LOCK C CONCRETE

VIDEO

CE ETA 19/0831

CONCEALED HOOK TIMBER-TO-CONCRETE CONNECTOR

SIMPLE
Quick installation on concrete. Easy to hook system with screw 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.

CONCEALED
Fastening on concrete is concealed. When installed without grooving, it generates an aesthetically pleasing joint shadow.

CHARACTERISTICS

FOCUS	joints for concrete that can be disassembled
TIMBER SECTIONS	from 70 x 120 mm to 200 x 400 mm
STRENGTH	$R_{v,k}$ up to 95 kN
FASTENERS	LBS, SKS-CE

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

MATERIAL

Aluminium alloy three dimensional perforated plate.

FIELDS OF USE

Timber-to-concrete shear joint
- solid timber and glulam
- CLT, LVL

BUILDING RECOVERY

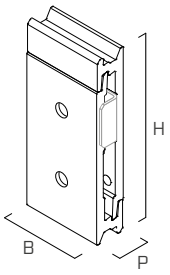
The rod version is specially designed for fastening CLT floors to reinforced concrete beams or kerbs or masonry elements. Ideal for the restoration or renovation of existing buildings.

TIMBER-TO-CONCRETE

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

CODES AND DIMENSIONS

1



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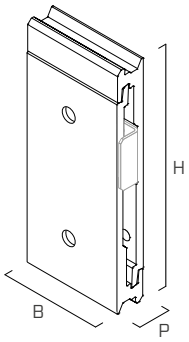

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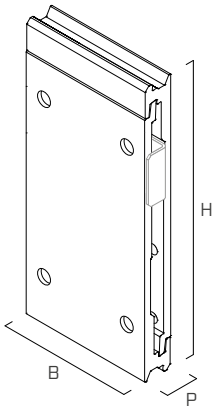

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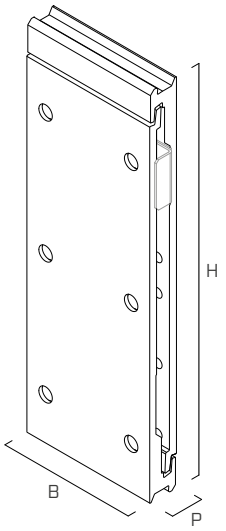
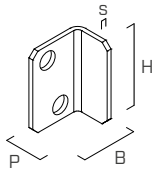


	CODE		B [mm]	H [mm]	P [mm]	n_{screw} x Ø(1) pcs	$n_{anchors}$ x Ø(1)	$n_{LOCKSTOP}$ x type(2)	pcs.(3)		
1	**LOCKC53120**		52,5	120	20	12 - Ø5	2 - Ø8	2 x LOCKSTOP5	25	●	●
2	**LOCKC75175**		75	175	22	12 - Ø7	2 - Ø10	2 x LOCKSTOP7 1 x LOCKSTOP75	12	●	●
3	**LOCKC100215**		100	215	22	24 - Ø7	4 - Ø10	2 x LOCKSTOP7 1 x LOCKSTOP100	8	●	●
4	**LOCKC100290**	NEW	100	290	22	36 - Ø7	6 - Ø10	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 6.
(3) Number of connector pairs.

LOCK STOP | LOCKING DEVICE FOR F_{lat}

1



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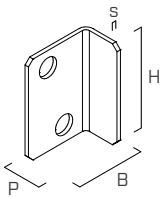

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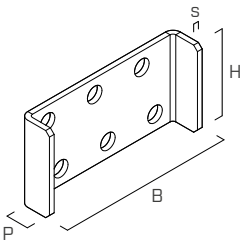

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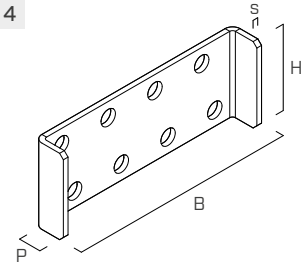


	CODE		description	B [mm]	H [mm]	P [mm]	s [mm]	pcs
1	**LOCKSTOP5**		carbon steel DX51D+Z275	19	27,5	13	1,5	100
2	**LOCKSTOP7**		carbon steel DX51D+Z275	26,5	38	15	1,5	50
3	**LOCKSTOP75**	NEW	stainless steel A2 | AISI 304	81	40	15,5	2,5	20
4	**LOCKSTOP100**	NEW	stainless steel A2 | AISI 304	106	40	15,5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

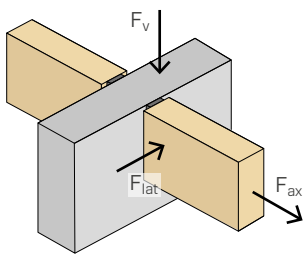
MATERIAL AND DURABILITY

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

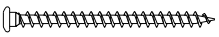
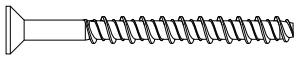
FIELD OF USE

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

EXTERNAL LOADS



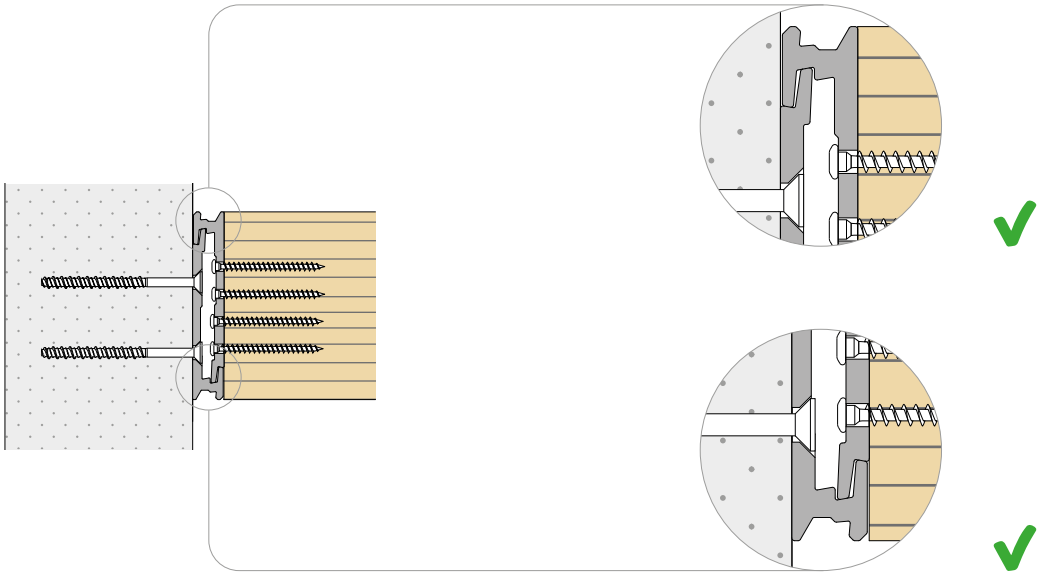
ADDITIONAL PRODUCTS - FASTENING

CODE	description	material		d_1 [mm]	L [mm]	d_0 [mm]	T_{inst} [Nm]	TX	pcs
LBS550				5	50	-	-	TX 20	200
LBS570	round head screw for plates	bright zinc plated carbon steel		5	70	-	-	TX 20	200
LBS780				7	80	-	-	TX 30	100
SKS75100CE	screw anchor with countersunk head for concrete	bright zinc plated carbon steel		8	100	6	20	TX 30	50
SKS10100CE				10	100	8	50	TX 40	50

INSTALLATION METHODS

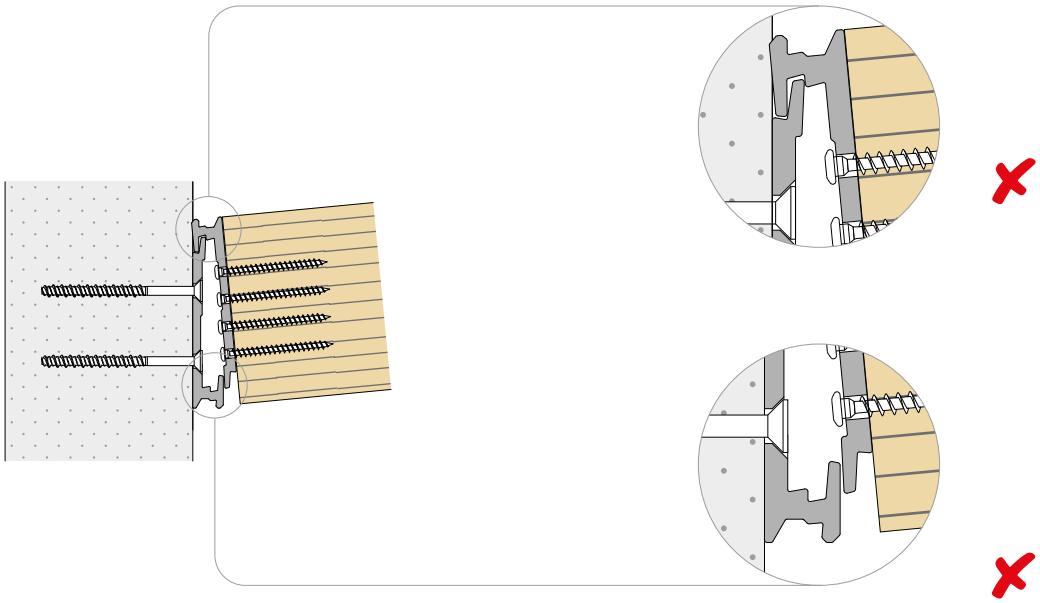
CORRECT INSTALLATION

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.



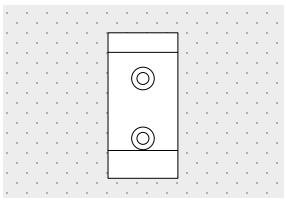
INCORRECT INSTALLATION

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

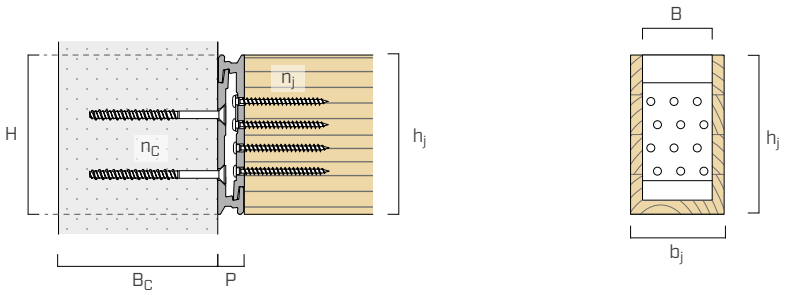


LOCK C INSTALLATION

WALL



BEAM

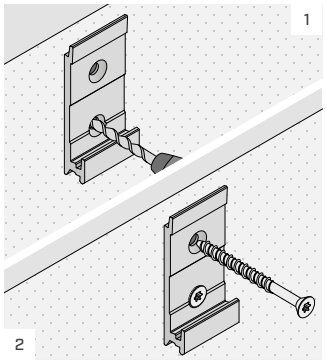


connector		CONCRETE		TIMBER		
		SKS-CE anchors		LBS screws	$b_{j,min}$ x $h_{j,min}$	
CODE	B x H	n_c - Ø x L	$B_{C,min}$	n_j - Ø x L	with pre-drilling hole	without pre-drilling hole
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
LOCKC53120	52,5 x 120	2 - Ø8 x 100	120	12 - Ø5 x 50 12 - Ø5 x 70	70 x 120	78 x 120
LOCKC75175	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

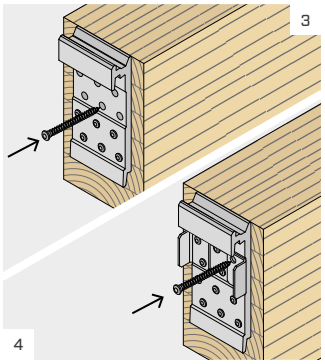
INSTALLATION

VIDEO

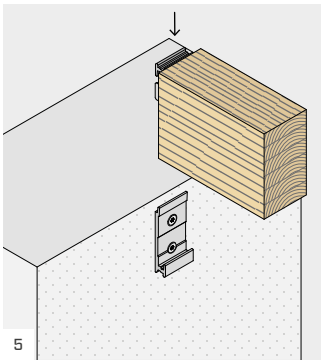
EXPOSED INSTALLATION WITH LOCK STOP



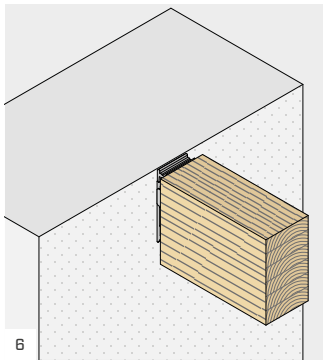
Place the connector on concrete and fasten the anchors according to the installation instructions.



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

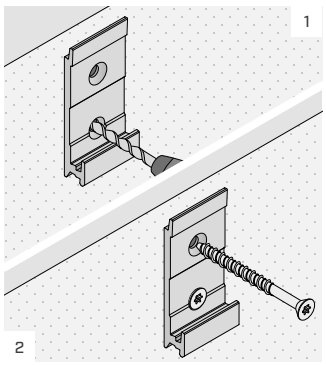


Hang the secondary beam from the main member by lowering it into place.

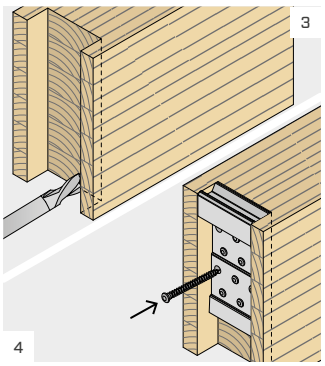


Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

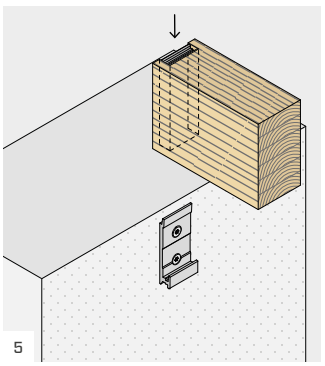
SEMI-CONCEALED INSTALLATION - CONNECTOR VISIBLE FROM BELOW



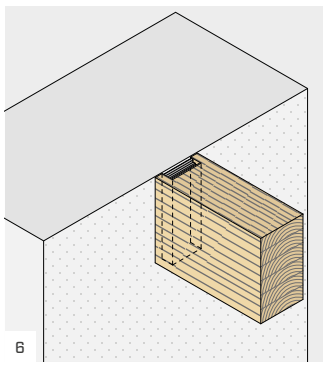
Place the connector on concrete and fasten the anchors according to the installation instructions.



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



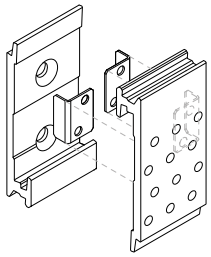
Hang the secondary beam from the main member by lowering it into place.



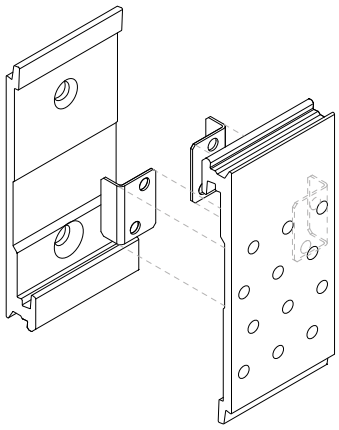
Make sure that the two LOCK connectors are parallel to each other and avoid subjecting them to excessive strain during installation.

LOCK STOP INSTALLATION ON LOCK C

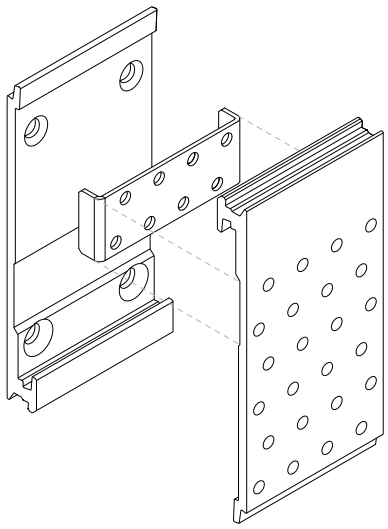
LOCKC53120 + 2 x LOCKSTOP5



LOCKC75175 + 2 x LOCKSTOP7



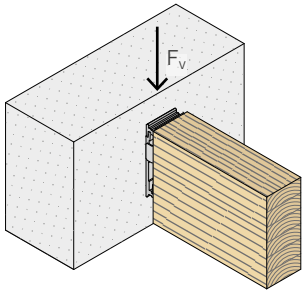
LOCKC100215 + 1 x LOCKSTOP100



LOCK STOP| assembly

connector		assembly configuration							
CODE	B x H [mm]	LOCKSTOP5 application	LOCKSTOP5 pcs	LOCKSTOP7 application	LOCKSTOP7 pcs	LOCKSTOP75 application	LOCKSTOP75 pcs	LOCKSTOP100 application	LOCKSTOP100 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 JOINT | F_V



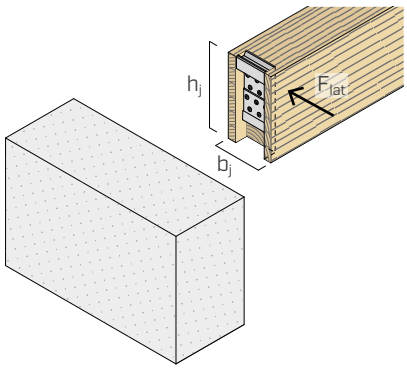
connector		fasteners	TIMBER			ALUMINIUM	CONCRETE	
		LBS screws	$R_{v,k\ timber}$			$R_{v,k\ alu}$	SKS-CE anchors	$R_{v,d\ concrete}$
CODE	B x H [mm]	n_j - Ø x L [mm]	C24 [kN]	GL24h [kN]	LVL [kN]	[kN]	n_c - Ø x L [mm]	[kN]
LOCKC53120	52,5 x 120	12 - Ø5 x 50	13,8	15,0	15,4	30	2 - Ø8 x 100	12,1
		12 - Ø5 x 70	17,1	17,9	17,8			
LOCKC75175	75 x 175	12 - Ø7 x 80	30,2	32,2	31,4	60	2 - Ø10 x 100	20,8
LOCKC100215	100 x 215	24 - Ø7 x 80	60,5	64,5	62,8	80	4 - Ø10 x 100	35,5
LOCKC100290	100 x 290	36 - Ø7 x 80	90,7	96,7	94,2	96	6 - Ø10 x 100	45,0

GENERAL PRINCIPLES:

- For the general principles of calculation, see page 9.

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

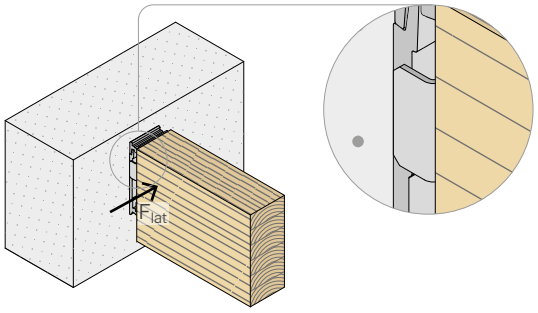
SECONDARY BEAM REBATE



connector		fasteners	TIMBER		CONCRETE	
		LBS screws		$R_{lat,k\ timber}$	SKS-CE anchors	$R_{lat,d\ concrete}$
CODE	B x H	n_j - Ø x L	$b_{j,min}$ x $h_{j,min}$	C24	n_c - Ø x L	
	[mm]	[mm]	[mm]	[kN]	[mm]	[kN]
LOCKC53120	52,5 x 120	12 - Ø5 x 50	100 x 120	3,7	2 - Ø8 x 100	6,9
LOCKC75175	75 x 175	12 - Ø7 x 80	120 x 175	5,9	2 - Ø10 x 100	16,0
LOCKC100215	100 x 215	24 - Ø7 x 80	140 x 215	7,1	4 - Ø10 x 100	27,1
LOCKC100290	100 x 290	36 - Ø7 x 80	140 x 290	9,7	6 - Ø10 x 100	34,0

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

LOCK STOP



connector		STEEL		CONCRETE	
			$R_{lat,k\ steel}$ [1]	SKS-CE anchors	$R_{lat,d\ concrete}$
CODE	B x H	$n_{LOCKSTOP}$ x type		n_c - Ø x L	
	[mm]	[mm]	[kN]	[mm]	[kN]
LOCKC53120	52,5 x 120	2 x LOCKSTOP5	0,5	2 - Ø8 x 100	6,9
LOCKC75175	75 x 175	2 x LOCKSTOP7	0,3	2 - Ø10 x 100	16,0
		1 x LOCKSTOP75	0,8		
LOCKC100215	100 x 215	2 x LOCKSTOP7	0,3	4 - Ø10 x 100	27,1
		1 x LOCKSTOP100	0,8		
LOCKC100290	100 x 290	2 x LOCKSTOP7	0,3	6 - Ø10 x 100	34,0
		1 x LOCKSTOP100	0,8		

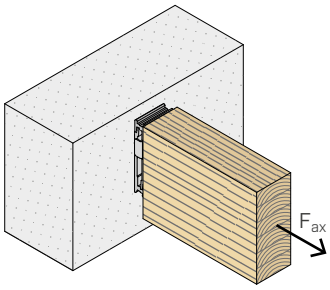
NOTES:

[1] For the configurations shown in the table, the static values are independent of the type of screw in the secondary beam.

GENERAL PRINCIPLES:

- For the general principles of calculation, see page 9.

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



connector		fasteners	TIMBER		ALUMINIUM	CONCRETE	
		LBS screws	$R_{ax,k\ timber}$		$R_{ax,k\ alu}$	SKS-CE anchors	$R_{ax,d\ concrete}$
CODE	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 - Ø5 x 50	4,4	4,8	6,9	2 - Ø8 x 100	9,5
LOCKC75175	75 x 175	12 - Ø7 x 80	9,3	10,0	9,8	2 - Ø10 x 100	16,7
LOCKC100215	100 x 215	24 - Ø7 x 80	12,2	13,2	12,0	4 - Ø10 x 100	26,1
LOCKC100290	100 x 290	36 - Ø7 x 80	12,9	13,9	12,6	6 - Ø10 x 100	31,5

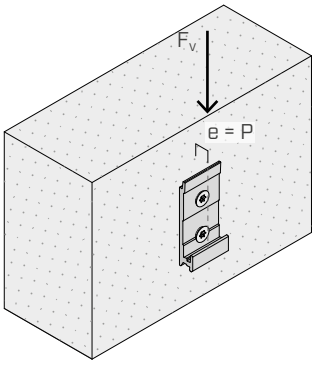
STRUCTURAL VALUES

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.

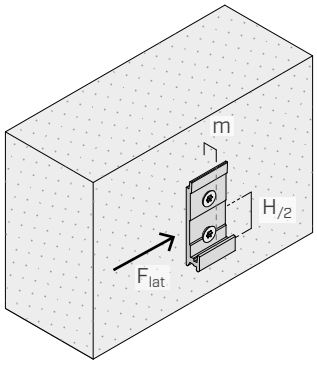
In the same way, the calculation of fasteners on steel can be carried out in accordance with national design standards for steel structures, following the diagrams below.

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



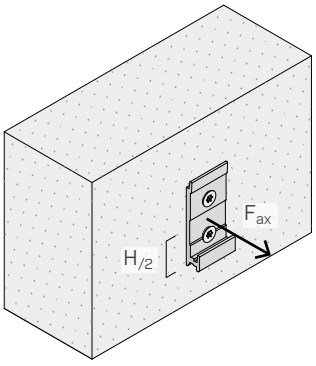
$V_d = F_{v,d}$

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



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

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



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

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*

GENERAL PRINCIPLES:

- For the general principles of calculation, see page 9.

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 and/or anchors 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.
- Static values were calculated assuming a constant thickness of the metal element, including the thickness of the LOCK STOP.
- 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}

- C24 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 C24 and ρ_k = 385 kg/m^3 for GL24h have been considered for calculations.
- LVL (F_v): values calculated according to ETA-19/0831, ETA-11/0030 and EN 1995-1-1 for screws with pre-drilling hole. ρ_k = 480 kg/m^3 has been taken in consideration in the calculation.
- 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 and C24 timber elements with a density of ρ_k = 350 kg/m^3.
- Special care must be taken in the execution of cutting the rebate in the secondary beam to limit the lateral sliding of the connection.
- The two configurations for F_{lat} resistance (milled secondary beam and LOCK STOP) have different stiffness values. Therefore, combining the two configurations in order to increase the strength is not allowed.
- Design values can be obtained from characteristic values as follows:

Grooving in the secondary beam

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

LOCK STOP

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

where:

- *γ_M is the partial safety coefficient of timber*
- *γ_{steel} is the partial safety coefficient of steel*

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.*