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to Article 29 of the Regulation (EU)  
No 305/2011 of the European  
Parliament and of the Council of 9  
March 2011

MEMBER OF EOTA



## European Technical Assessment ETA-21/0336 of 2021/07/13

### I General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S**

**Trade name of the construction product:**

best wood CLT BOX

**Product family to which the above construction product belongs:**

Prefabricated wood-based loadbearing stressed skin panels

**Manufacturer:**

Holzwerk Gebr. Schneider GmbH  
Kappel 28  
DE-88436 Eberhardzell  
[www.schneider-holz.com](http://www.schneider-holz.com)

**Manufacturing plant:**

Holzwerk Gebr. Schneider GmbH  
Kappel 28  
DE-88436 Eberhardzell

**This European Technical Assessment contains:**

17 pages including 3 annexes which form an integral part of the document

**This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:**

EAD 140022-00-0304 for Pre-fabricated wood-based loadbearing stressed Skin Panels

**This version replaces:**

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## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product and intended use**

#### **Technical description of the product**

Schneider best wood CLT BOX Elements (hereinafter referred to as “CLT BOX Elements”) are glued stressed skin panels made of glulam webs and three layer CLT flanges. The adhesive is of type I polyurethane adhesive as defined in EN 15425. CLT BOX Elements may contain thermal or acoustic insulation inside the cavities, additional fire protective gypsum plasterboards and roofing. CLT BOX Elements may have a top or bottom flange or both, a top and bottom flange. The materials, dimensions and tolerances are given in Annex 1.

CLT BOX Elements are intended to be used as structural or non-structural elements in buildings and bridges. CLT BOX Elements may function as directly load bearing as well as bracing members e.g. as wall, floor and roof elements.

The products are shaped according to the customer's specification. The maximum length of the elements is 16 m and the height varies from 160 to 500 mm. Typical widths are from 900 mm to 1250 mm.

For gluing the webs and flanges to form a CLT BOX element an adhesive type I according to EN 15425 is to be used. Specifications are deposited with ETA-Danmark A/S.

Chemically treated elements are not covered by this ETA.

#### **Manufacturing**

Gluing of CLT panels to ribs are performed in The CLT BOX Elements are manufactured in accordance with the provisions of this European technical assessment using the automated manufacturing process in accordance with the technical documentation. Gluing of webs to flanges shall be performed according to the ETA holder's instructions assessed by ETA-Danmark A/S. Gluing pressure is achieved by pneumatic presses as specified in detail in the instructions of the ETA holder.

### **2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)**

CLT BOX Elements are intended to be used as directly load bearing parts of building constructions. They may also be used as diaphragms for bracing. CLT BOX Elements are supported below the lower flange or below the webs for elements without lower flange. The CLT BOX Elements shall be subjected to static and quasi static actions only. This includes seismic actions according to EN 1998-1.

With regard to moisture behaviour of the product, the use is limited to service classes 1 and 2 as defined in EN 1995-1-1. The product shall not be used in service class 3 / use class 3 (3.1 exterior, above ground, protected; occasionally wet). If CLT BOX Elements are intended to be a part of the external envelope of the building, they shall be protected adequately, e.g. by a roof or by cladding.

If the elements are intended to be covered by flooring, it is recommended that the moisture content of the top flange is checked by a moisture meter; moisture content of the flange should not exceed the value recommended by the manufacturer of the flooring material.

CLT BOX Elements with holes in flanges to provide openings for ducts, pipes etc. or modification or repair of the construction are not covered by this ETA.

The provisions made in this European Technical Assessment are based on an assumed intended working life of CLT BOX Elements of 50 years.

The real working life may be, in normal conditions, considerably longer without major degradation affecting the essential requirements of the works.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body but are to be regarded only as a means for choosing the right 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

Characteristic	Assessment of characteristic
<b>3.1 Mechanical resistance and stability (BWR1)</b>	
Mechanical resistance and stiffness	Clause 3.1.1
Dimensional stability	Clause 3.1.2
Durability	Clause 3.1.3
<b>3.2 Safety in case of fire (BWR2)</b>	
Reaction to fire	Clause 3.2.1
Resistance to fire	Clause 3.2.2
External fire performance	No performance assessed
<b>3.3 Hygiene, health and the environment (BWR 3)</b>	
Water vapor permeability and moisture resistance	No performance assessed
Watertightness	No performance assessed
Content, emission and/or release of dangerous substances	Clause 3.3.1
<b>3.4 Safety and accessibility in use (BWR 4)</b>	
Impact resistance	No performance assessed
<b>3.5 Protection against noise (BWR 5)</b>	
Airborne sound insulation	Annex 3
Impact sound insulation	Annex 3
Sound absorption	No performance assessed
<b>3.6 Energy economy and heat retention (BWR 6)</b>	
Thermal resistance	Clause 3.4.1
Air permeability	Clause 3.4.2

### 3.1 Mechanical resistance and stability

#### 3.1.1 Mechanical resistance and stiffness as well as serviceability

Mechanical resistance and deformations of CLT BOX Elements are determined by one of the following methods:

Method 3a: Reference to design documents of the purchaser

Method 3b: Reference to design documents produced and held by the manufacturer according to the order for the works

The structural performance of CLT BOX Elements is considered in accordance with the limit state design principles specified in Eurocodes and is described in detail in the manufacturer's instructions for design. Both ultimate limit state and serviceability limit state (comprising vibrations when relevant) are considered. Calculation methods comply with EN 1995-1-1.

CLT BOX Elements may be used in seismic areas if designed adequately. The use is limited to non-dissipative or low-dissipative structures ( $q \leq 1.5$ ), defined according to Eurocode 8 (EN 1998-1:2004) clauses 1.5.2 and 8.1.3 b), and applicable national rules on works.

Structural design shall be documented. Strength values of glulam and CLT to be used in design together with information of the dimensions of the components are given in Annex 1.

#### 3.1.2 Dimensional stability

In normal conditions, harmful deformations due to moisture changes of the CLT BOX Elements are not expected. When necessary, the dimensional change  $\Delta L$  of a web or flange due to change of moisture content may be calculated as for the constitutive materials glulam and CLT.

#### 3.1.3 Durability

CLT BOX Elements may only be used in service classes 1 and 2 according to EN 1995-1-1, and hazard classes 1 and 2 as specified in EN 335. The designer shall pay attention to the construction details and prevent any water accumulation by structural detailing. During the erection of the building, CLT BOX Elements have good resistance to temporary exposure to water without decay, provided that they are allowed to dry afterwards. Integrity of the bond is maintained in the assigned service classes throughout the expected life of the structure.

### 3.2 Safety in case of fire

#### 3.2.1 Reaction to fire

Untreated products are classified to have reaction to fire class D-s2, d0 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364.

CLT BOX Elements treated against fire are not covered by this ETA.

#### 3.2.2 Resistance to fire

Fire design of CLT BOX Elements shall be performed according to standards EN 1995-1-2:2004/AC:2009 and EN 1995-1-1:2004. National determined parameters valid in the relevant Member State shall be used

CLT BOX Elements are classified according to EN 13501-2. Annex 2 provides the classification and field of application.

Charring rate for CLT shall be applied as per ETA-21/0568.

Charring rate for the glued laminated ribs shall be taken from EN1995-1-2, table 3.1.

Passage of fire to the end of the element has to be prevented. In addition, the bottom slab may not have such holes that can act as passages for fire to the cavity inside the CLT BOX Elements.

### 3.3 Content, emission and/or release of dangerous substances

#### 3.3.1 Dangerous substances

Based on the assessment of the Assessment Body, the CLT BOX Elements do not contain harmful or dangerous substances > 0.1 mass %. The use of wood preservatives and flame retardants is excluded. The product does not contain pentachlorophenol, or recycled wood.

The chemical composition of the adhesives for gluing the boards and the finger joints of the individual boards has to be in compliance with the chemical composition deposited at the Technical Assessment Body.

CLT BOX Elements treated against biological attack are not covered by this ETA..

In addition to the specific clauses relating to dangerous substances contained in this European Technical Assessment, there may be other requirements applicable

to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need to also be complied with, when and where they apply.

### **3.4 Energy economy and heat retention**

#### **3.4.1 Thermal resistance**

The thermal conductivity  $\lambda$  for the web material is 0.13 W/(m K) and 0.12 W/(m K) for the flange material according to EN ISO 10456.

The natural density variation of the materials is taken into account in this value.

#### **3.4.2 Air permeability**

A construction with CLT BOX Elements, including the joints between the elements, will provide adequate airtightness in relation to the intended use, taking into account both energy economy and heat retention, risk of cold draughts and risk of condensation within the construction. The joints of the panels shall be tightened with a gasket. See Annex 3.

## **4 Attestation and verification of constancy of performance (AVCP)**

### **4.1 AVCP system**

According to the Decision 2000/447/EC of the European Commission, the system of assessment and verification of constancy of performance (see Annex V to the regulation (EU) No 305/2011) is System 1.

## **5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

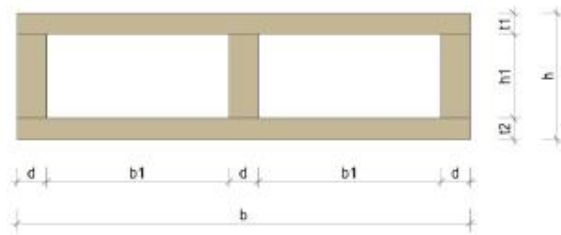
Issued in Copenhagen on 2021-07-13 by



Thomas Bruun  
Managing Director, ETA-Danmark

**Annex 1**  
**DESCRIPTION OF best wood CLT BOX Elements**

**"best wood CLT BOX" - geschlossen**

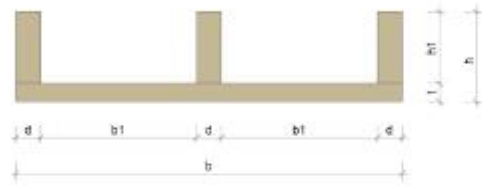


$h$	220 - 500 mm
$h1$	100 - 380 mm
$b$	900 - 1250 mm
$b1$	270 - 535 mm
$d$	60 - 120 mm
$t1$	60 mm
$t2$	60 - 90 mm
$l$	$\leq 16$ m

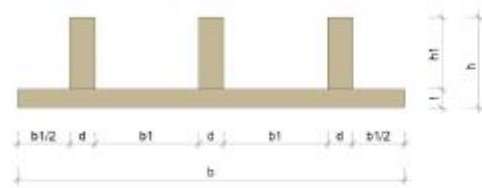




**"best wood CLT BOX" - offen**

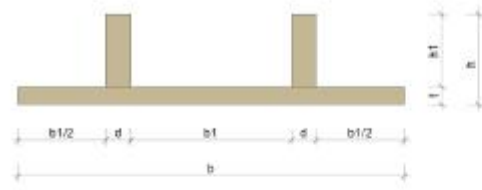


<b>h</b>	160 - 490 mm
<b>h1</b>	100 - 400 mm
<b>b</b>	900 - 1250 mm
<b>b1</b>	270 - 535 mm
<b>d</b>	60 - 120 mm
<b>t</b>	60 - 90 mm
<b>l</b>	≤ 16 m



<b>h</b>	160 - 490 mm
<b>h1</b>	100 - 400 mm
<b>b</b>	900 - 1250 mm
<b>b1</b>	180 - 357 mm
<b>d</b>	60 - 120 mm
<b>t</b>	60 - 90 mm
<b>l</b>	≤ 16 m

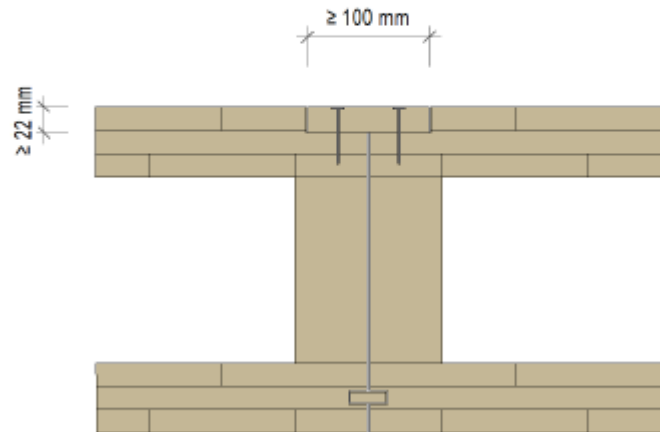




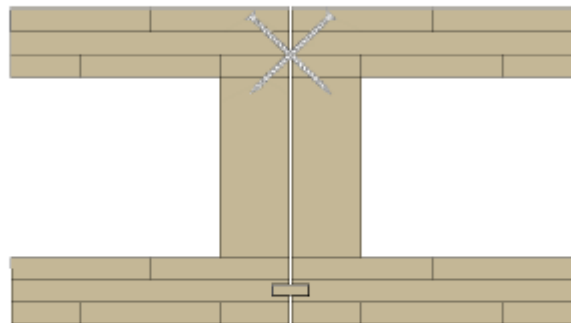
<b>h</b>	160 - 490 mm
<b>h1</b>	100 - 400 mm
<b>b</b>	1100 - 1250 mm
<b>b1</b>	430 - 565 mm
<b>d</b>	60 - 120 mm
<b>t</b>	60 - 90 mm
<b>l</b>	≤ 16 m



Beispielhafte Elementverbindung "best wood CLT BOX" - geschlossen

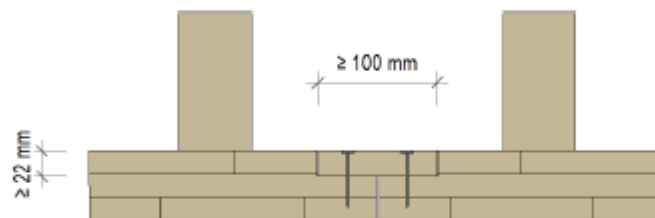


Die Auswahl, Anzahl und Anordnung der mechanischen Verbindungsmittel ist nach statischen Erfordernissen zu wählen



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Beispielhafte Elementverbindung "best wood CLT BOX" - offen



Die Auswahl, Anzahl und Anordnung der mechanischen Verbindungsmittel ist nach statischen Erfordernissen zu wählen



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The different cross-section types of CLT BOX Elements are shown in Annexes 1 to 3. The products are individually designed based on the specification of the customer. The maximum length of the elements is 16 m and the height varies from 160 to 500 mm. Top and bottom slabs are one-piece CLT slabs.

Typical cross sections and symbols used are illustrated in Annexes 1 to 3.

Typical dimensions of the members to be glued together are

$$b_w = 60 \text{ to } 120 \text{ mm}$$

$$h_w = 100 \text{ to } 400 \text{ mm}$$

$$h_f = 60 \text{ to } 90 \text{ mm}$$

### 1. Tolerances of dimensions

Tolerances of dimensions at the reference moisture content of 12 % are presented in Table 1- 1.

*Table 1-1. Tolerances of CLT BOX Elements.*

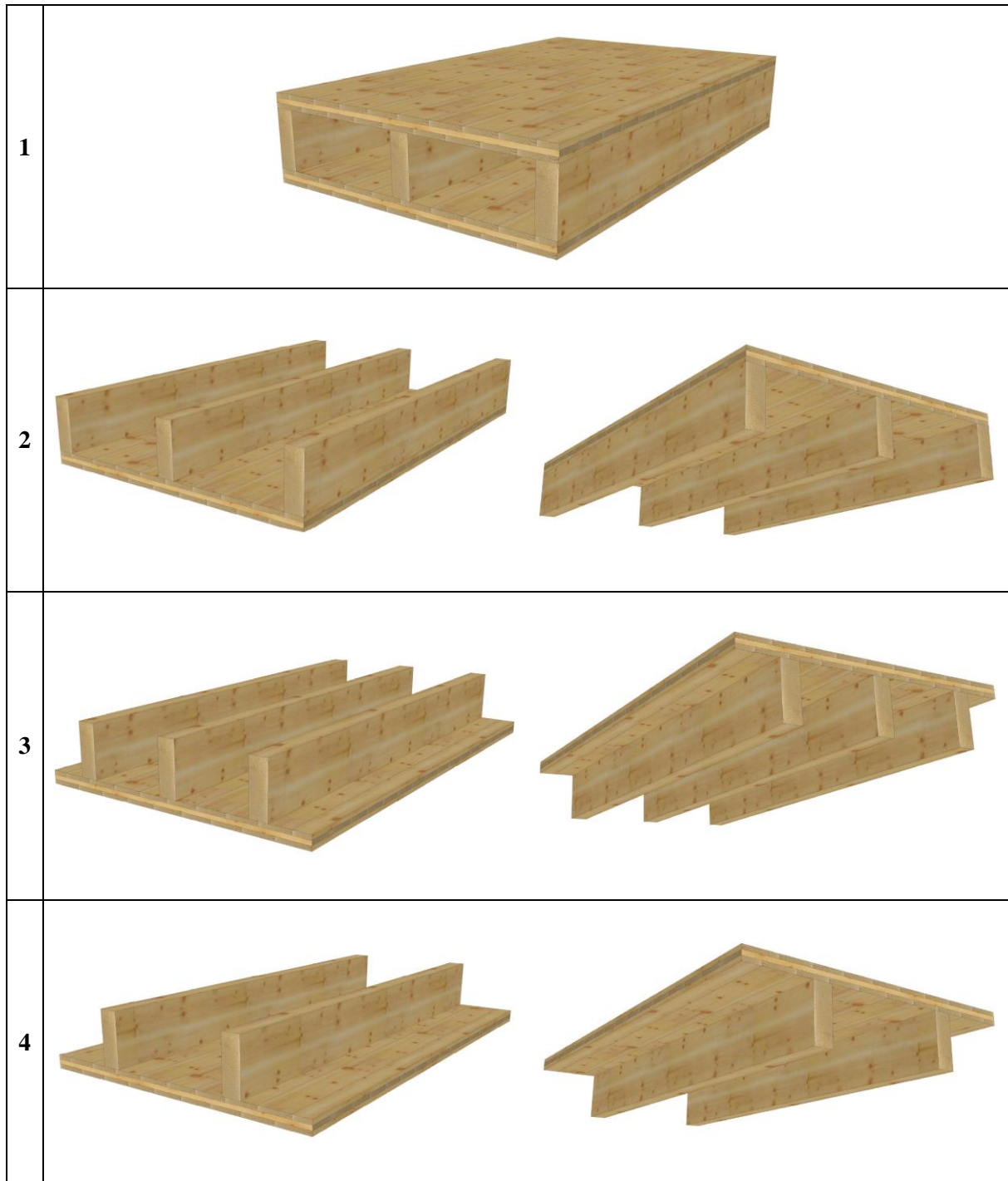
Dimension	Tolerance, mm or %
Depth of the CLT BOX Elements	$\pm 3,0 \text{ mm}$ or $1,5 \%$ **
Width of the CLT BOX Elements	$\pm 0,5 \%$
Length of the CLT BOX Elements	$\pm 5,0 \text{ mm}$

\*\* whichever is the smaller

### 2. Specifications of components

The components are made of glulam according to EN 14080 and CLT according to EN 16351 produced by Holzwerk Gebr. SCHNEIDER GmbH. Orientation of the CLT flange material is given in Figure 1-2. The characteristic strength and stiffness values comply with EN 14080 and EN 16351, respectively.

The polyurethane adhesive used in manufacturing CLT BOX Elements is of type I as defined in EN 15425.



*Figure 1-1:* Definition of the web and flange orientations: 1 Closed type, 2 Open box with outer webs flush with flange, 3 Open box with three webs and protruding flange, and 4 Open box with two webs and protruding flange.

The modification factors  $k_{mod}$  and  $k_{def}$  for glulam and CLT, as defined in Eurocode 5, shall be used in the design of CLT BOX Elements. Partial safety factors  $\gamma_m$  are defined in the National annex of 1995-1-1. The tensile stresses perpendicular to grain caused by both tensile forces and bending moments in the webs due to the mass of the acoustic insulation material in the cavities may be taken into account as follows:

$$\frac{\tau_d}{f_{v,d}} + \frac{\sigma_{t,90,d}}{k_{dis} \cdot k_{vol} \cdot f_{t,90,d}} \leq 1$$

Where:

$$\sigma_{t,90,d} = \frac{6 \cdot M_{90,d}}{d^2} + \frac{N_{90,d}}{d}$$

$$M_{90,d} = k_1 \cdot q_d \cdot \frac{(b_1 + d)^3}{12 \cdot b_1} \cdot \left( 1 - \frac{u}{2u + w} - \frac{u}{2u + 3w} \right)$$

$$q_d = g_{s,d} + g_{f,d}$$

$g_{s,d}$  permanent design gravel load per m<sup>2</sup> floor area

$g_{f,d}$  permanent design load of the lower flange

$k_1$  factor taking into account unequal load distribution

$$k_1 = \begin{cases} 1,3 & \text{for elements with 3 webs} \\ 1,5 & \text{for elements with 2 webs} \end{cases}$$

$$u = \frac{E_0 I_f}{b_1 + d} \quad w = \frac{E_{90} I_w}{h_1}$$

$E_0 I_f$  Bending stiffness of lower flange perp. to longitudinal element axis

$E_0$  MOE of cross layer parallel to grain

$$I_f = \frac{t_{90}^3}{12}; \text{ where } t_{90} = \text{cross layer thickness}$$

$E_{90} I_w$  Bending stiffness of web

$E_{90}$  MOE of web perp. to grain

$$I_w = \frac{d^3}{12}; \text{ where } d = \text{web width}$$

$b_1$  Interspace between webs

$h_1$  Web depth

$d$  Web width

$$N_{90,d} = k_2 \cdot q_d \cdot \frac{(b_1 + d)^2}{b_1}$$

$$k_2 = \begin{cases} 0,5 & \text{for elements without protruding flanges} \\ 1 & \text{for elements with protruding flanges} \end{cases}$$

$$k_{vol} = \left( \frac{V_0}{V} \right)^{0,2}$$

$$V_0 = 0,01 \text{ m}^3$$

$$V = 0,65 \cdot d \cdot h_1 \cdot \ell_{\text{element}}$$

$h_1$  Web depth in m

$d$  Web width in m

$\ell_{\text{element}}$  maximum element span in m

$$k_{dis} = 2$$

Since the dimensions of CLT BOX Elements remain quite stable during temperature changes, it is not usually necessary to consider any effects of temperature variations on the structural design.

### 3. Typical connections between CLT BOX Elements

CLT BOX Elements are normally connected to each other with mechanical fasteners (see Annex 4 and 5). Diagonal screwing is recommended. CLT BOX Elements shall be designed in such a way that width and thickness changes due to moisture content variation do not cause harmful stresses in the structures. Special attention shall be paid to the design of joints.

## Annex 2 Resistance to fire of best wood CLT BOX Elements

### CLT BOX Elements, type closed box element

The structure of closed box type CLT BOX Elements is shown in Annex 1, Figure 1-1, type 1. A floor or roof construction made of CLT BOX Elements with a continuous bottom slab may have resistance to fire class REI 60 if the thickness of the bottom slab is at least 60 mm and REI 90 if the thickness of the bottom slab is at least 90 mm and the following provisions are met.

*Provisions for the classification above:*

The width of the ribs shall be at least 80 mm and the spacing of the ribs shall not exceed 585 mm. The cavities may contain insulation or not. The height of the ribs is at least 140 mm. The elements shall be glued with polyurethane adhesive of type I as defined in EN 15425.

The orientation of the CLT flanges corresponds to Figure 1-2, Type 1.

The normal and shear stresses in the glulam webs and CLT flanges must not exceed the relevant stresses in the tested element for REI 90 (width 3756 mm, span 4750 mm, thickness 290 mm) under a uniformly distributed load of 5,5 kN/m<sup>2</sup> and for REI 60 (width 3756 mm, span 4750 mm, thickness 260 mm) under a uniformly distributed load of 8,0 kN/m<sup>2</sup>.

The cavities contain a thermal insulation layer best wood MULTITHERM 140, d = 20 mm for REI 90 and best wood floor 220, d = 22 mm.

The mass of an acoustic insulation in the cavities does not exceed 80 kg/m<sup>3</sup> for REI 90 and 40 kg/m<sup>3</sup> for REI 60.

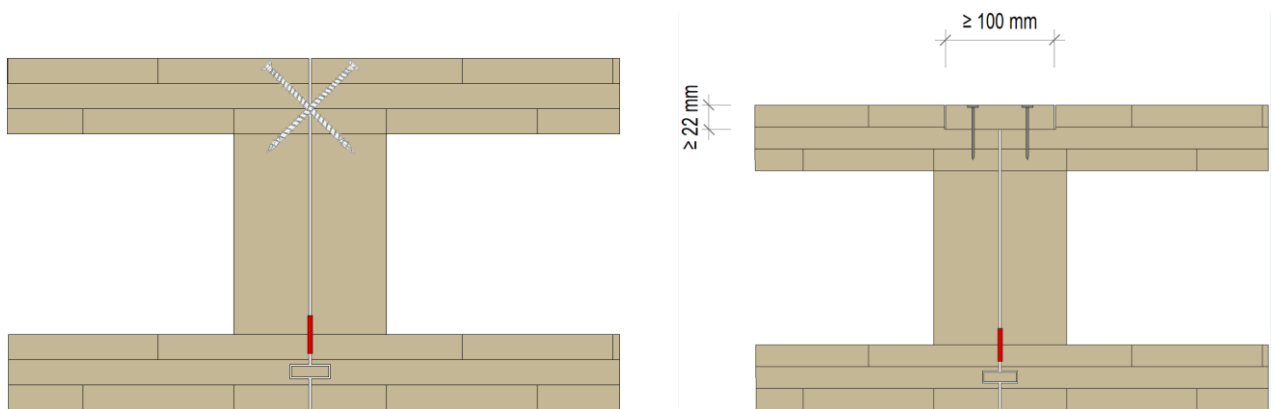


Figure 2-1. The joint between the elements sealed with a horizontal wooden tongue 9,0 mm x 30 mm at the centre of the bottom flange and additional joint sealing "ISO FLAME KOMBI F120" 4,0 mm x 30 mm.

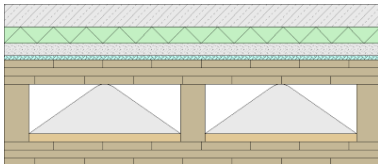
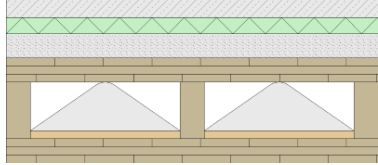
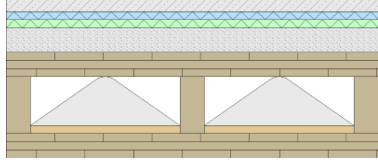
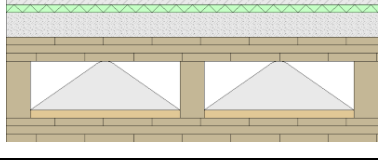
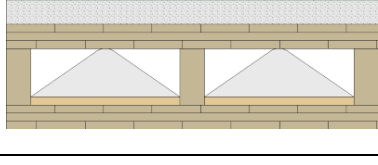
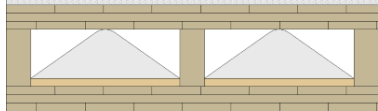
The elements shall be connected by one of the joint types presented in Figure 2-1. When using the joint type in Figure 2-1 left, the board shall have cross-section of 100 mm x 22 mm and be fixed on both sides with staples Würth type WN 10,55 x 50 mm at 400 mm spacing.

When using the joint type in Figure 2-1 right between the elements they shall be connected with two cross-screwed, diagonal screws, e.g. HECO UNIX-top (or similar), Ø = 6 mm x 120 mm at 1000 mm spacing.



**Annex 3**  
**Protection against noise and air permeability of best wood CLT BOX Elements**

**CLT BOX Elements, type closed box element**

Airborne sound insulation and impact sound insulation	EN ISO 10140-2 EN ISO 10140-3	Airborne sound insulation $R_w (C; C_{tr})$ (dB)	Impact sound insulation $L_{n,w} (C_1; C_{1,50-2500})$ (dB)
	50 mm screed 40 mm ISOVER Akustic EP1 30 mm calcite ballast 10 mm silent floor EVO 260 mm CLT BOX CEILING FS	70 (-1 ; -5)	43 (0; 2)
	50 mm screed 40 mm ISOVER Akustic EP1 60 mm calcite ballast 260 mm CLT BOX CEILING FS	72 (-1 ; -5)	43 (-2; 1)
	50 mm screed 20 mm EPS 20 mm ISOVER Akustic EP1 60 mm calcite ballast 260 mm CLT BOX CEILING FS	73 (-2 ; -6)	42 (-1; 2)
	50 mm screed 20 mm ISOVER Akustic EP1 60 mm calcite ballast 260 mm CLT BOX CEILING FS	72 (-1 ; -5)	43 (-1; 3)
	25 mm Fermacell dry screed 12,5 mm PhoneStar TRI 20 mm ISOVER Akustic EP3 60 mm calcite ballast 260 mm CLT BOX CEILING FS	66 (-3 ; -10)	47 (0; 5)
	25 mm Fermacell dry screed 20 mm ISOVER Akustic EP3 60 mm calcite ballast 260 mm CLT BOX CEILING FS	65 (-4 ; -11)	51 (0; 4)

**Air permeability CLT Flange**

The best wood CLT flanges with 60 mm minimum thickness tested according to EN 1026 and EN 12114 fulfil air permeability class 4 according to EN 12207.