one per shift	Measure the glue line thickness according to EN xxx, 11.2.6
Glue line integrity or shear strength of block glued glulam	5.5	EN xxx, 10.2.1.2 or	For each shift in which gluing is carried out, each species and adhesive at least two drill cores having a geometry as given in EN xxx, Figure D.7 or one end-cut ^b	Delamination test, Method B as given in EN xxx, Annex C or
		EN xxx, 10.2.1.3		Shear test according to EN xxx, Annex D
		EN xxx, 12.2.4		Measure the glue line thickness according to EN xxx, 12.2.4
Durability of bonding strength				
Species	5.5	EN xxx, Clause 5	Each reception	Check the suppliers declaration
		Moisture content of timber to be jointed according to EN xxx, A.1	According to the quality manual of the manufacturer of the glued laminated product	EN xxx, A.1
		And EN xxx, A.2 (if relevant)	At least one measurement per month	EN xxx, A.2

Table 12 — Factory production control for structural glued laminated products and components (continued)

Characteristics	Clause, indicating the relevant test or evaluation method	Compliance criteria	Minimum frequency	Evaluation method
Durability of bonding strength				
Adhesive	5.5	-	Each reception	Check the suppliers declaration of adhesives for the production of finger joints or glue lines between laminations:
			Each shift in which products are produced	Check the suppliers declaration of adhesives for large finger joints or glue lines between components of block glued glulam:
Durability of other characteristics against biological attack				
Species or preservative treatment	5.6	-	Each reception	Checking the species or checking preservative treatment according to EN 15228:2009, 5.3
Resistance to fire				
For any of the methods given in 5.1.2: Resistance to fire	5.7	-	Once per week	Control the material properties (i.e. characteristics relevant to mechanical resistance, as given above)
Resistance to fire				
For methods 2, 3a and 3b given in 5.1.2: Design documentation	5.1.2	5.1.2	Once per shift in which one of the methods is applied	Check compliance of production with design documentation
Reaction to fire				
Reaction to fire	5.8		Once per shift	For 5.8 a) (CWFT): Control the minimum mean density, minimum overall thickness and preservative treatment (if any). For 5.8 b) (testing): Check at least once per shift that the relevant parameters of the tests are fulfilled

Table 12 — Factory production control for structural glued laminated products and components (continued)

Characteristics	Clause, indicating the relevant test or evaluation method	Compliance criteria	Minimum frequency	Evaluation method
Release of formaldehyde				
Formaldehyde emission	5.9	Class E1 or E2	Each reception of adhesives	Control that only adhesives for which an initial classification has been carried out within the Type Testing are used.
Release of other dangerous substances				
Release of other dangerous substances	5.10	As relevant, according to 5.7		
<p>^a If all tests for a three months period satisfy the requirements the number of samples may be reduced to not less than half of the number prescribed above as long as the requirements are satisfied.</p> <p>^b The bonding over the full contact area shall be deemed satisfactory if the mean cramping pressure is at least 0,3 N/mm², the heights of the glulam components are not exceeding 600 mm and the width of the smaller glulam component is less than or equal to 200 mm. In this case no specimen needs to be sampled.</p> <p>^c If all tests for a three months period satisfy the requirements the number of samples may be reduced to one per day as long as the requirements are satisfied.</p>				

6.3.2.7 Non complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the requirements for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

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6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

- a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan, and/or
- b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product-type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc..

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Initial inspection of factory and of FPC

6.3.4.1 General

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of clause 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

- a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented, and
- b) that the FPC-procedures in accordance with the FPC documentation are followed in practice, and
- c) that the product complies with the product-type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.4.2 When mechanical and fire resistance performances are to be declared using method M1 or method M3a

Continuous surveillance, assessment and evaluation of the permanent internal production control shall be carried out in particular regarding the manufacturing conditions, to ensure that they enable to achieve both the

constancy of the mechanical and fire resistance performances of the product-type and the compliance of the information accompanying the product with the provisions of this European Standard

6.3.4.3 When mechanical and fire resistance performances are to be declared using method M2 or method M3b

Verification shall be carried out, with the appropriate frequency specified in this European standard, that the documentation regarding the calculation method is still valid (regardless whether modified or not) and that a documented FPC system, in accordance with this European standard ensuring (a) to (e) as listed in 6.2.6.2, is continuously used and maintained.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken twice per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product-type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product-type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

7 Marking, labelling and packaging

7.1 General

Each glued laminated product, which complies with this European Standard, shall be durably marked on its surface or on a durable label affixed on it, with the information as given below. When regulatory marking requirements require information on some of the items listed in 7.2 and 7.3 the requirements of these subsections concerning these items are deemed to be met.

In exceptional cases, the end use may require marking to be omitted for aesthetic reasons. In such cases, when the customer specifically requests or orders the glued laminated products to be free from marks, each delivery shall be dispatched under the cover of a document stating the following minimum information.

- customer's name and address;
- customer's purchase order number;
- dimensions and quantities of the delivered glued laminated timber or glued solid timber.

7.2 Glued laminated products

The following information shall be given for glued laminated timber, glued solid timber and block glued glulam:

- a) identity of the manufacturer, logo or name;
- b) strength, stiffness and density values of the glued laminated timber or the glued solid timber;

NOTE 1 This is usually done by reference to a strength class according to Table 3 or 4 or to a manufacturer specific strength class.

If a manufacturer's specific class name starting with GLxx is chosen (where "xx" is the characteristic bending strength) it shall be accompanied by the Company name, e.g. GL 30 Any Company. For glulam having an asymmetrical layup, "ca" has to be added to the class name, e.g. GL28 ca.

NOTE 2 Coded marking, e.g. continuous carving of laminations, is allowed.

- c) "Brick-bonded", if member has a cross sectional layup according to B.2.2;
- d) the topside of a glued laminated product having an asymmetrical cross-sectional layup shall be clearly marked with "Top" unless there is no danger to mistake which side is the topside (e.g. for curved members);
- e) production week and year or traceability code;
- f) adhesive type according to EN 301, EN 15425 or EN 16254 and adhesive family according to EN xxx, 7;

NOTE 3 Subclasses need not be given.

- g) test method for glue lines between laminations declared as "A", "B", "C", if tested by delamination method A, B or C or by "S" if tested by block shear test;
- h) "PT", if the glued laminated timber or glued solid timber is treated against biological attack.

7.3 Additional for glulam with large finger joints

Characteristic bending strength of the large finger joint.

Annex A (normative)

Bending tests with glued laminated timber and glued solid timber (including compliance criteria)

A.1 Sampling

The specimens shall be representative.

The specimens shall be tested with a typical cross sectional size normally supplied by the manufacturer. A finger joint shall be placed where the bending tensile stress is the maximum.

A.2 Testing

Bending tests shall be done as edge-wise bending tests in accordance with EN 408.

It is allowed to do the testing without conditioning the specimens as described in EN 408 if the specimens have a moisture content of $u = (12 \pm 3) \%$.

A.3 Evaluation

If the overall height of the glued laminated timber is less than 600 mm the bending strength parallel to the grain $f_{m,g,k}$ (for glulam) or $f_{m,s,k}$ (for resawn glulam), determined by testing, shall be multiplied by k_h (see Formula (A.1)):

$$k_h = \max \left\{ \left(\frac{h}{600} \right)^{0,1} \right. \\ \left. 0,90 \right. \quad (A.1)$$

If the overall height of the glued solid timber is less than 150 mm the bending strength parallel to the grain $f_{m,gs,k}$ determined by testing shall be multiplied by k_h (see Formula (A.2)):

$$k_h = \max \left\{ \left(\frac{h}{150} \right)^{0,15} \right. \\ \left. 0,77 \right. \quad (A.2)$$

The characteristic values shall be derived in accordance with the methods given in EN 14358.

A.4 Compliance criteria

The characteristic values shall be greater than or equal to the declared value.

A.5 Report

A test report in accordance with EN 408 shall be given.

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For glued laminated timber and glued solid timber $f_{m,g,mean}$, $E_{0,g,mean}$, $\rho_{g,k}$ and the related coefficients of variation shall be given additionally.

Any preservative treatment shall be documented.

Annex B (normative)

Layup requirements

B.1 General

The respective requirements regarding the layup given in EN xxx and Clause 5 of this standard shall be fulfilled.

B.2 Requirements for glued laminated timber

B.2.1 Finished lamination sizes and radius of curvature

The finished lamination thickness shall be taken from Table B.1.

The finished width of the laminations for glued solid timber shall not exceed 280 mm. The finished overall depth of glued solid timber shall not exceed 280 mm.

Emulsion isocyanate adhesives tested with a maximum glue line thickness of 0,3 mm instead of 0,5 mm shall only be used in straight glued laminated products having widths up to 180 mm, depths up to 300mm and cross sectional areas up to 45.000 mm².

Table B.1 — Finished thickness t for laminations in mm

	Service class (SC) according to EN 1995-1-1	
	SC 1 or 2	SC 3
Glued laminated timber	$6 \leq t \leq 45$	$6 \leq t \leq 35^a$
Glued solid timber	$45 < t \leq 85$	-

^a For glulam which is not a component for block glued glulam and which has a cross-sectional area up to 60.000 mm² this value may be raised by an agreement between customer and producer.

For curved glued laminated timber the finished thickness t of the laminations is also governed by the radius r of curvature of the lamination with the smallest radius of the glued laminated timber and the declared characteristic bending strength of the end joints. The finished thickness t shall comply with Formula (B.1):

$$t \leq \frac{r}{250} \left(1 + \frac{f_{m,j,dc,k}}{150} \right) \quad (B.1)$$

where

t is the finished lamination thickness (in mm);

r is the radius of the lamination with the smallest radius of the member (in mm);

$f_{m,j,dc,k}$ is the declared characteristic bending strength of the finger joints (in N/mm²).

B.2.2 Laminations made of two boards side by side

Where a lamination for glued laminated timber consists of two boards side by side and the edges are not bonded, the edge-joints in adjacent laminations shall be staggered laterally by at least the lamination thickness, see Figure 4.

Such glued laminated timber shall only be used in service class 1 or 2.

B.2.3 Grooves in laminations

In order to reduce cupping and cracking, laminations for the production of glued laminated timber may be grooved.

In each lamination one groove is permitted in the middle third of the cross sectional width, with a maximum width of 4 mm and a maximum depth of one third of the lamination thickness.

Grooves in adjacent laminations may be staggered.

B.2.4 Orientation of laminations in the cross section

The laminations shall have the pith to the same side and the outermost laminations at either edge shall have the pith facing outwards, see Figure B.1 a), with the following exception:

For glued laminated timber to be used in service class 1 or 2, the outermost laminations at either edge may have the pith side facing in the same direction, see Figure B.1 b).

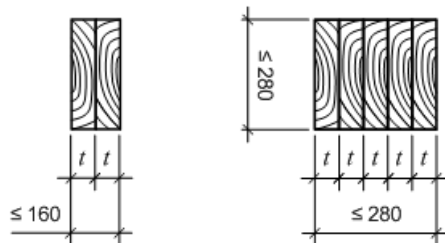


Figure B.1 — Orientation of the laminations in the cross section

B.3 Requirements for glued solid timber

Glued solid timber shall have cross sectional sizes and layouts as given in Figure B.2.

Dimensions in mm



Key

t = lamination thickness $45 < t \leq 85$

Figure B.2 — Glued solid timber with two or five laminations

Annex ZA (informative)

Clauses of this European Standard addressing the provisions of EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/112 "Structural timber products and ancillaries" given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the Structural glued laminated timber products intended for the uses indicated in Table ZA.1 shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 – Relevant clauses for structural glued laminated products

Construction products: Structural glued laminated products ^a , which are:				
a) glued laminated timber (glulam);				
b) glued solid timber;				
c) glulam with large finger joints;				
d) block glued glulam.				
e) block glued glulam with large finger joints				
Intended uses: In buildings and bridges				
Essential characteristics	Clauses in this or other European Standard(s) related to essential characteristics	Regulatory classes	Notes	
Bending strength, Compressive strength, Tensile strength and Shear strength^b as:				
Strength and stiffness properties of glued laminated product	5.1.3	-	For any of the methods given in 5.1.2	Declared as strength class or manufacturer specific strength class or individual values
Bending strength of finger joints as bending strength of timber	5.1.5.2 or 5.1.6.2 or 5.1.7.2 or 5.2.4.2 or 5.2.5.2	-		Declared as strength class or manufacturer specific strength class or individual values
Additional for glulam with large finger joints: Bending strength of large finger joints	5.3	-		Declared as bending strength of large finger joints
Compliance with design documentation	5.1.2	-	Methods 2, 3a and 3b	Declared by reference to design documentation

Table ZA.1 – (continued)

Construction products: Structural glued laminated products ^a , which are:					
a) glued laminated timber (glulam);					
b) glued solid timber;					
c) glulam with large finger joints;					
d) block glued glulam.					
e) block glued glulam with large finger joints					
Intended uses: In buildings and bridges					
Essential characteristics		Clauses in this or other European Standard(s) related to essential characteristics	Regulatory classes	Notes	
Bonding strength					
Bonding strength of finger joints as bending strength of timber		5.1.4.2 or 5.1.5.2 or 5.1.6.2 or 5.2.4.2 or 5.2.5.2	-	Declared as strength class or manufacturer specific strength class or individual values	
Glue line integrity or shear strength of glue lines between laminations in glulam or glued solid timber		5.5	-	Declared according to EN xxx, 10.2.1 as "A", "B", "C" or "S"	
Glue line integrity or shear strength of glue lines between glulam components		5.5	-	Declared according to EN xxx, 10.2.1 as "A", "B", "C" or "S"	
Bonding strength of large finger joints as bending strength		5.3	-	Declared as bending strength of large finger joints	
Resistance to fire^c, as					
Charring rate, as	Species ^d	5.7	-	For any of the methods given in 5.1.2	Declared as species
	characteristic density	5.7			Declared as strength class or manufacturer specific strength class or individual values
Design documentation		5.1.2	-	Methods 2, 3a and 3b	Declared by reference to documentation
Reaction to fire^e		5.8	A1 to F	D-s2, d0 according to Table 2; or Tested and classified acc. to EN 13501-1	
Release of formaldehyde		5.9	-	Class E1 or E2	
Release of other dangerous substances^e		5.10	-	The relevant values shall be-declared according to CEN/TS 16516	
Durability of bonding strength					
Species		5.5	-	Declared as species according to EN xxx, Clause 5	
Adhesives		5.5	-	Declared as adhesive families, adhesive types and subclasses according to EN xxx, Clause 7	

Table ZA.1 – (continued)

Construction products: Structural glued laminated products ^a , which are:			
a) glued laminated timber (glulam);			
b) glued solid timber;			
c) glulam with large finger joints;			
d) block glued glulam.			
e) block glued glulam with large finger joints			
Intended uses: In buildings and bridges			
Essential characteristics	Clauses in this or other European Standard(s) related to essential characteristics	Regulatory classes	Notes
Durability against biological attack (i.e. resistance to biological organisms)			
Timber without preservative treatment	5.6.1	-	Declared as durability class(es) according to EN 350-2 or EN 350-1
Timber with preservative treatment	5.6.2	-	Declared according to EN 15228: 2009, Clause 6
^a For glued laminated products made from coniferous species and poplar listed in EN xxx, Clause 5, which are not treated to improve the fire performances. ^b The declared information enables the designer to calculate the mechanical resistance for the specific end use situation. ^c The declared information enables the designer to calculate the resistance to fire according to EN 13501-2 for the specific end-use situation. ^d As for durability of bonding. ^e The performance of these characteristics may be affected by the preservative treatment against biological attack of timber.			

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory provisions on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option "No performance determined" (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for Assessment and Verification of Constancy of Performance (AVCP) of structural glued laminated products

ZA.2.1 AVCP

The AVCP system of glulam, glued solid timber, block glued glulam, glulam with large finger joints and block glued glulam with large finger joints established by EC Decisions 97/176/EC of 1997-02-17 (see OJEU L73 of 1997-03-14) and 2001/596/EC of 2001-01-08 (see OJEU L209 of 2001-08-02) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System of AVCP

Product	Intended uses	Levels or classes of performance	AVCP system
Products of this column can be treated against fire, biological attack or not treated. Structural glued laminated products and other glued timber products	Buildings and bridges	-	1 ⁽¹⁾
⁽¹⁾ AVCP System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2			

NOTE Glued solid timber, block glued glulam, glulam with large finger joints and block glued glulam with large finger joints may be considered as other glued timber products.

Structural glued laminated products treated with fire retardants are not covered in this standard.

The AVCP of the structural glued laminated products in Table ZA.1.1 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of AVCP tasks for structural glued laminated products under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.1, 6.3
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	6.1, 6.3.2.6
	determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the intended use which are declared except reaction, bonding strength and durability of bonding strength	6.1, 6.2
Tasks for the notified product certification body	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	reaction to fire, bonding strength and durability of bonding strength	6.1, 6.2
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared Documentation of the FPC.	6.1, 6.3.4

Table ZA.3— Assignment of AVCP tasks for structural glued laminated products under system 1 (continued)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the notified product certification body	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which are declared, namely <ul style="list-style-type: none"> — mechanical resistance covering modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength, — reaction to fire, — bonding strength (including durability of bonding strength), — release of formaldehyde, Documentation of the FPC.	6.1, 6.3.5

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011 modified by the Commission Delegated Regulation (EU) No 568/2014:

In case of products under system 1:

- the factory production control and further testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and
- the certificate of constancy of performance issued by the notified product certification body on the basis of determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; initial inspection of the manufacturing plant and of factory production control and continuous surveillance, assessment and evaluation of factory production control.

ZA.2.2.2 Content

The model of the DoP is provided Regulation (EU) No 574/2014 which supersedes Annex III of the Regulation (EU) No 305/2011. According to this Regulation, the DoP shall contain, in particular, the following information:

- the reference of the product-type for which the declaration of performance has been drawn up;
- the AVCP system of the construction product, as set out in Tables ZA.2 and ZA.3 in accordance with Annex V of the CPR;
- the reference number and date of issue of the harmonised standard which has been used for the assessment of each essential characteristic;

where applicable, the reference number of the Specific Technical Documentation used and the provisions with which the manufacturer claims the product complies.

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The DoP shall in addition contain:

- a) the intended use or uses for the construction product, in accordance with the applicable harmonised technical specification;
- b) the list of essential characteristics, as determined in the harmonised technical specification for the declared intended use or uses;
- c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;
- d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared;
- e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;
- f) for the listed essential characteristics for which no performance is declared, the letters "NPD" (No Performance Determined);

Regarding the supply of the DoP Regulation article 7 of the Regulation (EU) No 305/2011 amended by Regulation (EU) xxx/2014 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for glulam. Mechanical resistance and resistance to fire are declared by Method M1 according to 5.1.2.

DECLARATION OF PERFORMANCE

No. 001-2014-07-14

1. Unique identification code of the product-type: **Glued laminated timber - GL24h – Norway spruce**
3. Intended use or uses: **Buildings and bridges**
3. Manufacturer: **AnyCo (complete address and contact data to be given)**
4. Authorized representative: **No external representative**
5. System or AVCP: **System 1**
- 6a. Harmonised standard: **EN 14080:2005+A1:2014**
Notified body: **No. 5678**
7. Declared performance

Essential characteristics	Performance
Modulus of elasticity, Bending strength, Compressive strength, Tensile strength and Shear strength, given as Strength class of glulam	Method M1 GL 24h
Bonding strength, given as Bending strength of finger joints declared as strength class of glulam Bonding strength of glue lines between laminations	GL 24h B
Durability of bonding strength, given as Species Adhesive For finger joints For bonds between laminations	Norway spruce MUF, EN 301 I 70 FJ 0,1S MUF, EN 301 I 70 GP 0,6S
Durability against biological attack as Natural durability class against wood destroying fungi (EN 350-2)	Durability class 4
Resistance to Fire, given as Charring rate as Characteristic density Species	Method M1 350 kg/m ³ Norway spruce
Reaction to fire	D-s2, d0
Release of formaldehyde	E1

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

(name and function)

(place and date of issue)

(signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

- to the product or
- to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

- to the packaging or
- to the accompanying documents.

The CE marking shall be followed by:

- a) the last two digits of the year in which it was first affixed;
- b) the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;
- c) the unique identification code of the product-type, e.g. a combination of the name (e.g. glulam), the strength class (e.g. GL 24h), the species (e.g. Norway spruce) and the treatment, if any (usually as "PT");
- d) the reference number of the declaration of performance;
- e) the level or class of some performances declared;
 - **modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength** as the element's mechanical resistance declared as:
 - For any of the methods given in 5.1.2:
 - Strength class or manufacturer specific strength class or individual values of glued laminated timber or glued solid timber

NOTE 1 This is usually done by reference to a strength class according to Table 3 or 4 or to a manufacturer specific strength class.

NOTE 2 For the designation of manufacturer specific strength classes, glulam with asymmetrical layup and brick-bonded glulam see also 7.2.

- and characteristic bending strength of large finger joints, if any;
- Additionally for method M2 according to 5.1.2:
 - Characteristic or design values and information on relevant parameters of design (e.g. partial safety factors, configuration of loads and supports etc.)

NOTE 3 This is usually done by reference to a design documentation.

- Additionally for method M3a according to 5.1.2:
 - Compliance with design documentation of the customer by reference to this documentation
- Additionally for method M3b according to 5.1.2:
 - Compliance with design documentation of the producer by reference to this documentation

- **bonding strength** declared as
 - characteristic bending or tension strength of finger joints declared as bending strength of timber declared as strength class or manufacturer specific strength class or individual values of glued laminated timber or glued solid timber
 - and glue line integrity of glue lines between laminations according to EN xxx, 10.2.1.2 as “A”, “B” or “C” or shear strength of glue lines between laminations according to EN xxx, 10.2.1.3 as “S”
 - characteristic bending strength of large finger joints, if any;
- **resistance to fire, declared using one of the calculation methods, described in 5.2.2 or by tests** as
 - For any of the methods given in 5.1.2:
 - species
 - and characteristic density

NOTE 4 Characteristic density is usually declared by reference to a strength class.

- Additionally for method M2 according to 5.1.2:
 - Characteristic or design values and information on relevant parameters of design (e.g. partial safety factors, configuration of loads and supports, charring rate etc.)

NOTE 5 This is usually done by reference to a design documentation.

- Additionally for method M3a according to 5.1.2:
 - Compliance with design documentation of the costumer by reference to this documentation
- Additionally for method M3b according to 5.1.2:
 - Compliance with design documentation of the producer by reference to this documentation
- **reaction to fire**, as class (including smoke and droplets) as class acc. to EN 13501-1,
 - either referring to Table 7 (CWFT), as class D-s2, d0,
 - or based on results of the relevant tests, specified in the standards, referred therein;
- **release of formaldehyde declared** as class E1 or E2 according to EN xxx, Clause 14;
- **release of other dangerous substances**, see 5.10, where applicable;
- **durability of bonding strength**, as
 - species
 - and adhesive families and adhesive types (including subclasses, if relevant), according to EN 301 or EN 15425 or EN 16254 for all bondings;
- **durability against biological attack** (i.e. resistance to biological organisms), as
 - natural durability class(es) according to EN 350-2 or EN 350-1
 - or in accordance with EN 15228:2009, Clause 6, for treated timber;

f) the dated reference to this harmonised technical specification;

g) the identification number of the notified body.

EN 14080:2014 (E)

h) the intended use laid down in the harmonized technical specification applied;

Figure ZA.1 gives an example for the CE marking for glued laminated timber. The presentation of the CE-mark may be different.


 4321	<i>CE marking, consisting of the "CE"-symbol</i>
AnyCo Ltd 14 001- 2014/07/14	<i>Identification number of the product certification body</i>
EN 14080:2005+A1:2014 Glulam – GL24h – Norway spruce Intended to be used in buildings and bridges	<i>Name and the registered address of the manufacturer, or identifying mark</i> <i>Last two digits of the year in which the marking was first affixed</i> <i>Reference number of the DoP</i>
Modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength by Method M1 as – strength class GL 24h	<i>No. of European Standard applied, as referenced in OJEU</i>
Bonding strength as – strength class GL 24h – test method of glue lines B	<i>Unique identification of the product-type</i>
Resistance to fire as Method M1 – species Norway spruce – characteristic density 385 kg/m ³	<i>Intended use of the product as laid down in the European Standard applied</i>
Reaction to fire D-s2, d0	<i>Level or class(es) of the performance declared</i>
Release of formaldehyde E1	
Durability of bonding strength as – species Norway spruce – adhesive for bonds between laminations MUF, EN 301 I 70 GP 0,6S – adhesive for finger joints MUF, EN 301 I 70 FJ 0,1S	
Durability against biological attack as – natural durability class(es) against wood destroying fungi Class 4	<i>The density and species are needed to choose the appropriate charring rate from the fire design code</i> <i>Dangerous substances other than formaldehyde need only to be declared, if there is at least one additional regulated dangerous substance which obliges the manufacturer to declare. In this case, the substance has to be mentioned.</i>

Figure ZA.1 — Example of CE marking given in the documents accompanying glulam made of Norway spruce and being untreated

In addition to the CE marking and the information previously addressed in this clause, the CE marking symbol, together with the following information, may also be affixed on the glulam:

- a) the last two digits of the year in which it was first affixed;
- b) the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;
- c) the unique identification of the product-type;
- d) the reference number of the declaration of performance;
- e) the level or class of some performances declared;

- **modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength** declared as

- strength class or manufacturer specific strength class or individual values of glulam or glued solid timber

NOTE 1 This is usually done by reference to a strength class according to Table 3 or 4 or to a manufacturer specific strength class.

NOTE 2 For the designation of manufacturer specific strength classes, glulam with asymmetrical layup and brick-bonded glulam see also 7.2.

- and characteristic bending strength of large finger joints, if any;

- **bonding strength** declared as

- glue line integrity of glue lines between laminations according to EN xxx, 10.2.1.2 as "A", "B" or "C" or shear strength of glue lines between laminations according to EN xxx, 10.2.1.3 as "S"

- **"PT"** for preservative treated glulam;

- f) the reference to the harmonised technical specification applied.

Figure ZA. 2 gives an example for information to be affixed on the glulam or on a label attached to it.


	<i>CE marking, consisting of the "CE"-symbol</i>
<p>AnyCo Ltd</p> <p>14</p> <p>001- 2014/07/14</p>	<p><i>Name and the registered address of the manufacturer, or identifying mark</i></p> <p><i>Last two digits of the year in which the marking was first affixed</i></p> <p><i>Reference number of the DoP</i></p>
<p>EN 14080:2005+A1:2014</p> <p>Glulam – GL 24h – Norway spruce</p>	<p><i>No. of European Standard applied, as referenced in OJEU</i></p> <p><i>Unique identification of the product-type</i></p>
– strength class GL 24h	<i>Level or classes) of the performances declared</i>
– species Norway spruce	
– adhesive for bonds between laminations MUF, EN 301 I 70 GP 0,6S	
– adhesive for finger joints MUF, EN 301 I 70 FJ 0,1S	
– test method of glue lines B	

Figure ZA.2 — Example for information affixed on glulam or on a label attached to it

Bibliography

- [1] EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*
- [2] EN 15497, *Timber structures — Structural finger jointed timber — Requirements*
- [3] EN 16351, *Timber structures — Cross laminated timber — Requirements*
- [4] WI 124250, *Timber structures – Glued laminated timber made from hardwoods - Requirements*