TBS

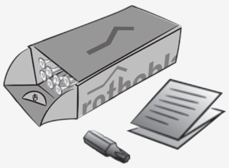
Large head screw

Carbon steel with white galvanic zinc coating

ETA 11/0030

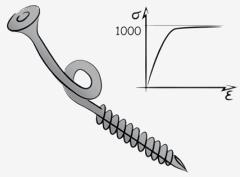
PACKAGING

Box + CE paper + BIT



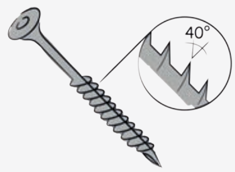
SPECIAL STEEL

Highly ductile (moves with the wood) and resistant steel ($f_{y,k}$ = 1000 N/mm^2)



SPECIAL THREADING

Asymmetric "umbrella" threading for better wood penetration

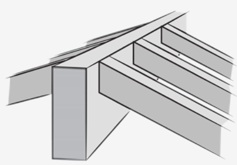


ECO-FRIENDLY

Trivalent Cr^{3+} chrome coating, replacing hexavalent chrome Cr^{6}

FIELDS OF USE

Solid-wood, glulam, X-Lam, LVL, wood-based panels. Service classes 1 and 2.



JOINT SEAL

The large head guarantees excellent tensile strength which means the use of additional lateral fastening systems can be avoided

JOINT CLOSURE

The large head offers tight joint closure. The diameter of the head is optimised based on the length of the thread

JOINT STABILITY

The large head guarantees excellent penetration resistance and allows for stabilisation of joints subject to variations in the dimensions of the wood

Applications

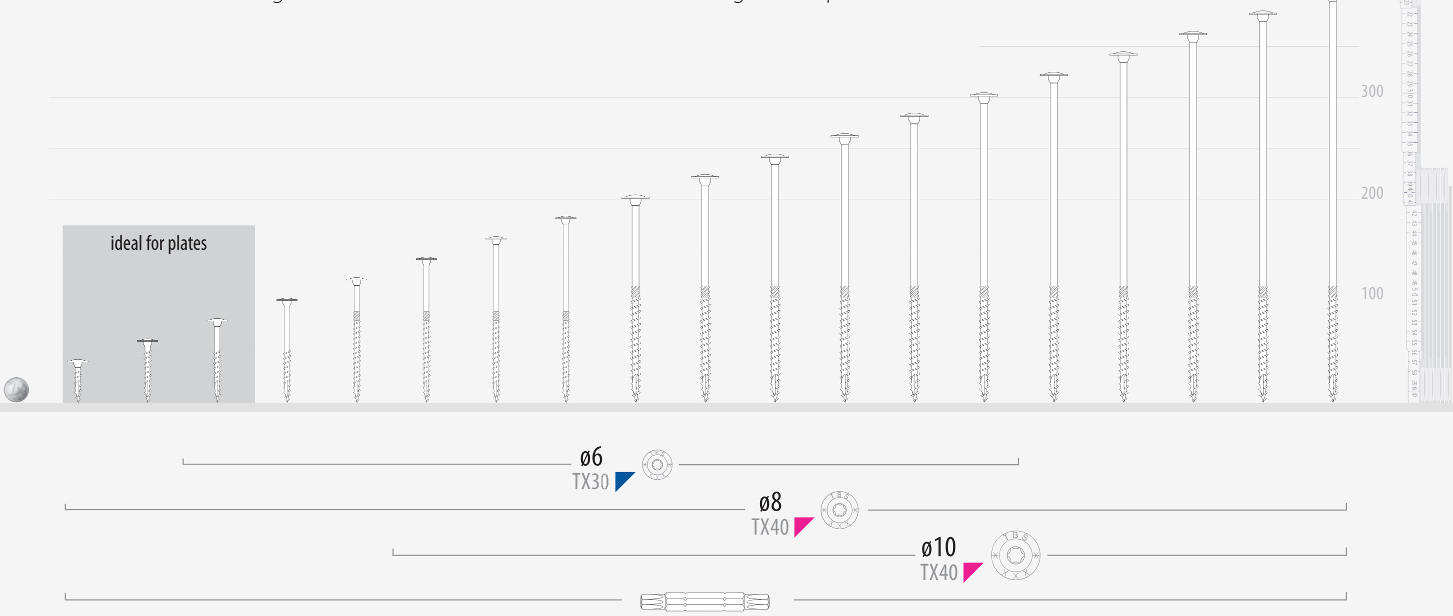
Fastening walls at the corners of the structure in X-Lam with excellent joint closure

Fastening walls at the corners of the frame structure with excellent joint closure

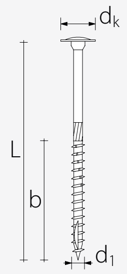
Fastening of plaster fibre panels

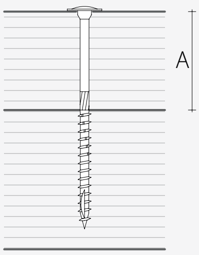
Range

The large head offers excellent grip capacity and makes it possible to obtain greater thread length with respect to a screw with a classic head. The size of the head diameter (dk) is calculated according to the thread length to obtain the perfect proportion between head penetration resistance and the thread grip capacity. In this way, the risk of stripping the screw is avoided. 8mm screws with a length between 40 and 80mm are ideal for fastening to steel plates.



Codes and dimensions



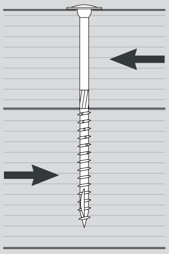


d_1 [mm]	d_k [mm]	code	L [mm]	b [mm]	A [mm]	pcs/pckg
6 *TX30*	15,5	**TBS680**	80	50	30	50
		TBS6100	100	60	40	
		TBS6120	120	75	45	
		TBS6140	140	75	65	
		TBS6160	160	75	85	
		TBS6180	180	75	105	
		TBS6200	200	75	125	
		TBS6220	220	100	120	
		TBS6240	240	100	140	
		TBS6260	260	100	160	
		TBS6280	280	100	180	
		TBS6300	300	100	200	
8 *TX40*	19	**TBS840**	40	32	8	50
		TBS860	60	52	10	
		TBS880	80	52	28	
		TBS8100	100	80	20	
		TBS8120	120	80	40	
		TBS8140	140	80	60	
		TBS8160	160	100	60	
		TBS8180	180	100	80	
		TBS8200	200	100	100	
		TBS8220	220	100	120	
		TBS8240	240	100	140	
		TBS8260	260	100	160	
		TBS8280	280	100	180	
		TBS8300	300	100	200	
		TBS8320	320	100	220	
		TBS8340	340	100	240	
		TBS8360	360	100	260	
		TBS8380	380	100	280	
		TBS8400	400	100	300	
10 *TX40*	25	**TBS10160**	160	80	80	50
		TBS10180	180	80	100	
		TBS10200	200	100	100	
		TBS10220	220	100	120	
		TBS10240	240	100	140	
		TBS10260	260	100	160	
		TBS10280	280	100	180	
		TBS10300	300	100	200	
		TBS10320	320	100	220	
		TBS10340	340	100	240	
		TBS10360	360	100	260	
		TBS10380	380	100	280	
		TBS10400	400	100	300	

Carpenter statics

ALLOWABLE VALUES
DIN 1052:1988

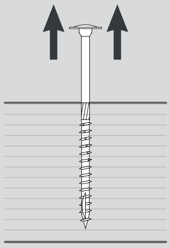
SHEAR V_{adm}



WOOD-WOOD

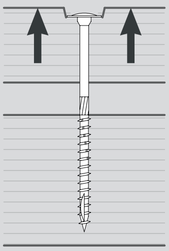
d_1 [mm]	L [mm]	V_{adm}
6	≥ 80	61 kg
8	≥ 120	109 kg
10	≥ 160	170 kg

THREAD WITHDRAWAL N_{adm}



	Length L [mm]									
d_1 [mm]	40	60	80	100	120 - 140	160	180	200	220 - 300	320-400
6	-	-	150 kg	180 kg	225 kg	225 kg	225 kg	225 kg	300 kg	-
8	128 kg	208 kg	208 kg	320 kg	320 kg	400 kg	400 kg	400 kg	400 kg	400 kg
10	-	-	-	-	-	400 kg	400 kg	500 kg	500 kg	500 kg

HEAD PENETRATION N_{adm}



d_1 [mm]	N_{adm}
6	120 kg
8	181 kg
10	281 kg

CALCULATION FORMULAS - SHEAR DIN 1052-2:1988

WOOD-WOOD

$V_{adm} = \min \{ 0{,}4 \cdot A \cdot d_1 ; 1{,}7 \cdot d_1{}^2 \}$

d_1 [mm]
A [mm]
V_{adm} [kg]

EXAMPLE WOOD-WOOD

TBS 6 x 160 mm

$d_1 = 6$ mm
A = 85 mm

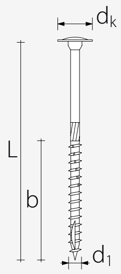
$V_{adm} = \min \{ 0{,}4 \cdot A \cdot d_1 ; 1{,}7 \cdot d_1{}^2 \}$
$V_{adm} = \min \{ 0{,}4 \cdot 85 \cdot 6 ; 1{,}7 \cdot 6^2 \} = \min \{ 204 ; 61 \} = 61$ kg

NOTE

- Allowable values in accordance with DIN 1052:1988.
- The allowable shear values are calculated considering a fixing length of 8 d_1.
- The allowable extraction values are calculated considering the threaded part as being completely inserted into the wood.

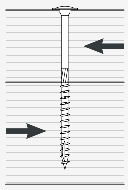
Geometry and minimum distances

GEOMETRY AND MECHANICAL CHARACTERISTICS

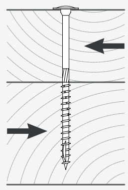


TBS SCREWS				
Nominal diameter	**d_1 [mm]**	**6**	**8**	**10**
Head diameter	d_K [mm]	15,50	19,00	25,00
Tip diameter	d_2 [mm]	3,95	5,40	6,40
Shank diameter	d_S [mm]	4,30	5,80	7,00
Pre-bored hole diameter	d_V [mm]	4,0	5,0	6,0
Characteristic yield moment	$M_{y,k}$ [Nmm]	9493,7	20057,5	35829,6
Characteristic extraction-resistance parameter	$f_{ax,k}$ [N/mm^2]	11,7	11,7	11,7
Characteristic head-penetration parameter	$f_{head,k}$ [N/mm^2]	10,5	10,5	10,5
Characteristic tensile strength	$f_{tens,k}$ [kN]	11,3	20,1	31,4

MINIMUM DISTANCES FOR SHEAR LOADS



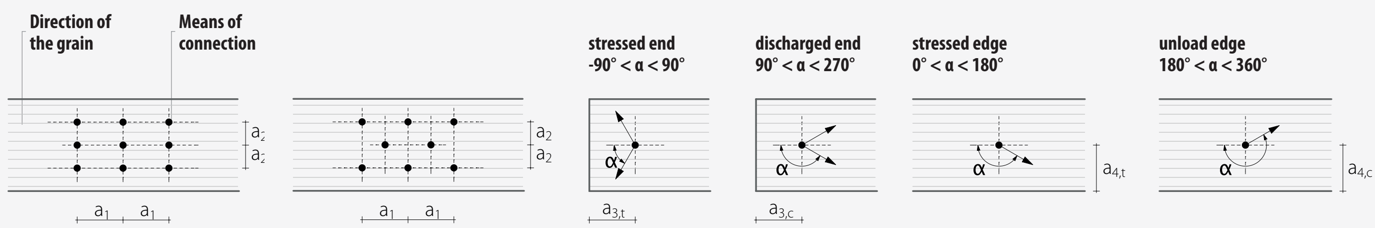
Angle between strength and grain α = 0°



Angle between strength and grain α = 90°

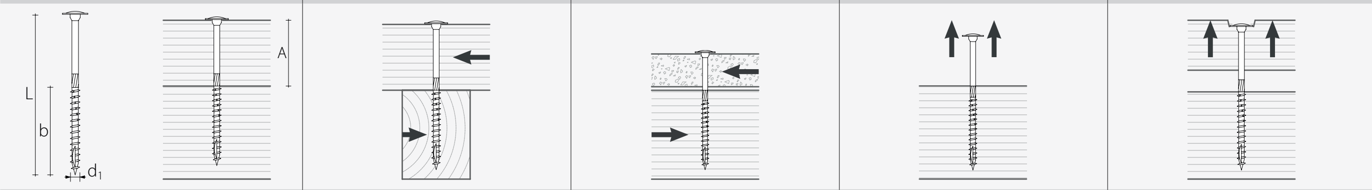
SCREWS INSERTED WITH PRE-BORED HOLES							
		6	**8**	**10**	**6**	**8**	**10**
a_1	[mm]	30	40	50	24	32	40
a_2	[mm]	18	24	30	24	32	40
$a_{3,t}$	[mm]	72	96	120	42	56	70
$a_{3,c}$	[mm]	42	56	70	42	56	70
$a_{4,t}$	[mm]	18	24	30	42	56	70
$a_{4,c}$	[mm]	18	24	30	18	24	30

SCREWS INSERTED WITHOUT PRE-BORED HOLES							
		6	**8**	**10**	**6**	**8**	**10**
a_1	[mm]	72	96	120	30	40	50
a_2	[mm]	30	40	50	30	40	50
$a_{3,t}$	[mm]	90	120	150	60	80	100
$a_{3,c}$	[mm]	60	80	100	60	80	100
$a_{4,t}$	[mm]	30	40	50	60	80	100
$a_{4,c}$	[mm]	30	40	50	30	40	50



NOTE

- The minimum distances are in accordance with the EN 1995:2008 standard, according to ETA-11/0030, considering a mass density of the wood elements of $\rho_k \leq 420$ kg/m^3.
- In the case of OSB-wood joints, the minimum spacings (a_1, a_2) can be multiplied by a coefficient of 0.85.



				SHEAR			TRACTION	
geometry				wood-wood	panel-wood [(1)]		thread withdrawal [(2)]	head penetration
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,k}$ [kN]		$R_{V,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
6	**80**	50	30	2,13	S_{PAN} = 50 mm	2,12	3,75	2,69
	100	60	40	2,33		2,63	4,50	2,69
	120	75	45	2,33		2,63	5,62	2,69
	140	75	65	2,33		2,63	5,62	2,69
	160	75	85	2,33		2,63	5,62	2,69
	180	75	105	2,33		2,63	5,62	2,69
	200	75	125	2,33		2,63	5,62	2,69
	220	100	120	2,33		2,63	7,50	2,69
	240	100	140	2,33		2,63	7,50	2,69
	260	100	160	2,33		2,63	7,50	2,69
	280	100	180	2,33		2,63	7,50	2,69
	300	100	200	2,33		2,63	7,50	2,69
8	**40**	32	8	1,07	S_{PAN} = 65 mm	-	3,20	4,05
	60	52	10	1,34		-	5,20	4,05
	80	52	28	2,99		2,00	5,20	4,05
	100	80	20	2,67		3,19	8,00	4,05
	120	80	40	3,38		4,09	8,00	4,05
	140	80	60	3,67		4,09	8,00	4,05
	160	100	60	3,67		4,09	10,00	4,05
	180	100	80	3,67		4,09	10,00	4,05
	200	100	100	3,67		4,09	10,00	4,05
	220	100	120	3,67		4,09	10,00	4,05
	240	100	140	3,67		4,09	10,00	4,05
	260	100	160	3,67		4,09	10,00	4,05
	280	100	180	3,67		4,09	10,00	4,05
	300	100	200	3,67		4,09	10,00	4,05
	320	100	220	3,67		4,09	10,00	4,05
	340	100	240	3,67		4,09	10,00	4,05
	360	100	260	3,67		4,09	10,00	4,05
	380	100	280	3,67		4,09	10,00	4,05
	400	100	300	3,67		4,09	10,00	4,05
10	**160**	80	80	5,60	S_{PAN} = 80 mm	6,19	10,00	7,01
	180	80	100	5,60		6,19	10,00	7,01
	200	100	100	5,60		6,19	12,50	7,01
	220	100	120	5,60		6,19	12,50	7,01
	240	100	140	5,60		6,19	12,50	7,01
	260	100	160	5,60		6,19	12,50	7,01
	280	100	180	5,60		6,19	12,50	7,01
	300	100	200	5,60		6,19	12,50	7,01
	320	100	220	5,60		6,19	12,50	7,01
	340	100	240	5,60		6,19	12,50	7,01
	360	100	260	5,60		6,19	12,50	7,01
	380	100	280	5,60		6,19	12,50	7,01
	400	100	300	5,60		6,19	12,50	7,01

GENERAL PRINCIPLES

- Characteristic values comply with the EN 1995:2008 standard in accordance with ETA-11/0030.
- Design values are obtained from the following characteristic values: $R_d = \frac{R_k \cdot k_{mod}}{\gamma_m}$

  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..
- In the calculations, the density of the wood elements was considered equal to $\rho_k = 380\ kg/m^3$.
  Characteristic resistances can also be considered as valid for larger densities, for the purposes of safety.
- Values were calculated considering the threaded part as being completely inserted into the wood.
- Sizing and verification of the wooden elements and panels must be done separately.
- The shear characteristic resistances are calculated for screws inserted without pre-bored holes. In the case of screws inserted with pre-bored holes, greater resistance values can be obtained.
- For different calculation methods, the myProject software is available free of charge (www.rothoblaas.com)
- The characteristic resistances were calculated using solid wood or glulam. In the case of joints with X-Lam elements, the resistance values may be different and should be calculated on the basis of the characteristics of the panel and the connection configuration.

NOTE

[(1)] The shear characteristic resistances are calculated considering a particle board with a S_{PAN} thickness.
[(2)] The axial thread-extraction resistance was calculated considering a 90° angle between the grain and the connector and for a fixing length of b.

Calculation example: rafter - purlin joint with myProject

CONNECTION WOOD-WOOD / SINGLE SHEAR

Download free at www.rothoblaas.com

ELEMENT 1 [1]

B1 = 120 mm
H1 = 160 mm
Slope 30% (16,7°)
Wood GL24h

ELEMENT 2 [2]

B2 = 200 mm
H2 = 240 mm
Slope 0% (0°)
Wood GL24h

PROJECT DATA

$F_{v,Rd}$ = 1,89 kN
Service class = 1
Load duration = short

SCREW SELECTION

TBS = 8 x 260 mm
Pre-bored hole = no

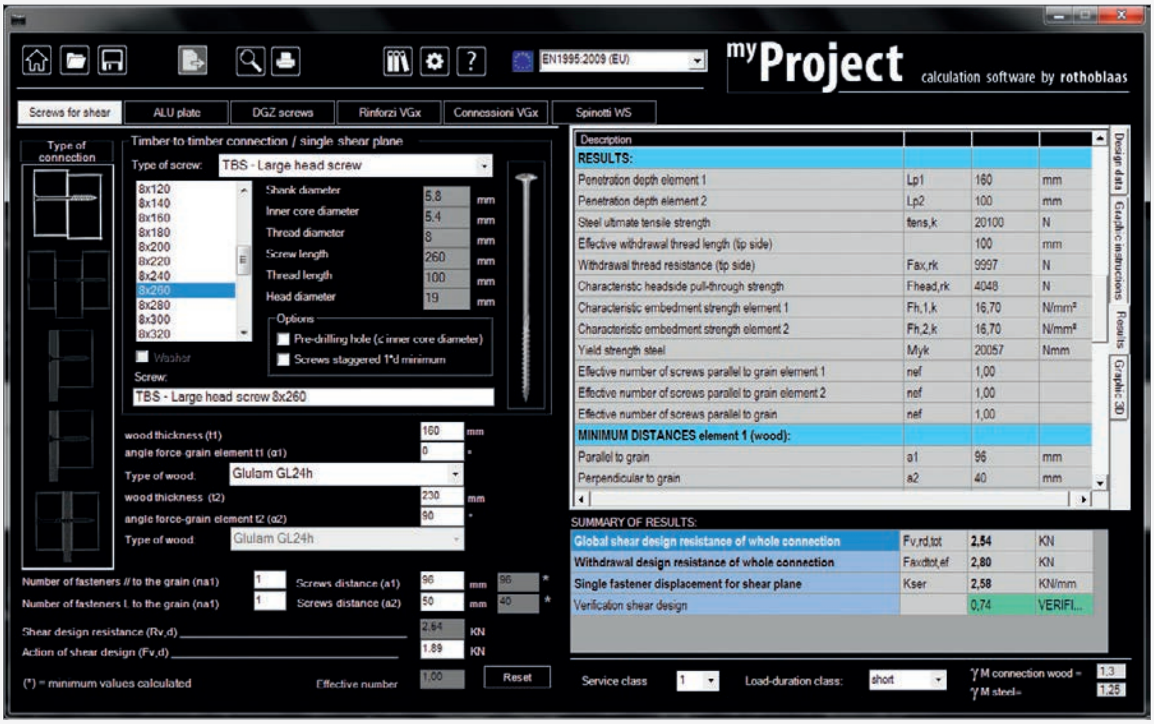
CONNECTION GEOMETRY

t_1 = 160 mm
α_1 = 0°
t_2 = 100 mm (fixing length in element 2)
α_2 = 90°

SHEAR RESISTANCE CALCULATION WITH myProject SOFTWARE (EN 1995:2008 e ETA-11/0030)

d_1 = 8,0 mm
$f_{h,1,k}$ = 16,70 N/mm^2
$f_{h,2,k}$ = 16,70 N/mm^2
β = 1,00
$M_{y,k}$ = 20057,5 Nmm

$R_{ax,Rk}$ = min {resistance to thread withdrawal; resistance to head penetration} = min {$R_{ax,Rk}$; $R_{head,Rk}$} = 4,05 kN
$R_{ax,Rk}$ / 4 = 1,01 kN (cable effect)



$R_{v,Rk}$ = 3,67 kN

$$R_{v,Rd} = \frac{R_{v,Rk} \cdot k_{mod}}{\gamma_m} \geq F_{v,Rd}$$

EN 1995:2008
k_{mod} = 0,9
γ_m = 1,3
$R_{v,Rd}$ = 2,54 kN > 1,89 kN **OK**

Italia - NTC 2008
k_{mod} = 0,9
γ_m = 1,5
$R_{v,Rd}$ = 2,20 kN > 1,89 kN **OK**