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European Assessment Document for

Special block glued laminated timber



CE

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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The EAD covers glued laminated timber (in the following text named “special block glued glulam”) made of softwood according to EN 14080¹ that is block glued with an adhesive of type I according to EN 15425 (in the following text named “special block glued glulam”). The block glue line is maximum 0,3 mm thick. The glulam components of the special block glued glulam are homogeneous or combined glulam according to EN 14080 made of species in accordance with EN 14080, clause 5.5.2, and adhesives of type I according to EN 301 or EN 15425. The lay-up of combined glulam is symmetrical.

The glulam components are

- in the case of homogeneous glulam components assigned to a strength class in accordance with EN 14080, Table 3,
- in the case of combined glulam components assigned to a strength class in accordance with EN 14080, Table 2 or
- assigned to a strength class in accordance with EN 14080, clause 5.1.5, if an assignment to a strength class in accordance with EN 14080, Tables 2 or 3, is not possible.

This EAD covers only glulam components which, if finger-jointed, have been tested according to EN 14080, clause 5.5.5.2.2, methods A or B. They fulfil the requirements given in EN 14080, clause 5.5.5.2.2,

The EAD also covers block glued glulam from re-sawn glulam.

In terms of geometry the special block glued glulam is widely in accordance with EN 14080. The EAD covers special block glued glulam with a depth H up to 300 mm, a width B from 38 mm up to 1000 mm and a geometry according to Figures 1.1.1 and 1.1.2.

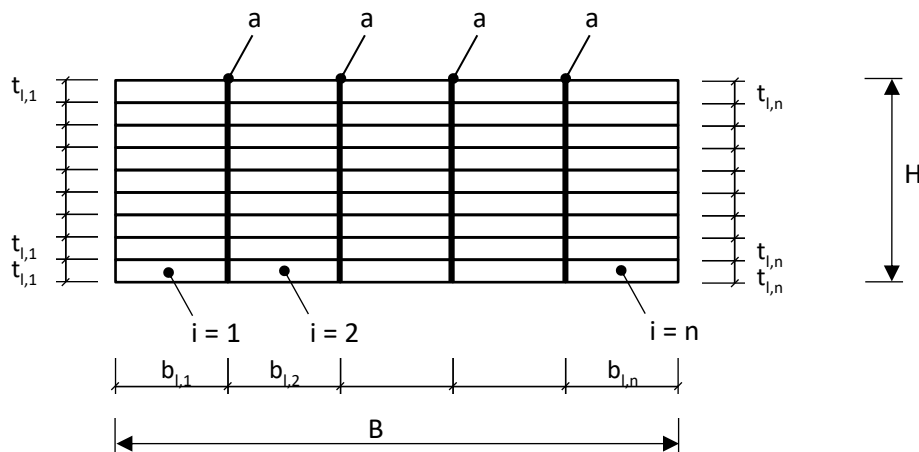


Figure 1.1.1: Geometry and layup of the special block glued glulam made of homogeneous or combined glulam

In Figure 1.1.1 is:

- a block glue line
- $b_{i,i}$ lamination width of the glulam component i , $b_{i,i} \leq 280$ mm
- i glulam component i
- n glulam component n
- $t_{i,i}$ lamination thickness of the glulam component i , $6 \text{ mm} \leq t_{i,i} \leq 45$ mm
- B, H dimensions of the special block glued glulam.

¹ All undated references to standards in this EAD are to be understood as references to the dated versions listed in chapter 4.

If the special block glued glulam is made of homogeneous glulam the thickness $t_{i,i}$ of the glulam laminations of different glulam components may vary such as given in Figure 1.1.2. The lamination thickness $t_{i,i}$ of one glulam component is always the same.

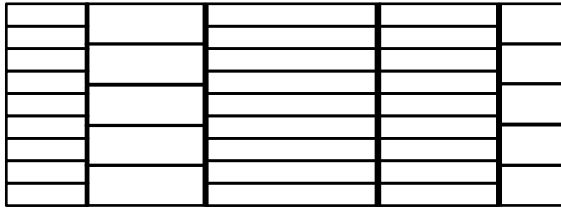


Figure 1.1.2: Example of a layup of the special block glued glulam made of homogeneous glulam with varying thicknesses of the laminations

In the case that the special block glued glulam is made of combined glulam the lamination thickness $t_{i,i}$ of all glulam components is the same (see Figure 1.1.3).

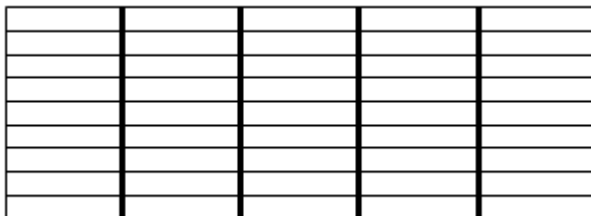


Figure 1.1.3: Example of a layup of the special block glued glulam made of combined or homogeneous glulam

Adhesives of type EN 15425 I 70 GP 0.3 w, EN 15425 I 90 SP 0.5 w and/or EN 15425 I 90 GP 0.3 w are used to produce special block glued glulam.

The product is not covered by any harmonised standard. The EAD on hand covers special block glued glulam that is block glued with an adhesive according to EN 15425 contrary to the provisions given in EN 14080, clause 5.5.3.1, Table 7. EN 14080 covers the use of gap-filling adhesives according to EN 301 only while adhesives according to EN 15425 are not gap-filling. Thus, the methods for assessing the bonding strength of glue lines between glulam components in accordance with EN 14080, clause 5.5.7, and the resistance to fire as given in EN 14080, clause 5.7, do not apply for the products covered by this EAD. Furthermore, there are no methods regarding the assessment of the shear strength and of the durability of bonding strength of the special block glued glulam given in EN 14080. Hence, additional assessment methods and methods deviating from EN 14080 are required.

Because of the way to prepare the specimens as well as the different test methods and because of the position of the block glue line in the test setup the product is not covered by any other EAD.

The EAD covers special block glued glulam:

- with solid rectangular cross section,
- with a characteristic value of the shear strength of the special block glued glulam $f_{v,g,k}$ of at least 3,5 N/mm² assessed as given in clause 2.2.2,
- fulfilling the minimum production provisions according to EN 14080, Annex I.7.1 to I.7.3 and I.7.5.

The EAD does not cover special block glued glulam:

- with large finger joints,
- made of softwood preservative treated against biological attack,
- made of softwood treated with flame retardants,
- made of recycled softwood.

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)

The special block glued glulam is intended to be used in load-bearing timber structures in service classes 1 and 2 according to EN 1995-1-1, clause 2.3.1.3, such as beams, columns, walls and ceilings.

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 special block glued glulam for the intended use of 50 years when installed in the works (provided that the special block glued glulam is subject to appropriate installation (see 1.1)). 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 2.1.1 shows how the performance of special block glued glulam is assessed in relation to the essential characteristics.

Table 2.1.1 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	Assessment method	Type of expression of product performance
Basic Works Requirement 1: Mechanical resistance and stability			
1	Strength, stiffness and density properties of the special block glued glulam	2.2.1	Class
2	Shear strength of the special block glued glulam	2.2.2	Level $f_{v,g,k}$ in N/mm ²
Basic Works Requirement 2: Safety in case of fire			
3	Reaction to fire	2.2.3	Class
Basic Works Requirement 3: Hygiene, health and the environment			
4	Content, emission and/or release of dangerous substances - SVOC and VOC	2.2.4.1	Level, description
5	Content, emission and/or release of dangerous substances - Formaldehyde emission	2.2.4.2	Class
Aspects of durability			
6	Durability of bonding strength of the block glue line	2.2.5	Description, Level
7	Durability against biological attack	2.2.6	Class

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

This chapter is intended to provide instructions for TABs. Therefore, the use of wordings such as “shall be stated in the ETA” or “it has to be given in the ETA” shall be understood only as such instructions for TABs on how results of assessments shall be presented in the ETA. Such wordings do not impose any obligations for the manufacturer and the TAB shall not carry out the assessment of the performance in relation to a given essential characteristic when the manufacturer does not wish to declare this performance in the Declaration of Performance.

2.2.1 Strength, stiffness and density properties of the special block glued glulam

Depending on the strength class of the glulam components and the lay-up the special block glued glulam shall be assigned to a strength class according to Table 2.2.1.1.

Table 2.2.1.1 Strength class assignment for the special block glued glulam

Glulam components	Assignment of the special block glued glulam to a strength class according to EN 14080
Homogenous glued laminated timber	Table 3
Combined glued laminated timber	Table 2
Homogenous or combined glued laminated timber with symmetrical lay-up	Clause 5.1.5

The strength class of the special block glued glulam shall be given in the ETA.

2.2.2 Shear strength of the special block glued glulam

The test shall be carried out for all species/adhesive combinations of the special block glued glulam and for every type of block gluing press.

Ten special block glued glulam specimens with one block glue line shall be produced in the respective block gluing press of the manufacturer. The glulam components shall be equally wide. Five block glued glulam specimens shall have the smallest depth and five the largest depth (≤ 300 mm) of the product range to be covered by the ETA. The specimen length is seven times the specimen width. The specimens with the largest depth shall be cut in two pieces at half of its depth. The cut shall be rectangular to the block glue line. Thus, in total 15 specimens shall be tested.

The characteristic value of the shear strength of the special block glued glulam $f_{v,g,k}$ shall be determined by bending-shear tests. The tests shall be performed as 4-point bending tests according to the provision given in EN 408, clause 19, with following deviations (see Figure 2.2.2.1):

- The lever arm a shall be significantly smaller than provided in EN 408: It shall be chosen in a way, that the clear distance between the edge of the support bearing plate to the edge of the nearest load bearing plate shall be between 2 and 2.5 times the specimen's depth. The minimum clear distance indicated shall be regarded as critical to prevent the shear stress distribution from being influenced by the compression perpendicular to grain stress.
- The distance of the two loading points is also significantly smaller than provided in EN 408: The distance of the centres of the load bearing plates shall be smaller than 2 times the specimen's depth B (see Figure 2.2.2.1). However, the clear distance between the load bearing plates shall not fall below 0,5 times the depth.
- The bearing length shall be sufficient to avoid compression perpendicular to the grain failure, but not greater than the beam depth. All specimens shall be cut to the exact length with no overhangs allowed.

- Load shall be applied at a constant rate according to EN 408 so as to reach the ultimate load in 300 ± 120 s.
- In the tests the laminations of the glulam components shall be edgewise orientated (block glue line horizontal).
- If the specimens tend to fail in bending mode, the tension and the compression zones may be strengthened by means of additional laminations glued to the side faces in the zone of highest bending moment (see Figure 2.2.2.1). The width of the additional laminations shall not exceed $B/6$. The timber material and the thickness of the additional laminations shall be chosen such that bending failure of the specimens is avoided. The specimens may also be reinforced in the area of compression stresses perpendicular to the grain at the supports and at the loading points, e.g., by fully-threaded self-tapping screws. The position of the screws shall be chosen such that compression failure of the specimens is avoided.

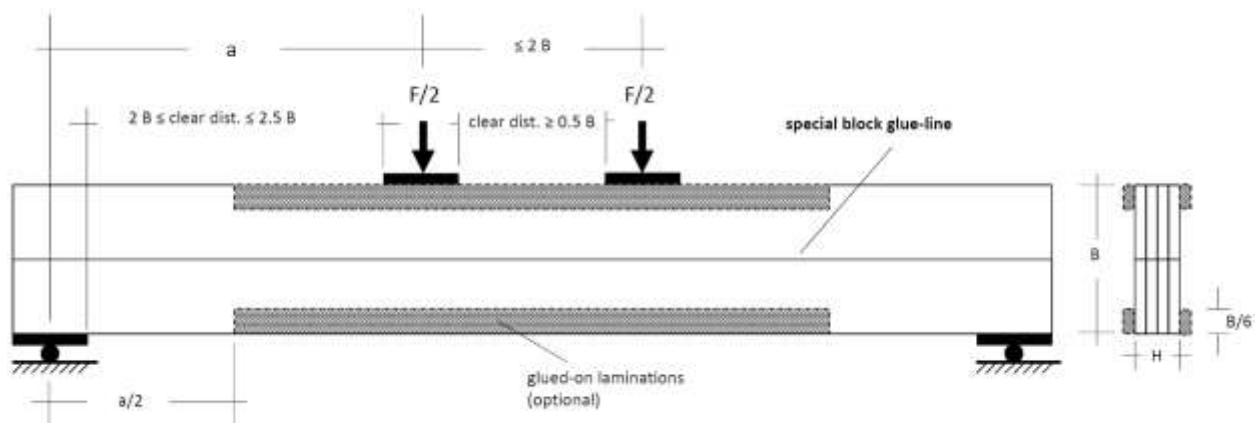


Figure 2.2.2.1: Setup of the shear strength test

The maximum shear stress at ultimate load shall be taken as the individual shear strength. The characteristic value of shear strength shall be calculated from the individual shear strength values according to EN 14358 and given in the ETA in N/mm^2 .

2.2.3 Reaction to fire

One of the following options shall apply:

- a) The special block glued glulam is considered to satisfy the requirements for performance class D-s2, d0 of the characteristic reaction to fire in accordance with the Commission Delegated Regulation (EU) 2017/1227 without the need for testing on the basis of fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

Therefore, when the conditions and intended use referred to above are met, the performance of the product is D-s2, d0 and shall be stated in the ETA.

- b) If the special block glued glulam is not covered by "a)" or a better classification is sought, the product shall be tested, using the test method(s) relevant for the corresponding reaction to fire class according to EN 13501-1. The special block glued glulam shall be classified according to Commission Delegated Regulation (EU) 2016/364 in connection with EN 13501-1.

For the mounting and fixing conditions of the specimens of the tests according to EN 13823 (SBI) the provisions in EN 14080, clause 5.8, shall apply. Tests according to EN ISO 11925-2 shall be conducted on free-hanging specimens without using an additional substrate.

Results of these tests are valid for special block glued glulam produced

- with the same type of wood as tested,
- with the same adhesive with equal or lower visible area per square meter of glued joints as used for the preparation of the tested specimens,
- with the same or higher thickness than tested,
- with the same or higher apparent minimum density ($\rho_{g, \text{mean}}$).

2.2.4 Content, emission and/or release of dangerous substances

The performance of the product related to the emissions and/or release and, where appropriate, the content of dangerous substances shall be assessed on the basis of the information provided by the manufacturer³ after identifying the release scenarios taking into account the intended use of the product and the Member States where the manufacturer intends his product to be made available on the market.

The identified intended release scenarios for this product and intended use with respect to dangerous substances are:

IA 1⁴: Product with direct contact to indoor air.

IA 2⁵: Product with indirect contact to indoor air (e.g., covered products) but possible impact on indoor air.

2.2.4.1 SVOC and VOC

For the intended use covered by the release scenario IA1 and/or IA2 semi-volatile organic compounds (SVOC) and volatile organic compounds (VOC) shall be determined in accordance with EN 16516. The respective loading factor [m^2/m^3] used for emission testing shall be taken from the following Table 2.2.4.1.1, depending on the intended use. The chosen loading factor shall present the intended use or sum the relevant loading factors if appropriate (e.g., wall and ceiling). The loading factor for small surfaces shall not be taken into account additionally if the loading factor for ceiling, wall or the sum of both is already considered.:

Table 2.2.4.1.1: Loading factor L, depending on the product type (in accordance with EN 16516)

Intended use	Loading factor [m^2/m^3]
Walls	1,0
Ceiling	0,4
Small surfaces, e.g., columns, beams	0,05

³ The manufacturer may be asked to provide to the TAB the REACH related information which he must accompany the DoP with (cf. Article 6(5) of Regulation (EU) No 305/2011).

The manufacturer is **not** obliged to:

- to provide the chemical constitution and composition of the product (or of constituents of the product) to the TAB, or
- to provide a written declaration to the TAB stating whether the product (or constituents of the product) contain(s) substances which are classified as dangerous according to Directive 67/548/EEC and Regulation (EC) No 1272/2008 and listed in the "Indicative list on dangerous substances" of the SGDS, taking into account the installation conditions of the construction product and the release scenarios resulting from there.

Any information provided by the manufacturer regarding the chemical composition of the products may not be distributed to EOTA, to another TAB or beyond.

⁴ Scenario IA1 is applicable for products which are in contact with indoor air in a way that dangerous substances could be released directly out of the product.

⁵ Scenario IA2 is applicable for products which are covered with other products but nevertheless could release dangerous substances to indoor air (e.g., products covered with porous/unsealed coverings incapable of avoiding migration, such as gypsum panels).

The preparation of the test specimen shall be performed by using a representative sample of the product installed in accordance with the manufacturer's product installation instructions or in absence of such instructions the usual practice of the product installation. The size of the test specimen shall be chosen in consideration of the test chamber size and the intended loading factor (see above).

Once the test specimen has been produced, as described above, it shall immediately be placed in the emission test chamber. This time shall be considered the starting time of the emission test.

The test results shall be reported for the relevant parameters (e.g., chamber size, temperature and relative humidity, air exchange rate, loading factor, size of test specimen, conditioning, production date, arrival date, test period, test result) after 3 and/or 28 days testing.

The product performance shall be expressed in [$\mu\text{g}/\text{m}^3$ or mg/m^3] and stated as tested/described in the ETA.

2.2.4.2 Formaldehyde emission

If formaldehyde-containing adhesives are used to produce special block glued glulam, the release of formaldehyde shall be determined according to EN 14080, Annex A.

The release of formaldehyde shall be stated as class E1 or E2.

If a formaldehyde-free adhesive is used to produce special block glued glulam, the release of formaldehyde can be assigned to class E1 without testing according to EN 14080, Annex A.

2.2.5 Durability of bonding strength of the block glue line

The test of the glue lines between components (block glue lines) shall be carried out for all species/adhesive combinations of the special block glued glulam and for every type of block gluing press.

Preparation of specimens

A total of 10 special block glued glulam specimens with a length of $5 \text{ m} \pm 10 \text{ cm}$ shall be produced in the respective block gluing press of the manufacturer. Specimens with

- the largest width B of the special block glued glulam,
- the smallest width B of the special block glued glulam, if relevant considering block glued re-sawn glulam,
- special block glued glulam made of combined glued laminated timber and uniform lamination thickness,
- special block glued glulam made of homogenous glued laminated timber (the lamination thickness of the glulam components may be different)

shall be included.

Six slabs shall be cut from each of the 10 specimens, three slabs with a length of 100 mm for testing the bonding quality and three slabs with a length of 75 mm for the delamination test.

The slabs shall be divided with respect to width direction into several sections, whereby the block glue line is centrally arranged in the sections, so that the maximum width of the specimens is 280 mm.

For testing the bonding quality, the 100 mm long sections shall be divided further with respect to depth direction into maximum three specimens, so that the cleavage width is at least 75 mm and not more than 100 mm.

The cutting pattern of the specimens is exemplarily illustrated in Figure 2.2.5.1.

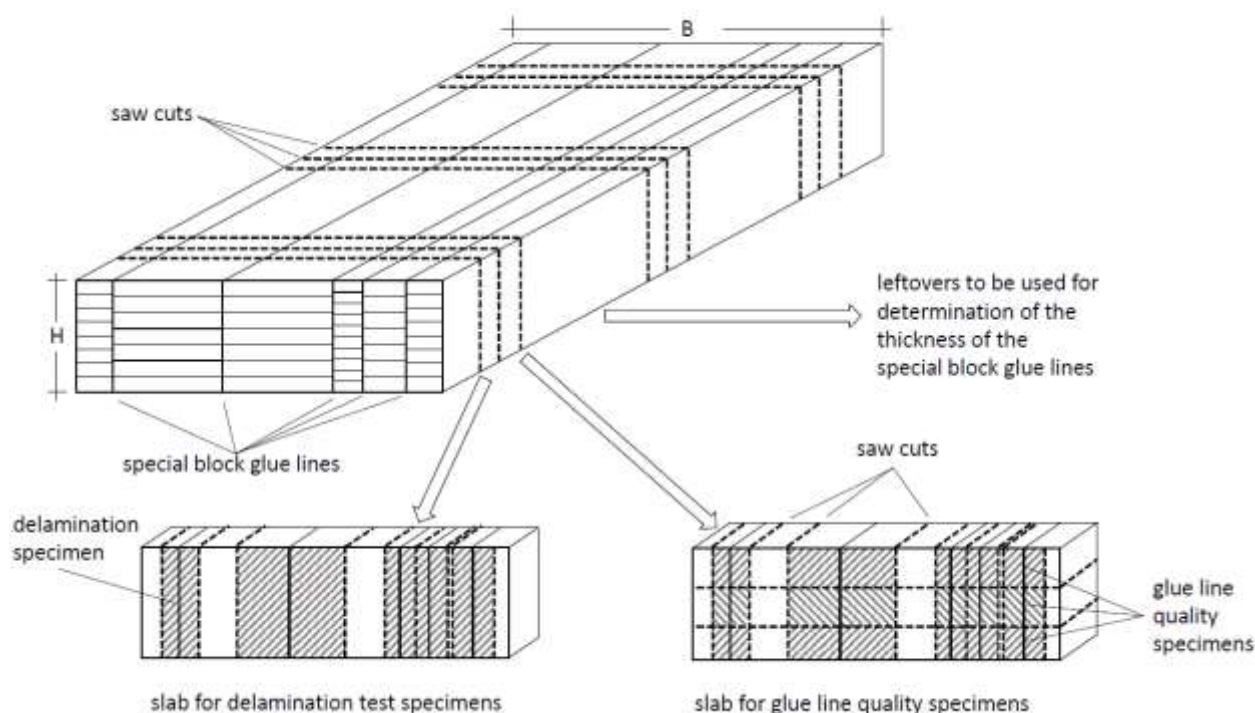


Figure 2.2.5.1: Principle of the specimens cutting

Determination of the bonding strength

The durability of the bonding strength of the special block glued glulam shall be determined by tests according to Table 2.2.5.1.

Table 2.2.5.1: Specification of the determination of the durability of the bonding strength of the special block glued glulam

Tests of the block glued glulam	Test method	Specimen type	Minimum specimen number	Provisions to be fulfilled
Bonding quality	Cleavage tests according to EN 14374, Annex B	According to the description above	30 slabs, each slab subdivided into several specimens, (see description above)	EN 14374, clause 4.2
Delamination	EN 14080, Annex C, method A	Largest cross-section with largest lamination depth prepared according to the description above	30 slabs, each slab subdivided into several specimens, (see description above)	EN 14080, Table 9

It shall be stated in the ETA whether the provisions given in Table 2.2.5.1 are fulfilled.

Block glue line thickness

The thickness of the block glue line of all specimens shall be measured according to EN 14080, Annex I.7.4, before testing. Furthermore, the leftover parts of the produced block-glued specimens shall be used for determination of the glue-line thickness, too (see Figure 2.2.6.1). At least 10 additional slabs shall be sawn from the leftovers and the glue-line thickness shall be measured for all block-glue-lines. The thickness of the block glue line of all such prepared specimens shall be measured over the full glue line length at 10 points.

From the frequency distribution of all block-glue-line thickness results the 95% quantile shall be determined and given in the ETA.

2.2.6 Durability against biological attack

The natural durability against biological attack of the special block glued glulam shall be assessed in accordance with EN 350, clause 5.2 and Annex B. The species and the durability class in accordance with EN 350, clause 5.2 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 Commission Decision 97/176/EC, as amended by Commission Decision 2001/596/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 3.2.1

Table 3.2.1 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) [including testing of samples taken at the factory in accordance with a prescribed test plan]					
Mechanical resistance and stability					
1	Strength, stiffness and density properties of the glulam components	EN 14080, clause 5.1	EN 14080, clause 5.1	Each glulam component	Each glulam component
2	Species, adhesives	See control plan	Check whether the species and adhesives are within the conditions given in 1.1	-	For each delivery
3	Moisture content of the glulam components to be jointed	EN 14080: Annex I.7.1	EN 14080, Annex I.7.1	Each glulam component	Each glulam component
4	Temperature of the timber	EN 14080, Annex I.7.5	EN 14080, Annex I.7.5	-	Continuously during production
5	Block glue line thickness	EN 14080, Annex I.7.4	≤ 0.3 mm	One full cross sectional specimen for each 20 m ³ of production, measurement 3 points per block-glue-line	2 per shift
6	Cramping pressure for block gluing	See control plan	EN 14080, Annex I.7.3	-	daily
7	Geometrical data, especially planarity and squareness of the glulam components	EN 14080, clause 5.11.1	EN 14080, clause 5.11.1	Each glulam component	Each glulam component
8	Bonding strength of the block glue line - Delamination	EN 14080, Annex C, method B	EN 14080, Table 9	one full cross sectional specimen for each 20 m ³ of production, divided into delamination specimens	1 per shift
Safety in case of fire					

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
9	Reaction to fire	<u>clause 2.2.3 a)</u> Check the relevant indirect parameters, e.g.: <ul style="list-style-type: none"> • minimum thickness • apparent minimum density 	The provisions of Delegated Regulation (EU) 2017/1227 shall be fulfilled.	1	Per shift
		<u>clause 2.2.3 b)</u> Check that all relevant indirect parameters, e.g.: <ul style="list-style-type: none"> • minimum thickness • apparent minimum density • wood type • type of adhesive and its coverage as determined within the reaction to fire tests are fulfilled 	See control plan	1	Per shift
Content, emission and/or release of dangerous substances					
10	SVOC and VOC	2.2.5.1	Control plan	1	With production start and every 5 years
11	Formaldehyde emission	EN 14080, Annex A, A 2.1.2	Class E1 or E2	-	Control at any reception of adhesives that only adhesives for which an initial classification has been carried out within the assessment of the performance are used.

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 special block glued glulam are laid down in Table 3.3.1

Table 3.3.1 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 <i>(for systems 1+, 1 and 2+ only)</i>					
1	<p>Ascertain that the factory production control with the staff and equipment is suitable to ensure a continuous and orderly manufacturing of the product considering particularly the following inspections and in accordance with EN 14080, Annex I.7:</p> <ul style="list-style-type: none"> – Suitable premises – Suitable technical equipment – Qualified personnel – Suitability of the factory production control established by the manufacturer <p>Full implementation of the control plan</p>	Verification of the complete FPC, to be implemented by the manufacturer as defined in the control plan	-	-	When starting the production process, after its modification or when starting a new production line
Continuous surveillance, assessment and evaluation of factory production control <i>(for systems 1+, 1 and 2+ only)</i>					
2	Ascertain that the system of factory production control and the specified automated manufacturing process are maintained according to EN 14080, Annex I.7, and as defined in the control plan	Verification of the controls carried out by the manufacturer on the raw materials, on the manufacturing process and on the product as indicated in Table 3.2.1 and as defined in the control plan	-	-	Twice a year

4 REFERENCE DOCUMENTS

EN 301:2023	Adhesives, phenolic and aminoplastic, for load-bearing timber structures - Classification and performance requirements
EN 350:2016	Durability of wood and wood-based products – Testing and classification of the durability to biological agents of wood and wood-based materials
EN 408:2010+A1:2012	Timber structures – Structural timber and glued laminated timber – Determination of some physical and mechanical properties
EN 1995-1-1:2004+AC:2006+A1:2008+A2:2014	Eurocode 5: Design of timber structures – Part 1-1: General – Common rules and rules for buildings
EN 1995-1-2:2004+AC:2009	Eurocode 5: Design of timber structures – Part 1-2: General – Structural fire design
EN 13501-1:2018	Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
EN 13823:2020+A1:2022	Reaction to fire tests for building products – Building products excluding floorings exposed to the thermal attack by a single burning item
EN 14080:2013	Timber structures – Glued laminated timber and glued solid timber – Requirements
EN 14358:2016	Timber structures – Calculation of characteristic values
EN 14374:2004	Timber structures – Structural laminated veneer lumber – Requirements
EN 15425:2023	Adhesives – One component polyurethane (PUR) for load-bearing timber structures – Classification and performance requirements
EN 16516:2017+A1:2020	Construction products – Assessment of release of dangerous substances – Determination of emissions into indoor air
EN ISO 11925-2:2020	Reaction to fire tests – Ignitability of products subjected to direct impingement of flame – Part 2: Single-flame source test (ISO 11925-2:2020)