VGS EVO

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

FULLY THREADED SCREW WITH COUNTERSUNK OR HEXAGONAL HEAD

C4 EVO COATING

Surface treatment of epoxy resin and aluminium flakes. No rust after 1440 hours of salt spray exposure test, as per ISO 9227. Can be used in wet service outdoor applications and under class C4 atmospheric corrosion conditions.

STRUCTURAL APPLICATIONS

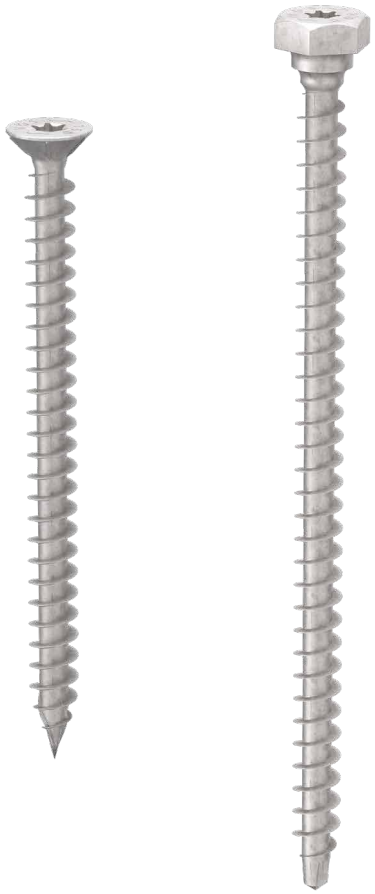
Approved for structural applications subject to stresses in any direction vs the grain (0° - 90°). Safety certified by numerous tests carried out for any direction of insertion. Cyclical SEISMIC-REV tests according to EN 12512. Countersunk head up to L = 600 mm, ideal for use on plates or for concealed reinforcements.

AUTOCLAVE-TREATED TIMBER

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

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.



VIDEO MANUALS

BIT INCLUDED

DIAMETER [mm]	9 **9** – **13** 13
LENGTH [mm]	80 **100** – **800** 1500
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
CORE HARDNESS	<390 HV — as required in CSA 086:24[1]

CANADIAN DESIGN VALUES

USA, EU and more design values available online.

METAL-to-TIMBER recommended use:

NO IMPACT

TORQUE LIMITER

$M_{ins,rec}$

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).

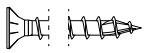
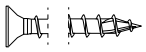
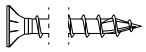
OUTDOOR STRUCTURAL PERFORMANCE

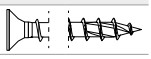
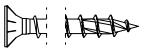
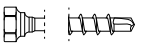
Ideal for fastening timber framed panels and trusses (Rafter, Truss). Values also tested, certified and calculated for high density woods. Ideal for fastening timber-framed panels and lattice beams (Rafter, Truss).

CLT & LVL

Values also tested, certified and calculated for CLT and high density woods such as laminated veneer lumber (LVL).

CODES AND DIMENSIONS

d_1 [mm]	CODE	L [mm]	b [mm]	pcs	
9 TX 40	VGSEVO9120	120	110	50	
	VGSEVO9160	160	150	50	
	VGSEVO9200	200	190	50	
	VGSEVO9240	240	230	50	
	VGSEVO9280	280	270	50	
	VGSEVO9320	320	310	25	
	VGSEVO9360	360	350	25	
11 TX 50	VGSEVO11100	100	90	25	
	VGSEVO11150	150	140	25	
	VGSEVO11200	200	190	25	
	VGSEVO11250	250	240	25	
	VGSEVO11300	300	290	25	
	VGSEVO11350	350	340	25	
	VGSEVO11400	400	390	25	
	VGSEVO11500	500	490	25	
	VGSEVO11600	600	590	25	

d_1 [mm]	CODE	L [mm]	b [mm]	pcs	
13 TX 50	VGSEVO13200	200	190	25	
	VGSEVO13300	300	280	25	
	VGSEVO13400	400	380	25	
	VGSEVO13500	500	480	25	
	VGSEVO13600	600	580	25	
13 SW 19 TX 50	VGSEVO13700	700	680	25	
	VGSEVO13800	800	780	25	

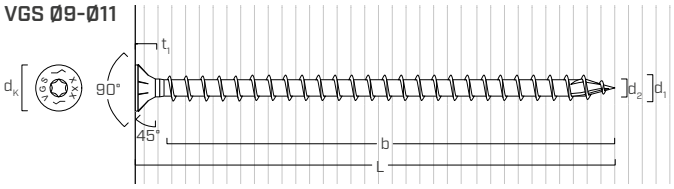
RELATED PRODUCTS

VGU EVO

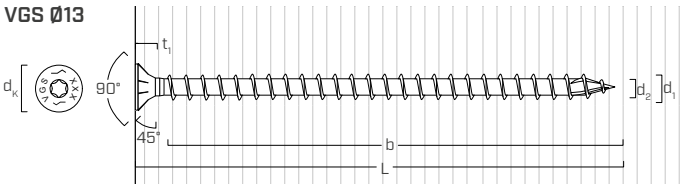
TORQUE LIMITER

GEOMETRY AND MECHANICAL CHARACTERISTICS

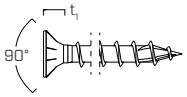
VGS Ø9-Ø11



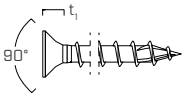
VGS Ø13



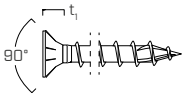
VGS Ø9
120 mm ≤ L ≤ 360 mm



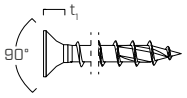
VGS Ø11
L ≤ 250 mm



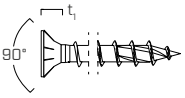
VGS Ø11
250 mm < L ≤ 600 mm



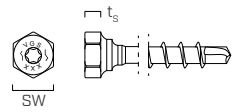
VGS Ø13
L ≤ 250 mm



VGS Ø13
250 mm < L ≤ 600 mm



VGS Ø13
L > 600 mm



GEOMETRY

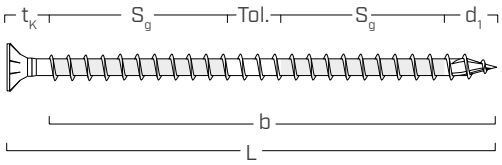
Nominal diameter	d_1	[mm]	9	11	13	13
Length	L	[mm]	-	-	≤ 600 mm	> 600 mm
Countersunk head diameter	d_K	[mm]	16,00	19,30	22,00	-
Countersunk head thickness	t_1	[mm]	6,50	8,20	9,40	-
Wrench size	SW	-	-	-	-	SW 19
Hexagonal head thickness	t_s	[mm]	-	-	-	7,50
Root diameter	d_2	[mm]	5,90	6,60	8,00	8,00
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	5,0	6,0	8,0	8,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	6,0	7,0	9,0	9,0

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

MECHANICAL PARAMETERS

Nominal diameter	d_1	[mm]		9	11	13
Factored tensile strength	Φf_u	[kN]		17,84	23,17	31,96
Bending yield strength	F_{yb}	[MPa]		1069	1026	960
Factored shear strength of the screw	Φv_s	[kN]		10,50	13,14	19,30
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	78,56	96,02	113,5
			G=0.42	90,9	111,1	131,3
			G=0.49	102,8	125,7	148,5
			G=0.55	112,8	137,9	162,9

EFFECTIVE THREAD USED IN CALCULATION



b = $\mathbf{S_{g,tot}}$ = L - t_K

represents the entire length of the threaded part (see table above)

$\mathbf{S_g}$ = (b - d_1 - Tol.)/2

represents the partial length of the threaded part net of a laying tolerance (Tol.) of 10 mm

t_K = 10 mm or 20mm depending on head type and diameter

NOTES

- The length of the tip is equal to the nominal diameter of the respective fasteners, d_1, as specified in the ELC-4645 report.

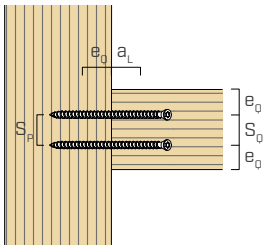
MINIMUM DISTANCES FOR AXIAL STRESSES | TIMBER

screws inserted **WITH and WITHOUT pre-drilled hole**

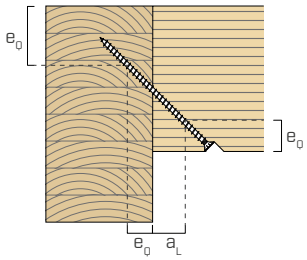
d_1		**9** [mm]	*0.36 [in]*	**11** [mm]	*0.44 [in]*	**13** [mm]	*0.52 [in]*
S_P	**7·d†**	63	*2 1/2*	77	*3 1/16*	91	*3 9/16*
S_Q	**5·d**	45	*1 3/4*	55	*2 3/16*	65	*2 9/16*
a_L	**10·d†**	90	*3 1/2*	110	*4 3/8*	130	*5 1/8*
e_Q	**4·d**	36	*1 7/16*	44	*1 3/4*	52	*2 1/16*

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

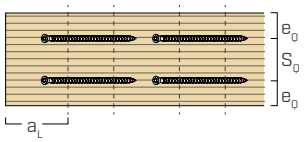
SCREWS UNDER TENSION INSERTED WITH AN ANGLE α WITH RESPECT TO THE GRAIN



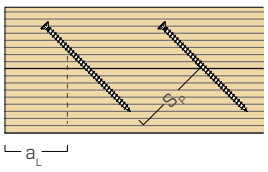
plan



front

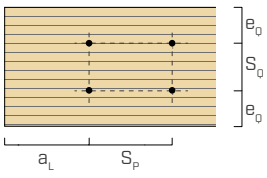


plan

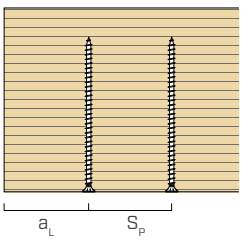


front

SCREWS INSERTED WITH α = 90° ANGLE WITH RESPECT TO THE GRAIN

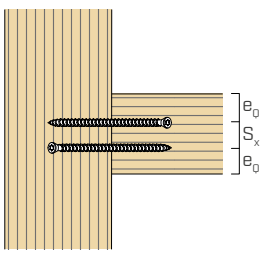


plan

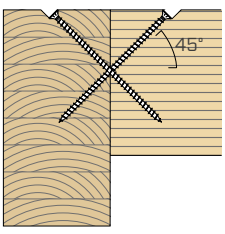


front

CROSSED SCREWS INSERTED WITH AN ANGLE α WITH RESPECT TO THE GRAIN



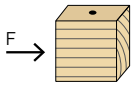
plan



front

MINIMUM DISTANCES FOR SHEAR LOADS

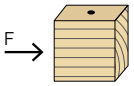
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



d_1		9 [mm]	*0.36 [in]*	11 [mm]	*0.44 [in]*	13 [mm]	*0.52 [in]*
S_P	**12·d‡**	108	*4 1/4*	132	*5 3/16*	156	*6 1/8*
S_Q	**5·d**	45	*1 3/4*	55	*2 3/16*	65	*2 9/16*
a_L	**15·d‡**	135	*5 5/16*	165	*6 1/2*	195	*7 11/16*
a	**10·d‡**	90	*3 1/2*	110	*4 3/8*	130	*5 1/8*
e_Q	**10·d**	90	*3 1/2*	110	*4 3/8*	130	*5 1/8*
e_P	**5·d**	45	*1 3/4*	55	*2 3/16*	65	*2 9/16*
S_x	**2·d**	18	*11/16*	22	*7/8*	26	*1 1/32*

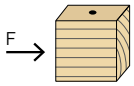
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



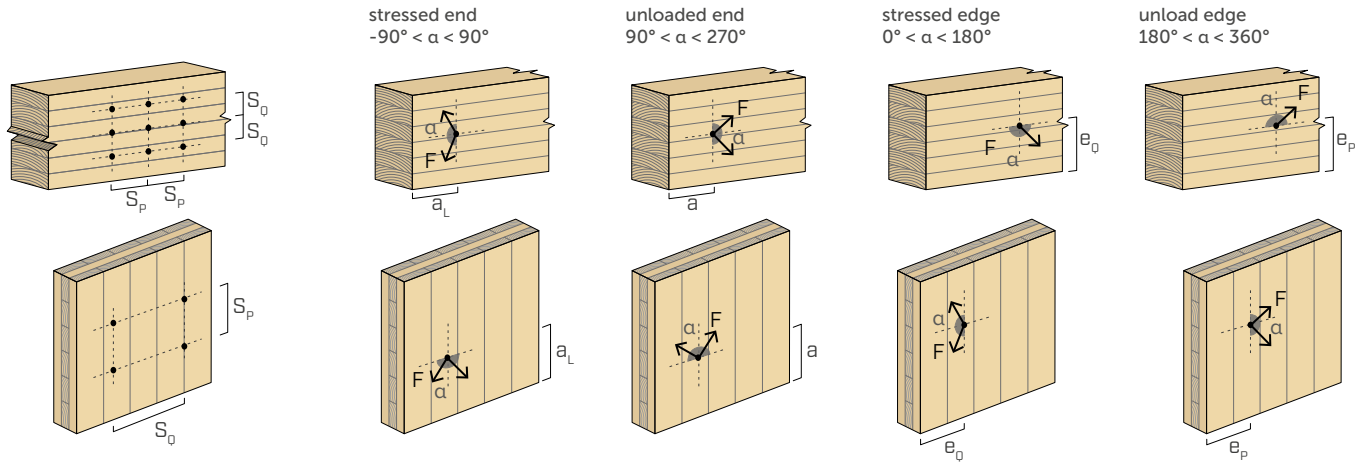
d_1		9 [mm]	*0.36 [in]*	11 [mm]	*0.44 [in]*	13 [mm]	*0.52 [in]*
S_P	**18·d**	162	*6 3/8*	198	*7 13/16*	234	*9 1/4*
S_Q	**7·d**	63	*2 1/2*	77	*3 1/16*	91	*3 9/16*
a_L	**22·d**	198	*7 13/16*	242	*9 1/2*	286	*11 1/4*
a	**15·d**	135	*5 5/16*	165	*6 1/2*	195	*7 11/16*
e_Q	**12·d**	108	*4 1/4*	132	*5 3/16*	156	*6 1/8*
e_P	**7·d**	63	*2 1/2*	77	*3 1/16*	91	*3 9/16*
S_x	**3·d**	27	*1 1/16*	33	*1 5/16*	39	*1 9/16*

screws inserted **WITH pre-drilled hole**



d_1		9 [mm]	*0.36 [in]*	11 [mm]	*0.44 [in]*	13 [mm]	*0.52 [in]*
S_P	**5·d†**	45	*1 3/4*	55	*2 3/16*	65	*2 9/16*
S_Q	**4·d**	36	*1 7/16*	44	*1 3/4*	52	*2 1/16*
a_L	**12·d†**	108	*4 1/4*	132	*5 3/16*	156	*6 1/8*
a	**7·d†**	63	*2 1/2*	77	*3 1/16*	91	*3 9/16*
e_Q	**7·d**	63	*2 1/2*	77	*3 1/16*	91	*3 9/16*
e_P	**3·d**	27	*1 1/16*	33	*1 5/16*	39	*1 9/16*
S_x	**1,5·d**	13,5	*9/16*	16,5	*5/8*	19,5	*3/4*

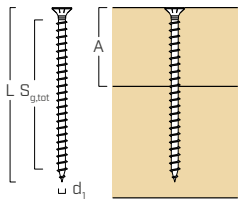
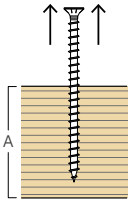
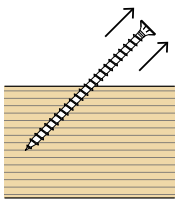
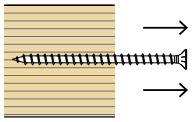
† For Douglas Fir–Larch and Western Red Cedar, this minimum spacing shall be increased by 50%.
α = load-to-grain angle
d = d_1 = nominal diameter of the screw



NOTES

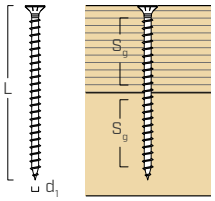
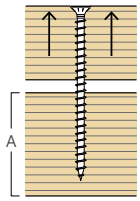
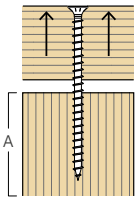
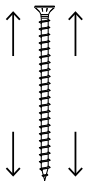
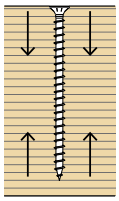
- The minimum spacing and distances comply with Clause 12.12.5 of CSA O86:24, where d_1 refers to the nominal diameter of the self-tapping screw.
- The spacing, end, and edge distances for Rothoblaas screws installed in the narrow face of CLT panels shall comply with the specifications outlined in ETA-11/0030.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

TENSION/COMPRESSION[1]

geometry				total thread withdrawal											
				α = 90°				α = 45°				end grain α = 0°			
															
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}[2]			
				G				G				G			
d_1	L		$S_{g,tot}$	A_{min}	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]	[kN]	[kN]	[kN]	[kN]
9 *0.36*	120	*4 3/4*	101	130	5,55	6,43	7,27	7,97	5,05	5,84	6,61	7,25	2,78	3,21	3,63	3,99
	160	*6 1/4*	141	170	7,75	8,97	10,15	11,13	7,05	8,16	9,22	10,12	3,88	4,49	5,07	5,57
	200	*8*	181	210	9,95	11,52	13,02	14,29	9,05	10,47	11,84	12,99	4,98	5,76	6,51	7,15
	240	*9 1/2*	221	250	12,15	14,06	15,90	17,45	11,05	12,78	14,46	15,86	6,08	7,03	7,95	8,73
	280	*11*	261	290	14,35	16,61	18,78	20,61	13,05	15,10	17,07	18,74	7,18	8,30	9,39	10,30
	320	*12 5/8*	301	330	16,55	19,15	21,66	23,77	15,05	17,41	19,69	21,61	8,28	9,58	10,83	11,88
	360	*14 1/4*	341	370	18,75	21,70	24,54	26,93	17,05	19,73	22,31	24,48	9,38	10,85	12,27	13,46
11 *0.44*	100	*4*	79	110	5,31	6,14	6,95	7,63	4,83	5,59	6,32	6,93	2,65	3,07	3,48	3,81
	150	*6*	129	160	8,67	10,03	11,35	12,45	7,88	9,12	10,32	11,32	4,34	5,02	5,68	6,23
	200	*8*	179	210	12,03	13,92	15,75	17,28	10,94	12,66	14,32	15,71	6,02	6,96	7,88	8,64
	250	*10*	229	260	15,39	17,81	20,15	22,11	13,99	16,19	18,32	20,10	7,70	8,90	10,07	11,05
	300	*11 3/4*	279	310	18,75	21,70	24,55	26,93	17,05	19,73	22,32	24,48	9,38	10,85	12,27	13,47
	350	*13 3/4*	329	360	22,11	25,59	28,95	31,76	20,10	23,26	26,32	28,87	11,06	12,79	14,47	15,88
	400	*15 3/4*	379	410	25,47	29,47	33,35	36,58	23,16	26,80	30,32	33,26	12,74	14,74	16,67	18,29
	500	*19 3/4*	479	510	32,20	37,25	42,15	46,24	29,27	33,87	38,32	42,03	16,10	18,63	21,07	23,12
	600	*23 5/8*	579	610	38,92	45,03	50,95	55,89	35,38	40,94	46,31	50,81	19,46	22,51	25,47	27,95
13 *0.52*	200	*8*	177	210	14,06	16,29	18,40	20,18	12,78	14,81	16,73	18,35	7,03	8,15	9,20	10,09
	300	*11 3/4*	267	310	21,21	24,58	27,75	30,45	19,28	22,34	25,23	27,68	10,61	12,29	13,88	15,22
	400	*15 3/4*	367	410	29,16	33,78	38,15	41,85	26,51	30,71	34,68	38,04	14,58	16,89	19,07	20,92
	500	*19 3/4*	467	510	37,10	42,99	48,54	53,25	33,73	39,08	44,13	48,41	18,55	21,49	24,27	26,63
	600	*23 5/8*	567	610	45,05	52,19	58,94	64,66	40,95	47,45	53,58	58,78	22,52	26,10	29,47	32,33
	700	*27 1/2*	667	710	52,99	61,40	69,33	76,06	48,18	55,82	63,03	69,14	26,50	30,70	34,67	38,03
	800	*31 1/2*	767	810	60,94	70,60	79,73	87,46	55,40	64,18	72,48	79,51	30,47	35,30	39,86	43,73

α = screw-to-grain angle

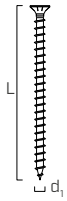
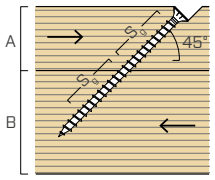
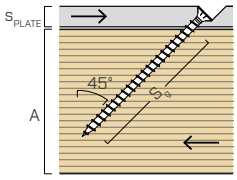
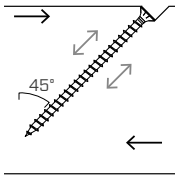
NOTES and GENERAL PRINCIPLES on page 10.

geometry				TENSION/COMPRESSION[1]									
				partial thread withdrawal α = 90°				partial thread withdrawal end grain α = 0°				steel tension	buckling α = 90°
													
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}[2]				factored tension resistance T_{rs}	factored buckling resistance P_{rb}
d_1	L		S_g	A_{min}	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]	[kN]	[kN]
9 *0.36*	120	*4 3/4*	45	65	2,47	2,86	3,24	3,55	1,24	1,43	1,62	1,78	17,84	16,37
	160	*6 1/4*	65	85	3,57	4,14	4,68	5,13	1,79	2,07	2,34	2,57		
	200	*8*	85	105	4,67	5,41	6,12	6,71	2,34	2,70	3,06	3,36		
	240	*9 1/2*	105	125	5,77	6,68	7,56	8,29	2,89	3,34	3,78	4,15		
	280	*11*	125	145	6,87	7,95	9,00	9,87	3,44	3,98	4,50	4,94		
	320	*12 5/8*	145	165	7,97	9,23	10,43	11,45	3,99	4,61	5,22	5,72		
	360	*14 1/4*	165	185	9,07	10,50	11,87	13,03	4,54	5,25	5,94	6,51		
11 *0.44*	100	*4*	35	55	2,35	2,72	3,08	3,38	1,18	1,36	1,54	1,69	23,17	19,66
	150	*6*	60	80	4,03	4,67	5,28	5,79	2,02	2,33	2,64	2,90		
	200	*8*	85	105	5,71	6,61	7,48	8,21	2,86	3,31	3,74	4,10		
	250	*10*	110	130	7,39	8,55	9,68	10,62	3,70	4,28	4,84	5,31		
	300	*11 3/4*	135	155	9,07	10,50	11,88	13,03	4,54	5,25	5,94	6,52		
	350	*13 3/4*	160	180	10,75	12,44	14,08	15,44	5,38	6,22	7,04	7,72		
	400	*15 3/4*	185	205	12,43	14,39	16,28	17,86	6,22	7,19	8,14	8,93		
	500	*19 3/4*	235	255	15,80	18,28	20,68	22,68	7,90	9,14	10,34	11,34		
	600	*23 5/8*	285	305	19,16	22,16	25,08	27,51	9,58	11,08	12,54	13,76		
13 *0.52*	200	*8*	85	105	6,75	7,82	8,84	9,69	3,38	3,91	4,42	4,85	31,96	27,02
	300	*11 3/4*	130	155	10,33	11,97	13,51	14,82	5,16	5,98	6,76	7,41		
	400	*15 3/4*	180	205	14,30	16,57	18,71	20,53	7,15	8,28	9,36	10,26		
	500	*19 3/4*	230	255	18,27	21,17	23,91	26,23	9,14	10,59	11,95	13,11		
	600	*23 5/8*	280	305	22,25	25,77	29,11	31,93	11,12	12,89	14,55	15,96		
	700	*27 1/2*	330	355	26,22	30,38	34,30	37,63	13,11	15,19	17,15	18,81		
	800	*31 1/2*	380	405	30,19	34,98	39,50	43,33	15,10	17,49	19,75	21,67		

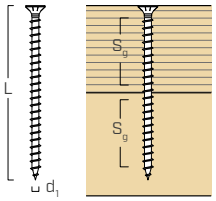
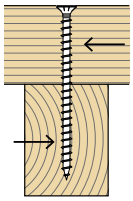
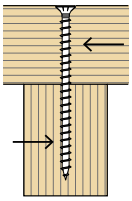
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 10.

SLIDING[3]

geometry			timber-to-timber							steel-to-timber							steel tension
																	
d_1	L		S_g	A	B_{min}	factored lateral resistance N_r[4] G				S_{PLATE}[5]	S_g	A_{min}	factored lateral resistance N_r[4] G				factored tension resistance T_{rs}
						0.35	0.42	0.49	0.55				0.35	0.42	0.49	0.55	
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[mm] *[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]
9 *0.36*	120	*4 3/4*	45	45	60	1,91	2,21	2,50	2,74	15,9 *5/8*	90	85	3,82	4,42	5,00	5,48	12,61
	160	*6 1/4*	65	60	75	2,76	3,19	3,61	3,96		130	115	5,51	6,38	7,22	7,92	
	200	*8*	85	75	90	3,61	4,17	4,72	5,18		170	140	7,21	8,34	9,44	10,35	
	240	*9 1/2*	105	90	105	4,45	5,15	5,83	6,40		210	170	8,91	10,31	11,66	12,79	
	280	*11*	125	105	120	5,30	6,14	6,94	7,61		250	200	10,61	12,27	13,88	15,23	
	320	*12 5/8*	145	115	130	6,15	7,12	8,05	8,83		290	225	12,30	14,23	16,10	17,66	
	360	*14 1/4*	165	130	145	7,00	8,10	9,16	10,05		330	255	14,00	16,20	18,32	20,10	
11 *0.44*	100	*4*	35	40	55	1,81	2,10	2,38	2,61	19,1 *3/4*	60	65	3,11	3,60	4,07	4,47	16,38
	150	*6*	60	60	75	3,11	3,60	4,07	4,47		110	100	5,70	6,60	7,47	8,19	
	200	*8*	85	75	90	4,41	5,10	5,77	6,33		160	135	8,30	9,60	10,86	11,91	
	250	*10*	110	95	110	5,70	6,60	7,47	8,19		210	170	10,89	12,60	14,25	15,64	
	300	*11 3/4*	135	110	125	7,00	8,10	9,16	10,05		260	205	13,48	15,60	17,65	19,36	
	350	*13 3/4*	160	130	145	8,30	9,60	10,86	11,91		310	240	16,07	18,60	21,04	23,08	
	400	*15 3/4*	185	145	160	9,59	11,10	12,56	13,78		360	275	18,67	21,60	24,43	26,81	
	500	*19 3/4*	235	180	195	12,18	14,10	15,95	17,50		460	350	23,85	27,60	31,22	34,25	
	600	*23 5/8*	285	220	235	14,78	17,10	19,34	21,22		560	420	29,03	33,59	38,01	41,70	
13 *0.52*	200	*8*	85	80	95	5,21	6,04	6,82	7,48	22,2 *7/8*	155	135	9,50	11,01	12,43	13,63	22,60
	300	*11 3/4*	130	110	125	7,97	9,23	10,42	11,43		255	205	15,63	18,11	20,45	22,43	
	400	*15 3/4*	180	145	160	11,03	12,78	14,43	15,83		355	275	21,76	25,21	28,47	31,23	
	500	*19 3/4*	230	180	195	14,10	16,33	18,44	20,23		455	345	27,89	32,31	36,48	40,02	
	600	*23 5/8*	280	215	230	17,16	19,88	22,45	24,63		555	415	34,01	39,41	44,50	48,82	
	700	*27 1/2*	330	250	265	20,22	23,43	26,46	29,03		-	-	-	-	-	-	
	800	*31 1/2*	380	285	300	23,29	26,98	30,47	33,43		-	-	-	-	-	-	

NOTES and GENERAL PRINCIPLES on page 10.

geometry				SHEAR[6] timber-to-timber							
				α = 90°				α = 0°			
											
				factored lateral resistance N_r				factored lateral resistance N_r[2]			
				G				G			
d_1	L		S_g	A[7]	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]
9 *0.36*	120	*4 3/4*	45	60	2,18	2,59	3,00	3,34	1,37	1,55	1,73	1,87
	160	*6 1/4*	65	80	2,85	3,17	3,48	3,73	1,61	1,83	2,05	2,23
	200	*8*	85	100	3,12	3,49	3,84	4,13	1,85	2,12	2,38	2,59
	240	*9 1/2*	105	120	3,40	3,81	4,20	4,52	2,09	2,40	2,70	2,90
	280	*11*	125	140	3,67	4,13	4,56	4,90	2,33	2,62	2,88	3,09
	320	*12 5/8*	145	160	3,91	4,28	4,62	4,90	2,48	2,78	3,06	3,29
	360	*14 1/4*	165	180	3,91	4,28	4,62	4,90	2,62	2,94	3,24	3,49
11 *0.44*	100	*4*	35	50	2,07	2,46	2,85	3,18	1,34	1,59	1,84	2,03
	150	*6*	60	75	3,24	3,81	4,17	4,47	1,86	2,12	2,37	2,57
	200	*8*	85	100	3,84	4,29	4,72	5,07	2,22	2,54	2,85	3,11
	250	*10*	110	125	4,26	4,78	5,27	5,68	2,58	2,97	3,34	3,62
	300	*11 3/4*	135	150	4,68	5,27	5,75	6,09	2,94	3,31	3,65	3,92
	350	*13 3/4*	160	175	4,86	5,32	5,75	6,09	3,17	3,56	3,92	4,22
	400	*15 3/4*	185	200	4,86	5,32	5,75	6,09	3,38	3,80	4,20	4,52
	500	*19 3/4*	235	250	4,86	5,32	5,75	6,09	3,67	4,02	4,35	4,60
	600	*23 5/8*	285	300	4,86	5,32	5,75	6,09	3,67	4,02	4,35	4,60
13 *0.52*	200	*8*	80	100	4,95	5,53	6,06	6,50	2,75	3,13	3,50	3,80
	300	*11 3/4*	125	150	5,81	6,52	7,18	7,73	3,58	4,11	4,62	5,03
	400	*15 3/4*	175	200	6,65	7,28	7,87	8,33	4,32	4,85	5,34	5,74
	500	*19 3/4*	225	250	6,65	7,28	7,87	8,33	4,82	5,42	5,95	6,30
	600	*23 5/8*	275	300	6,65	7,28	7,87	8,33	5,03	5,51	5,95	6,30
	700	*27 1/2*	325	350	6,65	7,28	7,87	8,33	5,03	5,51	5,95	6,30
	800	*31 1/2*	375	400	6,65	7,28	7,87	8,33	5,03	5,51	5,95	6,30

α = screw-to-grain angle.

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 factored thread withdrawal resistance were evaluated considering a penetration length of $S_{g,tot}$ or S_g, as shown in the table. For intermediate values of S_g it is possible to linearly interpolate.
- The reference lateral design values are calculated for screws inserted without pre-drilling hole 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 hole, 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).
- VGS EVO 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.

(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) For fully threaded screws, head pull-through does not govern the connection capacity, instead, thread withdrawal governs. The governing axial resistance is taken as the minimum of the screw's shear, thread withdrawal, and tensile resistances. In this case, the tensile resistance is always lower than the shear resistance, so the governing value is the minimum between thread withdrawal and tensile resistance.

(4) The 45° inclined screw is intended to work in withdrawal and the resulting resistance of the connection is given by the projection of the withdrawal resistance (along screw axis) onto the shear plane.

(5) The plate thickness (S_{PLATE}) are understood to be the minimum values to allow the countersunk head of the screw to be accommodated.

(6) 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.

(7) The fixable thickness (A) is considered as half the length of the screw (L/2).