

### 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 ( $\alpha = 0^\circ - 90^\circ$ ). Asymmetric "umbrella" threading for better timber pull-through.

### SUPERIOR STRENGTH

Steel with superb yield and failure strength ( $f_{y,k} = 1000 \text{ N/mm}^2$ ). Very high torsional strength  $f_{tor,k}$  for safer screwing.



## CHARACTERISTICS

|          |                                  |
|----------|----------------------------------|
| FOCUS    | corrosiveness class C4           |
| HEAD     | countersunk with under-head ribs |
| DIAMETER | from 5,0 to 8,0 mm               |
| LENGTH   | from 80 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.

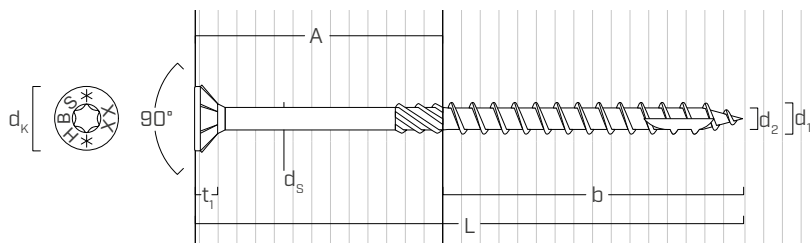


Fastening sill beams in frame structures.



Fastening outdoor fencing. ➤

## ■ GEOMETRY AND MECHANICAL CHARACTERISTICS



| Nominal diameter                                              | $d_1$        | [mm]                 | 5     | 6     | 8     |
|---------------------------------------------------------------|--------------|----------------------|-------|-------|-------|
| Head diameter                                                 | $d_k$        | [mm]                 | 10,00 | 12,00 | 14,50 |
| Tip diameter                                                  | $d_2$        | [mm]                 | 3,40  | 3,95  | 5,40  |
| Shank diameter                                                | $d_s$        | [mm]                 | 3,65  | 4,30  | 5,80  |
| Head thickness                                                | $t_1$        | [mm]                 | 3,10  | 4,50  | 4,50  |
| Pre-drilling hole diameter <sup>(1)</sup>                     | $d_v$        | [mm]                 | 3,0   | 4,0   | 5,0   |
| Characteristic yield moment                                   | $M_{y,k}$    | [Nm]                 | 5,4   | 9,5   | 20,1  |
| Characteristic withdrawal-resistance parameter <sup>(2)</sup> | $f_{ax,k}$   | [N/mm <sup>2</sup> ] | 11,7  | 11,7  | 11,7  |
| Associated density                                            | $\rho_a$     | [kg/m <sup>3</sup> ] | 350   | 350   | 350   |
| Characteristic head-pull-through parameter <sup>(2)</sup>     | $f_{head,k}$ | [N/mm <sup>2</sup> ] | 10,5  | 10,5  | 10,5  |
| Associated density                                            | $\rho_a$     | [kg/m <sup>3</sup> ] | 350   | 350   | 350   |
| Characteristic tensile strength                               | $f_{tens,k}$ | [kN]                 | 7,9   | 11,3  | 20,1  |

<sup>(1)</sup> Pre-drilling valid for softwood.

<sup>(2)</sup> Valid for softwood – maximum density 440 kg/m<sup>3</sup>.

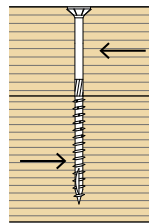
For applications with different materials or with high density please see ETA-11/0030.

## CODES AND DIMENSIONS

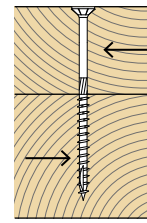
| d <sub>1</sub><br>[mm] [in] | CODE       | L<br>[mm] [in] | b<br>[mm] | A<br>[mm] [in] | pcs |
|-----------------------------|------------|----------------|-----------|----------------|-----|
| 5<br>0.20<br>TX 25          | HBSEVO580  | 80 3 1/8       | 40        | 40 1 9/16      | 100 |
|                             | HBSEVO590  | 90 3 1/2       | 45        | 45 1 3/4       | 100 |
|                             | HBSEVO5100 | 100 4          | 50        | 50 1 15/16     | 100 |
| 6<br>0.24<br>TX 30          | 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 <sub>1</sub><br>[mm] [in] | CODE       | L<br>[mm] [in] | b<br>[mm] | A<br>[mm] [in] | pcs |
|-----------------------------|------------|----------------|-----------|----------------|-----|
| 8<br>0.32<br>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 |
|                             | HBSEVO8280 | 280 11         | 80        | 200 8          | 100 |
|                             | HBSEVO8320 | 320 12 5/8     | 100       | 220 9 1/2      | 100 |

## MINIMUM DISTANCES FOR SHEAR LOADS



Load-to-grain angle  $\alpha = 0^\circ$



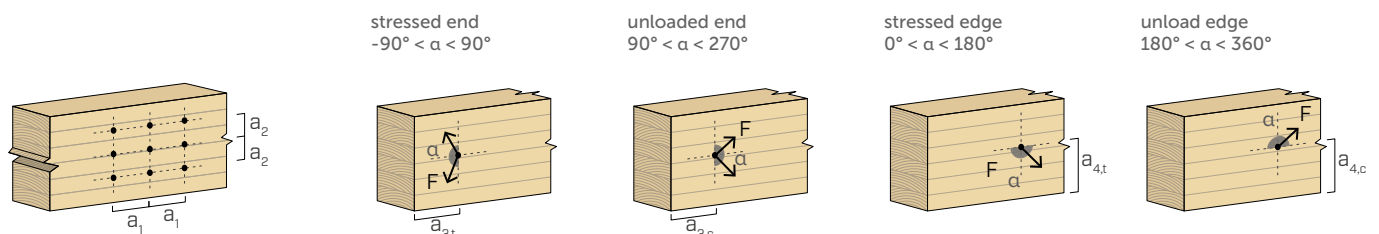
Load-to-grain angle  $\alpha = 90^\circ$

| SCREWS INSERTED WITH PRE-DRILLING HOLE |      |    |    |    | SCREWS INSERTED WITH PRE-DRILLING HOLE |    |    |    |  |
|----------------------------------------|------|----|----|----|----------------------------------------|----|----|----|--|
| d <sub>1</sub> [mm]                    | 5    | 6  | 8  |    | d <sub>1</sub> [mm]                    | 5  | 6  | 8  |  |
| a <sub>1</sub> [mm]                    | 5·d  | 25 | 30 | 40 | 4·d                                    | 20 | 24 | 32 |  |
| a <sub>2</sub> [mm]                    | 3·d  | 15 | 18 | 24 | 4·d                                    | 20 | 24 | 32 |  |
| a <sub>3,t</sub> [mm]                  | 12·d | 60 | 72 | 96 | 7·d                                    | 35 | 42 | 56 |  |
| a <sub>3,c</sub> [mm]                  | 7·d  | 35 | 42 | 56 | 7·d                                    | 35 | 42 | 56 |  |
| a <sub>4,t</sub> [mm]                  | 3·d  | 15 | 18 | 24 | 7·d                                    | 35 | 42 | 56 |  |
| a <sub>4,c</sub> [mm]                  | 3·d  | 15 | 18 | 24 | 3·d                                    | 15 | 18 | 24 |  |

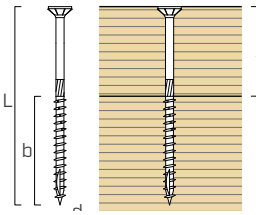
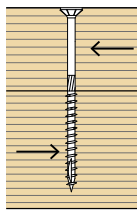
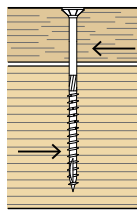
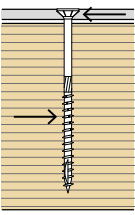
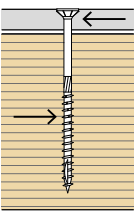
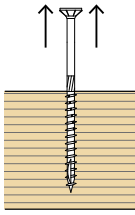
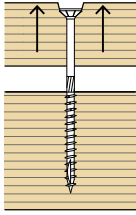
| SCREWS INSERTED WITHOUT PRE-DRILLING HOLE |      |    |    |     | SCREWS INSERTED WITHOUT PRE-DRILLING HOLE |    |    |    |  |
|-------------------------------------------|------|----|----|-----|-------------------------------------------|----|----|----|--|
| d <sub>1</sub> [mm]                       | 5    | 6  | 8  |     | d <sub>1</sub> [mm]                       | 5  | 6  | 8  |  |
| a <sub>1</sub> [mm]                       | 12·d | 60 | 72 | 96  | 5·d                                       | 25 | 30 | 40 |  |
| a <sub>2</sub> [mm]                       | 5·d  | 25 | 30 | 40  | 5·d                                       | 25 | 30 | 40 |  |
| a <sub>3,t</sub> [mm]                     | 15·d | 75 | 90 | 120 | 10·d                                      | 50 | 60 | 80 |  |
| a <sub>3,c</sub> [mm]                     | 10·d | 50 | 60 | 80  | 10·d                                      | 50 | 60 | 80 |  |
| a <sub>4,t</sub> [mm]                     | 5·d  | 25 | 30 | 40  | 10·d                                      | 50 | 60 | 80 |  |
| a <sub>4,c</sub> [mm]                     | 5·d  | 25 | 30 | 40  | 5·d                                       | 25 | 30 | 40 |  |

d = nominal screw diameter



### NOTES:

- The minimum distances are in accordance with the EN 1995:2014 standard, according to ETA-11/0030, considering a timber characteristic density of  $\rho_k \leq 420 \text{ kg/m}^3$ .
- 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 <sup>(1)</sup>                                                    | thin steel-timber plate <sup>(2)</sup>                                            | thick steel-timber plate <sup>(3)</sup>                                            | thread withdrawal <sup>(4)</sup>                                                    | head pull-through <sup>(5)</sup>                                                    |
|  |           |           |           |  |  |  |  |  |  |
| d <sub>1</sub><br>[mm]                                                            | L<br>[mm] | b<br>[mm] | A<br>[mm] | R <sub>V,k</sub><br>[kN]                                                          | R <sub>V,k</sub><br>[kN]                                                          | R <sub>V,k</sub><br>[kN]                                                          | R <sub>V,k</sub><br>[kN]                                                           | R <sub>ax,k</sub><br>[kN]                                                           | R <sub>head,k</sub><br>[kN]                                                         |
| 5                                                                                 | 80        | 40        | 40        | 1,54                                                                              | S <sub>PAN</sub> = 15 mm<br>1,22                                                  | S <sub>PLATE</sub> = 2,5 mm<br>1,91                                               | S <sub>PLATE</sub> = 5,0 mm<br>2,42                                                | 2,71                                                                                | 1,21                                                                                |
|                                                                                   | 90        | 45        | 45        | 1,54                                                                              |                                                                                   |                                                                                   |                                                                                    | 3,05                                                                                | 1,21                                                                                |
|                                                                                   | 100       | 50        | 50        | 1,54                                                                              |                                                                                   |                                                                                   |                                                                                    | 3,38                                                                                | 1,21                                                                                |
| 6                                                                                 | 80        | 40        | 40        | 2,18                                                                              | S <sub>PAN</sub> = 18 mm<br>1,67                                                  | S <sub>PLATE</sub> = 3,0 mm<br>2,55                                               | S <sub>PLATE</sub> = 6,0 mm<br>3,27                                                | 3,25                                                                                | 1,75                                                                                |
|                                                                                   | 100       | 50        | 50        | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 4,06                                                                                | 1,75                                                                                |
|                                                                                   | 120       | 60        | 60        | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 3,68                                                                                | 1,75                                                                                |
|                                                                                   | 140       | 75        | 65        | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,09                                                                                | 1,75                                                                                |
|                                                                                   | 160       | 75        | 85        | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,09                                                                                | 1,75                                                                                |
|                                                                                   | 180       | 75        | 105       | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,09                                                                                | 1,75                                                                                |
|                                                                                   | 200       | 75        | 125       | 2,18                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,09                                                                                | 1,75                                                                                |
| 8                                                                                 | 100       | 52        | 48        | 3,44                                                                              | S <sub>PAN</sub> = 22 mm<br>2,64                                                  | S <sub>PLATE</sub> = 4,0 mm<br>4,21                                               | S <sub>PLATE</sub> = 8,0 mm<br>5,37                                                | 5,63                                                                                | 2,55                                                                                |
|                                                                                   | 120       | 60        | 60        | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,50                                                                                | 2,55                                                                                |
|                                                                                   | 140       | 60        | 80        | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 6,50                                                                                | 2,55                                                                                |
|                                                                                   | 160       | 80        | 80        | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 180       | 80        | 100       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 200       | 80        | 120       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 220       | 80        | 140       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 240       | 80        | 160       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 280       | 80        | 200       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 8,66                                                                                | 2,55                                                                                |
|                                                                                   | 320       | 100       | 220       | 3,44                                                                              |                                                                                   |                                                                                   |                                                                                    | 10,83                                                                               | 2,55                                                                                |

#### 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<sub>PAN</sub>.
- (2) The shear resistance characteristics are calculated considering the case of a thin plate (S<sub>PLATE</sub> ≤ 0,5 d<sub>1</sub>).
- (3) The shear resistance characteristics are calculated considering the case of a thick plate (S<sub>PLATE</sub> ≥ d<sub>1</sub>).
- (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<sub>M</sub> and k<sub>mod</sub> 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<sub>k</sub> = 420 kg/m<sup>3</sup> 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](http://www.rothoblaas.com)).