

ALUMAXI

CONCEALED BRACKET WITH AND WITHOUT HOLES

POST AND BEAM CONSTRUCTIONS

Standard connection designed for optimum strength for post and beam systems. By using SBD self-drilling dowels, a tolerance of up to 46 mm (± 23 mm) along the beam axis can be accommodated to fit installation tolerances.

NEW GEOMETRY

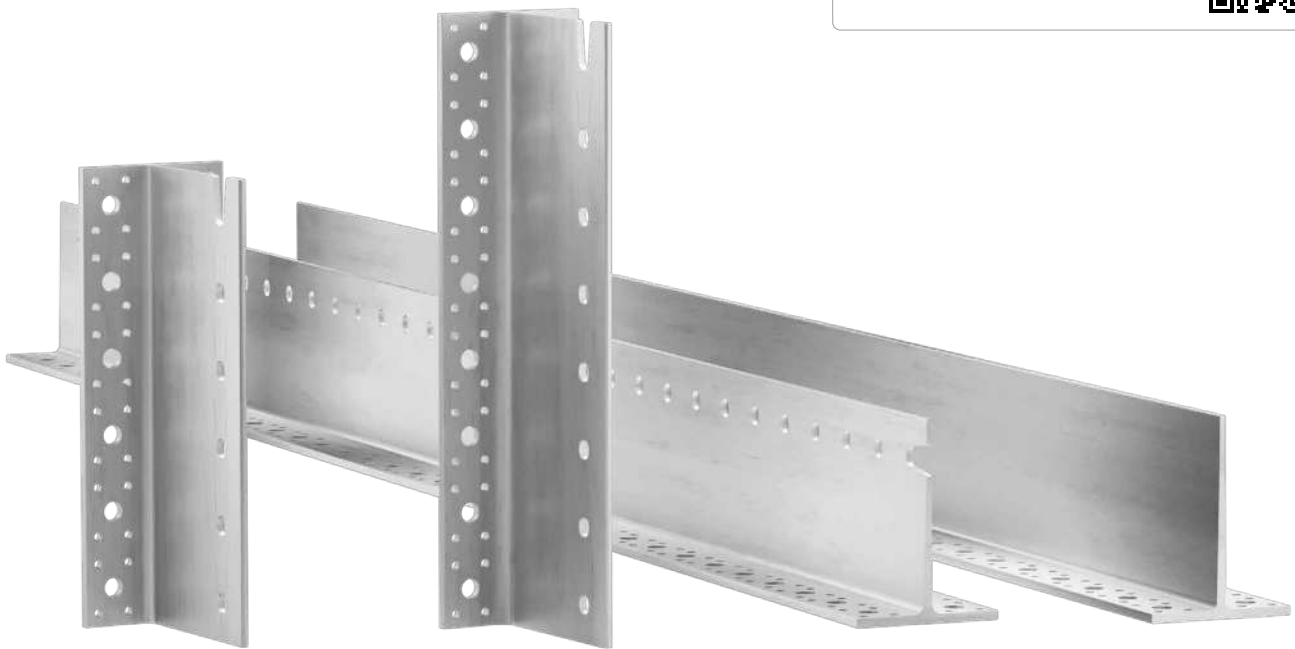
Optimised shape thanks to the new high-strength aluminium alloy EN AW-6082. Reduced weight and easier insertion of SBD self-drilling dowels.

FAST FASTENING

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



USA, Canada and more design values available online.



VIDEO



MY PROJECT
SOFTWARE



DESIGN
REGISTERED



ETA-09/0361

SERVICE CLASS

SC1

SC2

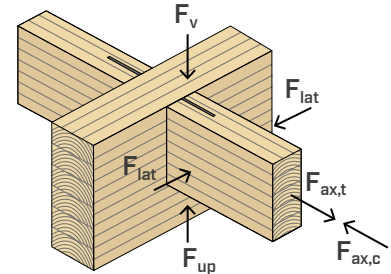
SC3

MATERIAL

alu
6082

EN AW-6082 aluminium alloy

EXTERNAL LOADS



VIDEO

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



FIELDS OF USE

Concealed beam joints in timber-to-timber, timber-to-concrete or timber-to-steel configurations, suitable for large roofs, floors and post-and-beam constructions. Use also outdoors in non aggressive environments.

Can be applied to:

- glulam, softwood and hardwood
- LVL



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.

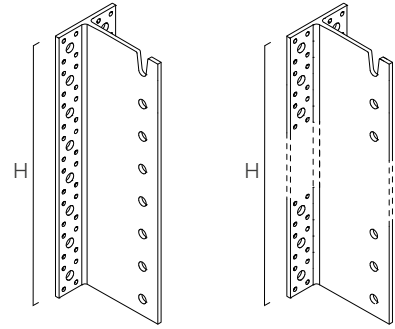
SIDE-BY-SIDE INSTALLATION

For high stresses or in the case of wide beams, two brackets can be placed side by side and fastened with long SBD dowels.

CODES AND DIMENSIONS

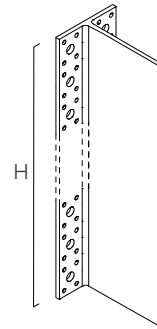
ALUMAXI WITH HOLES

CODE	type	H [mm]	H [in]	pcs
ALUMAXI384L	with holes	384	15 1/8	1
ALUMAXI512L	with holes	512	20 3/16	1
ALUMAXI640L	with holes	640	25 3/16	1
ALUMAXI768L	with holes	768	30 1/4	1
ALUMAXI2176L	with holes	2176	85 11/16	1



ALUMAXI WITHOUT HOLES

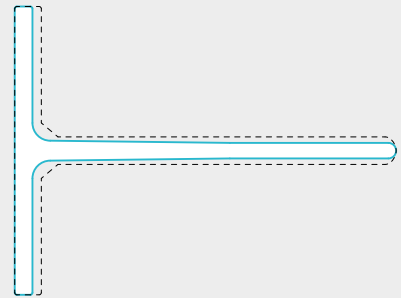
CODE	type	H [mm]	H [in]	pcs
ALUMAXI2176	without holes	2176	85 11/16	1



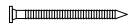
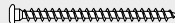
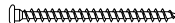
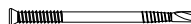
ENGINEERING OPTIMISATION

The new ALUMAXI bracket has been designed using a higher-performance aluminium alloy. This choice made it possible to reduce the thickness of the wing and core, and to optimise the shape of the wing by using a tapered profile. The mechanical characteristics are unchanged despite a 17% weight reduction.

- new geometry
- - - - - previous geometry

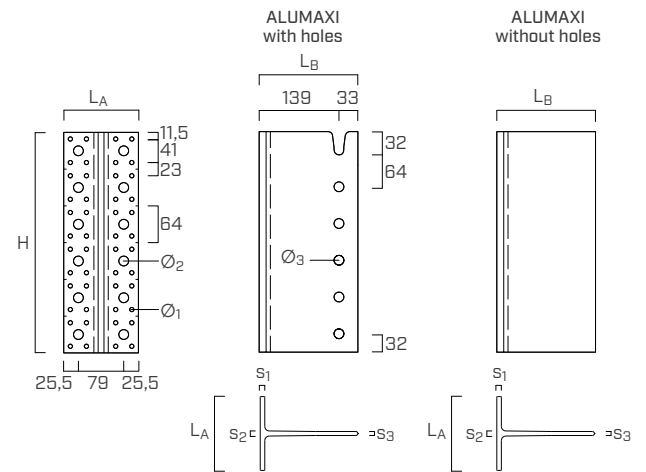


ADDITIONAL PRODUCTS - FASTENING

type	description		d [mm]	support	page
LBA	high bond nail		6		570
LBS	round head screw		7		571
LBS EVO	C4 EVO round head screw		7		571
LBS HARDWOOD EVO	C4 EVO round head screw on hardwoods		7		572
SBD	self-drilling dowel		7,5		154
STA	smooth dowel		16		162
STA A2 AISI 304	smooth dowel		16		162
KOS	hexagonal head bolt		M16		168
VIN-FIX	vinyl ester chemical anchor		M16		545
EPO-FIX	epoxy chemical anchor		M16		557
INA	5.8 or 8.8 steel class threaded rod		M16		562
JIG ALU STA	drilling template for ALUMIDI and ALUMAXI	-	-		-

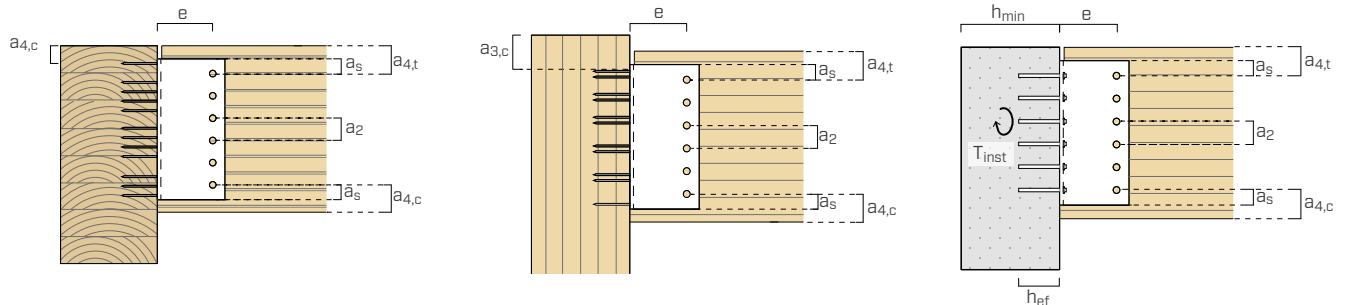
GEOMETRY

ALUMAXI			
flange thickness	s_1	[mm]	8
web thickness (base)	s_2	[mm]	9
web thickness (end)	s_3	[mm]	7
flange width	L_A	[mm]	130
web length	L_B	[mm]	172
small flange-holes	$\varnothing_1$	[mm]	7,5
large flange-holes	$\varnothing_2$	[mm]	17,0
blade holes (dowels)	$\varnothing_3$	[mm]	17,0



INSTALLATION

MINIMUM DISTANCES



secondary beam-timber			self-drilling dowel SBD Ø7,5	smooth dowel STA Ø16
dowel-dowel	a_2	[mm] $\geq 3 \cdot d$	≥ 23	≥ 48
dowel-top of beam	$a_{4,t}$	[mm] $\geq 4 \cdot d$	≥ 30	≥ 64
dowel-bottom of beam	$a_{4,c}$	[mm] $\geq 3 \cdot d$	≥ 23	≥ 48
dowel-bracket edge	a_s	[mm] $\geq 1,2 \cdot d_0^{(1)}$	≥ 10	≥ 21
dowel-dowel	$a_1^{(2)}$	[mm] $\geq 3 \cdot d$	$\geq 23 \mid \geq 38$	-
dowel-main beam	e	[mm] -	88 ÷ 139	139

(1) Hole diameter.

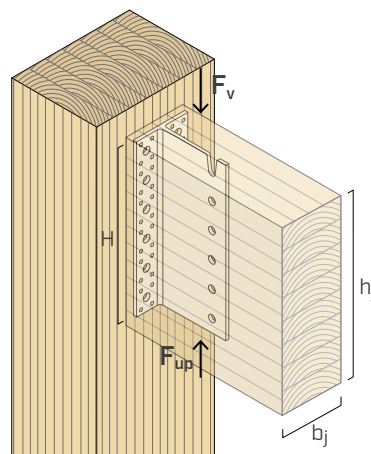
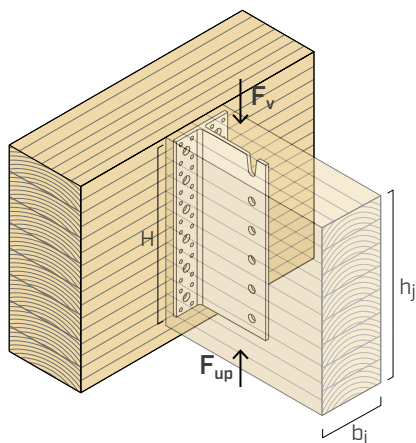
(2) Spacing between dowels parallel to the grain for load-to-grain angle $\alpha = 90^\circ$ (F_v stress) and $\alpha = 0^\circ$ (F_{ax} stress).

main element-timber			nail LBA Ø6	screw LBS Ø7
first connector-top of beam	$a_{4,c}$	[mm] $\geq 5 \cdot d$	≥ 30	≥ 35
first connector-column end	$a_{3,c}$	[mm] $\geq 10 \cdot d$	≥ 60	≥ 70

Minimum spacing and diameters refers to timber elements with density $\rho_k \leq 420 \text{ kg/m}^3$ and screws inserted without pre-drilling hole.

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

h_{ef} = effective anchoring depth in concrete.



ALUMAXI with SBD self-drilling dowels

ALUMAXI $H^{(1)}$ [mm]	SECONDARY BEAM		MAIN ELEMENT	
	$b_j \times h_j$ [mm]	dowels SBD Ø7,5 ⁽²⁾ [pcs Ø x L]	LBA nails / LBS screws LBA Ø6 x 80 / LBS Ø7 x 80 [pcs]	$R_{v,k} - R_{up,k}^{(3)}$ [kN]
384	160 x 432	12 - Ø7,5 x 155	48	134,5
448	160 x 496	14 - Ø7,5 x 155	56	156,9
512	160 x 560	16 - Ø7,5 x 155	64	179,4
576	160 x 624	18 - Ø7,5 x 155	72	201,8
640	200 x 688	20 - Ø7,5 x 195	80	259,8
704	200 x 752	22 - Ø7,5 x 195	88	285,8
768	200 x 816	24 - Ø7,5 x 195	96	311,8
832	200 x 880	26 - Ø7,5 x 195	104	337,7
896	200 x 944	28 - Ø7,5 x 195	112	363,7
960	200 x 1008	30 - Ø7,5 x 195	120	389,7

ALUMAXI with STA dowels

ALUMAXI $H^{(1)}$ [mm]	SECONDARY BEAM		MAIN ELEMENT	
	$b_j \times h_j$ [mm]	dowels STA Ø16 ⁽⁴⁾ [pcs Ø x L]	LBA nails / LBS screws LBA Ø6 x 80 / LBS Ø7 x 80 [pcs]	$R_{v,k} - R_{up,k}^{(3)}$ [kN]
384	160 x 432	6 - STA Ø16 x 160	48	131,1
448	160 x 496	7 - STA Ø16 x 160	56	153,0
512	160 x 560	8 - STA Ø16 x 160	64	174,8
576	160 x 624	9 - STA Ø16 x 160	72	196,7
640	200 x 688	10 - STA Ø16 x 200	80	247,6
704	200 x 752	11 - STA Ø16 x 200	88	272,4
768	200 x 816	12 - STA Ø16 x 200	96	297,1
832	200 x 880	13 - STA Ø16 x 200	104	321,9
896	200 x 944	14 - STA Ø16 x 200	112	346,6
960	200 x 1008	15 - STA Ø16 x 200	120	371,4

NOTES

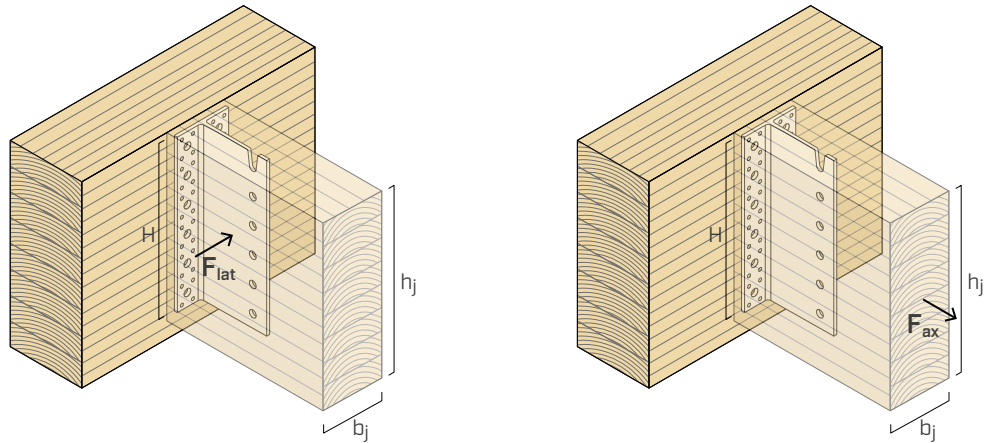
(1) The bracket with height H is available pre-cut in the ALUMAXI versions with holes (codes on page 90) or can be obtained from the rod ALUMAXI2176 or ALUMAXI2176L rod.

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

(3) The structural values in the table are valid for fastening on the main beam and column. The screws can be installed in the column without pre-drilled holes.

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

For the GENERAL PRINCIPLES of calculation, see page 95.



TIMBER-TO-TIMBER | F_{lat}

ALUMAXI with SBD self drilling dowels and STA dowels

ALUMAXI 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 Ø6 x 80 / LBS Ø7 x 80 [pcs]		
384	160 x 432	≥ 24	34,3	31,2
448	160 x 496	≥ 28	39,4	36,4
512	160 x 560	≥ 32	44,4	41,6
576	160 x 624	≥ 36	49,5	46,8
640	200 x 688	≥ 40	69,1	52,0
704	200 x 752	≥ 44	75,6	57,2
768	200 x 816	≥ 48	82,0	62,4
832	200 x 880	≥ 52	88,4	67,6
896	200 x 944	≥ 56	94,9	72,8
960	200 x 1008	≥ 60	101,3	78,0

TIMBER-TO-TIMBER | F_{ax}

ALUMAXI with STA dowels

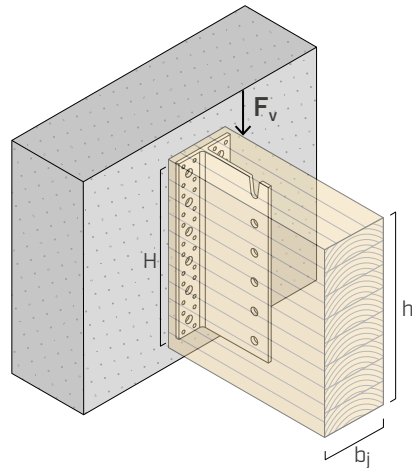
ALUMAXI H [mm]	SECONDARY BEAM		MAIN BEAM				$R_{ax,k \text{ alu}}$ [kN]
	$b_j \times h_j$ [mm]	STA Ø16 [pcs Ø x L]	fastening through nails LBA Ø6 x 80 [pcs]	$R_{ax,k \text{ timber}}$ GL24h [kN]	fastening through screws LBS LBS Ø7 x 80 [pcs]	$R_{ax,k \text{ timber}}$ GL24h [kN]	
384	160 x 432	6 - Ø16 x 160	48	78,3	48	131,3	101,6
448	160 x 496	7 - Ø16 x 160	56	91,4	56	153,1	118,5
512	160 x 560	8 - Ø16 x 160	64	104,4	64	175,0	135,4
576	160 x 624	9 - Ø16 x 160	72	117,5	72	196,9	152,4
640	200 x 688	10 - Ø16 x 200	80	130,5	80	218,8	169,3
704	200 x 752	11 - Ø16 x 200	88	143,6	88	240,7	186,2
768	200 x 816	12 - Ø16 x 200	96	156,6	96	262,5	203,2
832	200 x 880	13 - Ø16 x 200	104	169,7	104	284,4	220,1
896	200 x 944	14 - Ø16 x 200	112	182,7	112	306,3	237,0
960	200 x 1008	15 - Ø16 x 200	120	195,8	120	328,2	254,0

NOTES

(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.

For the GENERAL PRINCIPLES of calculation, see page 95.



CHEMICAL ANCHOR

ALUMAXI with SBD self drilling dowels and STA dowels

ALUMAXI	SECONDARY BEAM TIMBER				MAIN BEAM UNCRACKED CONCRETE		
	$H^{(1)}$ [mm]	$b_j \times h_j$ [mm]	SBD dowels ⁽²⁾		STA dowels ⁽³⁾		VIN-FIX anchor ⁽⁴⁾
			$\varnothing 7,5$ [pcs $\varnothing \times L$]	$R_{v,k}$ [kN]	$\varnothing 16$ [pcs $\varnothing \times L$]	$R_{v,k}$ [kN]	
384	160	432	12 - $\varnothing 7,5 \times 155$	134,5	6 - $\varnothing 16 \times 160$	131,1	6
448	160	496	14 - $\varnothing 7,5 \times 155$	156,9	7 - $\varnothing 16 \times 160$	153,0	8
512	160	560	16 - $\varnothing 7,5 \times 155$	179,4	8 - $\varnothing 16 \times 160$	174,8	8
576	160	624	18 - $\varnothing 7,5 \times 155$	201,8	9 - $\varnothing 16 \times 160$	196,7	10
640	200	688	20 - $\varnothing 7,5 \times 195$	259,8	10 - $\varnothing 16 \times 200$	247,6	10
704	200	752	22 - $\varnothing 7,5 \times 195$	285,8	11 - $\varnothing 16 \times 200$	272,4	12
768	200	816	24 - $\varnothing 7,5 \times 195$	311,8	12 - $\varnothing 16 \times 200$	297,1	12
832	200	880	26 - $\varnothing 7,5 \times 195$	337,7	13 - $\varnothing 16 \times 200$	321,9	14
896	200	944	28 - $\varnothing 7,5 \times 195$	363,7	14 - $\varnothing 16 \times 200$	346,6	14
960	200	1008	30 - $\varnothing 7,5 \times 195$	389,7	15 - $\varnothing 16 \times 200$	371,4	16

NOTES

⁽¹⁾ The bracket with height H is available pre-cut in the ALUMAXI versions with holes (codes on page 90) or can be obtained from the rod ALUMAXI2176 or ALUMAXI2176L rod.

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

⁽³⁾ STA smooth dowel $\varnothing 16$: $M_{y,k} = 191000$ Nmm.

⁽⁴⁾ Chemical anchor VIN-FIX according to ETA-20/0363 with threaded rods (type INA) of minimum steel class 5.8 with $h_{ef} = 128$ mm. Install the anchors two at a time, starting from the top, dowelling alternate rows.

For the GENERAL PRINCIPLES of calculation, see page 95.

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 10 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 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:

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

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

- Shear strengths on columns are calculated considering the effective number of connectors according to ETA-09/0361.
- 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 | F_{lat} | 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:

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

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

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:

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

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

INTELLECTUAL PROPERTY

- An ALUMAXI model is protected by the Registered Community Design RCD 015032190-0001.



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