ALUMIDI

CONCEALED BRACKET WITH AND WITHOUT HOLES

INCLINED JOINTS
Certified strengths calculated in all directions: vertical, horizontal and axial. They can be used in seismic areas and in mixed-mode bending.

STEEL-ALUMINUM
EN AW-6005A high strength aluminium alloy bracket, obtained by extrusion and therefore weld-free.

TIMBER AND CONCRETE
Optimal hole spacing both for timber (nails or screws) and reinforced concrete (chemical or screwed anchor) joints.

CHARACTERISTICS

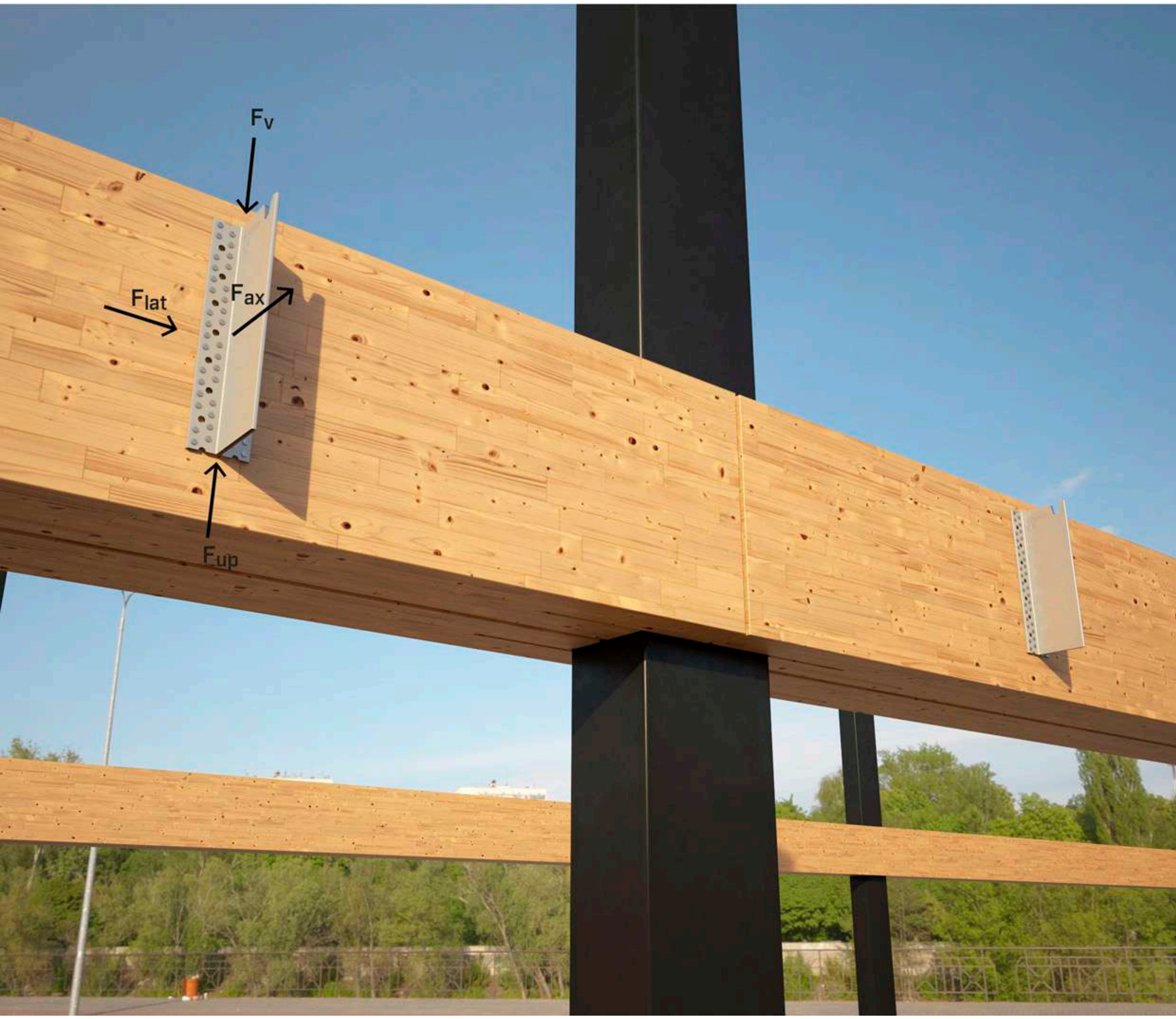
FOCUS	concealed joints
TIMBER SECTIONS	from 80 x 100 mm to 200 x 520 mm
STRENGTH	$R_{v,k}$ up to 150 kN
FASTENERS	LBA, LBS, SBD, STA, SKR

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-timber and timber-to-concrete shear joints, both perpendicular and inclined

- solid timber and glulam
- CLT, LVL
- timber based panels



INVISIBLE

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

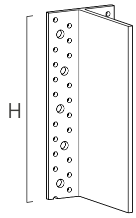
TIMBER AND CONCRETE

For applications on concrete or other uneven surfaces the self-drilling dowels allow a greater installation tolerance when fastening the timber element. Values are certified, tested and consolidated.

CODES AND DIMENSIONS

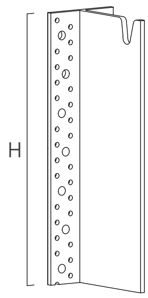
ALUMIDI WITHOUT HOLES

CODE	type	H [mm]	pcs
ALUMIDI80	without holes	80	25
ALUMIDI120	without holes	120	25
ALUMIDI160	without holes	160	25
ALUMIDI200	without holes	200	15
ALUMIDI240	without holes	240	15
ALUMIDI2200	without holes	2200	1



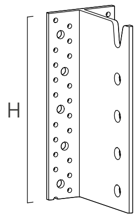
ALUMIDI WITHOUT HOLES WITH UPPER COUNTERSINK

CODE	type	H [mm]	pcs
ALUMIDI280N	without holes	280	15
ALUMIDI320N	without holes	320	8
ALUMIDI360N	without holes	360	8
ALUMIDI400N	without holes	400	8
ALUMIDI440N	without holes	440	8



ALUMIDI WITH HOLES

CODE	type	H [mm]	pcs
ALUMIDI120L	with holes	120	25
ALUMIDI160L	with holes	160	25
ALUMIDI200L	with holes	200	15
ALUMIDI240L	with holes	240	15
ALUMIDI280L	with holes	280	15
ALUMIDI320L	with holes	320	8
ALUMIDI360L	with holes	360	8



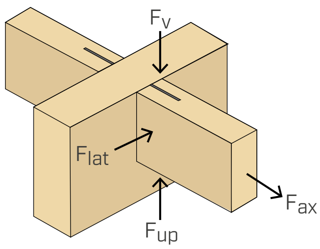
MATERIAL AND DURABILITY

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

FIELDS OF USE

- Timber-to-timber, timber-to-concrete and timber-to-steel joints
- Secondary beam on main beam or on column
- Perpendicular and inclined joints

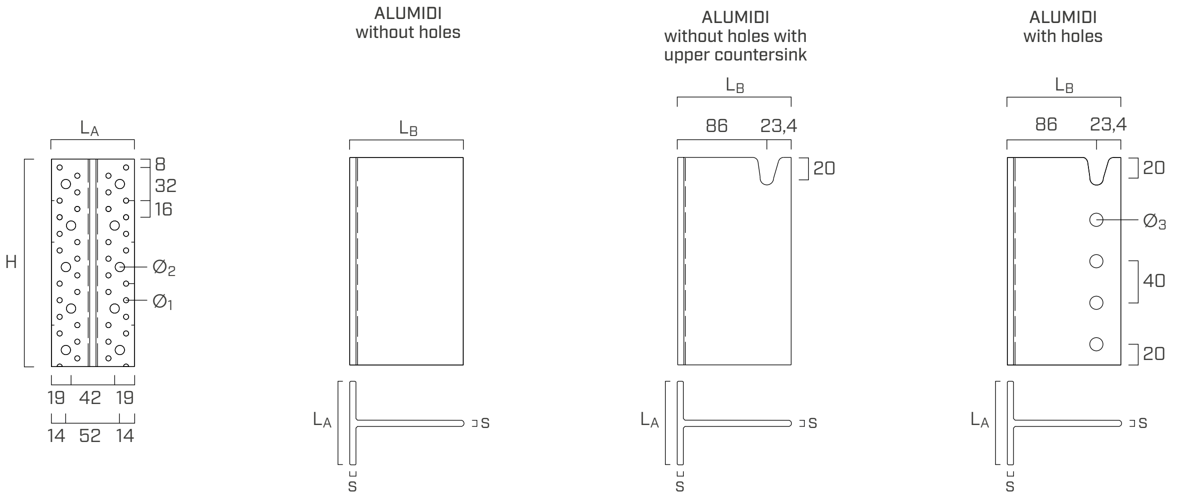
EXTERNAL LOADS



ADDITIONAL PRODUCTS - FASTENING

type	description		d [mm]	support	page
LBA	Anker nail		4		548
LBS	screw for plates		5		552
SBD	self-drilling dowel		7,5		48
STA	smooth dowel		12		54
SKR	screw anchor		10		488
VIN-FIX PRO	chemical anchor		M8		514
EPO-FIX PLUS	chemical anchor		M8		517

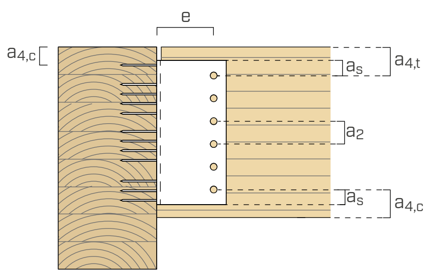
GEOMETRY

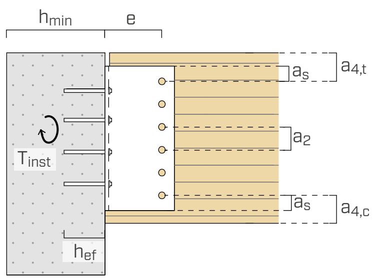


ALUMIDI			
thickness	**s**	[mm]	6
wing width	**L_A**	[mm]	80
web length	**L_B**	[mm]	109,4
small flange-holes	**$Ø_1$**	[mm]	5,0
large flange-holes	**$Ø_2$**	[mm]	9,0
web holes (dowels)	**$Ø_3$**	[mm]	13,0

INSTALLATION

MINIMUM DISTANCES





secondary beam-timber				self-drilling dowel SBD Ø7,5	smooth dowel STA Ø12
dowel-dowel	**a_2**	[mm]	$\geq$ 3 d	$\geq$ 23	$\geq$ 36
dowel-top of beam	**$a_{4,t}$**	[mm]	$\geq$ 4 d	$\geq$ 30	$\geq$ 48
dowel-bottom of beam	**$a_{4,c}$**	[mm]	$\geq$ 3 d	$\geq$ 23	$\geq$ 36
dowel-bracket edge	**a_s**	[mm]	$\geq 1,2\ d_0$[(1)]	$\geq$ 10	$\geq$ 16
dowel-main beam	**e**	[mm]		86	86

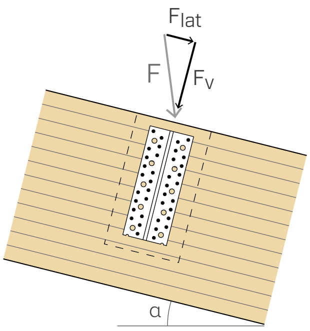
[(1)] Hole diameter.

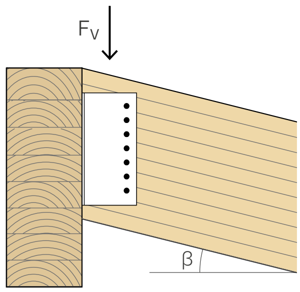
main beam-timber				Anker nail LBA Ø4	screw LBS Ø5
first connector-top of beam	**$a_{4,c}$**	[mm]	$\geq$ 5 d	$\geq$ 20	$\geq$ 25

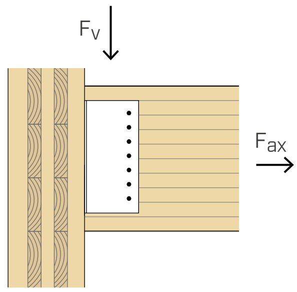
main beam-concrete			chemical anchor VIN FIX-PRO Ø8	screw anchor SKR-E Ø10
minimum support thickness	**h_{min}**	[mm]	$h_{ef} + 30 \geq 100$	110
concrete hole diameter	**d_0**	[mm]	10	8
tightening torque	**T_{inst}**	[Nm]	10	50

h_{ef} = effective anchoring depth in concrete.

APPLICATION EXAMPLES



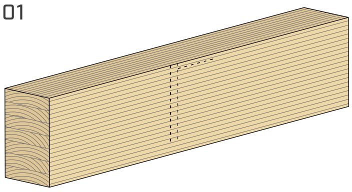




ASSEMBLY

VIDEO

01



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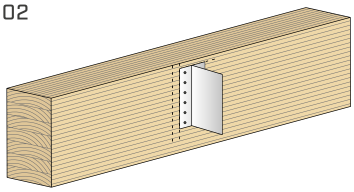

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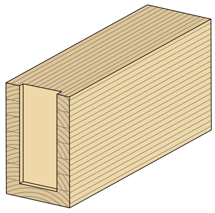
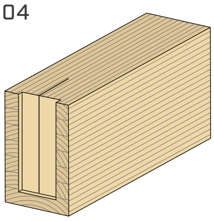


ALUMIDI WITHOUT HOLES

04



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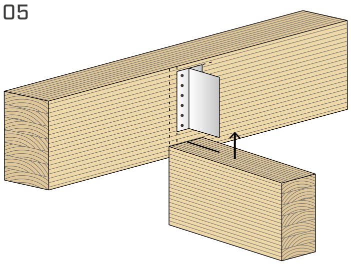

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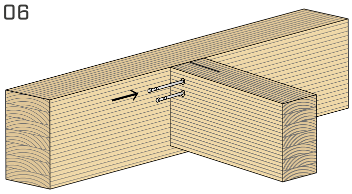

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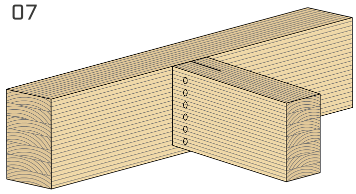
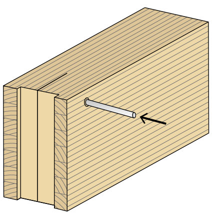


ALUMIDI WITHOUT HOLES WITH UPPER COUNTERSINK

04



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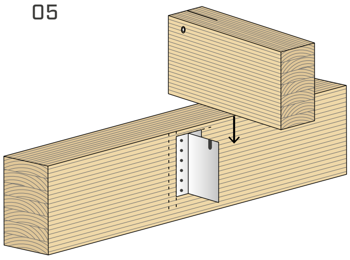

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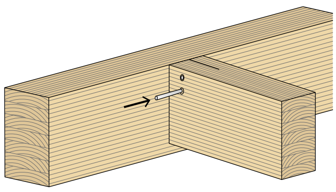

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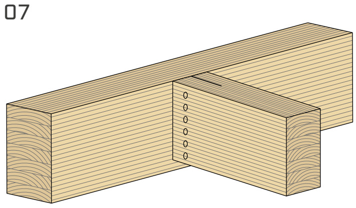
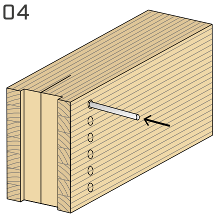


ALUMIDI WITH HOLES

04



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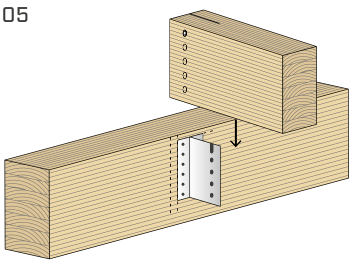

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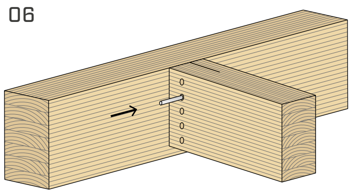

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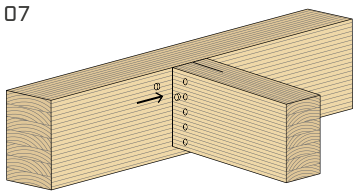
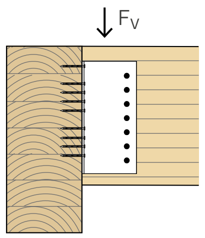
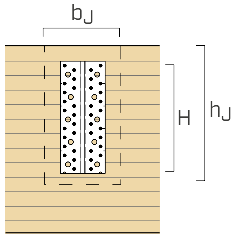


STATIC VALUES | TIMBER-TO-TIMBER JOINT | F_V

FULL NAILING





ALUMIDI with SBD self-drilling dowels

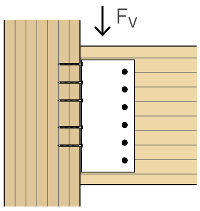
	SECONDARY BEAM			MAIN BEAM			
ALUMIDI				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[(1)] [mm]	b_J [mm]	h_J [mm]	SBD dowels Ø7,5[(2)] [pcs Ø x L]	LBA nails Ø4 x 60 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø5 x 60 [pcs]	$R_{v,k}$ [kN]
80	120	120	3 - Ø7,5 x 115	14	**10,9**	14	**13,4**
120	120	160	4 - Ø7,5 x 115	22	**19,7**	22	**24,6**
160	120	200	5 - Ø7,5 x 115	30	**29,6**	30	**35,3**
200	120	240	7 - Ø7,5 x 115	38	**42,5**	38	**51,6**
240	120	280	9 - Ø7,5 x 115	46	**54,6**	46	**66,5**
280	140	320	10 - Ø7,5 x 135	54	**71,8**	54	**85,0**
320	140	360	11 - Ø7,5 x 135	62	**84,9**	62	**99,9**
360	160	400	12 - Ø7,5 x 155	70	**103,6**	70	**119,9**
400	160	440	13 - Ø7,5 x 155	78	**116,3**	78	**130,7**
440	160	480	14 - Ø7,5 x 155	86	**134,5**	86	**145,6**

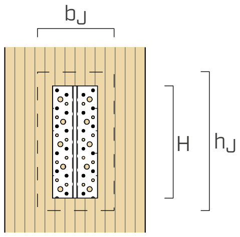
ALUMIDI with STA dowels

	SECONDARY BEAM			MAIN BEAM			
ALUMIDI				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[(1)] [mm]	b_J [mm]	h_J [mm]	STA dowels Ø12[(3)] [pcs Ø x L]	LBA nails Ø4 x 60 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø5 x 60 [pcs]	$R_{v,k}$ [kN]
120	120	160	3 - Ø12 x 120	22	**23,0**	22	**25,8**
160	120	200	4 - Ø12 x 120	30	**34,5**	30	**40,6**
200	120	240	5 - Ø12 x 120	38	**46,5**	38	**54,8**
240	120	280	6 - Ø12 x 120	46	**60,9**	46	**68,4**
280	140	320	7 - Ø12 x 140	54	**77,2**	54	**87,0**
320	140	360	8 - Ø12 x 140	62	**93,2**	62	**102,4**
360	160	400	9 - Ø12 x 160	70	**114,3**	70	**124,7**
400	160	440	10 - Ø12 x 160	78	**127,3**	78	**141,0**
440	160	480	11 - Ø12 x 160	86	**144,6**	86	**154,9**

STATIC VALUES | TIMBER-TO-TIMBER JOINT | F_V

PARTIAL NAILING[4]





ALUMIDI with SBD self-drilling dowels

ALUMIDI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	SBD dowels Ø7,5[2] [pcs Ø x L]	LBA nails Ø4 x 60 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø5 x 60 [pcs]	$R_{v,k}$ [kN]
80	120	120	3 - Ø7,5 x 115	10	**9,0**	10	**11,2**
120	120	160	4 - Ø7,5 x 115	14	**15,0**	14	**18,6**
160	120	200	5 - Ø7,5 x 115	18	**24,7**	18	**25,2**
200	120	240	6 - Ø7,5 x 115	22	**31,0**	22	**35,2**
240	120	280	7 - Ø7,5 x 115	26	**38,0**	26	**45,5**
280	140	320	8 - Ø7,5 x 135	30	**47,6**	30	**54,8**
320	140	360	9 - Ø7,5 x 135	34	**55,0**	34	**64,8**
360	160	400	10 - Ø7,5 x 155	38	**66,2**	38	**75,2**
400	160	440	11 - Ø7,5 x 155	42	**74,9**	42	**84,4**
440	160	480	12 - Ø7,5 x 155	46	**83,2**	46	**95,3**

ALUMIDI with STA dowels

ALUMIDI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	STA dowels Ø12[3] [pcs Ø x L]	LBA nails Ø4 x 60 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø5 x 60 [pcs]	$R_{v,k}$ [kN]
120	120	160	3 - Ø12 x 120	14	**18,2**	14	**21,4**
160	120	200	4 - Ø12 x 120	18	**26,4**	18	**30,9**
200	120	240	5 - Ø12 x 120	22	**34,8**	22	**39,7**
240	120	280	6 - Ø12 x 120	26	**44,0**	26	**48,5**
280	140	320	7 - Ø12 x 140	30	**54,0**	30	**63,5**
320	140	360	8 - Ø12 x 140	34	**64,2**	34	**73,2**
360	160	400	9 - Ø12 x 160	38	**80,2**	38	**83,0**
400	160	440	10 - Ø12 x 160	42	**89,4**	42	**92,7**
440	160	480	11 - Ø12 x 160	46	**98,7**	46	**102,5**

NOTES:

TIMBER-TO-TIMBER | F_V

(1) The bracket with height H is available pre-drilled in the ALUMIDI versions without holes, ALUMIDI with holes and ALUMIDI with countersink (codes on page 28) or can be obtained from the ALUMIDI2200 rod.

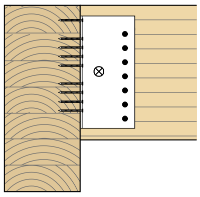
(2) SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 42000 Nmm.

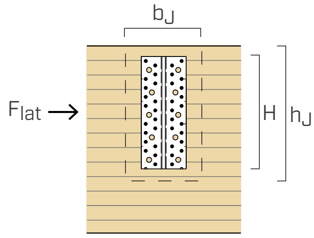
(3) STA smooth dowels Ø12: $M_{y,k}$ = 69100 Nmm.

(4) Partial nailing is necessary for beam-column joints in order to observe minimum fastener spacings; it can be applied also for beam-beam joints. Partial nailing is performed by nailing each column alternately as shown in the picture.

General calculation principles see page 36.

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

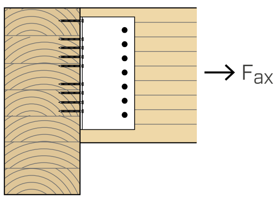


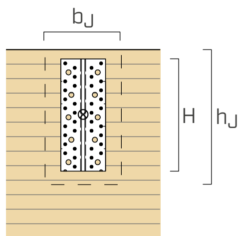


ALUMIDI with SBD self drilling dowels or STA dowels

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

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





ALUMIDI with SBD self-drilling dowels

	SECONDARY BEAM			MAIN BEAM			
ALUMIDI				**FASTENING THROUGH NAILS**		**FASTENING THROUGH SCREWS**	
			SBD dowels	**LBA nails**		**LBS screws**	
H [mm]	**b_J** [mm]	**h_J** [mm]	**Ø7,5** [pcs Ø x L]	**Ø4 x 60** [pcs]	**$R_{ax,k}$** [kN]	**Ø5 x 60** [pcs]	**$R_{ax,k}$** [kN]
80	120	120	3 - Ø7,5 x 115	14	**11,3**	14	**23,9**
120	120	160	4 - Ø7,5 x 115	22	**17,8**	22	**37,5**
160	120	200	5 - Ø7,5 x 115	30	**24,3**	30	**51,2**
200	120	240	7 - Ø7,5 x 115	38	**30,8**	38	**64,8**
240	120	280	9 - Ø7,5 x 115	46	**37,3**	46	**78,4**
280	140	320	10 - Ø7,5 x 135	54	**43,7**	54	**92,1**
320	140	360	11 - Ø7,5 x 135	62	**50,2**	62	**105,7**
360	160	400	12 - Ø7,5 x 155	70	**56,7**	70	**119,4**
400	160	440	13 - Ø7,5 x 155	78	**63,2**	78	**133,0**
440	160	480	14 - Ø7,5 x 155	86	**69,7**	86	**146,6**

NOTES:

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

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

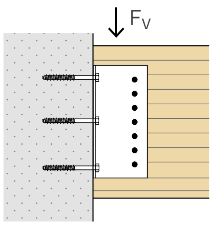
[2] The strength values are valid for both LBA Ø4 nails and for LBS Ø5 screws.

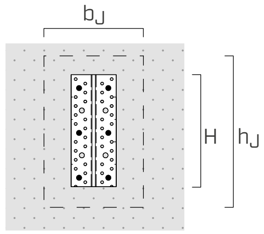
[3] Glulam GL24h.

General calculation principles see page 36.

STATIC VALUES | TIMBER-TO-CONCRETE JOINT | F_V

SCREW ANCHOR





ALUMIDI with SBD self-drilling dowels

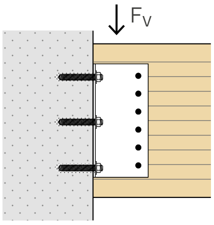
	SECONDARY BEAM TIMBER				MAIN BEAM UNCRACKED CONCRETE	
ALUMIDI			SBD dowels		SKR-E anchor	
H(1) [mm]	b_J [mm]	h_J [mm]	Ø7,5(2) [pcs Ø x L]	$R_{v,k\ timber}$ [kN]	Ø10 x 80(4) [pcs]	$R_{v,d\ concrete}$ [kN]
80	120	120	2 - Ø7,5 x 115	**16,6**	2	**6,1**
120	120	160	3 - Ø7,5 x 115	**24,9**	4	**10,2**
160	120	200	4 - Ø7,5 x 115	**33,2**	4	**12,9**
200	120	240	5 - Ø7,5 x 115	**41,6**	6	**17,4**
240	120	280	6 - Ø7,5 x 115	**49,9**	6	**19,8**
280	140	320	6 - Ø7,5 x 135	**55,1**	8	**24,3**
320	140	360	7 - Ø7,5 x 135	**64,3**	8	**26,5**
360	160	400	7 - Ø7,5 x 155	**71,1**	10	**31,1**
400	160	440	8 - Ø7,5 x 155	**81,2**	10	**33,1**
440	160	480	9 - Ø7,5 x 155	**91,4**	12	**38,8**

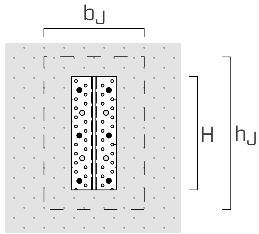
ALUMIDI with STA dowels

	SECONDARY BEAM TIMBER				MAIN BEAM UNCRACKED CONCRETE	
ALUMIDI			STA dowels		SKR-E anchor	
H(1) [mm]	b_J [mm]	h_J [mm]	Ø12(3) [pcs Ø x L]	$R_{v,k\ timber}$ [kN]	Ø10 x 80(4) [pcs]	$R_{v,d\ concrete}$ [kN]
120	120	160	3 - Ø12 x 120	**35,5**	4	**10,2**
160	120	200	4 - Ø12 x 120	**47,3**	4	**12,9**
200	120	240	5 - Ø12 x 120	**59,1**	6	**17,4**
240	120	280	6 - Ø12 x 120	**70,9**	6	**19,8**
280	140	320	7 - Ø12 x 140	**91,0**	8	**24,3**
320	140	360	8 - Ø12 x 140	**104,0**	8	**26,5**
360	160	400	9 - Ø12 x 160	**128,4**	10	**31,1**
400	160	440	10 - Ø12 x 160	**142,7**	10	**33,1**
440	160	480	11 - Ø12 x 160	**157,0**	12	**38,8**

STATIC VALUES | TIMBER-TO-CONCRETE JOINT | F_V

CHEMICAL ANCHOR





ALUMIDI with SBD self-drilling dowels

	SECONDARY BEAM TIMBER				MAIN BEAM UNCRACKED CONCRETE	
ALUMIDI			SBD dowels		VIN-FIX PRO anchor	
H[1]	b_J	h_J	Ø7,5[2]	$R_{v,k\ timber}$	Ø8 x 110[5]	$R_{v,d\ concrete}$
[mm]	[mm]	[mm]	[pcs Ø x L]	[kN]	[pcs]	[kN]
80	120	120	3 - Ø7,5 x 115	**24,9**	2	**8,8**
120	120	160	4 - Ø7,5 x 115	**33,2**	4	**15,4**
160	120	200	5 - Ø7,5 x 115	**41,6**	4	**22,1**
200	120	240	7 - Ø7,5 x 115	**58,2**	6	**30,7**
240	120	280	8 - Ø7,5 x 115	**66,5**	6	**37,0**
280	140	320	10 - Ø7,5 x 135	**91,9**	8	**48,7**
320	140	360	11 - Ø7,5 x 135	**101,1**	8	**55,6**
360	160	400	12 - Ø7,5 x 155	**121,9**	10	**64,4**
400	160	440	13 - Ø7,5 x 155	**132,0**	10	**66,4**
440	160	480	14 - Ø7,5 x 155	**142,2**	12	**80,0**

ALUMIDI with STA dowels

	SECONDARY BEAM TIMBER				MAIN BEAM UNCRACKED CONCRETE	
ALUMIDI			STA dowels		VIN-FIX PRO anchor	
H[1]	b_J	h_J	Ø12[3]	$R_{v,k\ timber}$	Ø8 x 110[5]	$R_{v,d\ concrete}$
[mm]	[mm]	[mm]	[pcs Ø x L]	[kN]	[pcs]	[kN]
120	120	160	3 - Ø12 x 120	**35,5**	4	**15,4**
160	120	200	4 - Ø12 x 120	**47,3**	4	**22,1**
200	120	240	5 - Ø12 x 120	**59,1**	6	**30,7**
240	120	280	6 - Ø12 x 120	**70,9**	6	**37,0**
280	140	320	7 - Ø12 x 140	**91,0**	8	**48,7**
320	140	360	8 - Ø12 x 140	**104,0**	8	**55,6**
360	160	400	9 - Ø12 x 160	**128,4**	10	**64,4**
400	160	440	10 - Ø12 x 160	**142,7**	10	**66,4**
440	160	480	11 - Ø12 x 160	**157,0**	12	**80,0**

NOTES:

TIMBER-TO-CONCRETE

(1) The bracket with height H is available pre-drilled in the ALUMIDI versions without holes, ALUMIDI with holes and ALUMIDI with countersink (codes on page 28) or can be obtained from the ALUMIDI2200 rod.

(2) SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 42000 Nmm.

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

(4) Screw anchor SKR-E according to ETA 19/0100. Install the anchors two at a time, starting from the top, dowelling alternate rows.

(5) Chemical anchor VIN-FIX PRO with threaded rods (type INA) of minimum strength grade equal to 5.8. with h_{ef} = 93 mm. Install the anchors two at a time, starting from the top, dowelling alternate rows.

General calculation principles see page 36.

GENERAL PRINCIPLES:

- Resistance values for the fastening system are valid for the calculation examples shown in the table.
- 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.
- In case of combined loading the following verification shall be satisfied:

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

STATIC VALUES | F_{lat} | F_{ax}

TIMBER-TO-TIMBER

- Characteristic values are consistent with EN 1995-1-1 and in accordance with ETA-09/0361.
- The design values are obtained from the characteristic values as follows:

$$R_{lat,d} = min \begin{cases} \dfrac{R_{lat,k,alu}}{\gamma_{M,alu}} \\ \dfrac{R_{lat,k,beam} \cdot k_{mod}}{\gamma_{M,T}} \end{cases}$$

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

with $\gamma_{M,T}$ partial coefficient of the timber.

STATIC VALUES | F_v

TIMBER-TO-TIMBER

- Characteristic values are consistent with EN 1995-1-1, in accordance with ETA-09/0361 and evaluated with Rothoblaas experimental method.
- The design values are obtained from the characteristic values as follows:

$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_M}$$

- In some cases the connection shear strength $R_{v,k}$ 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 in correspondence with the bracket location.

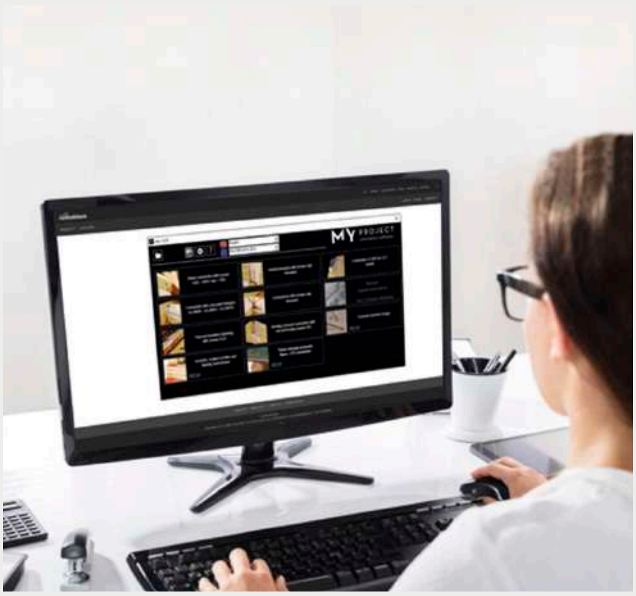
STATIC VALUES | F_v

TIMBER-TO-CONCRETE

- Characteristic values are consistent with EN 1995-1-1 and in accordance with ETA-09/0361. The design values of the anchors for concrete are calculated in accordance with the respective European Technical Assessments.

Design resistance values can be obtained from the tabled values as follows:

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



MY PROJECT calculation software

For different calculation methods, the MyProject software is available free of charge (www.rothoblaas.com).

- The analysis of various configurations is possible by varying number and type of fasteners, inclination, dimensions and material of the structural elements to maximize the mechanical strength.
- Possibility of using two different methods of calculation (according to ETA 09/0361 and experimental model).
- Wide and diversified variety of ALUMINI, ALUMIDI and ALUMAXI brackets able to satisfy different static requirements.

LABORATORY TESTING

EXPERIMENTAL INVESTIGATION

A comprehensive experimental campaign aimed at defining the real behaviour of the ALU brackets was carried out in collaboration the University of Trento. A numerical model has then been proposed and validated on the experimental results (Rothoblaas experimental method).

RESEARCH AND DEVELOPMENT

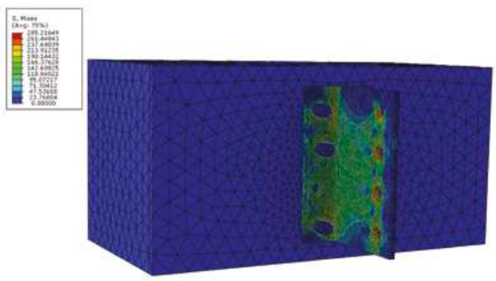
Experimental investigation – Materials and Structures Tests Laboratory (Faculty of Engineering, Trento).

Tests on specimens with reduced dimensions (timber-to-timber and timber-to-concrete).

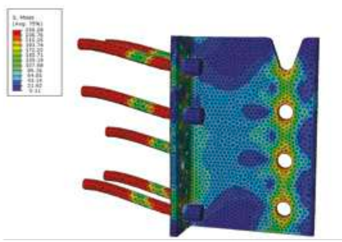
Tests on full-scale specimens (main-secondary beam connection).

NUMERICAL MODELING

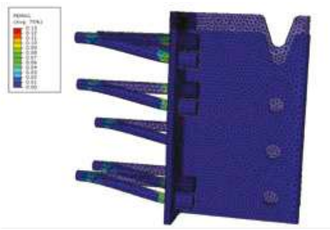
Investigation on the plastic deformation history of anchors and ALU brackets through finite element analysis.



Solid model of ALU bracket on concrete



Mises stress history on anchors and ALU bracket



Comparison between undeformed and deformed shape at the end of the test