HBS PLATE EVO

PAN HEAD SCREW

BIT INCLUDED | MY PROJECT SOFTWARE | C4 EVO COATING | CE ETA-11/0030

HBS P EVO

Designed for outdoor steel-to-timber joints: the thickness of the shoulder screw is increased for completely safe, reliable fastening plates to the timber. The small sizes (5,0 and 6,0 mm) are also ideal for timber-to-timber joints.

C4 EVO COATING

20 µm multilayer coating with a surface treatment of epoxy resin and aluminium flakes. No rust after 1440 hours of salt spray exposure, as per ISO 9227. Can be used in service class 3 outdoor applications and under class C4 atmospheric corrosion conditions.

AGGRESSIVE WOODS

Ideal for applications with woods containing tannin or treated with impregnating agents or other chemical processes.

CHARACTERISTICS

FOCUS	corrosiveness class C4
HEAD	shoulder for plate
DIAMETER	from 5,0 to 10,0 mm
LENGTH	from 40 to 180 mm

MATERIAL

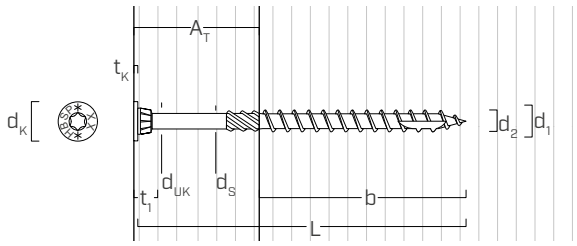
Carbon steel, with a 20 µm coating, highly resistant to corrosion.

FIELDS OF USE

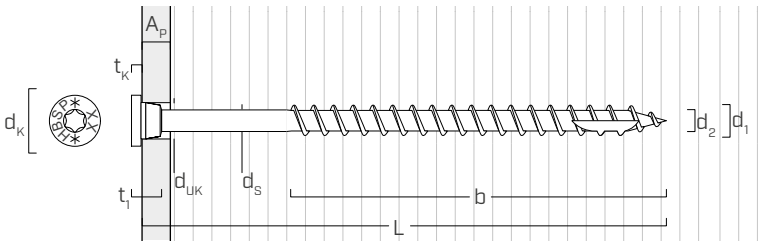
- timber based panels
- solid timber and glulam
- CLT, LVL
- high density woods
- aggressive woods (containing tannin)
- chemically treated woods

Service classes 1, 2 and 3.

GEOMETRY AND MECHANICAL CHARACTERISTICS



HBS P EVO - 5,0 | 6,0 mm



HBS P EVO - 8,0 | 10,0 mm

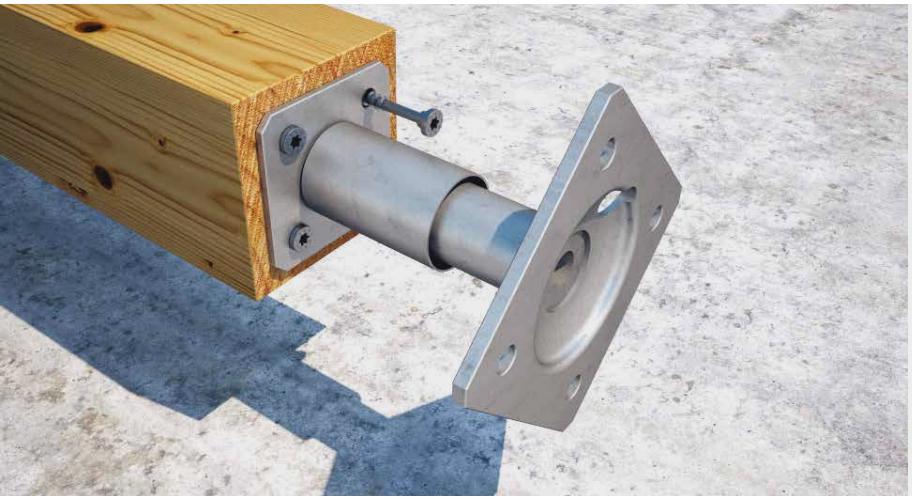
Nominal diameter	**d_1**	**[mm]**	**5**	**6**	**8**	**10**
Head diameter	d_K	[mm]	9,65	12,00	14,50	18,25
Tip diameter	d_2	[mm]	3,40	3,95	5,40	6,40
Shank diameter	d_S	[mm]	3,65	4,30	5,80	7,00
Head thickness	t_1	[mm]	5,50	6,50	8,00	10,00
Washer thickness	t_K	[mm]	1,00	1,50	3,40	4,35
Underhead diameter	d_{UK}	[mm]	6,0	8,0	10,00	12,00
Pre-drilling hole diameter(1)	d_V	[mm]	3,0	4,0	5,0	6,0
Characteristic yield moment	$M_{y,k}$	[Nm]	5,4	9,5	20,1	35,8
Characteristic withdrawal-resistance parameter(2)	$f_{ax,k}$	[N/mm²]	11,7	11,7	11,7	11,7
Associated density	ρ_a	[kg/m³]	350	350	350	350
Characteristic head-pull-through parameter(2)	$f_{head,k}$	[N/mm²]	10,5	10,5	10,5	10,5
Associated density	ρ_a	[kg/m³]	350	350	350	350
Characteristic tensile strength	$f_{tens,k}$	[kN]	7,9	11,3	20,1	31,4

(1) Pre-drilling valid for softwood.
(2) Valid for softwood - maximum density 440 kg/m³.
For applications with different materials or with high density please see ETA-11/0030.

CODES AND DIMENSIONS

d_1 [mm] *[in]*	CODE	L [mm]	L *[in]*	b [mm]	A_T [mm]	A_P [mm]	pcs
5 *0.20* **TX 25**	**HBSPEVO550**	50	*1 15/16*	30	20	1.0 ÷ 10.0	200
	HBSPEVO560	60	*2 3/8*	35	25	1.0 ÷ 10.0	200
	HBSPEVO570	70	*2 3/4*	40	30	1.0 ÷ 10.0	100
	HBSPEVO580	80	*3 1/8*	50	30	1.0 ÷ 10.0	100
6 *0.24* **TX 30**	**HBSPEVO680**	80	*3 1/8*	50	30	1.0 ÷ 10.0	100
	HBSPEVO690	90	*3 1/2*	55	35	1.0 ÷ 10.0	100
8 *0.32* **TX 40**	**HBSPEVO840**	40	*1 9/16*	32	-	1.0 ÷ 15.0	100
	HBSPEVO860	60	*2 3/8*	52	-	1.0 ÷ 15.0	100
	HBSPEVO880	80	*3 1/8*	55	-	1.0 ÷ 15.0	100
	HBSPEVO8100	100	*4*	75	-	1.0 ÷ 15.0	100

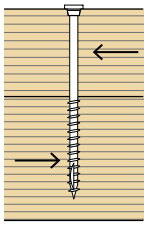
d_1 [mm] *[in]*	CODE	L [mm]	L *[in]*	b [mm]	A_P [mm]	pcs
8 *0.32* **TX 40**	**HBSPEVO8120**	120	*4 3/4*	95	1.0 ÷ 15.0	100
	HBSPEVO8140	140	*5 1/2*	110	1,0 ÷ 20,0	100
	HBSPEVO8160	160	*6 1/4*	130	1,0 ÷ 20,0	100
10 *0.40* **TX 40**	**HBSPEVO1060**	60	*2 3/8*	52	1.0 ÷ 15.0	50
	HBSPEVO1080	80	*3 1/8*	60	1.0 ÷ 15.0	50
	HBSPEVO10100	100	*4*	75	1.0 ÷ 15.0	50
	HBSPEVO10120	120	*4 3/4*	95	1.0 ÷ 15.0	50
	HBSPEVO10140	140	*5 1/2*	110	1,0 ÷ 20,0	50
	HBSPEVO10160	160	*6 1/4*	130	1,0 ÷ 20,0	50
	HBSPEVO10180	180	*7 1/8*	150	1,0 ÷ 20,0	50



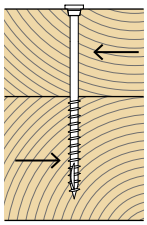
TYP R

Ideal for fastening standard Rothoblaas plates in outdoor environments.
The 5 mm diameter version is ideal for fastening patio deck planks.

MINIMUM DISTANCES FOR SHEAR LOADS



Load-to-grain angle α = 0°

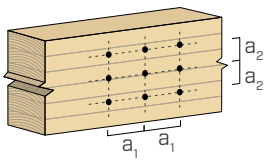


Load-to-grain angle α = 90°

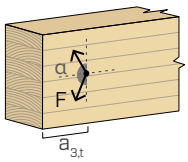
		SCREWS INSERTED WITH PRE-DRILLING HOLE					SCREWS INSERTED WITH PRE-DRILLING HOLE				
d_1	[mm]		5	6	8	10		5	6	8	10
a_1	[mm]	**5·d**	25	30	40	50	**4·d**	20	24	32	40
a_2	[mm]	**3·d**	15	18	24	30	**4·d**	20	24	32	40
$a_{3,t}$	[mm]	**12·d**	60	72	96	120	**7·d**	35	42	56	70
$a_{3,c}$	[mm]	**7·d**	35	42	56	70	**7·d**	35	42	56	70
$a_{4,t}$	[mm]	**3·d**	15	18	24	30	**7·d**	35	42	56	70
$a_{4,c}$	[mm]	**3·d**	15	18	24	30	**3·d**	15	18	24	30

		SCREWS INSERTED WITHOUT PRE-DRILLING HOLE					SCREWS INSERTED WITHOUT PRE-DRILLING HOLE				
d_1	[mm]		5	6	8	10		5	6	8	10
a_1	[mm]	**12·d**	60	72	96	120	**5·d**	25	30	40	50
a_2	[mm]	**5·d**	25	30	40	50	**5·d**	25	30	40	50
$a_{3,t}$	[mm]	**15·d**	75	90	120	150	**10·d**	50	60	80	100
$a_{3,c}$	[mm]	**10·d**	50	60	80	100	**10·d**	50	60	80	100
$a_{4,t}$	[mm]	**5·d**	25	30	40	50	**10·d**	50	60	80	100
$a_{4,c}$	[mm]	**5·d**	25	30	40	50	**5·d**	25	30	40	50

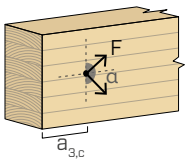
d = nominal screw diameter



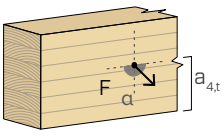
stressed end
-90° < α < 90°



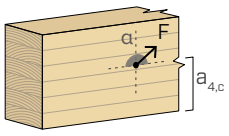
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

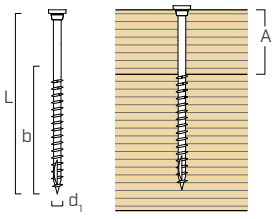
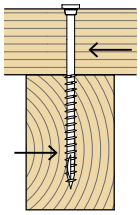
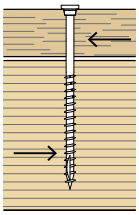
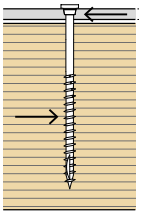
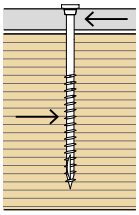
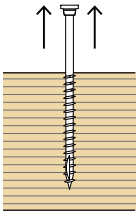
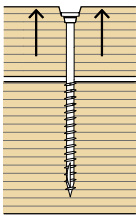


NOTES:

- Minimum distances are in accordance with EN 1995:2014 as per ETA-11/0030 considering a timber characteristic density of $\rho_k \leq 420$ kg/m^3.
- In the case of joints with elements in Douglas fir, the minimum spacing and distances parallel to the grain must be multiplied by a coefficient of 1.5.
- The minimum spacing for all steel-to-timber connections (a_1, a_2) can be multiplied by a coefficient of 0,7.
- The minimum spacing for all panel-to-timber connections(a_1, a_2) can be multiplied by a coefficient of 0,85.

STATIC VALUES

CHARACTERISTIC VALUES
EN 1995:2014

geometry				SHEAR								TENSION	
				timber-to-timber	panel-to-timber[1]			thin steel-timber plate[2]		thick steel-timber plate[3]		thread withdrawal[4]	head pull-through [5]
													
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]		$R_{V,k}$ [kN]		$R_{V,k}$ [kN]		$R_{V,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
5	50	30	20	1,29	S_{PAN} = 9 mm	1,05	S_{PAN} = 12 mm	1,12	S_{PLATE} = 2,5 mm	1,74	S_{PLATE} = 5,0 mm	2,25	2,03	1,13
	60	35	25	1,43		1,05		1,12		1,82		2,33	2,37	1,13
	70	40	30	1,51		1,05		1,12		1,91		2,42	2,71	1,13
	80	50	30	1,51		1,05		1,12		2,08		2,59	3,38	1,13
6	80	50	30	2,02	S_{PAN} = 12 mm	1,51	S_{PAN} = 15 mm	1,58	S_{PLATE} = 3,0 mm	2,76	S_{PLATE} = 6,0 mm	3,48	4,06	1,75
	90	55	35	2,18		1,51		1,58		2,86		3,58	4,47	1,75
8	40	32	8	1,18	S_{PAN} = 15 mm	-	S_{PAN} = 18 mm	-	S_{PLATE} = 4,0 mm	2,13	S_{PLATE} = 8,0 mm	3,66	3,47	2,55
	60	52	8	1,18		-		-		3,31		5,12	5,63	2,55
	80	55	25	2,67		2,32		2,38		4,29		5,45	5,96	2,55
	100	75	25	2,67		2,32		2,38		4,83		5,99	8,12	2,55
	120	95	25	2,67		2,32		2,38		5,37		6,53	10,29	2,55
	140	110	30	2,83		2,32		2,38		5,60		6,94	11,91	2,55
	160	130	30	2,83		2,32		2,38		5,60		7,48	14,08	2,55
10	60	52	8	1,38	S_{PAN} = 15 mm	-	S_{PAN} = 18 mm	-	S_{PLATE} = 5,0 mm	3,80	S_{PLATE} = 10,0 mm	6,31	7,04	4,05
	80	60	20	3,45		2,55		3,12		5,18		7,74	8,12	4,05
	100	75	25	3,77		2,55		3,12		6,56		8,26	10,15	4,05
	120	95	25	3,77		2,55		3,12		7,26		8,93	12,86	4,05
	140	110	30	3,91		2,55		3,12		7,77		9,44	14,89	4,05
	160	130	30	3,91		2,55		3,12		8,09		10,12	17,60	4,05
	180	150	30	3,91		2,55		3,12		8,09		10,80	20,31	4,05

NOTES:

(1) The characteristic shear resistances are calculated considering an OSB3 or OSB4 panel, as per EN 300, or a particle board panel, as per EN 312, with thickness S_{PAN}.

(2) The shear resistance characteristics are calculated considering the case of a thin plate ($S_{PLATE} \leq 0,5\ d_1$).

(3) The shear resistance characteristics are calculated considering the case of a thick plate ($S_{PLATE} \geq d_1$).

(4) The axial thread withdrawal resistance was calculated considering a 90° angle between the grain and the connector and for a fixing length of b.

(5) The axial resistance to head pull-through was calculated using timber elements.

In the case of steel-to-timber connections, generally the steel tensile strength is binding with respect to head separation or pull-through.

GENERAL PRINCIPLES:

- Characteristic values comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- 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.
- For the mechanical resistance values and the geometry of the screws, reference was made to ETA-11/0030.
- For the calculation process a timber characteristic density ρ_k = 420 kg/m^3 has been considered.
- Values were calculated considering the threaded part as being completely inserted into the wood.
- Sizing and verification of the timber elements, panels and steel plates must be done separately.
- The characteristic shear resistances are calculated for screws inserted without pre-drilling hole. In the case of screws inserted with pre-drilling hole, greater resistance values can be obtained.
- For different calculation configurations, the MyProject software is available (www.rothoblaas.com).