ALUMIDI

Concealed beam hanger with and without holes

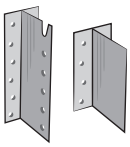
Aluminum alloy tridimensional perforated plate

CE
ETA 09/0361

software myProject

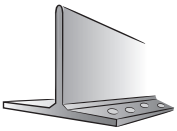
CERTIFIED

Available with and without holes.
The 2200 mm model is also certified



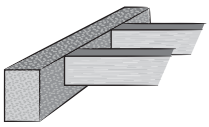
STEEL-ALUMINUM

EN AW-6005A high strength aluminum alloy, obtained by extrusion thus weld-free



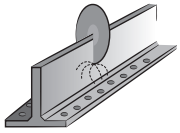
TIMBER AND CONCRETE

Optimal hole spacing both for timber (nails or screws) and concrete (chemical or screwed anchor)



SPARES MANAGEMENT

Versions without holes available in 2200 mm long pieces with notches every 40 mm, to be cut onsite according to the worksite needs



FIELD OF USE

Timber-to-Timber 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

INVISIBLE

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

TIMBER - CONCRETE

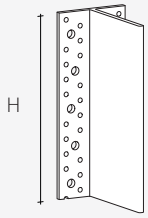
For applications on reinforced concrete or other uneven surfaces the self-drilling dowels allow a greater installation tolerance when fixing the timber element. Values are certified, tested and consolidated

CERTIFIED SAFETY

AluMIDI bracket has been the subject of many research works, studies and international publications, both from theoretical (calculation models) and experimental point of view

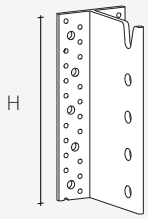
CODES AND DIMENSIONS

ALUMIDI WITHOUT HOLES



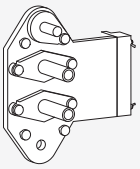
code	type	H [mm]	pcs/box
ALUMIDI80	without holes	80	25
ALUMIDI120	without holes	120	25
ALUMIDI160	without holes	160	25
ALUMIDI200	without holes	200	15
ALUMIDI240	without holes	240	15
ALUMIDI2200	without holes	2200	1

ALUMIDI WITH HOLES



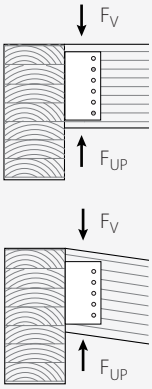
code	type	H [mm]	pcs/box
ALUMIDI120L	with holes	120	25
ALUMIDI160L	with holes	160	25
ALUMIDI200L	with holes	200	15
ALUMIDI240L	with holes	240	15
ALUMIDI280L	with holes	280	15
ALUMIDI320L	with holes	320	8
ALUMIDI360L	with holes	360	8

TEMPLATE



code	type	pcs/box
ATALUMIDI	template for AluMIDI with STA Ø12	1

EXTERNAL LOADS



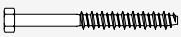
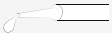
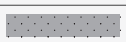
MATERIAL AND DURABILITY

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

FIELD OF USE

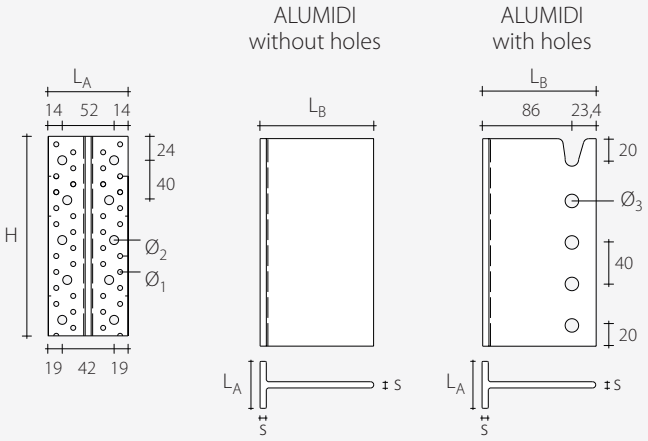
Timber to timber joints
Timber to concrete joints
Steel to timber joints

ADDITIONAL PRODUCTS - FIXINGS

type	description		d [mm]	support	p.
LBA	anker nail		4		364
LBS	screw for plates		5		364
WS	self-drilling dowel		7		368
STA	smooth dowel		12		50
SKR	screw anchor		10		328
VINYLPRO	chemical anchor		M8		346
EPOPLUS	chemical anchor		M8		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)

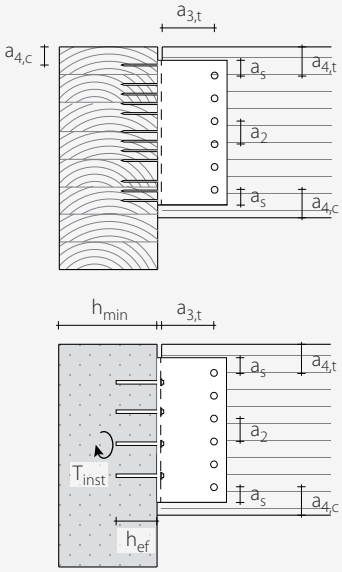
GEOMETRY



			AluMIDI without holes	AluMIDI with hole
Thickness	**s**	[mm]	6	6
Flange width	**L_A**	[mm]	80	80
Web length	**L_B**	[mm]	109,4	109,4
Small flange-holes	**$Ø_1$**	[mm]	5,0	5,0
Large flange-holes	**$Ø_2$**	[mm]	9,0	9,0
Web holes (dowels)	**$Ø_3$**	[mm]	-	13,0

INSTALLATION

MINIMUM DISTANCES



SECONDARY BEAM - TIMBER				self-drilling dowel WS Ø7	smooth dowel STA Ø12
Dowel - Dowel	**a_2**	[mm]	≥ 3 d	≥ 21	≥ 36
Dowel - Beam extrados	**$a_{4,t}$**	[mm]	≥ 4 d	≥ 28	≥ 48
Dowel - Beam intrados	**$a_{4,c}$**	[mm]	≥ 3 d	≥ 21	≥ 36
Dowel – Beam end	**$a_{3,t}$**	[mm]	≥ {7 d; 80}	≥ 80	≥ 80
Dowel – Bracket edge	**a_s**	[mm]	≥ 1,2 d_0 (1)	≥ 10	≥ 16

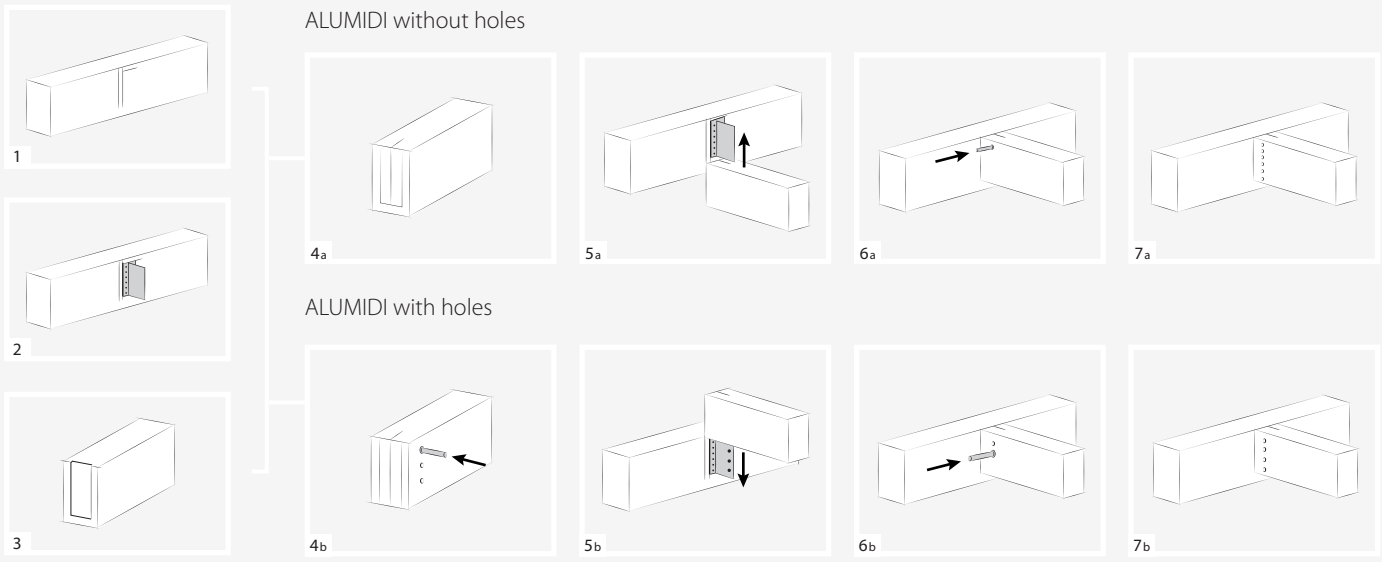
(1) hole diameter

MAIN BEAM - TIMBER				anker nail LBA Ø4	screw LBS Ø5
First connector – Beam extrados	**$a_{4,c}$**	[mm]	≥ 5 d	≥ 20	≥ 25

MAIN BEAM - CONCRETE			chemical anchor VINYLPRO Ø8	screw anchor SKR Ø10
Minimum support thickness	**h_{min}**	[mm]	h_{ef} + 30 mm ≥ 100	110
Concrete hole diameter	**d_0**	[mm]	10	8
Tightening torque	**T_{inst}**	[Nm]	10	25

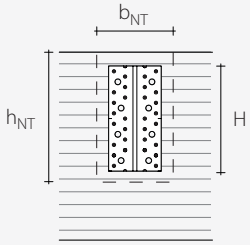
h_{ef} = effective anchoring depth in concrete

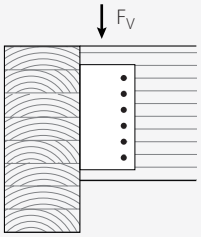
ASSEMBLY



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

TOTAL NAILING





AluMIDI without holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels WS Ø7 [1] [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]	*DIN 1052:1988 V_{adm} [kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]
80	120	120	3 - Ø7 x 113	14	9,1	*540*	14	11,6
120	120	160	4 - Ø7 x 113	22	16,6	*1070*	22	21,5
160	120	200	5 - Ø7 x 113	30	25,7	*1530*	30	32,7
200	120	240	7 - Ø7 x 113	38	36,7	*2030*	38	45,9
240	120	280	9 - Ø7 x 113	46	50,0	*2720*	46	62,4
280 *	140	320	10 - Ø7 x 133	54	64,3	*2890*	54	78,1
320 *	140	360	11 - Ø7 x 133	62	75,7	*3180*	62	87,7
360 *	160	400	12 - Ø7 x 153	70	93,2	*3470*	70	105,8
400 *	160	440	13 - Ø7 x 153	78	106,7	*3867*	78	115,8

* dimension obtainable from ALUMIDI2200

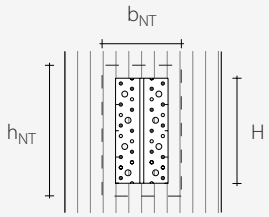
AluMIDI with holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels STA Ø12 [2] [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]	*DIN 1052:1988 V_{adm} [kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]
120	120	160	3 - Ø12 x 120	22	23,1	*1070*	22	25,6
160	120	200	4 - Ø12 x 120	30	34,6	*1820*	30	40,5
200	120	240	5 - Ø12 x 120	38	46,6	*2320*	38	54,9
240	120	280	6 - Ø12 x 120	46	59,8	*3010*	46	68,2
280	140	320	7 - Ø12 x 140	54	77,2	*3390*	54	86,4
320	140	360	8 - Ø12 x 140	62	93,2	*3580*	62	100,9
360	160	400	9 - Ø12 x 160	70	112,0	*3760*	70	123,9
400 *	160	440	10 - Ø12 x 160	78	127,0	*4190*	78	139,8

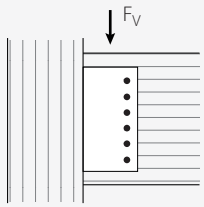
* dimension obtainable from ALUMIDI2200

NOTES – TIMBER TO TIMBER

[1] Self-drilling dowels WS Ø7 ($f_{u,k}$ = 550 N/mm^2).
[2] Smooth dowels STA Ø12 ($f_{u,k}$ = 360 N/mm^2).
[3] Partial nailing 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.
[4] Strength values listed in the table have been evaluated for an angle β = 30% (16,7°) of the secondary joist to the vertical and by considering a precut AluMIDI hidden bracket.
To optimize timber element dimensions and joint strength it is possible to cut the AluMIDI bracket at an angle starting from the AluMIDI2200 model.

PARTIAL NAILING (3)





AluMIDI without holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels WS Ø7 (1) [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]
80	120	120	3 - Ø7 x 113	10	7,4	*393*	10	9,4
120	120	160	4 - Ø7 x 113	14	14,6	*853*	14	15,6
160	120	200	5 - Ø7 x 113	18	20,6	*1143*	18	24,9
200	120	240	7 - Ø7 x 113	22	27,2	*1433*	22	34,7
240	120	280	9 - Ø7 x 113	26	34,4	*1713*	26	44,4
280 *	140	320	9 - Ø7 x 133	30	44,2	*1833*	30	54,7
320 *	140	360	11 - Ø7 x 133	34	54,6	*1963*	34	64,6
360 *	160	400	11 - Ø7 x 153	38	63,5	*2143*	38	74,8
400 *	160	440	13 - Ø7 x 153	42	74,4	*2365*	42	84,0

* dimension obtainable from ALUMIDI2200

AluMIDI with holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels STA Ø12 (2) [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{v,k}$ [kN]
120	120	160	3 - Ø12 x 120	14	18,1	*853*	14	21,4
160	120	200	4 - Ø12 x 120	18	26,2	*1143*	18	30,8
200	120	240	5 - Ø12 x 120	22	34,6	*1433*	22	39,5
240	120	280	6 - Ø12 x 120	26	43,7	*1713*	26	48,2
280	140	320	7 - Ø12 x 140	30	53,5	*1823*	30	63,0
320	140	360	8 - Ø12 x 140	34	63,7	*1963*	34	72,7
360	160	400	9 - Ø12 x 160	38	79,4	*2143*	38	82,3
400*	160	440	10 - Ø12 x 160	42	88,6	*2365*	42	91,7

* dimension obtainable from ALUMIDI2200

All Strength values of the connection system are valid for the calculation hypotheses listed in the table.
For different configurations the free software **myProject** is available (www.rothoblaas.com)

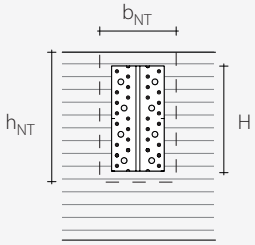
The analysis of various configurations is possible by varying number and type of fasteners, inclination, dimensions and material of the structural elements to maximize the mechanical strength.

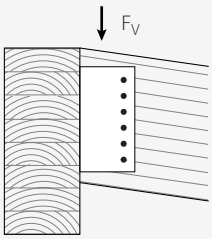
- Possibility of using two different methods of calculation (according to ETA 09/0361 and experimental model
- Wide and diversified variety of ALUMINI, MIDI e MAXI brackets able to satisfy different static requirements

myProject
calculation software by rothoblaas

STATIC VALUES - TIMBER-TO-TIMBER JOINT - INCLINED[4]

TOTAL NAILING





β = 30%

AluMIDI without holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels WS Ø7 [1] [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{V,k}$ [kN]
80	120	140	3 - Ø7 x 113	14	9,1	*540*	14	11,6
120	120	180	4 - Ø7 x 113	22	16,6	*1070*	22	21,5
160	120	220	5 - Ø7 x 113	30	25,7	*1530*	30	32,7
200	120	260	7 - Ø7 x 113	38	36,7	*2030*	38	45,9
240	120	300	9 - Ø7 x 113	46	50,0	*2720*	46	62,4
280 *	140	340	10 - Ø7 x 133	54	64,3	*2890*	54	78,1
320 *	140	380	11 - Ø7 x 133	62	75,7	*3180*	62	87,7
360 *	160	420	12 - Ø7 x 153	70	93,2	*3470*	70	105,8
400 *	160	460	13 - Ø7 x 153	78	106,7	*3867*	78	115,8

* size obtainable from ALUMIDI2200

AluMIDI with holes			SECONDARY BEAM	FIXING THROUGH NAILS			FIXING THROUGH SCREWS	
				MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*	MAIN BEAM	CHARACTERISTIC VALUES
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels STA Ø12 [2] [pcs - Ø x L]	nails LBA Ø4 x 60 [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*	screws LBS Ø5 x 60 [pcs]	EN 1995:2008 $R_{V,k}$ [kN]
120	120	160	3 - Ø12 x 120	22	23,1	*1070*	22	25,6
160	120	200	4 - Ø12 x 120	30	34,6	*1820*	30	40,5
200	120	240	5 - Ø12 x 120	38	46,6	*2320*	38	54,9
240	120	280	6 - Ø12 x 120	46	59,8	*3010*	46	69,2
280	140	320	7 - Ø12 x 140	54	77,2	*3390*	54	89,0
320	140	360	8 - Ø12 x 140	62	93,2	*3580*	62	104,8
360	160	400	9 - Ø12 x 160	70	114,2	*3760*	70	126,1
400 *	160	440	10 - Ø12 x 160	78	127,0	*4190*	78	143,6

* dimension obtainable from ALUMIDI2200

GENERAL PRINCIPLES – TIMBER TO TIMBER

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

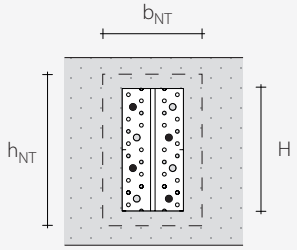
$$R_d = \frac{R_k \cdot k_{mod}}{\gamma_m}$$

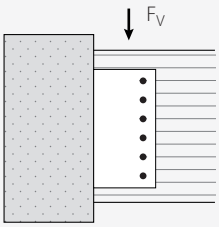
Coefficients γ_m and k_{mod} smust be taken according to the current Standard adopted for the design.

- Admissible values are obtained according to DIN 1052:1988.
- For the calculation process a timber density ρ_k = 380 kg/m^3 has been considereded.
- 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 crossection in correspondence with the bracket location.

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

SCREW ANCHOR [1]





AluMIDI without holes			SECONDARY BEAM	MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels WS Ø7 [2] [pcs - Ø x L]	anchor SKR Ø10 x 80 [4] [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*
80	120	120	2 - Ø7 x 113	2	6,9	*340*
120	120	160	3 - Ø7 x 113	3	11,4	*570*
160	120	200	4 - Ø7 x 113	4	16,0	*800*
200	120	240	5 - Ø7 x 113	5	20,6	*1030*
240	120	280	6 - Ø7 x 113	6	25,2	*1260*
280 *	140	320	7 - Ø7 x 133	7	29,7	*1490*
320 *	140	360	8 - Ø7 x 133	8	34,3	*1720*
360 *	160	400	9 - Ø7 x 153	9	38,9	*1950*
400 *	160	440	10 - Ø7 x 153	10	43,2	*2167*

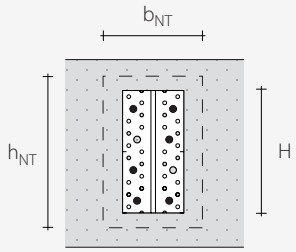
* dimension obtainable from ALUMIDI2200

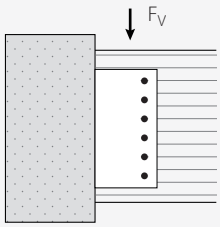
AluMIDI with holes			SECONDARY BEAM	MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels STA Ø12 [3] [pcs - Ø x L]	anchor SKR Ø10 x 80 [4] [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*
120	120	160	3 - Ø12 x 120	3	12,6	*630*
160	120	200	4 - Ø12 x 120	4	17,7	*880*
200	120	240	5 - Ø12 x 120	5	22,8	*1140*
240	120	280	6 - Ø12 x 120	6	27,8	*1390*
280	140	320	7 - Ø12 x 140	7	32,9	*1640*
320	140	360	8 - Ø12 x 140	8	37,9	*1900*
360	160	400	9 - Ø12 x 160	9	43,0	*2150*
400 *	160	440	10 - Ø12 x 160	10	47,8	*2389*

* dimension obtainable from ALUMIDI2200

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

CHEMICAL ANCHOR [1]





AluMIDI without holes			SECONDARY BEAM	MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels WS Ø7 [2] [pcs - Ø x L]	anchor VINYLPRO Ø8 x 110 [5] [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*
80	120	120	3 - Ø7 x 113	4	11,9	*606*
120	120	160	4 - Ø7 x 113	4	19,0	*948*
160	120	200	5 - Ø7 x 113	6	30,3	*1516*
200	120	240	7 - Ø7 x 113	7	37,8	*1894*
240	120	280	9 - Ø7 x 113	8	46,8	*2343*
280 *	140	320	10 - Ø7 x 133	9	54,6	*2724*
320 *	140	360	11 - Ø7 x 133	11	58,5	*2926*
360 *	160	400	12 - Ø7 x 153	12	68,1	*3405*
400 *	160	440	13 - Ø7 x 153	14	78,1	*3906*

* dimension obtainable from ALUMIDI2200

AluMIDI with holes			SECONDARY BEAM	MAIN BEAM	CHARACTERISTIC VALUES	*ADMISSABLE VALUES*
AluMIDI H [mm]	b_{NT} [mm]	h_{NT} [mm]	dowels STA Ø12 [3] [pcs - Ø x L]	anchor VINYLPRO Ø8 x 110 [5] [pcs]	EN 1995:2008 $R_{V,k}$ [kN]	*DIN 1052:1988* V_{adm} *[kg]*
120	120	160	3 - Ø12 x 120	4	19,0	*948*
160	120	200	4 - Ø12 x 120	6	30,3	*1516*
200	120	240	5 - Ø12 x 120	7	37,8	*1894*
240	120	280	6 - Ø12 x 120	8	46,8	*2343*
280	140	320	7 - Ø12 x 140	9	54,6	*2724*
320	140	360	8 - Ø12 x 140	11	58,5	*2926*
360	160	400	9 - Ø12 x 160	12	68,1	*3405*
400 *	160	440	10 - Ø12 x 160	14	78,1	*3906*

* dimension obtainable from ALUMIDI2200

GENERAL PRINCIPLES – TIMBER TO CONCRETE

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

$$R_d = \frac{R_{V,k}}{\gamma_{mc}}$$

  Coefficient γ_{mc} shall be taken as 1.50.
- Admissible values are obtained according to DIN 1052:1988.
- For the calculation process a timber density ρ_k = 380 kg/m^3 and a concrete grade C25/30 have been considered.
- Dimensioning and verification of the timber elements must be carried out separately.
- Strength values of the connection system are valid under the calculation hypotheses listed in the table.

NOTES – TIMBER TO CONCRETE

[1] 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).
[2] Self drilling dowel WS Ø7 ($f_{u,k}$ = 550 N/mm^2).
[3] Smooth dowel STA Ø12 ($f_{u,k}$ = 360 N/mm^2).
[4] Screw anchor SKR according to testing by Politecnico di Milano (Test Certification n. 2006/5205/1).
[5] Chemical anchor VINYLPRO with steel threaded rods (type INA) of minimum strength grade equal to 5.8.with h_{ef} = 90 mm.

LABORATORY TESTING

EXPERIMENTAL INVESTIGATION

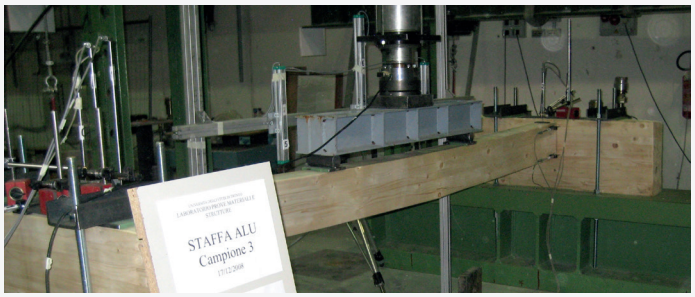
A comprehensive experimental campaign aimed at defining the real behaviour of the ALU brackets was carried out in collaboration the University of Trento. A numerical model has then been proposed and validated on the experimental results (rothoblaas experimental method).

RESEARCH AND DEVELOPMENT

Experimental investigation – Laboratorio Prove Materiali e Strutture (LPMS - Faculty of Engineering, Trento)

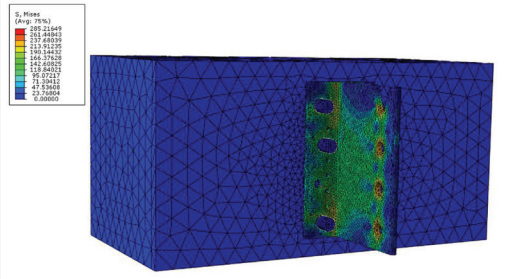
Tests on specimens with reduced dimensions (timber-to-timber and timber-to-concrete)

Tests on full-scale specimens (main-secondary joint)

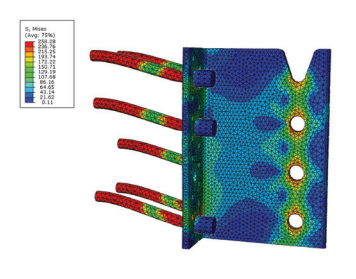


NUMERICAL MODELING

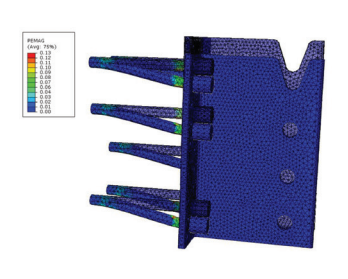
Investigation on the plastic deformation history of dowels and ALU brackets through finite element analysis.



Solid model of Alu bracket on concrete



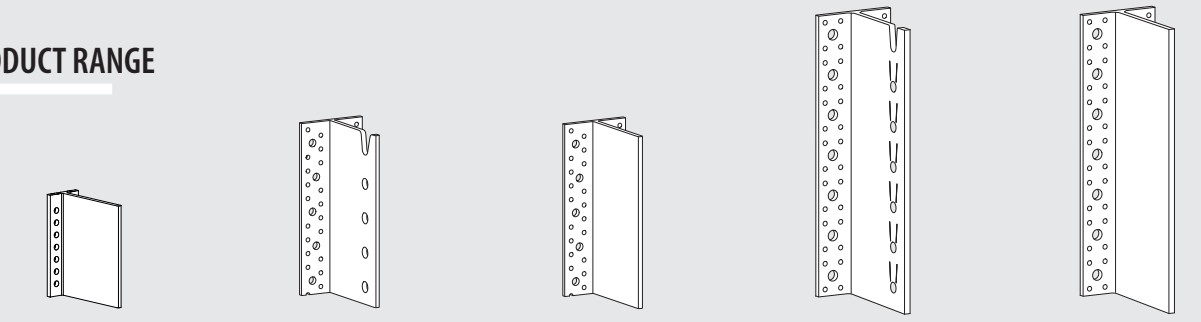
Mises stress history on dowels and ALU bracket



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

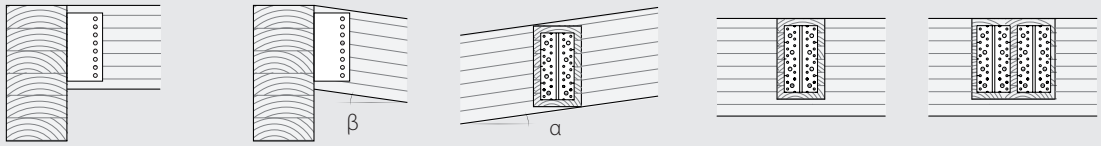
JOINTS WITH ALU BRACKETS

PRODUCT RANGE



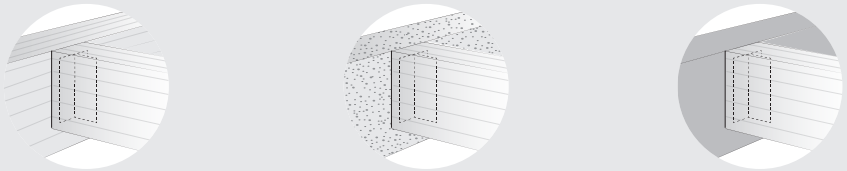
APPLICATIONS

GEOMETRY



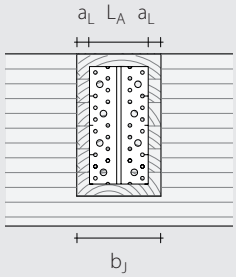
PERPENDICULAR JOINT | INCLINED JOINTS | SINGLE BRACKET | DOUBLE BRACKET

MATERIAL



TIMBER / TIMBER | TIMBER / CONCRETE | STEEL / TIMBER

INSTALLATION – Minimum dimensions for timber elements in hidden bracket joints



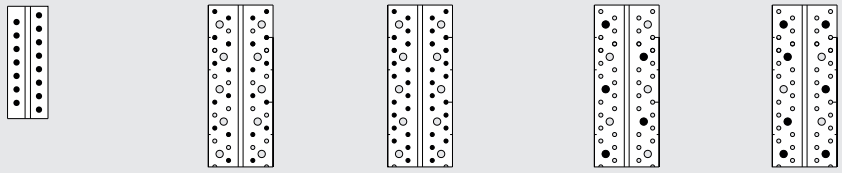
			self-drilling dowel WS			smooth dowel STA		
			AluMINI	AluMIDI	AluMAXI	AluMINI	AluMIDI	AluMAXI
wing width	L_A	[mm]	45	80	130	45	80	130
bracket - timber edge	a_L	[mm]	≥ 10	≥ 10	≥ 15	≥ 10	≥ 10	≥ 15
joist width (1)	b_J	[mm]	≥ 80	≥ 100 (2)	≥ 160	≥ 70	≥ 100 (2)	≥ 150
dowel	Ø	[mm]	7			8	12	16
	L	[mm]	length 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

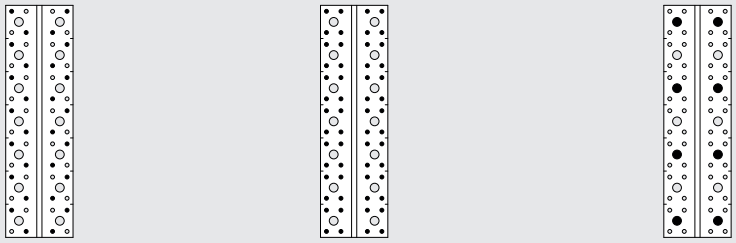
(2) Lateral distance to the edge of the timber element < 10 mm, thus particolar care is suggested when realizing the grooving

INSTALLATION – Fixing types and positioning

	AluMINI	AluMIDI			
APPLICATION	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



	AluMAXI		
APPLICATION	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

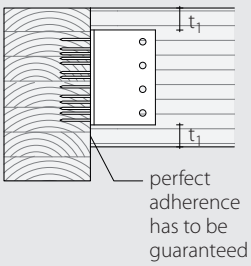


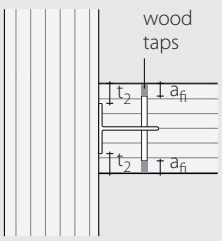
FIRE RESISTANCE - Connections (EN1995-1-2 §6.2.1)

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	a_{fi} [mm] 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