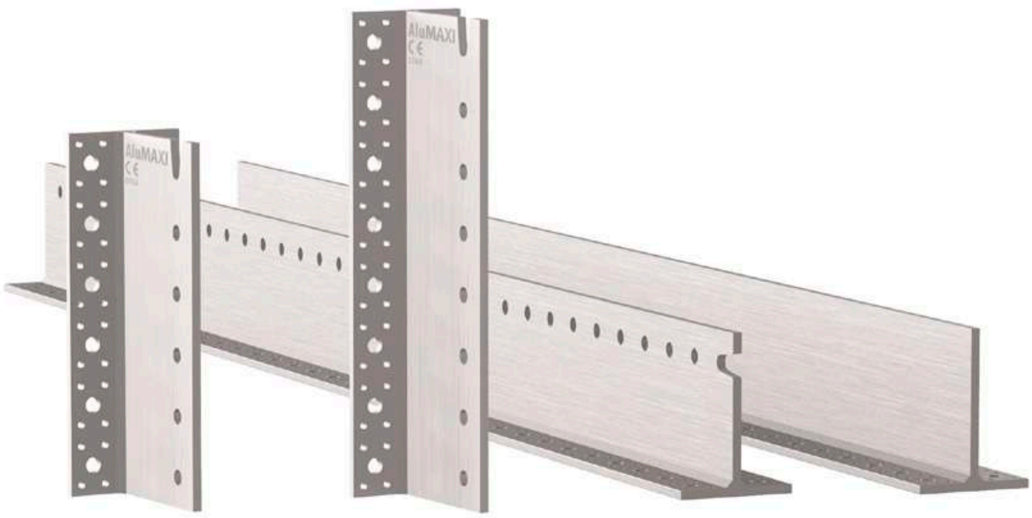
ALUMAXI

CONCEALED BRACKET WITH AND WITHOUT HOLES

SUPERIOR STRENGTH
Standard connection system developed to guarantee higher values of design strength. All values are calculated and certified.

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

FAST FASTENING
Certified strengths calculated in all directions: vertical, horizontal and axial. Certified fastening with LBS screws and SBD self-drilling dowels.



CHARACTERISTICS

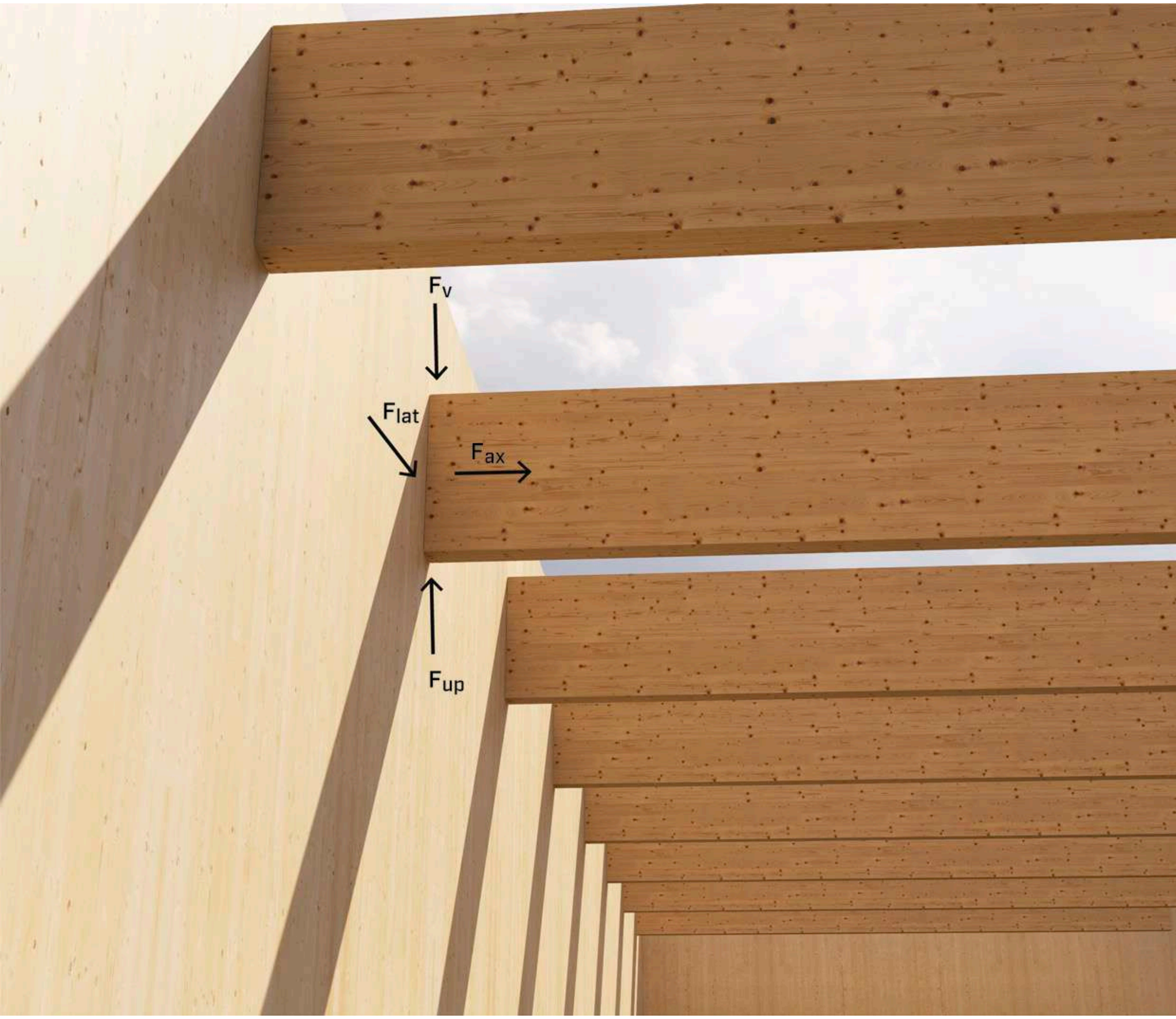
FOCUS	concealed joints
TIMBER SECTIONS	from 160 x 432 mm to 280 x 1200 mm
STRENGTH	$R_{v,k}$ up to 345 kN
FASTENERS	LBA, LBS, SBD, STA, VIN-FIX PRO

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



FIRE RESISTANCE

The low weight of the steel - aluminium alloy facilitates easy transportation and on-site movements, while guaranteeing a very high strength.
Being a concealed joint, it satisfies the fire safety requirements.

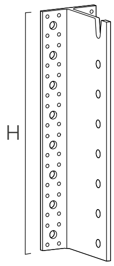
LARGE SCALE STRUCTURES

Ideal for joints between oversize beams or when high strength is required. The version without holes provides free choice when positioning the dowels.

CODES AND DIMENSIONS

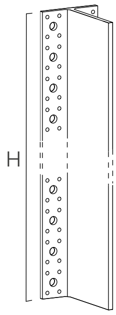
ALUMAXI WITH HOLES

CODE	type	H [mm]	pcs
ALUMAXI384L	with holes	384	1
ALUMAXI512L	with holes	512	1
ALUMAXI640L	with holes	640	1
ALUMAXI768L	with holes	768	1
ALUMAXI2176L	with holes	2176	1



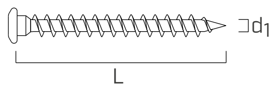
ALUMAXI WITHOUT HOLES

CODE	type	H [mm]	pcs
ALUMAXI2176	without holes	2176	1



LBS

CODE	d_1 [mm]	L [mm]	b [mm]	TX	pcs
LBS760	7	60	55	TX30	100
LBS780	7	80	75	TX30	100
LBS7100	7	100	95	TX30	100



MATERIAL AND DURABILITY

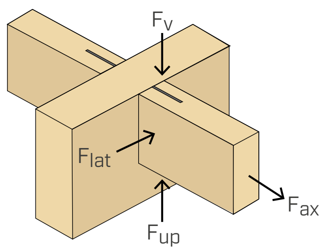
ALUMAXI: EN AW-6005A aluminium alloy.

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

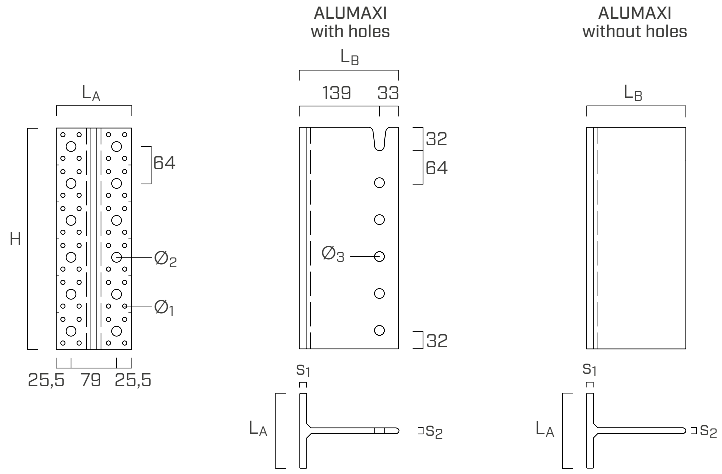
EXTERNAL LOADS



ADDITIONAL PRODUCTS - FASTENING

type	description	d [mm]	support	page
LBA	Anker nail	6		548
LBS	screw for plates	7		552
SBD	self-drilling dowel	7,5		48
STA	smooth dowel	16		54
KOS	bolt	M16		526
VIN-FIX PRO	chemical anchor	M16		514
EPO-FIX PLUS	chemical anchor	M16		517

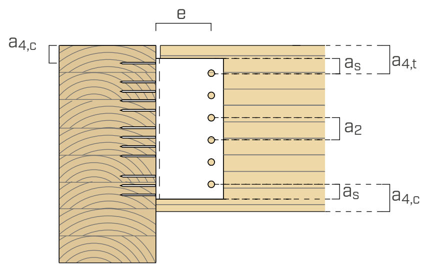
GEOMETRY

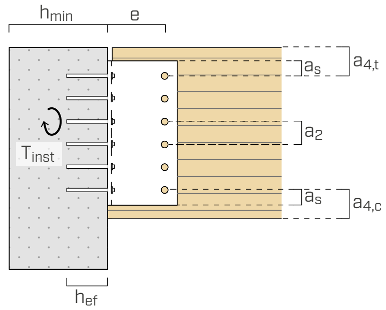


ALUMAXI			
flange thickness	s_1	[mm]	12
web thickness	s_2	[mm]	10
wing width	L_A	[mm]	130
web length	L_B	[mm]	172
small flange-holes	$Ø_1$	[mm]	7,5
large flange-holes	$Ø_2$	[mm]	17,0
web holes (dowels)	$Ø_3$	[mm]	17,0

INSTALLATION

MINIMUM DISTANCES





secondary beam-timber				self-drilling dowel SBD Ø7,5	smooth dowel STA Ø16
dowel-dowel	a_2	[mm]	≥ 3 d	≥ 23	≥ 48
dowel-top of beam	$a_{4,t}$	[mm]	≥ 4 d	≥ 30	≥ 64
dowel-bottom of beam	$a_{4,c}$	[mm]	≥ 3 d	≥ 23	≥ 48
dowel-bracket edge	a_s	[mm]	≥ 1,2 d_0(1)	≥ 10	≥ 21
dowel-dowel	a_1(2)	[mm]	≥ 3 d	≥ 23	-
dowel-main beam	e	[mm]		92 ÷ 139	139

(1) Hole diameter.

(2) Spacing between dowels parallel to the grain for force-fibre angle α = 90° for application with SBD.

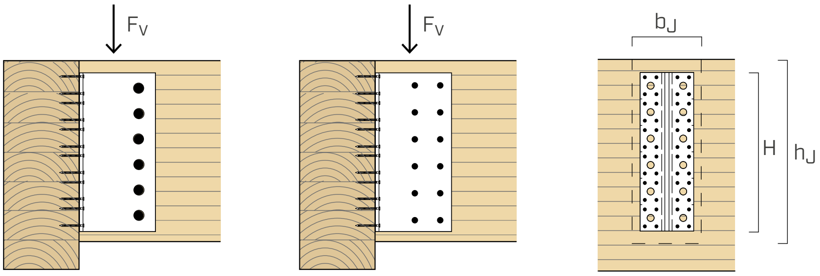
main beam-timber				Anker nail LBA Ø6	screw LBS Ø7
first connector-top of beam	$a_{4,c}$	[mm]	≥ 5 d	≥ 30	≥ 35

main beam-concrete			chemical anchor VIN-FIX PRO Ø16
minimum support thickness	h_{min}	[mm]	h_{ef} + 30 ≥ 100
concrete hole diameter	d_0	[mm]	18
tightening torque	T_{inst}	[Nm]	80

h_{ef} = effective anchoring depth in concrete

STATIC VALUES | TIMBER-TO-TIMBER JOINT | F_V

FULL NAILING



ALUMAXI with STA dowels

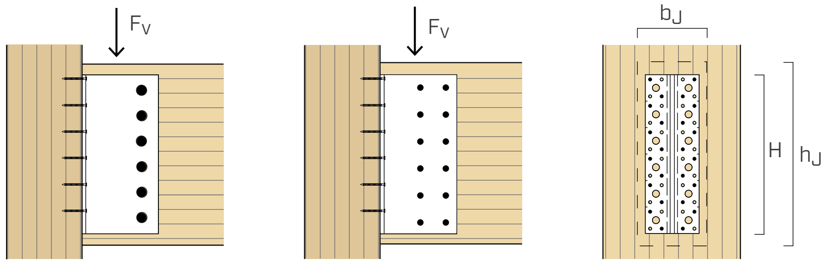
ALUMAXI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	STA dowels Ø16[2] [pcs Ø x L]	LBA nails Ø6 x 80 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø7 x 80 [pcs]	$R_{v,k}$ [kN]
384	160	432	6 - Ø16 x 160	48	122,8	48	130,3
448	160	496	7 - Ø16 x 160	56	152,0	56	152,0
512	160	560	8 - Ø16 x 160	64	173,8	64	173,8
576	160	624	9 - Ø16 x 160	72	195,5	72	195,5
640	200	688	10 - Ø16 x 200	80	246,0	80	246,0
704	200	752	11 - Ø16 x 200	88	270,6	88	270,6
768	200	816	12 - Ø16 x 200	96	295,2	96	295,2
832	200	880	13 - Ø16 x 200	104	319,8	104	319,8
896	200	944	14 - Ø16 x 200	112	344,4	112	344,4
960	200	1008	15 - Ø16 x 200	120	369,0	120	369,0

ALUMAXI with SBD self-drilling dowels

ALUMAXI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	SBD dowels Ø7,5[3] [pcs Ø x L]	LBA nails Ø6 x 80 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø7 x 80 [pcs]	$R_{v,k}$ [kN]
384	160	432	12 - Ø7,5 x 155	48	121,0	48	121,0
448	160	496	14 - Ø7,5 x 155	56	141,2	56	141,2
512	160	560	16 - Ø7,5 x 155	64	161,3	64	161,3
576	160	624	18 - Ø7,5 x 155	72	181,5	72	181,5
640	200	688	20 - Ø7,5 x 195	80	230,7	80	230,7
704	200	752	22 - Ø7,5 x 195	88	253,8	88	253,8
768	200	816	24 - Ø7,5 x 195	96	276,9	96	276,9
832	200	880	26 - Ø7,5 x 195	104	299,9	104	299,9
896	200	944	28 - Ø7,5 x 195	112	323,0	112	323,0
960	200	1008	30 - Ø7,5 x 195	120	346,1	120	346,1

STATIC VALUES | TIMBER-TO-TIMBER JOINT | F_V

PARTIAL NAILING[4]



STA Ø16   SBD Ø7,5

ALUMAXI with STA dowels

ALUMAXI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	STA dowels Ø16[2] [pcs Ø x L]	LBA nails Ø6 x 80 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø7 x 80 [pcs]	$R_{v,k}$ [kN]
384	160	432	6 - Ø16 x 160	24	61,4	24	83,6
448	160	496	7 - Ø16 x 160	28	80,0	28	103,5
512	160	560	8 - Ø16 x 160	32	99,7	32	123,3
576	160	624	9 - Ø16 x 160	36	120,2	36	143,1
640	200	688	10 - Ø16 x 200	40	141,3	40	162,7
704	200	752	11 - Ø16 x 200	44	162,7	44	182,2
768	200	816	12 - Ø16 x 200	48	184,3	48	201,5
832	200	880	13 - Ø16 x 200	52	206,1	52	220,8
896	200	944	14 - Ø16 x 200	56	227,8	56	239,9
960	200	1008	15 - Ø16 x 200	60	249,6	60	258,9

ALUMAXI with SBD self-drilling dowels

ALUMAXI	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
H[1] [mm]	b_J [mm]	h_J [mm]	SBD dowels Ø7,5[3] [pcs Ø x L]	LBA nails Ø6 x 80 [pcs]	$R_{v,k}$ [kN]	LBS screws Ø7 x 80 [pcs]	$R_{v,k}$ [kN]
384	160	432	8 - Ø7,5 x 155	24	61,4	24	80,7
448	160	496	10 - Ø7,5 x 155	28	80,0	28	100,8
512	160	560	12 - Ø7,5 x 155	32	99,7	32	121,0
576	160	624	14 - Ø7,5 x 155	36	120,2	36	141,2
640	200	688	16 - Ø7,5 x 195	40	141,3	40	162,7
704	200	752	18 - Ø7,5 x 195	44	162,7	44	182,2
768	200	816	20 - Ø7,5 x 195	48	184,3	48	201,5
832	200	880	22 - Ø7,5 x 195	52	206,1	52	220,8
896	200	944	24 - Ø7,5 x 195	56	227,8	56	239,9
960	200	1008	26 - Ø7,5 x 195	60	249,6	60	258,9

NOTES:

TIMBER-TO-TIMBER | F_v

(1) The bracket with height H is available pre-cut in the ALUMAXI versions with holes (codes on page 40) or can be obtained from the rod ALUMAXI2176 or ALUMAXI2176L rod.

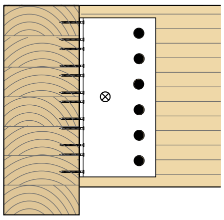
(2) STA smooth dowels Ø16: $M_{y,k}$ = 191000 Nmm

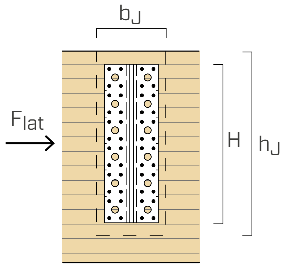
(3) SBD self-drilling dowels Ø7,5: $M_{y,k}$ = 42000 Nmm.

(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 46.

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

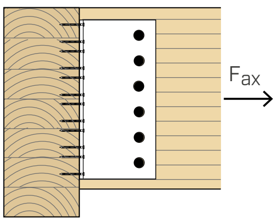


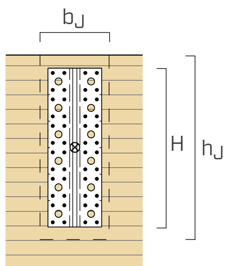


ALUMAXI with SBD self drilling dowels and STA dowels

	SECONDARY BEAM[1]		MAIN BEAM[2]		
ALUMAXI H [mm]	**b_J** [mm]	**h_J** [mm]	**LBA nails / LBS screws Ø6 x 80 / Ø7 x 80** [pcs]	**$R_{lat,k,alu}$** [kN]	**$R_{lat,k,beam}$**[3] [kN]
384	160	432	≥ 24	31,2	34,3
448	160	496	≥ 28	36,4	39,4
512	160	560	≥ 32	41,6	44,4
576	160	624	≥ 36	46,8	49,5
640	200	688	≥ 40	52,0	69,1
704	200	752	≥ 44	57,2	75,6
768	200	816	≥ 48	62,4	82,0
832	200	880	≥ 52	67,6	88,4
896	200	944	≥ 56	72,8	94,9
960	200	1008	≥ 60	78,0	101,3

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





ALUMAXI with STA dowels

	SECONDARY BEAM			MAIN BEAM			
				FASTENING THROUGH NAILS		FASTENING THROUGH SCREWS	
ALUMAXI H[1] [mm]	**b_J** [mm]	**h_J** [mm]	**STA dowels Ø16** [pcs Ø x L]	**LBA nails Ø6 x 80** [pcs]	**$R_{ax,k}$** [kN]	**LBS screws Ø7 x 80** [pcs]	**$R_{ax,k}$** [kN]
384	160	432	6 - Ø16 x 160	48	79,2	48	144,3
448	160	496	7 - Ø16 x 160	56	92,4	56	168,3
512	160	560	8 - Ø16 x 160	64	105,6	64	192,3
576	160	624	9 - Ø16 x 160	72	118,8	72	216,4
640	200	688	10 - Ø16 x 200	80	132,0	80	240,4
704	200	752	11 - Ø16 x 200	88	145,2	88	264,5
768	200	816	12 - Ø16 x 200	96	158,4	96	288,5
832	200	880	13 - Ø16 x 200	104	171,6	104	312,5
896	200	944	14 - Ø16 x 200	112	184,8	112	336,6
960	200	1008	15 - Ø16 x 200	120	198,0	120	360,6

NOTES:

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

(1) The strength values are valid for both STA Ø16 dowels and for SBD Ø7,5 self-drilling dowels.

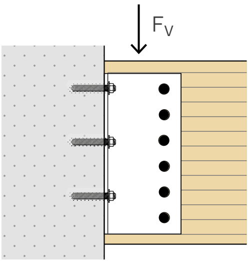
(2) The strength values are valid for both LBA Ø6 nails and for LBS Ø7 screws.

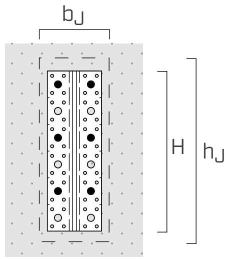
(3) Glulam GL24h.

General calculation principles see page 46.

STATIC VALUES | TIMBER-TO-CONCRETE JOINT | F_V

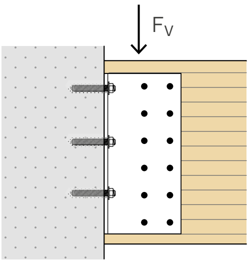
CHEMICAL ANCHOR

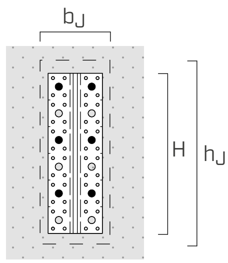




ALUMAXI with STA dowels

			SECONDARY BEAM TIMBER		MAIN BEAM UNCRACKED CONCRETE	
ALUMAXI			STA dowels		VIN-FIX PRO anchor	
H[1] [mm]	b_J [mm]	h_J [mm]	Ø16[2] [pcs Ø x L]	$R_{v,k\ timber}$ [kN]	Ø16 x 160[4] [pcs]	$R_{v,d\ concrete}$ [kN]
384	160	432	6 - Ø16 x 160	130,3	6	89,3
448	160	496	7 - Ø16 x 160	152,0	8	112,4
512	160	560	8 - Ø16 x 160	173,8	8	126,4
576	160	624	9 - Ø16 x 160	195,5	10	149,5
640	200	688	10 - Ø16 x 200	246,0	10	163,8
704	200	752	11 - Ø16 x 200	270,6	12	191,4
768	200	816	12 - Ø16 x 200	295,2	12	197,2
832	200	880	13 - Ø16 x 200	319,8	14	226,2
896	200	944	14 - Ø16 x 200	344,4	14	239,7
960	200	1008	15 - Ø16 x 200	369,0	16	258,9





ALUMAXI with SBD self-drilling dowels

			SECONDARY BEAM TIMBER		MAIN BEAM UNCRACKED CONCRETE	
ALUMAXI			SBD dowels		VIN-FIX PRO anchor	
H[1] [mm]	b_J [mm]	h_J [mm]	Ø7,5[3] [pcs Ø x L]	$R_{v,k\ timber}$ [kN]	Ø16 x 160[4] [pcs]	$R_{v,d\ concrete}$ [kN]
384	160	432	12 - Ø7,5 x 155	121,0	6	89,3
448	160	496	14 - Ø7,5 x 155	141,2	8	112,4
512	160	560	16 - Ø7,5 x 155	161,3	8	126,4
576	160	624	18 - Ø7,5 x 155	181,5	10	149,5
640	200	688	20 - Ø7,5 x 195	230,7	10	163,8
704	200	752	22 - Ø7,5 x 195	253,8	12	191,4
768	200	816	24 - Ø7,5 x 195	276,9	12	197,2
832	200	880	26 - Ø7,5 x 195	299,9	14	226,2
896	200	944	28 - Ø7,5 x 195	323,0	14	239,7
960	200	1008	30 - Ø7,5 x 195	346,1	16	258,9

NOTES:

TIMBER-TO-CONCRETE

(1) The bracket with height H is available pre-cut in the ALUMAXI versions with holes (codes on page 40) or can be obtained from the rod ALUMAXI2176 or ALUMAXI2176L rod.

(2) STA smooth dowels Ø16: $M_{y,k}$ = 191000 Nmm.

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

(4) Chemical anchor VIN-FIX PRO with threaded rods (type INA) of minimum strength grade equal to 5.8. with h_{ef} = 128 mm. Install the anchors two at a time, starting from the top, dowelling alternate rows.

General calculation principles see page 46.

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.
- 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_v

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:

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

- 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_{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-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:

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