



EUROPEAN ASSESSMENT DOCUMENT

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GLUED LAMINATED TIMBER MADE OF HARDWOOD — STRUCTURAL LAMINATED VENEER LUMBER MADE OF BEECH

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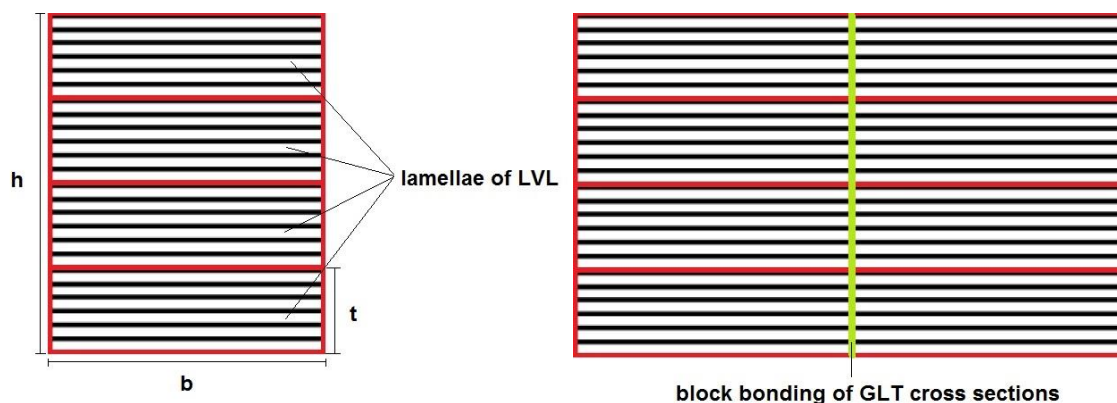
1 SCOPE OF THE EAD

1.1 Description of the construction product

The product, "Glued laminated timber (GLT) made of hardwood – Structural laminated veneer lumber made of beech", is comprised of lamellae of structural laminated veneer lumber (LVL) made of beech (*Fagus sylvatica*) which may be block glued. Lamellae conform to EN 14374.

The cross section is identical to, i.e. rectangular, standardized glued laminated timber without finger joints according to EN 14080 and may be block glued, see Figure 1. Lamellae of LVL are bonded at the faces.

Figure 1: Cross section of GLT made of lamellae of LVL and definition of block bonding



Minimum and maximum dimensions for the lamellae of LVL and GLT are given in Table 1.

Table 1: Minimum and maximum dimensions for the lamellae of LVL and for GLT

Types of GLT made of lamellae of LVL from Beech <i>Fagus sylvatica</i>	Regular	XXL
Min. and max. dimensions	mm	mm
Max. width b of lamellae of LVL	300	600
Max. thickness t of lamellae of LVL	50	50
Max. depth h of GLT	600	2 500
Min. width b of GLT	50	50
Max. width b of GLT ¹⁾	300	600
Max. length l of GLT	18 000	36 000
Service class	1 and 2	1 and 2
Min. number of lamellae	2	2

¹⁾ Without block bonding

Adhesives used for GLT¹ are adhesives type I according to EN 301 or adhesives type I according to EN 15425 and EN 14080, Annex B.2.

Block gluing is possible for a maximum number of 4 XXL GLTs. The width of block glued GLT does not exceed 1 200 mm, the max. depth h is identical to the max. depth h of XXL GLTs. The dimensions of the single XXL GLTs for block bonding are given in the European Technical Assessment. Gapfilling adhesive Type EN 301 I 90 GF 1,5M is used for block gluing. The bonding quality of the block bonding fulfils the

¹ NOTE: In some Member States minimum value of bonding pressure and pressure time, minimum and maximum values of open and closed assembly time and minimum spread rate must be determined and shall be included in the control plan.

provisions given in Clause 2.2.12. The EAD only covers block bonded GLT with a shear strength of the block bonding higher than the shear strength of the LVL lamellae loaded in plane.

Lamellae for the product are

- in conformity with EN 14374,
- without preservative treatment,
- without flame retardant and
- exclusively made in virgin wood; no recycled wood is used.

In addition the EAD applies for assessment of the withdrawal strength, the embedment strength as well as the head pull-through parameter of screws in GLT. The essential characteristics of the screws used in the tests shall be given in the ETA as declared by the component manufacturers in their Declaration of Performance (DoP). The screws shall be applicable for use in GLT.

Manufacture is in accordance with EN 14080 if not specified in the European Technical Assessment.

Holes in glued laminated timber made from laminated veneer lumber are excluded from the scope of the EAD.

The EAD only applies for products which do not contain wood preservatives and flame retardants.

Large finger joints are excluded from the scope of the EAD.

The product is not fully covered by the following harmonised technical specification: EAD 130010-00-0304 2015-03 because of integration of block glued GLT as well as additional characteristics (bonding quality of block bonding, withdrawal strength, embedment strength, head pull-through parameter of screws in GLT).

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.

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.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

1.2 Information on the intended use(s) of the construction product

1.2.1 Intended use(s)

Glued laminated timber made of laminated veneer lumber is intended to be used as a structural element for load bearing applications in buildings and civil engineering structures, in service classes 1 and 2 according to EN 1995-1-1.

The product is only intended to be used subject to static or quasi-static actions.

1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the glued laminated timber made of laminated veneer lumber for the intended use of 50 years when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works².

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 when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

² 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 may also be shorter than referred to above.

2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

2.1 Essential characteristics of the product

Table 2 shows how the performance of the glued laminated timber made of laminated veneer lumber is assessed in relation to the essential characteristics.

Table 2 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics

No	Essential characteristic	Method of assessment	Type of expression of product performance
Basic Requirement for Construction Works 1: Mechanical resistance and stability ¹⁾			
1	Bending strength	2.2.1	Description, level
2	Tensile strength parallel to the grain	2.2.2	Description, level
3	Tensile strength perpendicular to the grain	2.2.3	Description, level
4	Compression strength parallel to the grain	2.2.4	Description, level
5	Compression strength perpendicular to the grain	2.2.5	Description, level
6	Shear strength	2.2.6	Description, level
7	Modulus of elasticity parallel to the grain	2.2.1	Description, level
8	Modulus of elasticity perpendicular to the grain	2.2.7	Description, level
9	Shear modulus	2.2.8	Description, level
10	Creep and duration of the load	2.2.9	Description, level
11	Dimensional stability	2.2.10	Description, level
12	Bonding quality	2.2.11	Description
13	Bonding quality of block bonding	2.2.12	Description
14	In-service environment	2.2.13	Description
15	Density	2.2.14	Description, level
16	Withdrawal strength of screws in GLT made of hardwood	2.2.15	Level
17	Embedment strength of screws in GLT made of hardwood	2.2.16	Level
18	Head pull-through parameter of screws in GLT made of hardwood	2.2.17	Level
Basic Requirement for Construction Works 2: Safety in case of fire			
19	Reaction to fire	2.2.18	Class
20	Resistance to fire (Charring rate)	2.2.19	Description, level

No	Essential characteristic	Method of assessment	Type of expression of product performance
Basic Requirement for Construction Works 3: Hygiene, health and the environment			
21	Emission of formaldehyde	2.2.20	Class
Basic Requirement for Construction Works 4: Safety and accessibility in use			
22	Same as BWR 1		
Basic Works Requirement 6: Energy economy and heat retention			
23	Thermal conductivity	2.2.21	Description, level
24	Thermal inertia	2.2.22	Description, level
1) This characteristic also relates to BWR 4.			

2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

Samples shall be produced from lamellae according to EN 14374. The assembly of the lamellae of LVL and, if necessary, information on the veneer joint formation and arrangements are given in the European Technical Assessment. Mechanical strength and density of the lamellae of LVL used in the tests shall be given in the ETA as declared by the component manufacturers in their Declaration of Performance (DoP).

The samples shall represent the timber source, sizes and grade that will be used in production. Each sample shall be from one source.

Regular GLT samples shall be tested at least in the available dimension limits (depths and widths). In case of determination of a size effect at least one medium size shall be tested in addition.

XXL glued laminated timber samples shall be tested for the essential characteristics specified below in order to confirm the results determined from testing of regular glued laminated timber samples.

2.2.1 Bending strength and modulus of elasticity parallel to the grain

The test shall be carried out in accordance with Clause 19, Figure 17, of EN 408 with measurement of local and global deformations according to Clause 9 and 10 of EN 408. A minimum of 15 regular glued laminated timber specimen shall be tested per sample.

For XXL GLTs a minimum of 7 specimen shall be tested with a depth h of approx. half of the maximal depth h of the XXL GLTs in accordance with Clause 19 of EN 408 with measurement of global and local deformations according to Clause 9 and 10 of EN 408.

The bending strength shall be calculated from the results of the bending tests according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

From these characteristic values determined for different glulam depths the characteristic bending strength for different GLT depths may be determined using the size effect as:

$$f_{m,k}(h) = f_{m,k}(h_0) \left(\frac{h_0}{h} \right)^m$$

where

$f_{m,k}$... characteristic bending strength of GLT

h ... depth of GLT

h_0 ... reference depth of GLT for flatwise bending with $h_0 = 600 \text{ mm}$

m ... exponent considering the dependence on the depth h

The determined values shall be valid for the whole range of glulam depths.

The local modulus of elasticity parallel to the grain shall be calculated from the results of the tests according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

The characteristic bending strength in MPa depending on the depth of the glulam shall be given in the ETA. The mean and characteristic value of the local modulus of elasticity parallel to the grain in MPa shall be given in the ETA.

2.2.2 Tensile strength parallel to the grain

The tensile strength parallel to the grain shall be tested according to Clause 13 of EN 408. A minimum of 15 specimen shall be tested per sample.

The tensile strength parallel to the grain shall be calculated according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

From these characteristic values determined for different glulam depths the characteristic tensile strength parallel to the grain for different GLT depths may be determined using the size effect as:

$$f_{t,0,k}(h) = f_{t,0,k}(h_0) \left(\frac{h_0}{h} \right)^m$$

where

$f_{t,0,k}$...	characteristic tensile strength parallel to the grain of GLT
h	...	depth of GLT
h_0	...	reference depth of GLT for flatwise bending with $h_0 = 600 \text{ mm}$
m	...	exponent considering the dependence on the depth h

The determined values shall be valid for the whole range of glulam depths.

Alternatively, the tensile strength parallel to the grain may be estimated by the characteristic value of strength parallel to the grain of the lamellae.

The characteristic tensile strength parallel to the grain of glued laminated timber in MPa depending on the depth of the glulam shall be given in the ETA.

2.2.3 Tension strength perpendicular to the grain

The tensile strength perpendicular to the grain shall be tested according to Clause 16 of EN 408. A minimum of 15 specimens shall be tested per sample.

The tensile strength perpendicular to the grain shall be calculated according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

The characteristic tensile strength perpendicular to the grain of glued laminated timber in MPa shall be given in the ETA.

2.2.4 Compression strength parallel to the grain

The compressive strength parallel to the grain shall be tested according to Clause 15 of EN 408. A minimum of 15 specimen shall be tested per sample.

The compressive strength parallel to the grain shall be calculated according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

For GLT of lamellae of LVL, used in the environmental conditions specified by service class 2, tests to determine the compressive strength parallel to the grain shall be performed on specimens that were air-conditioned according to the environmental conditions of service class 2.

Alternatively, the compressive strength parallel to the grain in service class 2 may be estimated from the characteristic values determined for service class 1 of GLT as $f_{c,0,k,SC2} = \frac{5}{6} f_{c,0,k,SC1}$.

The characteristic compression strength parallel to the grain of glued laminated timber in MPa shall be given in the ETA.

2.2.5 Compression strength perpendicular to the grain

The compressive strength perpendicular to the grain shall be tested according to Clause 16 of EN 408. A minimum of 15 specimen shall be tested per sample.

The compressive strength perpendicular to the grain shall be calculated according to the equations given in EN 408. The characteristic values shall be determined in accordance with EN 14358.

Alternatively, the compressive strength perpendicular to the grain may be estimated from the characteristic density of GLT as $f_{c,90,k} = 0.010 \rho_k$, if appropriate.

For glued laminated timber made from laminated veneer lumber, used in the environmental conditions specified by service class 2, tests to determine the compressive strength perpendicular to the grain may be performed on specimens that were air-conditioned according to the environmental conditions of service class 2.

Alternatively, the compressive strength perpendicular to the grain in service class 2 may be estimated from the characteristic values determined for service class 1 of GLT as $f_{c,90,k,SC2} = \frac{5}{6} f_{c,90,k,SC1}$.

The characteristic compression strength perpendicular to the grain of glued laminated timber in MPa shall be given in the ETA.

2.2.6 Shear strength

The test shall be carried out according to Annex F.3.2, Figure F.4 b), of EN 16351. A minimum of 15 regular glued laminated timber specimen shall be tested per sample. In contrast to Figure F.3.2 the ratio l/h is approx. 8. In addition, the forces must be imposed sufficient close to the supports to result in shear failure.

For XXL GLTs a minimum of 7 specimen shall be tested with a depth h of approx. half of the maximal depth h of the XXL GLTs in accordance with the provisions given above.

The shear strength is calculated according to $\tau_v = \frac{1,5 \cdot V}{A}$

τ_v shear strength

V shear force

A cross sectional area

The characteristic values shall be determined in accordance with EN 14358.

From these characteristic values determined for different glulam depths the characteristic shear strength for different GLT depths may be determined using the size effect as:

$$f_{v,k}(h) = f_{v,k}(h_0) \left(\frac{h_0}{h} \right)^m$$

where

$f_{v,k}$... characteristic shear strength of GLT

h ... depth of GLT

h_0 ... reference depth of GLT for flatwise bending with $h_0 = 600 \text{ mm}$

m ... exponent considering the dependence on the depth h

The determined values shall be valid for the whole range of glulam depths.

The characteristic shear strength of glued laminated timber in MPa depending on the depth of the glulam shall be given in the ETA.

2.2.7 Modulus of elasticity perpendicular to the grain

The modulus of elasticity perpendicular to the grain shall be tested according to Clause 17 of EN 408 with measurement of global and local deformations. A minimum of 15 specimens shall be tested per sample.

The modulus of elasticity perpendicular to the grain shall be calculated according to the equations given in EN 408. The mean and characteristic values shall be determined in accordance with EN 14358.

Alternatively, the mean modulus of elasticity perpendicular to the grain may be estimated from the mean modulus of elasticity parallel to the grain as $E_{90,mean} = \frac{E_{0,mean}}{15}$, if appropriate. Hereby, the characteristic modulus of elasticity perpendicular to the grain shall be determined by $E_{90,05} = 0.84 E_{90,mean}$.

The mean and characteristic value of the modulus of elasticity perpendicular to the grain in MPa shall be given in the ETA.

2.2.8 Shear modulus

The test shall be carried out according to Annex F.3.2, Figure F.4 a), of EN 16351. A minimum of 15 regular glued laminated timber specimen shall be tested per sample.

In addition a minimum of 3 specimens shall be tested according to Clause 11.2 of EN 408 for comparison.

The shear modulus shall be calculated according to EN 16351 from the measured global and local deformations. The characteristic values shall be determined in accordance with EN 14358.

The mean and characteristic value of shear modulus in MPa shall be given in the ETA.

2.2.9 Creep and duration of load

Assessment of factors k_{mod} and k_{def} according to EN 1995-1-1 for LVL.

The numeric value for k_{mod} and k_{def} shall be given in the ETA for the relevant service class and duration of load as defined in EN 1995-1-1.

2.2.10 Dimensional stability

Dimensions of cross section shall be measured according to EN 1309-1.

Moisture content shall be measured according to EN 13183-2.

Tolerances of dimensions

Tolerances of the dimensions are to be assessed from the measured dimensions.

Numeric values of the nominal dimensions and tolerances, e.g. on length, width and depth, shall be given in the ETA.

Stability of dimensions

Dimensional stability shall be considered as swelling and shrinkage of the product due to changes of its moisture content. An assessment shall be made of the effect on the product dimensions of variations in moisture content based on calculation according to EN 1995-1-1 considering the environmental and climatic conditions in place of use.

The moisture content shall be given in the ETA.

2.2.11 Bonding quality

Determination of bonding quality shall be in accordance with EN 14374, Annex B, on 100 glue lines.

The requirements in EN 14374 shall be met.

The content of wood fracture shall be given in the ETA.

2.2.12 Bonding quality of block bonding

Specimen shall be extracted from block bonded glued laminated timber comprised of 4 single cross sections of the following dimensions: 15 m length, 200 mm width and 1 200 mm depth. The block bonded glued laminated timber shall be cut in pieces of 3 m length leading to 8 cut surfaces for

testing. Hereby, every cut surface shall be divided in 4 sections comprising 3 block joints to be tested with the following test methods each:

- Determination of bonding quality in accordance with EN 14374, Annex B. The percentage of wood failure (determined in accordance with EN 314-1) shall meet the requirements given in EN 14374.
- Shear tests on glue lines according to EN 14080, Annex D, on untreated specimen as well as specimen treated according to EN 14374, Annex B. The shear strength and percentage of wooden failure shall be determined.

A minimum of 20 specimen shall be tested per test type.

In addition a minimum of 7 specimen of block bonded specimen (composed of 4 XXL glued laminated timber specimen) shall be tested with horizontal glue joint (upright lamellae) following the principles of EN 408 and ASTM 3737 in the following dimensions: 3.3 m length (3 m support distance), 600 mm width and 300 mm depth. The loads shall be applied at a distance of 1 m to the support.

The characteristic shear strength calculated according to Clause 2.2.6 shall be given in the ETA.

2.2.13 In-service environment

Durability of timber shall be assessed according to EN 335, Table 1, EN 350, Table B.1, and EN 460.

The service classes according to EN 1995-1-1, Clause 2.3.1.3 shall be given in the ETA.

2.2.14 Density

Measurement of density of lamellae according to EN 14374 and EN 323.

The characteristic values shall be determined in accordance with EN 14358.

The mean and characteristic density in kg/m³ shall be given in the ETA.

2.2.15 Withdrawal strength of screws in GLT made of hardwood

Testing according to EN 1382. The provisions are valid for screws inserted in the timber member with an angle α between screw axis and grain direction of at least 15°. A minimum of 20 self-tapping screws shall be tested for all parameters influencing the withdrawal parameter (e.g. outer thread diameter, drill tip, secondary rough thread, angle between screw-axis and grain). For angles α between screw axis and grain direction $0^\circ \leq \alpha \leq 15^\circ$ the provisions of EAD 130118-00-0603, Clause 2.2.4.1 apply.

Calculation of the characteristic values according to EN 14358.

The withdrawal strength together with the technical specification of the respective screw shall be given in the ETA.

2.2.16 Embedment strength of screws in GLT made of hardwood

Testing according to EN 383. A minimum of 10 self-tapping screws shall be tested per dimension and desired angle between fastener axis and grain direction.

Calculation of the characteristic values according to EN 14358.

The embedment strength together with the technical specification of the respective screw shall be given in the ETA.

2.2.17 Head pull-through parameter of screws in GLT made of hardwood

Testing according to EN 1383. A minimum of 20 self-tapping screws shall be tested for each parameter influencing the head pull-through parameter. For one chosen characteristic density ρ_k the density of the test specimens shall fulfil the requirements of EN ISO 8970.

Calculation of the characteristic values according to EN 14358. This characteristic head pull-through parameter corresponds to the chosen characteristic density.

The head pull-through parameter together with the technical specification of the respective screw shall be given in the ETA.

2.2.18 Reaction to fire

The GLT of lamellae of LVL shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1 and Commission delegated regulation (EU) 2016/364.

Testing shall be performed according to EN 13823. For assembly of the specimen see Clause 5.8 of EN 14080.

Tests for the lamellae made of LVL according to EN 14374 are also applicable for GLT.

The reaction to fire class shall be given in the ETA.

2.2.19 Resistance to fire (Charring rate)

Assessment according to EN 14080, Clause 5.7.

The geometrical data as well as strength and stiffness properties and density shall be given in the ETA.

2.2.20 Emission of formaldehyde

Assessment according to EN 14374, Clause 4.9 and Annex C.

The class for the emission of formaldehyde shall be given in the ETA.

2.2.21 Thermal conductivity

Assessment according to EN ISO 10456 and ISO 8990.

The thermal conductivity λ shall be given in the ETA.

2.2.22 Thermal inertia

Assessment according to EN ISO 10456 and ISO 8990.

The specific heat capacity c_p shall be given in the ETA.

3. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is: Decision 97/176/EC

The system is: 1

3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 4.

Table 4 Control plan for the manufacturer; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Factory production control (FPC)					
1	Strength, stiffness and density properties of lamellae of LVL	Supplier's DoP according EN 14374	Product specification of the manufacturer	–	Each delivery
		EN 14080, E.5	Bending strength of lamellae of LVL $f_{m,k,l}$ determined according to E.5 shall be greater than or equal to bending strength of LVL in Supplier's DoP	2 lamellae of LVL	per shift and line, layup or manufacturer specific strength class
2	Geometrical date	EN 14080	EN 14080	1	Each change of cross section
3	Bonding strength of glue lines in GLT	EN 14374, Annex B	EN 14374	1 full cross sectional specimen	for each shift in which gluing is carried out for each 20 m ³ of production
4	Bonding strength of block glued GLT	EN 14374, Annex B	EN 14374	At least 2 specimens with dimensions according to Clause 2.2.12	for each shift in which block gluing is carried out
5	Adhesive	Check of suppliers declaration	Product specification of the manufacturer	–	Each reception
6	Moisture content of lamellae of LVL to be jointed	EN 14374	EN 14374	–	According to the quality manual of the manufacturer

3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for GLT and block glued GLT are laid down in Table 5. The tasks of the notified body are referred to assessment and verification of constancy of performance on the level of the GLT and block glued GLT manufacturer as detailed on the table thereafter.

Table 5 Control plan for the notified body; cornerstones

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
Initial inspection of the manufacturing plant and of factory production control					
1	Ascertain that the factory production control with the staff and equipment are suitable to ensure a continuous and orderly manufacturing of GLT and block glued GLT.	As defined in the control plan	As defined in the control plan	As defined in the control plan	1
Continuous surveillance, assessment and evaluation of factory production control					
2	Continuous surveillance, assessment and evaluation of the factory production control carried out by the manufacturer (parameters according to Table 4 ¹⁾ of this EAD).	As defined in the control plan	As defined in the control plan	As defined in the control plan	2 / year

4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

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

EN 302-2: Adhesives for load-bearing timber structures – Test methods – Part 2: Determination of resistance to delamination

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

EN 302-6: Adhesives for load-bearing timber structures - Test methods – Part 6: Determination of the minimum pressing time under reference conditions

EN 302-7: Adhesives for load-bearing timber structures — Test methods — Part 7: Determination of the working life under referenced conditions

EN 314-1: Plywood – Bonding quality – Part 1: Test methods

EN 323: Wood-based panels – Determination of density

EN 350: Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials

EN 383: 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: Timber structures — Structural timber and glued laminated timber — Determination of some physical and mechanical properties

EN 1382: Timber structures – Test methods – Withdrawal capacity of timber fasteners

EN 1383: Timber structures – Test methods – Pull through resistance of timber fasteners

EN 1365-3: Fire resistance tests for loadbearing elements – Part 3: Beams

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

EN 1309-1: Round and sawn timber — Method of measurement of dimensions — Part 1: Sawn timber

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

EN 1995-1-2: Eurocode 5 — Design of timber structures — Part 1 2: General — Structural fire design

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 14080: Timber structures — Glued laminated timber and glued solid timber — Requirements

EN 14374: Timber structures – Structural laminated veneer lumber - Requirements

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

EN 16351: Timber structures – Cross laminated timber – Requirements

EN ISO 8970: Timber structures – Testing of joints made with mechanical fasteners – Requirements for wood density

EN ISO 10456: Building materials and products — Hygrothermal properties — Tabulated design values and procedures for determining declared and design thermal values

ISO 8990: Thermal insulation – Determination of steady-state thermal transmission properties – Calibrated and guarded hot box