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.
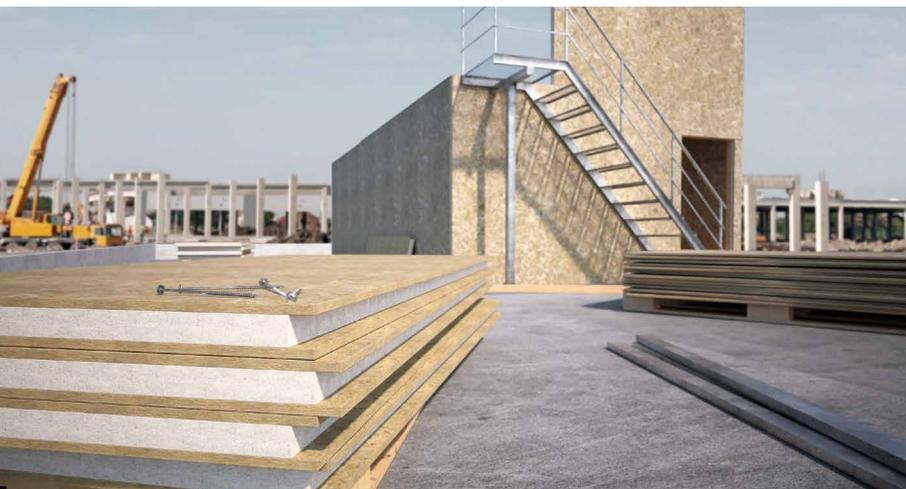
CANADIAN DESIGN VALUES
USA, EU and more design values available online.

BIT INCLUDED

| DIAMETER [mm]	6	8	16
LENGTH [mm]	40	120 400	1000
SERVICE CONDITION	EC1	DRY	
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
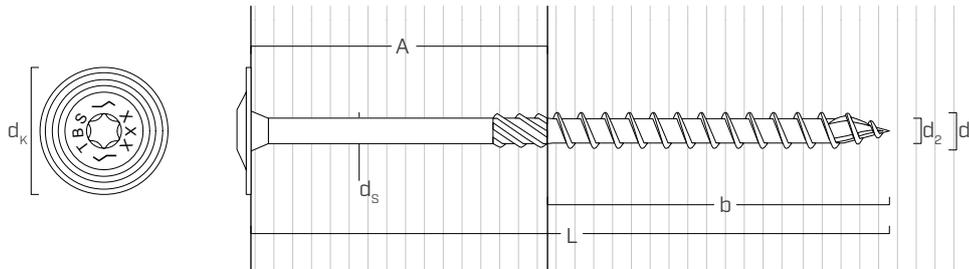
GEOMETRY

Nominal diameter	d$_1$	[mm]	8
Head diameter	d$_K$	[mm]	24,50
Root 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.

MECHANICAL PROPERTIES

Nominal diameter	d$_1$	[mm]	8	
Factored tensile strength	Φf_u	[kN]	14,70	
Bending yield strength	F$_{yb}$	[MPa]	1047	
Factored shear strength of the screw	Φv_s	[kN]	8,79	
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y$_w$	[N/mm]	G=0.35	69,83
			G=0.42	80,80
			G=0.49	91,40
			G=0.55	100,25
Specified head pull-through resistance per screw	F$_{pt}$	[kN]	G=0.35	3,73
			G=0.42	4,48
			G=0.49	5,23
			G=0.55	5,87

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 glue unnecessary when connecting wooden elements together.
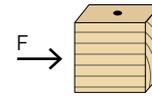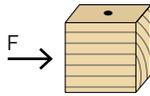
MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

⬤ screws inserted **WITHOUT pre-drilled hole** ———— **G ≤ 0.44**

d_1		8	*0.32*
		[mm]	*[in]*
S_P	12·d‡	96	*3 3/4*
S_Q	5·d	40	*1 9/16*
a_L	15·d‡	120	*4 3/4*
a	10·d‡	80	*3 1/8*
e_Q	10·d	80	*3 1/8*
e_P	5·d	40	*1 9/16*

‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

⬤ screws inserted **WITHOUT pre-drilled hole** ———— **0.44 < G ≤ 0.50**

d_1		8	*0.32*
		[mm]	*[in]*
S_P	18·d	144	*5 11/16*
S_Q	7·d	56	*2 3/16*
a_L	22·d	176	*6 15/16*
a	15·d	120	*4 3/4*
e_Q	12·d	96	*3 3/4*
e_P	7·d	56	*2 3/16*

⊔ screws inserted **WITH pre-drilled hole** ————

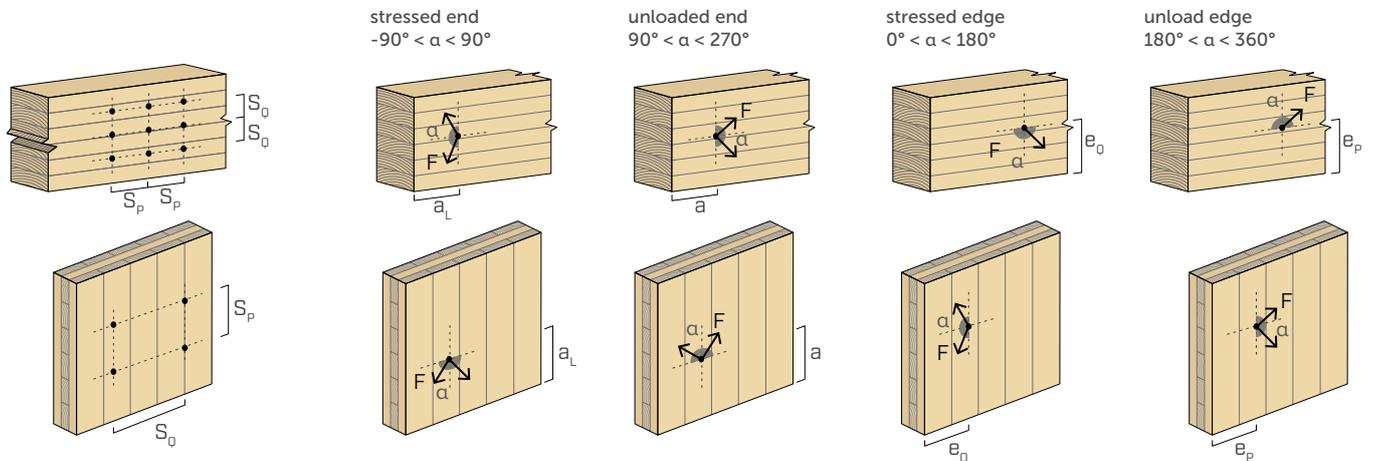| d_1		8	*0.32*
		[mm]	*[in]*
S_P	5·d†	40	*1 9/16*
S_Q	4·d	32	*1 1/4*
a_L	12·d†	96	*3 3/4*
a	7·d†	56	*2 3/16*
e_Q	7·d	56	*2 3/16*
e_P	3·d	24	*15/16*
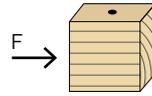
† For Douglas Fir–Larch and Western Red Cedar, this minimum spacing shall be increased by 50%.
d = d_1 = nominal diameter of the screw
α = load-to-grain angle

stressed end
-90° < α < 90°

unloaded end
90° < α < 270°

stressed edge
0° < α < 180°

unload edge
180° < α < 360°

NOTES

• The minimum spacing and distances comply with Clause 12.12.5 of CSA O86:24, where d_1 refers to the nominal diameter of the self-tapping screw.
• The spacing, end, and edge distances for Rothoblaas screws installed in the narrow face of CLT panels shall comply with the specifications outlined in ETA-11/0030.
• The placement of fasteners subjected to axial loading shall be determined in accordance with Clause 12.12.5 of CSA O86:24.

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 disassembled.

www.rothoblaas.com

STRUCTURAL VALUES | AXIAL TENSION

geometry			thread withdrawal												steel tension
			α = 90°				α = 45°				end grain α = 0°				
			factored withdrawal resistance P$_{rw}$				factored withdrawal resistance P$_{rw}$				factored withdrawal resistance P$_{rw}$[2][3]				factored tension resistance T$_{rs}$
d$_1$	L	b	G				G				G				
			0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	
[mm] [in]	[mm] [in]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	120 4 3/4	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	160 6 1/4	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	180 7 1/8	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	200 8	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
8 0.32	220 8 5/8	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	14,7
	240 9 1/2	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	280 11	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	320 12 5/8	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	360 14 1/4	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	
	400 15 3/4	120	5,47	6,33	7,17	7,86	4,98	5,76	6,51	7,15	2,74	3,17	3,58	3,93	

α = screw-to-grain angle

STRUCTURAL VALUES | LATERAL RESISTANCE

geometry				SHEAR[4]							
				timber-to-timber α = 90°				timber-to-timber α = 0°			
				factored lateral resistance N$_r$				factored lateral resistance N$_r$[2][3]			
d$_1$	L	b	A	G				G			
				0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] [in]	[mm] [in]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	120 4 3/4	100	20	1,71	1,96	2,21	2,42	1,28	1,51	1,74	1,94
	160 6 1/4	120	40	1,95	2,25	2,55	2,80	1,71	2,03	2,29	2,51
	180 7 1/8	120	60	2,19	2,54	2,84	3,06	1,84	2,13	2,35	2,52
	200 8	120	80	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
8 0.32	220 8 5/8	120	100	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
	240 9 1/2	120	120	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
	280 11	120	160	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
	320 12 5/8	120	200	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
	360 14 1/4	120	240	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
	400 15 3/4	120	280	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 6.

◾ STRUCTURAL VALUES | LATERAL RESISTANCE

α = screw-to-grain angle

				SHEAR[4]													
geometry				CLT-CLT lateral face α = 90°				CLT-CLT α = 0°					spline joint lateral face α = 90°			
				factored lateral resistance N$_r$ [5]				factored lateral resistance N$_r$ [2][3]				S$_{DFP}$	factored lateral resistance N$_r$			
d$_1$	L		b	A	G				G					G			
					0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55		0.35	0.42	0.49	0.55
[mm] [in]	[mm]	[in]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[mm] [in]	[kN]	[kN]	[kN]	[kN]
8 **0.32**	120	4 3/4	100	65	1,87	2,22	2,50	2,72	1,11	1,26	1,40	1,52		2,33	2,39	2,44	2,48
	160	6 1/4	120	85	2,19	2,47	2,74	2,96	1,32	1,50	1,68	1,83		2,33	2,39	2,44	2,48
	180	7 1/8	120	95	2,19	2,47	2,74	2,96	1,42	1,62	1,82	1,98		2,33	2,39	2,44	2,48
	200	8	120	105	2,19	2,47	2,74	2,96	1,52	1,75	1,96	2,14		2,33	2,39	2,44	2,48
	220	8 5/8	120	115	2,19	2,47	2,74	2,96	1,63	1,87	2,10	2,29	19,1 3/4	2,33	2,39	2,44	2,48
	240	9 1/2	120	120	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44		2,33	2,39	2,44	2,48
	280	11	120	160	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44		2,33	2,39	2,44	2,48
	320	12 5/8	120	200	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44		2,33	2,39	2,44	2,48
	360	14 1/4	120	240	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44		2,33	2,39	2,44	2,48
	400	15 3/4	120	280	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44		2,33	2,39	2,44	2,48

α = screw-to-grain angle

◾ STRUCTURAL VALUES | LATERAL RESISTANCE

				SHEAR[4]							
geometry				CLT-timber lateral face α = 90°				timber-CLT narrow face α = 0°			
				factored lateral resistance N$_r$				factored lateral resistance N$_r$ [2][3]			
d$_1$	L		b	A	G				G			
					0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] [in]	[mm]	[in]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
8 **0.32**	120	4 3/4	100	20	1,66	1,91	2,15	2,36	1,23	1,46	1,68	1,86
	160	6 1/4	120	40	1,88	2,17	2,45	2,70	1,65	1,98	2,27	2,46
	180	7 1/8	120	60	2,09	2,43	2,76	3,01	1,76	2,05	2,29	2,46
	200	8	120	80	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	220	8 5/8	120	100	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	240	9 1/2	120	120	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	280	11	120	160	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	320	12 5/8	120	200	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	360	14 1/4	120	240	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
	400	15 3/4	120	280	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46

α = screw-to-grain angle

NOTES and **GENERAL PRINCIPLES** on page 6.

STRUCTURAL VALUES

GENERAL PRINCIPLES

- The reference factored lateral resistance for self-tapping screws has been determined following the guidelines in Clause 12.12 of the CSA O86:24 including the withdrawal restraint effect. Listed values are based on standard long term load duration factor ($K_D = 1.0$), dry service condition factor ($K_{SF} = 1.0$), and treatment factor ($K_T = 1.0$).

- The reference lateral design values are calculated for screws inserted without pre-drilling as per CSA O86:24 Clause 12.12.10.5.3. The direction of the bearing-to-grain angle does not influence lateral resistance. In the case of screws inserted with pre-drilling, greater resistance values can be obtained.

- Specified head pull-through capacities are taken from the ELC-4645. The withdrawal and head pull-through values provided in this datasheet are also applicable to CLT connections.

- Connection design requires comparing head pull-through resistance to both screw tensile capacity and thread withdrawal - the minimum of the three governs.

- Not all screw lengths satisfy the required embedment depth in either the side member ($4d_1$) or the main member ($8d_1$). Engineering discretion and judgment should be applied to evaluate the potential impact of reduced penetration on the connection's load-carrying capacity.

- TBS screws must be positioned in accordance with the minimum distances.

- G is the mean relative density according to CSA O86:24 Table A12. Most common wood species are assumed such as Northern species (G = 0.35), Spruce-Pine-Fir (G = 0.42), Douglas Fir (G = 0.49), and Southern Pine (G = 0.55).

- The tabulated lateral design values are based on both wood members having the same specific gravity G.

- As part of the connection design, the designer must size and verify both the structural wood members and the steel plates separately.

- Combined shear and tensile stresses shall comply with the interaction criteria outlined in CSA O86:24 Clause 12.12.11.

NOTES

[1] Factored withdrawal resistances were calculated with the entire threaded portion of the screw, b (in millimeters), minus the tip length, L_{tip}. The length of the tip is equal to the nominal diameter of the respective fasteners, d_1, as specified in the ELC-4645 report. Factor for fastener axis-to-grain angle, J_α, and the factor for dowel bearing effect for laterally loaded connections, J_w, varies according to connection geometry. The factored tensile resistance of the connector (P_{rt}) is governed by the lower value between the withdrawal resistance (P_{rw}), head pull-through resistance (P_{pt}) and the steel strength (T_{rs}).

[2] The angle between the fastener axis and the grain direction of the wood member, α, is taken as zero for the end grain calculations. Self-tapping screws installed perpendicular to the panel edge of CLT are assumed to be installed in the end grain of member.

[3] TBS screws installed in the end grain may not meet the minimum penetration requirement for withdrawal ($20d_1$) specified in CSA O86:24 Clause 12.12.6.1. Discretion and engineering judgment must be exercised to evaluate the impact of reduced penetration on the connection's capacity.

[4] Lateral resistances are factored and according to CSA O86:24 Clause 12.12.10. Values apply to dry service conditions and are representative of a single screw.

[5] The CLT-to-CLT boundary conditions are equally applicable to half-lap connections. Use the nearest connection geometry to determine the appropriate values.