

CONCEALED BRACKET WITH AND WITHOUT HOLES

FLOORS AND ROOFS

Suitable for medium-sized floors and roofs. It can also be used with inclined beams, thanks to the certified and calculated strengths in all directions.

NEW LONG VERSION

The 2200 mm long version is now also available with holes. The possibility of cutting every 40 mm allows brackets to be cut to the most suitable size.

TIMBER, CONCRETE AND STEEL

Optimal hole spacing for joints on timber (nails or screws), on reinforced concrete (chemical anchors) and on steel (bolts).



USA, Canada and more design values available online.

SERVICE CLASS

SC1

SC2

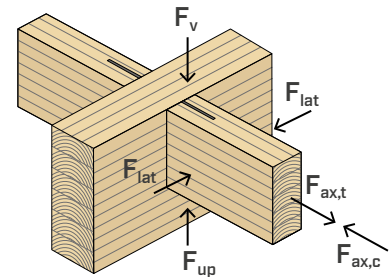
SC3

MATERIAL

alu
6005A

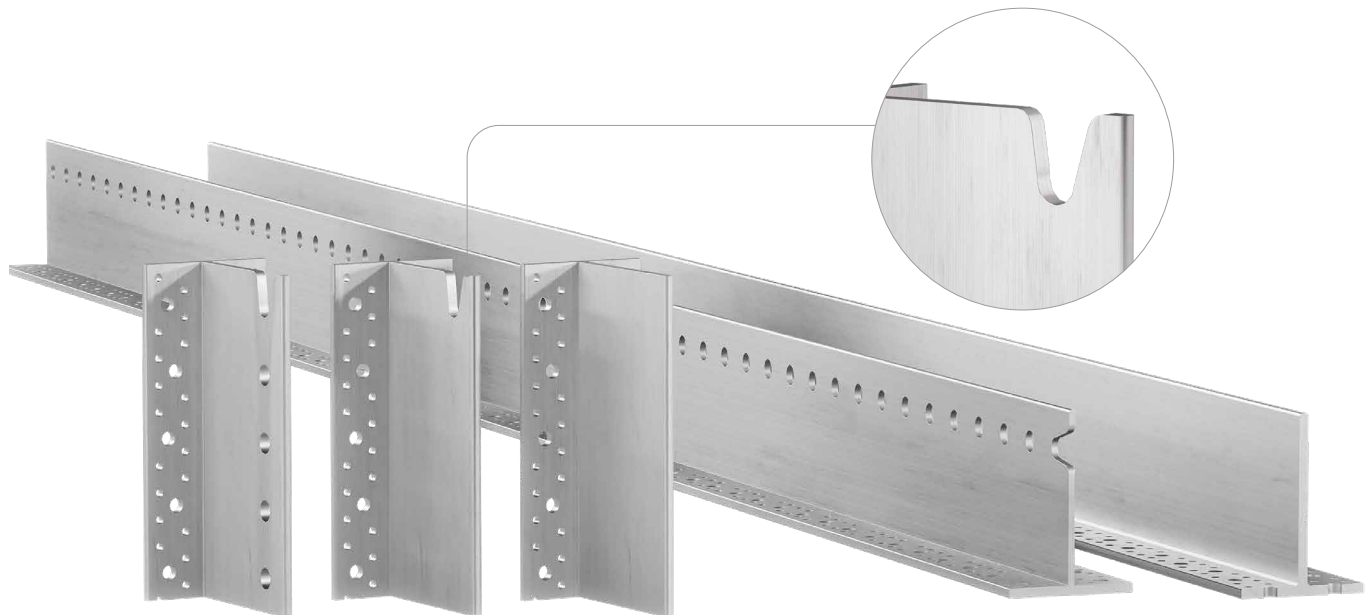
EN AW-6005A aluminium alloy

EXTERNAL LOADS



VIDEO

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

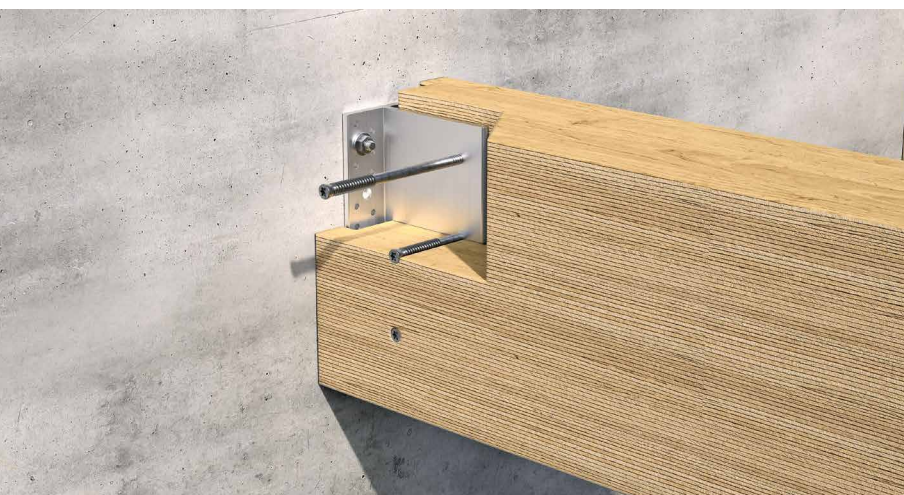


FIELDS OF USE

Concealed joint for beams in timber-to-timber or timber-to-concrete configuration, suitable for roofs, floors and medium-sized post-and-beam constructions. Use also outdoors in non aggressive environments.

Can be applied to:

- solid timber softwood and hardwood
- glulam, LVL



INVISIBLE

The concealed connection provides a satisfying appearance to the joint and fulfils the fire safety requirements. The notch where the first hole is located, facilitates the introduction of the secondary beam from the top.

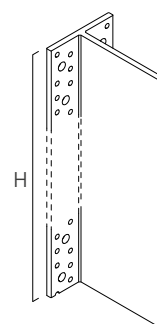
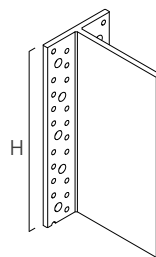
UNEVEN SURFACES

For applications on concrete or other uneven surfaces the self-drilling dowels allow a greater installation tolerance when fastening the timber element.

CODES AND DIMENSIONS

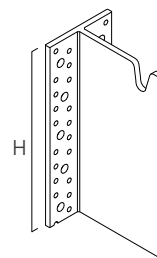
ALUMIDI WITHOUT HOLES

CODE	type	H [mm]	H [in]	pcs
ALUMIDI80	without holes	80	3 1/8	25
ALUMIDI120	without holes	120	4 3/4	25
ALUMIDI160	without holes	160	6 1/4	25
ALUMIDI200	without holes	200	8	15
ALUMIDI240	without holes	240	9 1/2	15
ALUMIDI2200	without holes	2200	86 5/8	1



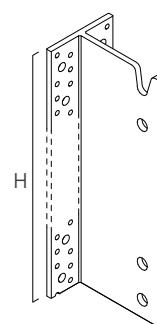
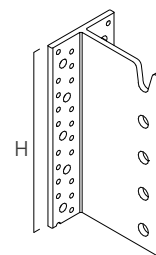
ALUMIDI WITHOUT HOLES WITH UPPER NOTCH

CODE	type	H [mm]	H [in]	pcs
ALUMIDI280N	without holes	280	11	15
ALUMIDI320N	without holes	320	12 5/8	8
ALUMIDI360N	without holes	360	14 1/4	8
ALUMIDI400N	without holes	400	15 3/4	8
ALUMIDI440N	without holes	440	17 1/4	8



ALUMIDI WITH HOLES

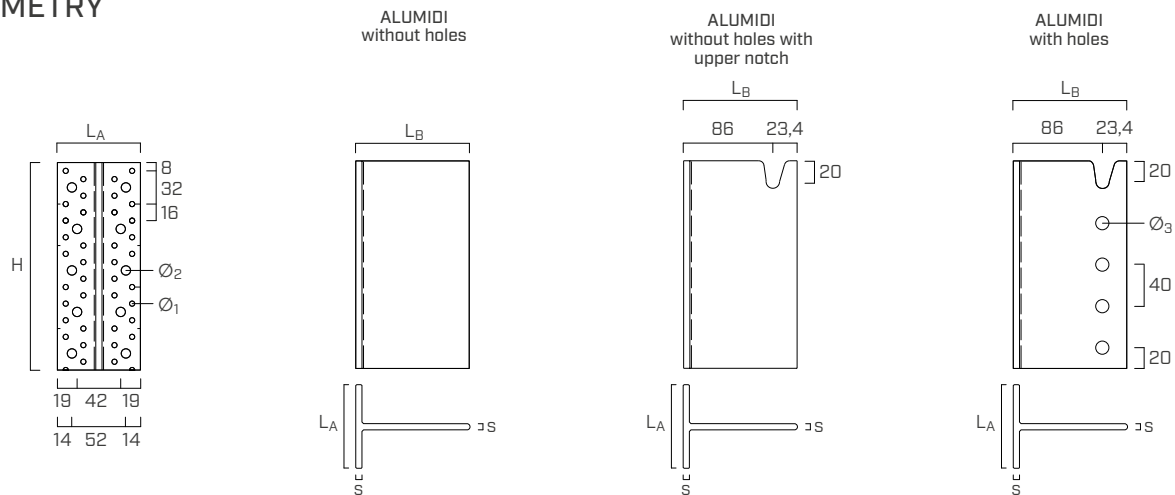
CODE	type	H [mm]	H [in]	pcs
ALUMIDI120L	with holes	120	4 3/4	25
ALUMIDI160L	with holes	160	6 1/4	25
ALUMIDI200L	with holes	200	8	15
ALUMIDI240L	with holes	240	9 1/2	15
ALUMIDI280L	with holes	280	11	15
ALUMIDI320L	with holes	320	12 5/8	8
ALUMIDI360L	with holes	360	14 1/4	8
ALUMIDI2200L	with holes	2200	86 5/8	1



ADDITIONAL PRODUCTS - FASTENING

type	description		d [mm]	support	page
LBA	high bond nail		4		570
LBS	round head screw		5		571
LBS EVO	C4 EVO round head screw		5		571
LBS HARDWOOD	round head screw on hardwoods		5		570
LBS HARDWOOD EVO	C4 EVO round head screw on hardwoods		5		572
SBD	self-drilling dowel		7,5		154
STA	smooth dowel		12		162
STA A2 AISI 304	smooth dowel		12		162
VIN-FIX	vinyl ester chemical anchor		M8		545
EPO-FIX	epoxy chemical anchor		M8		557
INA	5.8 or 8.8 steel class threaded rod		M8		562
JIG ALU STA	drilling template for ALUMIDI and ALUMAXI	-	-		-

GEOMETRY

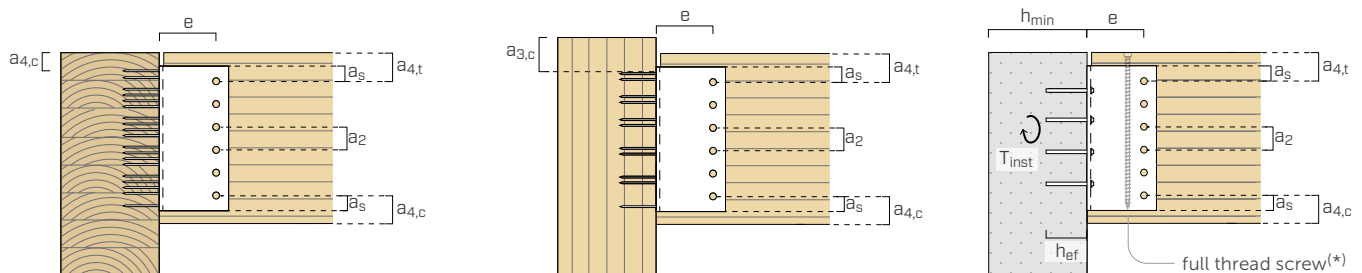


ALUMIDI

thickness	s	[mm]	6
flange width	LA	[mm]	80
web length	LB	[mm]	109,4
small flange-holes	Ø ₁	[mm]	5,0
large flange-holes	Ø ₂	[mm]	9,0
blade holes (dowels)	Ø ₃	[mm]	13,0

INSTALLATION

MINIMUM DISTANCES



secondary beam-timber			self-drilling dowel SBD Ø7,5	smooth dowel STA Ø12
dowel-dowel	a ₂ [mm]	≥ 3·d	≥ 23	≥ 36
dowel-top of beam	a _{4,t} [mm]	≥ 4·d	≥ 30	≥ 48
dowel-bottom of beam	a _{4,c} [mm]	≥ 3·d	≥ 23	≥ 36
dowel-bracket edge	a _s [mm]	≥ 1,2·d ₀ ⁽¹⁾	≥ 10	≥ 16
dowel-main beam	e [mm]	-	86	86

(1) Hole diameter.

main element-timber			nail LBA Ø4	screw LBS Ø5
first connector-top of beam	a _{4,c} [mm]	≥ 5·d	≥ 20	≥ 25
first connector-column end	a _{3,c} [mm]	≥ 10·d	≥ 40	≥ 50

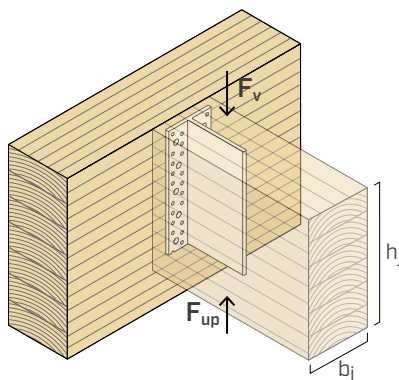
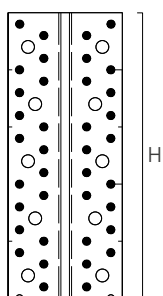
Spacing and minimum distances refers to timber elements with density $\rho_k \leq 420 \text{ kg/m}^3$, screws inserted without pre-drilling hole and for F_v stresses.

main element-concrete			chemical anchor VIN-FIX Ø8
minimum support thickness	h _{min} [mm]		h _{ef} + 30 ≥ 100
concrete hole diameter	d ₀ [mm]		10
tightening torque	T _{inst} [Nm]		10

h_{ef} = effective anchoring depth in concrete.

(*) For timber-to-concrete configurations with smooth STA dowels, the addition of VGZ full thread screws in accordance with ETA-09/0361 prevents tensile cracking perpendicular to the grain.

TOTAL FASTENING



ALUMIDI with SBD self-drilling dowels

ALUMIDI $H^{(1)}$ [mm]	SECONDARY BEAM		MAIN BEAM			
	$b_j \times h_j$ [mm]	dowels SBD Ø7,5 ⁽²⁾ [pcs Ø x L]	fastening through nails		fastening through screws	
			LBA Ø4 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]	LBS Ø5 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]
80	120 x 120	3 - Ø7,5 x 115	14	9,1	14	12,4
120	120 x 160	4 - Ø7,5 x 115	22	18,2	22	24,6
160	120 x 200	5 - Ø7,5 x 115	30	29,0	30	36,6
200	120 x 240	7 - Ø7,5 x 115	38	42,0	38	54,8
240	120 x 280	9 - Ø7,5 x 115	46	56,3	46	70,5
280	140 x 320	10 - Ø7,5 x 135	54	72,5	54	87,0
320	140 x 360	11 - Ø7,5 x 135	62	84,9	62	105,1
360	160 x 400	12 - Ø7,5 x 155	70	105,1	70	124,7
400	160 x 440	13 - Ø7,5 x 155	78	118,1	78	139,2
440	160 x 480	14 - Ø7,5 x 155	86	128,7	86	151,0

ALUMIDI with STA dowels

ALUMIDI $H^{(1)}$ [mm]	SECONDARY BEAM		MAIN BEAM			
	$b_j \times h_j$ [mm]	dowels STA Ø12 ⁽³⁾ [pcs Ø x L]	fastening through nails		fastening through screws	
			LBA Ø4 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]	LBS Ø5 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]
120	120 x 160	3 - Ø12 x 120	22	22,1	22	25,8
160	120 x 200	4 - Ø12 x 120	30	34,4	30	40,6
200	120 x 240	5 - Ø12 x 120	38	46,7	38	54,8
240	120 x 280	6 - Ø12 x 120	46	60,9	46	68,4
280	140 x 320	7 - Ø12 x 140	54	77,6	54	87,0
320	140 x 360	8 - Ø12 x 140	62	93,0	62	102,4
360	160 x 400	9 - Ø12 x 160	70	114,6	70	124,7
400	160 x 440	10 - Ø12 x 160	78	128,9	78	141,0
440	160 x 480	11 - Ø12 x 160	86	145,1	86	154,9

NOTES

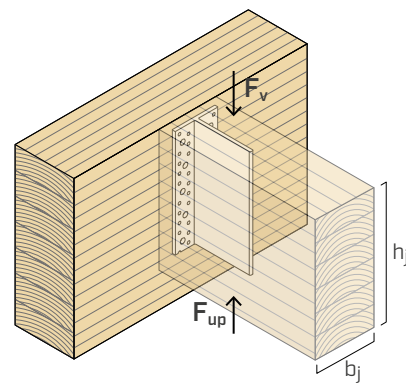
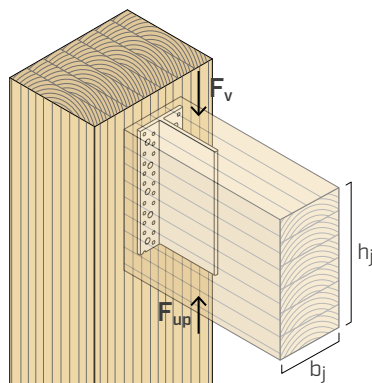
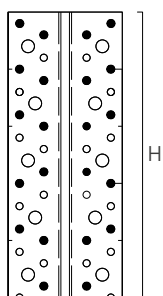
⁽¹⁾ The bracket with height H is available pre-drilled in the ALUMIDI versions without holes, ALUMIDI with holes and ALUMIDI with notch (codes on page 80) or can be obtained from the ALUMIDI2200 or ALUMIDI2200L rods.

⁽²⁾ SBD self-drilling dowels Ø7,5: $M_{y,k} = 75000 \text{ Nmm}$.

⁽³⁾ STA smooth dowels Ø12: $M_{y,k} = 69100 \text{ Nmm}$.

For the GENERAL PRINCIPLES of calculation, see page 87.

PARTIAL FASTENING⁽⁴⁾



ALUMIDI with SBD self-drilling dowels

ALUMIDI H ⁽¹⁾ [mm]	SECONDARY BEAM		MAIN ELEMENT			
	$b_j \times h_j$ [mm]	dowels SBD Ø7,5 ⁽²⁾ [pcs Ø x L]	fastening through nails		fastening through screws	
			LBA Ø4 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]	LBS Ø5 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]
80	120 x 120	3 - Ø7,5 x 115	10	7,5	10	10,1
120	120 x 160	4 - Ø7,5 x 115	14	16,6	14	18,1
160	120 x 200	5 - Ø7,5 x 115	18	24,1	18	25,2
200	120 x 240	6 - Ø7,5 x 115	22	31,0	22	35,2
240	120 x 280	7 - Ø7,5 x 115	26	38,8	26	45,2
280	140 x 320	8 - Ø7,5 x 135	30	49,8	30	54,8
320	140 x 360	9 - Ø7,5 x 135	34	60,9	34	64,8
360	160 x 400	10 - Ø7,5 x 155	38	73,2	38	75,2
400	160 x 440	11 - Ø7,5 x 155	42	80,0	42	84,4
440	160 x 480	12 - Ø7,5 x 155	46	88,8	46	95,3

ALUMIDI with STA dowels

ALUMIDI H ⁽¹⁾ [mm]	SECONDARY BEAM		MAIN ELEMENT			
	$b_j \times h_j$ [mm]	dowels STA Ø12 ⁽³⁾ [pcs Ø x L]	fastening through nails		fastening through screws	
			LBA Ø4 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]	LBS Ø5 x 60 [pcs]	$R_{v,k} - R_{up,k}$ [kN]
120	120 x 160	3 - Ø12 x 120	14	17,5	14	21,4
160	120 x 200	4 - Ø12 x 120	18	27,5	18	30,9
200	120 x 240	5 - Ø12 x 120	22	38,2	22	39,7
240	120 x 280	6 - Ø12 x 120	26	46,7	26	48,5
280	140 x 320	7 - Ø12 x 140	30	59,9	30	63,5
320	140 x 360	8 - Ø12 x 140	34	69,2	34	73,2
360	160 x 400	9 - Ø12 x 160	38	81,8	38	83,0
400	160 x 440	10 - Ø12 x 160	42	95,6	42	92,7
440	160 x 480	11 - Ø12 x 160	46	105,8	46	102,5

NOTES

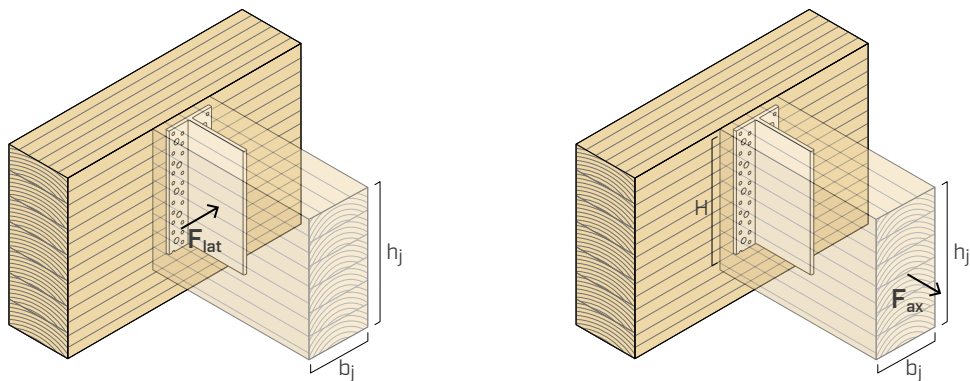
⁽¹⁾ The bracket with height H is available pre-drilled in the ALUMIDI versions without holes, ALUMIDI with holes and ALUMIDI with notch (codes on page 80) or can be obtained from the ALUMIDI2200 or ALUMIDI2200L rods.

⁽²⁾ SBD self-drilling dowels Ø7,5: $M_{y,k} = 75000 \text{ Nmm}$.

⁽³⁾ STA smooth dowels Ø12: $M_{y,k} = 69100 \text{ Nmm}$.

⁽⁴⁾ Partial fastening is necessary for beam-to-column joints in order to observe minimum fastener spacings; it can be applied also for beam-to-beam joints. Partial fastening is achieved by fastening the connectors (nails or screws) alternately as shown in the image.

For the GENERAL PRINCIPLES of calculation, see page 87.



TIMBER-TO-TIMBER | F_{lat}

ALUMIDI with SBD self drilling dowels and STA dowels

ALUMIDI H [mm]	SECONDARY BEAM ⁽¹⁾		MAIN BEAM ⁽²⁾		$R_{lat,k \text{ timber}}$ GL24h [kN]	$R_{lat,k \text{ alu}}$ [kN]
	$b_j \times h_j$ [mm]		LBA nails / LBS screws LBA Ø4 x 60 / LBS Ø5 x 60 [pcs]			
80	120 x 120		≥ 10		9,0	3,6
120	120 x 160		≥ 14		12,0	5,4
160	120 x 200		≥ 18		15,0	7,2
200	120 x 240		≥ 22		18,0	9,1
240	120 x 280		≥ 26		21,0	10,9
280	140 x 320		≥ 30		28,1	12,7
320	140 x 360		≥ 34		31,6	14,5
360	160 x 400		≥ 38		40,1	16,3
400	160 x 440		≥ 42		44,1	18,1
440	160 x 480		≥ 46		48,1	19,9

TIMBER-TO-TIMBER | F_{ax}

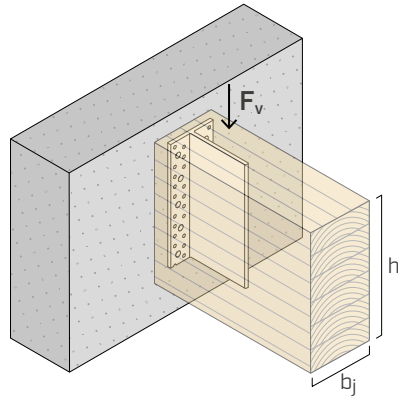
ALUMIDI with SBD self-drilling dowels

ALUMIDI H [mm]	SECONDARY BEAM		MAIN BEAM				$R_{ax,k \text{ alu}}$ [kN]
	$b_j \times h_j$ [mm]	SBD Ø7,5 [pcs Ø x L]	fastening through nails LBA Ø4 x 60 [pcs]	$R_{ax,k \text{ timber}}$ [kN]	fastening through screws LBS Ø5 x 60 [pcs]	$R_{ax,k \text{ timber}}$ [kN]	
80	120 x 120	3 - Ø7.5 x 115	14	9,7	14	23,9	16,6
120	120 x 160	4 - Ø7.5 x 115	22	15,3	22	37,5	25,0
160	120 x 200	5 - Ø7.5 x 115	30	20,8	30	51,2	33,3
200	120 x 240	7 - Ø7.5 x 115	38	26,4	38	64,8	41,6
240	120 x 280	9 - Ø7.5 x 115	46	31,9	46	78,4	49,9
280	140 x 320	10 - Ø7.5 x 135	54	37,5	54	92,1	58,2
320	140 x 360	11 - Ø7.5 x 135	62	43,1	62	105,7	66,6
360	160 x 400	12 - Ø7.5 x 155	70	48,6	70	119,4	74,9
400	160 x 440	13 - Ø7.5 x 155	78	54,2	78	133,0	83,2
440	160 x 480	14 - Ø7.5 x 155	86	59,7	86	146,6	91,5

NOTES

⁽¹⁾ The strength values are valid for both SBD Ø7,5 self-drilling dowels and STA Ø12 dowels.

⁽²⁾ The strength values are valid for both LBA Ø4 nails and for LBS Ø5 screws. For the GENERAL PRINCIPLES of calculation, see page 87.



CHEMICAL ANCHOR

ALUMIDI	$H^{(1)}$ [mm]	$b_j \times h_j$ [mm]	SECONDARY BEAM TIMBER		MAIN BEAM UNCRACKED CONCRETE	
			SBD dowels ⁽²⁾	STA dowels ⁽³⁾	VIN-FIX anchor ⁽⁴⁾	
			$\varnothing 7,5$ [pcs $\varnothing \times L$]	$\varnothing 12$ [pcs $\varnothing \times L$]		$R_{v,d}$ concrete [kN]
80		120 x 120	3 - $\varnothing 7,5 \times 115$	-	2	9,1
120		120 x 160	4 - $\varnothing 7,5 \times 115$	3 - $\varnothing 12 \times 120$	4	15,7
160		120 x 200	5 - $\varnothing 7,5 \times 115$	4 - $\varnothing 12 \times 120$	4	22,7
200		120 x 240	7 - $\varnothing 7,5 \times 115$	5 - $\varnothing 12 \times 120$	6	31,4
240		120 x 280	8 - $\varnothing 7,5 \times 115$	6 - $\varnothing 12 \times 120$	6	38,5
280		140 x 320	10 - $\varnothing 7,5 \times 135$	7 - $\varnothing 12 \times 140$	8	49,7
320		140 x 360	11 - $\varnothing 7,5 \times 135$	8 - $\varnothing 12 \times 140$	8	57,1
360		160 x 400	12 - $\varnothing 7,5 \times 155$	9 - $\varnothing 12 \times 160$	10	69,4
400		160 x 440	13 - $\varnothing 7,5 \times 155$	10 - $\varnothing 12 \times 160$	10	77,3
440		160 x 480	14 - $\varnothing 7,5 \times 155$	11 - $\varnothing 12 \times 160$	12	89,3

NOTES

(1) The bracket with height H is available pre-drilled in the ALUMIDI versions without holes, ALUMIDI with holes and ALUMIDI with notch (codes on page 80) or can be obtained from the ALUMIDI2200 or ALUMIDI2200L rods.

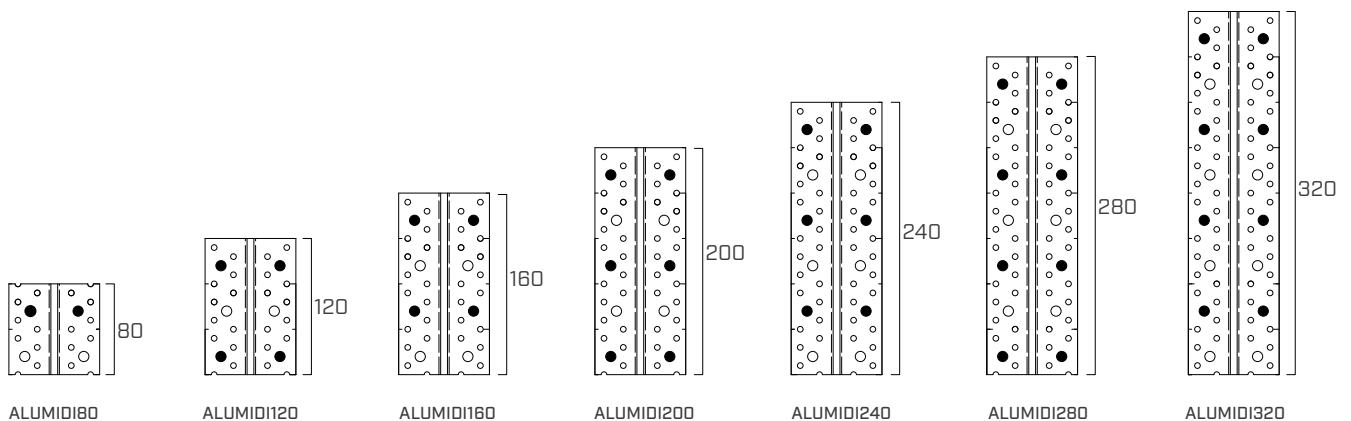
(2) SBD self-drilling dowels $\varnothing 7,5$: $M_{y,k} = 75000 \text{ Nmm}$.

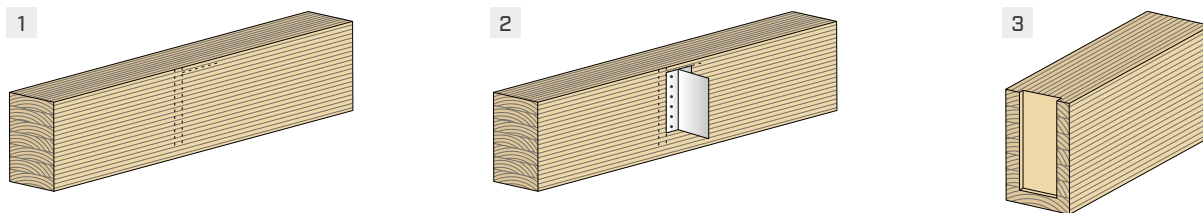
(3) STA smooth dowels $\varnothing 12$: $M_{y,k} = 69100 \text{ Nmm}$.

(4) Chemical anchor VIN-FIX according to ETA-20/0363 with threaded rods (type INA) of minimum steel class 5.8 with $h = 93 \text{ mm}$. Install the anchors two at a time, starting from the top, dowelling alternate rows.

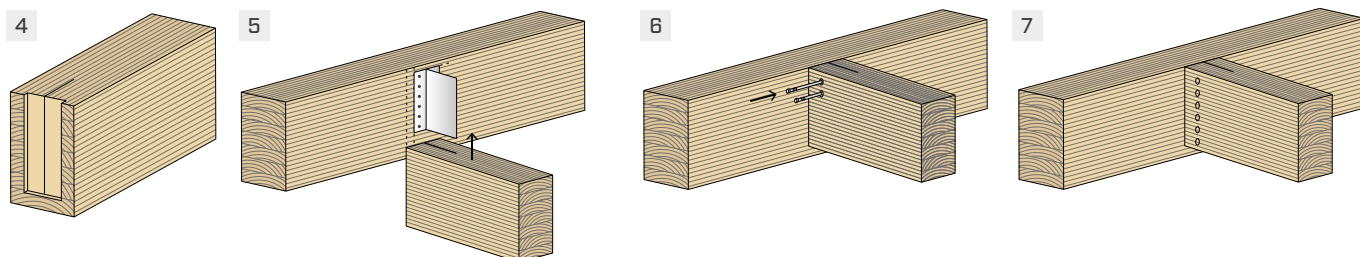
For the GENERAL PRINCIPLES of calculation, see page 87.

■ TIMBER-TO-CONCRETE FASTENING PATTERNS

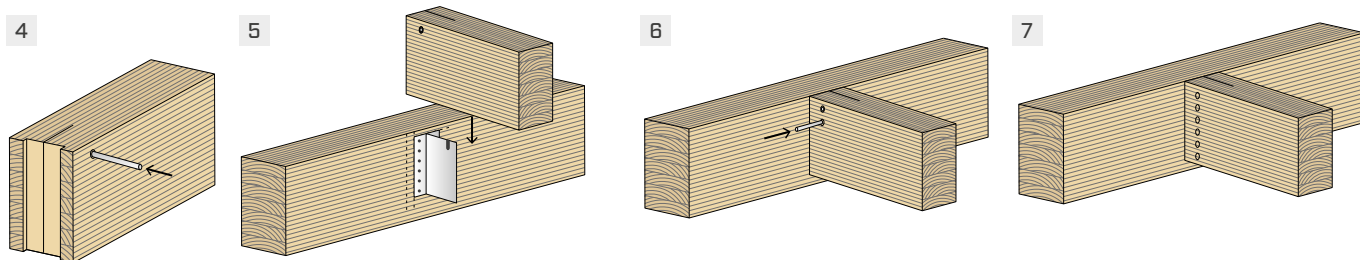




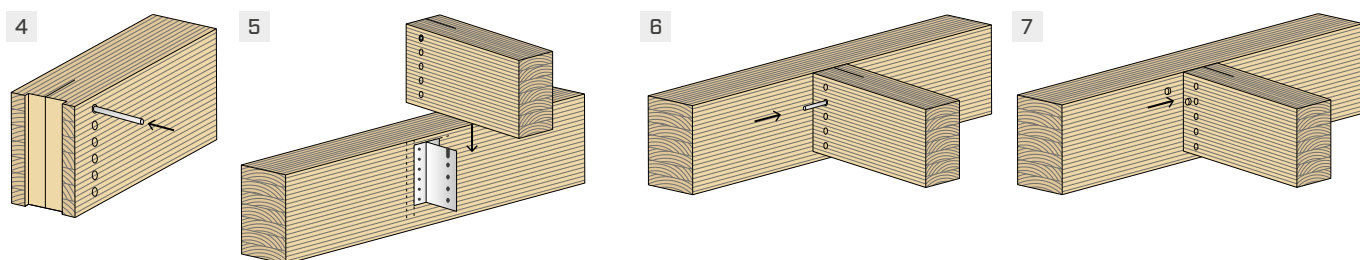
BOTTOM-UP INSTALLATION | ALUMIDI WITHOUT HOLES



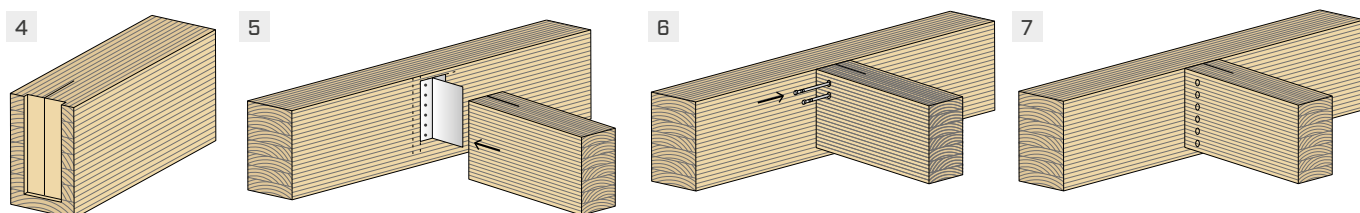
TOP-DOWN INSTALLATION | ALUMIDI WITHOUT HOLES WITH TOP NOTCH



TOP-DOWN INSTALLATION | ALUMIDI WITH HOLES

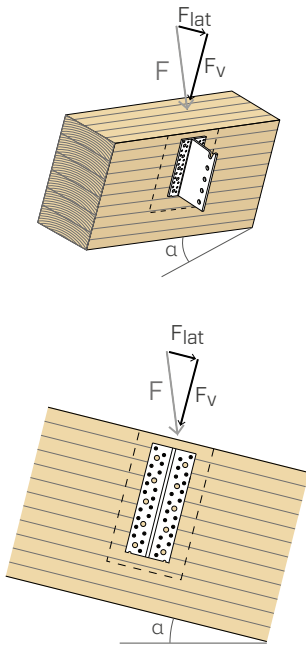


AXIAL INSTALLATION | ALUMIDI WITHOUT HOLES

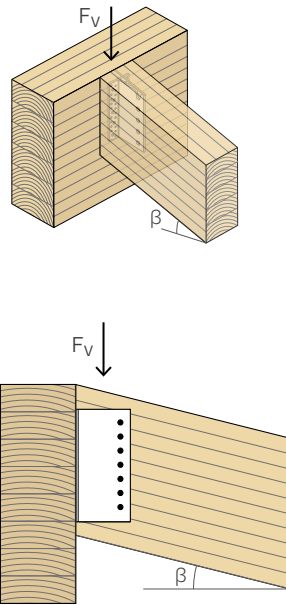


APPLICATION EXAMPLES

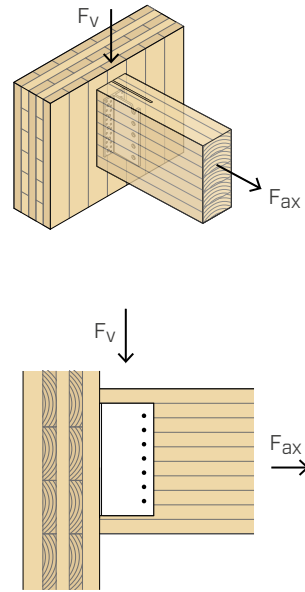
primary inclined beam



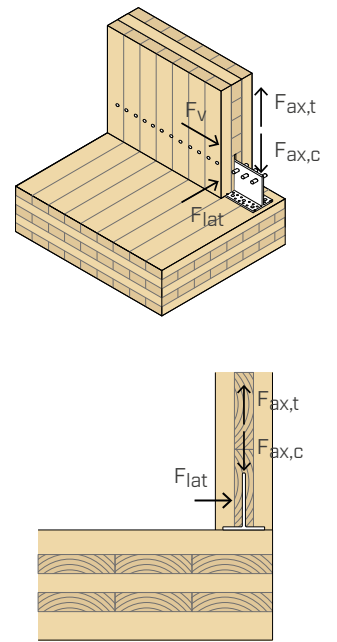
secondary inclined beam



fastening on CLT wall



CLT wall-CLT floor joint



GENERAL PRINCIPLES

- Resistance values for the fastening system are valid for the calculation examples shown in the table. For different calculation methods, the MyProject software is available free of charge (www.rothoblaas.com).
- The calculation process used a timber characteristic density of $\rho_k = 385 \text{ kg/m}^3$ and C25/30 concrete with a thin reinforcing layer, where edge-distance is not a limiting factor.
- The coefficients k_{mod} and γ_M should be taken according to the current regulations used for the calculation.
- Dimensioning and verification of timber and concrete elements must be carried out separately.
- The following verification shall be satisfied for combined loading:

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

$F_{v,d}$ and $F_{up,d}$ are forces acting in opposite directions. Therefore only one of the forces $F_{v,d}$ and $F_{up,d}$ can act in combination with the forces $F_{ax,d}$ or $F_{lat,d}$.

- The values provided are calculated with a routing in the 8 mm thick timber.
- For configurations for which only the timber-side strength is reported, the aluminium-side overstrength can be assumed.

STRUCTURAL VALUES | F_v | F_{up}

TIMBER-TO-TIMBER

- Characteristic values are consistent with EN 1995-1-1:2014, in accordance with ETA-09/0361 and ETA-22/0002, and evaluated with Rothoblaas experimental method.
- Design values can be obtained from characteristic values as follows:

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

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

- In some cases the connection shear strength $R_{v,k}$ - $R_{up,k}$ is notably large and may be higher than the secondary beam strength. Particular attention should be paid to the shear check of the reduced timber cross-section at the bracket location.

STRUCTURAL VALUES | Flat | F_{ax}

TIMBER-TO-TIMBER

- Characteristic values comply with the EN 1995-1-1:2014 standard in accordance with ETA-09/0361.
- Design values can be obtained from characteristic values as follows:

$$R_{lat,d} = \min \left\{ \begin{array}{l} \frac{R_{lat,k,alu}}{\gamma_{M2}} \\ \frac{R_{lat,k,timber} \cdot k_{mod}}{\gamma_M} \end{array} \right.$$

$$R_{ax,d} = \min \left\{ \begin{array}{l} \frac{R_{ax,k,alu}}{\gamma_{M2}} \\ \frac{R_{ax,k,timber} \cdot k_{mod}}{\gamma_M} \end{array} \right.$$

with γ_{M2} partial coefficient of the aluminium.

STRUCTURAL VALUES | F_v

TIMBER-TO-CONCRETE

- Characteristic values are consistent with EN 1995-1-1:2014 and in accordance with ETA-09/0361 and ETA-20/0363..
- Design resistance values can be obtained from the tabulated values as follows:

$$R_{v,d} = \min \left\{ \begin{array}{l} \frac{R_{v,k} \cdot k_{mod}}{\gamma_M} \\ R_{v,d,concrete} \end{array} \right.$$

- The design values $R_{v,d,concrete}$ are according to EN 1992:2018 with $\alpha_{sus} = 0.6$.

INTELLECTUAL PROPERTY

- An ALUMIDI model is protected by the Registered Community Design RCD 008254353-0001.