

LBS EVO

ROUND HEAD SCREW FOR PLATES

SCREW FOR PERFORATED PLATES FOR OUTDOOR USE

LBS EVO version designed for steel-timber joints for outdoor use. Achieves an interlocking effect with the hole in the plate, thus guaranteeing excellent static performance.

C4 EVO COATING

The atmospheric corrosion strength class (C4) of the C4 EVO coating was tested by the Research Institutes of Sweden - RISE. Coating suitable for use in applications on wood with an acidity level (pH) greater than 4, such as spruce, larch and pine.

STATICS

These can be calculated in accordance with the CSA-O86 provisions for the lateral resistance of connections. Excellent shear strength values.



CANADIAN DESIGN VALUES

USA, EU and more design values available online.



DIAMETER [mm]

3,5 ☒ 5 ☐ 7 ☐ 12

LENGTH [mm]

25 ☐ 40 ☒ 100 ☐ 200

SERVICE CONDITION



ATMOSPHERIC CORROSIVITY



WOOD CORROSIVITY



MATERIAL



carbon steel with C4 EVO coating

CORE HARDNESS



as required in CSA 086:24⁽¹⁾



FIELDS OF USE

- timber based panels
- solid timber and glulam
- CLT and LVL
- high density woods
- ACQ, CCA treated timber

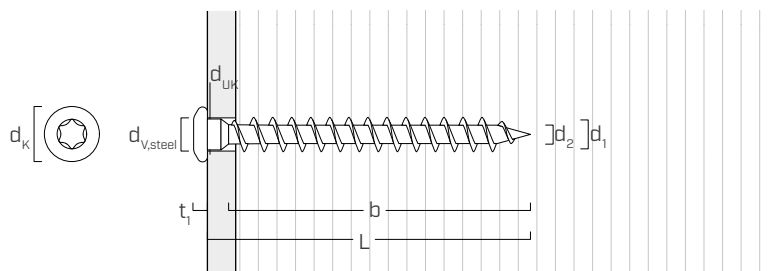
⁽¹⁾ Core hardness < 390 HV guaranteed for structural timber screws diameter 6 mm and above.

CODES AND DIMENSIONS

d_1 [mm] [in]	CODE	L [mm]	b [mm]	pcs
5 0.20 TX 20	LBSEVO540	40	36	500
	LBSEVO550	50	46	200
	LBSEVO560	60	56	200
	LBSEVO570	70	66	200

d_1 [mm] [in]	CODE	L [mm]	b [mm]	pcs
7 0.28 TX 30	LBSEVO780	80	75	100
	LBSEVO7100	100	95	100

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	d_1	[mm]	5	7
Head diameter	d_K	[mm]	7,80	11,00
Root diameter	d_2	[mm]	3,00	4,40
Underhead diameter	d_{UK}	[mm]	4,90	7,00
Head thickness	t_1	[mm]	2,40	3,50
Hole diameter on steel plate	$d_{V,steel}$	[mm]	5,0÷5,5	7,5÷8,0
Pre-drilling hole diameter ⁽¹⁾	$d_{V,S}$	[mm]	3,0	4,0
Pre-drilling hole diameter ⁽²⁾	$d_{V,H}$	[mm]	3,5	5,0

⁽¹⁾ Pre-drilling valid for softwood.

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

MECHANICAL PARAMETERS

Nominal diameter	d_1	[mm]	5	7
Factored tensile strength	Φf_u	[kN]	5,36	11,59
Bending yield strength	F_{yb}	[MPa]	1075	1146
Factored shear strength of the screw	Φv_s	[kN]	2,71	5,84
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	73,20
			G=0.42	84,70
			G=0.49	95,82
			G=0.55	105,09



T3 TIMBER CORROSIVITY

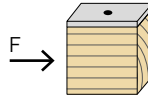
Coating suitable for use in applications on wood with an acidity level (pH) greater than 4, such as spruce, larch, pine, ash and birch.

STEEL-TO-TIMBER APPLICATION

The LBSEVO screw with diameter 7 is particularly suitable for custom-designed connections, which are characteristic of steel structures.

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

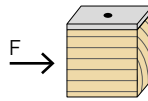
screws inserted **WITHOUT** pre-drilled hole $G \leq 0.44$



d_1	5	0.20	7	0.28
	[mm]	[in]	[mm]	[in]
S_p	$12 \cdot d^\dagger$	60	84	$3 \frac{5}{16}$
S_Q	$5 \cdot d$	25	35	$1 \frac{3}{8}$
a_L	$15 \cdot d^\dagger$	75	105	$4 \frac{1}{8}$
a	$10 \cdot d^\dagger$	50	70	$2 \frac{3}{4}$
e_Q	$10 \cdot d$	50	70	$2 \frac{3}{4}$
e_p	$5 \cdot d$	25	35	$1 \frac{3}{8}$

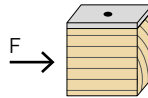
[†] For Western Red Cedar, this minimum spacing shall be increased by 50%.

screws inserted **WITHOUT** pre-drilled hole $0.44 < G \leq 0.50$



d_1	5	0.20	7	0.28
	[mm]	[in]	[mm]	[in]
S_p	$18 \cdot d$	90	126	$4 \frac{15}{16}$
S_Q	$7 \cdot d$	35	49	$1 \frac{15}{16}$
a_L	$22 \cdot d$	110	154	$6 \frac{1}{16}$
a	$15 \cdot d$	75	105	$4 \frac{1}{8}$
e_Q	$12 \cdot d$	60	84	$3 \frac{5}{16}$
e_p	$7 \cdot d$	35	49	$1 \frac{15}{16}$

screws inserted **WITH** pre-drilled hole

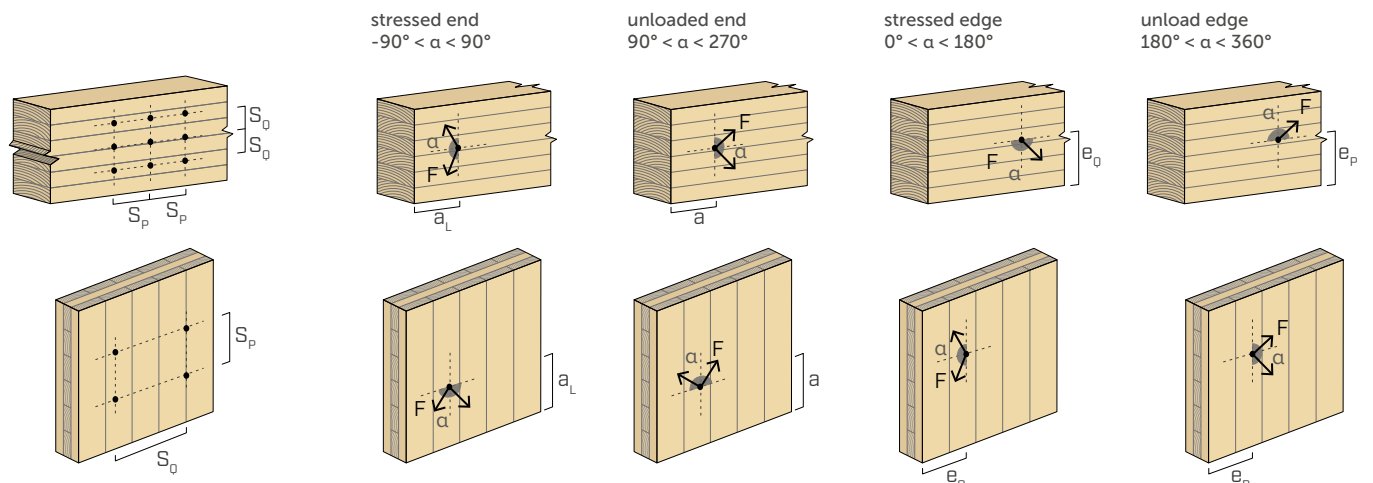


d_1	5	0.20	7	0.28
	[mm]	[in]	[mm]	[in]
S_p	$5 \cdot d^\dagger$	25	35	$1 \frac{3}{8}$
S_Q	$4 \cdot d$	20	28	$1 \frac{1}{8}$
a_L	$12 \cdot d^\dagger$	60	84	$3 \frac{5}{16}$
a	$7 \cdot d^\dagger$	35	49	$1 \frac{15}{16}$
e_Q	$7 \cdot d$	35	49	$1 \frac{15}{16}$
e_p	$3 \cdot d$	15	21	$\frac{13}{16}$

[†] For Douglas Fir–Larch and Western Red Cedar, this minimum spacing shall be increased by 50%.

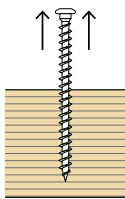
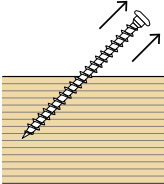
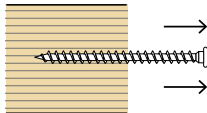
α = load-to-grain angle

$d = d_1$ = nominal diameter of the screw



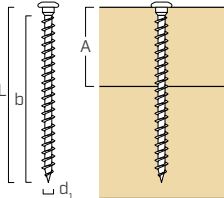
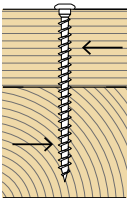
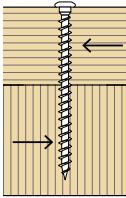
NOTES

- The minimum spacing and distances comply with Clause 12.12.5 of CSA-O86 2024, where d_1 refers to the nominal diameter of the self-tapping screw.

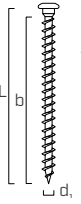
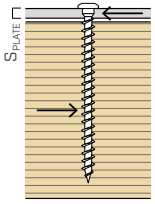
geometry		TENSION ^[1]												steel tension	
			thread withdrawal $\alpha = 90^\circ$				thread withdrawal $\alpha = 45^\circ$				thread withdrawal $\alpha = 0^\circ$				
															
			factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance $P_{rw}^{(2)}$				factored tension resistance T_{rs}
d_1	L	b	G				G				G				
[mm] [in]	[mm]	[mm]	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	[kN]
5 0.20	40	36	1,13	1,31	1,49	1,63	1,03	1,19	1,35	1,48	0,57	0,66	0,74	0,81	5,36
	50	46	1,50	1,74	1,96	2,15	1,36	1,58	1,79	1,96	0,75	0,87	0,98	1,08	
	60	56	1,87	2,16	2,44	2,68	1,70	1,96	2,22	2,44	0,93	1,08	1,22	1,34	
	70	66	2,23	2,58	2,92	3,21	2,03	2,35	2,66	2,91	1,12	1,29	1,46	1,60	
7 0.28	80	75	3,48	4,03	4,56	5,00	3,17	3,67	4,15	4,55	1,74	2,02	2,28	2,50	11,59
	100	95	4,51	5,22	5,90	6,47	4,10	4,74	5,37	5,89	2,25	2,61	2,95	3,24	

α = screw-to-grain angle

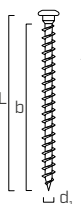
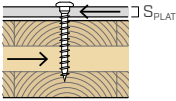
■ STRUCTURAL VALUES | LATERAL RESISTANCE

				SHEAR ^[3]							
geometry				wood-to-wood α = 90°				wood-to-wood end grain α = 0°			
											
				factored lateral resistance N _r				factored lateral resistance N _r ⁽²⁾			
d ₁	L	b	A ⁽⁴⁾	G				G			
[mm] <i>[in]</i>	[mm]	[mm]	[mm]	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
				[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
5 <i>0.20</i>	40	36	15	0,45	0,53	0,62	0,69	0,31	0,37	0,42	0,47
	50	46	20	0,58	0,69	0,78	0,84	0,39	0,46	0,54	0,60
	60	56	25	0,70	0,80	0,90	0,98	0,47	0,54	0,61	0,66
	70	66	30	0,79	0,90	1,00	1,07	0,52	0,59	0,66	0,72
7 <i>0.28</i>	80	75	35	1,26	1,49	1,73	1,90	0,82	0,98	1,13	1,22
	100	95	45	1,60	1,84	2,07	2,23	1,00	1,14	1,27	1,38

α = screw-to-grain angle

geometry			SHEAR steel-to-timber $\alpha = 90^\circ$					
								
d_1 [mm] [in]	L [mm]	b [mm]	steel plate thickness S_{PLATE}		factored lateral resistance $N_r^{(3)}$			
			[mm]	[in]	G=0.35 [kN]	G=0.42 [kN]	G=0.49 [kN]	G=0.55 [kN]
5 0.20	40	36	1,6	1/16	1,02	1,17	1,32	1,43
	50	46			1,19	1,33	1,45	1,56
	60	56			1,28	1,43	1,57	1,69
	70	66			1,37	1,54	1,69	1,82
	40	36	3,2	1/8	1,01	1,16	1,30	1,42
	50	46			1,19	1,33	1,45	1,56
	60	56			1,28	1,43	1,57	1,69
	70	66			1,37	1,54	1,69	1,82
	40	36	6,4	1/4	0,96	1,10	1,23	1,34
	50	46			1,14	1,30	1,42	1,53
	60	56			1,26	1,41	1,54	1,66
	70	66			1,35	1,51	1,66	1,79
	50	46	9,5	3/8	1,08	1,24	1,39	1,48
	60	56			1,23	1,37	1,51	1,62
	70	66			1,32	1,48	1,63	1,75
	50	46	12,7	1/2	1,02	1,17	1,32	1,44
	60	56			1,20	1,34	1,47	1,57
	70	66			1,29	1,44	1,59	1,70
	50	46	15,9	5/8	0,97	1,11	1,24	1,35
	60	56			1,15	1,31	1,43	1,53
	70	66			1,26	1,41	1,55	1,66
	50	46	19,1	3/4	0,91	1,04	1,17	1,27
	60	56			1,09	1,25	1,39	1,49
	70	66			1,23	1,38	1,51	1,62
7 0.28	80	75	1,6	1/16	2,55	2,85	3,13	3,35
	100	95			2,81	3,14	3,46	3,72
	80	75	3,2	1/8	2,55	2,85	3,13	3,35
	100	95			2,81	3,14	3,46	3,72
	80	75	6,4	1/4	2,50	2,83	3,10	3,33
	100	95			2,79	3,12	3,44	3,69
	80	75	9,5	3/8	2,42	2,78	3,05	3,27
	100	95			2,75	3,08	3,38	3,64
	80	75	12,7	1/2	2,35	2,70	3,00	3,21
	100	95			2,71	3,03	3,33	3,58
	80	75	15,9	5/8	2,27	2,61	2,93	3,15
	100	95			2,67	2,98	3,28	3,52
	80	75	19,1	3/4	2,20	2,52	2,83	3,09
	100	95			2,63	2,94	3,22	3,46

α = screw-to-grain angle

geometry			SHEAR				
			steel-to-CLT lateral face ⁽⁵⁾				
							
d ₁	L	b	steel plate thickness		factored lateral resistance N _r ⁽³⁾		
			S _{PLATE}		E3 G=0.35	E1 and V2 G=0.42	E2 and V1 G=0.49
[mm] [in]	[mm]	[mm]	[mm]	[in]	[kN]	[kN]	[kN]
5 0.20	40	36	1,6	1/16	0,97	1,11	1,25
	50	46			1,14	1,28	1,40
	60	56			1,24	1,39	1,52
	70	66			1,33	1,49	1,64
	40	36	3,2	1/8	0,96	1,09	1,23
	50	46			1,13	1,28	1,40
	60	56			1,24	1,39	1,52
	70	66			1,33	1,49	1,64
	40	36	6,4	1/4	0,91	1,04	1,17
	50	46			1,08	1,24	1,38
	60	56			1,22	1,36	1,50
	70	66			1,31	1,47	1,62
	50	46	9,5	3/8	1,03	1,18	1,32
	60	56			1,19	1,33	1,46
	70	66			1,28	1,43	1,58
	50	46	12,7	1/2	0,97	1,11	1,25
	60	56			1,14	1,29	1,42
	70	66			1,25	1,40	1,54
	50	46	15,9	5/8	0,92	1,05	1,18
	60	56			1,09	1,25	1,38
	70	66			1,22	1,37	1,50
	50	46	19,1	3/4	0,86	0,99	1,10
	60	56			1,03	1,19	1,33
	70	66			1,19	1,33	1,46
7 0.28	80	75	1,6	1/16	2,44	2,75	3,02
	100	95			2,72	3,05	3,36
	80	75	3,2	1/8	2,42	2,75	3,02
	100	95			2,72	3,05	3,36
	80	75	6,4	1/4	2,38	2,73	3,00
	100	95			2,70	3,03	3,34
	80	75	9,5	3/8	2,30	2,65	2,95
	100	95			2,66	2,98	3,28
	80	75	12,7	1/2	2,23	2,56	2,88
	100	95			2,62	2,94	3,23
	80	75	15,9	5/8	2,16	2,48	2,78
	100	95			2,58	2,89	3,18
	80	75	19,1	3/4	2,09	2,39	2,69
	100	95			2,54	2,84	3,12

NOTES and GENERAL PRINCIPLES on page 7.

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 2024 including the withdrawal restrain effect. Listed values are based on standard term load duration factor ($K_D = 1.0$), dry service condition factor ($K_{SF} = 1.0$), and treatment factor ($K_T = 1.0$).
- The steel plate is assumed to be ASTM A36 with a minimum ultimate tensile strength, f_u , equal to 58 ksi (400 MPa).
- The reference lateral design values are calculated for screws inserted without pre-drilling hole as per CSA-O86 Clause 12.12.10.5.3. The direction of the bearing-to-grain angle does not influence lateral resistance.
- LBS EVO screws must be positioned in accordance with the minimum distances.
- As part of the connection design, the designer must size and verify both the structural wood members and the steel plates separately.
- In the case of combined shear and tensile stress, the interaction between shear and tension must be satisfied.
- Not all screw lengths satisfy the required embedment depth in either the side member ($4d_f$) or the main member ($8d_f$). LBS screws installed in the end grain may not meet the minimum penetration requirement for withdrawal ($20d_f$) 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.
- G is the mean relative density according to CSA-O86 2024 Table A.12. 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 ($G = 0.55$).

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_a , and the factor for dowel bearing effect for laterally loaded connections, J_w , varies according to connection geometry.
- (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.
- (3) Lateral resistances are factored and according to CSA-O86 2024 Clause 12.12.10. Values apply to dry service conditions and are representative of a single screw.
- (4) The fixable thickness (A) is considered as half the length of the screw ($L/2$) - 5 mm.
- (5) The resistance for CLT includes the application of the $J_x = 0.9$ factor.