HBS EVO

COUNTERSUNK SCREW

AC233 | AC257
ESR-4645

BIT INCLUDED

SOFTWARE

COATING

ETA-11/0030

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.

STRUCTURAL APPLICATIONS

Approved for structural applications subject to stresses in any direction vs. the grain (α = 0° - 90°). Asymmetric "umbrella" threading for better timber pull-through.

SUPERIOR STRENGTH

Steel with superb yield and failure strength ($f_{y,k}$ = 1000 N/mm²). Very high torsional strength $_{ftor,k}$ for safer screwing.

CHARACTERISTICS

FOCUS	corrosiveness class C4
HEAD	countersunk with under-head ribs
DIAMETER	from 4,5 to 8,0 mm
LENGTH	from 45 to 320 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

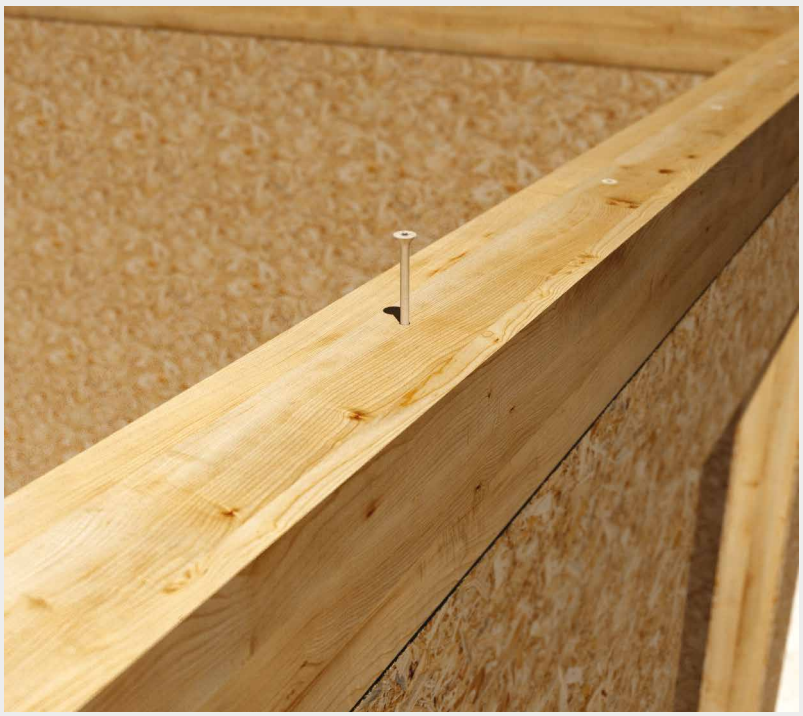
Service classes 1, 2 and 3.

SERVICE CLASS 3

Certified for use in service class 3 outdoor applications and under class C4 atmospheric corrosion conditions. Ideal for fastening timber framed panels and lattice beams (Rafter, Truss).

HARDWOOD FRAME

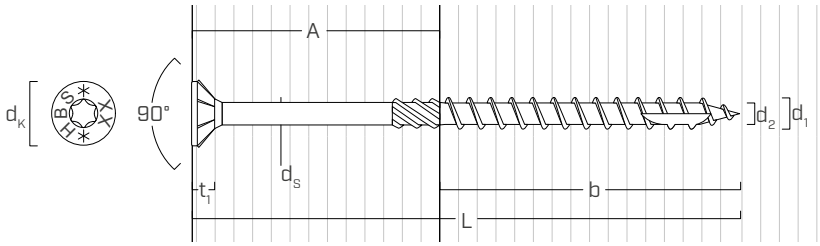
Values also tested, certified and calculated for high density woods. Ideal for fastening aggressive woods containing tannin.



Fastening sill beams in frame structures.

Fastening outdoor fencing.

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	**d_1**	**[mm]**	**4,5**	**5**	**6**	**8**
Head diameter	d_K	[mm]	9,00	10,00	12,00	14,50
Thread diameter	d_2	[mm]	2,80	3,40	3,95	5,40
Shank diameter	d_S	[mm]	3,15	3,65	4,30	5,80
Head thickness	t_1	[mm]	2,80	3,10	4,50	4,50
Pre-drilling hole diameter(1)	d_V	[mm]	2,5	3,0	4,0	5,0
Characteristic yield moment	$M_{y,k}$	[Nm]	4,1	5,4	9,5	20,1
Characteristic withdrawal-resistance parameter(2)	$f_{ax,k}$	[N/mm^2]	11,7	11,7	11,7	11,7
Associated density	ρ_a	[kg/m^3]	350	350	350	350
Characteristic head-pull-through parameter(2)	$f_{head,k}$	[N/mm^2]	10,5	10,5	10,5	10,5
Associated density	ρ_a	[kg/m^3]	350	350	350	350
Characteristic tensile strength	$f_{tens,k}$	[kN]	6,4	7,9	11,3	20,1

(1) Pre-drilling valid for softwood.
(2) Valid for softwood - maximum density 440 kg/m^3.
For applications with different materials (e.g. LVL) or with high density please see ETA-11/0030.

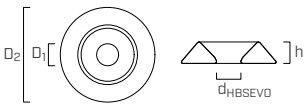
CODES AND DIMENSIONS

d_1 [mm] [in]	CODE	L [mm]	L [in]	b [mm]	A [mm]	A [in]	pcs
4,5 0.18 TX 25	HBSEVO4545 NEW	45	1 3/4	30	15	9/16	400
	HBSEVO4550 NEW	50	1 15/16	30	20	13/16	200
	HBSEVO4560 NEW	60	2 3/8	35	25	1	200
	HBSEVO4570 NEW	70	2 3/4	40	30	1 3/16	200
5 0.20 TX 25	HBSEVO550 NEW	50	1 15/16	24	26	1 1/32	200
	HBSEVO560 NEW	60	2 3/8	30	30	1 3/16	200
	HBSEVO570 NEW	70	2 3/4	35	35	1 3/8	100
	HBSEVO580	80	3 1/8	40	40	1 9/16	100
	HBSEVO590	90	3 1/2	45	45	1 3/4	100
	HBSEVO5100	100	4	50	50	1 15/16	100
6 0.24 TX 30	HBSEVO660 NEW	60	2 3/8	30	30	1 3/16	100
	HBSEVO670 NEW	70	2 3/4	40	30	1 3/16	100
	HBSEVO680	80	3 1/8	40	40	1 9/16	100
	HBSEVO6100	100	4	50	50	1 15/16	100
	HBSEVO6120	120	4 3/4	60	60	2 3/8	100
	HBSEVO6140	140	5 1/2	75	65	2 9/16	100
	HBSEVO6160	160	6 1/4	75	85	3 3/8	100
	HBSEVO6180	180	7 1/8	75	105	4 1/8	100
	HBSEVO6200	200	8	75	125	4 15/16	100

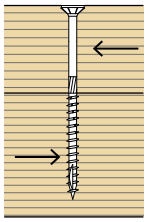
d_1 [mm] [in]	CODE	L [mm]	L [in]	b [mm]	A [mm]	A [in]	pcs
8 0.32 TX 40	HBSEVO8100	100	4	52	48	1 7/8	100
	HBSEVO8120	120	4 3/4	60	60	2 3/8	100
	HBSEVO8140	140	5 1/2	60	80	3 1/8	100
	HBSEVO8160	160	6 1/4	80	80	3 1/8	100
	HBSEVO8180	180	7 1/8	80	100	4	100
	HBSEVO8200	200	8	80	120	4 3/4	100
	HBSEVO8220	220	8 5/8	80	140	5 1/2	100
	HBSEVO8240	240	9 1/2	80	160	6 1/4	100
	HBSEVO8260 NEW	260	10 1/4	80	180	7 1/8	100
	HBSEVO8280	280	11	80	200	8	100
	HBSEVO8300 NEW	300	11 3/4	100	200	8	100
	HBSEVO8320	320	12 5/8	100	220	8 5/8	100

HUS EVO TURNED WASHER

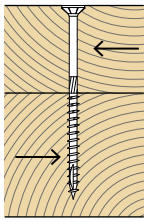
d_{HBSEVO} [mm]	d_{HBSEVO} [in]	CODE	D_1 [mm]	D_1 [in]	D_2 [mm]	D_2 [in]	h [mm]	h [in]	pcs
6	0.24	HUSEVO6	7,5	0.295	20	0.787	4,5	0.177	100
8	0.32	HUSEVO8	8,5	0.335	25	0.984	5,5	0.217	50



MINIMUM DISTANCES FOR SHEAR LOADS



Load-to-grain angle α = 0°

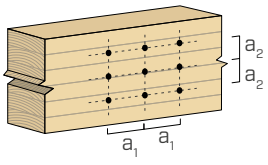


Load-to-grain angle α = 90°

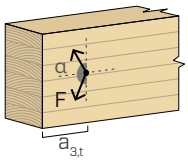
		SCREWS INSERTED WITH PRE-DRILLING HOLE						SCREWS INSERTED WITH PRE-DRILLING HOLE					
d_1	[mm]		4,5		5	6	8		4,5		5	6	8
a_1	[mm]	**5·d**	23	**5·d**	25	30	40	**4·d**	18	**4·d**	20	24	32
a_2	[mm]	**3·d**	14	**3·d**	15	18	24	**4·d**	18	**4·d**	20	24	32
$a_{3,t}$	[mm]	**12·d**	54	**12·d**	60	72	96	**7·d**	32	**7·d**	35	42	56
$a_{3,c}$	[mm]	**7·d**	32	**7·d**	35	42	56	**7·d**	32	**7·d**	35	42	56
$a_{4,t}$	[mm]	**3·d**	14	**3·d**	15	18	24	**5·d**	23	**7·d**	35	42	56
$a_{4,c}$	[mm]	**3·d**	14	**3·d**	15	18	24	**3·d**	14	**3·d**	15	18	24

		SCREWS INSERTED WITHOUT PRE-DRILLING HOLE						SCREWS INSERTED WITHOUT PRE-DRILLING HOLE					
d_1	[mm]		4,5		5	6	8		4,5		5	6	8
a_1	[mm]	**10·d**	45	**12·d**	60	72	96	**5·d**	23	**5·d**	25	30	40
a_2	[mm]	**5·d**	23	**5·d**	25	30	40	**5·d**	23	**5·d**	25	30	40
$a_{3,t}$	[mm]	**15·d**	68	**15·d**	75	90	120	**10·d**	45	**10·d**	50	60	80
$a_{3,c}$	[mm]	**10·d**	45	**10·d**	50	60	80	**10·d**	45	**10·d**	50	60	80
$a_{4,t}$	[mm]	**5·d**	23	**5·d**	25	30	40	**7·d**	32	**10·d**	50	60	80
$a_{4,c}$	[mm]	**5·d**	23	**5·d**	25	30	40	**5·d**	23	**5·d**	25	30	40

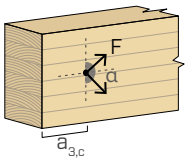
d = nominal screw diameter



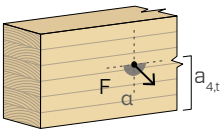
stressed end
-90° < α < 90°



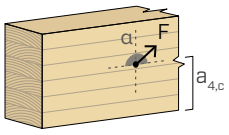
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°

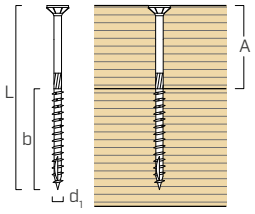
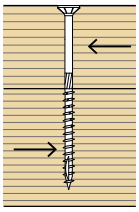
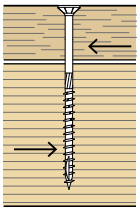
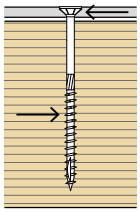
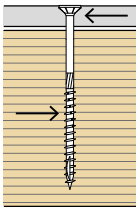
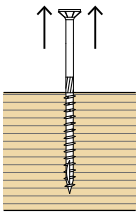
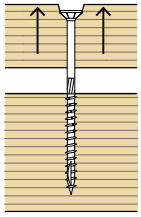
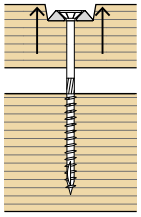


unload edge
180° < α < 360°



NOTES:

- The minimum distances are in accordance with the EN 1995:2014 standard, according to 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.

				SHEAR				TENSION		
geometry				timber-to-timber	panel-to-timber[1]	thin steel-timber plate[2]	thick steel-timber plate[3]	thread withdrawal[4]	head pull-through[5]	head pull-through with washer[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]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]	$R_{head,k}$ [kN]
4,5	45	30	15	1,02	1,08	1,49	1,92	1,83	0,98	-
	50	30	20	1,14	1,08	1,49	1,92	1,83	0,98	-
	60	35	25	1,27	1,08	1,57	2,00	2,13	0,98	-
	70	40	30	1,28	1,08	1,64	2,07	2,44	0,98	-
5	50	34	16	1,21	1,22	1,81	2,32	2,30	1,21	-
	60	30	30	1,54	1,22	1,74	2,25	2,03	1,21	-
	70	35	35	1,54	1,22	1,82	2,33	2,37	1,21	-
	80	40	40	1,54	1,22	1,91	2,42	2,71	1,21	-
	90	45	45	1,54	1,22	2,00	2,51	3,05	1,21	-
	100	50	50	1,54	1,22	2,08	2,59	3,38	1,21	-
6	60	30	30	1,94	1,67	2,35	3,07	2,44	1,75	4,86
	70	40	30	2,02	1,67	2,55	3,28	3,25	1,75	4,86
	80	40	40	2,18	1,67	2,55	3,28	3,25	1,75	4,86
	100	50	50	2,18	1,67	2,76	3,48	4,06	1,75	4,86
	120	60	60	2,18	1,67	2,96	3,68	4,87	1,75	4,86
	140	75	65	2,18	1,67	3,26	3,99	6,09	1,75	4,86
	160	75	85	2,18	1,67	3,26	3,99	6,09	1,75	4,86
	180	75	105	2,18	1,67	3,26	3,99	6,09	1,75	4,86
	200	75	125	2,18	1,67	3,26	3,99	6,09	1,75	4,86

S_{PAN} = 15 mm

S_{PLATE} = 2,25 mm

S_{PLATE} = 4,5 mm

S_{PAN} = 15 mm

S_{PLATE} = 2,5 mm

S_{PLATE} = 5,0 mm

S_{PAN} = 18 mm

S_{PLATE} = 3,0 mm

S_{PLATE} = 6,0 mm

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, with and without a washer, 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.

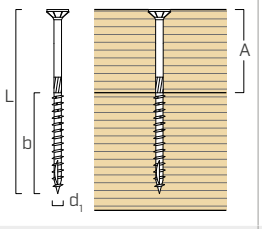
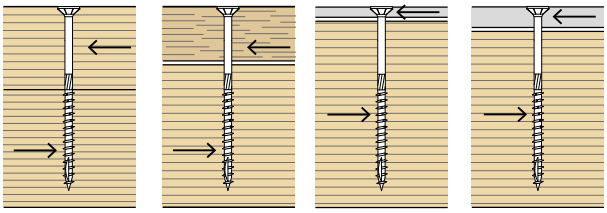
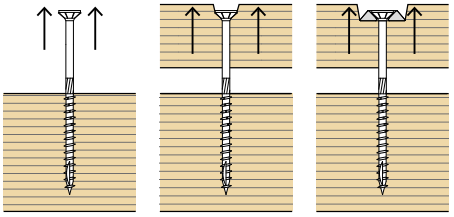
GENERAL PRINCIPLES:

- 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).

				SHEAR				TENSION		
geometry				timber-to-timber	panel-to-timber(1)	thin steel-timber plate(2)	thick steel-timber plate(3)	thread withdrawal(4)	head pull-through(5)	head pull-through with washer(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]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]	$R_{head,k}$ [kN]
8	100	52	48	3,44	2,64	4,21	5,37	5,63	2,55	7,59
	120	60	60	3,44	2,64	4,43	5,59	6,50	2,55	7,59
	140	60	80	3,44	2,64	4,43	5,59	6,50	2,55	7,59
	160	80	80	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	180	80	100	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	200	80	120	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	220	80	140	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	240	80	160	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	260	80	180	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	280	80	200	3,44	2,64	4,97	6,13	8,66	2,55	7,59
	300	100	200	3,44	2,64	5,51	6,67	10,83	2,55	7,59
	320	100	220	3,44	2,64	5,51	6,67	10,83	2,55	7,59

S_{PAN} = 22 mm

S_{PLATE} = 4,0 mm

S_{PLATE} = 8,0 mm

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, with and without a washer, was calculated using timber elements.

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- 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).