Ποιοτικός έλεγχος πρώτων υλών

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14080

June 2013

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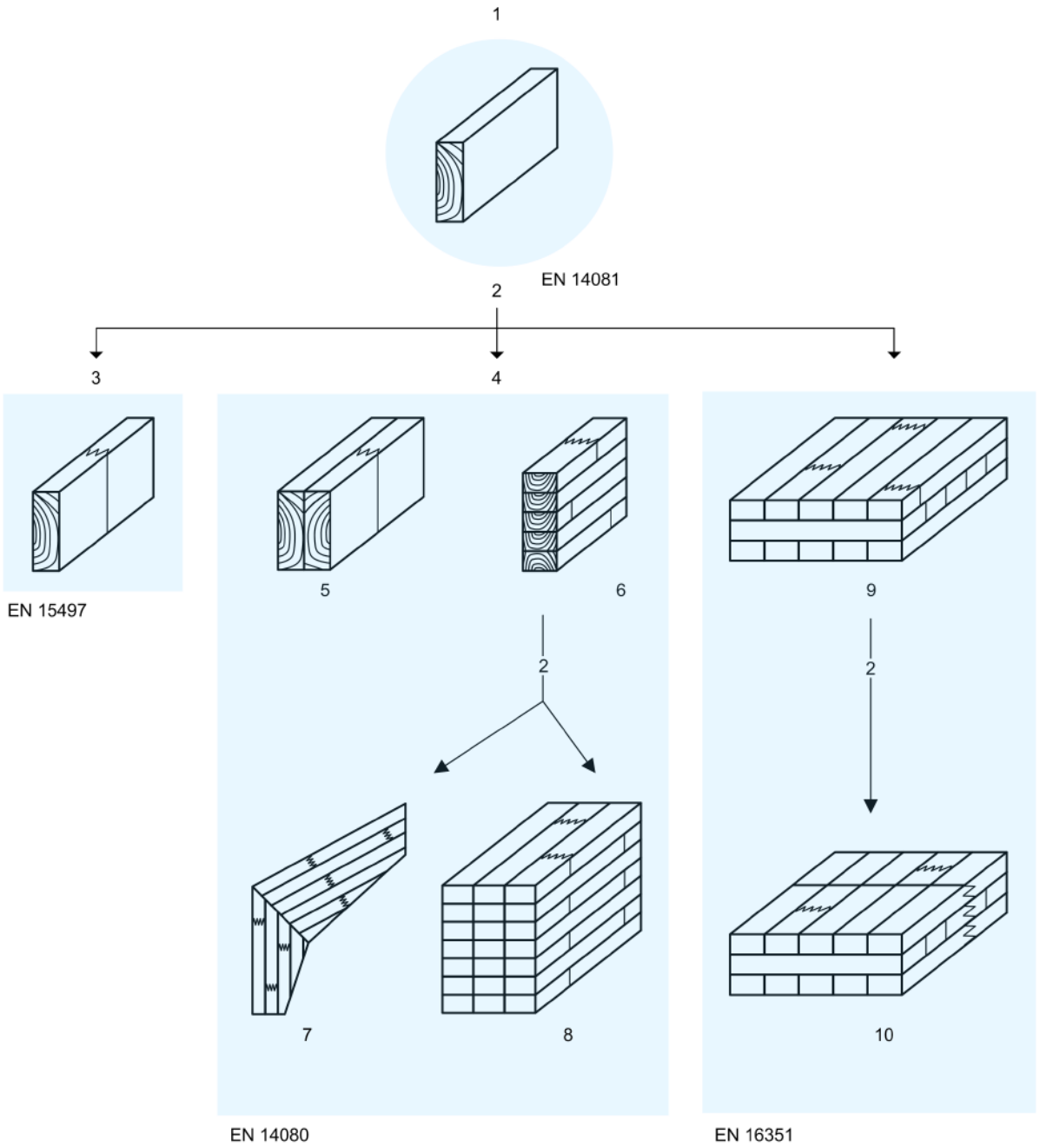
Timber structures - Glued laminated timber and glued solid timber - Requirements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EN 14081
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EN 15497
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Normative references

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

EN 15416-3, *Adhesives for load bearing timber structures other than phenolic and aminoplastic — Test methods — Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear*

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

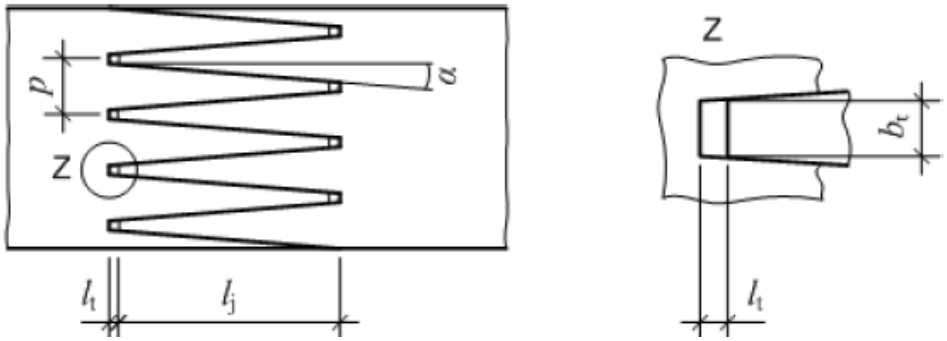
EN 15425:2008, *Adhesives — One-component polyurethane adhesives for load bearing timber structures — Classification and performance requirements*

3.11

finger joint

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 3.20).



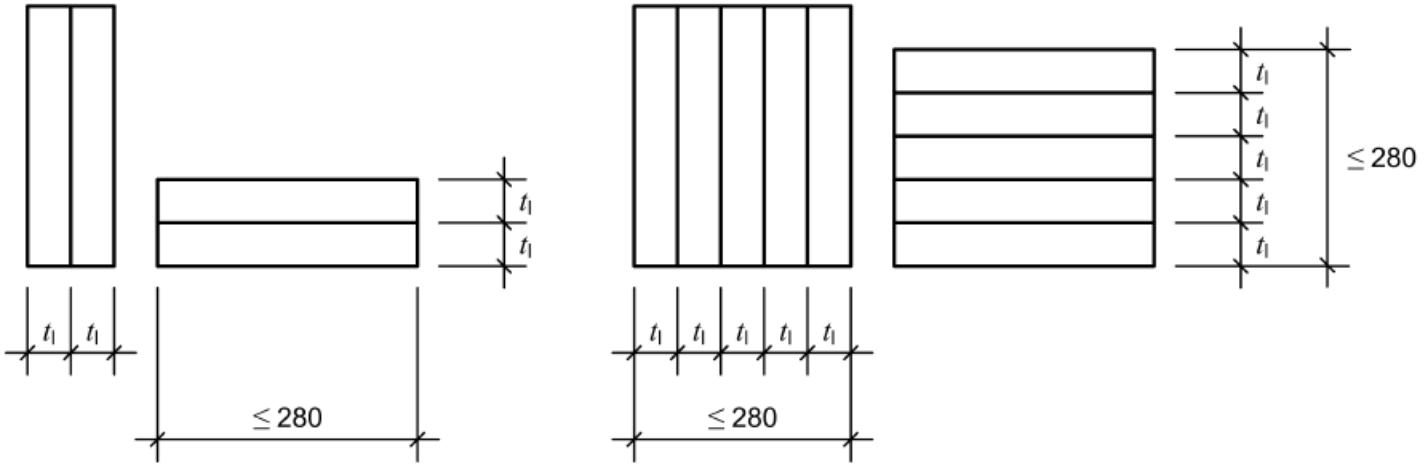

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Table 1 — Characteristic strength and stiffness properties for T-classes in N/mm^2 and densities in kg/m^3 for boards or planks for glued laminated timber

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.

Table 2 — Beam lay-up of combined glued laminated timber and minimum values for bending strength of finger joints in laminations in N/mm²

Glued laminated timber	Outer zones of laminations			Intermediate zones of laminations			Inner zone of laminations		
Strength class	Strength class	Proportion [%]	$f_{m,j,k}$ [N/mm²]	Strength class	Proportion [%]	$f_{m,j,k}$ [N/mm²]	Strength class[a]	Proportion [%]	$f_{m,j,k}$ [N/mm²]
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/mm^2

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	$f_{m,g,k}$	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[b]	$\rho_{g,k}$	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 5.1.5 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 here.

[b] Calculated as the weighted mean of the densities of the different lamination zones, see 5.1.5.3, 5th paragraph.

Table 5 — Characteristic strength and stiffness properties an 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

Table 7 — Applicability of adhesives for components and products

	Relevant requirements for the application of		
	Phenolic and aminoplastic adhesives	**Moisture curing one-component polyurethane adhesives**	**Emulsion polymer isocyanate adhesives**
Finger joints in laminations for glulam and glued solid timber	5.5.3.2.1 and 5.5.3.2.2 (if relevant)	5.5.3.3	5.5.3.4
Glue lines between laminations for glulam and glued solid timber	5.5.3.2.1	5.5.3.3	5.5.3.4
Large finger joints	5.5.3.2.1 mixed before used	Not applicable	Not applicable
Glue lines between glulam components of block glued glulam	5.5.3.2.3	Not applicable	Not applicable

Table 9 — Maximum values for the total delamination in %

Type [a]	Number of cycles	1	2	3
Glued laminated timber, Glulam with large finger joints and block glued glulam	Method A	–	5	10
	Method B	4	8	–
	Method C	10	–	–
Glued solid timber with lamination thicknesses from 60 mm up to 85 mm (inclusive)	Method A	–	10	15
	Method B	8	12	–
	Method C	15	–	–
[a] For Glued solid timber having lamination thicknesses from 45 mm up to 60 mm linear interpolation applies.				

Table 11[3)] — 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.

Table 15 — Initial type testing for glued laminated products[a]

Characteristics	Requirement clause	Test-/Assessment method	Test sample	Acceptance criteria
Mechanical resistance of glued laminated timber expressed as modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength				
Strength, stiffness and density properties of timber	5.1.2	EN 14081-1	General, for timber graded by the manufacturer of the glued laminated products: EN 14081-1:2005+A1:2011, 6.2	EN 14081-1:2005+A1:2011, 6.2
			General, for timber not graded by the manufacturer of the glued laminated products: -	Check labelling of timber according to EN 14081-1:2005+A1:2011, Clause 7
			Additionally for glulam for which mechanical resistance has been derived from full scale tests: For each grade and species 30 boards shall be tested according to EN 408 and $f_{m,k,l,dc}$ shall be determined according to EN 14358.	5.1.6.1
Finger joints in laminations	5.1.4.2 or 5.1.5.2	Annex E (test)	General, for each combination of species, adhesive 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	5.1.4.2 or 5.1.5.2
	5.1.6.2		For glulam for which mechanical resistance has been derived from full scale tests, for each combination of species, adhesive and cross-sectional layup: – For laminations complying with Table 1 : 30 finger joints in laminations – For laminations not complying with Table 1: 100 finger joints in laminations from at least three batches	5.1.6.2

Table 15 *(continued)*

Characteristics	Requirement clause	Test-/Assessment method	Test sample	Acceptance criteria
Mechanical resistance of glued laminated timber expressed as modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength				
Bending strength, compressive strength, tensile strength, shear strength, modulus of elasticity, density of glued laminated timber	5.1.6.3	or 5.1.6.3 (test)	Only for glulam for which mechanical resistance is derived from full scale tests: 30 glulam specimens	5.1.6.3
Additionally for resawn glulam	5.1.7	5.1.7 (check)	-	5.1.7
Geometrical data	5.11	5.11 (check)	General	5.11
Mechanical resistance of glued solid timber expressed as modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength				
Strength, stiffness and density properties of timber	5.2.2	EN 14081-1	General, for timber graded by the manufacturer of the glued laminated products: EN 14081-1:2005+A1:2011, 6.2	EN 14081-1:2005+A1:2011, 6.2
			General, for timber not graded by the manufacturer of the glued laminated products: -	Check labelling of timber according to EN 14081-1:2005+A1:2011, Clause 7
			Additionally for glued solid timber for which mechanical resistance is derived from full scale tests: For each grade and species 30 boards shall be tested according to EN 408 and $f_{m,k,l,dc}$ shall be determined according to EN 14358.	5.2.5.1
Strength of finger joints in laminations	5.5.4.2 or 5.2.5.2	Annex E (test)	General, for each combination of species, adhesive 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	5.2.4.2 or 5.2.5.2
Bending strength, compressive strength, tensile strength, shear strength, modulus of elasticity, density of glued solid timber	5.2.5.3	5.2.5.3 (test)	Only for glued solid timber for which mechanical resistance is derived from full scale tests: 30 glued solid timber specimens	5.2.5.3
Geometrical data	5.11	5.11 (check)	-	5.11

Table 15 (continued)

Characteristics	Requirement clause	Test-/Assessment method	Test sample	Acceptance criteria
Mechanical resistance of glulam with large finger joints as modulus of elasticity, bending strength, compressive strength, tensile strength and shear strength of glulam components and bending strength of large finger joints				
Mechanical resistance of glulam components and geometrical data	5.3	As for mechanical resistance of glued laminated timber (see 5.1)		
Bending strength of large finger joints	5.3	Annex F (test)	for each species and adhesive 10 from two different batches	Annex F (test)
Mechanical resistance of block glued glulam 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 glued laminated timber (see 5.1)		
Bonding strength expressed as				
Strength of finger joints in laminations for glued laminated timber	5.1.4.2 or 5.1.5.2 or 5.1.6.2	As for mechanical resistance of glued laminated timber		
Strength of finger joints in laminations for glued solid timber	5.2.4.2 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	5.5.5.2.2	According to Annex C (test)	for each combination of species and adhesive 10 full cross sectional specimens	5.5.5.2.2
Bending strength of large finger joints	5.3	As for mechanical resistance of glulam with large finger joints		
Bonding strength of glue lines of block glued glulam	5.5.7.2	Annex C (test) or Annex D (test)	2 specimens	5.5.5.2.2 5.5.5.2.3
Durability of bonding strength as				
Species	5.5.2	5.5.2 (check)	-	5.5.2
Moisture of timber to be bonded[b]	G.1	G.1 (test)	100 timber pieces for each species	G.1

Table 15 *(continued)*

Characteristics	Requirement clause	Test-/Assessment method	Test sample	Acceptance criteria
Durability of bonding strength as				
Adhesive characteristics	5.5.3.1 and 5.5.3.2.1 General requirements for phenolic and aminoplastic adhesives[b]	prEN 302-1, -2, -3, -4 and -6 (test)	acc. to prEN 302-1, -2, -3, -4 and -6	The requirements for the respective adhesive type class and subclass given in prEN 301 shall be fulfilled and the conventional pressing time according to prEN 302-6 shall be declared.
	5.5.3.2.2 Additional requirements for phenolic and aminoplastic adhesives for separate application of resin and hardener for the production of finger joints in laminations	prEN 302-1, -2, -3 and B.3[b]	5.5.3.2.2	5.5.3.2.2
		and B.3	5.5.3.2.2	5.5.3.2.2
		and Annex E	5.5.3.2.2	5.1 or 5.2
	5.5.3.2.3 Additional requirements for gap filling adhesives[b]	prEN 302-6	prEN 302-6	prEN 302-6
	5.5.3.1 and 5.5.3.3 Moisture curing one-component polyurethane adhesives[b]	EN 15425 (test)	EN 15425	EN 15425
		and B.2 (test)	80	B.2
		and prEN 302-2:2011, 5.1, 2nd para. (test) or	prEN 302-2:2011, 5.1, 2nd para.	prEN 302-2:2011, 5.1, 2nd para.
		For adhesives only to be used for finger joints in larch laminations: B.3	Analogue to 5.5.3.2.2, 1st dash	B.3
		and EN 15416-5 (test)	EN 15416-5	The conventional pressing time acc. to EN 15416-5 shall be declared
	5.5.3.1 and 5.5.3.4 Emulsion polymer isocyanate adhesives[b]	EN 15425 (test)	EN 15425	5.5.3.4
		and B.2 (test)	80	B.2
		and prEN 302-6 (test)	prEN 302-6	The conventional pressing time according to prEN 302-6 shall be declared

Table 15 *(continued)*

Characteristics	Requirement clause	Test-/Assessment method	Test sample	Acceptance criteria
Durability of other characteristics against biological attack				
Without preservative treatment: Natural durability	5.6.1	5.6.1 (check)	–	requirements for the declared durability-class according to EN 350-2 shall be fulfilled
With preservative treatment	5.6.2	5.6.2 (test)	acc. to EN 15228	acc. to EN 15228
Resistance to fire as				
Resistance to fire	5.7	Declared as for mechanical resistance of the glued laminated product,		
Reaction to fire				
Reaction to fire	5.8	Table 11 (CWFT) (check)	–	Table 11
		or tested acc. to methods referred in EN 13501-1	according to EN 13501-1	Classes according to EN 13501-1
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 Annex I are made in Clause 5, the corresponding requirements shall also be included into the Initial 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 by notified product certification bodies (shared Initial Type Testing results).

6.3 Factory production control (FPC)

Table 16 — Factory production control for glued laminated products

Property	Clause, indicating the relevant test or evaluation method	Acceptance criteria	Minimum frequency
Mechanical resistance of glued laminated products			
Strength, stiffness and density properties of timber	5.1.2	General, 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
		General, for timber not graded by the manufacturer of the glued laminated products: -	Check suppliers declaration according to EN 14081-1:2005+A1:2011, Clause 7, on receipt
	E.5	Additionally for glulam for which mechanical resistance has been derived from full-scale tests: $f_{m,k,l}$ determined according to E.5 shall be greater than or equal to $f_{m,k,l,dc}$ (determined within ITT)	2 boards per shift and line, layup, strength class or manufacturer specific strength class
Finger joints in laminations	Annex E	see E.3 and declared values according to 5.1.4.2 or 5.1.5.2 or 5.1.6.2 (glulam) or 5.2.4.2 or 5.2.5.2 (glued solid timber)	at least 3 per shift and line, highest strength class or manufacturer specific strength class and adhesive
Geometrical data	5.11	5.11	Check at each change of cross section
Bonding strength			
Finger joints in laminations	5.1.4.2 or 5.1.5.2 or 5.1.6.2 (glulam) or 5.2.4.2 or 5.2.5.2 (glued solid timber)	As for mechanical resistance	
Bonding strength of glue lines in glued laminated timber or glued solid timber	Annex C	see 5.5.5.2.2	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]
	or Annex D	see 5.5.5.2.3	
	I.5.8	I.5.8	
Large finger joints	I.6.6	I.6.6	at each change of dimension, at least one per shift
Bonding strength of block glued glulam	method B as given in Annex C	see 5.5.5.2.2	for each shift in which gluing is carried out, each species and adhesive at least two drill cores having a geometry as given in Figure D.7 or one end-cut[b]
	or Annex D	see 5.5.5.2.3	
	I.7.4	I.7.4	

Property	Clause, indicating the relevant test or evaluation method	Acceptance criteria	Minimum frequency
Durability of bonding strength			
Species	5.5.2	5.5.2	Check the suppliers declaration at each reception
Adhesive	5.5.3	-	Adhesives for the production of finger joints or glue lines between laminations: Check the suppliers declaration at each reception Adhesives for large finger joints or glue lines between components of block glued glulam: At each shift in which products are produced
Moisture content of timber to be jointed	G.1	G.1	Measurement according to the quality manual of the manufacturer of the glued laminated product
	and G.2 (if relevant)	G.2	At least one measurement per month
Durability of other characteristics against biological attack			
Species or preservative treatment	5.6	-	Checking the species of each reception or checking preservative treatment according to EN 15228:2009, 5.3
Resistance to fire			
Resistance to fire	5.7		Control of the product´s geometric data and its properties (i.e. characteristics relevant to mechanical resistance, as given above)
Reaction to fire			
Reaction to fire	5.8		For 5.8 a) (CWFT): Control the minimum mean density, minimum overall thickness and preservative treatment (if any) at least once per shift. For 5.8 b) (testing): Check at each reception that the relevant parameters of the tests are fulfilled at least once per shift.

Table 10 (continued)

Property	Clause, indicating the relevant test or evaluation method	Acceptance criteria	Minimum frequency
Release of formaldehyde			
Formaldehyde emission	5.9	Class E1 or E2	Control at any reception of adhesives that only adhesives for which an initial classification has been carried out within the Initial Type Testing are used.
Release of other dangerous substances			
Release of other dangerous substances	5.10	As relevant, according to 5.7	

[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.

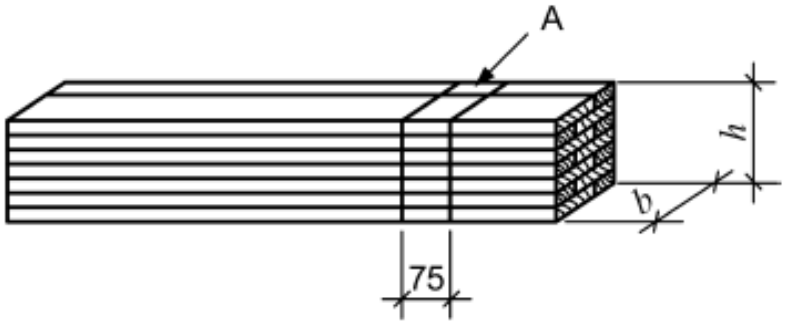
[b] The bonding over the full contact area shall be deemed satisfactory if the mean cramping pressure is at least 0,3 N/mm^2, the depths of the glulam components are not exceeding 600 mm and the width of the smaller glulam component is less than or equal to 200 mm. In this case no specimen needs to be sampled.

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.

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.


A
h
b
75

C.4.3 Test cycle for method A

Place the test piece in the pressure vessel and weigh them down. Add water at a temperature between 10 °C and 20 °C in sufficient quantity so that the pieces are completely submerged through the test. Separate the test pieces by stickers, wire screens, or other means in such a manner that all end-grain surfaces are freely exposed to the water. Draw a vacuum between 70 kPa and 85 kPa (i.e. an absolute pressure between 15 kPa and 30 kPa at sea level) and hold it for 5 min. Then release the vacuum and apply a pressure between 500 kPa and 600 kPa (between 600 kPa and 700 kPa absolute pressure) for 1 h. Whilst the test pieces are still completely immersed, repeat this vacuum pressure cycle making a two-cycle impregnation period requiring a total of 130 min.

Dry the test pieces for a period approximately 21 h to 22 h in a climate according to Table C.1 in the drying duct. During drying the test pieces shall be placed at least 50 mm apart with the end-grain surfaces parallel to the stream of air.

The delaminations shall be observed and recorded.

C.5.2 Total delamination

The total delamination $Delam_{tot}$ of a test piece shall be calculated from Formula (C.1):

$$Delam_{tot} = 100 \frac{l_{tot,delam}}{l_{tot,glue\ line}} \quad \text{(in \%)} \qquad \text{(C.1)}$$

where

$l_{tot,\ delam}$ is the total delamination length (in mm),

$l_{tot,\ glue\ line}$ is the entire length of all glue lines on the two end-grain surfaces of each test piece (in mm).

C.5.3 Maximum delamination

The maximum delamination $Delam_{max}$ of a single glue line in a test piece shall be calculated from Formula (C.2):

$$Delam_{max} = 100 \frac{l_{max,delam}}{2 \cdot l_{glue\ ine}} \quad \text{(in \%)} \qquad \text{(C.2)}$$

where

$l_{max,\ delam}$ is the maximum delamination length (in mm),

$l_{glue\ line}$ is the length of one glue line (in mm).

CE 4321	*CE-marking symbol given in Directive 93/68/EEC* *Identification number of the notified certification body*
AnyCo Ltd **13** 4321-CPD-00234	*Name or identifying mark of the manufacturer* *NOTE Registered address of the manufacturer may also be added.* *Last two digits of the year in which the marking was affixed* *Number of the EC certificate of conformity*
EN 14080:2013 Glued laminated timber Intended to be used in buildings and bridges	*Number of EN with the year of its publication* *Description of the product* *Intended use of the product as laid down in the European Standard applied*
Mechanical resistance and resistance to fire as	*Performance of the mandated characteristics*
– geometrical data (mm)	160 x 800
– strength class	GL 24h
Bonding strength as	
– strength class	GL 24h
– bonding strength test	B
Reaction to fire	D-s2, d0
Release of formaldehyde	E1
Durability of bonding strength	*Other dangerous substances 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.*
– species	*Picea abies*
– adhesive	MUF, Type IGP70S
Durability of other characteristics as	
- natural durability class(es) against wood destroying fungi	Durability class 5