

TBS MAX

XL FLANGE HEAD SCREW



FLANGE HEAD OF INCREASED SIZE

The oversized head provides excellent head pull-through strength and joint tightening capacity.

LONGER THREAD

The oversized thread of the TBS MAX guarantees excellent withdrawal resistance and closing strength of the joint.

RIBBED FLOORS

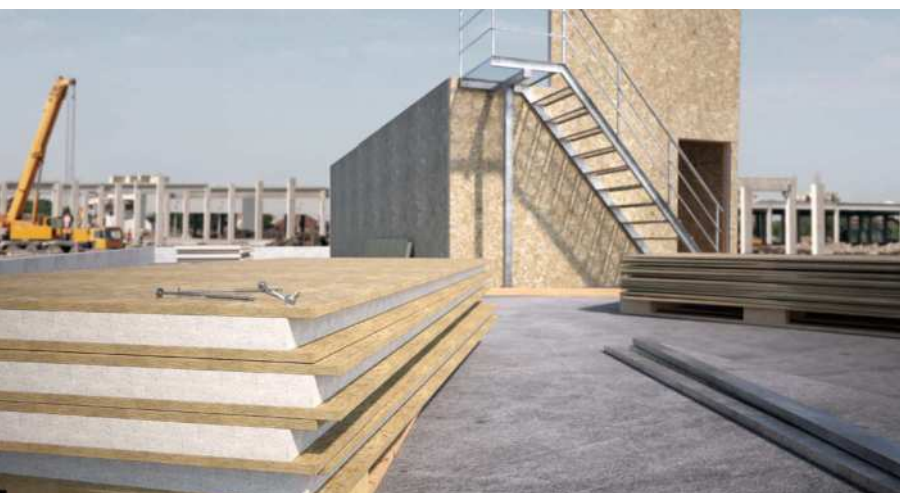
Thanks to its large head and oversized thread, it is the ideal screw in the production of ribbed floors (Rippendecke). Used in conjunction with SHARP METAL, it optimises the number of fasteners by avoiding the use of presses when gluing timber elements together.

3 THORNS TIP

Thanks to the 3 THORNS tip, minimum installation distances are reduced. More screws can be used in less space and larger screws in smaller elements. Costs and time for project implementation are reduced.



DIAMETER [mm]	6	8	16
LENGTH [mm]	40	120	400
SERVICE CLASS	SC1	SC2	
ATMOSPHERIC CORROSIVITY	C1	C2	
WOOD CORROSIVITY	T1	T2	
MATERIAL	Zn ELECTRO PLATED electrogalvanized carbon steel		



FIELDS OF USE

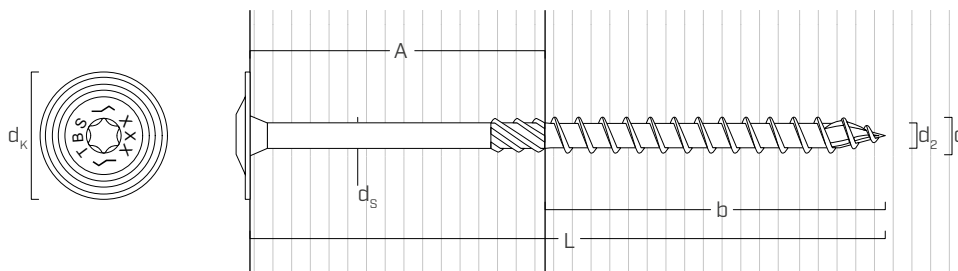
- timber based panels
- fibreboard and MDF panels
- SIP and ribbed panels.
- solid timber and glulam
- CLT and LVL
- high density woods

CODES AND DIMENSIONS

d ₁ [mm]	d _K [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
8 TX 40	24,5	TBSMAX8120	120	100	20	50
		TBSMAX8160	160	120	40	50
		TBSMAX8180	180	120	60	50
		TBSMAX8200	200	120	80	50
		TBSMAX8220	220	120	100	50

d ₁ [mm]	d _K [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
8 TX 40	24,5	TBSMAX8240	240	120	120	50
		TBSMAX8280	280	120	160	50
		TBSMAX8320	320	120	200	50
		TBSMAX8360	360	120	240	50
		TBSMAX8400	400	120	280	50

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	d ₁	[mm]	8
Head diameter	d _K	[mm]	24,50
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

⁽¹⁾ Pre-drilling valid for softwood.

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

CHARACTERISTIC MECHANICAL PARAMETERS

Nominal diameter	d ₁	[mm]	8
Tensile strength	f _{tens,k}	[kN]	20,1
Yield moment	M _{y,k}	[Nm]	20,1

			softwood (softwood)	LVL softwood (LVL softwood)	pre-drilled beech LVL (beech LVL predrilled)
Withdrawal resistance parameter	f _{ax,k}	[N/mm ²]	11,7	15,0	29,0
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.



TBS MAX FOR RIB TIMBER

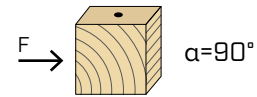
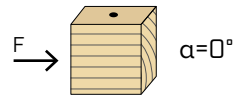
With its increased thread (120 mm) and enlarged head (24,5 mm), the TBS MAX guarantees excellent grip and superb joint closure. Ideal for the production of ribbed floors (Rippendecke), optimising the number of fastenings.

SHARP METAL

Ideal in combination with the SHARP METAL system, as the enlarged head guarantees excellent joint tightening, making the use of presses unnecessary when gluing wooden elements together.

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

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

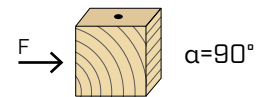
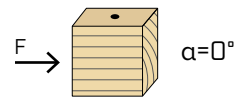


d_1	[mm]	8
a_1	[mm]	10·d
a_2	[mm]	5·d
$a_{3,t}$	[mm]	15·d
$a_{3,c}$	[mm]	10·d
$a_{4,t}$	[mm]	5·d
$a_{4,c}$	[mm]	5·d

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

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

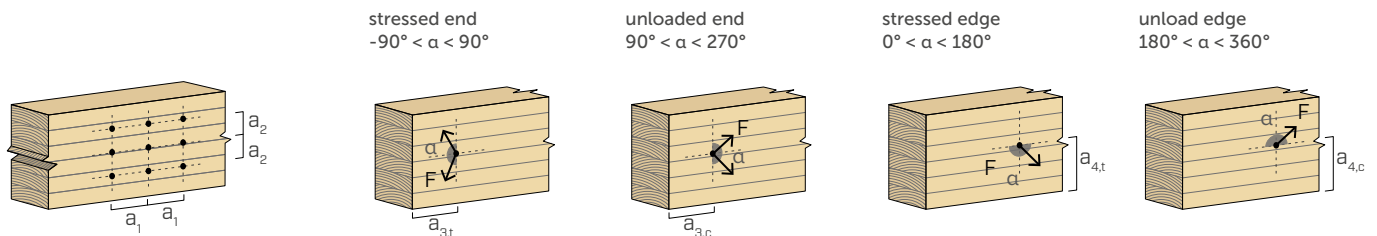
screws inserted **WITH** pre-drilled hole



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

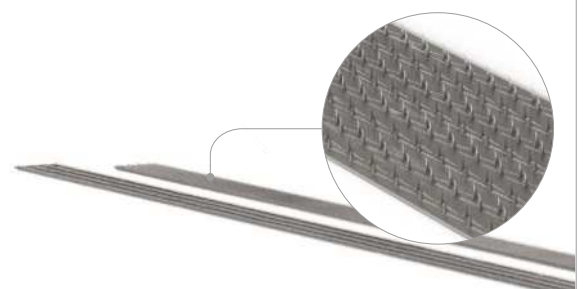
- Minimum distances are in accordance with EN 1995:2014 as per ETA-11/0030 considering a timber characteristic density of $\rho_k \leq 420 \text{ kg/m}^3$.
- The minimum spacing for all panel-to-timber connections (a_1 , a_2) can be multiplied by a coefficient of 0,85.
- In the case of joints with elements 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.

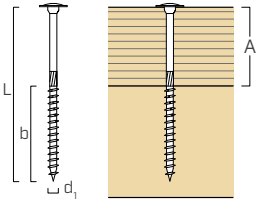
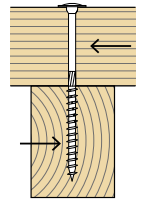
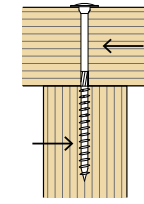
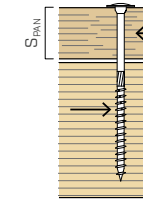
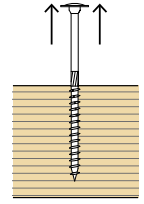
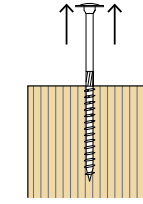
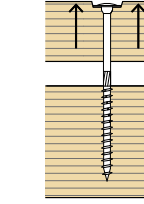
SHARP METAL

STEEL HOOKED PLATES

The joint between the two timber elements is made by the mechanical engagement of the metal hooks in the timber. The system is non-invasive can be uninstalled.

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				SHEAR			TENSION			
geometry				timber-to-timber $\varepsilon=90^\circ$	timber-to-timber $\varepsilon=0^\circ$	panel-to-timber	thread withdrawal $\varepsilon=90^\circ$	thread withdrawal $\varepsilon=0^\circ$	head pull-through	
										
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,90,k}$ [kN]	$R_{V,0,k}$ [kN]	S_{PAN} [mm]	$R_{V,k}$ [kN]	$R_{ax,90,k}$ [kN]	$R_{ax,0,k}$ [kN]	$R_{head,k}$ [kN]
8	120	100	20	2,71	2,17	65	4,27	10,10	3,03	9,72
	160	120	40	4,78	2,84		5,28	12,12	3,64	9,72
	180	120	60	5,11	2,94		5,28	12,12	3,64	9,72
	200	120	80	5,11	2,94		5,28	12,12	3,64	9,72
	220	120	100	5,11	2,94		5,28	12,12	3,64	9,72
	240	120	120	5,11	2,94		5,28	12,12	3,64	9,72
	280	120	160	5,11	2,94		5,28	12,12	3,64	9,72
	320	120	200	5,11	2,94		5,28	12,12	3,64	9,72
	360	120	240	5,11	2,94		5,28	12,12	3,64	9,72
	400	120	280	5,11	2,94		5,28	12,12	3,64	9,72

ε = screw-to-grain angle

NOTES | TIMBER

- The characteristic timber-to-timber shear strengths were evaluated considering both an ε angle of 90° ($R_{V,90,k}$) and 0° ($R_{V,0,k}$) between the grains of the second element and the connector.
 - The characteristic panel-timber shear strengths were evaluated considering an angle ε of 90° between the grains of the timber 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 on the table (timber-to-timber shear and tensile) can be converted by the k_{dens} coefficient.

$$R'_{V,k} = k_{dens,v} \cdot R_{V,k}$$

$$R'_{ax,k} = k_{dens,ax} \cdot R_{ax,k}$$

$$R'_{head,k} = k_{dens,ax} \cdot R_{head,k}$$

ρ_k [kg/m ³]	350	380	385	405	425	430	440
C-GL	C24	C30	GL24h	GL26h	GL28h	GL30h	GL32h
$k_{dens,v}$	0,90	0,98	1,00	1,02	1,05	1,05	1,07
$k_{dens,ax}$	0,92	0,98	1,00	1,04	1,08	1,09	1,11

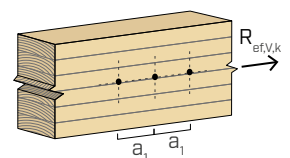
Strength values thus determined may differ, for higher safety standards, from those resulting from an exact calculation.

GENERAL PRINCIPLES on page 97.

EFFECTIVE NUMBER FOR SHEAR LOADS

The load-bearing capacity of a connection made with several screws, all of the same type and size, may be lower than the sum of the load-bearing capacities of the individual connection system. For a row of n screws arranged parallel to the direction of the grain at a distance a_1 , the characteristic effective load-bearing capacity is equal to:

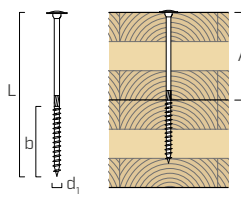
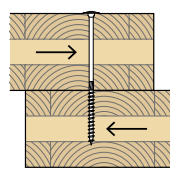
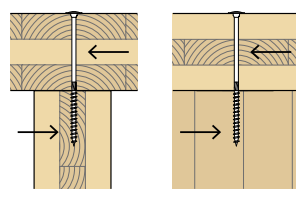
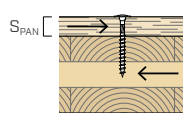
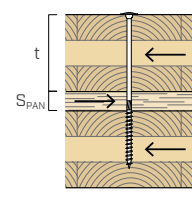
$$R_{ef,V,k} = n_{ef} \cdot R_{V,k}$$

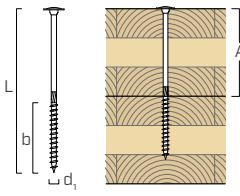
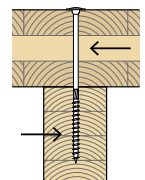
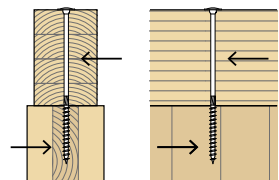
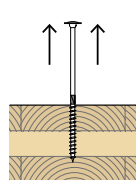
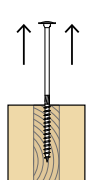
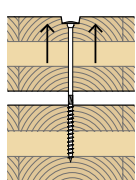


The n_{ef} value is given in the table below as a function of n and a_1 .

		$a_1^{(*)}$									
		4·d	5·d	6·d	7·d	8·d	9·d	10·d	11·d	12·d	13·d
n	2	1,41	1,48	1,55	1,62	1,68	1,74	1,80	1,85	1,90	1,95
	3	1,73	1,86	2,01	2,16	2,28	2,41	2,54	2,65	2,76	2,88
	4	2,00	2,19	2,41	2,64	2,83	3,03	3,25	3,42	3,61	3,80
	5	2,24	2,49	2,77	3,09	3,34	3,62	3,93	4,17	4,43	4,71
		$\geq 14 \cdot d$									
		2,00									

(*)For intermediate a_1 values a linear interpolation is possible.

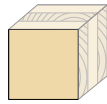
SHEAR											
geometry				CLT-CLT lateral face		CLT-CLT lateral face-narrow face		panel-CLT lateral face		CLT-panel-CLT lateral face	
											
d ₁ [mm]	L [mm]	b [mm]	A [mm]	R _{V,k} [kN]	R _{V,k} [kN]		S _{PAN} [mm]	R _{V,k} [kN]	S _{PAN} [mm]	t [mm]	R _{V,k} [kN]
8	120	100	20	2,46	2,46		22	3,64	22	45	3,64
	160	120	40	4,43	3,71			3,64		65	3,64
	180	120	60	4,81	3,99			3,64		75	3,64
	200	120	80	4,81	3,99			3,64		85	3,64
	220	120	100	4,81	3,99			3,64		95	3,64
	240	120	120	4,81	3,99			3,64		105	3,64
	280	120	160	4,81	3,99			3,64		125	3,64
	320	120	200	4,81	3,99			3,64		145	3,64
	360	120	240	4,81	3,99			3,64		165	3,64

				SHEAR		TENSION		
geometry				CLT-timber lateral face	timber-CLT narrow face	thread withdrawal narrow face	thread withdrawal narrow face	head pull-through
								
d_1 [mm]	L [mm]	b [mm]	A [mm]	$R_{V,k}$ [kN]	$R_{V,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{ax,k}$ [kN]	$R_{head,k}$ [kN]
8	120	100	20	2,46	2,71	9,36	6,66	9,00
	160	120	40	4,50	3,91	11,23	7,85	9,00
	180	120	60	4,87	4,02	11,23	7,85	9,00
	200	120	80	4,87	4,02	11,23	7,85	9,00
	220	120	100	4,87	4,02	11,23	7,85	9,00
	240	120	120	4,87	4,02	11,23	7,85	9,00
	280	120	160	4,87	4,02	11,23	7,85	9,00
	320	120	200	4,87	4,02	11,23	7,85	9,00
	360	120	240	4,87	4,02	11,23	7,85	9,00

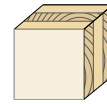
MINIMUM DISTANCES FOR SHEAR AND AXIAL LOADS | CLT



screws inserted **WITHOUT** pre-drilled hole



lateral face

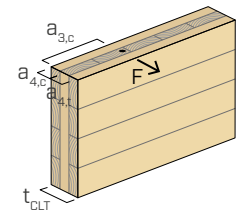
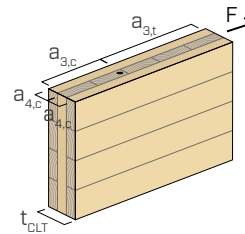
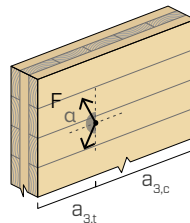
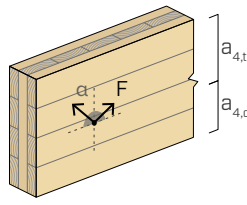
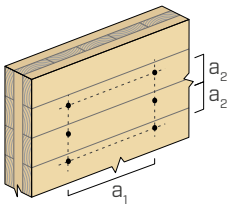


narrow face

d_1	[mm]	8
a_1	[mm]	$4 \cdot d$
a_2	[mm]	$2,5 \cdot d$
$a_{3,t}$	[mm]	$6 \cdot d$
$a_{3,c}$	[mm]	$6 \cdot d$
$a_{4,t}$	[mm]	$6 \cdot d$
$a_{4,c}$	[mm]	$2,5 \cdot d$

d_1	[mm]	8
a_1	[mm]	$10 \cdot d$
a_2	[mm]	$4 \cdot d$
$a_{3,t}$	[mm]	$12 \cdot d$
$a_{3,c}$	[mm]	$7 \cdot d$
$a_{4,t}$	[mm]	$6 \cdot d$
$a_{4,c}$	[mm]	$3 \cdot d$

$d = d_1 = \text{nominal screw diameter}$



NOTES

- The minimum distances are compliant with ETA-11/0030 and are to be considered valid unless otherwise specified in the technical documents for the CLT panels.
- Minimum distances are valid for minimum CLT thickness $t_{CLT,min} = 10 \cdot d_1$.
- The minimum distances referred to "narrow face" are valid for minimum screw pull-through depth $t_{pen} = 10 \cdot d_1$.

STRUCTURAL VALUES

GENERAL PRINCIPLES

- Characteristic values consistent with EN 1995:2014 and 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.
- Sizing and verification of the timber elements and panels 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.
- The screws must be positioned in accordance with the minimum distances.
- The characteristic panel-timber shear strengths are calculated considering an OSB panel or particle board with a s_{PAN} thickness.
- 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.
- For different calculation configurations, the MyProject software is available (www.rothoblaas.com).

NOTES | CLT

- The characteristic values are according to the national specifications ONORM EN 1995 - Annex K.
- For the calculation process, a mass density of $\rho_k = 350 \text{ kg/m}^3$ has been considered for CLT elements and a mass density of $\rho_k = 385 \text{ kg/m}^3$ has been considered for timber elements.
- The characteristics shear resistance are calculated considering a minimum fixing length of $4 \cdot d_1$.
- The characteristic shear strength is independent from the direction of the grain of the CLT panels outer layer.
- The axial thread withdrawal resistance is valid for minimum CLT thickness $t_{CLT,min} = 10 \cdot d_1$ and minimum screw pull-through depth $t_{pen} = 10 \cdot d_1$.