ALUMIDI

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.

VIDEO

MY PROJECT SOFTWARE

DESIGN REGISTERED

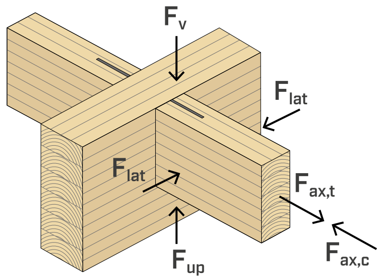
CE ETA-09/0361

SERVICE CLASS SC1 SC2 SC3

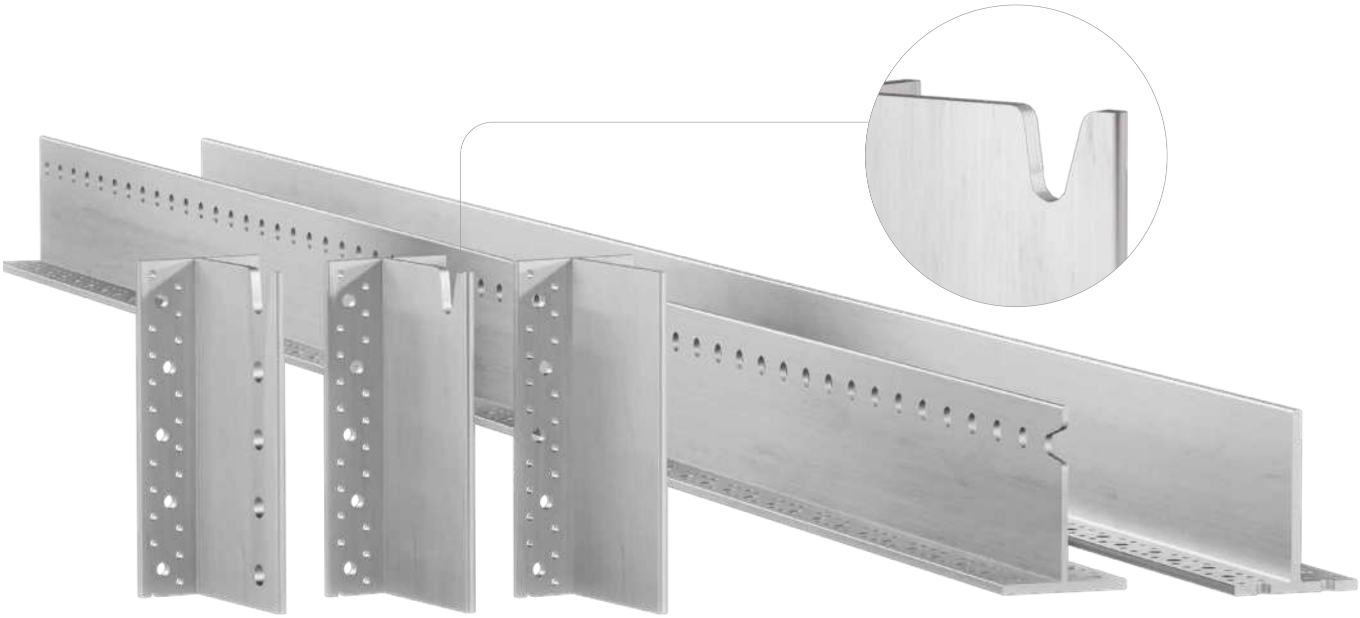
MATERIAL

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.

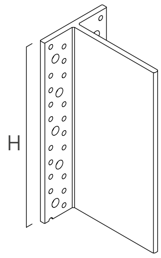
UNEVEN SURFACES

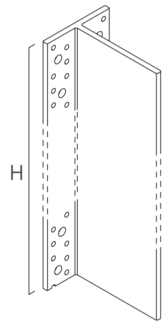
For applications on concrete or other uneven surfaces the self-drilling dowels allow a greater installation tolerance when fastening the timber element.

CODES AND DIMENSIONS

ALUMIDI WITHOUT HOLES

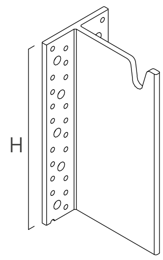
CODE	type	H [mm]	*H [in]*	pcs
ALUMIDI80	without holes	80	*3 1/8*	25
ALUMIDI120	without holes	120	*4 3/4*	25
ALUMIDI160	without holes	160	*6 1/4*	25
ALUMIDI200	without holes	200	*8*	15
ALUMIDI240	without holes	240	*9 1/2*	15
ALUMIDI2200	without holes	2200	*86 5/8*	1





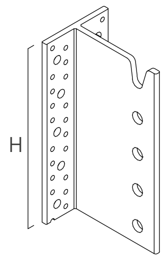
ALUMIDI WITHOUT HOLES WITH UPPER NOTCH

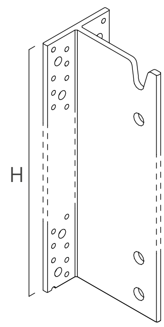
CODE	type	H [mm]	*H [in]*	pcs
ALUMIDI280N	without holes	280	*11*	15
ALUMIDI320N	without holes	320	*12 5/8*	8
ALUMIDI360N	without holes	360	*14 1/4*	8
ALUMIDI400N	without holes	400	*15 3/4*	8
ALUMIDI440N	without holes	440	*17 1/4*	8



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

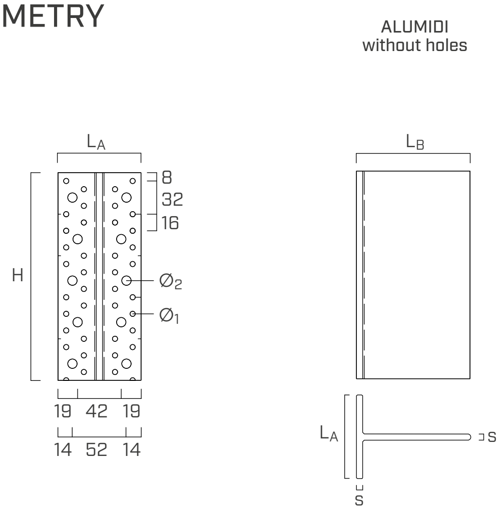




ADDITIONAL PRODUCTS - FASTENING

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	-	-		-

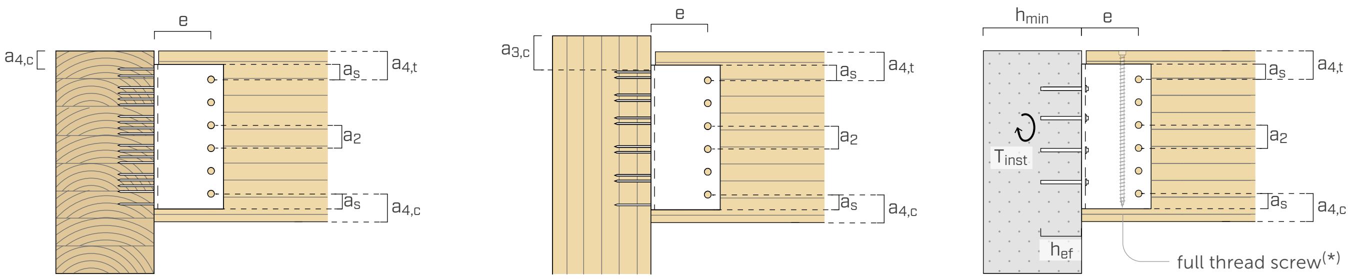
GEOMETRY



ALUMIDI			
thickness	s	[mm]	6
flange width	L_A	[mm]	80
web length	L_B	[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]	$\geq 3 \cdot d$	≥ 23	≥ 36
dowel-top of beam	$a_{4,t}$	[mm]	$\geq 4 \cdot d$	≥ 30	≥ 48
dowel-bottom of beam	$a_{4,c}$	[mm]	$\geq 3 \cdot d$	≥ 23	≥ 36
dowel-bracket edge	a_s	[mm]	$\geq 1{,}2 \cdot d_0$ (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]	$\geq 5 \cdot d$	≥ 20	≥ 25
first connector-column end	$a_{3,c}$	[mm]	$\geq 10 \cdot d$	≥ 40	≥ 50

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

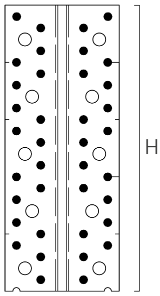
main element-concrete			chemical anchor VIN-FIX Ø8
minimum support thickness	h_{min}	[mm]	$h_{ef} + 30 \geq 100$
concrete hole diameter	d_0	[mm]	10
tightening torque	T_{inst}	[Nm]	10

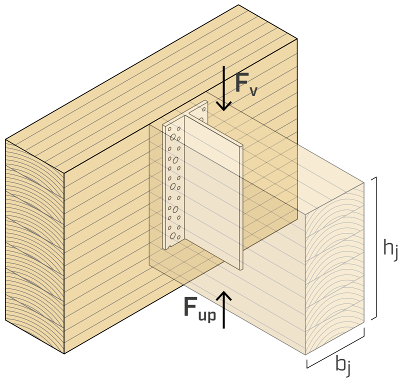
h_{ef} = effective anchoring depth in concrete.

(*) 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.

STRUCTURAL VALUES | TIMBER-TO-TIMBER | F_v | F_{up}

TOTAL FASTENING





ALUMIDI with SBD self-drilling dowels

	SECONDARY BEAM		MAIN BEAM			
ALUMIDI		dowels	fastening through nails		fastening through screws	
H[1]	b_j x h_j	SBD Ø7,5[2]	LBA Ø4 x 60	$R_{v,k}$ - $R_{up,k}$	LBS Ø5 x 60	$R_{v,k}$ - $R_{up,k}$
[mm]	[mm]	[pcs Ø x L]	[pcs]	[kN]	[pcs]	[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

	SECONDARY BEAM		MAIN BEAM			
ALUMIDI		dowels	fastening through nails		fastening through screws	
H[1]	b_j x h_j	STA Ø12[3]	LBA Ø4 x 60	$R_{v,k}$ - $R_{up,k}$	LBS Ø5 x 60	$R_{v,k}$ - $R_{up,k}$
[mm]	[mm]	[pcs Ø x L]	[pcs]	[kN]	[pcs]	[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.

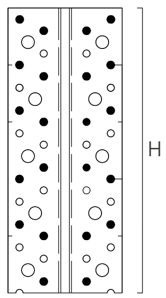
(2) SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 75000 Nmm.

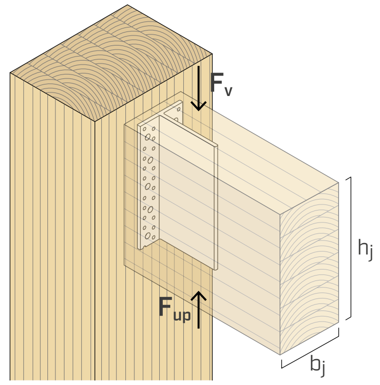
(3) STA smooth dowels Ø12: $M_{y,k}$ = 69100 Nmm.

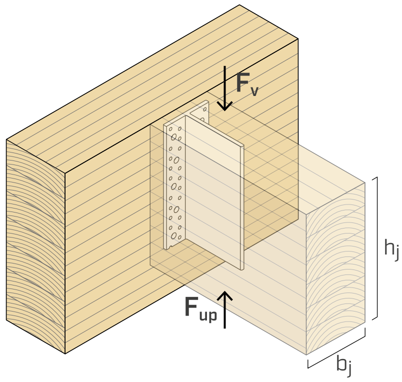
For the GENERAL PRINCIPLES of calculation, see page 87.

STRUCTURAL VALUES | TIMBER-TO-TIMBER | F_v | F_{up}

PARTIAL FASTENING[4]







ALUMIDI with SBD self-drilling dowels

	SECONDARY BEAM		MAIN ELEMENT			
			fastening through nails		fastening through screws	
ALUMIDI H[1] [mm]	**b_j x h_j** [mm]	**dowels SBD Ø7,5[2]** [pcs Ø x L]	**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

	SECONDARY BEAM		MAIN ELEMENT			
			fastening through nails		fastening through screws	
ALUMIDI H[1] [mm]	**b_j x h_j** [mm]	**dowels STA Ø12[3]** [pcs Ø x L]	**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.

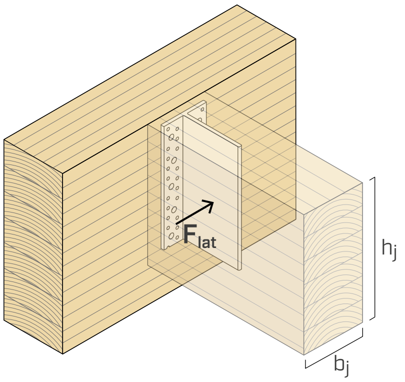
[2] SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 75000 Nmm.

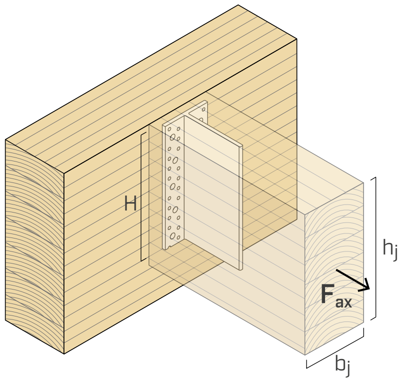
[3] STA smooth dowels Ø12: $M_{y,k}$ = 69100 Nmm.

[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.

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





TIMBER-TO-TIMBER | F_{lat}

ALUMIDI with SBD self drilling dowels and STA dowels

	SECONDARY BEAM[1]	MAIN BEAM[2]		
ALUMIDI H [mm]	b_j x h_j [mm]	LBA nails / LBS screws LBA Ø4 x 60 / LBS Ø5 x 60 [pcs]	$R_{lat,k\ timber}$ GL24h [kN]	$R_{lat,k\ alu}$ [kN]
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

	SECONDARY BEAM		MAIN BEAM				
ALUMIDI			fastening through nails		fastening through screws		
H [mm]	b_j x h_j [mm]	SBD Ø7,5 [pcs Ø x L]	LBA Ø4 x 60 [pcs]	$R_{ax,k\ timber}$ [kN]	LBS Ø5 x 60 [pcs]	$R_{ax,k\ timber}$ [kN]	$R_{ax,k\ alu}$ [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**

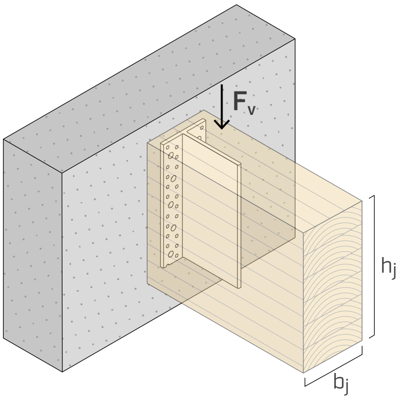
NOTES

(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.

STRUCTURAL VALUES | TIMBER-TO-CONCRETE | F_v



CHEMICAL ANCHOR

	SECONDARY BEAM TIMBER					MAIN BEAM UNCRACKED CONCRETE	
ALUMIDI		SBD dowels(2)		STA dowels(3)		VIN-FIX anchor(4)	
H(1)	b_j x h_j	Ø7,5	$R_{v,k}$	Ø12	$R_{v,k}$	Ø8 x 110	$R_{v,d\ concrete}$
[mm]	[mm]	[pcs Ø x L]	[kN]	[pcs Ø x L]	[kN]	[pcs]	[kN]
80	120 x 120	3 - Ø7,5 x 115	**29,2**	-	-	2	**9,1**
120	120 x 160	4 - Ø7,5 x 115	**39,0**	3 - Ø12 x 120	**35,5**	4	**15,7**
160	120 x 200	5 - Ø7,5 x 115	**48,7**	4 - Ø12 x 120	**47,3**	4	**22,7**
200	120 x 240	7 - Ø7,5 x 115	**68,2**	5 - Ø12 x 120	**59,1**	6	**31,4**
240	120 x 280	8 - Ø7,5 x 115	**87,7**	6 - Ø12 x 120	**70,9**	6	**38,5**
280	140 x 320	10 - Ø7,5 x 135	**103,4**	7 - Ø12 x 140	**91,0**	8	**49,7**
320	140 x 360	11 - Ø7,5 x 135	**113,8**	8 - Ø12 x 140	**104,0**	8	**57,1**
360	160 x 400	12 - Ø7,5 x 155	**133,1**	9 - Ø12 x 160	**128,4**	10	**69,4**
400	160 x 440	13 - Ø7,5 x 155	**144,2**	10 - Ø12 x 160	**142,7**	10	**77,3**
440	160 x 480	14 - Ø7,5 x 155	**155,3**	11 - Ø12 x 160	**157,0**	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.

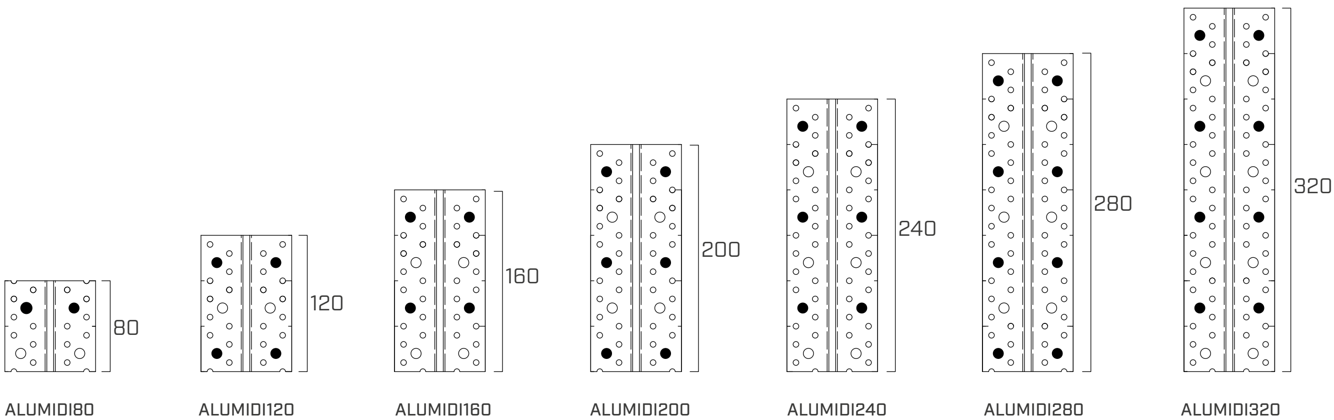
(2) SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 75000 Nmm.

(3) STA smooth dowels Ø12: $M_{y,k}$ = 69100 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 mm. Install the anchors two at a time, starting from the top, dowelling alternate rows.

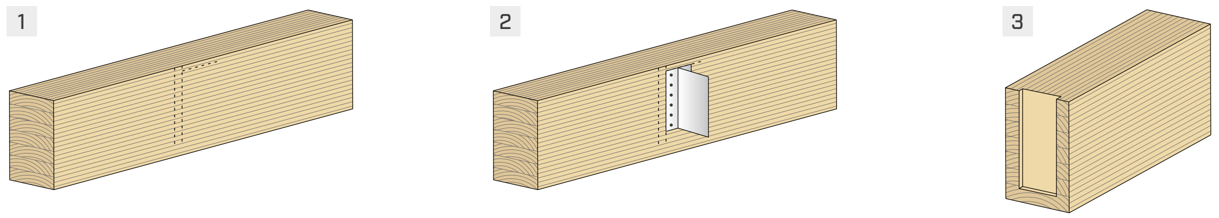
For the GENERAL PRINCIPLES of calculation, see page 87.

TIMBER-TO-CONCRETE FASTENING PATTERNS

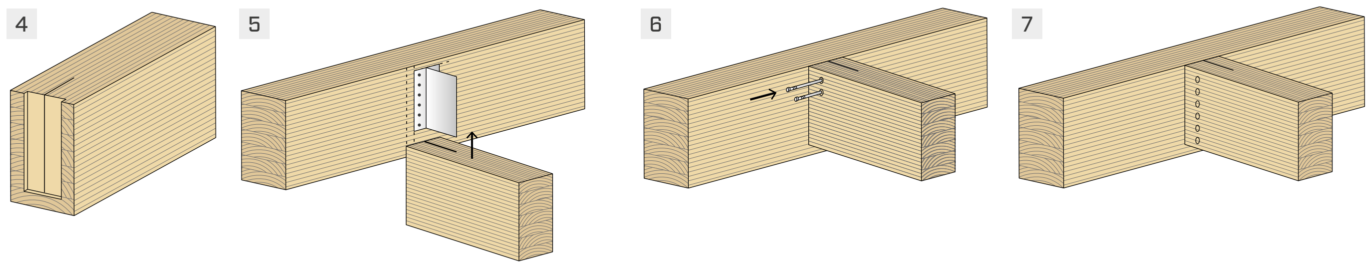


MOUNTING

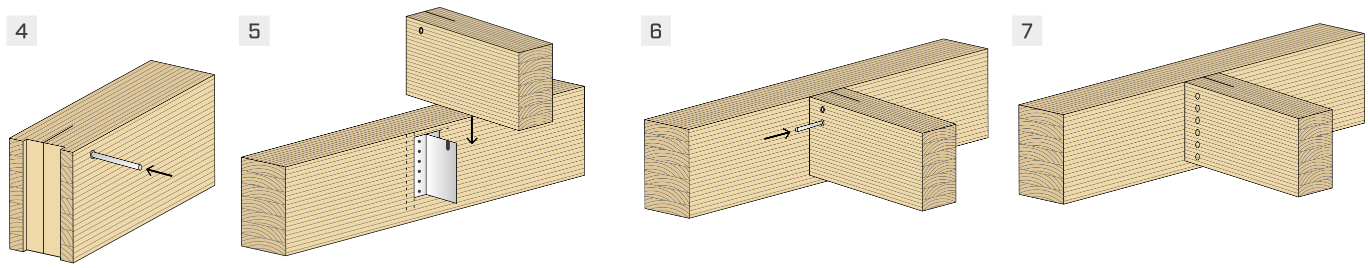
VIDEO



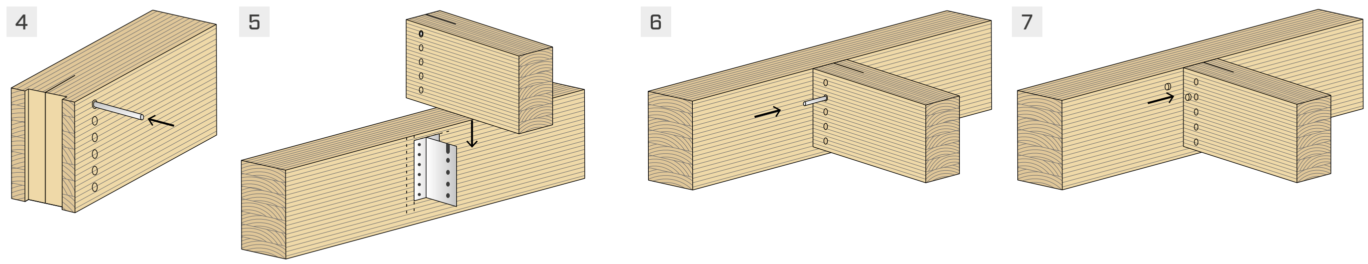
BOTTOM-UP INSTALLATION | ALUMIDI WITHOUT HOLES



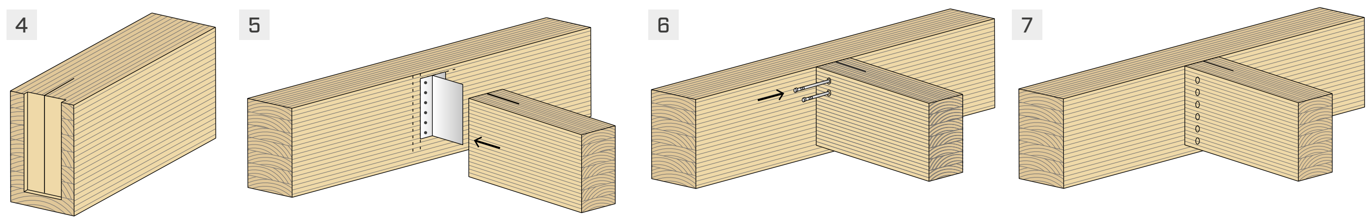
TOP-DOWN INSTALLATION | ALUMIDI WITHOUT HOLES WITH TOP NOTCH



TOP-DOWN INSTALLATION | ALUMIDI WITH HOLES

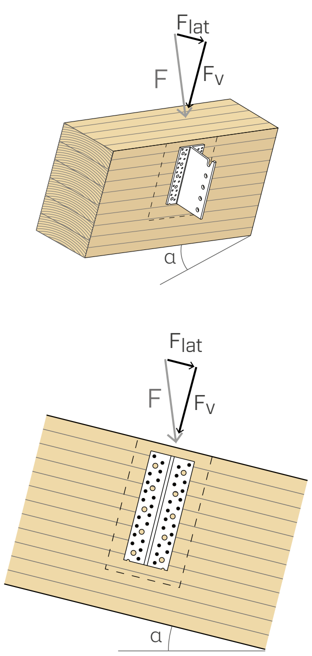


AXIAL INSTALLATION | ALUMIDI WITHOUT HOLES

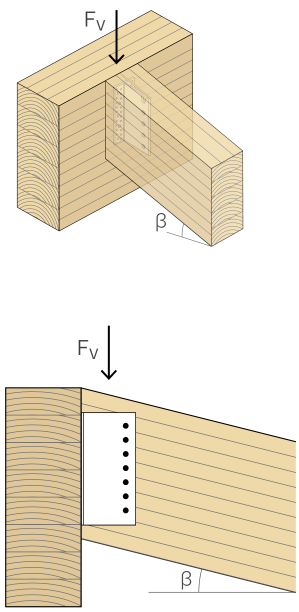


APPLICATION EXAMPLES

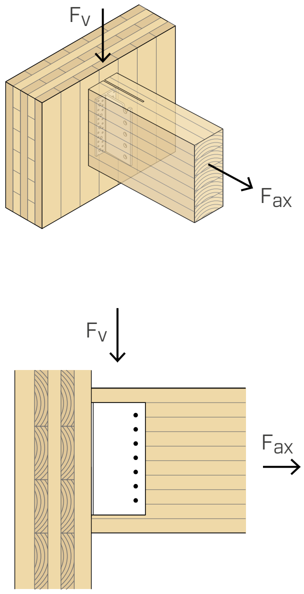
primary inclined beam



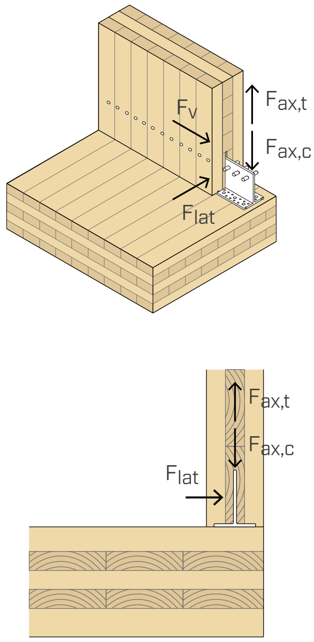
secondary inclined beam



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 ρ_k = 385 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 Fv,d and Fup,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 | Fv | 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 | Fax

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:

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

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

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:

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

- The design values $R_{v,d\ concrete}$ are according to EN 1992:2018 with α_{sus} = 0,6.

INTELLECTUAL PROPERTY

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