LOCK C CONCRETE

CONCEALED HOOK TIMBER-TO-CONCRETE CONNECTOR

SIMPLE
Quick installation on concrete. Easy to hook system with screw-in anchors on the concrete side and self-drilling screws on the wood side.

REMOVABLE
Thanks to the hooking system, the wooden beams can be easily removed for seasonal requirements.

OUTDOOR
They can be used outdoors in SC3 in the absence of aggressive conditions. The correct choice of screw enables all fastening requirements to be met.

USA, Canada and more design values available online.

VIDEO

CALCULATION TOOL

CE ETA-19/0831

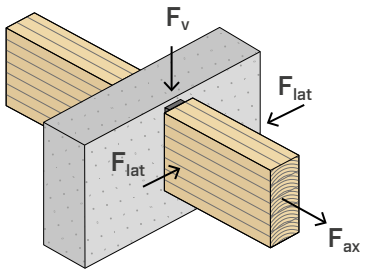
SERVICE CLASS SC1 SC2 SC3

For information on the application areas of with reference to environment service class, atmospheric corrosivity class and timber corrosion class, refer to the website www.rothoblaas.com.

MATERIAL

alu 6005A EN AW-6005A aluminium alloy

EXTERNAL LOADS



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

FIELDS OF USE

Concealed beam joint in timber-to-concrete or timber-to-steel configuration, suitable for gazebos, floors or roofs. Use also outdoors in non aggressive environments.

Can be applied to:
- solid timber softwood and hardwood
- glulam, LVL

HYBRID STRUCTURES

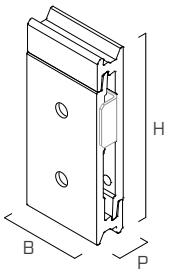
Specially designed for fastening timber beams to concrete or steel supports.
Ideal for hybrid structures.

TIMBER-TO-CONCRETE

Ideal for the construction of roofs or pergolas near concrete supports. Concealed fastening and easy to install.

CODES AND DIMENSIONS

1



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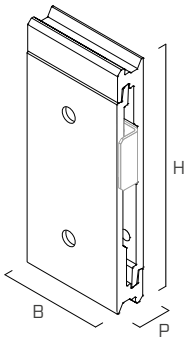

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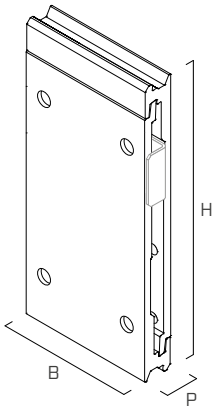

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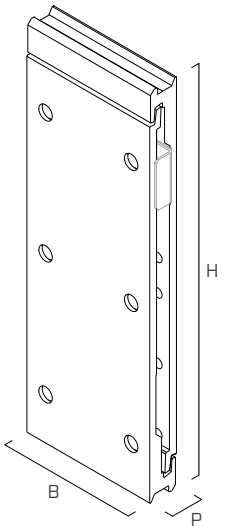
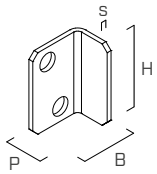


CODE	B [mm]	H [mm]	P [mm]	*B [in]*	*H [in]*	*P [in]*	n_{screw} x Ø(1) [pcs]	$n_{anchors}$ x Ø(1) [pcs]	$n_{LOCKSTOP}$ x type(2)			pcs.(3)
1 **LOCKC53120**	52,5	120	20	*2 1/16*	*4 3/4*	*0.79*	12 - Ø5 | *0.20*	2 - Ø8 | *0.32*	2 x LOCKSTOP5	●	●	25
2 **LOCKC75175**	75	175	22	*2 15/16*	*6 7/8*	*0.87*	12 - Ø7 | *0.28*	2 - Ø10 | *0.40*	2 x LOCKSTOP7 1 x LOCKSTOP75	●	●	12
3 **LOCKC100215**	100	215	22	*4*	*8 7/16*	*0.87*	24 - Ø7 | *0.28*	4 - Ø10 | *0.40*	2 x LOCKSTOP7 1 x LOCKSTOP100	●	●	8
4 **LOCKC100290**	100	290	22	*4*	*11 7/16*	*0.87*	36 - Ø7 | *0.28*	6 - Ø10 | *0.40*	2 x LOCKSTOP7 1 x LOCKSTOP100	●	●	10

Screws, anchors and LOCK STOP not included in the package.
(1) Number of screws and anchors for connector pairs.
(2) The LOCK STOP installation options are indicated on page 45.
(3) Number of connector pairs.

LOCK STOP | LOCKING DEVICE FOR Flat

1



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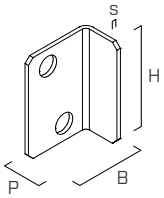

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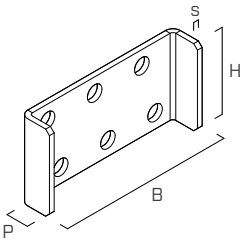

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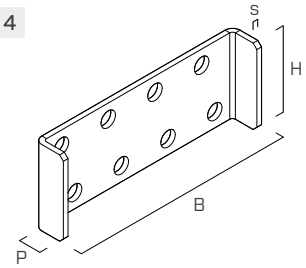


	CODE	description	B [mm]	H [mm]	P [mm]	s [mm]	*B [in]*	*H [in]*	*P [in]*	*s [in]*	pcs
1	**LOCKSTOP5(*)**	carbon steel DX51D+Z275	19	27,5	13	1,5	*3/4*	*1 1/16*	*1/2*	*0.06*	100
2	**LOCKSTOP7(*)**	carbon steel DX51D+Z275	26,5	38	15	1,5	*1 1/16*	*1 1/2*	*9/16*	*0.06*	50
3	**LOCKSTOP75**	stainless steel A2 | AISI 304	81	40	15,5	2,5	*3 3/16*	*1 9/16*	*5/8*	*0.10*	20
4	**LOCKSTOP100**	stainless steel A2 | AISI 304	106	40	15,5	2,5	*4 3/16*	*1 9/16*	*5/8*	*0.10*	20

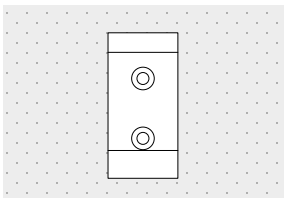
(*) Not holding CE marking

FASTENERS

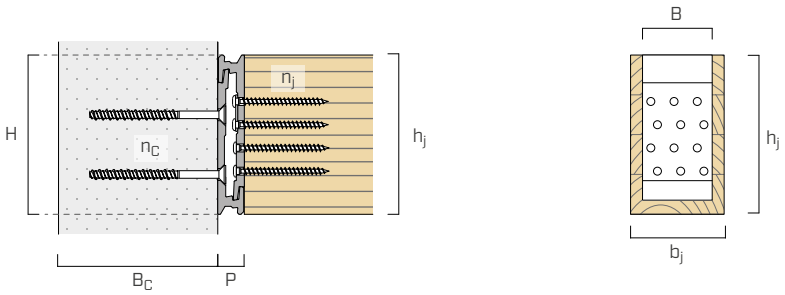
type	description		d [mm]	support	page
LBS	round head screw		5-7		571
LBS EVO	C4 EVO round head screw		5-7		571
LBS HARDWOOD	round head screw on hardwoods		5		572
LBS HARDWOOD EVO	C4 EVO round head screw on hardwoods		5-7		572
HBS PLATE EVO	C4 EVO pan head screw		5-6		573
KKF AISI410	pan head screw		5-6		574
SKS	screw-in anchor		8-10		528

INSTALLATION

wall



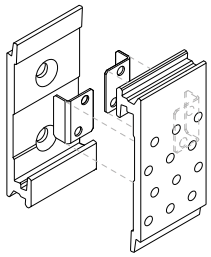
beam



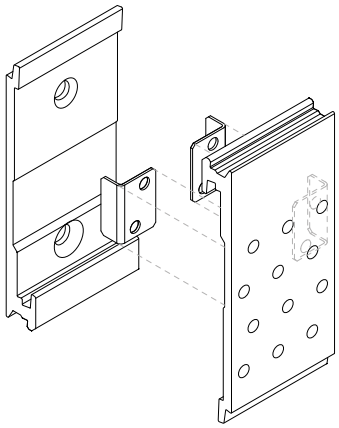
connector	B x H	CONCRETE SKS anchors n_c - Ø x L	CONCRETE B_C	TIMBER LBS screws n_j - Ø x L	TIMBER b_j x h_j with pre-drilling hole	TIMBER b_j x h_j without pre-drilled hole
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
LOCKC53120	52,5 x 120	2 - Ø8 x 100	120	12 - Ø5 x 50 12 - Ø5 x 70	70 x 120	78 x 120
LOCKC75175	75 x 175	2 - Ø10 x 100	120	12 - Ø7 x 80	99 x 175	105 x 175
LOCKC100215	100 x 215	4 - Ø10 x 100	120	24 - Ø7 x 80	124 x 215	130 x 215
LOCKC100290	100 x 290	6 - Ø10 x 100	120	36 - Ø7 x 80	124 x 290	130 x 290

INSTALLATION | LOCK STOP ON LOCK C

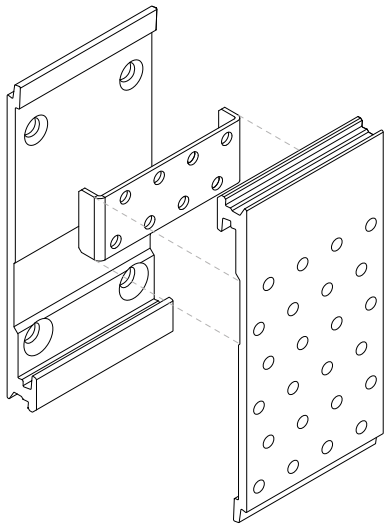
LOCKC53120 + 2 x LOCKSTOP5



LOCKC75175 + 2 x LOCKSTOP7



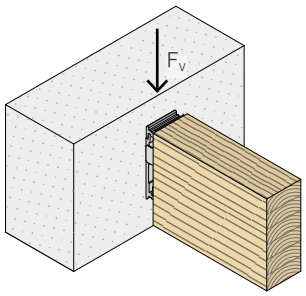
LOCKC100215 + 1 x LOCKSTOP100



LOCK STOP| assembly

connector	B x H	assembly configurations LOCKSTOP5	LOCKSTOP7	LOCKSTOP75	LOCKSTOP100
	[mm]	[pcs]	[pcs]	[pcs]	[pcs]
LOCKC53120	52,5 x 120	x 2	-	-	-
LOCKC75175	75 x 175	-	x 2	x 1	-
LOCKC100215	100 x 215	-	x 2	-	x 1
LOCKC100290	100 x 290	-	x 2	-	x 1

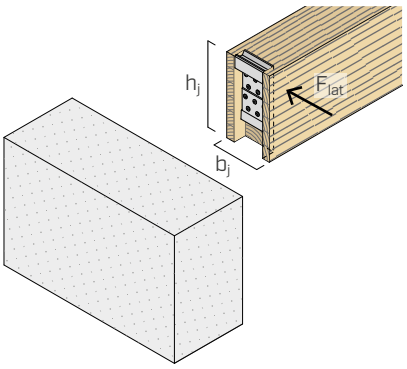
STRUCTURAL VALUES | TIMBER-TO-CONCRETE | F_v



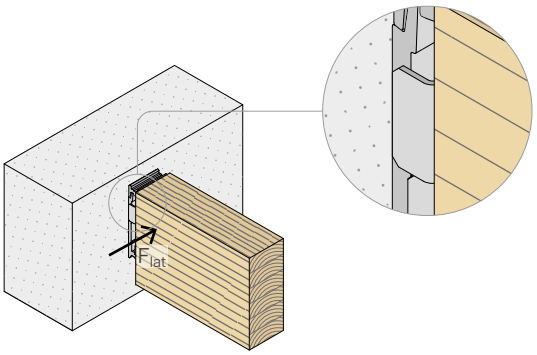
connector	B x H [mm]	fasteners LBS screws n_j - Ø x L [mm]	$R_{v,k\ timber}$ C24 [kN]	GL24h [kN]	LVL [kN]	$R_{v,k\ alu}$ [kN]	fasteners SKS anchors n_c - Ø x L [mm]	$R_{v,d\ concrete}$ [kN]
LOCKC53120	52,5 x 120	12 - Ø5x50 12 - Ø5x70	**13,8** **17,1**	**15,0** **17,9**	**15,4** **17,8**	**30**	2 - Ø8x100	**9,2**
LOCKC75175	75 x 175	12 - Ø7x80	**30,2**	**32,2**	**31,4**	**60**	2 - Ø10x100	**19,6**
LOCKC100215	100 x 215	24 - Ø7x80	**60,5**	**64,5**	**62,8**	**80**	4 - Ø10x100	**33,3**
LOCKC100290	100 x 290	36 - Ø7x80	**90,7**	**96,7**	**94,2**	**96**	6 - Ø10x100	**42,8**

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

secondary beam routing



LOCK STOP

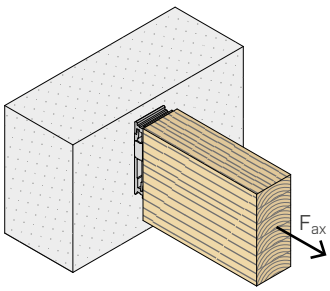


connector	B x H [mm]	fasteners LBS screws n_j - Ø x L [mm]	secondary beam routing $R_{lat,k\ timber}$ b_j x h_j [mm]	C24 [kN]	LOCK STOP $R_{lat,k\ steel}$ $n_{LOCKSTOP}$ x type [mm]	[kN]	fasteners SKS anchors n_c - Ø x L [mm]	$R_{lat,d\ concrete}$ [kN]
LOCKC53120	52,5 x 120	12 - Ø5x50	100 x 120	**3,7**	2 x LOCKSTOP5	**0,5**	2 - Ø8x100	**8,6**
LOCKC75175	75 x 175	12 - Ø7x80	120 x 175	**5,9**	2 x LOCKSTOP7 1 x LOCKSTOP75	**0,3** **0,8**	2 - Ø10x100	**18,7**
LOCKC100215	100 x 215	24 - Ø7x80	140 x 215	**7,1**	2 x LOCKSTOP7 1 x LOCKSTOP100	**0,3** **0,8**	4 - Ø10x100	**35,0**
LOCKC100290	100 x 290	36 - Ø7x80	140 x 290	**9,7**	2 x LOCKSTOP7 1 x LOCKSTOP100	**0,3** **0,8**	6 - Ø10x100	**33,1**

GENERAL PRINCIPLES

For the GENERAL PRINCIPLES of calculation, see page 49.

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



connector		fasteners LBS screws	$R_{ax,k\ timber}$		$R_{ax,k\ alu}$	fasteners SKS anchors	$R_{ax,d\ concrete}$
	B x H	n_j - Ø x L	C24	GL24h		n_c - Ø x L	
	[mm]	[mm]	[kN]	[kN]	[kN]	[mm]	[kN]
LOCKC53120	52,5 x 120	12 - Ø5x50	**4,4**	**4,8**	**6,9**	2 - Ø8x100	**10,8**
LOCKC75175	75 x 175	12 - Ø7x80	**9,3**	**10,0**	**9,8**	2 - Ø10x100	**17,7**
LOCKC100215	100 x 215	24 - Ø7x80	**12,2**	**13,2**	**12,0**	4 - Ø10x100	**26,1**
LOCKC100290	100 x 290	36 - Ø7x80	**12,9**	**13,9**	**12,6**	6 - Ø10x100	**31,5**

GENERAL PRINCIPLES

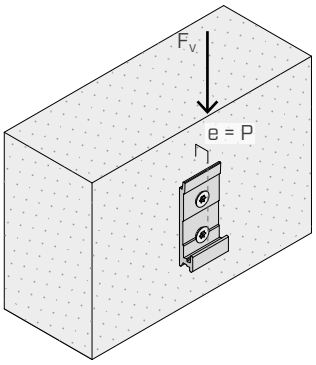
For the GENERAL PRINCIPLES of calculation, see page 49.

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.

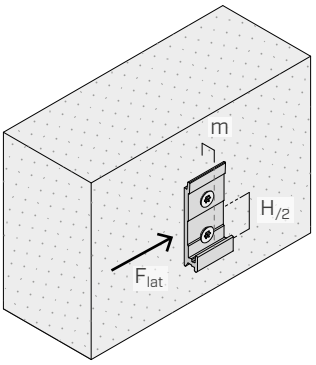
In the same way, the calculation of fasteners on steel can be carried out in accordance with national design standards for steel structures, following the diagrams below.

The LOCK connector and the group of anchors must be verified as follows:



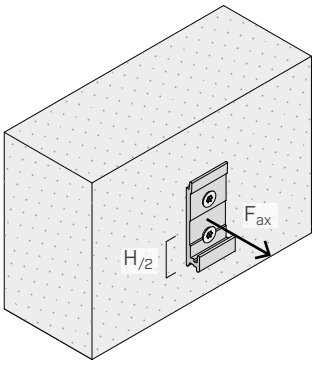
$V_d = F_{v,d}$

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



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

$M_{lat,d} = m \cdot F_{lat,d}$



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

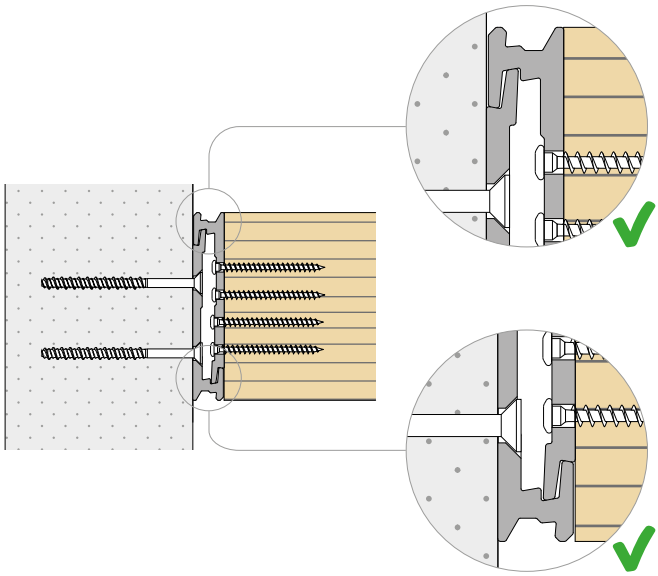
where:

- *e = 20 mm* — *for LOCKC53120*
- *e = 22 mm* — *for LOCKC75175, LOCKC100215 and LOCKC100290*
- *m = 6 mm* — *for LOCKC53120, LOCKC75175, LOCKC100215 and LOCKC100290*
- *H* — *LOCK C connector height*

INSTALLATION METHODS

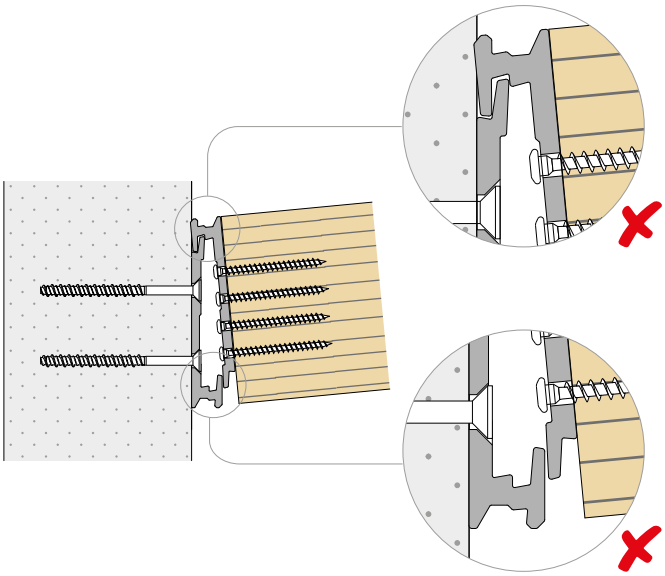
CORRECT INSTALLATION

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



INCORRECT INSTALLATION

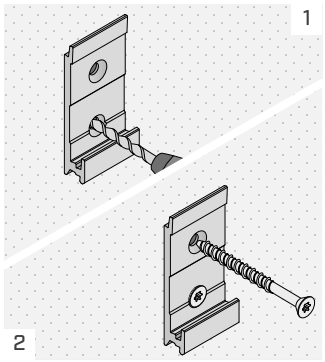
Partial and incorrect coupling of the connector. Ensure that both flanges of the connector are properly seated in their respective seats.



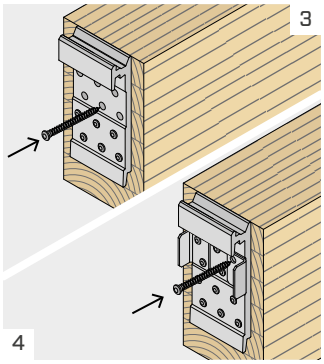
MOUNTING

VIDEO

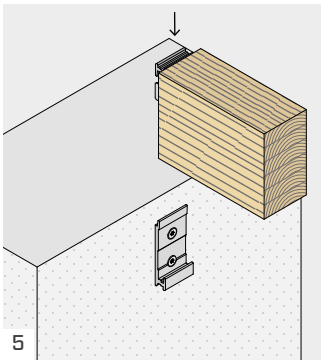
EXPOSED INSTALLATION WITH LOCK STOP



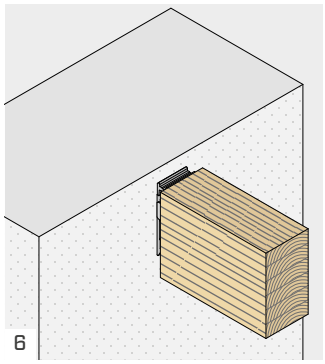
Place the connector on concrete and fasten the anchors according to the installation instructions.



Place the connector on the secondary beam and fasten the lower screws.
When using LOCK STOP, position LOCK STOP and fasten the remaining screws.

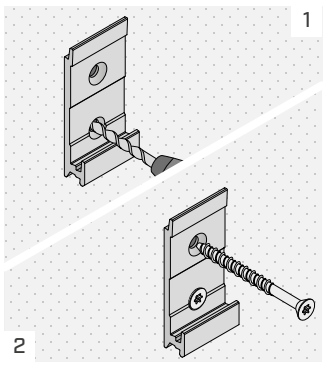


Hang the secondary beam from the main member by lowering it into place.

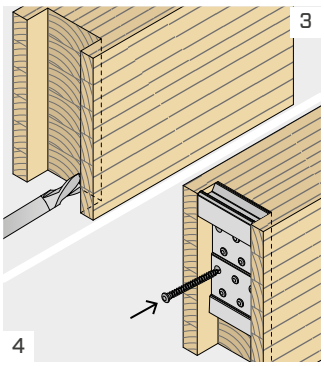


Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

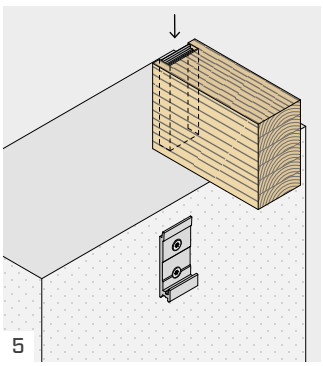
SEMI-CONCEALED INSTALLATION - CONNECTOR VISIBLE FROM BELOW



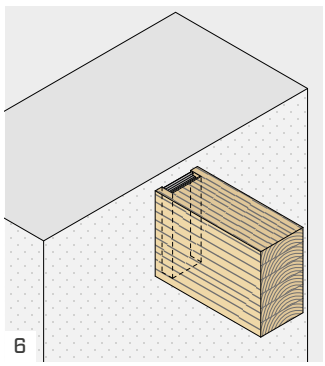
Place the connector on concrete and fasten the anchors according to the installation instructions.



Perform full routing on the secondary beam. Position the connector and fasten all screws.



Hang the secondary beam from the main member by lowering it into place.



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

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. Screws with the same length must be used for each connector half.
- Pre-drilling holes are not required for screws on secondary beam, with density $\rho_k \leq 420$ kg/m^3. The pre-drilling is mandatory on secondary beam with 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 hypothesis 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 coefficients k_{mod} and γ_M should be taken according to the current regulations used for the calculation.
- 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_{lat}

- Characteristic values calculated according to EN 1995:2014 and ETA-19/0831 for screws without pre-drilling hole and C24 timber elements with density of $\rho_k = 350$ kg/m^3.
- Design values of concrete anchors are in accordance with ETA-24/0024.
- Design values can be obtained from characteristic values as follows:

Routing in the secondary beam

$$R_{lat,d} = min \begin{cases} \frac{R_{lat,k\ timber} \cdot k_{mod}}{\gamma_M} \\ R_{lat,d\ concrete} \end{cases}$$

LOCK STOP

$$R_{lat,d} = min \begin{cases} \frac{R_{lat,k\ steel}}{\gamma_{M2}} \\ R_{lat,d\ concrete} \end{cases}$$

where:

- γ_{M2} is the partial safety coefficient of steel material according to EN 1993-1-1.

STRUCTURAL VALUES | F_v | F_{ax}

- C24 and GL24h: values calculated according to EN 1995:2014 and ETA-19/0831 for screws without pre-drilling hole. $\rho_k = 350$ kg/m^3 for C24 and $\rho_k = 385$ kg/m^3 for GL24h have been considered for calculations.
- LVL: characteristic values calculated according to EN 1995:2014 and ETA-19/0831 for screws with pre-drilling hole. $\rho_k = 480$ kg/m^3 has been taken in consideration in the calculation.
- Design values of concrete anchors are in accordance with ETA-24/0024.
- Design values can be obtained from characteristic values as follows:

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

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

where:

- 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 $\gamma_{M2} = 1.25$.

CONNECTION STIFFNESS | F_v

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

$$K_{v,ser} = \frac{n \cdot \rho_m^{1.5} \cdot d^{0.8}}{30} \quad N/mm$$

where:

- d is the nominal diameter of the screw 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.