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European Technical Assessment

ETA-18/1018 of 06.12.2018

General part

Technical Assessment Body issuing the European Technical Assessment	Österreichisches Institut für Bautechnik (OIB) Austrian Institute of Construction Engineering
Trade name of the construction product	HASSLACHER BauBuche
Product family to which the construction product belongs	Glued laminated timber made of hardwood – Structural laminated veneer lumber made of beech
Manufacturer	Hasslacher Holding GmbH Feistritz 1 9751 Sachsenburg Austria
Manufacturing plants	Hasslacher Holzbauteile GmbH & Co KG Am Hundsrück 2 63924 Kleinheubach Germany
This European Technical Assessment contains	16 pages including 3 Annexes which form an integral part of this assessment.
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document EAD 130010-01-0304 “Glued laminated timber made of hardwood – Structural laminated veneer lumber made of beech”.

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Remarks

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Specific parts

1 Technical description of the product

1.1 General

This European Technical Assessment (ETA) applies to the glued laminated timber "HASSLACHER BauBuche". HASSLACHER BauBuche is composed of lamellae of structural laminated veneer lumber (LVL) made of beech. Lamella conform to EN 14374. The glued laminated timber may be block glued.

HASSLACHER BauBuche consists of at least two lamellae which are bonded at the faces. Surfaces are grinded.

HASSLACHER BauBuche and the lamellae for its manufacturing correspond to the specifications given in Annex 1. The material characteristics, dimensions and tolerances of HASSLACHER BauBuche, not indicated in these Annexes, are given in the technical file[1] of the European Technical Assessment.

Holes in the glued laminated timber are not subject of the European Technical Assessment.

The application of wood preservatives and flame retardants is not subject of the European Technical Assessment.

1.2 Components

1.2.1 Lamellae

The specification of the lamellae is given in Annex 1, Table 2. Lamella conform to EN 14374.

Surfaces shall be grinded at the earliest 24 hours before bonding. Provided that there is a possibility for clean storage in suitable facilities as well as proper quality control for prevention of dirt at the surfaces, the lamellae may be stored for a maximum period of 4 weeks after grinding. The lamellae shall be bonded at the faces. No recycled wood shall be used.

Wood species is European Beech (Fagus sylvatica L.).

1.2.2 Adhesive

The adhesive for bonding of the glued laminated timber shall conform to EN 301, Type I. The adhesive for block gluing is gapfilling and conforms to EN 301, Type I 90 GF 1,5M. Only phenolic resorcinol (PRF) adhesives are applicable.

Adhesives with tested adhesive-hardener-ratio are given in the technical file of the European Technical Assessment.

[1] The technical file of the European Technical Assessment is deposited at Österreichisches Institut für Bautechnik and, in so far as is relevant to the tasks of the notified product certification body involved in the assessment and verification of constancy of performance procedure, is handed over to the notified product certification body.

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2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (thereafter EAD)

2.1 Intended use

HASSLACHER BauBuche is intended to be used as a structural or non-structural element in buildings and timber structures.

The product shall be subjected to static and quasi static actions only.

HASSLACHER BauBuche is intended to be used in service classes 1 and 2 according to EN 1995-1-1[2].

2.2 General assumptions

The glued laminated timber is manufactured in accordance with the provisions of the European Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plants by Österreichisches Institut für Bautechnik and laid down in the technical file.

The manufacturer shall ensure that the requirements in accordance with the Clauses 1, 2 and 3 as well as with the Annexes of the European Technical Assessment are made known to those who are concerned with design and execution of the works.

Manufacture shall be in accordance with EN 14080. In addition, the provisions laid down in this European Technical Assessment shall be considered.

Layers of grinded lamellae of LVL shall be bonded together to the required thickness of the glued laminated timber. Adhesive shall be applied on one face of each lamellae. There shall be no finger joints in the individual lamellae.

Minimum bonding pressure is 1.0 N/mm². Minimum temperature in the manufacturing room shall be 20°C. Minimum pressing time and spread rate according to the technical file shall be met.

Mechanical loading during minimum pressure and hardening time is not permitted, except insignificant loading during transport.

Design

The European Technical Assessment only applies to the manufacture and use of glued laminated timber. Verification of stability of the works including application of loads on the glued laminated timber is not subject to the European Technical Assessment.

The following conditions shall be observed:

- Design of glued laminated timber is carried out under the responsibility of an engineer experienced in such products.
- Design of the works shall account for the protection of the glued laminated timber.
- The glued laminated timber is installed correctly.

Design of glued laminated timber can be according to EN 1995-1-1 and EN 1995-1-2, taking into account of Annex 1 and Annex 2 of the European Technical Assessment.

Standards and regulations in force at the place of use shall be considered.

Packaging, transport, storage, maintenance, replacement and repair

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

[2] Reference documents are listed in Annex 3.

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Installation

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

2.3 Assumed working life

The provisions made in the European Technical Assessment (ETA) are based on an assumed intended working life of HASSLACHER BauBuche of 50 years, when installed in the works, provided that the glued laminated timber elements are subject to appropriate installation, use and maintenance (see Clause 2.2). These provisions are based upon the current state of the art and the available knowledge and experience[3].

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA nor by the Technical Assessment Body, but are regarded only as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

[3] The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product can also be shorter than the assumed working life.

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3 Performance of the product and reference to the methods used for its assessment

3.1 Essential characteristics of the product

Table 1: Essential characteristics of the product and assessment methods

№	Essential characteristic	Product performance
Basic requirement for construction works 1: Mechanical resistance and stability [1)]		
1	Bending strength	Annex 1
2	Tensile strength parallel to the grain	Annex 1
3	Tensile strength perpendicular to the grain	Annex 1
4	Compression strength parallel to the grain	Annex 1
5	Compression strength perpendicular to the grain	Annex 1
6	Shear strength	Annex 1
7	Modulus of elasticity parallel to the grain	Annex 1
8	Modulus of elasticity perpendicular to the grain	Annex 1
9	Shear modulus	Annex 1
10	Creep and duration of the load	Annex 1
11	Dimensional stability	Annex 1
12	Bonding quality	Annex 1
13	Bonding quality of block bonding	Annex 1
14	In-service environment	Annex 1
15	Density	Annex 1
16	Withdrawal strength of screws in GLT made of hardwood	Annex 1
17	Embedment strength of screws in GLT made of hardwood	Annex 1
18	Head pull-through parameter of screws in GLT made of hardwood	Annex 1
Basic requirement for construction works 2: Safety in case of fire		
19	Reaction to fire	Annex 1
20	Resistance to fire (Charring rate)	Annex 1
Basic requirement for construction works 3: Hygiene, health and the environment		
21	Emission of formaldehyde	Annex 1
Basic requirement for construction works 4: Safety and accessibility in use		
22	Same as Basic requirement for construction works 1	
Basic requirement for construction works 6: Energy economy and heat retention		
23	Thermal conductivity	Annex 1
24	Thermal inertia	Annex 1
[1)] These characteristics also relate to basic requirement for construction works 4.		

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3.2 Assessment methods

3.2.1 General

The assessment of the essential characteristics in Clause 3.1 of HASSLACHER BauBuche for the intended use, and in relation to the requirements for mechanical resistance and stability, for safety in case of fire, for hygiene, health and the environment, for safety and accessibility in use and for energy economy and heat retention in use in the sense of the basic requirements for construction works № 1, 2, 3, 4 and 6 of Regulation (EU) № 305/2011 has been made in accordance with the European Assessment Document EAD 130010-01-0304, Glued laminated timber made of hardwood – Structural laminated veneer lumber made of beech.

3.2.2 Identification

The European Technical Assessment for HASSLACHER BauBuche is issued on the basis of agreed data that identify the assessed product. Changes to materials, to composition, to characteristics of the product, or to the production process could result in these deposited data being incorrect. Österreichisches Institut für Bautechnik should be notified before the changes are implemented, as an amendment of the European Technical Assessment is possibly necessary.

4 Assessment and verification of constancy of performance (thereafter AVCP) system applied, with reference to its legal base

4.1 System of assessment and verification of constancy of performance

According to Commission Decision 97/176/EC the system of assessment and verification of constancy of performance to be applied to HASSLACHER BauBuche is System 1. System 1 is detailed in Commission Delegated Regulation (EU) № 568/2014 of 18 February 2014, Annex, 1.2., and provides for the following items:

(a) The manufacturer shall carry out

(i) factory production control;

(ii) further testing of samples taken at the manufacturing plant by the manufacturer in accordance with a prescribed test plan[4];

(b) The notified product certification body shall decide on the issuing, restriction, suspension or withdrawal of the certificate of constancy of performance of the construction product on the basis of the outcome of the following assessments and verifications carried out by that body:

(i) an assessment of the performance of the construction product carried out on the basis of testing (including sampling), calculation, tabulated values or descriptive documentation of the product;

(ii) initial inspection of the manufacturing plant and of factory production control;

(iii) continuous surveillance, assessment and evaluation of factory production control.

4.2 AVCP for construction products for which a European Technical Assessment has been issued

Notified bodies undertaking tasks under System 1 shall consider the European Technical Assessment issued for the construction product in question as the assessment of the performance of that product. Notified bodies shall therefore not undertake the tasks referred to in point 4.1 (b)(i).

[4] The prescribed test plan has been deposited with Österreichisches Institut für Bautechnik and is handed over only to the notified product certification body involved in the procedure for the assessment and verification of constancy of performance. The prescribed test plan is also referred to as control plan.

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5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

5.1 Tasks for the manufacturer

5.1.1 Factory production control

In the manufacturing plant the manufacturer shall establish and continuously maintain a factory production control. All procedures and specification adopted by the manufacturer shall be documented in a systematic manner. The factory production control shall ensure the constancy of performances of HASSLACHER BauBuche with regard to the essential characteristics.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the control plan. The incoming raw materials shall be subject to controls by the manufacturer before acceptance. Check of incoming materials shall include control of inspection documents presented by the manufacturer of the raw materials.

The frequencies of controls conducted during manufacturing and on the assembled product are defined by taking account of the manufacturing process of the product and are laid down in the control plan.

The results of factory production control are recorded and evaluated. The records include at least the following data:

- Designation of the product, basic materials and components
- Type of control or test
- Date of manufacture of the product and date of testing of the product or basic materials or components
- Results of controls and tests and, if appropriate, comparison with requirements
- Name and signature of person responsible for factory production control

The records shall be kept at least for ten years time after the construction product has been placed on the market and shall be presented to the notified product certification body involved in continuous surveillance. On request they shall be presented to Österreichisches Institut für Bautechnik.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance. When all the criteria of the assessment and verification of constancy of performance are met, including the certificate of conformity issued by the notified product certification body, the manufacturer shall draw up a declaration of performance.

5.2 Tasks for the notified product certification body

5.2.1 Initial inspection of the manufacturing plant and of factory production control

The notified product certification body shall verify the ability of the manufacturer for a continuous and orderly manufacturing of HASSLACHER BauBuche according to the European Technical Assessment. In particular the following items shall be appropriately considered

- Personnel and equipment
- The suitability of the factory production control established by the manufacturer
- Full implementation of the control plan

5.2.2 Continuous surveillance, assessment and evaluation of factory production control

The notified product certification body shall visit the factory at least twice a year for routine inspection. In particular the following items shall be appropriately considered

- The manufacturing process including personnel and equipment
- The factory production control

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– The implementation of the control plan

The results of continuous surveillance are made available on demand by the notified product certification body to Österreichisches Institut für Bautechnik. When the provisions of the European Technical Assessment and the control plan are no longer fulfilled, the certificate of constancy of performance is withdrawn by the notified product certification body.

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The original document is signed by:

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Managing Director

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Table 2: Dimensions and specifications

Characteristic		Dimension / Specification
Glued laminated timber – Regular		
Height h	mm	80 to 600
Width b	mm	50 to 300
Length l	m	≤ 18.0
Number of layers n	—	2 to 15 for t = 40 mm 2 to 12 for t = 50 mm
Precamber	—	≤ l/100
Glued laminated timber – XXL		
Height h	mm	80 to 2 500
Width b	mm	50 to 600
Length l	m	≤ 36.0
Number of layers n	—	≥ 2
Precamber	—	≤ l/100
Block gluing		
Number of GLT members	—	≤ 4
Width b of block glued GLT	mm	≤ 1 200
Height h of block glued GLT	mm	≤ 2 500

HASSLACHER BauBuche	Annex 1
Characteristic data of HASSLACHER BauBuche	of European Technical Assessment ETA-18/1018 of 06.12.2018

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Characteristic		Dimension / Specification
Lamellae of LVL		
Surface	—	grinded [1)]
Thickness t (grinded dimension)	mm	$40^{\pm 3}$ to $50^{\pm 3}$
Width	mm	50 to 600
Laminated veneer lumber according to EN 14374	—	
$f_{m,l,k}$	N/mm²	≥ 80
$f_{t,0,l,k}$	N/mm²	≥ 60
Density	—	
ρ_{mean}	kg/m³	≥ 800
ρ_k	kg/m³	≥ 730
Moisture content of lamella during gluing	%	$5^{\pm 3}$

[1)] The adhesive joint between the single laminations shall not be fully exposed. Grinding may take place at the earliest 24 hours before bonding. Following the conditions laid down in Clause 1.2.1 lamellae may be stored for a maximum period of 4 weeks after grinding.

HASSLACHER BauBuche	Annex 1
Characteristic data of HASSLACHER BauBuche	of European Technical Assessment ETA-18/1018 of 06.12.2018

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Table 3: Product characteristics of HASSLACHER BauBuche

BR	Essential characteristic	Method of verification	Class / Use category / Numeric value
1	**Mechanical resistance and stability**		
	Bending strength $f_{m,k}$	EN 408	$k_{h,m}$ · 75 MPa [1] with $k_{h,m} = \left(\frac{600}{h}\right)^{0.10}$
	Modulus of elasticity parallel to the grain of the lamellas		
	– $E_{0,mean}$	EN 408	16 800 MPa
	– $E_{0,05}$	EN 408	15 300 MPa
	Modulus of elasticity perpendicular to the grain of the lamellas		
	– $E_{90,mean}$	EN 14374	470 MPa
	– $E_{90,05}$	EN 14374	400 MPa
	Tensile strength		
	– parallel to the grain of the lamellas $f_{t,0,k}$	EAD 130010-01-0304	$k_{h,t}$ · 60 MPa [2] with $k_{h,t} = \left(\frac{600}{h}\right)^{0.10}$
	– perpendicular to the grain of the lamellas $f_{t,90,k}$	EN 384	0.6 MPa
	Compressive strength		
	– parallel to the grain of the lamellas $f_{c,0,k}$	EN 408 and EAD 130010-01-0304	$k_{c,0}$ · 59.4 MPa in service class 1 [3] $k_{c,0}$ · 49.5 MPa in service class 2 [3] with $k_{c,0} = min\begin{cases}0.0009 \cdot h + 0.892 \\ 1.18\end{cases}$ for n > 3
	– perpendicular to the grain of the lamellas $f_{c,90,k}$	EN 384 and EAD 130010-01-0304	14.8 MPa in service class 1 12.3 MPa in service class 2
	Shear strength $f_{v,k}$	EN 408	$k_{h,v}$ · 4.5 MPa [1] with $k_{h,v} = \left(\frac{600}{h}\right)^{0.13}$

[1] h is the height of HASSLACHER BauBuche in mm.
[2] h is the larger length of the cross section of HASSLACHER BauBuche perpendicular to the longitudinal axis in mm.
[3] h is the height of HASSLACHER BauBuche in mm and n is number of lamellas of LVL.

HASSLACHER BauBuche	Annex 1
Characteristic data of HASSLACHER BauBuche	of European Technical Assessment ETA-18/1018 of 06.12.2018

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BR	Essential characteristic	Method of verification	Class / Use category / Numeric value
	Shear modulus – G_{mean} – G_{05}	 EN 14374 EN 14374	 850 MPa 760 MPa
	Creep and duration of load	k_{mod} and k_{def} according to EN 1995-1-1 for glued laminated timber	
	Dimensional stability Moisture content during service shall not change to such an extend that adverse deformation will occur.		
	Moisture content	EAD 130010-01-0304	5 – 10 %
	Bonding quality	EN 14374	Pass
	Bonding quality of block bonding	EAD 130010-01-0304	Pass $f_{v,k}$ = 8.0 MPa Durability of block bonding: Untreated: $f_{v,mean}$ = 16.8 MPa Treated: $f_{v,mean}$ = 7.7 MPa
	In-service environment		
	Durability of timber Service classes	 EN 1995-1-1	 1 and 2
	Withdrawal strength of screws in GLT made of hardwood	EN 1382	Annex 2
	Embedment strength of screws in GLT made of hardwood	EN 383	Annex 2
	Head pull-through parameter of screws in GLT made of hardwood	EN 1383	Annex 2
2	**Safety in case of fire**		
	Reaction to fire	Commission Delegated Regulation (EU) 2017/2293	Euroclass D-s2, d0
	Resistance to fire (Charring rate)	EN 1995-1-2	Charring rate β_0 = 0.65 mm/min β_n = 0.7 mm/min

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BR	Essential characteristic	Method of verification	Class / Use category / Numeric value
3	**Hygiene, health and environment**		
	Emission of formaldehyde	EN 717-1	E1
6	**Energy economy and heat retention**		
	Thermal conductivity λ	EN ISO 10456	0.17 W/(m·K)
	Thermal inertia, specific heat capacity c_p	EN ISO 10456	1 600 J/(kg·K)

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Fasteners

Admissible fasteners in HASSLACHER BauBuche are nails, screws, rod dowels, bolts, split ring and shear connectors.

Calculation of fasteners shall follow EN 1995-1-1. However, for dowel-type fasteners with a diameter d ≥ 8 mm the embedment strength shall be reduced by factor 0.8 for use in the edge faces. Calculation of embedment strength of dowel-type fasteners is not permissible for use in the face.

Screws in GLT made of hardwood

The following provisions are valid for connections in members made of HASSLACHER BauBuche with wood screws Assy 3.0 and Assy plus according to ETA 11/0190 and diameter d 5 mm ≤ d ≤ 12 mm.

HASSLACHER BauBuche must be predrilled for threaded lengths of the screws $l_{ef} > l_{ef,max}$ given in Table A.2.

Table A.2 Max. threaded lengths of the screws to be used without predrilling

	Assy plus VG	Assy 3.0
Diameter *d*	$l_{ef,max}$	$l_{ef,max}$
mm	mm	mm
5	–	50
6	30	60
7	–	70
8	48	80
10	80	100
12	96	–

The minimum spacing, end and edge distances according to EN 1995-1-1, Table 8.2, Column 3 (ρ ≤ 420 kg/m³), apply for screws without predrilling. The minimum spacing, end and edge distances according to EN 1995-1-1, Table 8.2, Column 5, apply for screws with predrilling.

The characteristic withdrawal strength can be calculated by

$$F_{ax,\alpha,Rk} = n_{ef} \cdot k_{ax} \cdot f_{ax,90,k} \cdot d \cdot l_{ef}$$

with

$$f_{ax,90,k} = 0.52 \cdot d^{-0.35} l_{ef}^{-0.1} \cdot \rho_k^{0.8}$$

n_{ef} … effective number of screws according to ETA-11/0190

k_{ax} = 1 for 45° ≤ α ≤ 90°

k_{ax} = 0.3 + 0.7 · α/45° for α < 45°

HASSLACHER BauBuche	Annex 2
Fasteners in HASSLACHER BauBuche	of European Technical Assessment ETA-18/1018 of 06.12.2018

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d … diameter of the screw in mm

l_{ef} … penetration length of the threaded part of the screw in the timber member in mm

ρ_k … characteristic density of HASSLACHER BauBuche, ρ_k = 730 kg/m³

α … angle force to grain

The characteristic embedment strength can be calculated by

$$f_{h,k} = \frac{0.082 \cdot \rho_k \cdot d^{-0.15}}{(k_{90} \cdot \sin^2 \alpha + \cos^2 \alpha) \cdot (1.2 \cdot \cos^2 \beta + \sin^2 \beta) \cdot (2.5 \cdot \cos^2 \varepsilon + \sin^2 \varepsilon)}$$

With

d … diameter of the screw in mm

k_{90} … = 0.5 + 0.024 · d

α … angle force to grain

β … angle screw-axis to wide face

ε … angle screw-axis to grain

ρ_k … characteristic density of HASSLACHER BauBuche, ρ_k = 730 kg/m³

The characteristic head pull-through resistance can be calculated by

$$F_{ax,\alpha,Rk} = n_{ef} \cdot f_{head,k} \cdot d_{head}^2$$

The characteristic head pull-through parameter can be calculated by

$$f_{head,k} = 70 - 0.8 \cdot d_{head}$$

with

d_{head} … head diameter of the screw in mm

n_{ef} … effective number of screws according to ETA-11/0190

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EAD 130010-01-0304, European Assessment Document for “Glued laminated timber made of hardwood – Structural laminated veneer lumber made of beech”

ETA-11/0190, European technical Approval for „Würth self-tapping screws“ of Adolf Würth GmbH & Co. KG, Reinhold-Würth-Straße 12-17, 74653 Künzelsau, Germany, with validity from 27 June 2013 to 27 June 2018.

EN 301 (10.2013), Adhesives, phenolic and aminoplastic, for load-bearing timber structures – Classification and performance requirements

EN 383 (01.2007), Timber structures – Test methods – Determination of embedment strength and foundation values for dowel type fasteners

EN 384 (08.2016), Structural timber – Determination of characteristic values of mechanical properties and density

EN 408:2010+A1 (07.2012), Timber structures – Structural timber and glued laminated timber – Determination of some physical and mechanical properties

EN 717-1 (10.2004), Wood-based panels – Determination of formaldehyde release – Part 1: Formaldehyde emission by the chamber method

EN 1382 (02.2016),Timber structures – Test methods – Withdrawal capacity of timber fasteners

EN 1383 (02.2016),Timber structures – Test methods – Pull through resistance of timber fasteners

EN 1995-1-1 (11.2004), +AC (06.2006), +A1 (06.2008), +A2 (05.2014), Eurocode 5 – Design of timber structures - Part 1-1: General – Common rules and rules for buildings

EN 1995-1-2 (11.2004) +AC (06.2006), +AC (03.2009), Eurocode 5 – Design of timber structures – Part 1-2: General – Structural fire design

EN 14080 (06.2013), Timber structures – Glued laminated timber and glued solid timber – Requirements

EN 14374 (11.2004), Timber structures – Structural laminated veneer lumber – Requirements

EN ISO 10456 (12.2007), +AC (12.2009), Building materials and products – Hygrothermal properties – Tabulated design values and procedures for determining declared and design thermal values