TBS MAX

XL FLANGE HEAD SCREW

ELC-4645 ESR-4645 UKTA-0836 22/6195 ETA-11/0030

FLANGE HEAD OF INCREASED SIZE

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

LONGER THREAD

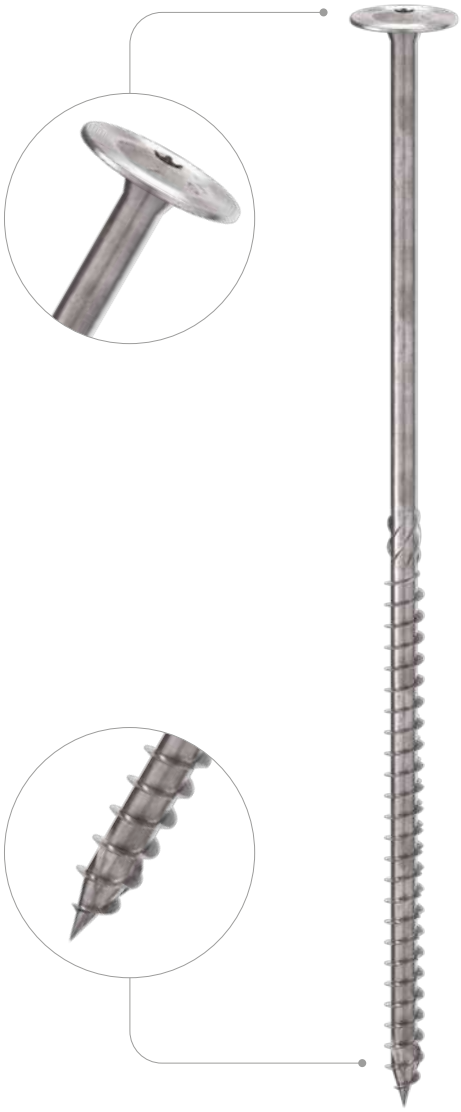
The oversized thread of the TBS MAX guarantees excellent withdrawal resistance and closing strength of the joint.

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.



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
CORE HARDNESS	<390 HV — as required in CSA 086:24(1)

CANADIAN DESIGN VALUES

USA, EU and more design values available online.

FIELDS OF USE

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

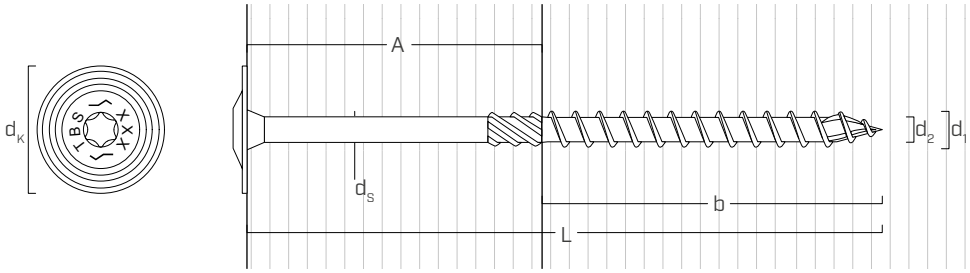
(1) Core hardness < 390 HV guaranteed for structural timber screws diameter 6 mm and above.

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

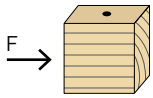
With its increased thread (120 mm) and enlarged head (24,5 mm), the TBS MAX guarantees excellent grip and superb joint closure. Ideal for the production of ribbed floors (Rippendecke), optimising the number of fastenings.

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

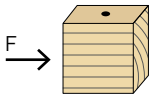
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



d_1		8 [mm]	*0.32 [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*

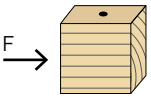
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



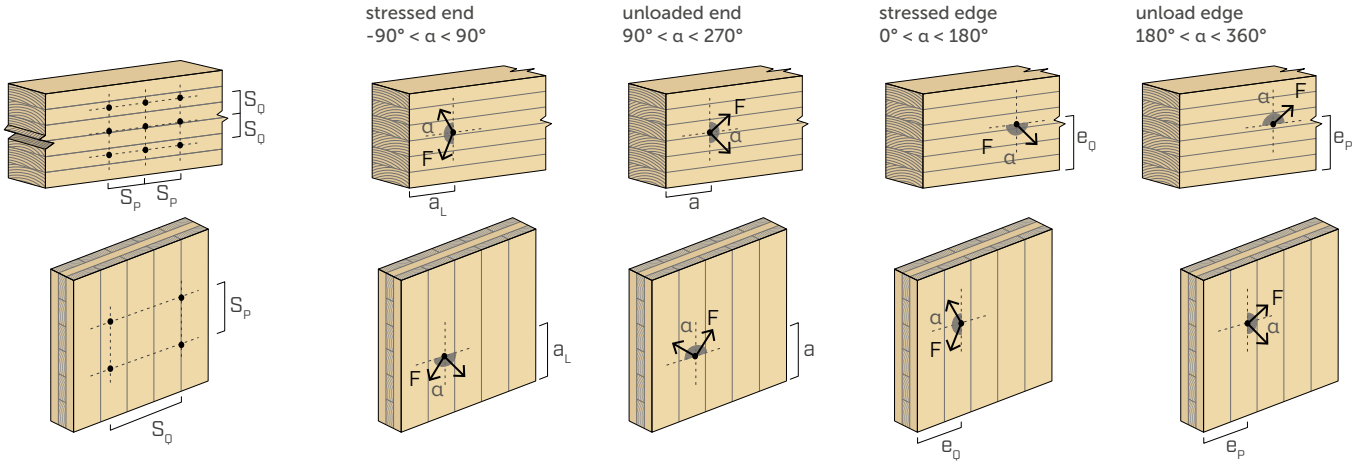
d_1		8 [mm]	*0.32 [in]*
S_P	18·d	144	*5 11/16*
S_Q	7·d	56	*2 3/16*
a_L	22·d	176	*6 15/16*
a	15·d	120	*4 3/4*
e_Q	12·d	96	*3 3/4*
e_P	7·d	56	*2 3/16*

screws inserted **WITH pre-drilled hole**



d_1		8 [mm]	*0.32 [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



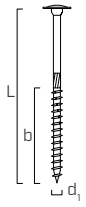
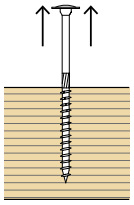
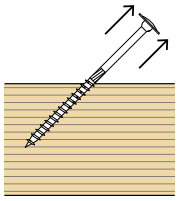
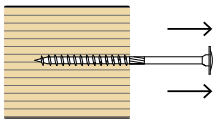
NOTES

- 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.

STRUCTURAL VALUES | AXIAL TENSION

STRENGTH VALUES
CSA 086:24

TENSION[1]

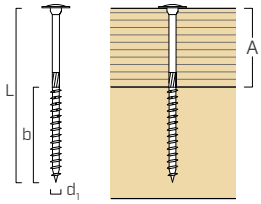
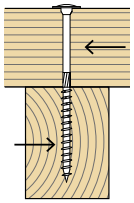
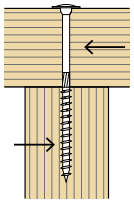
geometry				thread withdrawal α = 90°				thread withdrawal α = 45°				thread withdrawal end grain α = 0°				steel tension
																
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}[2][3]				factored tension resistance T_{rs}
				G				G				G				
d_1	L		b	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	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
0.32	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

STRENGTH VALUES
CSA 086:24

SHEAR[4]

geometry					timber-to-timber α = 90°				timber-to-timber α = 0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r[2][3]			
					G				G			
d_1	L		b	A	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	220	*8 5/8*	120	100	2,28	2,56	2,84	3,06	1,84	2,13	2,35	2,52
0.32	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

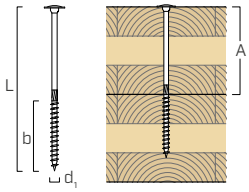
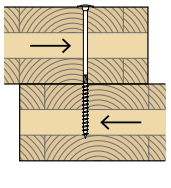
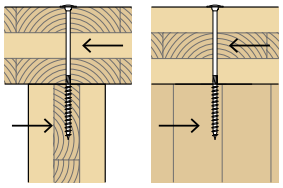
α = screw-to-grain angle

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

STRUCTURAL VALUES | LATERAL RESISTANCE

STRENGTH VALUES
CSA 086:24

SHEAR[4]

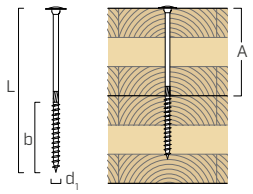
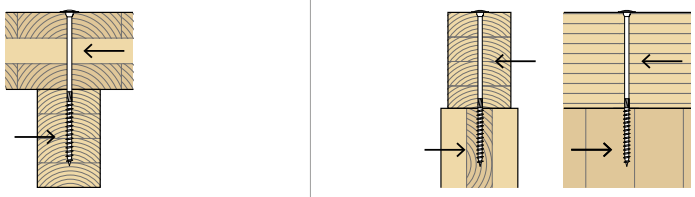
geometry					CLT-CLT lateral face α = 90°				CLT-CLT α = 0°				spline joint lateral face α = 90°				
																	
					factored lateral resistance N_r [5]				factored lateral resistance N_r [2][3]					factored lateral resistance N_r			
d_1	L		b	A	G				G				S_{DFP}	G			
					0.35	0.42	0.49	0.55	0.35	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]
	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
8	220	*8 5/8*	120	115	2,19	2,47	2,74	2,96	1,63	1,87	2,10	2,29	19,1	2,33	2,39	2,44	2,48
0.32	240	*9 1/2*	120	120	2,19	2,47	2,74	2,96	1,75	2,04	2,27	2,44	*3/4*	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

STRENGTH VALUES
CSA 086:24

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]
	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
8	220	*8 5/8*	120	100	2,23	2,52	2,79	3,01	1,76	2,05	2,29	2,46
0.32	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 report. 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.