

ALUMAXI

Concealed beam hanger with and without holes

Aluminum alloy three dimensional perforated bracket



ETA 09/0361

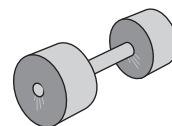


software
myProject



SUPERIOR STRENGTH STANDARD

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



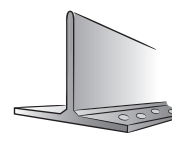
FIELD OF USE

Timber-to-timber and timber-to-concrete shear connections, both perpendicular and inclined to the vertical plane.

- solid timber
- glulam (Glued Laminated Timber)
- XLAM (Cross Laminated Timber)
- LVL (Laminated Veneer Lumber)
- wood-based panels

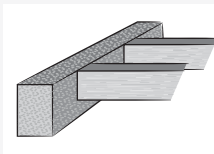
STEEL-ALUMINUM

EN AW-6005A high strength aluminum alloy, obtained through extrusion and thus weld-free.



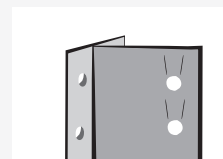
TIMBER AND CONCRETE

Optimal hole spacing for joints both on timber (nails or screws) and on concrete (chemical or heavy duty anchors)



SPARES MANAGEMENT

Versions without holes available in 2164mm long pieces with notches every 64mm, to be cut onsite according to the worksite needs.





UNMATCHED

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



STEEL AND CONCRETE

Possible applications regarding reinforced concrete or metal surfaces. Values are calculated, certified and consolidated.

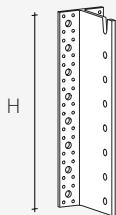


LARGE SCALE STRUCTURES

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

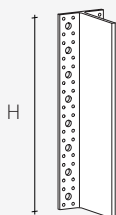
CODES AND DIMENSIONS

ALUMAXI WITH HOLES



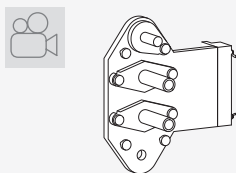
code	type	H [mm]	pcs/box
ALUMAXI384L	with holes	384	1
ALUMAXI512L	with holes	512	1
ALUMAXI640L	with holes	640	1
ALUMAXI768L	with holes	768	1
ALUMAXI2176L	with holes	2176	1

ALUMAXI WITHOUT HOLES



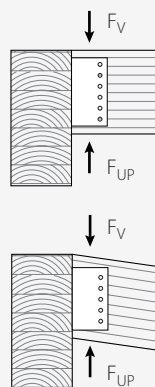
code	type	H [mm]	pcs/box
ALUMAXI2176	without holes	2176	1

TEMPLATE



code	type	pcs/box
ATALUMAXI	template for AluMAXI per STA Ø16	1

EXTERNAL LOADS

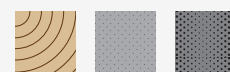


MATERIAL AND DURABILITY

ALUMAXI: EN AW-6005° aluminum alloy.
To be used in Service class 1 and 2 (EN 1995:2008).

FIELD OF USE

Timber to timber joint
Timber to concrete joint
Steel to timber joint

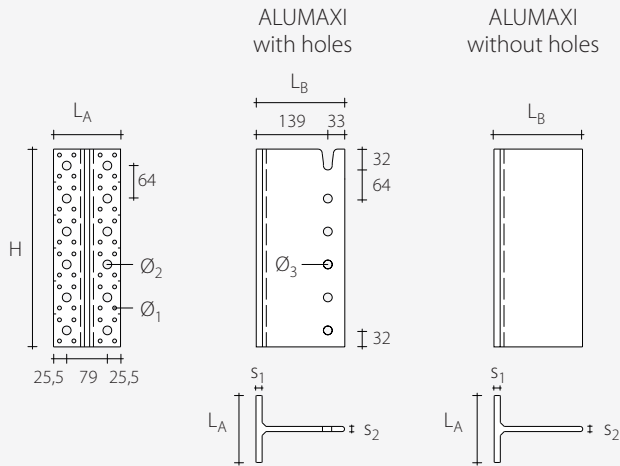


ADDITIONAL PRODUCTS - FIXINGS

type	description	d [mm]	support	p.
LBA	anker nail	6		364
WS	self-drilling dowel	7		368
STA	smooth dowel	16		50
KOS	bolt	M16		54
VINYLPPO	chemical anchor	M16		346
EPOPLUS	chemical anchor	M16		354

It is recommended to perform the assembly of the system by using the CHAIN MORTISER described in chapter 9 of the catalogue "Tools for wooden construction (pag. 147)

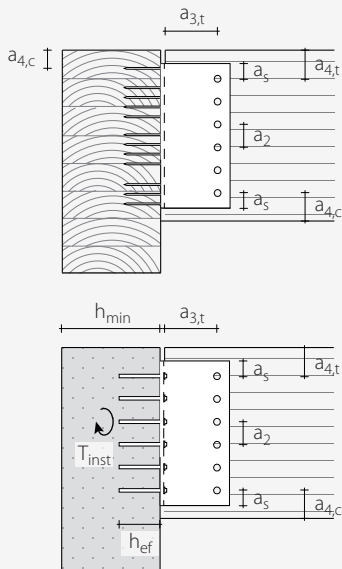
GEOMETRY



			AluMAXI without holes	AluMAXI with holes
Flange thickness	s_1	[mm]	12	12
Web thickness	s_2	[mm]	10	10
Flange width	L_A	[mm]	130	130
Web length	L_B	[mm]	172	172
Small flange-holes	\varnothing_1	[mm]	7,5	7,5
Large flange-holes	\varnothing_2	[mm]	17,0	17,0
Web holes (dowels)	\varnothing_3	[mm]	17,0	-

INSTALLATION

MINIMUM DISTANCES



SECONDARY BEAM - TIMBER			smooth dowel STA Ø16
Dowel - Dowel	a_2	[mm] $\geq 3 d$	≥ 48
Dowel - Beam extrados	$a_{4,t}$	[mm] $\geq 4 d$	≥ 64
Dowel - Beam extrados	$a_{4,c}$	[mm] $\geq 3 d$	≥ 48
Dowel - Beam end	$a_{3,t}$	[mm] $\geq \{7 d; 80\}$	≥ 112
Dowel - Bracket edge	a_5	[mm] $\geq 1,2 d_0^{(1)}$	≥ 21

⁽¹⁾ hole diameter

MAIN BEAM - TIMBER			anker nail LBA Ø6
First connector - Beam extrados	$a_{4,c}$	[mm] $\geq 5 d$	≥ 30

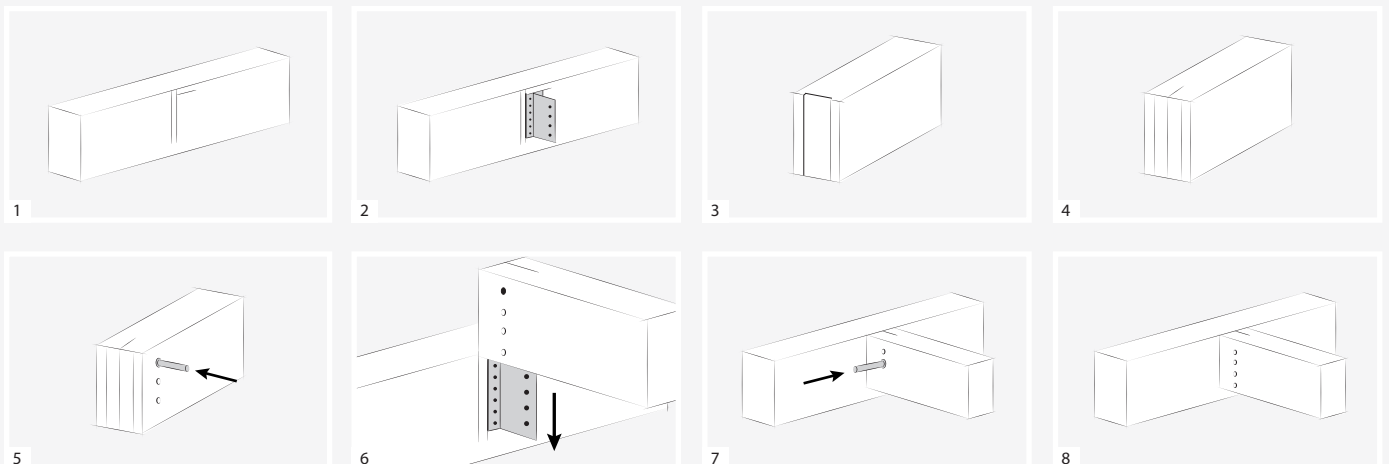
MAIN JOIST - CONCRETE			chemical anchor VINYLPRO Ø16
Minimum support thickness	h_{min}	[mm]	$h_{ef} + 2 d_0$
Concrete hole diameter	d_0	[mm]	18
d_0 [mm] Tightening torque	T_{inst}	[Nm]	80

h_{ef} = effective anchoring depth in the concrete

ASSEMBLY

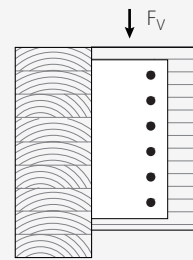
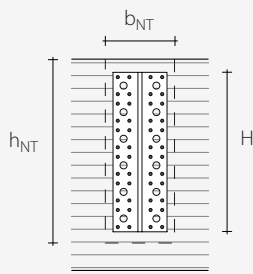


ALUMAXI with holes



STATIC VALUES - TIMBER-TO-TIMBER JOINT - RIGHT ANGLE

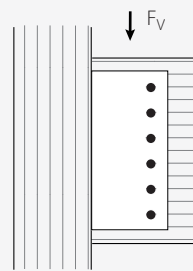
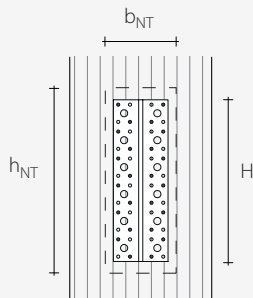
TOTAL NAILING



SECONDARY BEAM			MAIN BEAM	CHARACTERISTIC VALUES	ADMISSABLE VALUES	
AluMAXI H [mm]	b _{NT} [mm]	h _{NT} [mm]	dowels STA Ø16 ⁽¹⁾ [pcs - Ø x L]	nails LBA Ø6 x 100 [pcs]	EN 1995:2008 R _{V,k} [kN]	DIN 1052:1988 V _{adm} [kg]
384	160	432	6 - Ø16 x 160	48	117,3	4060
448 *	160	496	7 - Ø16 x 160	56	150,6	5035
512	160	560	8 - Ø16 x 160	64	172,1	6010
576 *	160	624	9 - Ø16 x 160	72	193,7	6980
640	160	688	10 - Ø16 x 160	80	215,2	7950
704 *	160	752	11 - Ø16 x 160	88	236,7	8910
768	160	816	12 - Ø16 x 160	96	258,2	9870
832 *	160	880	13 - Ø16 x 160	104	279,7	10735
896 *	160	944	14 - Ø16 x 160	112	301,2	11600
960 *	160	1008	15 - Ø16 x 160	120	322,8	12465

* dimension obtainable from ALUMAXI2176L or ALUMAXI2176

PARTIAL NAILING ⁽²⁾

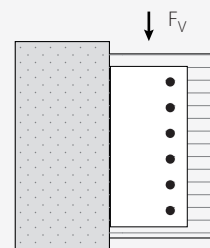
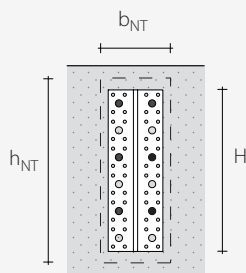


SECONDARY BEAM			MAIN BEAM	CHARACTERISTIC VALUES	ADMISSABLE VALUES	
AluMAXI H [mm]	b _{NT} [mm]	h _{NT} [mm]	dowels STA Ø16 ⁽¹⁾ [pcs - Ø x L]	nails LBA Ø6 x 100 [pcs]	EN 1995:2008 R _{V,k} [kN]	DIN 1052:1988 V _{adm} [kg]
384	160	432	6 - Ø16 x 160	24	58,6	2200
448 *	160	496	7 - Ø16 x 160	28	76,7	2605
512	160	560	8 - Ø16 x 160	32	95,9	3010
576 *	160	624	9 - Ø16 x 160	36	116,0	3495
640	160	688	10 - Ø16 x 160	40	136,7	3980
704 *	160	752	11 - Ø16 x 160	44	157,9	4460
768	160	816	12 - Ø16 x 160	48	179,3	4940
832 *	160	880	13 - Ø16 x 160	52	200,9	5370
896 *	160	944	14 - Ø16 x 160	56	222,5	5800
960 *	160	1008	15 - Ø16 x 160	60	244,2	6230

* dimension obtainable from ALUMAXI2176L or ALUMAXI2176

STATIC VALUES - TIMBER-TO-CONCRETE JOINT - RIGHT ANGLE

CHEMICAL ANCHOR ⁽³⁾



SECONDARY BEAM			MAIN BEAM	CHARACTERISTIC VALUES	ADMISSABLE VALUES	
AluMAXI H [mm]	b _{NT} [mm]	h _{NT} [mm]	dowels STA Ø16 ⁽¹⁾ [pcs - Ø x L]	anchor VINYLPRO Ø16 x 160 ⁽⁴⁾ [pcs]	EN 1995:2008 R _{V,k} [kN]	DIN 1052:1988 V _{adm} [kg]
384	160	432	6 - Ø16 x 160	6	133,5	5684
448 *	160	496	7 - Ø16 x 160	8	155,7	6628
512	160	560	8 - Ø16 x 160	8	178,0	7573
576 *	160	624	9 - Ø16 x 160	10	200,2	9584
640	160	688	10 - Ø16 x 160	10	222,4	9470
704 *	160	752	11 - Ø16 x 160	12	244,7	11465
768	160	816	12 - Ø16 x 160	12	266,9	11361
832 *	160	880	13 - Ø16 x 160	14	289,2	13326
896 *	160	944	14 - Ø16 x 160	14	311,4	13257
960 *	160	1008	15 - Ø16 x 160	16	333,7	15213

* dimension obtainable from ALUMAXI2176L or ALUMAXI2176

GENERAL PRINCIPLES

- Characteristic values are consistent with EN 1995:2008 and in accordance with ETA-09/0361.
- Design values can be obtained from characteristic values as follows:

$$R_{d} = \frac{R_k \cdot k_{mod}}{\gamma_m}$$
 Coefficients γ_m and k_{mod} must be taken according to the current Standard adopted for the design.
- Admissible values are obtained according to DIN 1052:1988.
- For the calculation process a timber density $\rho_k = 380 \text{ kg/m}^3$ and a concrete grade C 25/30 have been considered.
- Dimensioning and verification of the timber elements must be carried out separately.
- In some cases the connection shear strength $R_{V,k}$ is notably large and may be higher than the secondary joist strength. Particular attention should be paid to the shear check of the reduced timber crosssection in correspondence with the bracket location
- Strength values of the connection system are valid for the calculation hypotheses listed in the table. For different patterns the free software **myProject** is available (www.rothoblaas.com)

NOTES

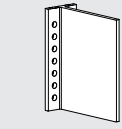
- (1) Smooth dowels STA Ø16 ($f_{u,k} = 470 \text{ N/mm}^2$).
- (2) Partial nailing of the column should be realized alternating the holes (see p. 26). Partial nailing is necessary for joist-column connections in order to observe minimum fastener spacings; it can be applied also for joist-joist connections.
- (3) The anchor disposition on concrete is obtained by placing the fasteners alternately according to the reference picture, depending on the type of anchor selected (see p. 26).
- (4) Chemical anchor VINYLPRO with threaded rods (type INA) of minimum strength grade equal to 5.8. with $h_{ef} = 128 \text{ mm}$.

myProject
calculation software by rothoblaas



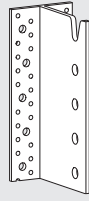
JOINTS WITH ALU BRACKETS

PRODUCT RANGE



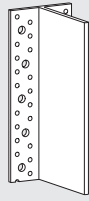
without holes

AluMINI

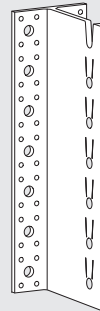


with holes

AluMIDI

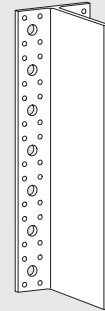


without holes



with holes

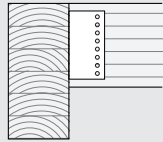
AluMAXI



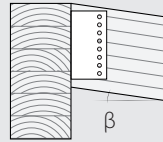
without holes

APPLICATIONS

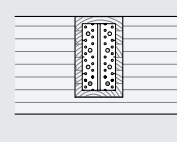
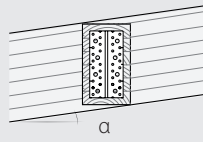
GEOMETRY



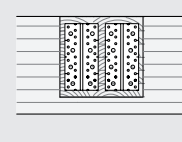
PERPENDICULAR JOINT



INCLINED JOINTS

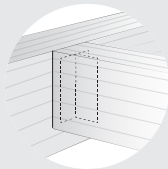


SINGLE BRACKET

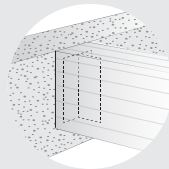


DOUBLE BRACKET

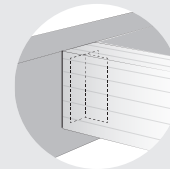
MATERIAL



TIMBER / TIMBER

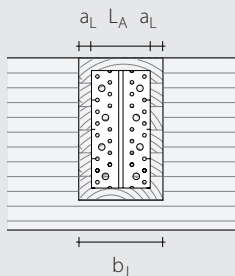


TIMBER / CONCRETE



STEEL / TIMBER

INSTALLATION – Minimum dimensions for timber elements in hidden bracket joints

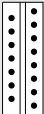
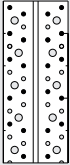
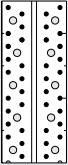
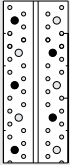
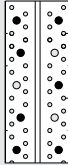


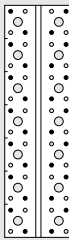
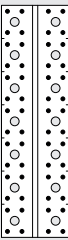
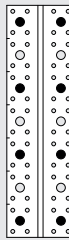
		self-drilling dowel WS			smooth dowel STA		
		AluMINI	AluMIDI	AluMAXI	AluMINI	AluMIDI	AluMAXI
wing width	L_A [mm]	45	80	130	45	80	130
bracket - timber edge	a_L [mm]	≥ 10	≥ 10	≥ 15	≥ 10	≥ 10	≥ 15
joist width ⁽¹⁾	b_J [mm]	≥ 80	≥ 100 ⁽²⁾	≥ 160	≥ 70	≥ 100 ⁽²⁾	≥ 150
dowel	\varnothing [mm]		7		8	12	16
	L [mm]	length to be evaluated based on aesthetic requirements and fire resistance					

⁽¹⁾ Recommended minimum width of the secondary beam to accommodate the grooving while ensuring that the connection remains completely hidden

⁽²⁾ Lateral distance to the edge of the timber element < 10 mm, thus particular care is suggested when realizing the grooving

INSTALLATION – Fixing types and positioning

APPLICATION	AluMINI	AluMIDI			
	TIMBER - TIMBER	TIMBER - TIMBER		TIMBER - CEMENT	
FIXINGS main joist	screw HBS+ evo Ø5	nail LBA Ø4 / screw LBS Ø5		SKR Ø10	VINYLPRO M8
FIXINGS secondary joist	WS Ø7 / STA Ø8	self-drilling dowel WS Ø7 / smooth dowel STA Ø12			
NAILING / DOWELLING main joist	total nailing	partial nailing	total nailing	dowelling SKR	dowelling VINYLPRO
					

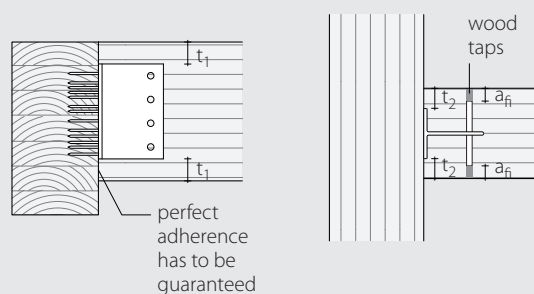
APPLICATION	AluMAXI		
	TIMBER - TIMBER	TIMBER - CONCRETE	
FIXINGS main joists	nail LBA Ø6	VINYLPRO M16	
FIXINGS secondary joists	self-drilling dowel WS Ø7 / liscio STA Ø16		
NAILING / DOWELLING main joist	partial nailing	total nailing	dowelling VINYLPRO
			

FIRE RESISTANCE - Connections (EN1995-1-2 §6.2.1)

ALU bracket allows the realization of a completely hidden connection system. High fire-rated performance can also be achieved if the minimum bracket-timber edge distances are observed (eg. with wood taps, available in the catalogue "Tools for wooden constructions") and adherence between elements is ensured.

Minimum covering required for protected joints ⁽³⁾

fire resistance	t ₁ min [mm]	t ₂ min [mm]	a _{fi} [mm]	
			glulam GL	solid wood C
R20	20 ⁽⁴⁾	10	0 ⁽⁵⁾	0 ⁽⁵⁾
R30	20 ⁽⁴⁾	10	10,5	12
R60	30	30	42	48



⁽³⁾ Strength check under fire condition must be carried out separately

⁽⁴⁾ Possible reduction to 10 mm if minimum bracket-timber edge distances for dowel are observed

⁽⁵⁾ Unprotected joint: L dowel > 100 mm