SBD

SELF-DRILLING DOWEL

BIT INCLUDED | MY PROJECT SOFTWARE | VIDEO | CE EN 14592

STEEL AND ALUMINUM

Special self-perforating timber-metal tip geometry that reduces the possibility of breakage. The cylindrical countersunk head ensures an optimal appearance and meets fire-resistance requisites.

INCREASED DIAMETER

The diameter of 7,5 mm ensures a shear resistance of over 15 % and enables optimisation of the number of fasteners.

DOUBLE THREAD

The thread up against the tip (b_1) facilitates screwing. The increased length of the under head thread (b_2) makes for fast, accurate closure.

CHARACTERISTICS

FOCUS	self-drilling, timber-metal-timber
HEAD	cylindrical, countersunk
DIAMETER	7,5 mm
LENGTH	from 55 mm to 235 mm

MATERIAL

Galvanized carbon steel.

FIELDS OF USE

Self-drilling system for concealed timber-steel joints. Can be used with screw guns running at 600-1500 rpm with:

- steel S235 ≤ 10,0 mm
- steel S275 ≤ 8.0 mm
- steel S355 ≤ 6.0 mm
- Alumini, Alumidi and Alumaxi brackets

Service classes 1 and 2.

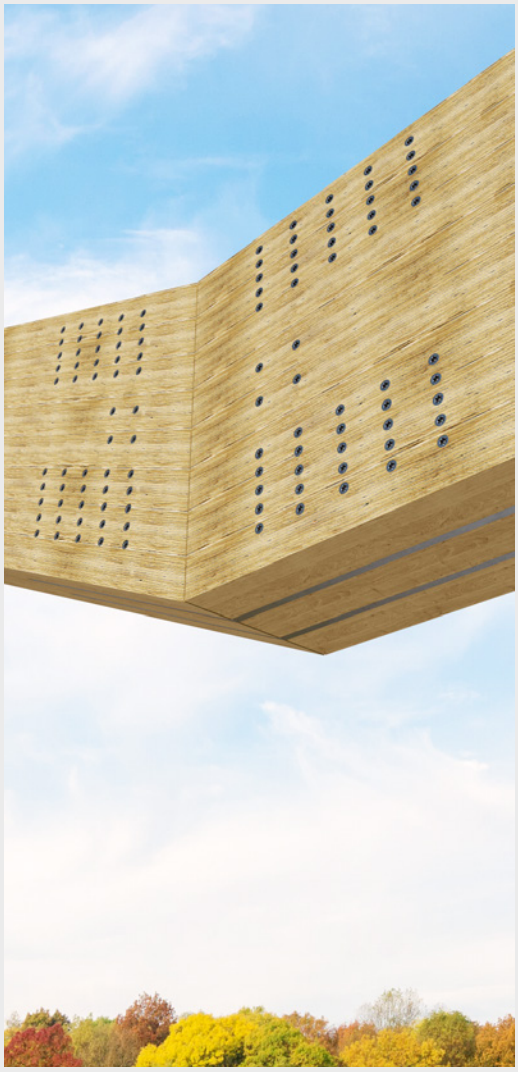
KNEE BEAM

Ideal for joining head beams and making continuous beams, restoring shear forces and momentum. The small dowel diameter guarantees joints that offer high stiffness.

MOMENT RESISTING JOINT

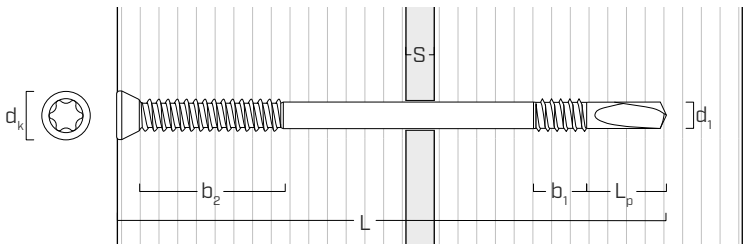
Also certified, tested and calculated for fastening standard Rothoblaas plates such as the TYP X pillar-holder.

Fastening of Rothoblaas pillar-holder with internal knife plate F70,



Rigid "knee" joint with double internal plate (LVL).

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	**d_1**	**[mm]**	**7,5**
Head diameter	d_k	[mm]	11,0
Tip length	L_p	[mm]	19,0
Effective length	L_{eff}	[mm]	L - 8,0
Characteristic yield moment	$M_{y,k}$	[Nmm]	42000

CODES AND DIMENSIONS

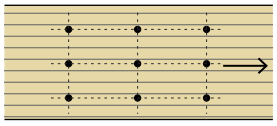
d_1 [mm]	CODE	L [mm]	b_2 [mm]	b_1 [mm]	pcs
7,5 TX 40	SBD7555	55	10	-	50
	SBD7575	75	10	15	50
	SBD7595	95	20	15	50
	SBD75115	115	20	15	50
	SBD75135	135	20	15	50
	SBD75155	155	20	15	50
	SBD75175	175	40	15	50
	SBD75195	195	40	15	50
	SBD75215	215	40	15	50
	SBD75235	235	40	15	50

PLATES THICKNESS

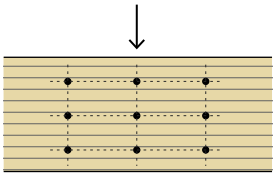
plate [mm]	max. thickness single plate [mm]	max. thickness double plate [mm]
S235 steel	10,0	8,0
S275 steel	8,0	6,0
S355 steel	6,0	5,0
ALUMINI	6,0	-
ALUMIDI	6,0	-
ALUMAXI	10,0	-

Timber - metal plate - timber shear joint
Recommended pressure: ≈ 40 kg
Recommended screwing: ≈ 1000 - 1500 rpm (steel plate)
≈ 600 - 1000 rpm (aluminium plate)

MINIMUM DISTANCES FOR CONNECTORS SUBJECTED TO SHEAR STRESS [1]



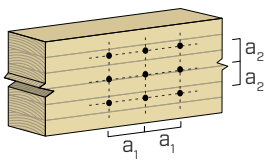
Load-to-grain angle α = 0°



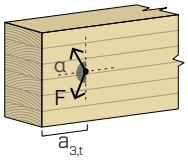
Load-to-grain angle α = 90°

			7,5		7,5
a_1	[mm]	5·d	38	3·d	23
a_2	[mm]	3·d	23	3·d	23
$a_{3,t}$	[mm]	max (7·d; 80)	80	max (7·d; 80)	80
$a_{3,c}$	[mm]	max (3,5·d; 40)	40	max (3,5·d; 40)	40
$a_{4,t}$	[mm]	3·d	23	4·d	30
$a_{4,c}$	[mm]	3·d	23	3·d	23

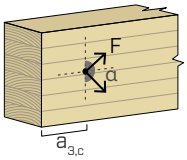
d = nominal screw diameter



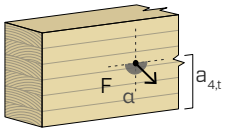
stressed end
-90° < α < 90°



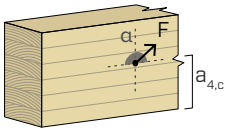
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°



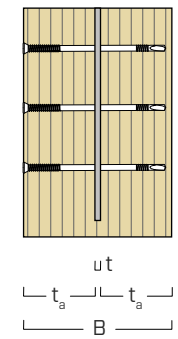
NOTES:

(1) Minimum distances in accordance with EN 1995:2014.

TIMBER-TO-STEEL STATIC VALUES

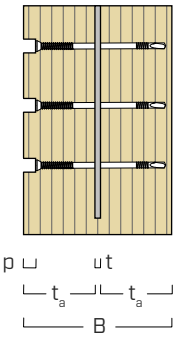
SHEAR $R_{V,k}$

1 INTERNAL PLATE (2 shear planes) - DOWEL HEAD INSTALLATION DEPTH 0 mm



FASTENING	SBD	[mm]	7,5x55	7,5x75	7,5x95	7,5x115	7,5x135	7,5x155	7,5x175	7,5x195	7,5x215	7,5x235
Beam width	B	[mm]	60	80	100	120	140	160	180	200	220	240
Head insertion depth	p	[mm]	0	0	0	0	0	0	0	0	0	0
Exterior wood	t_a	[mm]	27	37	47	57	67	77	87	97	107	117
$R_{V,k}$ [kN]	load-to-grain angle	0°	6,96	8,67	9,50	10,62	11,91	12,83	13,30	13,30	13,30	13,30
		30°	6,42	8,10	8,79	9,75	10,87	11,93	12,55	12,59	12,59	12,59
		45°	5,98	7,64	8,21	9,04	10,02	11,10	11,74	11,99	11,99	11,99
		60°	5,61	7,26	7,72	8,45	9,32	10,29	11,05	11,46	11,46	11,46
		90°	5,29	6,81	7,31	7,95	8,73	9,60	10,45	10,93	11,00	11,00

1 INTERNAL PLATE (2 shear planes) - DOWEL HEAD INSTALLATION DEPTH 15 mm



FASTENING	SBD	[mm]	7,5x55	7,5x75	7,5x95	7,5x115	7,5x135	7,5x155	7,5x175	7,5x195	7,5x215	7,5x235
Beam width	B	[mm]	80	100	120	140	160	180	200	220	240	-
Head insertion depth	p	[mm]	15	15	15	15	15	15	15	15	15	-
Exterior wood	t_a	[mm]	22	32	42	52	62	72	82	92	102	-
$R_{V,k}$ [kN]	load-to-grain angle	0°	7,88	8,57	9,45	10,59	11,89	13,18	13,30	13,30	13,30	-
		30°	7,26	8,01	8,74	9,72	10,85	12,07	12,59	12,59	12,59	-
		45°	6,63	7,56	8,16	9,01	10,00	11,09	11,99	11,99	11,99	-
		60°	6,06	7,17	7,68	8,42	9,30	10,27	11,30	11,46	11,46	-
		90°	5,58	6,85	7,27	7,92	8,71	9,59	10,52	11,00	11,00	-

CORRECTIVE COEFFICIENT k_F FOR DIFFERENT DENSITIES ρ_k

Strength class	C24	GL22h	C30	C40 / GL32c	GL28h	D24	D30
ρ_k [kg/m^3]	350	370	380	400	425	485	530
k_F	0,92	0,96	0,99	1,02	1,06	1,14	1,20

For different densities ρ_k the wood-side design resistance is calculated as: $R'_{V,d} = R_{V,d} \cdot k_F$.

EFFECTIVE NUMBER OF DOWELS n_{ef} FOR $\alpha = 0°$

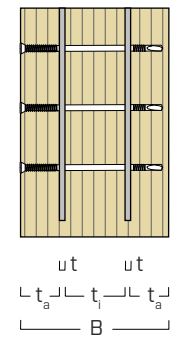
		a_1 [mm]								
	SBD no.	40	50	60	70	80	90	100	120	140
n_{ef}	2	1,49	1,58	1,65	1,72	1,78	1,83	1,88	1,97	2,00
	3	,15	2,27	2,38	2,47	2,56	2,63	2,70	2,83	2,94
	4	2,79	2,95	3,08	3,21	3,31	3,41	3,50	3,67	3,81
	5	3,41	3,60	3,77	3,92	4,05	4,17	4,28	4,48	4,66
	6	4,01	4,24	4,44	4,62	4,77	4,92	5,05	5,28	5,49
	7	4,61	4,88	5,10	5,30	5,48	5,65	5,80	6,07	6,31

In the case of multiple dowels placed parallel to the fibres, the effective number must be taken into account: $R'_{V,d} = R_{V,d} \cdot k_F$.

TIMBER-TO-STEEL STATIC VALUES

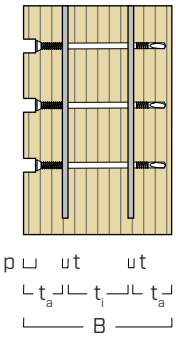
SHEAR $R_{V,k}$

2 INTERNAL PLATES (4 shear planes) - DOWEL HEAD INSTALLATION DEPTH 0 mm



FASTENING	SBD	[mm]	7,5x55	7,5x75	7,5x95	7,5x115	7,5x135	7,5x155	7,5x175	7,5x195	7,5x215	7,5x235
Beam width	B	[mm]	-	-	-	-	140	160	180	200	220	240
Head insertion depth	p	[mm]	-	-	-	-	0	0	0	0	0	0
Exterior wood	t_a	[mm]	-	-	-	-	37	42	48	56	66	74
Interior wood	t_i	[mm]	-	-	-	-	54	64	72	76	76	80
$R_{V,k}$ [kN]	load-to-grain angle	0°	-	-	-	-	19,42	21,40	22,90	23,80	25,08	25,93
		30°	-	-	-	-	17,74	19,67	21,13	22,24	23,35	24,30
		45°	-	-	-	-	16,38	18,23	19,54	20,66	21,63	22,76
		60°	-	-	-	-	15,24	16,91	18,21	19,20	20,06	21,24
		90°	-	-	-	-	14,16	15,79	17,09	17,97	18,74	19,80

2 INTERNAL PLATES (4 shear planes) - DOWEL HEAD INSTALLATION DEPTH 10 mm



FASTENING	SBD	[mm]	7,5x55	7,5x75	7,5x95	7,5x115	7,5x135	7,5x155	7,5x175	7,5x195	7,5x215	7,5x235
Beam width	B	[mm]	-	-	-	140	160	180	200	220	240	-
Head insertion depth	p	[mm]	-	-	-	10	10	10	10	10	10	-
Exterior wood	t_a	[mm]	-	-	-	27	32	38	46	56	64	-
Interior wood	t_i	[mm]	-	-	-	54	64	72	76	76	80	-
$R_{V,k}$ [kN]	load-to-grain angle	0°	-	-	-	17,72	20,49	22,03	22,70	23,80	24,81	-
		30°	-	-	-	16,06	18,71	20,41	21,30	22,24	23,11	-
		45°	-	-	-	14,71	17,23	18,94	19,85	20,66	21,70	-
		60°	-	-	-	13,59	15,88	17,71	18,50	19,20	20,30	-
		90°	-	-	-	12,65	14,74	16,67	17,36	17,97	18,96	-

GENERAL PRINCIPLES:

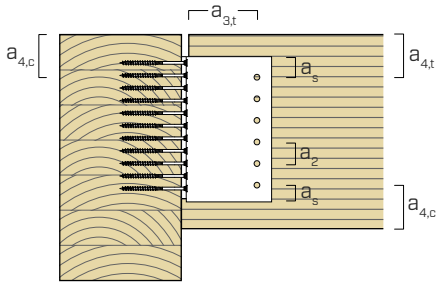
- Characteristic values according to EN 1995:2014.
- Design values can be obtained from characteristic values as follows:

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

The coefficients γ_m and k_{mod} should be taken according to the current regulations used for the calculation.

- The values provided are calculated using 5 mm thick plates, a 6 mm thick milled cut in the timber and a single SBD dowel.
- For the calculation process a timber characteristic density ρ_k = 385 kg/m³ has been considered.
- Sizing and verification of the wooden elements and metal plates must be done separately.

MINIMUM FASTENING DISTANCES ON ALUMINI AND ALUMIDI BRACKETS



Timber-to-timber joint.

SECONDARY BEAM - TIMBER				self-drilling dowel SBD Ø 7,5
Dowel - dowel	a_2	[mm]	≥ 3 d	≥ 23
Dowel - beam extrados	$a_{4,t}$	[mm]	≥ 4 d	≥ 30
Dowel - beam intrados	$a_{4,c}$	[mm]	≥ 3 d	≥ 23
Dowel – beam end	$a_{3,t}$	[mm]	≥ {7 d; 80}	≥ 80
Dowel – bracket edge	a_s	[mm]	≥ 1,2 d_f (1)	≥ 10

(1) hole diameter

ALUMINI MAIN BEAM - TIMBER				screw HBS P EVO Ø5
First connector - beam extrados	$a_{4,c}$	[mm]	≥ 5 d	≥ 25

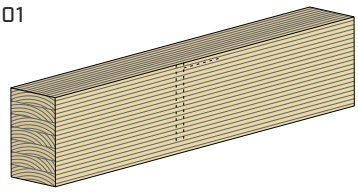
ALUMIDI MAIN BEAM - TIMBER				nail LBA Ø4	screw LBS Ø5
First connector - beam extrados	$a_{4,c}$	[mm]	≥ 5 d	≥ 25	

INSTALLATION

Video available on our YouTube channel

VIDEO

01



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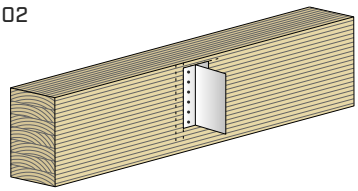

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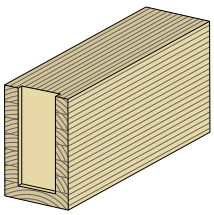

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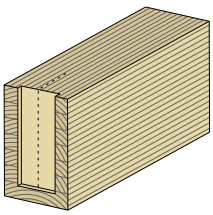

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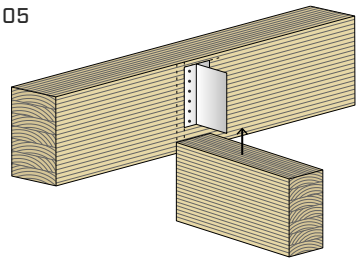

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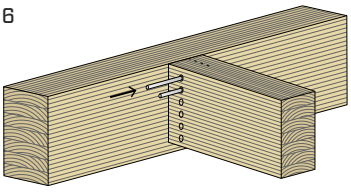

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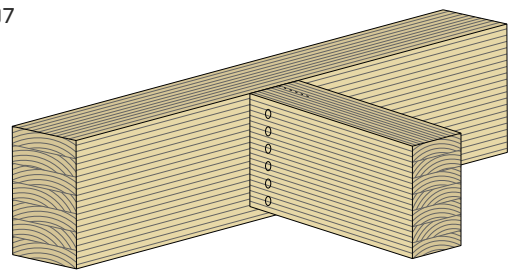


GENERAL PRINCIPLES:

- The characteristic values comply with the EN 1995:2014 standard in accordance with ETA-09/0361 and for the ALUMIDI bracket are assessed using the Rothoblaas experimental method.
- For timber-to-timber joints, design values are obtained from the following characteristic values:

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

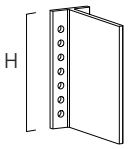
The coefficients γ_m and k_{mod} should be taken according to the current regulations used for the calculation.

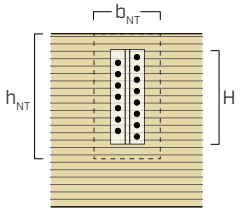
- Resistance values for the fastening system are valid for the calculation examples shown in the table.
- For the calculation process a timber characteristic density ρ_k = 385 kg/m³ has been considered.

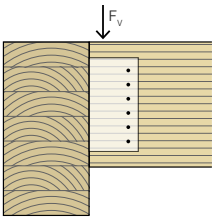
STATIC VALUES - CONCEALED ALU BRACKET

ALUMINI - TIMBER-TO-TIMBER JOINT

ALUMINI





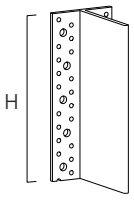


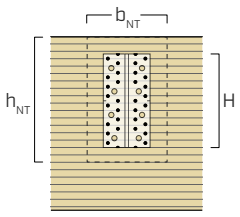
ALUMINI		secondary beam			main beam	characteristic values
CODE	H	b_{NT}	h_{NT}	dowels SBD Ø7,5 (1)	nails LBA Ø4 x 60	EN 1995:2014 $R_{V,k}$
[mm]	[mm]	[mm]	[mm]	[pcs Ø x L]	[pcs]	[kN]
ALUMINI65	65	60	90	2 - Ø7,5 x 55	7	2,3
ALUMINI95	95	60	120	3 - Ø7,5 x 55	11	5,7
ALUMINI125	125	60	150	4 - Ø7,5 x 55	15	10,4
ALUMINI155	155	60	180	5 - Ø7,5 x 55	19	16,3
ALUMINI185	185	60	210	6 - Ø7,5 x 55	23	23,2

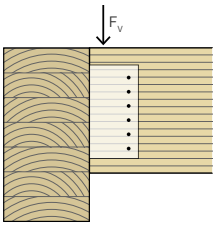
(1) Use of SBD dowels longer than those in the table is allowed, without affecting the overall resistance of the connection (failure on main-beam side). In this case, the minimum dimensions of the wood elements must be reassessed

ALUMIDI - TIMBER/TIMBER CONNECTION

ALUMIDI WITHOUT HOLES - TOTAL NAILING







ALUMIDI				secondary beam	fastening through nails: main beam	fastening through nails: characteristic values	fastening through screws: main beam	fastening through screws: characteristic values
CODE	H	b_{NT}	h_{NT}	dowels SBD Ø7,5	nails LBA Ø4 x 60	EN 1995:2014 $R_{V,k}$	screws LBS Ø5 x 60	EN 1995:2014 $R_{V,k}$
[mm]	[mm]	[mm]	[mm]	[pcs Ø x L]	[pcs]	[kN]	[pcs]	[kN]
ALUMIDI80	80	80	120	2 - Ø7,5 x 75	14	8,23	14	10,12
		120	120	3 - Ø7,5 x 115		10,01		12,35
ALUMIDI120	120	80	160	3 - Ø7,5 x 75	22	15,04	22	18,84
		120	160	4 - Ø7,5 x 115		18,38		22,92
ALUMIDI160	160	100	200	4 - Ø7,5 x 95	30	24,81	30	29,40
		120	200	5 - Ø7,5 x 115		27,44		34,78
ALUMIDI200	200	100	240	5 - Ø7,5 x 95	38	34,78	38	38,28
		120	240	6 - Ø7,5 x 115		38,27		46,24
ALUMIDI240	240	120	280	7 - Ø7,5 x 115	46	49,79	46	58,48
		140	280	8 - Ø7,5 x 135		54,61		64,98
ALUMIDI2200	280 *	140	320	8 - Ø7,5 x 135	54	64,92	54	73,63
		160	320	9 - Ø7,5 x 155		69,38		84,96
ALUMIDI2200	320 *	160	360	9 - Ø7,5 x 155	62	79,94	62	90,80
		180	360	10 - Ø7,5 x 175		84,86		102,44
ALUMIDI2200	360 *	160	400	10 - Ø7,5 x 155	70	94,22	70	101,68
		180	400	11 - Ø7,5 x 175		98,80		116,93
ALUMIDI2200	400 *	160	440	11 - Ø7,5 x 155	78	105,23	78	112,82
		180	440	12 - Ø7,5 x 175		114,12		134,19