

TBS FRAME

FLAT FLANGE HEAD SCREW



FLAT FLANGE HEAD

The flange head ensures excellent tightening capacity of the joint; the flat shape allows a joint without additional thickness on the wooden surface, thus enabling the fixing of plates on the same element without interference.

SHORT THREAD

The short, fixed-length thread at 1 1/3" (34 mm) is optimised for fastening multi-layer elements (Multi-ply) for lightweight frame construction.

BLACK E-COATING

Coated with black E-coating for easy recognition on site and increased corrosion resistance.

3 THORNS TIP

TBSF is easily installed without pre-drilling hole. More screws can be used in less space and larger screws in smaller elements.



BIT INCLUDED

DIAMETER [mm]	6	(8)	16
LENGTH [mm]	40	(73)	175
SERVICE CLASS	SC1	SC2	
ATMOSPHERIC CORROSIVITY	C1	C2	
WOOD CORROSIVITY	T1	T2	
MATERIAL	Zn E-COATING electrogalvanised carbon steel with black E-Coating		



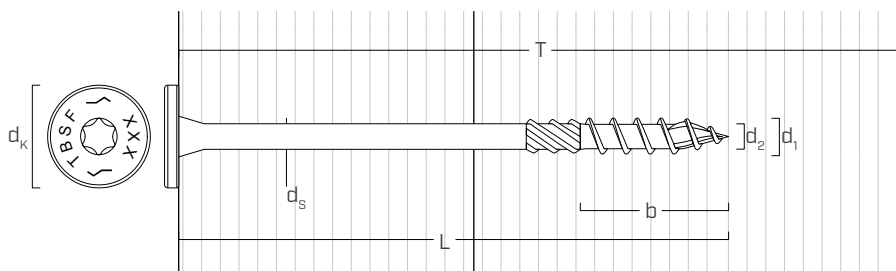
FIELDS OF USE

- timber based panels
- solid timber and glulam
- CLT and LVL
- high density woods
- multilayer lattice beams

CODES AND DIMENSIONS

d_1 [mm]	d_k [mm]	CODE	L [mm]	b [mm]	T [mm]	L [in]	b [in]	T [in]	pcs
8 TX 40	19	TBSF873	73	34	76	2 7/8"	1 5/16"	3"	50
		TBSF886	86	34	90	3 3/8"	1 5/16"	3 1/2"	50
		TBSF898	98	34	102	3 7/8"	1 5/16"	4"	50
		TBSF8111	111	34	114	4 3/8"	1 5/16"	4 1/2"	50
		TBSF8130	130	34	134	5 1/8"	1 5/16"	5 1/4"	50
		TBSF8149	149	34	152	5 7/8"	1 5/16"	6"	50
		TBSF8175	175	34	178	6 7/8"	1 5/16"	7"	50

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	d_1	[mm]	8
Head diameter	d_k	[mm]	19,00
Thread diameter	d_2	[mm]	5,40
Shank diameter	d_s	[mm]	5,80
Pre-drilling hole diameter ⁽¹⁾	$d_{v,s}$	[mm]	5,0
Pre-drilling hole diameter ⁽²⁾	$d_{v,h}$	[mm]	6,0
Characteristic tensile strength	$f_{tens,k}$	[kN]	20,1
Characteristic yield moment	$M_{y,k}$	[Nm]	20,1

⁽¹⁾ Pre-drilling valid for softwood.

⁽²⁾ Pre-drilling valid for hardwood and beech LVL.

			softwood (softwood)	LVL softwood (LVL softwood)	pre-drilled beech LVL (beech LVL predrilled)
Characteristic withdrawal resistance parameter	$f_{ax,k}$	[N/mm ²]	11,7	15,0	29,0
Characteristic head-pull-through parameter	$f_{head,k}$	[N/mm ²]	10,5	20,0	-
Associated density	ρ_a	[kg/m ³]	350	500	730
Calculation density	ρ_k	[kg/m ³]	≤ 440	410 ÷ 550	590 ÷ 750

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

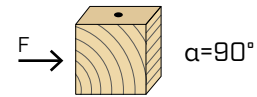
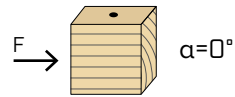


MULTILAYER LATTICE

It is available in optimised lengths for fastening 2-, 3- and 4-layer lattice elements of the most common solid timber and LVL dimensions.

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

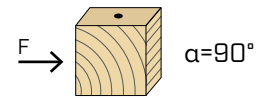
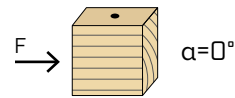
 screws inserted **WITHOUT** pre-drilled hole $\rho_k \leq 420 \text{ kg/m}^3$



d_1	[mm]	8
a_1	[mm]	10·d
a_2	[mm]	5·d
$a_{3,t}$	[mm]	15·d
$a_{3,c}$	[mm]	10·d
$a_{4,t}$	[mm]	5·d
$a_{4,c}$	[mm]	5·d

d_1	[mm]	8
a_1	[mm]	5·d
a_2	[mm]	5·d
$a_{3,t}$	[mm]	10·d
$a_{3,c}$	[mm]	10·d
$a_{4,t}$	[mm]	10·d
$a_{4,c}$	[mm]	5·d

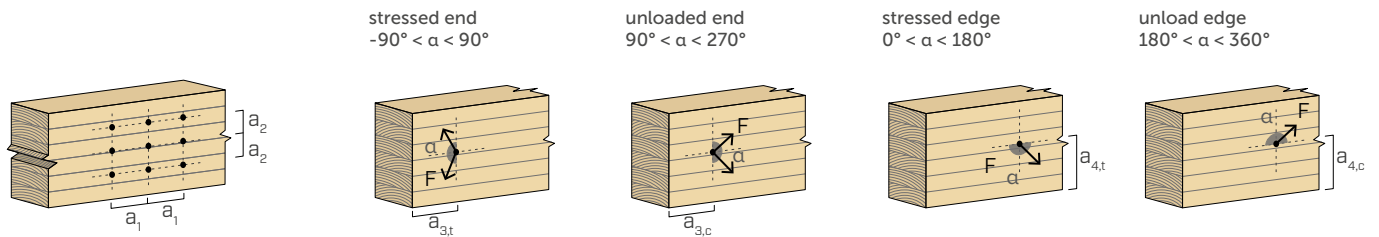
 screws inserted **WITH** pre-drilled hole



d_1	[mm]	8
a_1	[mm]	5·d
a_2	[mm]	3·d
$a_{3,t}$	[mm]	12·d
$a_{3,c}$	[mm]	7·d
$a_{4,t}$	[mm]	3·d
$a_{4,c}$	[mm]	3·d

d_1	[mm]	8
a_1	[mm]	4·d
a_2	[mm]	4·d
$a_{3,t}$	[mm]	7·d
$a_{3,c}$	[mm]	7·d
$a_{4,t}$	[mm]	7·d
$a_{4,c}$	[mm]	3·d

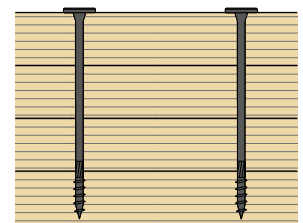
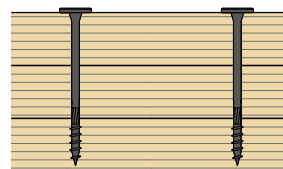
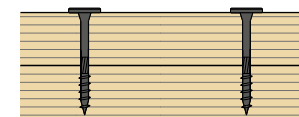
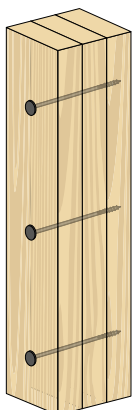
α = load-to-grain angle
 $d = d_1$ = nominal screw diameter



NOTES

- The minimum distances comply with the EN 1995:2014 standard in accordance with ETA-11/0030.
- In the case of joints with elements in Douglas fir (*Pseudotsuga menziesii*), the minimum spacing and distances parallel to the grain must be multiplied by a coefficient of 1.5.
- The spacing a_1 in the table for screws with 3 THORNS tip and $d_1 \geq 5 \text{ mm}$ inserted without pre-drilling hole in timber elements with density $\rho_k \leq 420 \text{ kg/m}^3$ with minimum height and width equal to 10·d and load-to-grain angle $\alpha = 0^\circ$ equal to 10·d. Alternatively, adopt 12·d in accordance with EN 1995:2014.
- For minimum distances on LVL see TBS on page 81.

APPLICATION EXAMPLES: LIGHTWEIGHT FRAME



screw: TBSF873
 timber element:
 2 x 38 mm (1 1/2")
 total thickness:
 76 mm (3 ")

screw: TBSF8111
 timber element:
 3 x 38 mm (1 1/2")
 total thickness:
 114 mm (4 1/2")

screw: TBSF8149
 timber element:
 4 x 38 mm (1 1/2")
 total thickness:
 152 mm (6 ")

geometry							SHEAR	TENSION		
							timber-to-timber $\varepsilon=90^\circ$	thread withdrawal $\varepsilon=90^\circ$	thread withdrawal $\varepsilon=0^\circ$	head pull-through
d_1 [mm]	L [mm]	b [mm]	T [mm]	T [in]	A [mm]	A [in]	$R_{V,90,k}$ [kN]	$R_{ax,90,k}$ [kN]	$R_{ax,0,k}$ [kN]	$R_{head,k}$ [kN]
8	73	34	76	3"	38	1 1/2"	2,91	3,43	1,03	4,09
	86	34	90	3 1/2"	45	1 3/4"	3,27	3,43	1,03	4,09
	98	34	102	4"	51	2"	3,51	3,43	1,03	4,09
	111	34	114	4 1/2"	57	2 1/4"	3,54	3,43	1,03	4,09
	130	34	134	5 1/4"	67	2 5/8"	3,54	3,43	1,03	4,09
	149	34	152	6"	76	3"	3,54	3,43	1,03	4,09
	175	34	178	7"	89	3 1/2"	3,54	3,43	1,03	4,09

STRUCTURAL VALUES | LVL

geometry							SHEAR	TENSION		
							LVL-LVL $\varepsilon=90^\circ$	thread withdrawal $\varepsilon=90^\circ$	thread withdrawal $\varepsilon=0^\circ$	head pull-through
d_1 [mm]	L [mm]	b [mm]	T [mm]	T [in]	A [mm]	A [in]	$R_{V,90,k}$ [kN]	$R_{ax,90,k}$ [kN]	$R_{ax,0,k}$ [kN]	$R_{head,k}$ [kN]
8	73	34	76	3"	38	1 1/2"	3,54	3,95	2,63	6,99
	86	34	90	3 1/2"	45	1 3/4"	3,90	3,95	2,63	6,99
	98	34	102	4"	51	2"	3,98	3,95	2,63	6,99
	111	34	114	4 1/2"	57	2 1/4"	3,98	3,95	2,63	6,99
	130	34	134	5 1/4"	67	2 5/8"	3,98	3,95	2,63	6,99
	149	34	152	6"	76	3"	3,98	3,95	2,63	6,99
	175	34	178	7"	89	3 1/2"	3,98	3,95	2,63	6,99

ε = screw-to-grain angle

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.
- Dimensioning and verification of the timber elements must be carried out separately.
- The screws must be positioned in accordance with the minimum distances.
- 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 characteristic shear strengths were evaluated by considering the threaded part fully inserted in the second element.
- The thread withdrawal characteristic strength has been evaluated considering a fixing length equal to b.
- The head pull-through characteristic strength was calculated using timber elements.

NOTES | TIMBER

- The characteristic timber-to-timber shear strengths were evaluated considering an angle ε of 90° ($R_{V,90,k}$) between the grains of the second element and the connector.
- The characteristic thread withdrawal resistances were evaluated considering both an ε angle of 90° ($R_{ax,90,k}$) and of 0° ($R_{ax,0,k}$) between the grains of the timber element and the connector.
- For the calculation process a timber characteristic density $\rho_k = 385 \text{ kg/m}^3$ has been considered.
For different ρ_k values, the strength values in the table can be converted by the k_{dens} coefficient (see page 87).
- For a row of n screws arranged parallel to the direction of the grain at a distance a_1 , the characteristic effective shear bearing capacity $R_{ef,V,k}$ can be calculated by means of the effective number n_{ef} (see page 80).

NOTES | LVL

- For the calculation process a mass density equal to $\rho_k = 480 \text{ kg/m}^3$ has been considered for softwood LVL elements.
- The characteristic shear strengths are evaluated for connectors inserted on the side face (wide face) considering, for individual timber elements, a 90° angle between the connector and the grain, a 90° angle between the connector and the side face of the LVL element and a 0° angle between the force and the grain.
- The axial thread-withdrawal resistance was calculated considering a 90° angle between the grains and the connector.