LOCK FLOOR

JOINT PROFILE FOR CLT PANELS

VIDEO

CE ETA 19/0831

MULTI-STOREY WALLS

Ideal for connecting CLT floor panels to multi-story walls (concrete or CLT). The hooking system enables installation without the use of shoring or temporary support structures.

FAST INSTALLATION

The profiles can be pre-installed on CLT panels and walls, without additional fastening on site during installation.

VERSATILE

Easy and quick to install, it can be fastened with a single type of screw. Joint that can be easily disassembled, ideal for the construction of permanent and temporary CLT structure.

CHARACTERISTICS

FOCUS	joints that can be disassembled for CLT panels
PANEL THICKNESS	minimum thickness 140 mm
STRENGTH	R_{vk} up to 70 kN/m
FASTENERS	LBS, SKS-CE

VIDEO
Scan the QR Code and watch the video on our YouTube channel

MATERIAL

Aluminium alloy.

FIELDS OF USE

Timber-to-timber or timber-to-concrete shear joints:

- CLT, LVL panels
- glulam (Glued Laminated Timber)

CLT FLOORS

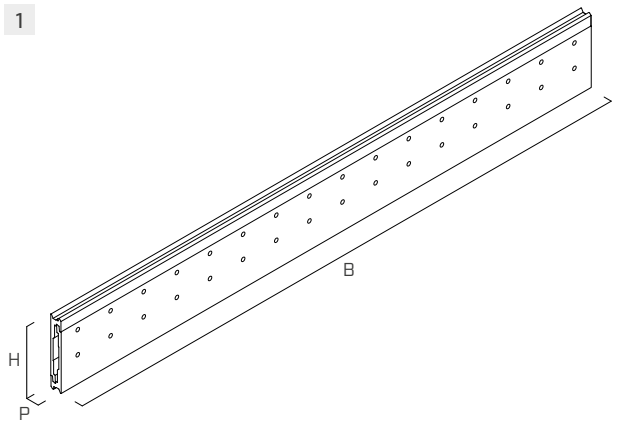
The timber-to-timber version is specifically designed for attaching floors to multi-story CLT walls. The hooking system is particularly suitable for prefabricated floors.

NEW POSSIBILITIES

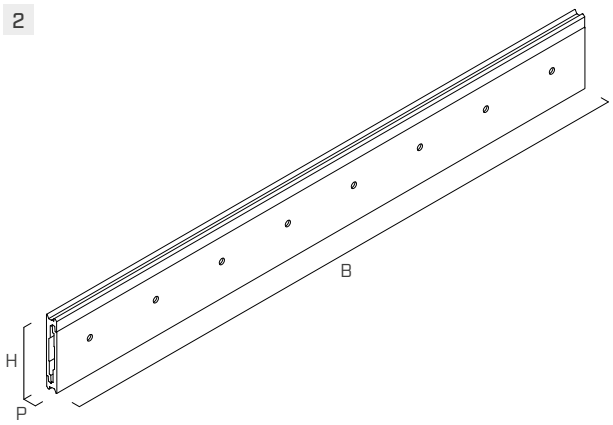
The geometry of the connector is also suitable for non-standard applications, e.g. for the installation of stair stringers, non-structural walls, etc.

CODES AND DIMENSIONS

1



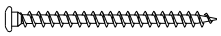
2



	CODE	B [mm]	H [mm]	P [mm]	n_{screw} x Ø(1) pcs	$n_{anchors}$ x Ø(1)	pcs(2)			
1	**LOCKTFLOOR135**	1200	135	22	64 - Ø7	-	1	●	-	-
2	**LOCKCFLOOR135**	1200	135	22	32 - Ø7	8 - Ø10	1	●	●	●

Screws and anchors not included in the package.
(1) Number of screws and anchors for connector pairs.
(2) Number of connector pairs.

ADDITIONAL PRODUCTS - FASTENING

CODE	description	material		d_1 [mm]	L [mm]	d_0 [mm]	T_{inst} [Nm]	TX	pcs
LBS780	round head screw for plates	bright zinc plated carbon steel		7	80	-	-	TX 30	100
SKS10100CE	screw anchor with countersunk head for concrete	bright zinc plated carbon steel		10	100	8	50	TX 40	50

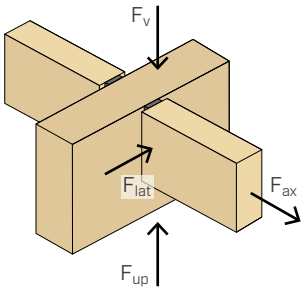
MATERIAL AND DURABILITY

LOCK T FLOOR: EN AW-6005A aluminium alloy.
To be used in service classes 1 and 2 (EN 1995-1-1).

FIELD OF USE

- Timber-to-timber joints between structural elements made of CLT, LVL and glulam

EXTERNAL LOADS

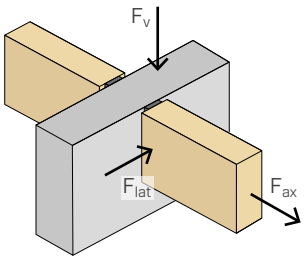


MATERIAL AND DURABILITY

LOCK C FLOOR: EN AW-6005A aluminium alloy.
To be used in service classes 1 and 2 (EN 1995-1-1).

FIELD OF USE

- Timber-to-concrete or timber to-steel joints

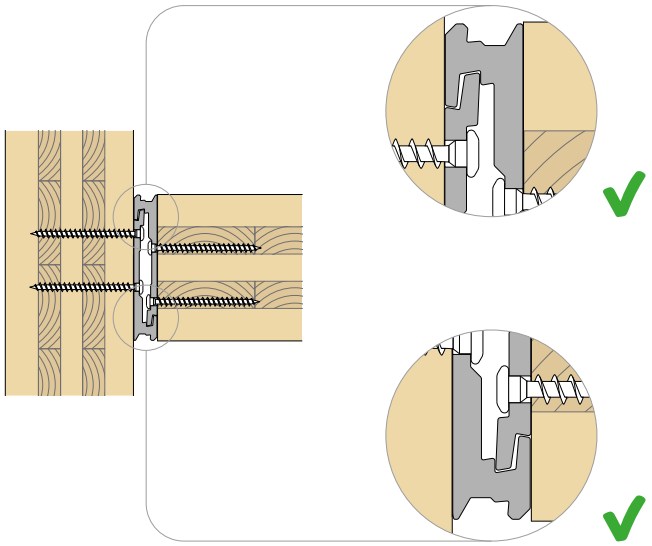


INSTALLATION METHODS

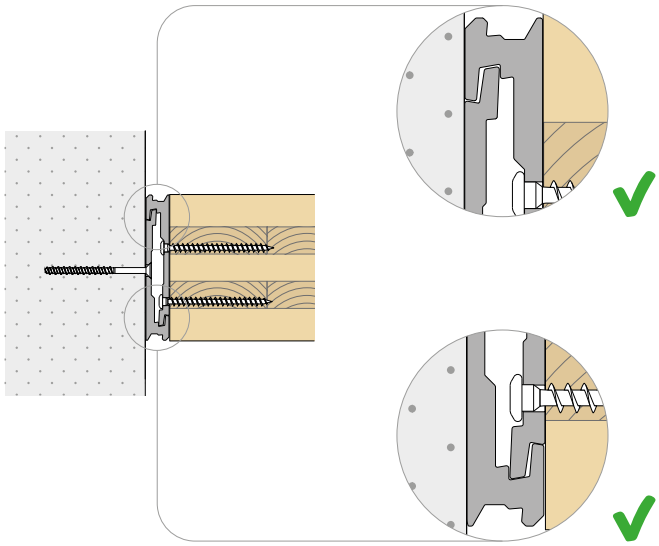
CORRECT INSTALLATION

Install the panel by lowering it from the top, without tilting. Ensure proper seating and coupling of the connector at both the top and bottom, as shown in the figure.

TIMBER-TO-TIMBER



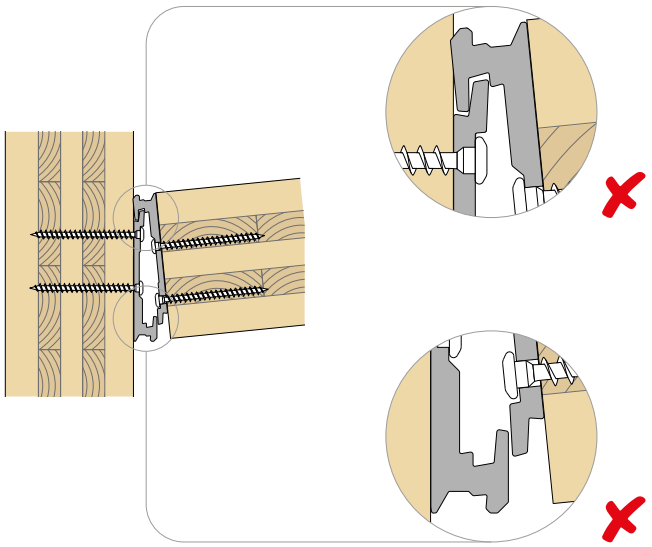
TIMBER-TO-CONCRETE



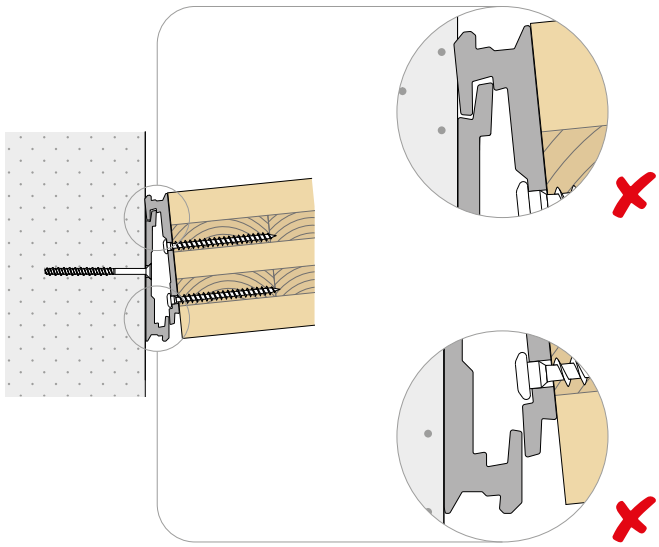
INCORRECT INSTALLATION

Partial and incorrect coupling of the connector. Ensure that both flanges of the connector are properly seated in their respective seats.

TIMBER-TO-TIMBER

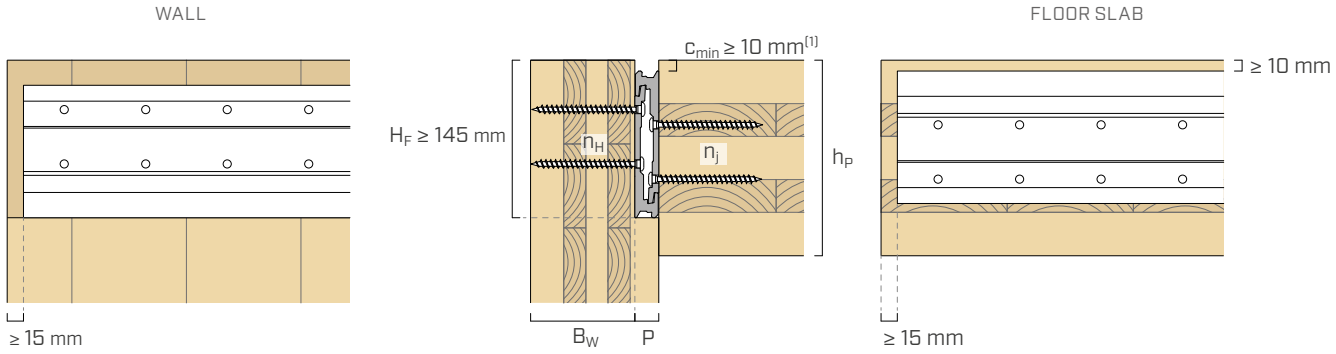


TIMBER-TO-CONCRETE

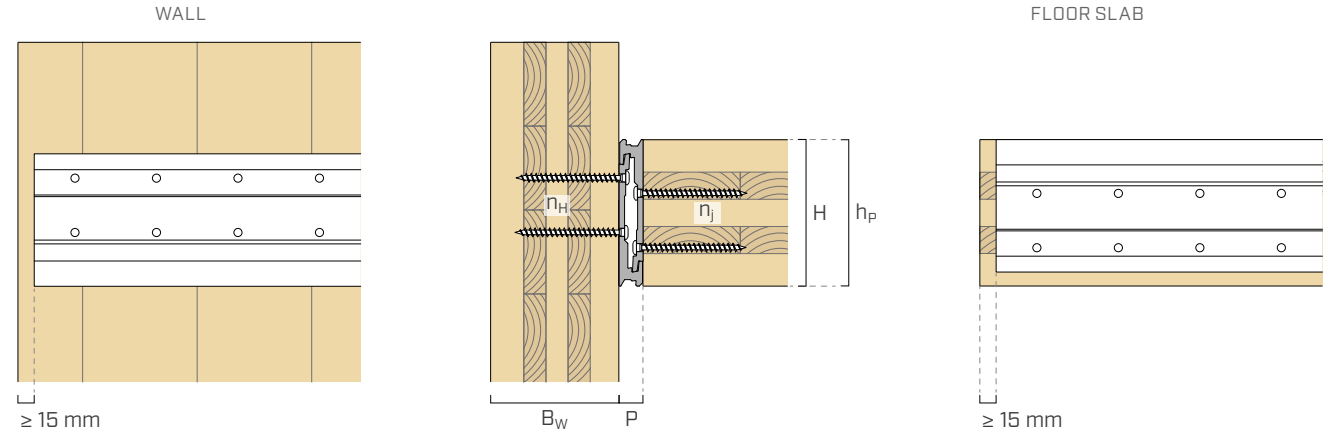


LOCK T FLOOR INSTALLATION

CONCEALED INSTALLATION



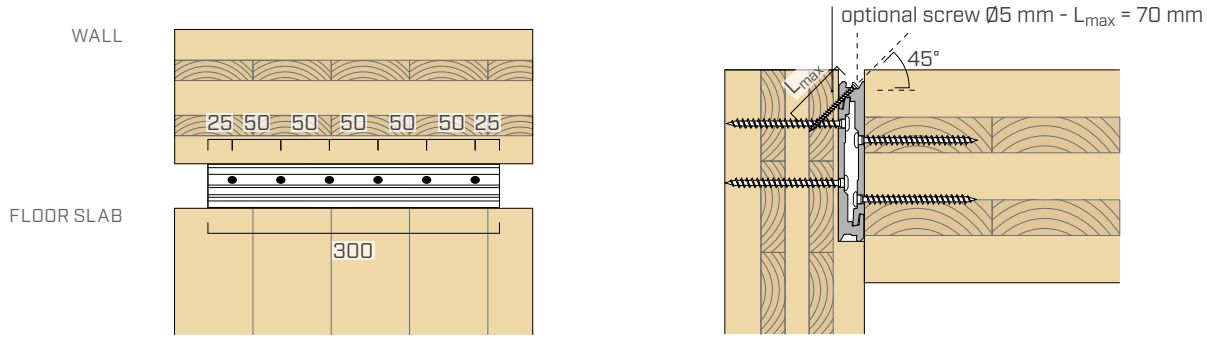
VISIBLE INSTALLATION



CODE	connector B x H [mm]	connector no. of modules(2)	fasteners LBS screws $n_H + n_j$ - Ø x L [mm]	CLT wall $B_{w,\,min}$ [mm]	CLT floor $h_{p,\,min}$ [mm]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	80	135(1)
	600 x 135	2	16 + 16 - Ø7 x 80		
	900 x 135	3	24 + 24 - Ø7 x 80		
	1200 x 135	4	32 + 32 - Ø7 x 80		

OPTIONAL INCLINED SCREW

45° inclined holes must be drilled on site using a 5 mm diameter and metal drill bit. The image shows the location of optional inclined holes for a 300 mm wide module.



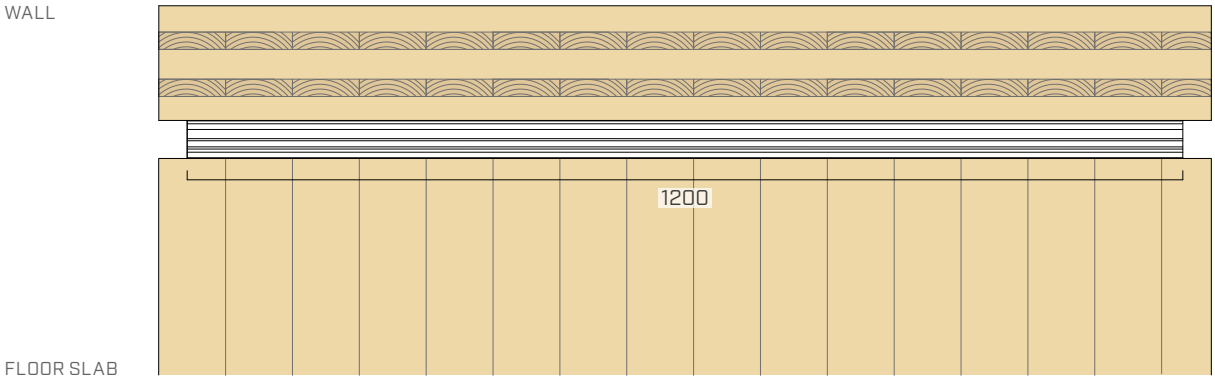
NOTES:

(1) Alignment between the top of floor and top of wall can be achieved by lowering the connector $c_{min} \geq 10$ mm from the top of the CLT floor. This ensures the minimum distance requirements for screws in the wall are met, with respect to the upper end of the wall. In this case, the minimum thickness of the h_p floor is 145 mm.

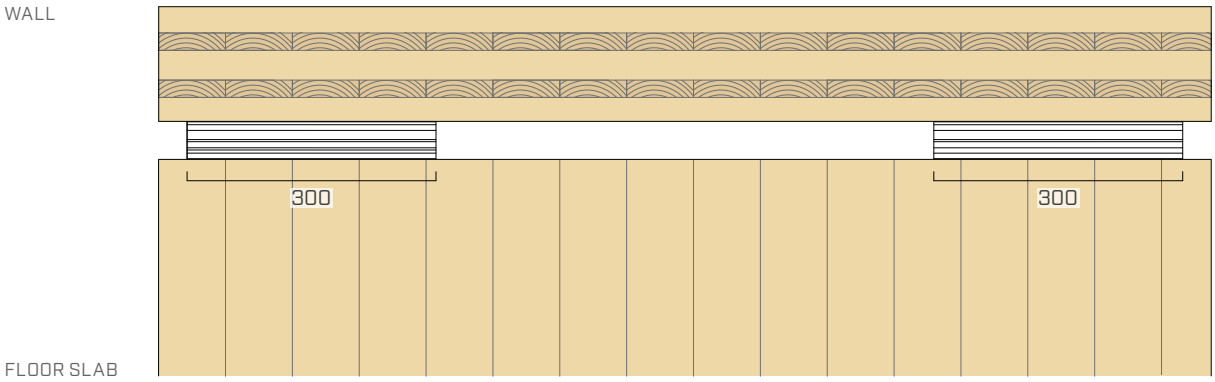
(2) The 1200 mm long connector can be cut into 300 mm standard length modules.

LOCK T FLOOR INSTALLATION

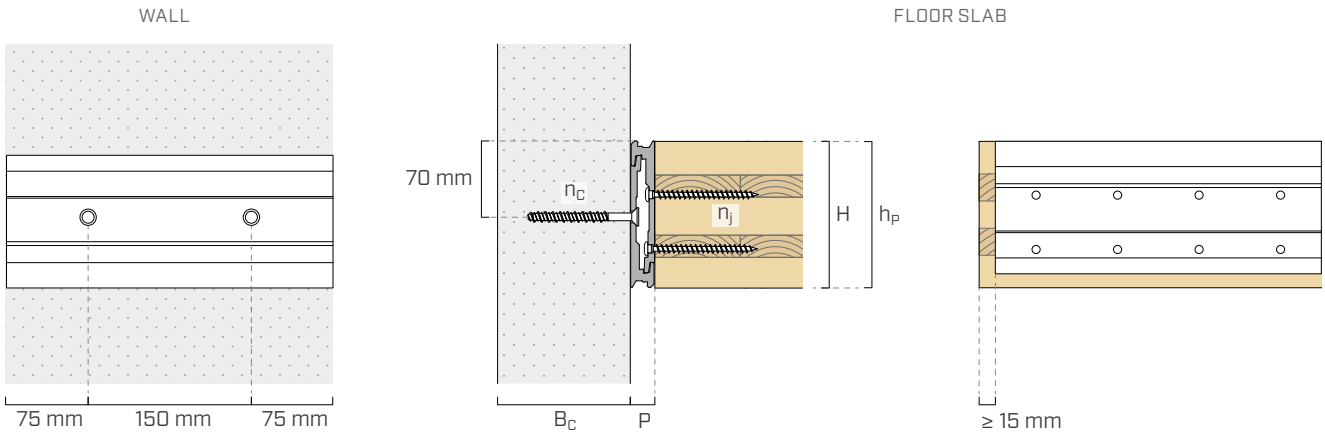
CONTINUOUS INSTALLATION



DISCONTINUOUS INSTALLATION



LOCK C FLOOR INSTALLATION



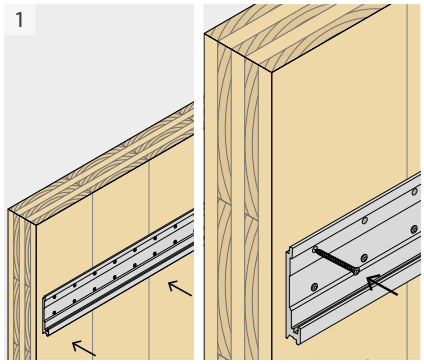
CODE	connector B x H [mm]	connector no. of modules[1]	fasteners SKS-CE anchors n_c - Ø x L [mm]	concrete wall $B_{c,\,min}$ [mm]	fasteners LBS screws n_j - Ø x L [mm]	CLT floor $h_{p,\,min}$ [mm]
LOCKCFLOOR135	300 x 135	1	2 - Ø10 x 100	120	8 - Ø7 x 80	135
	600 x 135	2	4 - Ø10 x 100		16 - Ø7 x 80	
	900 x 135	3	6 - Ø10 x 100		24 - Ø7 x 80	
	1200 x 135	4	8 - Ø10 x 100		32 - Ø7 x 80	

[1] The 1200 mm long connector can be cut into 300 mm standard length modules.

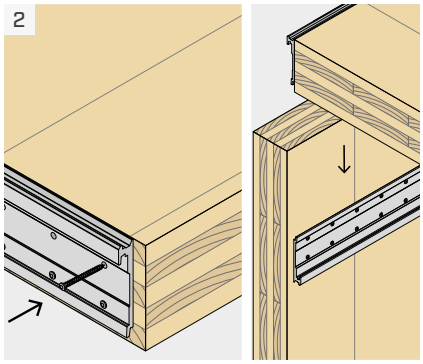
INSTALLATION

VIDEO

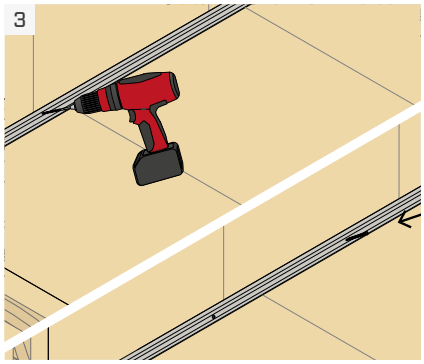
LOCK T FLOOR - VISIBLE INSTALLATION



Place the connector on the wall and fasten all screws.

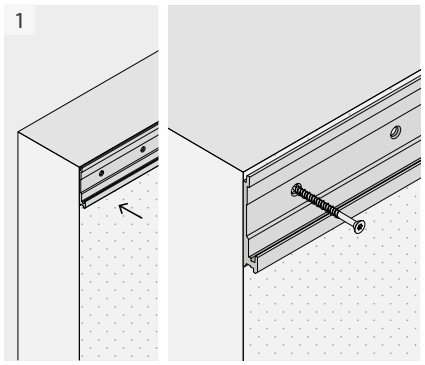


Place the connector on the floor and install all screws.
Engage the floor from the top to the bottom. Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

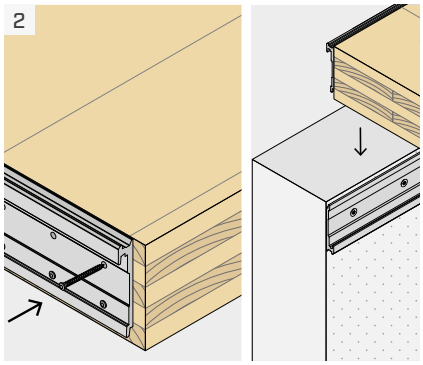


It is possible to install screws for uplift, and lateral shear transfer, F_{up} by drilling Ø5 inclined holes at 45° in the upper part of the connector.
A Ø5 screw must be installed in the hole.

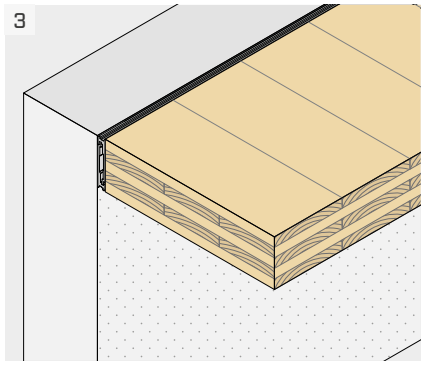
LOCK C FLOOR - VISIBLE INSTALLATION



Place the connector on concrete and fasten the anchors according to the installation instructions.

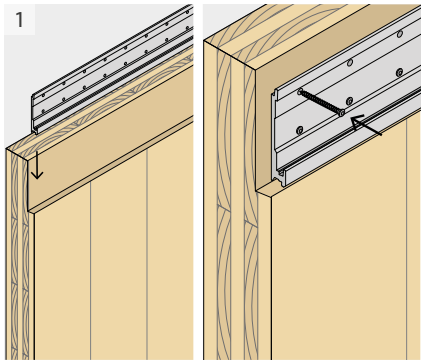


Place the connector on the floor and install all screws.
Engage the floor from the top to the bottom.

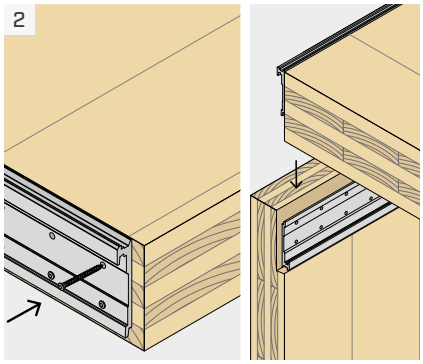


Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

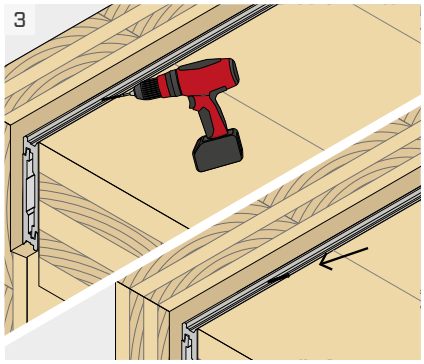
LOCK T FLOOR - CONCEALED INSTALLATION



Cut the rebate on the main element. Place the connector on the wall and fasten all screws.

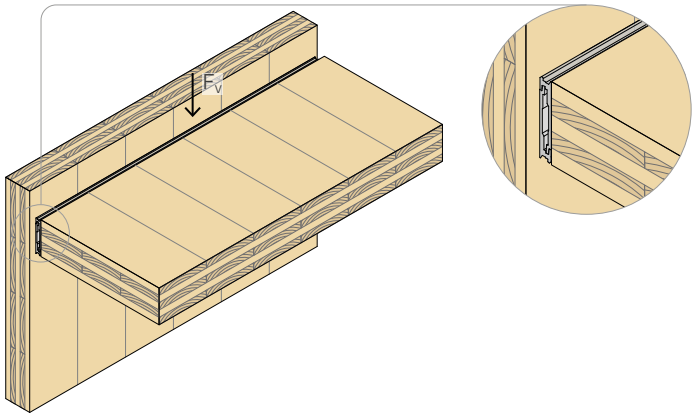


Place the connector on the floor and install all screws.
Engage the floor from the top to the bottom. Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

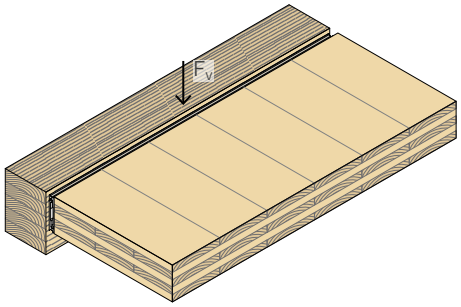


It is possible to install screws for uplift, and lateral shear transfer, F_{up} by drilling Ø5 inclined holes at 45° in the upper part of the connector.
A Ø5 screw must be installed in the hole.

STRUCTURAL VALUES | TIMBER-TO-TIMBER JOINT | F_V



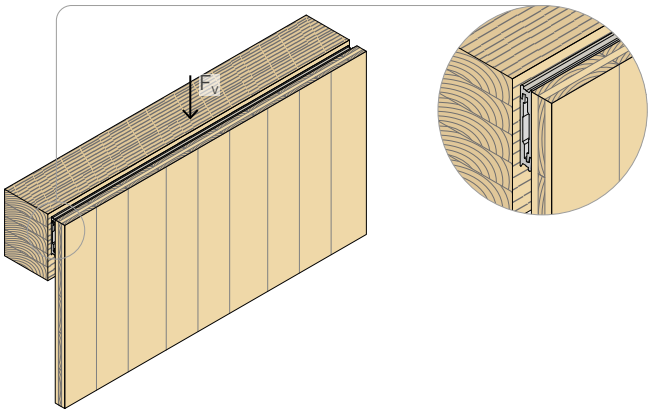
1. CLT WALL | CLT FLOOR



2. BEAM | CLT FLOOR

connector			TIMBER		ALUMINIUM
CODE	B x H [mm]	no. of modules[1]	LBS screws $n_H + n_j$ - Ø x L [mm]	$R_{v,k\ timber}$ [kN]	$R_{v,k\ alu}$ [kN]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	21,4	240
	600 x 135	2	16 + 16 - Ø7 x 80	42,7	480
	900 x 135	3	24 + 24 - Ø7 x 80	64,1	720
	1200 x 135	4	32 + 32 - Ø7 x 80	85,5	960

STRUCTURAL VALUES | TIMBER-TO-TIMBER JOINT | F_V



3. BEAM | CLT FAÇADE

connector			TIMBER		ALUMINIUM
CODE	B x H [mm]	no. of modules[1]	LBS screws $n_H + n_j$ - Ø x L [mm]	$R_{v,k\ timber}$ [kN]	$R_{v,k\ alu}$ [kN]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	28,5	240
	600 x 135	2	16 + 16 - Ø7 x 80	57,0	480
	900 x 135	3	24 + 24 - Ø7 x 80	85,6	720
	1200 x 135	4	32 + 32 - Ø7 x 80	114,1	960

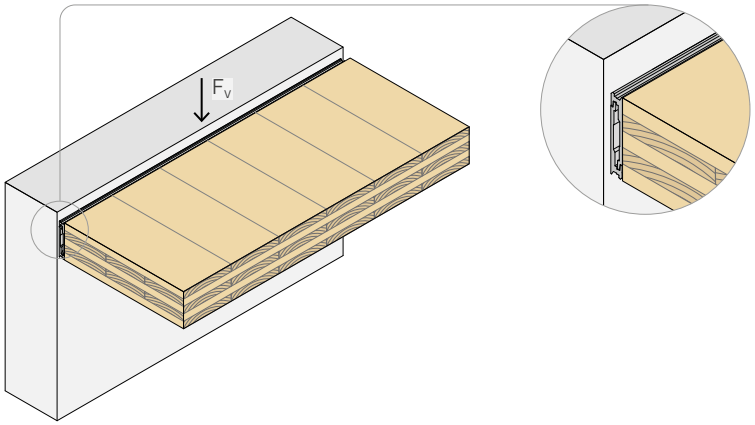
NOTES:

[1] The 1200 mm long connector can be cut into 300 mm standard length modules.

GENERAL PRINCIPLES:

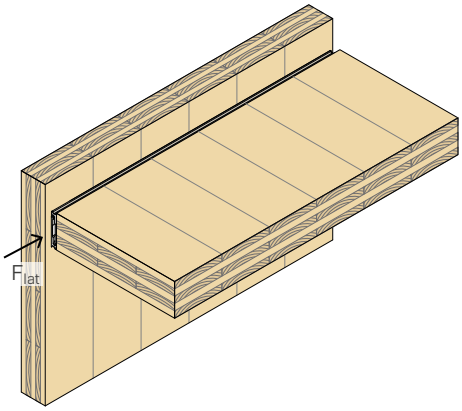
- For the general principles of calculation, see page 12.

STRUCTURAL VALUES | TIMBER-TO-CONCRETE JOINT | F_v

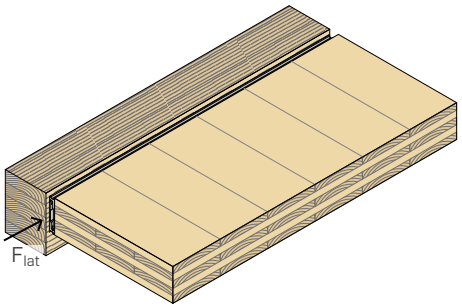


connector			TIMBER		ALUMINIUM	UNCRACKED CONCRETE	
			LBS screws	$R_{v,k\ timber}$	$R_{v,k\ alu}$	SKS-CE anchors	$R_{v,d\ concrete}$
CODE	B x H	no. of modules[1]	n_j - Ø x L			n_c - Ø x L	
	[mm]		[mm]	[kN]	[kN]	[mm]	[kN]
LOCKCFLOOR135	300 x 135	1	8 - Ø7 x 80	21,4	240	2 - Ø10 x 100	24,6
	600 x 135	2	16 - Ø7 x 80	42,7	480	4 - Ø10 x 100	47,9
	900 x 135	3	24 - Ø7 x 80	64,1	720	6 - Ø10 x 100	71,0
	1200 x 135	4	32 - Ø7 x 80	85,5	960	8 - Ø10 x 100	94,1

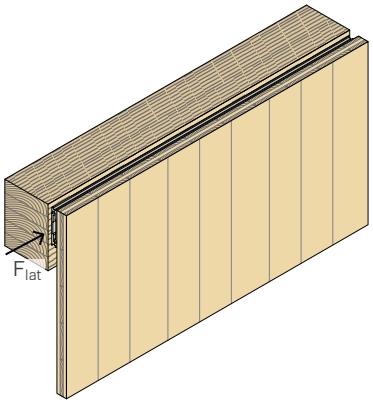
STRUCTURAL VALUES | TIMBER-TO-TIMBER JOINT | F_{lat}



1. CLT WALL | CLT FLOOR



2. BEAM | CLT FLOOR



3. BEAM | CLT FAÇADE

connector			fasteners		TIMBER
			LBS screws	LBS inclined screw	$R_{lat,k\ timber}$
CODE	B x H	no. of modules[1]	$n_H + n_j$ - Ø x L	n - Ø x L	
	[mm]		[mm]	[mm]	[kN]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	6 - Ø5 x 70	8,7
	600 x 135	2	16 + 16 - Ø7 x 80	12 - Ø5 x 70	18,0
	900 x 135	3	24 + 24 - Ø7 x 80	18 - Ø5 x 70	25,4
	1200 x 135	4	32 + 32 - Ø7 x 80	24 - Ø5 x 70	32,5

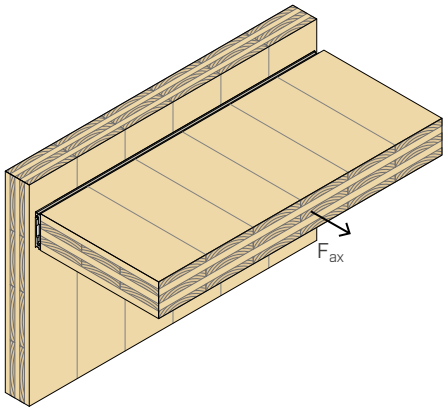
NOTES:

[1] The 1200 mm long connector can be cut into 300 mm standard length modules.

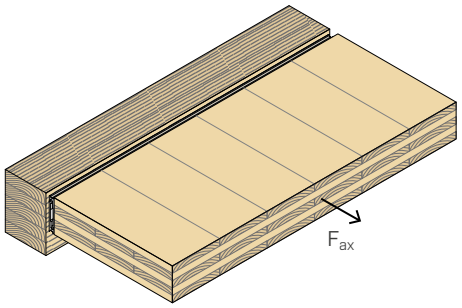
GENERAL PRINCIPLES:

- For the general principles of calculation, see page 12.

STRUCTURAL VALUES | TIMBER-TO-TIMBER JOINT | F_{ax}



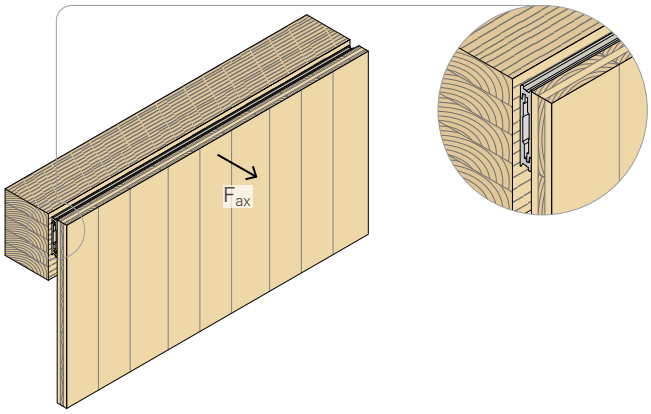
1. CLT WALL | CLT FLOOR



2. BEAM | CLT FLOOR

CODE	connector		TIMBER		ALUMINIUM
	B x H [mm]	no. of modules[1]	LBS screws $n_H + n_j$ - Ø x L [mm]	$R_{ax,k\ timber}$ [kN]	$R_{ax,k\ alu}$ [kN]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	28,5	32,3
	600 x 135	2	16 + 16 - Ø7 x 80	57,1	64,6
	900 x 135	3	24 + 24 - Ø7 x 80	85,6	96,9
	1200 x 135	4	32 + 32 - Ø7 x 80	114,1	129,2

STRUCTURAL VALUES | TIMBER-TO-TIMBER JOINT | F_{ax}



3. BEAM | CLT FAÇADE

CODE	connector		TIMBER		ALUMINIUM
	B x H [mm]	no. of modules[1]	LBS screws $n_H + n_j$ - Ø x L [mm]	$R_{ax,k\ timber}$ [kN]	$R_{ax,k\ alu}$ [kN]
LOCKTFLOOR135	300 x 135	1	8 + 8 - Ø7 x 80	37,9	32,3
	600 x 135	2	16 + 16 - Ø7 x 80	75,8	64,6
	900 x 135	3	24 + 24 - Ø7 x 80	113,6	96,9
	1200 x 135	4	32 + 32 - Ø7 x 80	151,5	129,2

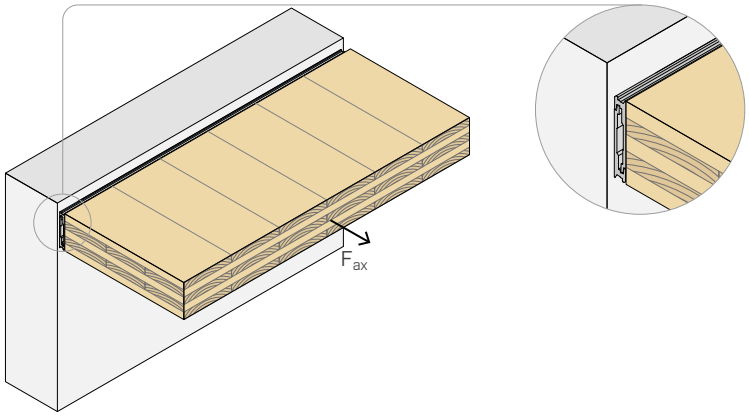
NOTES:

[1] The 1200 mm long connector can be cut into 300 mm standard length modules.

GENERAL PRINCIPLES:

For the general principles of calculation, see page 12.

STRUCTURAL VALUES | TIMBER-TO-CONCRETE JOINT | F_{ax}



connector			TIMBER		ALUMINIUM	UNCRACKED CONCRETE	
			LBS screws	$R_{ax,k\ timber}$	$R_{ax,k\ alu}$	SKS-CE anchors	$R_{ax,d\ concrete}$
CODE	B x H	no. of modules[1]	n_j - Ø x L			n_c - Ø x L	
	[mm]		[mm]	[kN]	[kN]	[mm]	[kN]
LOCKCFLOOR135	300 x 135	1	8 - Ø7 x 80	28,5	25,3	2 - Ø10 x 100	20,3
	600 x 135	2	16 - Ø7 x 80	57,1	50,6	4 - Ø10 x 100	39,3
	900 x 135	3	24 - Ø7 x 80	85,6	75,9	6 - Ø10 x 100	58,5
	1200 x 135	4	32 - Ø7 x 80	114,1	101,2	8 - Ø10 x 100	77,8

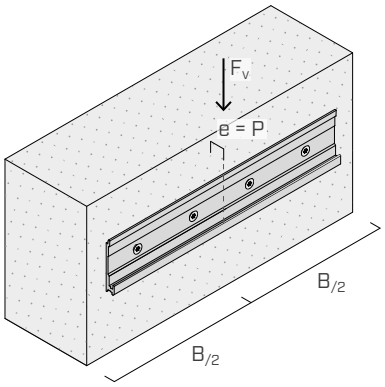
STRUCTURAL VALUES

DESIGN OF ALTERNATE FASTENERS AND ANCHORS

For fastening with anchors other than those indicated in the table, the calculation on concrete may be performed with reference to the ETA of the chosen anchor and the diagrams below.

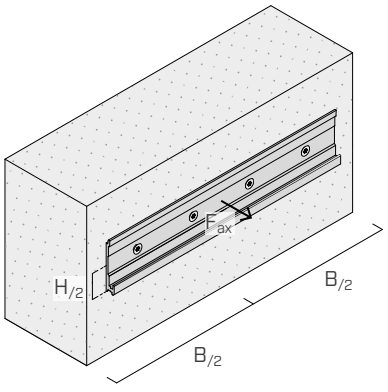
In the same way, the calculation of fasteners on steel can be carried out in accordance with national design standards for steel structures, following the diagrams below.

The fastener group shall be designed for shear force and eccentric moment equal to:



$V_d = F_{v,d}$

$M_d = e \cdot F_{v,d}$



$V_{ax,d} = F_{ax,d}$

where:

- *e = 22 mm* *for LOCKTFLOOR135*
- *H* *height of LOCK FLOOR connector*
- *B* *width of the LOCK FLOOR connector*

NOTES:

[1] The 1200 mm long connector can be cut into 300 mm standard length modules.

GENERAL PRINCIPLES:

For the general principles of calculation, see page 12.

GENERAL PRINCIPLES:

- Dimensioning and verification of concrete and timber elements must be carried out separately. In particular, it is recommended to perform a splitting check for loads perpendicular to the grain of timber elements.
- The connector must always be fully fastened using all the holes.
- Fastening with partial nailing is not allowed. Screws with the same length must be used for each connector half.
- Pre-drilled holes are not required for screws on secondary beam, with characteristic density $\rho_k \leq 420$ kg/m^3. The pre-drilling is mandatory on secondary beam with characteristic density $\rho_k > 420$ kg/m^3.
- In the calculation phase, a strength class of C25/30 concrete with thin reinforcement was considered, in the absence of spacing and distances from the edge and minimum thickness indicated in the installation tables. The strength values are valid for the calculation hypotheses defined in the table; for boundary conditions different from those in the table (e.g. minimum distances from the edge or different concrete thickness), the concrete strength must be calculated separately (see the DESIGN OF ALTERNATE FASTENERS AND ANCHORS section).
- The following verification shall be satisfied for combined loading:

$$\left(\frac{F_{ax,d}}{R_{ax,d}}\right)^2 + \left(\frac{F_{v,d}}{R_{v,d}}\right)^2 + \left(\frac{F_{lat,d}}{R_{lat,d}}\right)^2 \leq 1$$

STRUCTURAL VALUES | F_v - F_{ax}

- CLT and GL24h: values calculated according to ETA-19/0831, ETA-11/0030 and EN 1995-1-1 for screws without pre-drilled holes. The published characteristic resistances are conservative for screws installed in pre-drilled holes. ρ_k = 350 kg/m^3 for CLT and ρ_k = 385 kg/m^3 for GL24h have been considered for calculations.
- Design values can be obtained from characteristic values as follows:

$$R_{v,d} = min \begin{cases} R_{v,d\ timber} = \dfrac{R_{v,k\ timber} \cdot k_{mod}}{\gamma_M} \\ R_{v,d\ alu} = \dfrac{R_{v,k\ alu}}{\gamma_{M2}} \\ R_{v,d\ concrete} \end{cases}$$

$$R_{ax,d} = min \begin{cases} R_{ax,d\ timber} = \dfrac{R_{ax,k\ timber} \cdot k_{mod}}{\gamma_M} \\ R_{ax,d\ alu} = \dfrac{R_{ax,k\ alu}}{\gamma_{M2}} \\ R_{ax,d\ concrete} \end{cases}$$

where:

- *γ_M is the partial safety coefficient of timber.*
- *γ_{M2} is the partial safety coefficient of the aluminium material subject to tensile stress, to be taken according to the national standards used for calculation. If there are no other provisions, it is suggested to use the value provided by EN 1999-1-1, equal to γ_{M2}=1,25.*

STRUCTURAL VALUES | F_{lat}

- Values calculated according to ETA-19/0831, ETA-11/0030 and EN 1995-1-1 for screws without pre-drilled holes. ρ_k = 350 kg/m^3 for CLT and ρ_k = 385 kg/m^3 for GL24h have been considered for calculations.
- Design values can be obtained from characteristic values as follows:

$$R_{lat,d} = \frac{R_{lat,k\ timber} \cdot k_{mod}}{\gamma_M}$$

where:

- *γ_M is the partial safety coefficient of timber*

CONNECTION STIFFNESS | F_v

- Connection stiffness can be calculated according to ETA-19/0831, with the following equation:

$$K_{v,ser} = \frac{n \cdot \rho_m^{1,5} \cdot d^{0,8}}{30} \ N/mm$$

where:

- *d is the diameter of the screw thread in the secondary beam, in mm;*
- *ρ_m is the average density of the secondary beam, in kg/m^3;*
- *n is the number of screws in the secondary beam.*