BS EN 15497:2014

BSI Standards Publication

Structural finger jointed solid timber — Performance requirements and minimum production requirements

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National foreword

This British Standard is the UK implementation of EN 15497:2014. Together with BS EN 14080:2013 it supersedes BS EN 385:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/518, Structural timber.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Structural finger jointed solid timber - Performance requirements and minimum production requirements

Bois massif de structure à entures multiples - Exigences de performances et exigences minimales de fabrication

Keilgezinktes Vollholz für tragende Zwecke - Leistungsanforderungen und Mindestanforderungen an die Herstellung

This European Standard was approved by CEN on 6 February 2014.

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Foreword

This document (EN 15497:2014) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by January 2016.

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, along with EN 14080:2013, supersedes EN 385:2001.

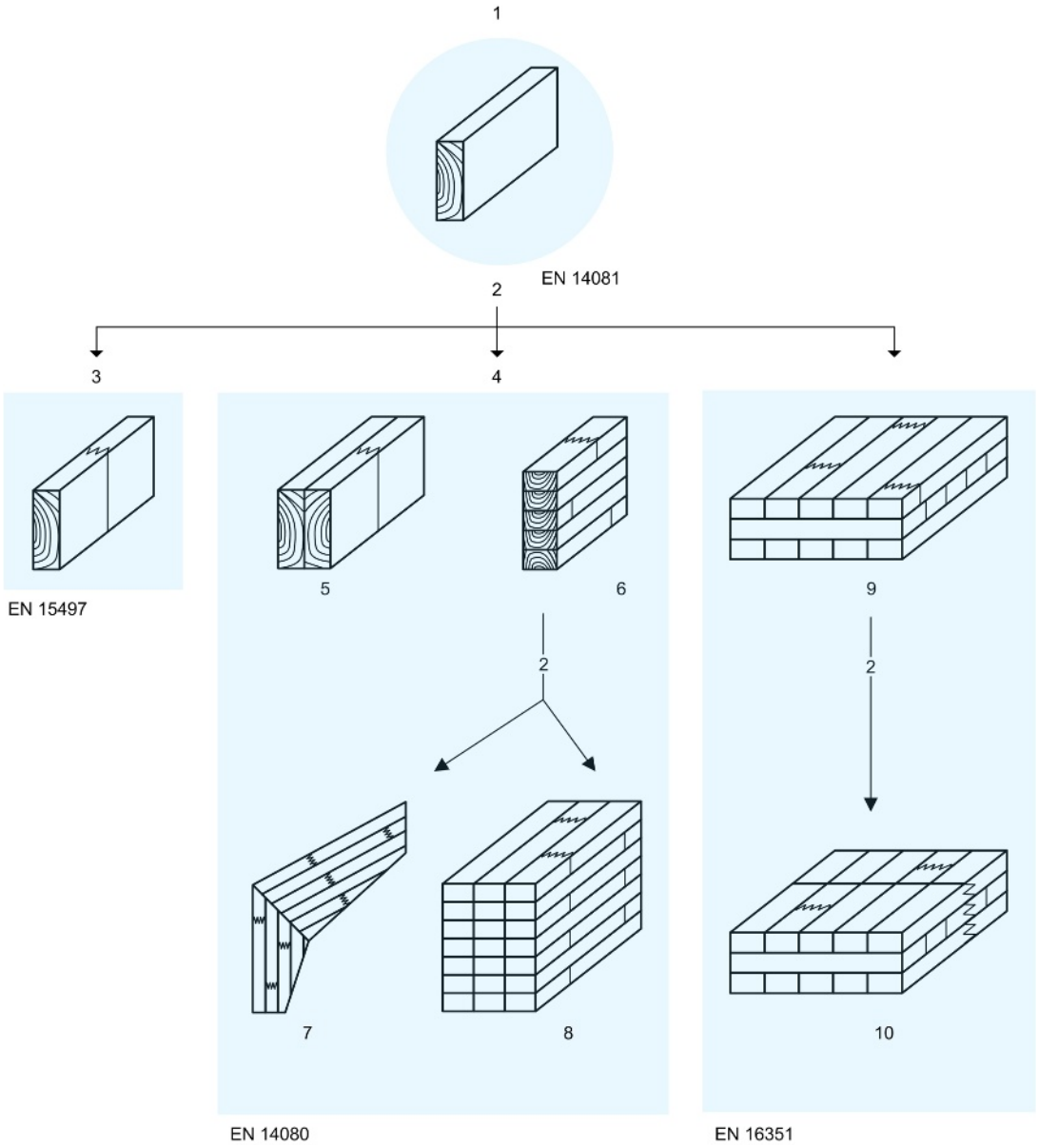
This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic work requirements of Regulation (EU) No 305/2011.

For relationship with the EU Regulations, see informative Annex ZA, which is an integral part of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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.

Introduction

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



Key

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

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

1 Scope

This European Standard sets out provisions regarding the performance characteristics for structural finger jointed timber with rectangular cross section for use in buildings and bridges.

The use of structural finger jointed timber may be limited to certain service classes in some member states.

It also lays down minimum production provisions and procedures for Assessment and Verification of Constancy of Performance for structural finger jointed timber.

This European Standard is applicable to structural finger jointed timber made of coniferous timber species listed in this standard or poplar.

Although it may be possible to produce structural finger jointed timber made from specific broadleaf species based on some provisions of this European Standard, this standard is not applicable to these products.

This European Standard is only applicable to finger joints between timber sections of the same species.

This European Standard does not cover impressed (die-formed) finger joints.

This European Standard covers structural finger jointed timber untreated or treated against biological attack. Structural finger jointed timber treated with fire retardants is 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 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 302-3:2013, *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 effects of wood shrinkage on the shear strength*

EN 302-5:2013, *Adhesives for load-bearing timber structures — Test methods — Part 5: Determination of maximum assembly time under referenced conditions*

EN 336, *Structural timber — Sizes, permitted deviations*

EN 338, *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 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, *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 data from reaction to fire tests*

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

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

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

3 Terms and definitions

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

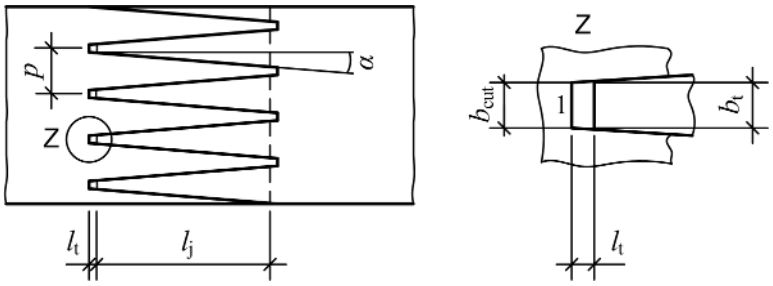
3.1
bonding strength
structural effectiveness of adhesives between timber components when subjected to stresses

3.2
finger angle
inclination α of each side of the fingers of a finger joint

Note 1 to entry: See Figure 2.

3.3
finger joint
interlocking end joint formed by machining a number of similar, tapered, symmetrical fingers in the ends of timber members using a finger joint cutter and then bonded together

Note 1 to entry: See Figure 2:



Key

1 slot base

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 2 — Typical profile of a finger joint

3.4
finger length
distance between the finger base and the tip of the finger, measured along the centre line of the finger

Note 1 to entry: See Figure 2.

3.5
manufacturer specific strength class
set of characteristic strength, stiffness and density properties declared by a manufacturer

3.6
minimum mean density
required mean density at reference moisture content

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

3.7
pitch
distance between centres of adjacent finger tips

Note 1 to entry: See Figure 2.

3.8
ratio of resin to hardener
proportion of resin and hardener by mass with the resin set at 100 parts

3.9
reduction factor
ratio between tip width and pitch

Note 1 to entry: See Figure 2.

3.10
relative tip gap
ratio between tip gap and finger length

Note 1 to entry: See Figure 2.

3.11
tip gap
distance between finger tip and slot base in a bonded finger joint

Note 1 to entry: See Figure 2.

3.12
tip width
distance between finger faces, measured at the tip of the finger

Note 1 to entry: See Figure 2.

4 Symbols

4.1 Main symbols

A	area, in mm^2;
A_W	area of one wane, in mm^2;
a_W	diagonal length of wane, in mm;
b	width of cross section, in mm;
b_{cut}	tip width of the cutter, in mm (see Figure 2);
b_t	tip width, in mm (see Figure 2);
d	diameter, in mm;
e	relative tip gap;
f	strength, in N/mm^2;
h	depth of cross section, in mm;
k_{15}	statistical factor;
k_f	divisor for flatwise bending;
l_j	finger joint length, in mm;
l_t	tip gap, in mm (see Figure 2);
p	pitch, in mm (see Figure 2);
u	moisture content, in %;
v	reduction factor of a finger joint;
α	finger angle, in degree (see Figure 2).

4.2 Subscripts

dc	declared value;
j	properties of finger joints;
k	characteristic;
m	bending;

0 parallel to the grain;

05 5 %-fractile.

5 Performance characteristics for structural finger jointed timber

5.1 Mechanical resistance

5.1.1 General

This European Standard covers the following mechanical resistance characteristics: modulus of elasticity and bending strength, compressive strength, tensile strength and shear strength. These characteristics may be determined either by testing or by strength grading according to EN 14081-1 and declared either as individual values or as strength class. For the declaration of the bending strength of the structural finger jointed timber, 5.2.1 shall be taken into account.

In order to allow the calculation of the mechanical resistance of any structural product made with structural finger jointed timber it is necessary to determine and declare also the cross section of the finger jointed timber.

NOTE The above mentioned mechanical resistance characteristics of the structural finger jointed timber, together with the cross section, allow the determination of the mechanical performance of structural elements made with this structural material using the relevant calculation methods applicable in the country of final use.

5.1.2 Timber

The timber used in the manufacturing of structural finger jointed timber shall be strength graded according to EN 14081-1.

5.1.3 Bending strength of finger joints

The bending strength of the finger joints shall be determined and declared according to Annex C and shall be equal to or greater than the declared characteristic bending strength of the unjointed timber.

If it is intended to manufacture preservative treated structural finger jointed timber it shall be verified that the treatment does not affect the strength of the finger joints.

5.1.4 Related material properties

If the provisions of 5.1.3 are met the strength, stiffness and density properties of structural finger jointed timber shall be declared as the properties of the unjointed timber, e.g. as a strength class according to EN 338.

The designation of strength classes shall be accompanied by the letter M, if machine graded. If the designation of a manufacturer specific strength class is Cxx (where “xx” is the characteristic bending strength) it shall be accompanied by the company name, e.g. C24 AnyCompany.

5.2 Bonding strength and durability of bonding strength

5.2.1 General

Durable and reliable finger joints can only be achieved under accurately defined conditions of production. That general provision shall be considered satisfied if the respective minimum production provisions given in Annex G are fulfilled.

The bonding strength of the finger joints in the finger jointed timber is determined by the bending strength of the finger joints according to Annex C and is declared as the characteristic bending strength of the timber used in the manufacturing of the finger jointed timber.

Durability of bonding strength is declared indirectly by reference to species, adhesive type and adhesive family.

5.2.2 Species

Structural finger jointed timber shall consist of only one species throughout.

This European Standard covers structural finger jointed timber made from one of the following species:

Norway spruce (*Picea abies*, PCAB), Fir (*Abies alba*, ABAL), Scots pine redwood (*Pinus sylvestris*, PNSY), Douglas fir (*Pseudotsuga menziesii*, PSMN), Western Hemlock (*Tsuga heterophylla*, TSHT), Corsican pine (*Pinus nigra Arnold subsp. laricio, PNNL),* Austrian pine (*Pinus nigra Arnold subsp. nigra*, PNNN), European larch (*Larix decidua*, LADC), Siberian larch (*Larix sibirica,* LASI), Dahurian larch (*Larix gmelinii (Rupr.) Kuzen.*), Poplar (Applicable clones: *Populus x euramericana cv "Robusta", "Dorskamp", "I214" and "I4551"*, POAL), Maritime pine (*Pinus pinaster*, PNPN), Radiata-Pine (*Pinus radiata*, PNRD), Sitka-spruce (*Picea sitchensis*, PCST), Southern Yellow pine (*Pinus palustris*, PNPL), Western Red Cedar (*Thuja plicata*, THPL), Yellow Cedar (*Chamaecyparis nootkatensis*, CHNT).

Norway spruce and Fir may be considered as one species.

NOTE 1 Letter codes according to EN 13556, if available, are given after the botanical name.

NOTE 2 Not all of the species listed above have a national grade related to a European strength class in EN 1912.

5.2.3 Adhesives for the production of structural finger jointed timber

5.2.3.1 General

Adhesives shall enable the production of durable bonds in structural finger jointed timber throughout the lifetime of the structure for the required service class according to EN 1995-1-1.

For structural finger jointed timber used in service class 1 adhesives, which can be assigned to an adhesive type I or II (including subclasses, if relevant) according to EN 301:2013, Table 1, or EN 15425:2008, Table 1, shall be used. For structural finger jointed timber used in service class 2 or 3 adhesives, which can be assigned to an adhesive type I (including subclasses, if relevant) according to EN 301:2013, Table 1, or EN 15425:2008, Table 1, shall be used. Emulsion polymer isocyanate adhesives shall also be assigned to an adhesive type according to EN 15425:2008, Table 1.

Taking into account the restrictions given in the referred subclauses, the following adhesive families are applicable:

— phenolic and aminoplastic adhesives (e.g. MF, MUF, PRF, UF) in accordance with 5.2.3.2;

— moisture curing one-component polyurethane adhesives (PUR) in accordance with 5.2.3.3;

— emulsion polymer isocyanate adhesives (EPI) in accordance with 5.2.3.4.

NOTE The applicability of adhesives may be further limited by national provisions valid at the place of use.

If a preservative treatment is done before the bonding of the timber, it shall be documented that the provisions are fulfilled for the combination of the preservative and adhesive.

5.2.3.2 Phenolic and aminoplastic adhesives

Phenolic and aminoplastic adhesives shall fulfil the provisions of EN 301.

5.2.3.3 Moisture curing one-component polyurethane adhesives

Moisture curing one-component polyurethane adhesives shall fulfil the provisions of EN 15425 and B.2 taking into account the conditions given in B.1.

The provisions given in EN 302-5:2013, 5.1, 2nd paragraph apply. For moisture curing one-component polyurethane adhesives to be used in finger joints in larch wood the delamination test according to EN 302-2 may be replaced by tests according to EN 301:2013, Annex A, with larch wood.

5.2.3.4 Emulsion polymer isocyanate adhesives

5.2.3.4.1 General

Emulsion polymer isocyanate adhesives shall only be used for finger jointed structural timber to be used in service classes 1 and 2.

Emulsion polymer isocyanate adhesives shall be tested in accordance with EN 15425 and B.2 taking into account the conditions given in B.1 and the respective provisions shall be fulfilled.

5.2.3.4.2 Systems tested with a maximum glue line thickness of 0,3 mm

Testing according to EN 15425 and B.1 and B.2 may be done with a maximum glue line thickness of 0,3 mm instead of 0,5 mm if the glue line thicknesses in the finished structural finger jointed timber do not exceed 0,2 mm;

For tests with a maximum glue line thickness of 0,3 mm the provisions given in EN 15425 shall apply with the following exceptions:

— For bonding strength in longitudinal tensile strength tests according to EN 302-1 with a glue line thickness of 0,3 mm, the provisions given in Table 1 shall be met.

— For creep deformation tests with specimens loaded in bending shear according to EN 15416-3, the specimens shall have a glue line thickness of 0,2 mm.

Table 1 — Required mean shear strength in N/mm^2 for lap shear tests according to EN 15425 for samples glued with EPI having a glue line thickness of 0,3 mm

	Adhesive type	
Treatment	Type I	Type II
A1	9,5	9,5
A2	5,5	5,5
A3	7,6	7,6
A4	5,5	NR [a]
A5	7,6	NR [a]
A6	NR [a]	8,3
A7	7,2	NR [a]
[a] Treatment cycle not required (NR).		

5.3 Durability against biological attack

5.3.1 Structural finger jointed timber without preservative treatment

The natural durability of structural finger jointed timber shall be taken as the natural durability of the timber from which it is made and shall be assessed according to EN 14081-1.

5.3.2 Structural finger jointed timber with preservative treatment

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

If either preservative treated timber is jointed or structural finger jointed timber is preservative treated, the information given in EN 15228:2009, Clause 6, shall be declared.

NOTE The use of timber preservatives may be restricted by provisions valid at the place of use.

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

5.4 Resistance to fire

Resistance to fire of structural finger jointed timber shall be declared according to EN 13501-2 indirectly by geometrical data (member sizes) and material properties (charring rate). Charring rate is declared indirectly by declaring both the species and the characteristic density. These parameters allow selecting the appropriate charring rate from the respective fire design code.

NOTE The above mentioned fire resistance characteristics of the structural finger jointed timber, together with the cross section, allow the determination of the fire resistance performance of structural elements made with this structural material using the relevant calculation methods applicable in the country of final use.

5.5 Reaction to fire

The class of reaction to fire performance of the structural finger jointed timber (including the additional classification on smoke production and flaming droplets/particles, if any), 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 (CWFT), as given in Table 2, if the structural finger jointed timber is proved to meet the provisions of the class given therein[1)];

b) or based on testing of the structural finger jointed timber according to the standards, referred to in EN 13501-1, when such a structural finger jointed timber does not meet the provisions of Table 2 or where a higher classification than the one in a) is sought. Tests may be done without conditioning according to EN 13238 with specimens having a moisture content of $u \leq 15$ %. The moisture content shall be reported.

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.

1) A Commission´s decision on the applicability of Table 2 for structural finger jointed timber has been filed.

Table 2[2)] — Classes of reaction to fire performance for structural timber[a] without the need of further testing

Product	**Product details**	**Minimum mean density** [b] kg/m^3	**Minimum overall thickness** mm	**Class** [c] (excluding floorings)
Structural timber	Visual and machine graded structural timber with rectangular cross sections shaped by sawing, planing or other methods or with round cross sections	350	22	D-s2, d0

[a] Applies to all species 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.

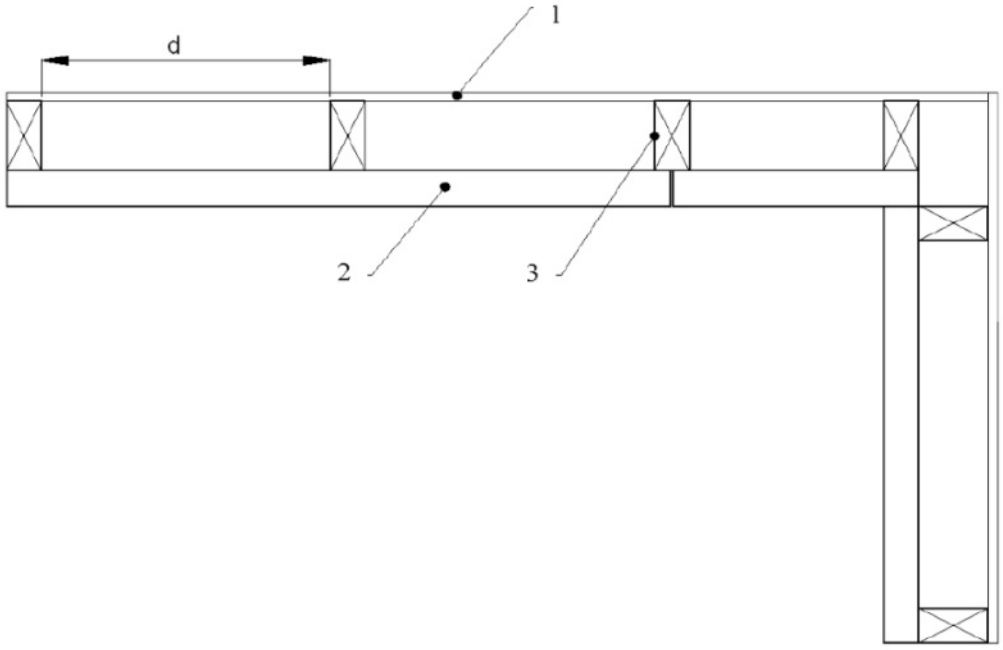
When reaction to Fire is determined by testing the product shall be tested according to EN 13823 (SBI test) and mounted and fixed in accordance with the following:

— the whole area of both wings in the SBI apparatus shall be covered with pieces of structural flinger jointed timber 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 3.

NOTE Test results are valid for finger jointed structural timber having at least the density and the minimum overall thickness of the specimens tested.

2) This table is the same as given in the Decision of the Commission 2003/593/EC of 2003-08-07 *(see OJEU L201 of 2003-08-08)*.



Key

400 mm ≤ d ≤ 600 mm

1 backing board

2 structural finger jointed timber

3 batten (cross section: 40 mm x 80 mm)

Figure 3 — Top view of fixing system for reaction to fire test according to EN 13823

5.6 Formaldehyde emission

The release of formaldehyde shall be declared as Class E1 or E2 according to Annex A.

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

5.7 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 European Standard are placed on those markets.

In the absence of European harmonized tests methods verification and declaration on release/content should be done taking into account national provisions in the place of use.

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

5.8 Deviation in sizes

The corrected sizes shall be calculated according to EN 336. They shall not deviate from the nominal width and thickness by more than the permissible deviations of the declared tolerance class given in EN 336.

6 Assessment and Verification of Constancy of Performance (AVCP)

6.1 General

The compliance of structural finger jointed timber with the provisions 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 3 of this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions 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 provisions 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

Products may be grouped in different families for different characteristics.

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 finger jointed timber 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 finger jointed timber 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 2 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 finger jointed timber product manufacturer to ensure that the structural finger jointed timber 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 3.

Table 3 — Numbers of samples to be tested and compliance criteria

Characteristics[a]	**Clause**	**Assessment method**	**No. of samples**	**Compliance criteria**
Mechanical resistance of structural finger jointed 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	EN 14081–1:2005+A1:2011, 6.2	EN 14081–1:2005+A1:2011, 6.2
Finger joints	5.1.3	Annex C (test)	For each production line, each combination of species and adhesive, the highest declared characteristic bending strength of the timber and the largest cross section: - 30 specimens tested in edgewise bending	C.3 in combination with 5.1.3
		Annex C (test)	For the determination of k_f (if relevant) for each finger joint geometry, the highest declared characteristic bending strength of the timber and the cross section with the smallest number of fingers: - at least 30 specimens tested in edgewise bending and - at least 30 specimens tested in flatwise bending	C.3 in combination with 5.1.3
Geometrical data	5.8	5.8 (measurement)	–	5.8
Bonding strength				
Finger joints	5.1.3	As for mechanical resistance		

Characteristics[a]	**Clause**	**Assessment method**	**No. of samples**	**Compliance criteria**
Durability of bonding strength expressed as				
Species	5.2.2	5.2.2 (check)	-	5.2.2
Adhesive characteristics	5.2.3.1 and 5.2.3.2 for phenolic and aminoplastic adhesives[b]	EN 302–1, EN 302–2, EN 302–3, and EN 302–4 (test)	according to EN 302–1, EN 302–2, EN 302–3, and EN 302–4	The provisions for the respective adhesive type class and subclasses given in EN 301 shall be fulfilled
	5.2.3.1 and 5.2.3.3 for moisture curing one-component polyurethane adhesives[b]	EN 15425 (test)	EN 15425	EN 15425
		and B.2 (test)	80	B.2
		and EN 302–2:2013, 5.1, 2nd para. (test) or	EN 302–2:2013, 5.1, 2nd para.	EN 302–2:2013, 5.1, 2nd para.
		For adhesives to be used with larch according to EN 301:2013, 5.7, 2)	EN 301:2013, 5.7, 2)	EN 301:2013, 5.7, 2)
	5.2.3.1 and 5.2.3.4 For emulsion polymer isocyanate adhesives[b]	EN 15425 (test)	EN 15425	5.2.3.4
		and B.2 (test)	80	B.2
Moisture of timber to be jointed[b]	D.1	D.1 (test)	100 timber pieces for each species	D.1
Durability against biological attack				
Without preservative treatment	5.3.1	5.3.1 (check)	–	Provisions for the declared durability-class(es) according to EN 350–2 shall be fulfilled
With preservative treatment	5.3.2	5.3.2 (test)	acc. to EN 15228	acc. to EN 15228
Resistance to fire				
Density properties of timber[c]	5.1.2	EN 14081–1	EN 14081–1:2005+A1:2011, 6.2	EN 14081–1:2005+A1:2011, 6.2
Geometrical data[c]	5.8	5.8 (measurement)	–	5.8
Species[d]	5.2.2	5.2.2 (check)	-	5.2.2
Reaction to fire				
Reaction to fire	5.5	Table 2 (CWFT) (check)	–	Table 2
		or test acc. to methods referred in EN 13501–1	according to EN 13501–1	Classes according to EN 13501–1
Release of formaldehyde				
Formaldehyde emission	5.6	Annex A	Annex A	Class E1 or E2

Characteristics[a]	Clause	Assessment method	No. of samples	Compliance criteria
Release of other dangerous substances				
Release of other dangerous substances	5.7	As relevant, according to 5.7		

[a] Where further references to Annex G are made in Clause 5 the corresponding provisions 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 structural finger jointed timber with some documentations on tests previously performed by notified product certification bodies (shared other party results, see 6.2.4).

[c] See also mechanical resistance.

[d] See also durability of bonding strength.

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 finger jointed timber 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:

a) the results are known to be valid for products with the same essential characteristics relevant for the product performance;

b) 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 accepted [3)] 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);

c) the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

   1) 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

   2) 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.

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

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 agreement[4)], some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)[5)] 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.

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.

4) 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.

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

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 provisions 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, provisions and provisions 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 6.2.4.

6.3.2 Provisions

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.

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 provisions 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 provisions of the present European Standard are considered as satisfying the FPC provisions 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 Annex E 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 finger jointed timber 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:

a) quality aims and organisational structure, responsibilities and powers of the management with regard to conformity of the products;

b) procedures for specifying and verifying the compliance of the timber and the bonding;

c) manufacturing, production control and other techniques, processes and systematic actions to be taken.

For the bonding processes in accordance with Annex G the following shall be recorded:

— production line;

— date and number of production;

— species;

— strength class or manufacturer specific strength class;

— cross sectional dimensions of the products;

— finger joint profile;

— moisture content;

— pressing time;

— cramping pressure;

— adhesive, e.g. resin and hardener;

— quantity of adhesive applied (g/m^2);

— ratio of resin and hardener, if relevant;

— information on preservative treatment in accordance with EN 15228, if the timber has 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.

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 provisions of Annex G are fulfilled. The characteristics and the means of control shall be as given in Table 4.

Table 4 — Factory production control for structural finger jointed timber

Characteristic	**Clause, indicating the relevant test or evaluation method**	**Acceptance criteria for tests**	**Minimum frequency**
Mechanical resistance of structural finger jointed timber products 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 14081–1:2005+A1:2011, 6.3	EN 14081–1:2005+A1:2011, 6.3
Finger joints in timber	Annex C	See C.3 and required value according to 5.1.3	2 specimens per shift (e.g. 8 h) and line taken at random for each combination of strength class or manufacturer specific strength class, species and adhesive[a]
Geometrical data	5.8	5.8	Check at each change of cross section
Bonding strength			
Finger joints in timber	Annex C	As for mechanical resistance	
Durability of bonding strength			
Species	5.2.2	-	Check on receipt
Adhesive	5.2.3	-	Check on receipt
For contact-free adhesive application	G.4.5.4	G.4.5.4	for automated monitoring systems: 2 per shift, evenly distributed in time for visual monitoring: 1 per two h
Moisture content of timber to be jointed	D.1	D.1	Measurement according to the quality manual of the manufacturer of the structural finger jointed timber product
	and D.2 (if relevant)	D.2	At least one measurement per month
Resistance to fire			
Density properties of timber[b]	5.1.2	EN 14081–1:2005+A1:2011, 6.3	EN 14081–1:2005+A1:2011, 6.3
Species[c]	5.2.2	-	Check on receipt

Characteristic	Clause, indicating the relevant test or evaluation method	Acceptance criteria for tests	Minimum frequency
Reaction to fire			
Reaction to fire	5.5		For 5.5 a) (CWFT): Control the minimum mean density, minimum overall thickness and preservative treatment (if any) at least once per shift. For 5.5 b) (testing): Check that the relevant parameters of the tests are fulfilled at least once per shift.
Durability against biological attack			
Species or preservative treatment of timber	5.3.1 or 5.3.2	-	Check the species the preservative treatment according to EN 15228:2009, 5.3 on receipt
Release of formaldehyde			
Formaldehyde emission	5.6	Class E1 or E2	Control on receipt 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	5.7	As relevant, according to 5.7	

[a] If by proof-loading it is proved that the declared characteristic strength value is met, then the testing can be reduced to at least one specimen per shift (e.g. 8 h) and line for each combination of strength class or manufacturer specific strength class, species and adhesive.

[b] As for mechanical resistance.

[c] As for durability of bonding strength.

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 provisions 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 provisions 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.

6.3.3 Product specific provisions

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

Initial inspection of factory and of FPC shall be carried out when the production process has been finalised and in operation. The factory and FPC documentation shall be assessed to verify that the provisions of Subclauses 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 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 b) 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 provisions are fulfilled when assessing one product, production line or production process, then the assessment of the general provisions 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.

6.3.5 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 and labelling

Each structural finger jointed timber, 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:

a) identity of the manufacturer, logo or name;

b) strength class according to EN 338 or manufacturer specific strength class;

c) production date or traceability code;

d) adhesive type according to EN 301 or EN 15425 and adhesive family according to 5.2.3.1;

NOTE Subclasses according to EN 301 need not be given.

e) “PT”, if the structural finger jointed timber is treated against biological attack.

Where the structural finger jointed timber is cut into parts, each part shall be re-marked.

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 structural finger jointed timber 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 structural finger jointed timber.

Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met and the information needs not be repeated for the purpose of this clause.

Annex A
(normative)

Release of Formaldehyde

A.1 General

The release of formaldehyde from structural finger jointed timber depends on the type of adhesives used.

A.2 Classification

A.2.1 Provisions

Where formaldehyde containing adhesives are used, the subsequent release of formaldehyde from structural finger jointed timber shall be assessed by testing as specified in A.2.2 and the corresponding class according to Table A.1 declared. The evaluation of release of formaldehyde shall be carried out for each type of adhesive used.

The maximum steady-state emission values for structural finger jointed timber shall be used, when assessing the formaldehyde release as Classes E1 or E2 according to Table A.1.

Table A.1 —Release of formaldehyde classes

Formaldehyde release classes	**Maximum steady-state emission values** in mg HCHO/m^3 air
E1	≤ 0,124
E2	> 0,124

The formaldehyde emission of structural finger jointed timber produced with adhesive not containing formaldehyde, can be taken as the formaldehyde emission of solid timber.

The maximum steady-state emission values of solid timber normally are much less than 0,124 mg HCHO/m^3 air.

Structural finger jointed timber contains significantly less formaldehyde than glued laminated timber. Therefore tests may be made with samples of glued laminated timber made from the same species and with the same adhesive and the results applied for the classification of structural finger jointed timber.

NOTE 1 In conventional structures under typical conditions of use, structural finger jointed timber, conforming to formaldehyde release class E1 is unlikely to result in an indoor air concentration exceeding 0,1 ppm formaldehyde.

NOTE 2 In certain Member States only products of class E1 are allowed.

A.2.2 Test procedure

The testing in a chamber shall be carried out according to EN 717-1 with a loading factor of 0,3 m^2/m^3. A test chamber with a volume of at least 1m^3 shall be used.

A.2.3 Test report

A test report according to EN 717-1 shall be written.

Annex B
(normative)

Additional test methods and provisions for adhesives

B.1 General

The adhesives to be tested shall be ready for use and shall be, if the manufacturer of the structural finger jointed timber intends to mix them before application in the subsequent production, mixed according to the instructions of the adhesive manufacturer. They shall have the viscosity in which they are used in practice. If no other specifications are given by the adhesive manufacturer the hardener shall be stirred in for 5 min using a stirring device.

B.2 Long-term sustained load test at cyclic climate conditions with specimens loaded perpendicular to the glue line for moisture curing one-component polyurethane and emulsion polymer isocyanate adhesives

B.2.1 General description

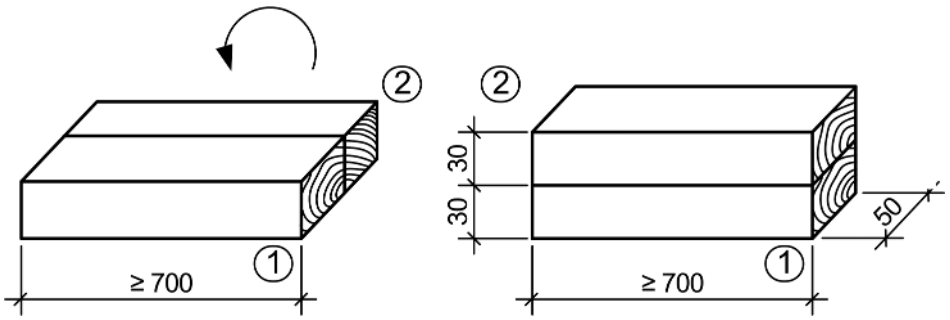
The tests shall be performed with specimens according to EN 302-3. As a divergence to EN 302-3, the specimens are made from beech wood with a glue line thickness of 0,1 mm. The beech wood boards from which the specimens are cut shall be free from knots, straight grained and shall have a density larger than 650 kg/m^3 at 20 °C/65 % rh. The timber prior to specimen manufacture shall be conditioned in a climate chamber at storage conditions of (20 ± 2) °C and (65 ± 5) % rh. The moisture content shall be (12 ± 1) %.

B.2.2 Production of the specimens

In total, 5 sticks with a cross section of 50 mm × 60 mm and a length of at least 700 mm, enabling the cutting of 8 test specimens and 2 reserve specimens from each stick of the specimen type described in EN 302-3, shall be manufactured for each glue line thickness. The 10 specimens for each test are made up of two specimens (see Figure B.2) from each stick. Figure B.2 gives a view of the stick and of the cutting scheme for its subdivision into 10 specimens for the determination of the tensile strength perpendicular to the glue line. The manufacture and build-up of the sticks shall follow the scheme shown in Figure B.1a) and B.1b). The annual ring orientation of both components glued together shall be roughly co-linear and shall be in the range of 30° to 60°.

NOTE For details of cutting see EN 302–3:2013, Clause 5, and Figure B.1.

Dimensions in mm



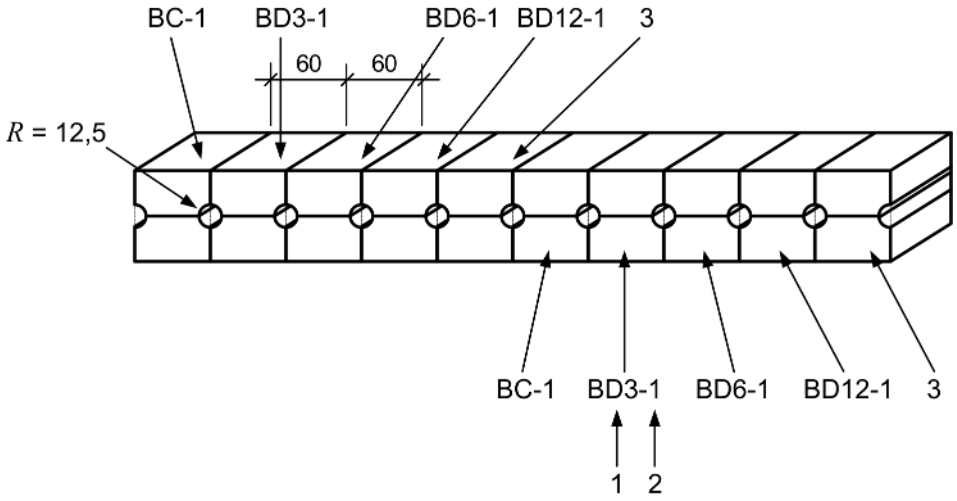
a) Dimensions before cutting **b) Dimensions after planing**

Key

1 and 2 positions of corners before cutting and after planing

Figure B.1 — Cutting scheme of the parts of the test sticks

Dimensions in mm



Key

1 test batch (BC = control batch, BD *x* = Batch for a test after a duration of *x* months)

2 current specimen number

3 reserve sample

Figure B.2 — Cutting scheme for test stick and numbering of specimens

B.2.3 Test procedure and climate conditions

The test procedure shall consist of the following test series:

a) short-term testing of a control batch BC of 10 specimens in ramp loading. The specimens are tested after 14 days of conditioning in (20 ± 2) °C and (65 ± 5) % rh subsequent to gluing;

b) long-term testing of 3 batches BD3, BD6, BD12, each with 10 specimens, whereby each batch shall be subjected to a different duration of loading time being 3 months, 6 months and 12 months. All batches shall be subjected to the same constant stress level specified below. At the end of each loading period, all

specimens of the respective batch not having failed shall be tested for residual tensile strength perpendicular to the glue line in ramp loading.

Constant stress equal in all 3 duration of load times shall be 1 N/mm^2 related to the net cross section of 25 mm × 50 mm.

The test climate shall be at natural outdoor conditions in Europe between latitude 45° and 60° protected with light penetrable covering (glass house).

An alternative test procedure is to use a climate chamber with cyclically stepped climate varying stepwise with 24 h step length between two climates (10 ± 2) °C with (90 ± 5) % rh and (35 ± 2) °C with (40 ± 5) % rh.

The specimens tested for residual strength after removal of the constant long-term load shall be conditioned at least for 2 weeks in climate (20 ± 2) °C and (65 ± 5) % rh before ramp loading.

The climate shall be recorded.

B.2.4 Provisions

The mean tensile strength perpendicular to the grain of the control batch BC and of each of the batches BD3, BD6 and BD12 tested for residual strength after 3 months, 6 months and 12 months of duration of load shall not be less than 5 N/mm^2. In each batch tested in long-term loading only one specimen may fail within each of the respective load duration periods. In case a specimen has failed in long-term loading, the mean value of the residual strength of the respective batch shall be calculated from the remaining 9 specimens.

B.2.5 Report

A test report according to EN 302-3 and records of the climate during testing shall be given.

Annex C
(normative)

Bending tests with finger joints (including compliance criteria)

C.1 Sampling

C.1.1 General

The whole jointed cross section of the specimens shall be tested. The finger joints shall be in the middle of the specimens. If it is intended to manufacture preservative treated structural finger jointed timber specimens from such preservative treated structural finger jointed timber shall be taken.

C.1.2 For type testing

The number of specimens shall be as indicated in Table 3.

C.1.3 For factory production control

The number of specimens shall be as indicated in Table 4. The specimens taken in a shift shall, as far as possible, be taken evenly distributed in time.

C.2 Testing

C.2.1 General

Finger joints in structural finger jointed timber shall be tested in bending according to EN 408, with the following exceptions:

— the knot free length of the joints shall bothway be at least 3 d, where d is the diameter of the knot;

— only sufficiently cured finger joints shall be tested. Testing shall take place within 3 days of manufacture or when the finger joints are cured.

C.2.2 Additional provisions for type testing

For type testing the following additional provisions apply:

— the surface finish of the specimens at test shall be the same as that of the normally supplied structural finger jointed timber;

— testing may be done without conditioning the specimens as described in EN 408. If the specimens are not conditioned according to EN 408, the moisture content shall be measured according to Annex D. No specimen shall have a moisture content below 10 %.

C.2.3 Additional provisions for factory production control

For factory production control the following additional provisions apply:

— the ultimate load should be reached within (60 ± 15) s;

— the accuracy of measuring the maximum load shall be better than ± 3 % of this load;

— testing may be done without conditioning the specimens as described in EN 408. The moisture content shall be measured according to Annex D;

— the density need not to be determined;

— bending tests may be done in flatwise bending. To convert flatwise bending strength to edgewise bending strength by $f_{m,edgewise} = f_{m,flatwise} / k_f$ the divisor k_f given in Table C.1 or derived from type testing shall be used. For square members, testing shall be carried out with the fingers visible on the face parallel to the load direction.

Table C.1 — Divisor k_f for converting flatwise bending strength to edgewise bending strength

Orientation	**Divisor k_f**
Fingers visible on the face perpendicular to load direction	1,25
Fingers visible on the face parallel to load direction	1,0

C.3 Compliance criteria

C.3.1 For type testing

The characteristic bending strength value and the coefficient of variation shall be calculated according to EN 14358. If relevant, the divisor for the correlation between edgewise and flatwise bending strength, k_f shall be calculated as $k_f = f_{m,j,k,flatwise} / f_{m,j,k,edgewise}$.

C.3.2 For factory production control

For each production line, declared bending strength value and shift: the declared bending strength shall be acceptable if one of the following provisions a) or b) is met.

a) Of the last 100 joints tested, the values of the bending strength $f_{m,j,k}$ of each single joint shall relate to the threshold value $f_{m,j,k,dc}$ as follows:

   1) not more than 5 values shall be below the threshold value and

   2) no value shall fall below 80 % of the threshold value.

b) The characteristic bending strength $f_{m,j,k} = k_{15}\ f_{m,j,15,mean}$ of the last 15 finger joints tested in flatwise bending shall be higher than or equal to the declared characteristic bending strength $f_{m,j,dc,k}$.

   Where k_{15} is a statistical factor, taken from Table C.2 and $f_{m,j,15,mean}$ is the mean bending strength of the last 15 finger joints.

Table C.2 — Factor k_{15}

Coefficient of variation according to EN 14358	**≤ 0,10**	**0,15**	**0,20**	**0,25**	**0,30**
k_{15}	0,82	0,74	0,67	0,61	0,55

C.4 Report

The following items shall be reported:

— production line;

— reference to this European Standard;

— date of production;

— date of the test;

— timber species;

— strength class or manufacturer specific strength class;

— preservative treatment (if relevant);

— type and trade name of adhesive;

— effective proportion of resin and hardener (if relevant);

— density (only for type testing), in kg/m^3;

— moisture content, in %;

— width and height of the timber, in mm;

— finger joint profile;

— finger joint orientation;

— ultimate test load at failure, in N;

— bending strength, in N/mm^2;

— description of the failure mode including amount of reaction wood;

— mean value(s) $f_{m,j,mean}$ and coefficient of variation (if relevant), in N/mm^2 and %, respectively;

— k_f (if relevant);

— name of the person responsible for the testing.

Annex D
(normative)

Measurement of moisture content

D.1 General

Moisture meters shall enable to measure the moisture content of timber with an accuracy of ± 2 % moisture content.

The accuracy of a moisture meter according to EN 13183-2 or EN 13183−3 shall be checked by comparison with results from measurements with the oven dry method according to EN 13183-1.

D.2 Measurement of moisture content of timber during production

The moisture content of each piece of timber shall be measured during processing.

The accuracy of the moisture meter shall be checked for each combination of species and preservative treatment (if relevant) with timber pieces having representative cross sections and with moisture contents covering the likely range of moisture contents during production, but at least a range of 8 % moisture content difference.

If the measurement is done by an electrical resistance moisture meter the electrodes shall be driven into one face of the timber at a distance of at least 0,3 times the width from the edge and at least 0,3 m from either end of the timber so that the tips of the electrodes penetrate into a depth of 0,3 times the thickness of the timber, max 40 mm. Lower penetration depths are allowed if correlation is checked within Factory Production Control.

If the measurement is done by an in-line capacitive moisture meter the mean value of the measured data are to be used.

D.3 Mean moisture content of structural finger jointed timber

The mean moisture content shall be measured with an electrical resistance moisture meter. Measurements shall be done at a point not nearer than 1 m from either end or in the centre of the piece if it is less than 2 m long using insulated electrodes having a maximum penetration length of 40 mm.

The mean moisture content shall be estimated from at least three measurements in different timber pieces being part of the structural finger jointed timber.

Annex E
(normative)

Equipment

Equipment shall be available to:

a) machine strength grading or visual strength grading when these operations are carried out by the manufacturer;

b) monitor continuously the temperature and relative humidity of the air (e.g. thermo hygrograph) in storage, production and curing areas;

c) moisten the air, if necessary;

d) measure the temperature of the timber;

e) measure the moisture content of the timber and for checking moisture meters for measurements according to Annex D;

f) produce finger joints with sufficient and reliable strength;

g) weigh and mix resin and hardener in the required proportions (if relevant);

h) uniformly apply the required quantity of adhesive.

Annex F
(normative)

Separation tests with finger joints produced with contact-free application of adhesive

An arbitrarily chosen finger joint shall be sampled directly after pressing, but before curing.

A slab with the finger joint shall be cut next to the slot bases and all finger surfaces shall be separated by manual breaking.

The adhesive coverage of all finger surfaces shall be inspected visually and the result shall be documented.

Annex G
(normative)

Minimum production provisions

G.1 Personnel

The personnel shall have adequate training in the production of the structural finger jointed timber and in the factory production control in order to allow meeting the relevant provisions of 6.3.

G.2 Production and storage facilities

G.2.1 General

The production and storage facilities shall be suitable for all phases of the production of the structural finger jointed timber, taking into consideration the provisions given in this standard.

G.2.2 Facilities for drying and storage of timber

Drying facilities of sufficient capacity shall be available when the drying is carried out by the manufacturer of the structural finger jointed timber.

Storage facilities of sufficient capacity shall be available to maintain the required moisture content of the timber.

Storage facilities of sufficient capacity shall be available to achieve the required temperature of the timber for the respective operation.

G.2.3 Facilities for processing and storage of adhesives

Unless resin and hardener are pumped directly from storage tanks and mixed automatically during application, there shall be a separate area for the preparation of the adhesive (mixing of resin and hardener). There shall also be suitable resin and hardener storage facilities and an area for cleaning the adhesive equipment.

G.2.4 Facilities for production and curing

The air temperature and relative humidity in the facilities for production and curing shall ensure that the required temperature at the glue line is reliably achieved and that no inadmissible changes in moisture content of the timber occurs until the structural finger jointed timber are fully cured.

The air temperature in the production and curing facilities shall be at least 15 °C. The instructions of the adhesive manufacturer shall be regarded.

G.3 Equipment

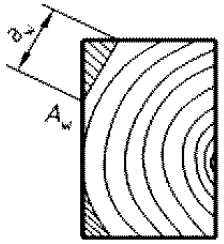
The equipment shall be suitable for all phases of the production, taking into consideration the provisions given in this standard. The equipment given in Annex E shall be available.

G.4 Finger joints

G.4.1 Wane and edge damages

There shall be no wane or edge damage affecting more than two corners at the joint within the finger length and within 75 mm of the root of the fingers. The area A_w of the wane at any corner shall not exceed 1 % of the cross sectional area (see Figure G.1).

NOTE Conformity with this provision can be verified by measuring the diagonal a_w of the wane and demonstrating that it is less than the maximum diagonal given in Figure G.2 as a function of the cross sectional area A.

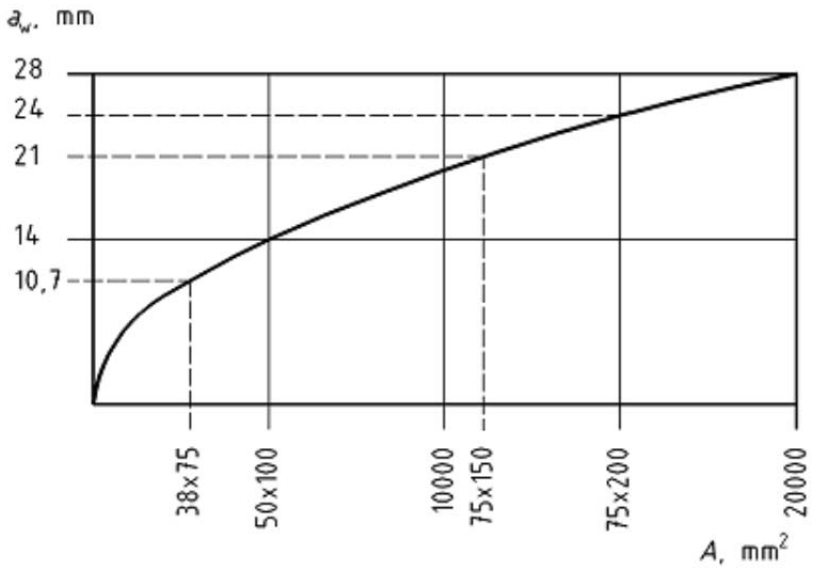


Key

a_w maximum diagonal of wane

A_w area of wane

Figure G.1 — Cross section of timber with wane



Key

$a_{w,max}$ maximum diagonal of wane

A cross sectional area of timber

Figure G.2 — Maximum diagonal of wane $a_{w,max} = \sqrt{A}/5$

G.4.2 Finger joint geometry

The geometry of the fingers shall permit the joint to be self-interlocking after pressing. Recommended relations for tip width to width of cutter b_t / b_{cut} are $1{,}1 \leq b_t / b_{cut} \leq 1{,}2$.

The finger length l_j, the pitch p, the tip width b_t, the reduction factor $v = b_t / p$ and the finger angle α shall fulfil Formulae (G.1) and (G.2), respectively:

$$l_j \geq 4\, p\,(1 - 2\,v) \tag{G.1}$$

$$\alpha \leq 7{,}1\,° \tag{G.2}$$

The reduction factor v shall be $v \leq 0{,}20$ and the finger length l_j shall be $l_j \geq 10$ mm.

Commonly used cutter geometries are given in Table G.1.

Table G.1 — Commonly used geometries of the cutters

Finger length l_j mm	Pitch p mm	Width of cutter b_{cut} mm	Reduction factor v
15	3,8	0,42	0,11
15	3,8	0,6	0,16
20	5,0	0,5	0,10
20	6,2	1,0	0,16

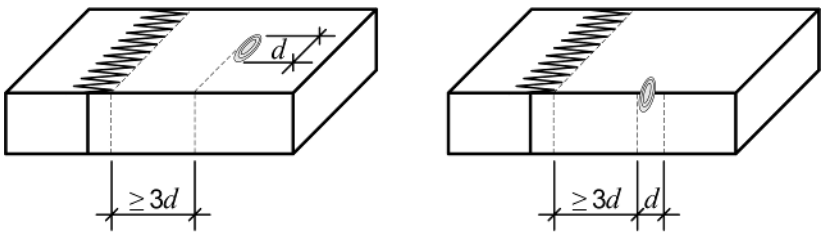
G.4.3 Knots, local grain deviations and fissures

Knots with a diameter not greater than 6 mm may be disregarded.

There shall be no knots or pronounced grain disturbance within the joint itself.

Fissures are allowed as long as they are not more than 50 % of the thickness.

Outside the joint the distance between a knot and the end of the cross-cut timber shall be not less than (l_j + 3d) (see Figure G.3), except where an appropriate automated system guarantees that in the range of the finger joints the grain orientation is parallel to the longitudinal direction. In this case the distance may be reduced down to 1,5 d.

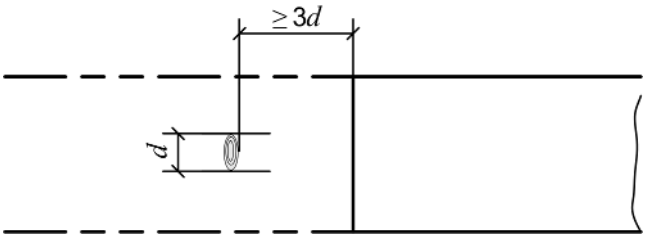


Key

d knot diameter

Figure G.3 — Minimum distance from the end of the timber to a knot

Where timber pieces are cross-cut to remove a knot, the distance between the cross-cut and the removed knot shall be not less than 3d (see Figure G.4), except where an appropriate automated system guarantees that in the range of the finger joints the grain orientation is parallel to the longitudinal direction.



Key

d knot diameter

Figure G.4 — Minimum distance for a cross-cut to remove a knot

G.4.4 Moisture content at bonding

The moisture content of each piece of timber shall be measured according to D.2.

At assembly, the moisture content in every timber shall be between 7 % and up to 18 %. Additionally, the instructions of the adhesive manufacturer shall be followed.

The moisture content of two timber pieces to be jointed shall not differ by more than 5 % moisture content.

G.4.5 Bonding surface and application of the adhesive

G.4.5.1 General

At the time of bonding the bonding surfaces shall be clean.

The adhesive shall be used in accordance with the instructions of the adhesive manufacturer.

The adhesive shall be applied to both timber ends unless different provisions are given in the subsequent subsections.

The application method shall ensure that all finger flanks in the assembled joint are covered with the adhesive.

G.4.5.2 Manual application

If the adhesive is applied manually, it may be applied to only one of the timber ends. It shall be checked visually that adhesive is applied to all finger flanks. This general provision may be considered satisfied, if adhesive is squeezed out of all four surfaces of the joint when the pressure is applied.

G.4.5.3 Application by machine

The suitability of the adhesive for a separate application of resin and hardener shall be verified in accordance with EN 301.

If an adhesive is applied by comb or roller, the adhesive shall be applied over a length of at least 75 % of the finger length.

If the adhesive is applied by comb or roller, it may be applied to only one of the timber ends. It shall be checked visually that adhesive is applied to all finger flanks. This general provision may be considered satisfied, if adhesive is squeezed out of all four surfaces of the joint when the pressure is applied.

If resin and hardener are applied separately by comb or roller the resin may be applied to one timber end and the hardener to the other. The production equipment shall have a device (e.g. a balance or a flow rate meter) to control and document the effective ratio of resin and hardener used. The application of resin and hardener shall be done by two independent application devices, e.g. by two combs with one nozzle or one comb with two nozzles per finger flank. The application device shall ensure that resin and hardener are applied evenly over at least 75 % of the finger length.

G.4.5.4 Additional provisions for contact free application

Adhesives may be applied contact free if it is ensured by monitoring, documentation and additional tests according to Annex F in Factory Production Control (FPC) (see Table 4) that the adhesive application results in the fulfilment of the principal provisions, i.e. that all finger surfaces in the assembled joint are covered with adhesive.

The following shall be continuously monitored:

a) The amount of adhesive applied shall be monitored by an automated system.

b) The application process shall be monitored:

   1) for two-sided contact free application either by visual monitoring or by an automated system (e.g. optical or other apt sensors);

   2) for one-sided contact free application by an automated system.

c) All results obtained shall be recorded and stored.

G.4.6 Time between cutting and adhesive application

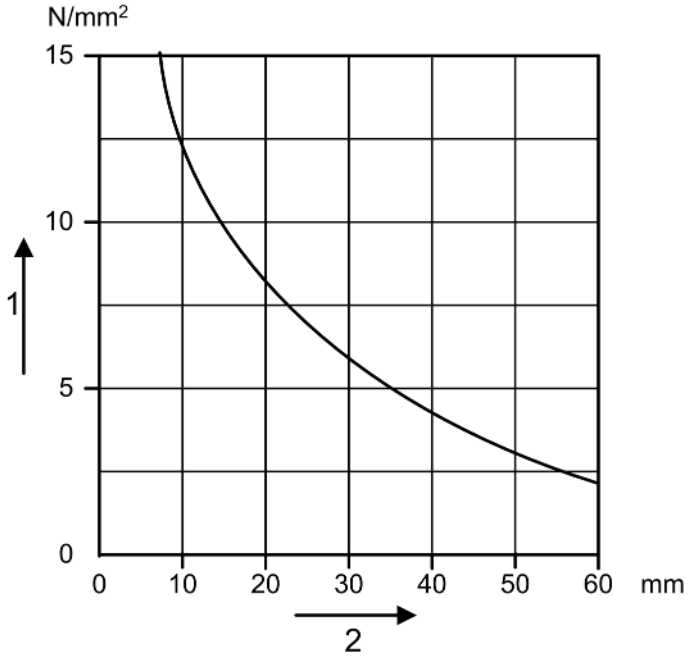
The adhesive application shall be done within 6 h after cutting the finger joint profile.

G.4.7 Pressure

The pressure depends on finger joint geometry, wood species, moisture content and temperature of the timber and the cross section of the timber.

The relative tip gap $e = l_t / l_j$ should be 0,01 ≤ e ≤ 0,08 after pressing.

If the pressure is applied in a cyclic finger joint press, the pressure shall be applied to the finger joint for at least 1 s for the timber with a thickness less than 45 mm and at least 2 s for others. Recommended cramping pressures for a timber temperature of 20 °C can be taken from Figure G.5.



Key

1 pressure

2 finger length

Figure G.5 — Recommended values for pressure

G.4.8 Curing

The temperature of the timber at the glue line during curing shall not be less than 18 °C. The not fully cured jointed timber shall be moved in a way that the curing process is not affected by deformation or vibration.

The jointed timber may be further processed if it can be ensured that the curing process and the finger joint strength is not affected.

The provisions of the technical data sheet of the adhesive shall apply.

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 finger jointed timber 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 finger jointed timber

Construction products: Structural finger jointed timber with rectangular cross section[a] **Intended uses:** In buildings and bridges				
Essential characteristics		**Clauses in this or other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Modulus of elasticity, Bending strength, Compressive strength, Tensile strength and Shear strength[b] as:				
Strength and stiffness properties of timber		5.1.2	-	Declared as strength class or individual values
Bending strength of finger joints as bending strength of timber		5.1.3	-	Declared as characteristic bending strength of timber
Bonding strength				
Bonding strength of finger joints as bending strength of timber		5.2.1	-	Declared as strength class or individual value
Resistance to fire[c], as				
Geometrical data		5.8	-	Declared as cross sectional dimensions
Charring rate, as	Species[d]	5.2.2	-	Declared as species
	characteristic density of timber	5.1.2		Declared as strength class or individual values
Reaction to fire[e]		5.5	A1 to F	D-s2, d0 according to Table 2; or Tested and classified acc. to EN 13501–1
Release of formaldehyde		5.6	-	Class E1 or E2
Release of other dangerous substances[e]		5.7	-	The relevant values shall be as declared.
Durability of bonding strength				
Species		5.2.2	-	Declared as species
Adhesives		5.2.3	-	Declared as adhesive families, adhesive types and subclasses
Durability against biological attack (i.e. resistance to biological organisms)				
Timber without preservative treatment		5.3.1	-	Declared as durability class(es) according to EN 350–2
Timber with preservative treatment		5.3.2	-	Declared according to EN 15228:2009, Clause 6

[a] For structural finger jointed made from coniferous species listed in 5.1.2 and poplar, 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 finger jointed timber

ZA.2.1 AVPC

The AVPC system of structural finger jointed timber 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 1 Structural finger jointed timber may be considered as other glued timber products.

NOTE 2 Structural finger jointed timber treated with fire retardants are not covered in this standard.

The AVCP of the structural finger jointed timber in Table ZA.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 finger jointed timber 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 to fire and bonding strength (including 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 and bonding strength (including 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
	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 — 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:

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 in 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 harmonized 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.

The DoP shall in addition contain:

a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

b) the list of essential characteristics, as determined in the harmonized 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, Article 7 of the Regulation (EU) No 305/2011 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 Structural finger jointed timber.

DECLARATION OF PERFORMANCE

No. 001CPR2013-07-14

1. Unique identification code of the product-type: **Structural finger jointed timber -C24-Spruce**

2. Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4): **Type ABC**

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer: **buildings and bridges**

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5): **AnyCo (complete address and contact data to be given)**

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2).

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V: **System 1**

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard: **Notified product certification body No. 5678 carried out the determination of the product-type on the basis of type testing regarding bonding strength and reaction to fire**, **performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of constancy of performance.**

8. Declared performance

Essential characteristics	Performance	Harmonized technical specification
Modulus of elasticity, **Bending strength,** **Compressive strength,** **Tensile strength and** **Shear strength**, given as Strength class (EN 14081)	 C 24	EN 15497:2014
Bonding strength, given as bending strength of finger joints	 24 N/mm^2	
Durability of bonding strength, given as Species Adhesive	 Spruce MUF, EN 301 I70 FJ 0.1S	
Durability against biological attack as natural durability class against wood destroying fungi (EN 350–2)	 Durability class 5	

Essential characteristics		Performance	Harmonized technical specification
Resistance to Fire, given as			
Geometrical data		Cross section *w* x *t* (mm): 120 × 240	
Charring rate as	Characteristic density	350 kg/m^3	
	species	Spruce	
Reaction to fire		D-s2, d0	EN 15497:2014
Release of formaldehyde		E1	
Declaration of release/content of other dangerous substance only when required in accordance with 5.7.			

10. The performance of the product identified in Points 1 and 2 is in conformity with the declared performance in Point 8. This declaration of performance is issued under the sole responsibility of the manufacturer identified in Point 4.

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 structural finger jointed timber 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;

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 given as individual values;
- bonding strength declared as characteristic bending strength of the timber;
- reaction to fire: class (including smoke and droplets) as class acc. to EN 13501-1, either referring to Table 2 (CWFT), as class D-s2, d0, or based on results of the relevant tests, specified in the standards, referred therein;
- resistance to fire on the basis of cross sectional dimensions, characteristic density and species;
    - release of formaldehyde declared as class E1 or E2;
    - release of other dangerous substances, see 5.7, where applicable;
    - durability of bonding strength declared on the basis of the used species, adhesive family according to 5.2.3.1 and adhesive type (including subclasses, if relevant), according to EN 301 or EN 15425;
    - durability (i.e. resistance to biological organisms):
        - for timber without preservative treatment, as natural durability: declared as durability class(es) according to EN 350-2;
        - for treated timber, in accordance with EN 15228:2009, Clause 6;

f) the dated reference to the harmonized technical specification applied;

g) the identification number of the notified body.

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

Figure ZA.1 gives an example of CE marking.

CE 4321	*CE marking, consisting of the "CE"-symbol* *Identification number of the product certification body*
AnyCo Ltd **13** 001-CPR-2013/07/14	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 15497:2014 Structural finger jointed timber -C24-Spruce-Type ABC Intended to be used in buildings and bridges	*No. of European Standard applied, as referenced in OJEU* *Unique identification of the product-type* *Intended use of the product as laid down in the European Standard applied*
Mechanical resistance as − strength class C 24	*Level or class(es) of the performance declared*
Resistance to fire as − geometrical data (mm) 120 × 240 − species Spruce − characteristic density 350 kg/m^3	*The density and species are needed to choose the appropriate charring rate from the fire design code*
Bonding strength as − bending strength of finger joints 24 N/mm^2	
Reaction to fire D-s2, d0	
Release of formaldehyde E1	*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.*
Durability of bonding strength as − species Spruce − adhesive MUF EN 301 I70 FJ 0.1S	
Durability against biological attack as − natural durability class(es) against wood destroying fungi Class 5	

Figure ZA.1 — Example of CE marking given in the documents accompanying structural finger jointed timber made of visual graded 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 structural finger jointed timber:

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 given as individual values;

— durability of bonding strength declared on the basis of the used species, if not spruce, adhesive family according to 5.2.3.1 and adhesive type (including subclasses, if relevant), according to EN 301 or EN 15425;

— “PT” for preservative treated structural finger jointed timber;

f) the reference to the harmonized technical specification applied.

Figure ZA.2 gives an example for information to be affixed on the structural finger jointed timber or on a label attached to it.

CE	*CE marking, consisting of the “CE”-symbol*
AnyCo Ltd **13** 001-CPR-2013/07/14	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 15497:2014 Structural finger jointed timber -C24-Spruce-Type ABC	*No. of European Standard applied, as referenced in OJEU* *Unique identification of the product-type*
− strength class: C 24 M	*Level or class8es) of the performances declared*
− adhesive: MUF, EN 301 I70 FJ 0.1S	

Figure ZA.2 — Example for information affixed on structural finger jointed timber or on a label attached to it

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[3] EN 14080, *Timber structures — Glued laminated timber and glued solid timber — Requirements*

[4] EN 14081-2, *Timber structures — Strength graded structural timber with rectangular cross section — Part 2: Machine grading; additional requirements for initial type testing*

[5] EN 14081-3, *Timber structures — Strength graded structural timber with rectangular cross section — Part 3: Machine grading; additional requirements for factory production control*

[6] EN 14081-4, *Timber structures — Strength graded structural timber with rectangular cross section — Part 4: Machine grading — Grading machine settings for machine controlled systems*

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

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[9] EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

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