VGZ EVO

AC233 | AC257 ESR-4645 · C4 COATING · BIT INCLUDED · MY PROJECT SOFTWARE · C4 EVO COATING · ETA-11/0030

FULL THREADED SCREW WITH CYLINDRICAL HEAD

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.

TENSION
Deep thread and high resistance steel ($f_{y,k}$ = 1000 N/mm²) for excellent tensile performance.

STRUCTURAL APPLICATIONS
Approved for structural applications subject to stresses in any direction vs. the grain (α = 0° - 90°). Reduced minimum distances.

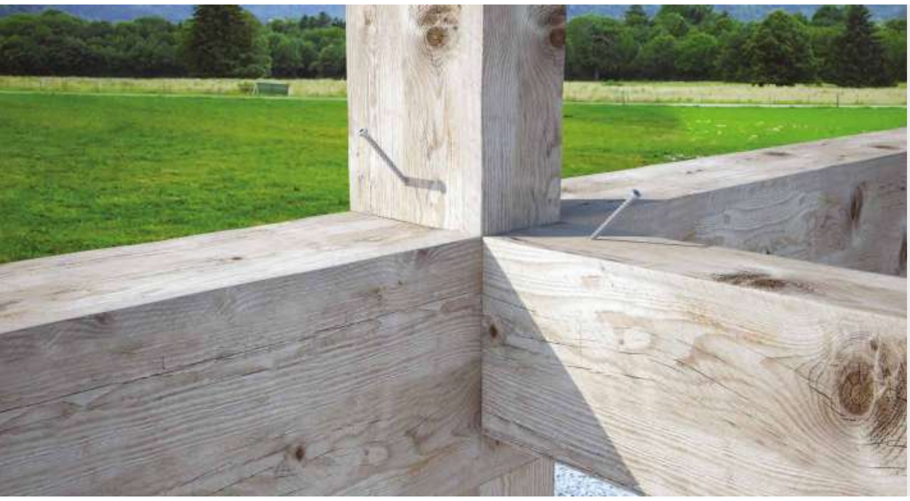
CHARACTERISTICS

FOCUS	corrosiveness class C4
HEAD	cylindrical, countersunk
DIAMETER	5,3 | 5,6 | 7,0 | 9,0 mm
LENGTH	from 80 to 360 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.



HARDWOOD FRAME

Ideal for the construction of outdoor structures and for fastening aggressive woods containing tannin. Values also certified for screw insertion parallel to the grain.

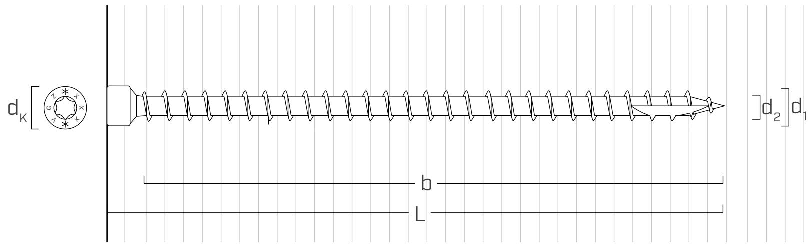
TIMBER FRAME

Values also tested, certified and calculated for CLT and high density woods such as Microllam® LVL.

Fastening Wood Trusses outdoors.

Restoration of existing timber floor using glulam beams and VGZ connectors.

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	d_1	**[mm]**	**5,3**	**5,6**	**7**	**9**
Head diameter	d_K	[mm]	8,00	8,00	9,50	11,50
Tip diameter	d_2	[mm]	3,60	3,80	4,60	5,90
Pre-drilling hole diameter(1)	d_V	[mm]	3,5	3,5	4,0	5,0
Characteristic yield moment	$M_{y,k}$	[Nm]	9,2	10,6	14,2	27,2
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 tensile strength	$f_{tens,k}$	[kN]	11,0	12,3	15,4	25,4
Characteristic yield strength	$f_{y,k}$	[N/mm^2]	1000	1000	1000	1000

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

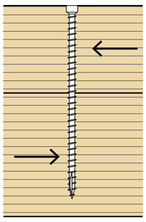
CODES AND DIMENSIONS

d_1 [mm] *[in]*	CODE	L [mm]	L *[in]*	b [mm]	pcs
5,3 *0.21* TX 25	**VGZEVO580**	80	*3 1/8*	70	50
	VGZEVO5100	100	*4*	90	50
	VGZEVO5120	120	*4 3/4*	110	50
5,6 *0.23* TX 25	**VGZEVO5140**	140	*5 1/2*	130	50
	VGZEVO5160	160	*6 1/4*	150	50
7 *0.28* TX 30	**VGZEVO7140**	140	*5 1/2*	130	25
	VGZEVO7180	180	*7 1/8*	170	25
	VGZEVO7220	220	*8 5/8*	210	25
	VGZEVO7260	260	*10 1/4*	250	25
	VGZEVO7300	300	*11 3/4*	290	25

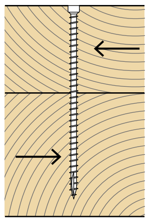
d_1 [mm] *[in]*	CODE	L [mm]	L *[in]*	b [mm]	pcs
9 *0.36* TX 40	**VGZEVO9200**	200	*8*	190	25
	VGZEVO9240	240	*9 1/2*	230	25
	VGZEVO9280	280	*11*	270	25
	VGZEVO9320	320	*12 5/8*	310	25
	VGZEVO9360	360	*14 1/4*	350	25

MINIMUM DISTANCES FOR SHEAR LOADS [1]

For the table
Minimum distances for axial stresses, see page 143



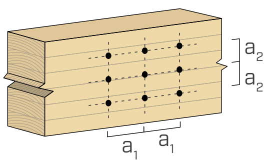
Load-to-grain angle α = 0°



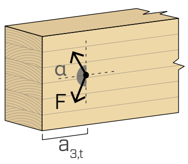
Load-to-grain angle α = 90°

		α = 0°					α = 90°				
		SCREWS INSERTED WITH PRE-DRILLING HOLE					**SCREWS INSERTED WITH PRE-DRILLING HOLE**				
d_1	**[mm]**		**5,3**	**5,6**	**7**	**9**		**5,3**	**5,6**	**7**	**9**
a_1	[mm]	**5·d**	27	28	35	45	**4·d**	21	22	28	36
a_2	[mm]	**3·d**	16	17	21	27	**4·d**	21	22	28	36
$a_{3,t}$	[mm]	**12·d**	64	67	84	108	**7·d**	37	39	49	63
$a_{3,c}$	[mm]	**7·d**	37	39	49	63	**7·d**	37	39	49	63
$a_{4,t}$	[mm]	**3·d**	16	17	21	27	**7·d**	37	39	49	63
$a_{4,c}$	[mm]	**3·d**	16	17	21	27	**3·d**	16	17	21	27
		SCREWS INSERTED WITHOUT PRE-DRILLING HOLE					**SCREWS INSERTED WITHOUT PRE-DRILLING HOLE**				
d_1	**[mm]**		**5,3**	**5,6**	**7**	**9**		**5,3**	**5,6**	**7**	**9**
a_1	[mm]	**12·d**	64	67	84	108	**5·d**	27	28	35	45
a_2	[mm]	**5·d**	27	28	35	45	**5·d**	27	28	35	45
$a_{3,t}$	[mm]	**15·d**	80	84	105	135	**10·d**	53	56	70	90
$a_{3,c}$	[mm]	**10·d**	53	56	70	90	**10·d**	53	56	70	90
$a_{4,t}$	[mm]	**5·d**	27	28	35	45	**10·d**	53	56	70	90
$a_{4,c}$	[mm]	**5·d**	27	28	35	45	**5·d**	27	28	35	45

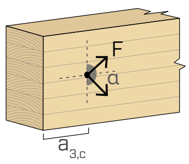
d = nominal screw diameter



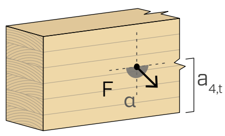
stressed end
-90° < α < 90°



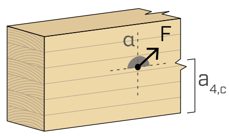
unloaded end
90° < α < 270°



stressed edge
0° < α < 180°



unload edge
180° < α < 360°

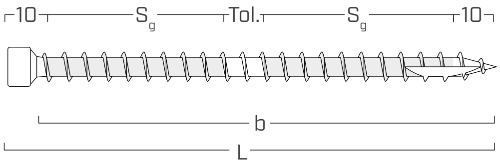


NOTES:

[1] The minimum distances are in accordance with EN 1995:2014 considering a timber characteristic density of $\rho_k \leq 420$ kg/m^3.

- 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.

EFFECTIVE THREAD USED IN CALCULATION



b = L - 10 mm — represents the entire length of the threaded part

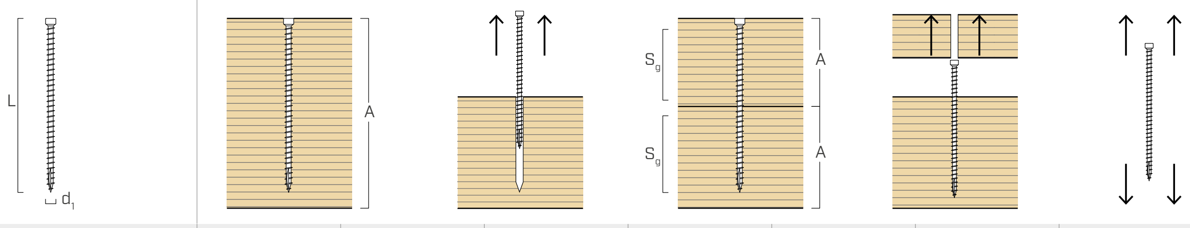
S_g = (L - 10 mm - 10 mm - Tol.)/ 2 — represents the partial length of the threaded part net of a laying tolerance (Tol.) of 10 mm

The timber to timber withdrawal, shear and sliding values were calculated considering the centre of gravity of the connector placed in correspondence with the shear plane.

STATIC VALUES

CHARACTERISTIC VALUES
EN 1995:2014

TENSION[1]



geometry		total thread withdrawal[2]			partial thread withdrawal[2]			steel tension
				timber			timber	steel
d_1 [mm]	L [mm]	b [mm]	A_{min} [mm]	$R_{ax,k}$ [kN]	S_g [mm]	A_{min} [mm]	$R_{ax,k}$ [kN]	$R_{tens,k}$ [kN]
5,3	80	70	90	5,02	25	45	1,79	11,0
	100	90	110	6,46	35	55	2,51	
	120	110	130	7,89	45	65	3,23	
5,6	140	130	150	9,86	55	75	4,17	12,3
	160	150	170	11,37	65	85	4,93	
7	140	130	150	12,32	55	75	5,21	15,4
	180	170	190	16,11	75	95	7,11	
	220	210	230	19,90	95	115	9,00	
	260	250	270	23,69	115	135	10,90	
	300	290	310	27,48	135	155	12,79	
9	200	190	210	23,15	85	105	10,36	25,4
	240	230	250	28,02	105	125	12,79	
	280	270	290	32,90	125	145	15,23	
	320	310	330	37,77	145	165	17,67	
	360	350	370	42,64	165	185	20,10	

NOTES:

(1) The connector design resistance is the lowest between the timber side design resistance ($R_{ax,d}$) and the steel side resistance ($R_{tens,d}$).

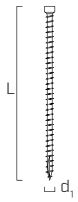
$$R_{ax,d} = min \begin{cases} \dfrac{R_{ax,k} \cdot k_{mod}}{\gamma_M} \\ \dfrac{R_{tens,k}}{\gamma_{M2}} \end{cases}$$

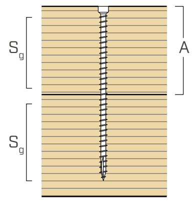
(2) The axial resistance of the thread to withdrawal was calculated considering a 90° angle between the fibres and the connector and for a effective thread length of b or S_g.
For intermediate values of S_g it is possible to linearly interpolate.

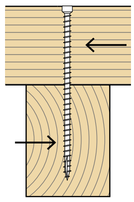
(3) The axial resistance of the thread withdrawal was calculated considering a 45° angle between the fibres and the connector and for an effective thread length of S_g.

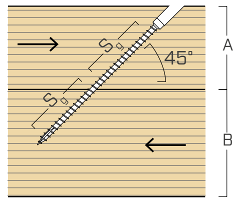
STATIC VALUES

CHARACTERISTIC VALUES
EN 1995:2014









			SHEAR		SLIDING		
geometry			**timber-to-timber**		**timber-to-timber**[3]		
d_1 [mm]	L [mm]	S_g [mm]	A_{min} [mm]	$R_{V,k}$ [kN]	A_{min} [mm]	B_{min} [mm]	$R_{V,k}$ [kN]
5,3	80	25	40	1,77	30	50	1,27
	100	35	50	2,25	40	55	1,78
	120	45	60	2,45	45	60	2,28
5,6	140	55	70	2,84	50	70	2,95
	160	65	80	3,03	60	75	3,48
7	140	55	70	3,55	55	70	3,69
	180	75	90	4,02	65	85	5,03
	220	95	110	4,49	80	100	6,37
	260	115	130	4,49	95	110	7,71
	300	135	150	4,49	110	125	9,05
9	200	85	100	5,99	75	90	7,32
	240	105	120	6,60	90	105	9,05
	280	125	140	6,80	105	120	10,77
	320	145	160	6,80	115	135	12,49
	360	165	180	6,80	130	145	14,21

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.
- Dimensioning and verification of the timber elements must be carried out 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.
- The withdrawal, shear and sliding values were calculated considering the centre of gravity of the connector placed in correspondence with the shear plane.