



Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

| UK Technical Assessment | UKTA-0836-22/6078 of 04/05/2022 |
|--|--|
| Technical Assessment Body issuing the UK Technical Assessment: | British Board of Agrément |
| Trade name of the construction product: | CLT - Cross Laminated Timber |
| Product family to which the construction product belongs: | Area Code 13 - Structural timber products\elements and ancillaries |
| Manufacturer: | Stora Enso Wood Products |
| Manufacturing plants: | See Annex 1 |
| This UK Technical Assessment contains: | 31 pages including 5 annexes which form an integral part of this assessment |
| This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of: | UKAD 130005-00-0304 "Solid wood slab element to be used as a structural element in buildings." |

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1. Technical description of the product

1.1 General

This UK Technical Assessment (UKTA) applies to CLT – Cross Laminated Timber. CLT – Cross Laminated Timber is made of softwood boards which are bonded together in order to form cross laminated timber (solid wood slab elements). Generally, adjacent layers of the softwood boards are arranged perpendicular (angle of 90°) to each other. See Annex 2, Figure 1.

The principal structure of the cross laminated timber is shown in Annex 2, Figures 2 and 3. The surfaces of the cross laminated timber are planed or sanded. Surfaces of the boards are planed.

The solid wood slab element consists of between three and twenty adjacent layers which are arranged perpendicular to each other. The thickness and orientation of individual layers are symmetrically assembled.

The following factors apply:

- Single softwood board layers (maximum 50% of the cross section) may be replaced by one- and multilayer solid wood panels. The resulting solid wood panels are suitable for structural use.
- Multiple consecutive board layers may be arranged in the same direction if their overall thickness does not exceed 90mm.
- For solid wood slabs with distinctive asymmetric cross sections, the effects of symmetry must be considered.

The individual layers of the softwood boards may be side-glued.

The transverse layers of the softwood boards may also be substituted by lamellae type “REX” boards – see 1.2.2. Lamellae type “REX” softwood boards may be side-glued.

The surfaces of the solid wood slab elements may be covered with additional layers as a covering. Panels constructed in this manner are outside the scope of this UK Technical Assessment.

Strength and stiffness characteristics for mechanical actions perpendicular to and in plane of the cross laminated timber are only assigned to the cross laminated timber without covering.

The manufacturing specifications of CLT – Cross Laminated Timber and the individual boards are given in Annexes 2 and 3. The material characteristics, dimensions and tolerances of CLT – Cross Laminated Timber, not included in these Annexes, are held in the technical file of the UK Technical Assessment Body.

The application of wood preservatives and flame retardants is outside the scope of this UK Technical Assessment.

1.2 Components

1.2.1 Boards

The specification of the boards is given in Annex 3, Table 2. Boards are visually or machine strength graded. Only kiln dried wood shall be used.

The timber species used is European spruce or equivalent softwood.

1.2.2 Lamellae type “REX”

The specification of the lamellae type “REX” is given in Annex 2, Table 2. Lamellae type “REX” are cut from symmetrical cross laminated timber of European spruce, fir or pine boards with minimum strength class $\geq 90\%$ T14 and $\leq 10\%$ T11 according to EN 338. Lamellae type

“REX” show a predefined percentage of end grain on the face of the lamellae – see Figure 4. Only kiln dried wood shall be used.

1.2.3 Wood-based panels

The specification of the wood-based panels is given in Annex 3, Table 2. Wood-based panels shall conform to EN 13986 or a UK Technical Assessment.

1.2.4 Adhesive

The adhesive for bonding of the cross laminated timber and the finger joints of the individual boards shall conform to EN 301 or EN 15425.

2. Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

2.1 Intended use

The solid wood slab is intended to be used as a structural or non-structural element in buildings and timber structures.

The solid wood slab shall be subjected to static and quasi-static actions only.

The solid wood slab is intended to be used in service classes 1 and 2 according to EN 1995-1-1. Members which are directly exposed to the weather shall be provided with an effective in-service protection.

2.2 General assumptions

The solid wood slab elements are manufactured in accordance with the provisions of the UK Technical Assessment using the manufacturing process as identified in the inspection of the manufacturing plants by the Technical Assessment Body 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 UK Technical Assessment are made known to those who are concerned with design and execution of the works.

Layers of planed boards shall be bonded together to the required thickness of the cross laminated timber. The individual boards shall be jointed in longitudinal direction by means of finger joints in accordance with EN 14080. There shall be no butt joints.

Adhesive shall be applied on one face of each board. The edges of the boards need not be bonded.

Design

This UK Technical Assessment only applies to the manufacture and use of cross laminated timber. Verification of stability of the works, including application of loads on the cross laminated timber, is outside the scope of this UK Technical Assessment.

The following conditions shall be observed:

- Design of cross laminated timber members is carried out under the responsibility of an engineer experienced in such products.
- Design of the works shall include appropriate protection of the cross laminated timber.
- The cross laminated timber members are installed correctly.

The design of cross laminated timber members elements may be in accordance with EN 1995-1-1 and EN 1995-1-2, taking into account information stated in Annex 3 of the UK Technical Assessment.

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

Packaging, transport, storage, maintenance, replacement and repair

It is the responsibility of the manufacturer to undertake the appropriate measures concerning product packaging, transport, storage, maintenance, replacement and repair procedures and to advise their clients on the transport, storage, maintenance, replacement and repair procedures of the product as considered necessary.

Installation

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

2.3 Assumed working life

The provisions made in this UK Technical Assessment are based on an assumed intended working life of CLT – Cross Laminated Timber of 50 years, when installed in the works, provided that they 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 experience¹.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee given by the product manufacturer or their representative, or 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. Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

| | |
|--|---------|
| Bending ⁽¹⁾ | Annex 3 |
| Tension and compression ⁽¹⁾ | Annex 3 |
| Shear ⁽¹⁾ | Annex 3 |
| Embedment strength | Annex 3 |
| Creep and duration of the load | Annex 3 |
| Dimensional stability | Annex 3 |
| In-service environment | Annex 3 |
| Bond integrity | Annex 3 |

⁽¹⁾ Load bearing capacity and stiffness regarding mechanical actions perpendicular to and in plane of the solid wood slab element

3.2 Safety in case of fire (BWR 2)

| | |
|--------------------|------------------------|
| Reaction to fire | Annex 3 ⁽¹⁾ |
| Resistance to fire | Annex 3 ⁽¹⁾ |

⁽¹⁾ Full test reports can be obtained from the holder of the UKTA, if required

3.3 Health, hygiene and the environment (BWR 3)

| | |
|--|---------|
| Content, emission and/or release of dangerous substances | 3.1.1 |
| Water vapour permeability – Water vapour transmission | Annex 3 |

3.3.1 The release of dangerous substances is determined in accordance with EAD 130005-00-0304, "Solid wood slab element to be used as a structural element in buildings".

No dangerous substances in the performance of CLT – Cross Laminated Timber are allowed.

NOTE

Regarding dangerous substances, there may be additional legislative requirements falling outside of the scope of this document. These requirements must be complied with as appropriate.

¹ The actual 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 be shorter than the assumed working life.

3.4 Safety and accessibility in use (BWR 4)

| | |
|--|---------|
| Bending ⁽¹⁾ | Annex 3 |
| Tension and compression ⁽¹⁾ | Annex 3 |
| Shear ⁽¹⁾ | Annex 3 |
| Embedment strength | Annex 3 |
| Creep and duration of the load | Annex 3 |
| Dimensional stability | Annex 3 |
| In-service environment | Annex 3 |
| Bond integrity | Annex 3 |
| Impact resistance | Annex 3 |

⁽¹⁾ Load bearing capacity and stiffness regarding mechanical actions perpendicular to and in plane of the solid wood slab element

3.5 Protection against noise (BWR 5)

| | |
|---------------------------|---------|
| Airborne sound insulation | Annex 3 |
| Impact sound insulation | Annex 3 |
| Sound absorption | Annex 3 |

3.6 Energy economy and heat retention (BWR 6)

| | |
|----------------------|---------|
| Thermal conductivity | Annex 3 |
| Air permeability | Annex 3 |
| Thermal inertia | Annex 3 |

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4 Assessment and verification of constancy of performance (hereinafter AVCP) system applied

4.1 System of assessment and verification of constancy of performance

According to UKAD No. 130005-00-0304 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011 as brought into UK law and amended, the system of Assessment and Verification of Constancy of Performance (AVCP) 1 applies.

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1 Tasks of the Manufacturer

5.1.1 Factory production control

The manufacturers shall establish and continuously maintain a factory production control for all manufacturing locations. All procedures and specification adopted by the manufacturers shall be documented in a systematic manner. The factory production control shall ensure the constancy of performances of CLT – Cross Laminated Timber with regard to the essential characteristics.

The manufacturers 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 manufacturers before acceptance. Checks on incoming materials shall include

control of quality control documents presented by the manufacturers 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 for each manufacturing location.

The results of factory production control are recorded and evaluated for each manufacturing location. 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 for a period of at least for ten years for all the manufacturing locations after the construction product has been placed on the market and shall be presented to the Approved Body involved in continuous surveillance.

5.1.2 Declaration of performance

The manufacturer is responsible for preparing the declaration of performance.

5.2 Tasks of the Approved Body

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

The Approved Body shall verify the manufacturers quality control procedures to ensure consistent production of the CLT – Cross Laminated Timber in accordance with this UK 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 Approved Body shall visit each factory at least once 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
- The implementation of the control plan

The results of continuous surveillance of each manufacturing location are made available on demand by the Approved Body to the Technical Assessment Body. If the provisions of the UK Technical Assessment and the control plan are no longer fulfilled, the Certificate of Constancy of Performance shall be withdrawn by the Approved Body.

5.3 UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product / system
- Marking with intention of clarification of intended use
- Date of marking
- Number of Certificate of Constancy of Performance
- UKTA number.

On behalf of the British Board of Agrément



Date of Issue: 4 May 2022

Hardy Giesler
Chief Executive



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Annex 1 Manufacturing plants

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Leonhard GmbH
Wisperndorf 4
9462 Bad St. Leonhard
Austria

Stora Enso Wood Products GmbH
Bahnhofstraße 31
3370 Ybbs
Austria

Stora Enso Timber AB
Timmervägen 2
664 33 Grums
Sweden

CLT – Cross Laminated Timber

Manufacturing plants

Annex 1

Figure 1: Principal structure of the solid wood slab – example

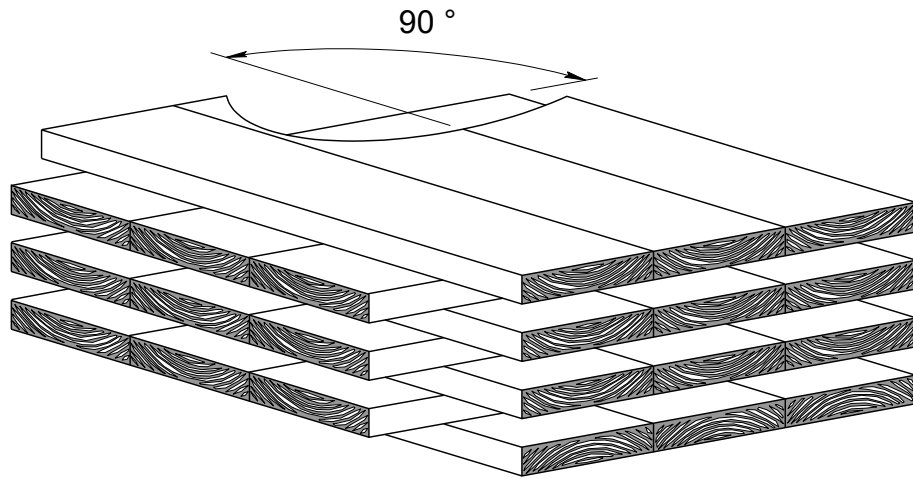


Figure 2: Principal structure of cross laminated timber with 3 layers – example

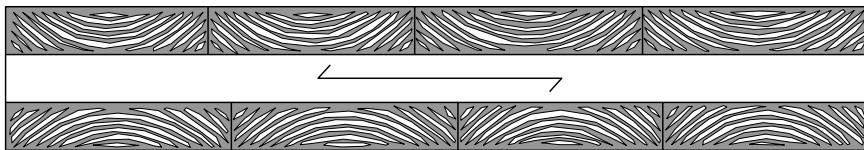
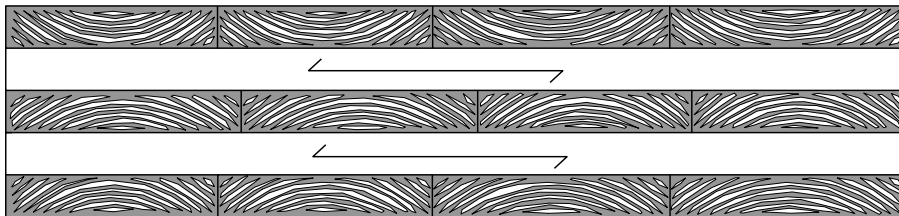


Figure 3: Principal structure of cross laminated timber with 5 layers – example



CLT – Cross Laminated Timber

Structure of cross laminated timber

Annex 2

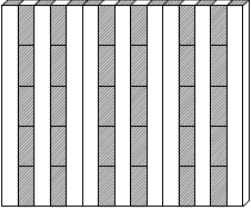
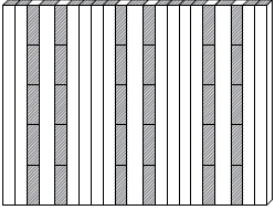
Figure 4: Pattern of lamellae type “REX” to be used as transverse layers

| Type | Illustration | Lamellae type “REX” | Type | Illustration | Lamellae type “REX” |
|---------------|--------------|--|-------------|--------------|--|
| REX 60L3s | | 20-20-20 33 % end grain in the face | REX 80 L3s | | 30-20-30 25 % end grain in the face |
| REX 90 L3s | | 30-30-30 33 % end grain in the face | REX 100 L3s | | 30-40-30 40 % end grain in the face |
| REX 100 L3s-B | | 40-20-40 20 % end grain in the face | REX 110 L3s | | 40-30-40 27 % end grain in the face |
| REX 120 L3s | | 40-40-40 33 % end grain in the face | REX 100 L5s | | 20-20-20-20-20 40 % end grain in the face |
| REX 120 L5s | | 30-20-20-20-30 33 % end grain in the face | REX 140 L5s | | 40-20-20-20-40 29 % end grain in the face |
| REX 160 L5s | | 40-20-40-20-40 25 % end grain in the face | REX 180 L5s | | 40-30-40-30-40 33 % end grain in the face |

CLT – Cross Laminated Timber

Structure of cross laminated timber

Annex 2

| Type | Illustration | Lamellae type "REX" | Type | Drawing | Lamellae type "REX" |
|----------------|---|--|------------------|--|--|
| REX 200 L5s |  | 40-40-40-40- 40 40 % end grain in the face | REX 220 L7s-2 |  | 60-30-40-30- 60 27 % end grain in the face |

CLT – Cross Laminated Timber

Structure of cross laminated timber

Annex 2

Table 1: Dimensions and specifications

| Item | Dimension / Specification | |
|--|---------------------------|---|
| Cross laminated timber | | |
| Thickness | mm | 42 to 350 |
| Width | m | ≤ 3.5 |
| Length | m | ≤ 16.5 |
| Number of layers | — | 3 to 20 symmetric assembly |
| Maximum number of adjacent layers arranged in the same direction | — | 2 for n = 4 or n = 5 3 for n > 5 |
| Maximum width of joints between boards within one layer | mm | 3 |
| Boards | | |
| Surface | — | planed |
| Thickness (planed dimension) | mm | 14 to 45 |
| Width | mm | 40 to 300 |
| Ratio width to thickness ²⁾ | — | ≥ 2.2 : 1 |
| Boards shall be graded with suitable visual and/or machine procedures to be able to assign them to a strength class according to EN 338. | — | <p>Within one member of cross laminated timber only one of the specified combinations of strength classes shall be applied.</p> <p>100 % C16 or T11 ¹⁾ ≥ 90 % C24 or T14 ¹⁾ / ≤ 10 % C16 or T11 ¹⁾ ≥ 90 % C30 or T21 ¹⁾ / ≤ 10 % C24 or T14 ¹⁾</p> |

¹⁾ According to EN 338.

²⁾ Except lamellae type "REX".

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

| Item | Dimension / Specification | |
|--|---------------------------|--|
| Moisture of wood according to EN 13183-2 | % | 6 to 15 % Within one member of cross laminated timber the moisture content shall not differ by more than 5 %. |
| Finger joints | — | EN 14080 |
| Lamellae type “REX” | — | See Annex 2, Figure 4 percentage of end grain in the face: 20 % to 40 % |
| Wood-based panels | — | EN 13986 |

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

Table 2: Product characteristics of the solid wood slab

| BWR | Essential characteristic | Assessment method | Level / Class / Description |
|---|---|---|--|
| 1 | Mechanical resistance and stability | | |
| | 1. Mechanical actions perpendicular to cross laminated timber ⁽¹⁾ | | |
| | Strength class of boards | EN 338 | See Table 2 |
| | Modulus of elasticity | | |
| | – parallel to the grain of the boards $E_{0, mean}$ | EAD 130005-00-0304, 2.2.1.1, I_{eff} | C16/T11 8 000 MPa C24/T14 12 000 MPa ⁽²⁾ C30/T21 12 000 MPa |
| | – perpendicular to the grain of the boards $E_{90, mean}$ | EN 338 | C16/T11 270 MPa C24/T14 370 MPa C30/T21 400 MPa |
| | Shear modulus | | |
| | – parallel to the grain of the boards $G_{090, mean}$ | EN 338 | C16/T11 500 MPa C24/T14 690 MPa C30/T21 750 MPa |
| – perpendicular to the grain of the boards (rolling shear) $G_{9090, mean}$ | EAD 130005-00-0304, 2.2.1.1 | 50 MPa | |
| Bending strength | | | |
| – parallel to the grain of the boards $f_{m, k}$ | EAD 130005-00-0304, 2.2.1.1, W_{eff} | C16/T11 $1/k_{sys} \cdot 17.6 \text{ MPa}$ ⁽³⁾ C24/T14 $1/k_{sys} \cdot 26.4 \text{ MPa}$ ⁽³⁾ C30/T21 $1/k_{sys} \cdot 33.0 \text{ MPa}$ ⁽³⁾ | |
| Tensile strength | | | |
| – perpendicular to the grain of the boards $f_{t, 90, k}$ | EN 338, reduced | 0.12 MPa | |
| Compressive strength | | | |
| – perpendicular to the grain of the boards $f_{c, 90, k}$ | EN 338 | C16/T11 2.2 MPa C24/T14 2.5 MPa C30/T21 2.7 MPa | |

NOTE ⁽¹⁾ CLT – Cross Laminated Timber with transverse layers of lamellae type “REX” may be considered equivalent to C24/T14

⁽²⁾ $E_{0, mean} = 6\ 800 \text{ MPa}$ for lamellae type “REX”

⁽³⁾ $k_{sys} = \max\{1.0; 1.1 - 0.025 \cdot n\}$

n ... number of boards within cover layer

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

| BWR | Essential characteristic | Assessment method | Level / Class / Description |
|-----|--|--|---|
| | Shear strength | | |
| | – parallel to the grain of the boards $f_{v, 090, k}$ | EN 338 | C16/T11 3.2 MPa C24/T14 4.0 MPa C30/T21 4.0 MPa |
| | – perpendicular to the grain of the boards (rolling shear strength) $f_{v, 9090, k}$ | EAD 130005-00-0304, 2.2.1.3, A_{gross} | Spruce: $\min \left\{ 1.25; 1.45 - \frac{t_Q}{100} \right\}$ MPa ⁽⁴⁾ Pine: $\min \left\{ 1.70; 1.90 - \frac{t_Q}{100} \right\}$ MPa ⁽⁴⁾ Lamellae type "REX": $\min \left\{ 1.25; 1.45 - \frac{t_Q}{100} \right\}$ Mpa ⁽⁴⁾ |

NOTE ⁽⁴⁾ t_Q is the thickness of the single or multiple layer in cross direction, $t_Q \leq 90\text{mm}$

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

| BWR | Essential characteristic | Assessment method | Level / Class / Description |
|-----|--|--|--|
| | 2. Mechanical actions in plane of cross laminated timber ⁽¹⁾ | | |
| | Strength class of boards | EN 338 | See Table 2 |
| | Modulus of elasticity – parallel to the grain of the boards $E_{0, mean}$ | EAD 130005-00-0304, 2.2.1.1, A_{net} , I_{net} | C16/T11 8 000 MPa C24/T14 12 000 Mpa ⁽²⁾ C30/T21 12 000 MPa |
| | Shear modulus – parallel to the grain of the boards $G_{090, mean}$ | EAD 130005-00-0304, 2.2.1.3, A_{net} | 460 MPa |
| | Bending strength – parallel to the grain of the boards $f_{m, k}$ | EAD 130005-00-0304, 2.2.1.1, W_{net} | C16/T11 16 MPa C24/T14 24 MPa C30/T21 30 MPa |
| | Tensile strength – parallel to the grain of the boards $f_{t, 0, k}$ | EN 338 | C16/T11 8.5 MPa C24/T14 14.5 MPa C30/T21 19.0 MPa |
| | Compressive strength – parallel to the grain of the boards $f_{c, 0, k}$ | EN 338 | C16/T11 17 MPa C24/T14 21 MPa C30/T21 24 MPa |
| | Shear strength – parallel to the grain of the boards $f_{v, 090, k}$ | EAD 130005-00-0304, 2.2.1.3, A_{net} ⁽³⁾ | 3.9 MPa ⁽⁵⁾ |

NOTE ⁽⁵⁾ $A_{net} = \max \begin{cases} A_{net,x} \\ A_{net,z} \end{cases}$

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

| BWR | Essential characteristic | Assessment method | Level / Class / Description | |
|----------|--|--|--|----------------------------|
| | 3. Other mechanical actions | | | |
| | Creep and duration of load | EN 1995-1-1 | | |
| | Dimensional stability Moisture content during service shall not change to such an extent that adverse deformation will occur. | | | |
| | Fasteners | EN 1995-1-1, the direction of grain of the cover layer shall be considered as in accordance with Eurocode 5. | | |
| | In-service environment | | | |
| | Durability of timber | EN 1995-1-1 | | |
| | Service classes | | 1 and 2 | |
| | Bond integrity | EAD 130005-00-0304 | Pass | |
| 2 | Safety in case of fire | | | |
| | <u>Reaction to fire</u> | | | |
| | Glued laminated timber products | Commission Decision 2005/610/EC | Mean density of wood $\geq 380 \text{ kg/m}^3$ Euroclass D-s2, d0 | |
| | <u>Resistance to fire</u> | | | |
| | Structures with specified fire resistance | EN 13501-2 | Annex 4 | |
| | Charring rate | EAD 130005-00-0304 | Floor/Roof | Wall |
| | - Charring of the cover layer - Charring of more layers than the cover layer | | 0.65 mm/min 1.3 mm/min ⁽⁶⁾ | 0.63 mm/min 0.86 mm/min |
| 3 | Hygiene, health and environment | | | |
| | Vapour permeability, μ , for wood | EN ISO 10456 | 50 (dry) to 20 (wet) | |
| 4 | Safety and accessibility in use | | | |
| | Impact resistance | Soft body resistance is assumed to be fulfilled for walls with a minimum of 3 layers and minimum thickness of 60 mm. | | |

NOTE ⁽⁶⁾ until 25 mm of charring. Afterwards the charring rate 0.65 mm/min applies up to the next glue line

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

| BWR | Essential characteristic | Assessment method | Level / Class / Description |
|------------|--|---------------------------------|---------------------------------------|
| 5 | Protection against noise | | |
| | Airborne sound insulation | EN ISO 10140-2, EN ISO 717-1 | For R_w (C; C_{tr}), see Annex 5 |
| | Impact sound insulation | EN ISO 10140-3, EN ISO 717-2 | For $L_{n,w}$ (C_i) see Annex 5 |
| | Sound absorption | EN ISO 354, EN ISO 11654 | For α_s see Annex 5 |
| 6 | Energy economy and heat retention | | |
| | Thermal conductivity, λ , of wood | EN ISO 10456 | 0.12 W/(m·K) |
| | Air permeability | EN 12114 | Class 4 according to EN 12207 |
| | Thermal inertia, specific heat capacity, c_p , of wood | EN ISO 10456 | 1600 J/(kg·K) |

CLT – Cross Laminated Timber

Characteristic data of cross laminated timber

Annex 3

Examples with specified fire resistance to EN 13501-2 to test method EN 1365-1

Wall structures

| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested wall height | Classification |
|---|--|--------------------------------|-----------|--------------------|----------------|
| | | Designation and structure [mm] | [kN/m] | [m] | i => o |
| – | – | CLT 100 C3s 30-40-30 | 35 | 3 | REI 60 |
| – | – | CLT 100 C5s 20-20-20-20-20 | 35 | 3 | REI 60 |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with a = 75/150 mm (edge/centre) row distance 625 mm | CLT 80 C3s 30-20-30 | 35 | 3 | REI 60 |
| 50 mm wood wool board Heraklith BM type L1/L2-W1-T1-S1/S2-P1-CS(10/Y)150-CI3 according to EN 13168, $\rho = 18.5 \text{ kg/m}^3$ 15 mm plaster | Heraklith screws 5 mm x 80 mm with a = 150 mm row distance 625 mm | CLT 80 C3s 30-20-30 | 35 | 3 | REI 60 |
| 10 mm Fermacell Firepanel A1 with fibrous reinforcement type GF-I-W2-C1 according to EN 15283-2, $\rho = 1\,200 \pm 50 \text{ kg/m}^3$ | Staples with a = 150 mm, row distance 390 mm | CLT 80 C3s 30-20-30 | 45 | 3 | REI 60 |
| 12.5 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | Staples with a = 150 mm, row distance 400 mm | CLT 120 C3s 40-40-40 | 200 | 3 | REI 60 |
| Hat-spring bar Protektor 60-27 according to EN 14195 40 mm glass wool Ursa Trennwandfilz TWF 1 according to EN 13162 12.5 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | Wood screws with flat head 4.2 mm x 35 mm with a = 600 mm Drywall screws 3.9 mm x 30 mm with a = 250 mm | CLT 120 C3s 40-40-40 | 200 | 3 | REI 60 |
| 2 x 18 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | First layer: staples with a = 200 mm, row distance 625 mm Second layer: staples with a = 80 mm, row distance 625 mm | CLT 80 C3s 20-40-20 | 120 | 3.28 | REI-M 60 |

CLT – Cross Laminated Timber

Resistance to fire to EN 13501-2 to test method EN 1365-1

Annex 4

| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested wall height | Classification |
|--|---|--|-----------|--------------------|----------------|
| | | Designation and structure [mm] | [kN/m] | [m] | i => o |
| 2 x 15 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | First layer: ribbed nails $l = 40 \text{ mm}$ Second layer: ribbed nails $l = 40 \text{ mm}$ (left side) and staples $l = 45 \text{ mm}$ (right side) with $a = 75/150 \text{ mm}$ (edge/centre) row distance 625 mm | CLT 80 C3s 30-20-30 | – | 3 | EI 90 |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with $a = 75/150 \text{ mm}$ (edge/centre) row distance 625 mm | CLT 100 C3s 30-40-30 | 35 | 3 | REI 90 |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ 40 mm mineral wool according to EN 13162, $\rho = 11 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with $a = 75/150 \text{ mm}$ (edge/centre) row distance 625 mm | CLT 100 C3s 30-40-30 | 35 | 3 | REI 90 |
| 50 mm wood wool board Heraklith BM type L1/L2-W1-T1-S1/S2-P1-CS(10/Y)150-CI3 according to EN 13168, $\rho = 18.5 \text{ kg/m}^3$ 15 mm plaster | Heraklith screws 5 mm x 80 mm with $a = 150 \text{ mm}$ row distance 625 mm | CLT 100 C3s 30-40-30 CLT 100 C5s 20-20-20-20-20 | 35 | 3 | REI 90 |
| Hat- spring bar Protektor 60-27 according to EN 14195 40 mm glass wool Ursa Trennwandfilz TWF 1 according to EN 13162 12.5 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | Wood screws with flat head 4.2 mm x 35 mm with $a = 600 \text{ mm}$ Drywall screws 3.9 mm x 30 mm with $a = 250 \text{ mm}$ | CLT 120 C3s 40-40-40 | 120 | 3 | REI 90 |
| 12.5 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | Staples with $a = 150 \text{ mm}$, row distance 400 mm | CLT 120 C3s 40-40-40 | 120 | 3 | REI 90 |
| 2 x 15 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | First layer: staples with $a = 200 \text{ mm}$, row distance 625 mm Second layer: staples with $a = 150 \text{ mm}$, row distance 400 mm | CLT 120 C3s 40-40-40 | 200 | 3 | REI 90 |

CLT – Cross Laminated Timber

Resistance to fire to EN 13501-2 to test method EN 1365-1

Annex 4

| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested wall height | Classification |
|--|---|--------------------------------|-----------|--------------------|----------------|
| | | Designation and structure [mm] | [kN/m] | [m] | i => o |
| 2 x 18 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | First layer: staples with a = 200 mm, row distance 625 mm Second layer: staples with a = 80 mm, row distance 625 mm | CLT 80 C3s 20-40-20 | 100 | 3.28 | REI-M 90 |
| 15 mm and 18 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | First layer: staples with a \leq 200 mm, row distance 625 mm Second layer: staples with a \leq 150 mm, row distance 400 mm | CLT 80 C3s 20-40-20 | 120 | 3 | REI-M 90 |

| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested wall height | Classification |
|--|---|--------------------------------|-----------|--------------------|----------------|
| | | Designation and structure [mm] | [kN/m] | [m] | i => o |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ 40 mm mineral wool according to EN 13162, $\rho = 11 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with a = 75/150 mm (edge/centre) row distance 625 mm | CLT 100 C3s 30-40-30 | 35 | 3 | REI 120 |
| 12.5 mm Fermacell Firepanel A1 with fibrous reinforcement type GF-I-W2-C1 according to EN 15283-2, $\rho = 1\,200 \pm 50 \text{ kg/m}^3$ 40 mm Rockwool panel 211, $\rho = 40 \text{ kg/m}^3$ 10 mm Fermacell Firepanel A1 with fibrous reinforcement type GF-I-W2-C1 according to EN 15283-2, $\rho = 1\,200 \pm 50 \text{ kg/m}^3$ | Staples with a = 150 mm, row distance 390 mm | CLT 80 C3s 30-20-30 | 45 | 3 | REI 120 |
| 18 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | Staples with a = 200 mm, row distance 400 mm | CLT 120 C3s 40-40-40 | 120 | 3 | REI 120 |
| 2 x 15 mm Fermacell Gypsum Fibreboard with fibrous reinforcement type GF-I-W2-C1 according to ETA-03/0050, $\rho = 1\,150 \pm 50 \text{ kg/m}^3$ | First layer: staples with a = 200 mm, row distance 625 mm Second layer: staples with a = 150 mm, row distance 400 mm | CLT 120 C3s 40-40-40 | 150 | 3 | REI 120 |

CLT – Cross Laminated Timber

Resistance to fire to EN 13501-2 to test method EN 1365-2

Annex 4

Examples with specified fire resistance to EN 13501-2 to test method EN 1365-2

Floor structures

| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested span | Classification |
|---|--|--------------------------------|----------------------|-------------|----------------|
| | | Designation and structure [mm] | [kN/m ²] | [m] | b => a |
| – | – | CLT 140 C5s 40-20-20-20-40 | 5 | 5 | REI 60 |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with a = 75/150 mm (edge/centre) row distance 625 mm | CLT 100 C3s 30-40-30 | 0.6 | 5 | REI 60 |


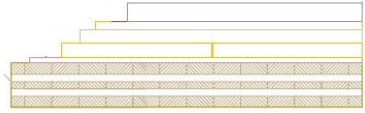
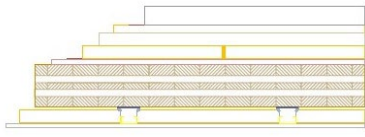
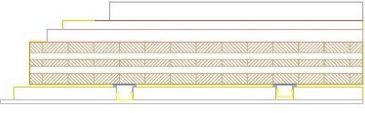

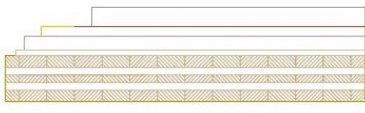
| Cladding on the fire exposed side | Mounting | CLT element | Test load | Tested span | Classification |
|--|--|--------------------------------|----------------------|-------------|----------------|
| | | Designation and structure [mm] | [kN/m ²] | [m] | b => a |
| – | – | CLT 160 C5s 40-20-40-20-40 | 6 | 5 | REI 90 |
| 12.5 mm Gypsum plasterboard type DF according to EN 520, $\rho \geq 800 \text{ kg/m}^3$ | Drywall screws 3.9 mm x 35 mm with a = 75/150 mm (edge/centre) row distance 625 mm | CLT 140 C5s 40-20-20-20-40 | – | 5 | EI 90 |
| 35 mm wood wool board Herakliith EPV type L2-W1-T2-S2-P2-CS(10/Y)200-CI3 according to EN 13168 | Herakliith screws 4.5 mm x 60 mm with a = 215 mm row distance 625 mm | CLT 140 C5s 40-20-20-20-40 | – | 5 | EI 90 |

CLT – Cross Laminated Timber

Resistance to fire to EN 13501-2

Annex 4


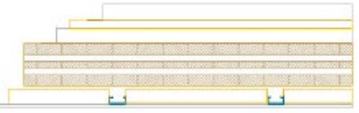
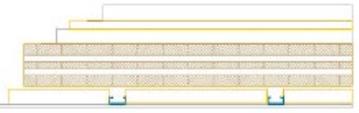

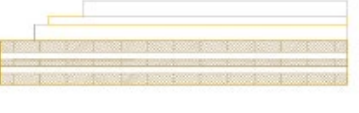
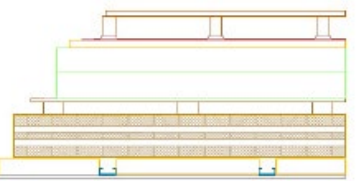
Examples for airborne and impact sound insulation

| № | Floor elements | | |
|------------|---|---|---|
| F 1 | 140 mm | CLT 140 NVI L5S, 428 kg/m ³ | L_{n,w}(C_i) = 88 (-5) dB  |
| F 2 | 70 mm 0.2 mm 30 mm 50 mm 50 mm 0.2 mm 18 mm 140 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1650 kg/m ³ Paving slab, 2320 kg/m ³ Trickle course Soft fibre board, 250 kg/m ³ CLT 140 NVI L5S, 428 kg/m ³ | L_{n,w}(C_i) = 41 (1) dB  |
| F 3 | 70 mm 0.2 mm 30 mm 50 mm 50 mm 0.2 mm 18 mm 140 mm 3 mm 70 mm 15 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1650 kg/m ³ Paving slab, 2320 kg/m ³ Trickle protection Soft fibre board, 250 kg/m ³ CLT 140 NVI L5S, 428 kg/m ³ Connection sealing tape Acoustical mounting including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 800 kg/m ³ | L_{n,w}(C_i) = 36 (3) dB  |
| F 4 | 70 mm 0.2 mm 30 mm 50 mm 140 mm 3 mm 70 mm 15 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1650 kg/m ³ CLT 140 NVI L5S, 428 kg/m ³ Connection sealing tape Acoustical mounting including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 800 kg/m ³ | L_{n,w}(C_i) = 46 (1) dB  |
| F 5 | 70 mm 0.2 mm 30 mm 50 mm 140 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1650 kg/m ³ CLT 140 NVI L5S, 428 kg/m ³ | L_{n,w}(C_i) = 50 (-1) dB  |
| F 6 | 70 mm 0.2 mm 30 mm 50 mm 20 mm 140 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1650 kg/m ³ Impact sound insulation board, 69 kg/m ³ , s' = 14 MN/m ³ CLT 140 NVI L5S, 428 kg/m ³ | L_{n,w}(C_i) = 49 (1) dB  |

CLT – Cross Laminated Timber

Protection against noise

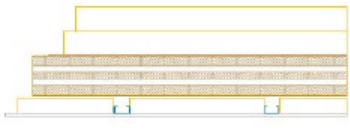
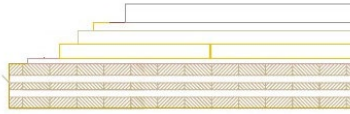
Annex 5



| | | | |
|-------------|--|--|---|
| F 7 | 70 mm 0.2 mm 30 mm 100 mm 140 mm | Cement screed, 2210 kg/m ³ Vapour barrier sheet Impact sound insulation board, 72 kg/m ³ , s' = 10 MN/m ³ Latex bonded ballast weight, 1650 kg/m ³ CLT 140 NVI L5S, 428 kg/m ³ | L_{n,w}(C_i) = 43 (-3) dB  |
| F 8 | 60 mm 0.05 mm 30 mm 60 mm 0.1 mm 150 mm 70 mm 12.5 mm | Cement screed, 2200 kg/m ³ PE-foil (separating layer) Impact sound insulation board, 120 kg/m ³ , s' ≤ 35 MN/m ³ Ballast weight, 1700 kg/m ³ PE-foil (trickle protection) CLT 5s Acoustical mounting including 60 mm thermal insulation, 22 kg/m ³ Gypsum plasterboard, 720 kg/m ³ | L_{n,w}(C_i) = 53 (3) dB  |
| F 9 | 60 mm 0.05 mm 30 mm 60 mm 0.1 mm 150 mm 70 mm 12.5 mm | Cement screed, 2200 kg/m ³ PE-foil (separating layer) Impact sound insulation board, 80 kg/m ³ , s' = 10 MN/m ³ Ballast weight, 1700 kg/m ³ PE-foil (trickle protection) CLT 5s Acoustical mounting including 60 mm thermal insulation, 22 kg/m ³ Gypsum plasterboard, 720 kg/m ³ | L_{n,w}(C_i) = 46 (2) dB  |
| F 10 | 60 mm 0.05 mm 30 mm 60 mm 0.1 mm 150 mm | Cement screed, 2200 kg/m ³ PE-foil (separating layer) Impact sound insulation board, 120 kg/m ³ , s' ≤ 35 MN/m ³ Ballast weight, 1700 kg/m ³ PE-foil (trickle protection) CLT 5s | L_{n,w}(C_i) = 57 (-1) dB  |
| F 11 | 60 mm 0.05 mm 30 mm 60 mm 0.1 mm 150 mm | Cement screed, 2200 kg/m ³ PE-foil (separating layer) Impact sound insulation board, 120 kg/m ³ , s' ≤ 35 MN/m ³ Bonded ballast weight, 1840 kg/m ³ PE-foil (trickle protection) CLT 5s | L_{n,w}(C_i) = 65 (-2) dB  |
| F 12 | 20 + 80 mm 10 mm 2 mm 0.1 mm 30 mm 2 x 100 mm 0.1 mm 15 mm 50 mm 150 mm 70 mm 12.5 mm | Floor covering on timber beams 50/80 Protection mat Roofing membrane PE-foil Impact sound insulation board, 133 kg/m ³ , s' = 10 MN/m ³ EPS F, 15 kg/m ³ PE-foil (vapour barrier) OSB, 580 kg/m ³ Timber beams 50/80 CLT 5s Acoustical mounting including 60 mm thermal insulation, 22 kg/m ³ Gypsum plasterboard, 720 kg/m ³ | L_{n,w}(C_i) = 52 (3) dB  |

CLT – Cross Laminated Timber

Protection against noise

Annex 5


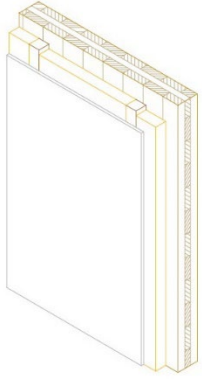
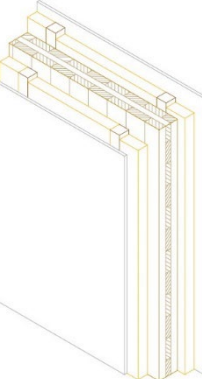
| Roof elements | | | |
|----------------------|--|---|---|
| Nº | | | |
| R 1 | 2 mm 2 x 100 mm 0.1 mm 125 mm 70 mm 12.5 mm | Roofing membrane EPS F, 15 kg/m ³ PE-foil (vapour barrier) CLT 5s Acoustical mounting including 60 mm thermal insulation, 22 kg/m ³ Gypsum plasterboard, 720 kg/m ³ | R_w(C; C_{tr}) = 48 (-3; -9) dB  |
| R 2 | 70 mm 0.7 mm 2 mm 2 x 100 mm 0.1 mm 125 mm | Ballast weight, 1600 kg/m ³ Separation geotextile Roofing membrane Mineral fibre board, 146 kg/m ³ PE-foil (vapour barrier) CLT 5s | R_w(C; C_{tr}) = 44 (0; -3) dB  |

| Wall elements | | | |
|----------------------|--------|--|---|
| Nº | | | |
| W 1 | 120 mm | CLT 120 NVI C5S, 445 kg/m ³ | R_w(C; C_{tr}) = 36 (-1; -4) dB  |
| W 2 | 100 mm | CLT 100 NVI C3S, 371 kg/m ³ | R_w(C; C_{tr}) = 34 (-1; -3) dB  |

CLT – Cross Laminated Timber

Protection against noise

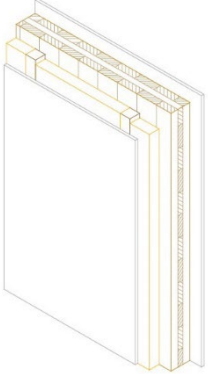


Annex 5

| | | | |
|------------|--|--|--|
| W 3 | 100 mm 3 mm 50 mm 12.5 mm | CLT 100 NVI C3S, 371 kg/m ³ Connection sealing tape Acoustical mounting, 388 kg/m ³ including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 51 (-2; -8) dB  |
| W 4 | 100 mm 50 mm 12.5 mm | CLT 100 NVI C3S, 371 kg/m ³ Wooden battens, 388 kg/m ³ including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 45 (-1; -5) dB  |
| W 5 | 12.5 mm 50 mm 100 mm 50 mm 12.5 mm | Gypsum plasterboard, 816 kg/m ³ Wooden battens, 388 kg/m ³ including 50 mm thermal insulation, 16 kg/m ³ CLT 100 NVI C3S, 371 kg/m ³ Wooden battens, 388 kg/m ³ including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 50 (-3; -10) dB  |

CLT – Cross Laminated Timber

Protection against noise

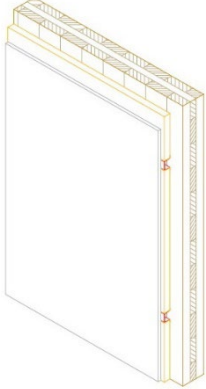

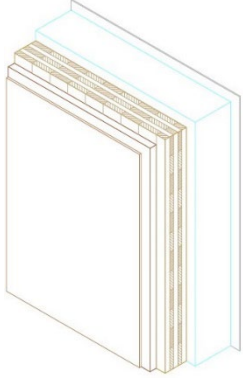
Annex 5

| | | | |
|------------|---------------------------------------|---|---|
| W 6 | 12.5 mm 100 mm 50 mm 12.5 mm | Gypsum plasterboard, 816 kg/m ³ CLT 100 NVI C3S, 371 kg/m ³ Wooden battens, 388 kg/m ³ including 50 mm thermal insulation, 16 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 46 (-2; -6) dB  |
| W 7 | 12.5 mm 100 mm 12.5 mm | Gypsum plasterboard, 816 kg/m ³ CLT 100 NVI C3S, 371 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 37 (-1; -3) dB  |
| W 8 | 100 mm 12.5 mm | CLT 100 NVI C3S, 371 kg/m ³ Gypsum plasterboard, 816 kg/m ³ | R_w(C; C_{tr}) = 37 (-1; -3) dB  |

CLT – Cross Laminated Timber

Protection against noise

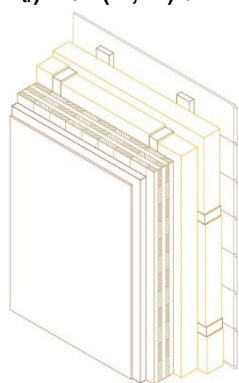
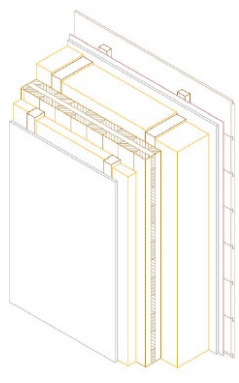
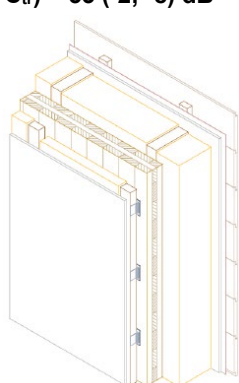
Annex 5

| | | | |
|--------------------|---|--|---|
| <p>W 9</p> | <p>100 mm 27 mm 12.5 mm</p> | <p>CLT 100 NVI C3S, 371 kg/m³ Acoustical mounting including 50 mm thermal insulation, 16 kg/m³ Gypsum plasterboard, 816 kg/m³</p> | <p>R_w(C; C_{tr}) = 48 (-5; -12) dB</p>  |
| <p>W 10</p> | <p>120 mm 35 mm 10 mm</p> | <p>CLT 120 NVI C5S, 445 kg/m³ Clay building board, 1043 kg/m³ Clay rendering including glass fibre reinforcement</p> | <p>R_w(C; C_{tr}) = 47 (-1; -5) dB</p>  |
| <p>W 11</p> | <p>5 mm 200 mm 120 mm 35 mm 10 mm</p> | <p>Exterior basecoat including reinforcing mesh Stone wool rendering panel, 121 kg/m³ CLT 120 NVI C5S, 445 kg/m³ Clay building board, 1043 kg/m³ Clay rendering including glass fibre reinforcement</p> | <p>R_w(C; C_{tr}) = 48 (-3; -8) dB</p>  |

CLT – Cross Laminated Timber

Protection against noise



Annex 5

| | | | |
|-------------|--|--|--|
| W 12 | 20 mm | Rabbet edge shuttering of larch, 536 kg/m ³ | R_w(C; C_{tr}) = 54 (-2; -7) dB  |
| | 27 mm | Spread shuttering, 640 kg/m ³ | |
| | 0.4 mm | Shuttering layer | |
| | 100 mm | Wooden battens, 542 kg/m ³ including 100 mm façade insulation board, 25 kg/m ³ , cross layer | |
| W 13 | 100 mm | Wooden battens, 542 kg/m ³ including 100 mm façade insulation board, 25 kg/m ³ | R_w(C; C_{tr}) = 46 (-2; -5) dB * R_w(C; C_{tr}) = 45 (-1; -4) dB **  |
| | 120 mm | CLT 120 NVI C5S, 445 kg/m ³ | |
| | 35 mm | Clay building board, 1043 kg/m ³ | |
| | 10 mm | Clay rendering including glass fibre reinforcement | |
| | 20 mm | Shuttering, laterally closed*/open all around** | |
| | 30 mm | Timber beams 30/50 | |
| W 14 | 0.3 mm | Foil (diffusion open) | R_w(C; C_{tr}) = 51 (-2; -7) dB * R_w(C; C_{tr}) = 53 (-2; -8) dB **  |
| | 15 mm | Gypsum fibre board, 1190 kg/m ³ | |
| | 200 mm | Wooden battens 200/60, e = 62.5 cm including 200 mm thermal hemp-mats, 30 kg/m ³ | |
| | 100 mm | CLT 3s or 5s | |
| | 94 mm | Wooden battens 60/60, e = 62.5 cm including 50 mm mineral wool, 13 kg/m ³ | |
| | 60 mm | Gypsum plasterboard, 810 kg/m ³ | |
| | 12.5 mm | | |
| | 20 mm | Shuttering | |
| 30 mm | Timber beams 30/50 | | |
| 0.3 mm | Foil (diffusion open) | | |
| 15 mm | Gypsum fibre board, 1190 kg/m ³ | | |
| 200 mm | Wooden battens 200/60, e = 62.5 cm including 200 mm thermal hemp-mats*, 30 kg/m ³ or wood fibre insulation board**, 58kg/m ³ | | |
| 100 mm | CLT 3s or 5s | | |
| 94 mm | Acoustical mounting including 50 mm mineral wool, 13 kg/m ³ | | |
| 70 mm | Gypsum plasterboard, 810 kg/m ³ | | |
| 12.5 mm | | | |

CLT – Cross Laminated Timber

Protection against noise

Annex 5

| | | | |
|-------------|---------------------------|--|---|
| W 15 | 100 mm 140 mm 8 mm | CLT 100 3s Mineral wool, 120 kg/m ³ Plaster including reinforcement, 3 kg/m ² | R_w(C; C_{tr}) = 44 (-2; -8) dB  |
| W 16 | 100 mm 160 mm 11 mm | CLT 100 3s Hemp fibre insulation, 100 kg/m ³ Plaster including reinforcement, 4 kg/m ² | R_w(C; C_{tr}) = 51 (-3; -10) dB  |

Sound absorption

| f in Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 |
|----------------------|------|------|------|------|------|------|------|
| α_s | 0.02 | 0.03 | 0.04 | 0.04 | 0.05 | 0.05 | 0.05 |

CLT – Cross Laminated Timber

Protection against noise

Annex 5



British Board of Agrément,
Bucknalls Lane,
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