HBS EVO

COUNTERSUNK SCREW

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

C4 EVO COATING

Multilayer coating with a surface treatment of epoxy resin and aluminium flakes. No rust after 1440 hours of salt sprayexposure test, as per ISO 9227. It can be used for service class 3 outdoor applications and under class C4 atmospheric corrosion conditions tested by the Research Institutes of Sweden - RISE.

3 THORNS TIP

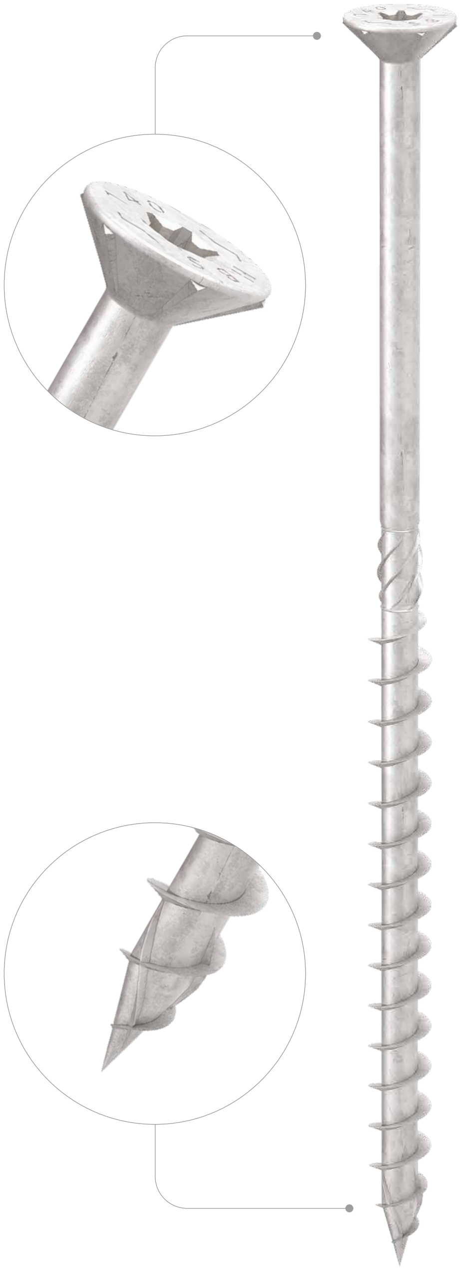
Thanks to the 3 THORNS tip, minimum installation distances are reduced. More screws can be used in less space and larger screws in smaller elements. Costs and time for project implementation are reduced.

PRESSURE TREATED LUMBER

The C4 EVO coating has been certified according to US acceptance criterion AC257 for outdoor use with ACQ-treated timber.

T3 TIMBER CORROSIVITY

Coating suitable for use in applications on wood with an acidity level (pH) greater than 4, such as spruce, larch and pine. For more information see the "TIMBER SCREWS AND DECK FASTENING" catalogue at www.rothoblaas.com



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

MY PROJECT SOFTWARE | MANUALS | BIT INCLUDED

DIAMETER [mm]	3 – **4** – **8** – 12
LENGTH [mm]	12 – **40** – **320** – 1000
SERVICE CONDITION	EC1, EC3
ATMOSPHERIC CORROSIVITY	C1, C2, C3, C4
WOOD CORROSIVITY	T1, T2, T3
MATERIAL	C4 EVO COATING – carbon steel with C4 EVO coating

FIELDS OF USE

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

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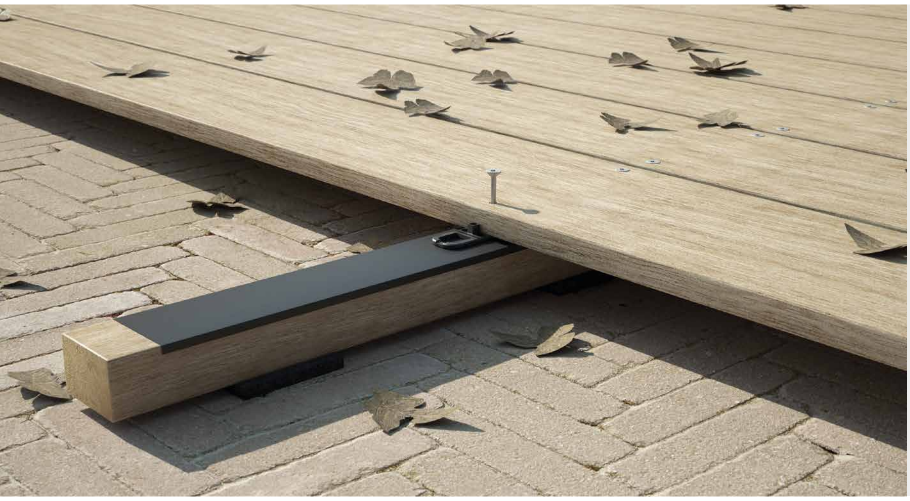


EXPOSURE CONDITION 3

Certified for use in exposure condition 3 outdoor applications and under class C4 atmospheric corrosion conditions. Ideal for fastening timber framed panels and trusses (Rafter, Truss).

PERGOLAS AND DECKS

The smaller sizes are ideal for securing boards and battens of decks set up outdoors.

CODES AND DIMENSIONS

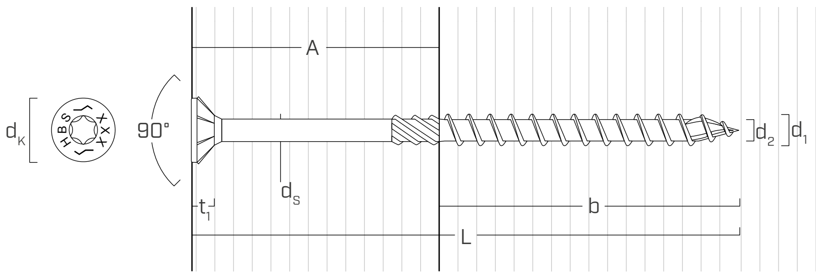
d1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
4 TX 20	**HBSEVO440**	40	24	16	500
	HBSEVO450	50	30	20	500
	HBSEVO460	60	35	25	500
4,5 TX 20	**HBSEVO4545**	45	30	15	400
	HBSEVO4550	50	30	20	200
	HBSEVO4560	60	35	25	200
	HBSEVO4570	70	40	30	200
5 TX 25	**HBSEVO550**	50	24	26	200
	HBSEVO560	60	30	30	200
	HBSEVO570	70	35	35	100
	HBSEVO580	80	40	40	100
	HBSEVO590	90	45	45	100
	HBSEVO5100	100	50	50	100
6 TX 30	**HBSEVO660**	60	30	30	100
	HBSEVO670	70	40	30	100
	HBSEVO680	80	40	40	100
	HBSEVO6100	100	50	50	100
	HBSEVO6120	120	60	60	100
	HBSEVO6140	140	75	65	100
	HBSEVO6160	160	75	85	100
	HBSEVO6180	180	75	105	100
	HBSEVO6200	200	75	125	100

d1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
8 TX 40	**HBSEVO8100**	100	52	48	100
	HBSEVO8120	120	60	60	100
	HBSEVO8140	140	60	80	100
	HBSEVO8160	160	80	80	100
	HBSEVO8180	180	80	100	100
	HBSEVO8200	200	80	120	100
	HBSEVO8220	220	80	140	100
	HBSEVO8240	240	80	160	100
	HBSEVO8260	260	80	180	100
	HBSEVO8280	280	80	200	100
	HBSEVO8300	300	100	200	100
	HBSEVO8320	320	100	220	100

RELATED PRODUCTS

HUS EVO
TURNED WASHER

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	d_1	[mm]	4	4,5	5	6	8
Head diameter	d_K	[mm]	8,00	9,00	10,00	12,00	14,50
Root diameter	d_2	[mm]	2,55	2,80	3,40	3,95	5,40
Shank diameter	d_S	[mm]	2,75	3,15	3,65	4,30	5,80
Head thickness	t_1	[mm]	2,80	2,80	3,10	4,50	4,50
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	2,5	2,5	3,0	4,0	5,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	-	-	3,5	4,0	6,0

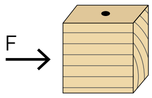
(1) Pre-drilling valid for softwood.
(2) Pre-drilling valid for hardwood and beech LVL.

MECHANICAL PROPERTIES

Nominal diameter	d_1	[mm]		4	4,5	5	6	8
Factored tensile strength	Φf_u	[kN]		3,11	3,91	4,97	8,56	14,7
Bending yield strength	F_{yb}	[MPa]		1482	1515	1315	1188	1047
Factored shear strength of the screw	Φv_s	[kN]		1,96	2,36	3,49	4,71	8,79
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	41,83	47,06	52,29	52,38	69,83
			G=0.42	48,40	54,45	60,50	60,60	80,80
			G=0.49	54,75	61,60	68,44	68,55	91,40
			G=0.55	60,05	67,56	75,07	75,19	100,25
Specified head pull-through resistance per screw	f_{pt}	[kN]	G=0.35	0,44	0,55	0,66	0,92	1,28
			G=0.42	0,53	0,66	0,80	1,10	1,53
			G=0.49	0,62	0,77	0,93	1,29	1,79
			G=0.55	0,70	0,86	1,04	1,45	2,01

MINIMUM DISTANCES FOR SHEAR LOADS

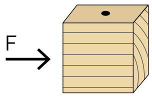
screws inserted **WITHOUT pre-drilled hole** — $G \leq 0.44$



d_1		4 [mm]	0.16 [in]	4,5 [mm]	0.18 [in]	5 [mm]	0.20 [in]	6 [mm]	0.24 [in]	8 [mm]	0.32 [in]
s_P	12·d‡	48	*1 7/8*	54	*2 1/8*	60	*2 3/8*	72	*2 13/16*	96	*3 3/4*
s_Q	5·d	20	*13/16*	23	*7/8*	25	*1*	30	*1 3/16*	40	*1 9/16*
a_L	15·d‡	60	*2 3/8*	68	*2 11/16*	75	*2 15/16*	90	*3 1/2*	120	*4 3/4*
a	10·d‡	40	*1 9/16*	45	*1 3/4*	50	*1 15/16*	60	*2 3/8*	80	*3 1/8*
e_Q	10·d	40	*1 9/16*	45	*1 3/4*	50	*1 15/16*	60	*2 3/8*	80	*3 1/8*
e_P	5·d	20	*13/16*	23	*7/8*	25	*1*	30	*1 3/16*	40	*1 9/16*

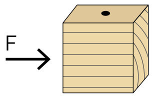
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



d_1		4 [mm]	0.16 [in]	4,5 [mm]	0.18 [in]	5 [mm]	0.20 [in]	6 [mm]	0.24 [in]	8 [mm]	0.32 [in]
s_P	18·d	72	*2 13/16*	81	*3 3/16*	90	*3 1/2*	108	*4 1/4*	144	*5 11/16*
s_Q	7·d	28	*1 1/8*	32	*1 1/4*	35	*1 3/8*	42	*1 5/8*	56	*2 3/16*
a_L	22·d	88	*3 7/16*	99	*3 7/8*	110	*4 3/8*	132	*5 3/16*	176	*6 15/16*
a	15·d	60	*2 3/8*	68	*2 11/16*	75	*2 15/16*	90	*3 1/2*	120	*4 3/4*
e_Q	12·d	48	*1 7/8*	54	*2 1/8*	60	*2 3/8*	72	*2 13/16*	96	*3 3/4*
e_P	7·d	28	*1 1/8*	32	*1 1/4*	35	*1 3/8*	42	*1 5/8*	56	*2 3/16*

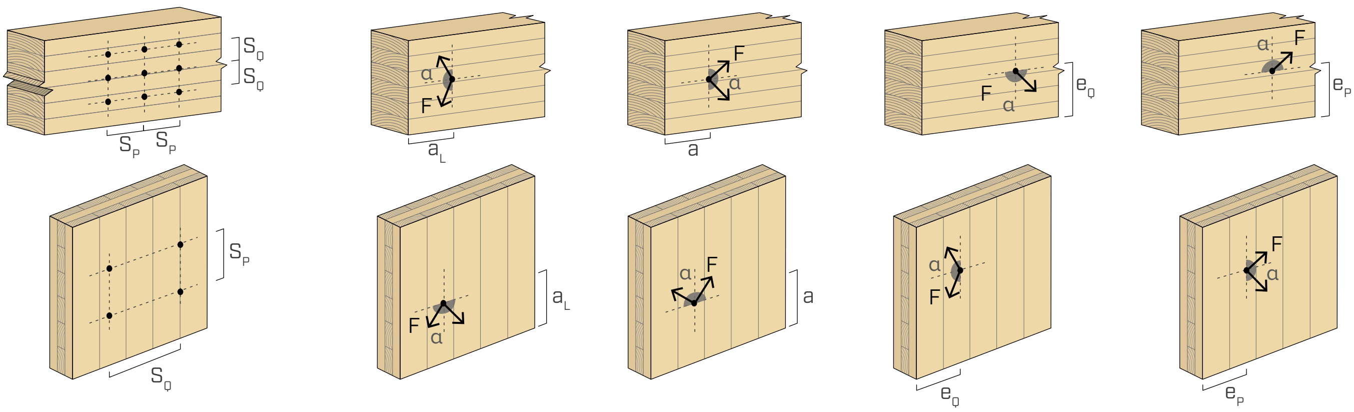
screws inserted **WITH pre-drilled hole**



d_1		4 [mm]	0.16 [in]	4,5 [mm]	0.18 [in]	5 [mm]	0.20 [in]	6 [mm]	0.24 [in]	8 [mm]	0.32 [in]
s_P	5·d†	20	*13/16*	23	*7/8*	25	*1*	30	*1 3/16*	40	*1 9/16*
s_Q	4·d	16	*5/8*	18	*11/16*	20	*13/16*	24	*15/16*	32	*1 1/4*
a_L	12·d†	48	*1 7/8*	54	*2 1/8*	60	*2 3/8*	72	*2 13/16*	96	*3 3/4*
a	7·d†	28	*1 1/8*	32	*1 1/4*	35	*1 3/8*	42	*1 5/8*	56	*2 3/16*
e_Q	7·d	28	*1 1/8*	32	*1 1/4*	35	*1 3/8*	42	*1 5/8*	56	*2 3/16*
e_P	3·d	12	*1/2*	14	*9/16*	15	*9/16*	18	*11/16*	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

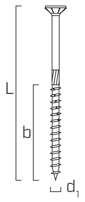
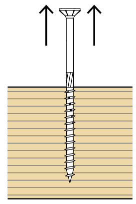
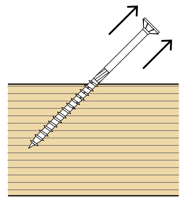
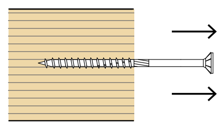
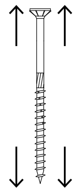
stressed end $-90° < \alpha < 90°$ | unloaded end $90° < \alpha < 270°$ | stressed edge $0° < \alpha < 180°$ | unload edge $180° < \alpha < 360°$



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.

STRUCTURAL VALUES | AXIAL TENSION

geometry				TENSION[1] thread withdrawal α = 90°				TENSION[1] thread withdrawal α = 45°				TENSION[1] 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}
d_1	L		b	G 0.35	G 0.42	G 0.49	G 0.55	G 0.35	G 0.42	G 0.49	G 0.55	G 0.35	G 0.42	G 0.49	G 0.55	
[mm] *[in]*	[mm]	*[in]*	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
4 *0.16*	40	*1 9/16*	24	0,59	0,68	0,77	0,84	0,53	0,62	0,70	0,76	0,29	0,34	0,38	0,42	3,11
	50	*1 15/16*	30	0,76	0,88	1,00	1,09	0,69	0,80	0,91	0,99	0,38	0,44	0,50	0,55	
	60	*2 3/8*	35	0,91	1,05	1,19	1,30	0,83	0,95	1,08	1,18	0,45	0,53	0,59	0,65	
4.5 *0.18*	45	*1 3/4*	30	0,84	0,97	1,10	1,21	0,76	0,88	1,00	1,10	0,42	0,49	0,55	0,60	3,91
	50	*1 15/16*	30	0,84	0,97	1,10	1,21	0,76	0,88	1,00	1,10	0,42	0,49	0,55	0,60	
	60	*2 3/8*	35	1,00	1,16	1,32	1,44	0,91	1,06	1,20	1,31	0,50	0,58	0,66	0,72	
	70	*2 3/4*	40	1,17	1,35	1,53	1,68	1,06	1,23	1,39	1,53	0,58	0,68	0,77	0,84	
5 *0.2*	50	*1 15/16*	24	0,70	0,80	0,91	1,00	0,63	0,73	0,83	0,91	0,35	0,40	0,46	0,50	4,97
	60	*2 3/8*	30	0,92	1,06	1,20	1,31	0,83	0,96	1,09	1,19	0,46	0,53	0,60	0,66	
	70	*2 3/4*	35	1,10	1,27	1,44	1,58	1,00	1,16	1,31	1,43	0,55	0,64	0,72	0,79	
	80	*3 1/8*	40	1,28	1,48	1,68	1,84	1,16	1,35	1,52	1,67	0,64	0,74	0,84	0,92	
	90	*3 1/2*	45	1,46	1,69	1,92	2,10	1,33	1,54	1,74	1,91	0,73	0,85	0,96	1,05	
	100	*4*	50	1,65	1,91	2,16	2,36	1,50	1,73	1,96	2,15	0,82	0,95	1,08	1,18	
6 *0.24*	60	*2 3/8*	30	0,88	1,02	1,15	1,26	0,80	0,93	1,05	1,15	0,44	0,51	0,58	0,63	8,56
	70	*2 3/4*	40	1,25	1,44	1,63	1,79	1,13	1,31	1,48	1,63	0,62	0,72	0,82	0,89	
	80	*3 1/8*	40	1,25	1,44	1,63	1,79	1,13	1,31	1,48	1,63	0,62	0,72	0,82	0,89	
	100	*4*	50	1,61	1,87	2,11	2,32	1,47	1,70	1,92	2,11	0,81	0,93	1,06	1,16	
	120	*4 3/4*	60	1,98	2,29	2,59	2,84	1,80	2,08	2,36	2,58	0,99	1,15	1,30	1,42	
	140	*5 1/2*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	160	*6 1/4*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	180	*7 1/8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	200	*8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
8 *0.32*	100	*4*	52	2,15	2,49	2,82	3,09	1,96	2,26	2,56	2,81	1,08	1,24	1,41	1,54	14,7
	120	*4 3/4*	60	2,54	2,94	3,33	3,65	2,31	2,67	3,02	3,32	1,27	1,47	1,66	1,82	
	140	*5 1/2*	60	2,54	2,94	3,33	3,65	2,31	2,67	3,02	3,32	1,27	1,47	1,66	1,82	
	160	*6 1/4*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	180	*7 1/8*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	200	*8*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	220	*8 5/8*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	240	*9 1/2*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	260	*10 1/4*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	280	*11*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	300	*11 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	
	320	*12 5/8*	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	

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

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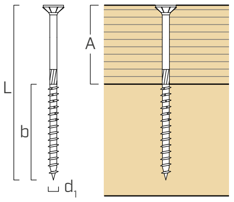
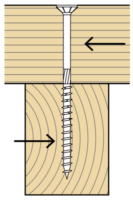
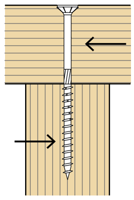
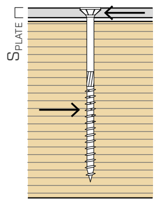
STRUCTURAL VALUES | LATERAL RESISTANCE

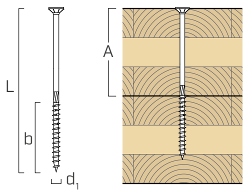
geometry					SHEAR[4] timber-to-timber α = 90°				timber-to-timber α = 0°				steel-to-timber				
																	
					factored lateral resistance N_r				factored lateral resistance N_r (2) (3)					factored lateral resistance N_r			
					G				G					G			
d_1	L		b	A	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	S_{PLATE}	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]
4 *0.16*	40	*1 9/16*	24	16	0,37	0,45	0,52	0,59	0,26	0,31	0,36	0,40	1,6 *1/16*	0,78	0,89	1,00	1,08
	50	*1 15/16*	30	20	0,45	0,54	0,61	0,66	0,31	0,38	0,44	0,49		0,88	0,98	1,07	1,14
	60	*2 3/8*	35	25	0,51	0,58	0,66	0,72	0,37	0,42	0,47	0,52		0,92	1,02	1,11	1,19
4.5 *0.18*	45	*1 3/4*	30	15	0,46	0,55	0,64	0,71	0,31	0,38	0,44	0,49	1,6 *1/16*	0,98	1,12	1,26	1,35
	50	*1 15/16*	30	20	0,50	0,60	0,70	0,78	0,35	0,42	0,49	0,55		1,02	1,16	1,27	1,35
	60	*2 3/8*	35	25	0,58	0,68	0,77	0,84	0,41	0,49	0,56	0,61		1,09	1,21	1,32	1,41
	70	*2 3/4*	40	30	0,64	0,73	0,82	0,90	0,45	0,52	0,58	0,64		1,13	1,26	1,37	1,47
5 *0.2*	50	*1 15/16*	24	26	0,55	0,66	0,77	0,86	0,39	0,47	0,54	0,61	1,6 *1/16*	1,14	1,30	1,45	1,59
	60	*2 3/8*	30	30	0,63	0,76	0,89	1,00	0,48	0,57	0,64	0,69		1,28	1,45	1,58	1,69
	70	*2 3/4*	35	35	0,72	0,87	1,01	1,13	0,53	0,60	0,68	0,74		1,36	1,51	1,64	1,75
	80	*3 1/8*	40	40	0,81	0,97	1,08	1,15	0,55	0,62	0,70	0,77		1,41	1,56	1,70	1,82
	90	*3 1/2*	45	45	0,89	0,98	1,08	1,15	0,56	0,65	0,73	0,79		1,45	1,61	1,76	1,88
	100	*4*	50	50	0,89	0,98	1,08	1,15	0,58	0,67	0,75	0,82		1,50	1,67	1,82	1,95
6 *0.24*	60	*2 3/8*	30	30	0,75	0,90	1,05	1,18	0,52	0,62	0,72	0,81	3,2 *1/8*	1,47	1,68	1,88	2,04
	70	*2 3/4*	40	30	0,85	1,02	1,19	1,33	0,61	0,72	0,84	0,93		1,66	1,87	2,04	2,17
	80	*3 1/8*	40	40	0,95	1,14	1,32	1,48	0,68	0,77	0,86	0,93		1,69	1,87	2,04	2,17
	100	*4*	50	50	1,14	1,27	1,38	1,48	0,73	0,83	0,94	1,03		1,78	1,98	2,16	2,30
	120	*4 3/4*	60	60	1,14	1,27	1,38	1,48	0,77	0,88	0,99	1,09		1,87	2,08	2,28	2,43
	140	*5 1/2*	75	65	1,14	1,27	1,38	1,48	0,83	0,95	1,08	1,18		2,01	2,24	2,46	2,63
	160	*6 1/4*	75	85	1,14	1,27	1,38	1,48	0,83	0,95	1,08	1,18		2,01	2,24	2,46	2,63
	180	*7 1/8*	75	105	1,14	1,27	1,38	1,48	0,83	0,95	1,08	1,18		2,01	2,24	2,46	2,63
	200	*8*	75	125	1,14	1,27	1,38	1,48	0,83	0,95	1,08	1,18		2,01	2,24	2,46	2,63
8 *0.32*	100	*4*	52	48	1,42	1,71	1,99	2,24	1,05	1,24	1,39	1,51	3,2 *1/8*	2,83	3,13	3,41	3,63
	120	*4 3/4*	60	60	1,66	2,00	2,23	2,39	1,13	1,29	1,44	1,57		2,92	3,24	3,54	3,77
	140	*5 1/2*	60	80	1,76	2,02	2,23	2,39	1,13	1,29	1,44	1,57		2,92	3,24	3,54	3,77
	160	*6 1/4*	80	80	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	180	*7 1/8*	80	100	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	200	*8*	80	120	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	220	*8 5/8*	80	140	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	240	*9 1/2*	80	160	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	260	*10 1/4*	80	180	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	280	*11*	80	200	1,85	2,05	2,23	2,39	1,22	1,40	1,58	1,72		3,17	3,52	3,86	4,13
	300	*11 3/4*	100	200	1,85	2,05	2,23	2,39	1,32	1,52	1,71	1,88		3,41	3,81	4,17	4,48
	320	*12 5/8*	100	220	1,85	2,05	2,23	2,39	1,32	1,52	1,71	1,88		3,41	3,81	4,17	4,48

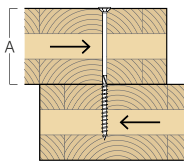
α = screw-to-grain angle

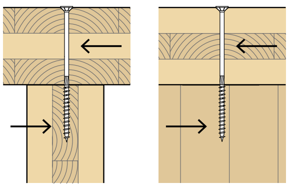
NOTES and GENERAL PRINCIPLES on page 11.

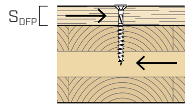
STRUCTURAL VALUES | LATERAL RESISTANCE

SHEAR[4]









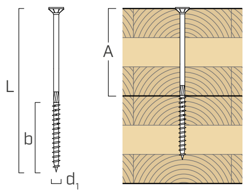
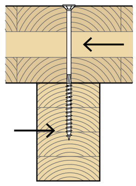
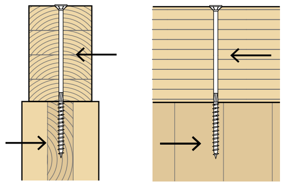
geometry					CLT-CLT lateral face α = 90°				CLT-CLT α = 0°				spline joint lateral face α = 90°				
					factored lateral resistance N_r [5]				factored lateral resistance N_r [2][3]					factored lateral resistance N_r			
					G				G					G			
d_1	L		b	A	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55	S_{DFP}	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]
6 *0.24*	60	*2 3/8*	30	30	0,69	0,83	0,97	1,09	0,48	0,57	0,66	0,74	12,7 *1/2*	0,91	1,00	1,08	1,14
	70	*2 3/4*	40	40	0,78	0,94	1,09	1,22	0,57	0,64	0,71	0,76		1,00	1,09	1,12	1,14
	80	*3 1/8*	40	40	0,87	1,04	1,21	1,36	0,65	0,73	0,82	0,89		1,05	1,09	1,12	1,14
	100	*4*	50	50	1,04	1,21	1,32	1,42	0,69	0,79	0,89	0,97		1,05	1,09	1,12	1,14
	120	*4 3/4*	60	60	1,09	1,21	1,32	1,42	0,72	0,83	0,94	1,03		1,05	1,09	1,12	1,14
	140	*5 1/2*	75	75	1,09	1,21	1,32	1,42	0,74	0,85	0,96	1,05		1,05	1,09	1,12	1,14
	160	*6 1/4*	75	85	1,09	1,21	1,32	1,42	0,78	0,90	1,01	1,11		1,05	1,09	1,12	1,14
	180	*7 1/8*	75	105	1,09	1,21	1,32	1,42	0,78	0,90	1,01	1,11		1,05	1,09	1,12	1,14
	200	*8*	75	125	1,09	1,21	1,32	1,42	0,78	0,90	1,01	1,11		1,05	1,09	1,12	1,14
8 *0.32*	100	*4*	52	55	1,30	1,56	1,83	2,05	1,00	1,13	1,26	1,36	19,1 *3/4*	1,69	1,79	1,84	1,88
	120	*4 3/4*	60	60	1,52	1,82	2,13	2,28	1,07	1,22	1,37	1,49		1,73	1,79	1,84	1,88
	140	*5 1/2*	60	80	1,64	1,89	2,13	2,28	1,07	1,22	1,37	1,49		1,73	1,79	1,84	1,88
	160	*6 1/4*	80	80	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	180	*7 1/8*	80	100	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	200	*8*	80	120	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	220	*8 5/8*	80	140	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	240	*9 1/2*	80	160	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	260	*10 1/4*	80	180	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	280	*11*	80	200	1,76	1,96	2,14	2,28	1,15	1,32	1,49	1,62		1,73	1,79	1,84	1,88
	300	*11 3/4*	100	200	1,76	1,96	2,14	2,28	1,24	1,42	1,61	1,76		1,73	1,79	1,84	1,88
	320	*12 5/8*	100	220	1,76	1,96	2,14	2,28	1,24	1,42	1,61	1,76		1,73	1,79	1,84	1,88

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

STRUCTURAL VALUES | LATERAL RESISTANCE

SHEAR [4]

geometry	CLT-timber lateral face α = 90°	timber-CLT narrow face α = 0°
		

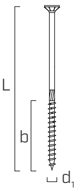
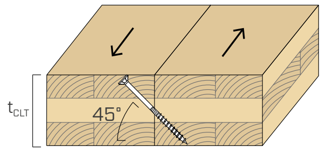
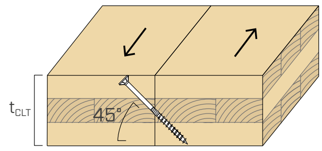
					factored lateral resistance N_r				factored lateral resistance N_r (2)(3)			
					G				G			
d_1	L		b	A	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
6 *0.24*	60	*2 3/8*	30	30	0,72	0,86	1,01	1,13	0,51	0,61	0,70	0,77
	70	*2 3/4*	40	40	0,82	0,98	1,15	1,27	0,59	0,70	0,81	0,89
	80	*3 1/8*	40	40	0,91	1,09	1,27	1,41	0,65	0,74	0,82	0,89
	100	*4*	50	50	1,08	1,24	1,35	1,45	0,69	0,80	0,89	0,98
	120	*4 3/4*	60	60	1,11	1,24	1,35	1,45	0,73	0,84	0,94	1,03
	140	*5 1/2*	75	75	1,11	1,24	1,35	1,45	0,78	0,90	1,02	1,12
	160	*6 1/4*	75	85	1,11	1,24	1,35	1,45	0,78	0,90	1,02	1,12
	180	*7 1/8*	75	105	1,11	1,24	1,35	1,45	0,78	0,90	1,02	1,12
	200	*8*	75	125	1,11	1,24	1,35	1,45	0,78	0,90	1,02	1,12
8 *0.32*	100	*4*	52	55	1,37	1,64	1,91	2,15	1,02	1,19	1,33	1,45
	120	*4 3/4*	60	60	1,59	1,91	2,16	2,33	1,07	1,23	1,38	1,50
	140	*5 1/2*	60	80	1,73	2,00	2,18	2,33	1,07	1,23	1,38	1,50
	160	*6 1/4*	80	80	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	180	*7 1/8*	80	100	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	200	*8*	80	120	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	220	*8 5/8*	80	140	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	240	*9 1/2*	80	160	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	260	*10 1/4*	80	180	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	280	*11*	80	200	1,80	2,00	2,18	2,33	1,16	1,33	1,50	1,64
	300	*11 3/4*	100	200	1,80	2,00	2,18	2,33	1,25	1,43	1,62	1,77
	320	*12 5/8*	100	220	1,80	2,00	2,18	2,33	1,25	1,43	1,62	1,77

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

STRUCTURAL VALUES | LATERAL RESISTANCE

SHEAR [4][6]

geometry					butt-joint α = 90°				butt-joint α = 45°			
												
					factored lateral resistance N_r				**factored lateral resistance N_r**			
					G				G			
d_1	**L**		**b**	**t_{CLT}**	**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]
6 ***0.24***	100	*4*	50	70	0,88	1,02	1,10	1,16	0,50	0,61	0,71	0,79
	120	*4 3/4*	60	85	0,93	1,02	1,10	1,16	0,61	0,73	0,83	0,88
	140	*5 1/2*	75	100	0,93	1,02	1,10	1,16	0,68	0,77	0,83	0,88
	160	*6 1/4*	75	115	0,93	1,02	1,10	1,16	0,70	0,77	0,83	0,88
	180	*7 1/8*	75	125	0,93	1,02	1,10	1,16	0,70	0,77	0,83	0,88
	200	*8*	75	140	0,93	1,02	1,10	1,16	0,70	0,77	0,83	0,88
8 ***0.32***	100	*4*	52	70	1,08	1,30	1,51	1,70	0,62	0,74	0,86	0,97
	120	*4 3/4*	60	85	1,30	1,56	1,81	1,93	0,74	0,89	1,04	1,16
	140	*5 1/2*	60	100	1,42	1,62	1,82	1,93	0,86	1,04	1,21	1,31
	160	*6 1/4*	80	115	1,54	1,69	1,82	1,93	0,99	1,19	1,38	1,46
	180	*7 1/8*	80	125	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	200	*8*	80	140	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	220	*8 5/8*	80	155	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	240	*9 1/2*	80	170	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	260	*10 1/4*	80	185	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	280	*11*	80	200	1,54	1,69	1,82	1,93	1,08	1,23	1,38	1,46
	300	*11 3/4*	100	210	1,54	1,69	1,82	1,93	1,16	1,28	1,38	1,46
	320	*12 5/8*	100	225	1,54	1,69	1,82	1,93	1,16	1,28	1,38	1,46

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

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.
- The steel plate is assumed to be ASTM A36 with a minimum ultimate tensile strength, f_u, equal to 58 ksi (400 MPa).
- The specified head pull-through design values are taken from table 6 of report 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 ($4d_F$) or the main member ($8d_F$). Engineering discretion and judgment should be applied to evaluate the potential impact of reduced penetration on the connection's load-carrying capacity.
- HBS 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 Table 1A of 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) HBS 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.

(6) The lateral resistance calculation for butt joints assumes the screws are installed on the CLT member's narrow face.