LBS HARDWOOD

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

ROUND HEAD SCREW FOR PLATES ON HARDWOODS

HARDWOOD CERTIFICATION
Special tip with embossed slit elements. Canadian certified according to ELC-4645 allows for use with high density timber without any pre-drill. Approved for structural applications subject to stresses in any direction vs the grain.

LARGER DIAMETER
Internal thread diameter increased compared to the LBS version to ensure tightening in the highest density woods. In steel-timber connections, an increase in strength of more than 15 % can be achieved.

SCREW FOR PERFORATED PLATES
Cylindrical shoulder designed for fastening metal elements. Achieves an interlocking effect with the hole in the plate, thus guaranteeing excellent static performance.

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

MANUALS

BIT INCLUDED

DIAMETER [mm]

3,5 | 5 | 12

LENGTH [mm]

25 | 40 | 70 | 200

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]

FIELDS OF USE

- timber based panels
- solid timber and glulam
- CLT and LVL
- high density woods
- beech, oak, cypress, ash, eucalyptus, bamboo

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

CODES AND DIMENSIONS

d_1 [mm]	CODE	L [mm]	b [mm]	pcs
5 TX 20	**LBSH540**	40	36	500
	LBSH550	50	46	200
	LBSH560	60	56	200
	LBSH570	70	66	200

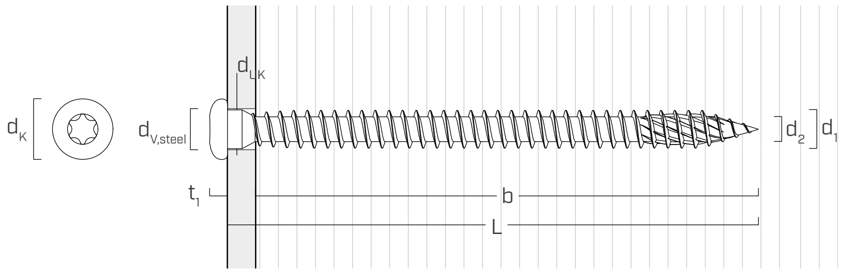
LBS HARDWOOD EVO

ROUND HEAD SCREW FOR PLATES ON HARDWOODS

DIAMETER [mm]	3	5	7	12	
LENGTH [mm]	25	60	200	200	

Also available in the LBS HARDWOOD EVO version, L from 60 to 200 mm, diameter Ø5 and Ø7 mm.

GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	**d_1**	**[mm]**	**5**
Head diameter	d_K	[mm]	7,80
Root diameter	d_2	[mm]	3,48
Underhead diameter	d_{UK}	[mm]	4,90
Head thickness	t_1	[mm]	2,45
Hole diameter on steel plate	$d_{V,steel}$	[mm]	5,0 - 5,5
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	3,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	3,5
Characteristic tensile strength	$f_{tens,k}$	[kN]	11,5
Characteristic yield moment	$M_{y,k}$	[Nm]	9,0

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

MECHANICAL PROPERTIES

Nominal diameter	**d_1**	**[mm]**		**5**
Factored tensile strength	Φf_u	[kN]		7,09
Bending yield strength	F_{yb}	[MPa]		1122
Factored shear strength of the screw	Φv_s	[kN]		3,65
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	52,29
			G=0.42	60,50
			G=0.49	68,44
			G=0.55	75,07

HARDWOOD PERFORMANCE

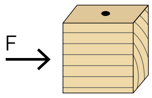
Geometry developed for high performance and use without pre-drill hole on structural woods such as beech, oak, cypress, ash, eucalyptus, bamboo.

BEECH LVL

Values also tested, certified and calculated for high density woods such as beech LVL. Certified for use without pre-drilling, for densities of up to 800 kg/m³.

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

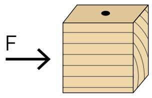
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



d_1		5 [mm]	*0.20* *[in]*
s_P	12·d‡	60	*2 3/8*
s_Q	5·d	25	*1*
a_L	15·d‡	75	*2 15/16*
a	10·d‡	50	*1 15/16*
e_Q	10·d	50	*1 15/16*
e_P	5·d	25	*1*

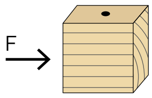
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



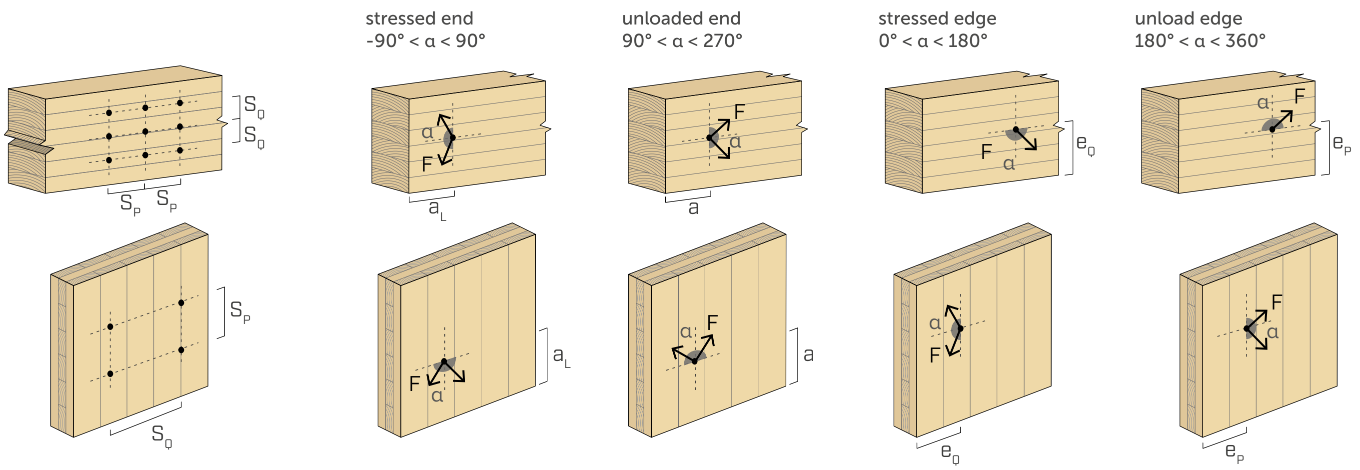
d_1		5 [mm]	*0.20* *[in]*
s_P	18·d	90	*3 1/2*
s_Q	7·d	35	*1 3/8*
a_L	22·d	110	*4 3/8*
a	15·d	75	*2 15/16*
e_Q	12·d	60	*2 3/8*
e_P	7·d	35	*1 3/8*

screws inserted **WITH pre-drilled hole**



d_1		5 [mm]	*0.20* *[in]*
s_P	5·d†	25	*1*
s_Q	4·d	20	*13/16*
a_L	12·d†	60	*2 3/8*
a	7·d†	35	*1 3/8*
e_Q	7·d	35	*1 3/8*
e_P	3·d	15	*9/16*

† 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

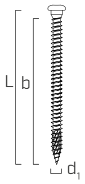


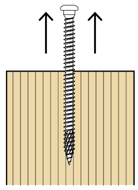
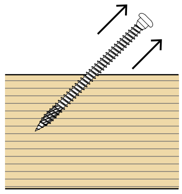
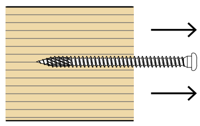
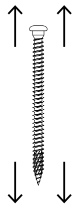
NOTES

- 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



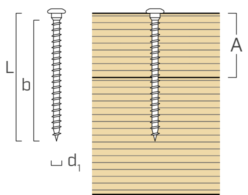





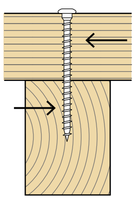
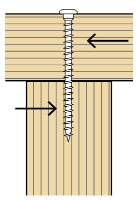
geometry				TENSION[1]												
				thread withdrawal												steel tension
				α = 90°				α = 45°				end grain α = 0°				
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw} (2)				factored tension resistance T_{rs}
d_1	L		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]
5 *0.20*	40	*1 9/16*	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	7,09
	50	*1 15/16*	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	*2 3/8*	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	*2 3/4*	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	

α = screw-to-grain angle

STRUCTURAL VALUES | LATERAL RESISTANCE

STRENGTH VALUES
CSA 086:24

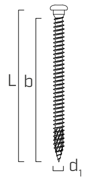
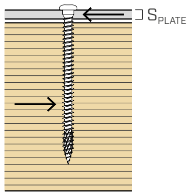
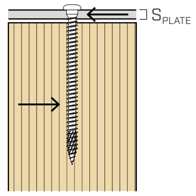
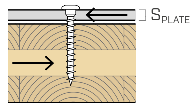


geometry					SHEAR[3]							
					timber-to-timber α = 90°				timber-to-timber α = 0°			
					factored lateral resistance N_r				factored lateral resistance N_r (2)			
d_1	L		b	A(4)	G				G			
					0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
5 *0.20*	40	*1 9/16*	36	15	0,45	0,53	0,62	0,69	0,31	0,37	0,42	0,47
	50	*1 15/16*	46	20	0,58	0,69	0,80	0,89	0,39	0,46	0,54	0,60
	60	*2 3/8*	56	25	0,71	0,84	0,98	1,08	0,47	0,56	0,65	0,73
	70	*2 3/4*	66	30	0,84	0,99	1,11	1,21	0,56	0,66	0,73	0,80

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 6.

				SHEAR[3]										
geometry				steel-to-timber α = 90°				steel-to-timber α = 0°				steel-to-timber α = 90°		
														
				factored lateral resistance N_r				factored lateral resistance N_r(2)				factored lateral resistance N_r		
												E3	E1 and V2	E2and V1
d_1	L		S_{PLATE}	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
[mm] *[in]*	[mm]	*[in]*	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
5 *0.20*	40	*1 9/16*	1,6 *1/16*	1,14	1,29	1,45	1,58	0,60	0,68	0,76	0,82	1,08	1,23	1,37
	50	*1 15/16*		1,31	1,50	1,69	1,84	0,68	0,78	0,87	0,94	1,24	1,43	1,60
	60	*2 3/8*		1,49	1,68	1,84	1,97	0,76	0,87	0,98	1,06	1,41	1,62	1,78
	70	*2 3/4*		1,60	1,78	1,96	2,10	0,84	0,97	1,09	1,18	1,54	1,73	1,90
	40	*1 9/16*	3,2 *1/8*	1,12	1,28	1,43	1,56	0,60	0,68	0,75	0,82	1,06	1,21	1,35
	50	*1 15/16*		1,30	1,49	1,67	1,82	0,68	0,77	0,86	0,94	1,23	1,41	1,58
	60	*2 3/8*		1,48	1,68	1,84	1,97	0,76	0,87	0,97	1,06	1,40	1,61	1,78
	70	*2 3/4*		1,60	1,78	1,96	2,10	0,84	0,96	1,08	1,18	1,54	1,73	1,90
	40	*1 9/16*	6,4 *1/4*	1,07	1,22	1,36	1,48	0,58	0,65	0,72	0,78	1,02	1,16	1,29
	50	*1 15/16*		1,25	1,43	1,60	1,75	0,66	0,75	0,83	0,90	1,19	1,36	1,52
	60	*2 3/8*		1,43	1,64	1,81	1,94	0,74	0,84	0,94	1,02	1,36	1,56	1,75
	70	*2 3/4*		1,58	1,76	1,93	2,07	0,82	0,94	1,05	1,14	1,52	1,70	1,87
	50	*1 15/16*	9,5 *3/8*	1,19	1,36	1,53	1,67	0,63	0,72	0,80	0,87	1,13	1,29	1,45
	60	*2 3/8*		1,37	1,57	1,77	1,90	0,71	0,81	0,91	0,99	1,30	1,49	1,68
	70	*2 3/4*		1,55	1,72	1,89	2,03	0,79	0,91	1,01	1,11	1,47	1,67	1,83
	50	*1 15/16*	12,7 *1/2*	1,14	1,30	1,45	1,58	0,61	0,69	0,76	0,83	1,08	1,23	1,38
	60	*2 3/8*		1,32	1,51	1,69	1,85	0,69	0,78	0,87	0,95	1,25	1,43	1,60
	70	*2 3/4*		1,49	1,69	1,85	1,99	0,77	0,88	0,98	1,07	1,42	1,63	1,79
	50	*1 15/16*	15,9 *5/8*	1,08	1,23	1,38	1,50	0,58	0,66	0,73	0,79	1,02	1,17	1,30
	60	*2 3/8*		1,26	1,44	1,62	1,76	0,66	0,75	0,84	0,91	1,19	1,37	1,53
	70	*2 3/4*		1,44	1,65	1,82	1,94	0,74	0,85	0,95	1,03	1,36	1,56	1,75
	50	*1 15/16*	19,1 *3/4*	1,02	1,16	1,30	1,41	0,53	0,63	0,69	0,75	0,97	1,10	1,23
	60	*2 3/8*		1,20	1,37	1,54	1,68	0,64	0,72	0,80	0,87	1,14	1,30	1,46
	70	*2 3/4*		1,38	1,58	1,78	1,90	0,72	0,82	0,91	0,99	1,31	1,50	1,69

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 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 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.
- LBS hardwood 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 hardwood 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.
- 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_α, 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. Self-tapping screws installed perpendicular to the panel edge of CLT are assumed to be installed in the end grain of member.

(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.