HBS PLATE A4

PAN HEAD SCREW FOR PLATES

ELC-4645 ESR-4645 ETA-11/0030

A4 | AISI316

HBS PLATE version in A4 | AISI316 austenitic stainless steel for high corrosion resistance. Ideal for environments adjacent to the sea in corrosivity class C5 and for insertion on the most aggressive timbers in class T5.

STEEL-TO-TIMBER CONNECTIONS

The under-head shoulder achieves an interlocking effect with the circular hole in the plate, thus guaranteeing excellent static performance. The edgeless geometry of the head reduces stress concentration points and gives the screw strength.

T5 TIMBER CORROSIVITY

Suitable for use in applications on agressive woods with an acidity (pH) level below 4 such as oak, Douglas fir and chestnut, and in wood moisture conditions above 20%.

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

MANUALS

BIT INCLUDED

DIAMETER [mm]

3,5 | 8 | 12 | 12

LENGTH [mm]

25 | 60 | 200 | 200

SERVICE CONDITION

EC1 EC2 EC3 EC4 WET

ATMOSPHERIC CORROSIVITY

C1 C2 C3 C4 C5

WOOD CORROSIVITY

T1 T2 T3 T4 T5

MATERIAL

A4 AISI 316 — A4 | AISI316 austenitic stainless steel (CRC III)

FIELDS OF USE

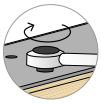
- timber based panels
- solid timber and glulam
- CLT and LVL
- ACQ, CCA treated timber

CODES AND DIMENSIONS

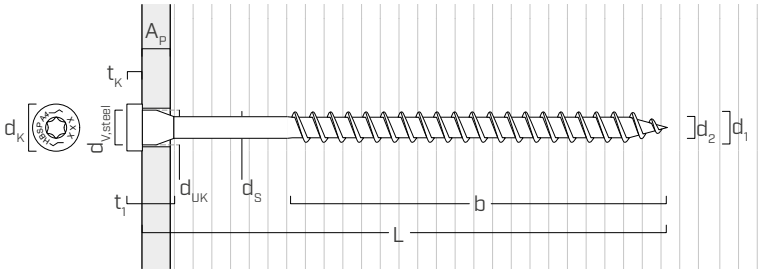
d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
8 TX 40	HBSPL860A4	60	52	1 - 10	100
	HBSPL880A4	80	55	1 - 15	100
	HBSPL8100A4	100	75	1 - 15	100
	HBSPL8120A4	120	95	1 - 15	100
	HBSPL8140A4	140	110	1 - 20	100
	HBSPL8160A4	160	130	1 - 20	100
10 TX 40	HBSPL1080A4	80	60	1 - 10	50
	HBSPL10100A4	100	75	1 - 15	50
	HBSPL10120A4	120	95	1 - 15	50
	HBSPL10140A4	140	110	1 - 20	50
	HBSPL10160A4	160	130	1 - 20	50
	HBSPL10180A4	180	150	1 - 20	50

d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
12 TX 50	HBSPL12100A4	100	75	1 - 15	25
	HBSPL12120A4	120	90	1 - 20	25
	HBSPL12140A4	140	110	1 - 20	25
	HBSPL12160A4	160	120	1 - 30	25
	HBSPL12180A4	180	140	1 - 30	25
	HBSPL12200A4	200	160	1 - 30	25

METAL-to-TIMBER recommended use:



GEOMETRY AND MECHANICAL CHARACTERISTICS



Nominal diameter	d_1	[mm]	8	10	12
Head diameter	d_K	[mm]	13,50	16,50	18,50
Internal thread diameter	d_2	[mm]	5,90	6,60	7,30
Shank diameter	d_s	[mm]	6,30	7,20	8,55
Head thickness	t_1	[mm]	10,00	11,50	13,00
Washer thickness	t_k	[mm]	4,00	4,50	5,00
Underhead diameter	d_{UK}	[mm]	10,00	12,00	13,00
Hole diameter on steel plate	$d_{V,steel}$	[mm]	11,00	13,00	14,00
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	5,0	6,0	7,0

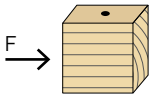
(1) Pre-drilling valid for softwood.

MECHANICAL PROPERTIES

Nominal diameter	d_1	[mm]		8	10	12
Factored tensile strength	Φf_u	[kN]		9,23	10,89	17,15
Bending yield strength	F_{yb}	[MPa]		631	619	655
Factored shear strength of the screw	Φv_s	[kN]		5,91	7,39	9,04
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	69,83	87,29	104,75
			G=0.42	80,80	101,00	121,20
			G=0.49	91,40	114,26	137,11
			G=0.55	100,25	125,32	150,38
Specified head pull-through resistance per screw	F_{pt}	[kN]	G=0.35	1,13	1,59	1,92
			G=0.42	1,36	1,91	2,30
			G=0.49	1,58	2,23	2,69
			G=0.55	1,78	2,50	3,02

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

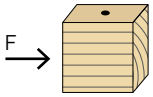
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



d_1		8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	12·d‡	96	*3 3/4*	120	*4 3/4*	144	*5 11/16*
S_Q	5·d	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*
a_L	15·d‡	120	*4 3/4*	150	*6*	180	*7 1/8*
a	10·d‡	80	*3 1/8*	100	*4*	120	*4 3/4*
e_Q	10·d	80	*3 1/8*	100	*4*	120	*4 3/4*
e_P	5·d	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*

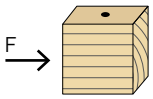
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



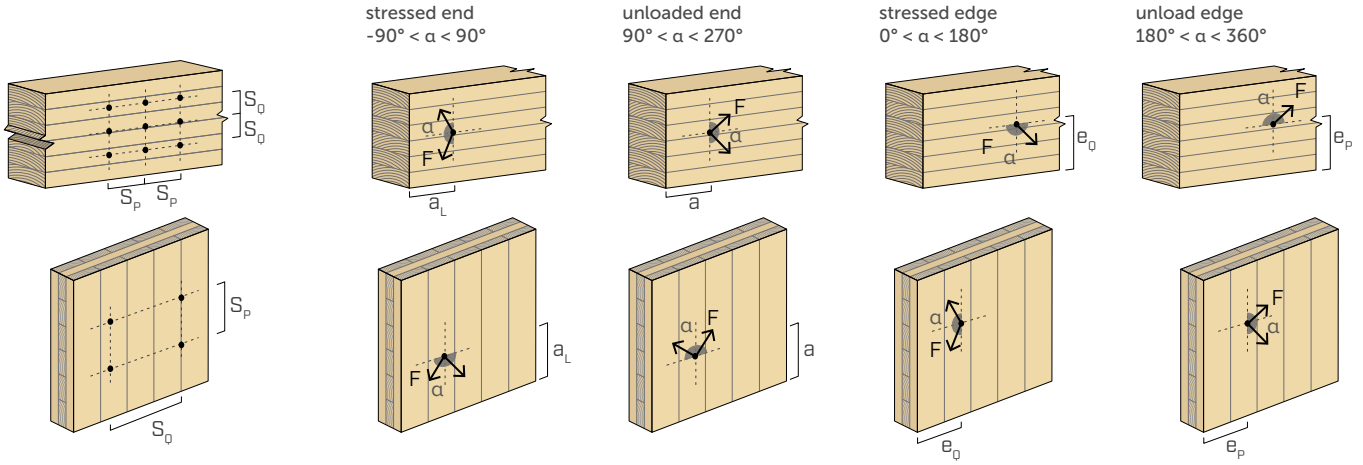
d_1		8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	18·d	144	*5 11/16*	180	*7 1/8*	216	*8 1/2*
S_Q	7·d	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
a_L	22·d	176	*6 15/16*	220	*8 5/8*	264	*10 3/8*
a	15·d	120	*4 3/4*	150	*6*	180	*7 1/8*
e_Q	12·d	96	*3 3/4*	120	*4 3/4*	*144*	*5 11/16*
e_P	7·d	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*

screws inserted **WITH pre-drilled hole**



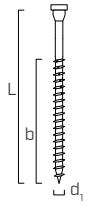
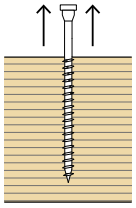
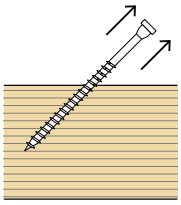
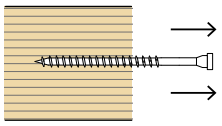
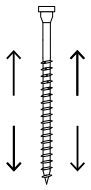
d_1		8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	5·d†	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*
S_Q	4·d	32	*1 1/4*	40	*1 9/16*	48	*1 7/8*
a_L	12·d†	96	*3 3/4*	120	*4 3/4*	144	*5 11/16*
a	7·d†	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
e_Q	7·d	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
e_P	3·d	24	*15/16*	30	*1 3/16*	36	*1 7/16*

† 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



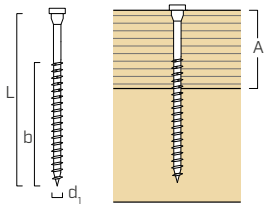
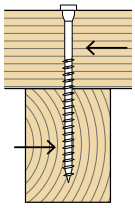
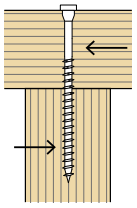
NOTES

- 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.

geometry				TENSION[1]												steel tension
				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][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]
8 *0.32*	60	*2 3/8*	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	9,23
	80	*3 1/8*	55	2,30	2,66	3,01	3,30	2,09	2,42	2,73	3,00	1,15	1,33	1,50	1,65	
	100	*4*	75	3,28	3,79	4,29	4,70	2,98	3,45	3,90	4,27	1,64	1,89	2,14	2,35	
	120	*4 3/4*	95	4,25	4,92	5,57	6,11	3,87	4,47	5,06	5,55	2,13	2,46	2,78	3,05	
	140	*5 1/2*	110	4,99	5,77	6,53	7,16	4,53	5,24	5,93	6,51	2,49	2,88	3,26	3,58	
	160	*6 1/4*	130	5,96	6,90	7,81	8,56	5,42	6,27	7,10	7,78	2,98	3,45	3,90	4,28	
10 *0.40*	80	*3 1/8*	60	3,06	3,54	4,00	4,39	2,78	3,21	3,64	3,99	1,53	1,77	2,00	2,19	10,89
	100	*4*	75	3,97	4,60	5,20	5,70	3,61	4,18	4,73	5,18	1,99	2,30	2,60	2,85	
	120	*4 3/4*	95	5,19	6,01	6,80	7,46	4,72	5,46	6,18	6,78	2,60	3,00	3,40	3,73	
	140	*5 1/2*	110	6,11	7,07	8,00	8,77	5,55	6,43	7,27	7,97	3,06	3,54	4,00	4,39	
	160	*6 1/4*	130	7,33	8,48	9,60	10,53	6,67	7,71	8,73	9,57	3,67	4,24	4,80	5,26	
	180	*7 1/8*	150	8,55	9,90	11,20	12,28	7,78	9,00	10,18	11,16	4,28	4,95	5,60	6,14	
12 *0.48*	100	*4*	75	4,62	5,34	6,05	6,63	4,20	4,86	5,50	6,03	2,31	2,67	3,02	3,32	17,15
	120	*4 3/4*	90	5,72	6,62	7,49	8,21	5,20	6,02	6,81	7,46	2,86	3,31	3,74	4,11	
	140	*5 1/2*	110	7,19	8,31	9,41	10,32	6,53	7,56	8,55	9,38	3,59	4,16	4,70	5,16	
	160	*6 1/4*	120	7,92	9,16	10,37	11,37	7,20	8,33	9,42	10,34	3,96	4,58	5,18	5,68	
	180	*7 1/8*	140	9,39	10,86	12,29	13,47	8,53	9,87	11,17	12,25	4,69	5,43	6,14	6,74	
	200	*8*	160	10,85	12,56	14,20	15,58	9,87	11,41	12,91	14,16	5,43	6,28	7,10	7,79	

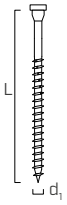
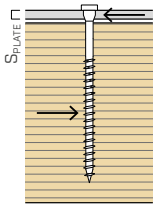
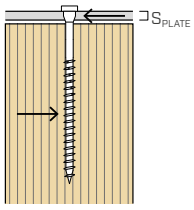
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 5.

geometry					SHEAR[4]							
					timber-to-timber α = 90°				timber-to-timber α = 0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r[2] [3]			
d_1	L		b	A[5]	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]
8 *0.32*	60	*2 3/8*	52	15	0,92	1,10	1,29	1,44	0,59	0,71	0,83	0,93
	80	*3 1/8*	55	25	1,16	1,39	1,55	1,68	0,76	0,91	1,07	1,20
	100	*4*	75	25	1,22	1,39	1,55	1,68	0,86	1,03	1,20	1,35
	120	*4 3/4*	95	25	1,22	1,39	1,55	1,68	0,95	1,14	1,34	1,46
	140	*5 1/2*	110	30	1,28	1,46	1,63	1,78	1,09	1,27	1,43	1,56
	160	*6 1/4*	130	30	1,28	1,46	1,63	1,78	1,10	1,27	1,43	1,56
10 *0.40*	80	*3 1/8*	60	20	1,40	1,67	1,86	2,02	0,90	1,07	1,25	1,41
	100	*4*	75	25	1,54	1,75	1,96	2,13	1,05	1,26	1,47	1,65
	120	*4 3/4*	95	25	1,54	1,75	1,96	2,13	1,16	1,39	1,63	1,83
	140	*5 1/2*	110	30	1,61	1,84	2,06	2,24	1,32	1,58	1,79	1,96
	160	*6 1/4*	130	30	1,61	1,84	2,06	2,24	1,39	1,59	1,79	1,96
	180	*7 1/8*	150	30	1,61	1,84	2,06	2,24	1,39	1,59	1,79	1,96
12 *0.48*	100	*4*	75	25	1,90	2,16	2,41	2,61	1,21	1,46	1,70	1,91
	120	*4 3/4*	90	30	1,98	2,25	2,52	2,74	1,39	1,67	1,94	2,18
	140	*5 1/2*	110	30	1,98	2,25	2,52	2,74	1,52	1,82	2,12	2,38
	160	*6 1/4*	120	40	2,14	2,44	2,74	2,99	1,74	2,09	2,40	2,63
	180	*7 1/8*	140	40	2,14	2,44	2,74	2,99	1,85	2,13	2,40	2,63
	200	*8*	160	40	2,14	2,44	2,74	2,99	1,85	2,13	2,40	2,63

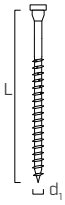
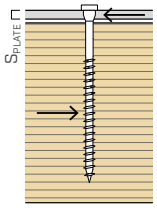
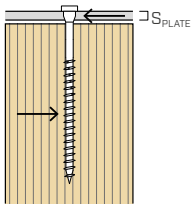
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

geometry				SHEAR[4]											
				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] [3]				factored lateral resistance N_r			
				G				G				G			
d_1	L		S_{PLATE}	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] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*		2,23	2,55	2,86	3,11	1,18	1,34	1,49	1,62	2,11	2,41	2,70	2,94
	80	*3 1/8*		2,51	2,88	3,15	3,36	1,30	1,48	1,65	1,80	2,37	2,71	3,03	3,23
8	100	*4*		2,85	3,17	3,47	3,71	1,52	1,74	1,95	2,12	2,74	3,06	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,74	1,99	2,22	2,37	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,91	2,13	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		3,13	3,58	4,03	4,31	1,63	1,85	2,07	2,25	2,95	3,38	3,80	4,15
	100	*4*		3,56	3,96	4,34	4,64	1,85	2,12	2,37	2,59	3,43	3,82	4,18	4,48
10	120	*4 3/4*	3,2	3,87	4,32	4,74	5,08	2,12	2,43	2,73	2,97	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*1/8*	4,10	4,58	5,04	5,41	2,35	2,67	2,93	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,55	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,34	4,93	5,39	5,76	2,23	2,55	2,85	3,10	4,10	4,71	5,19	5,55
	120	*4 3/4*		4,71	5,25	5,75	6,16	2,50	2,86	3,21	3,50	4,54	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,81	3,22	3,63	3,89	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	3,03	3,42	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,25	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79
	60	*2 3/8*		2,20	2,51	2,80	3,05	1,17	1,32	1,47	1,60	2,08	2,37	2,65	2,89
	80	*3 1/8*		2,47	2,84	3,15	3,36	1,28	1,46	1,63	1,77	2,33	2,67	3,00	3,23
8	100	*4*		2,85	3,17	3,47	3,71	1,50	1,72	1,93	2,10	2,74	3,06	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,72	1,97	2,22	2,37	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,91	2,13	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		3,08	3,53	3,97	4,31	1,61	1,83	2,04	2,22	2,91	3,34	3,74	4,08
	100	*4*		3,56	3,96	4,34	4,64	1,84	2,10	2,35	2,56	3,40	3,82	4,18	4,48
10	120	*4 3/4*	6,4	3,87	4,32	4,74	5,08	2,10	2,41	2,71	2,96	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*1/4*	4,10	4,58	5,04	5,41	2,33	2,67	2,93	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,55	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,29	4,92	5,39	5,76	2,21	2,52	2,82	3,07	4,06	4,65	5,19	5,55
	120	*4 3/4*		4,71	5,25	5,75	6,16	2,48	2,84	3,18	3,47	4,54	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,79	3,20	3,60	3,89	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	3,01	3,42	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,25	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79

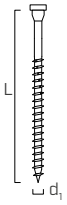
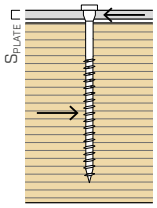
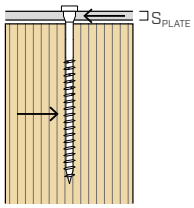
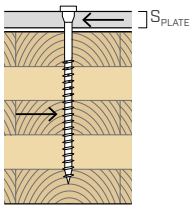
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

geometry				SHEAR[4]											
				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] [3]				factored lateral resistance N_r			
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	0.55
[mm] *[in]*	[mm]	*[in]*	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*		2,14	2,44	2,73	2,97	1,14	1,30	1,44	1,56	2,03	2,31	2,58	2,81
	80	*3 1/8*		2,43	2,79	3,13	3,36	1,27	1,44	1,61	1,75	2,30	2,63	2,96	3,23
8	100	*4*		2,85	3,17	3,47	3,71	1,49	1,70	1,90	2,08	2,74	3,06	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,71	1,96	2,20	2,37	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,89	2,13	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		3,04	3,48	3,90	4,26	1,59	1,81	2,02	2,19	2,87	3,29	3,69	4,02
	100	*4*		3,55	3,96	4,34	4,64	1,82	2,08	2,32	2,53	3,36	3,82	4,18	4,48
10	120	*4 3/4*	9,5	3,87	4,32	4,74	5,08	2,08	2,39	2,68	2,93	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*3/8*	4,10	4,58	5,04	5,41	2,31	2,66	2,93	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,55	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,24	4,86	5,39	5,76	2,19	2,50	2,79	3,04	4,01	4,60	5,17	5,55
	120	*4 3/4*		4,71	5,25	5,75	6,16	2,46	2,81	3,15	3,44	4,54	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,77	3,18	3,57	3,89	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	2,99	3,42	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,25	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79
	60	*2 3/8*		2,06	2,35	2,62	2,85	1,11	1,25	1,39	1,51	1,95	2,22	2,48	2,70
	80	*3 1/8*		2,40	2,74	3,08	3,36	1,25	1,42	1,59	1,73	2,26	2,59	2,91	3,17
8	100	*4*		2,85	3,17	3,47	3,71	1,47	1,68	1,88	2,05	2,72	3,06	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,69	1,94	2,18	2,37	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,88	2,13	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		2,99	3,42	3,84	4,19	1,57	1,79	1,99	2,16	2,83	3,24	3,63	3,96
	100	*4*		3,50	3,96	4,34	4,64	1,80	2,05	2,30	2,50	3,32	3,81	4,18	4,48
10	120	*4 3/4*	12,7	3,87	4,32	4,74	5,08	2,07	2,37	2,66	2,90	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*1/2*	4,10	4,58	5,04	5,41	2,29	2,63	2,93	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,55	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,19	4,80	5,39	5,76	2,17	2,47	2,76	3,01	3,96	4,54	5,10	5,55
	120	*4 3/4*		4,71	5,25	5,75	6,16	2,44	2,79	3,12	3,40	4,53	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,75	3,15	3,54	3,87	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	2,97	3,41	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,25	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79

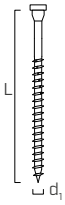
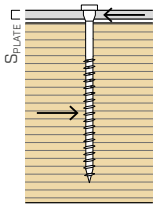
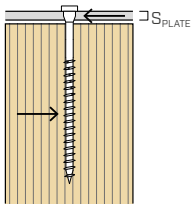
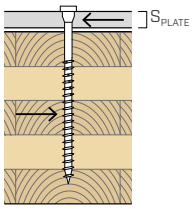
α = screw-to-grain angle

NOTES and **GENERAL PRINCIPLES** on page 11.

geometry				SHEAR[4]											
				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] [3]				factored lateral resistance N_r			
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	0.55
[mm] *[in]*	[mm]	*[in]*	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*		1,99	2,26	2,52	2,73	1,06	1,21	1,35	1,46	1,88	2,14	2,38	2,59
	80	*3 1/8*		2,36	2,70	3,03	3,30	1,24	1,41	1,57	1,70	2,23	2,55	2,86	3,12
8	100	*4*		2,84	3,17	3,47	3,71	1,46	1,66	1,86	2,03	2,69	3,06	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,67	1,92	2,16	2,35	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,86	2,13	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		2,95	3,37	3,78	4,12	1,56	1,77	1,97	2,13	2,79	3,19	3,58	3,90
	100	*4*		3,46	3,96	4,34	4,64	1,78	2,03	2,27	2,48	3,28	3,76	4,18	4,48
10	120	*4 3/4*	15,9	3,87	4,32	4,74	5,08	2,05	2,34	2,63	2,87	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*5/8*	4,10	4,58	5,04	5,41	2,28	2,61	2,93	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,54	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,14	4,74	5,33	5,76	2,15	2,45	2,74	2,97	3,92	4,49	5,04	5,50
	120	*4 3/4*		4,71	5,25	5,75	6,16	2,42	2,76	3,09	3,37	4,48	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,73	3,13	3,51	3,84	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	2,95	3,39	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,25	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79
	60	*2 3/8*		1,91	2,17	2,41	2,62	0,98	1,17	1,30	1,40	1,81	2,05	2,28	2,48
	80	*3 1/8*		2,32	2,65	2,97	3,24	1,22	1,39	1,55	1,68	2,20	2,51	2,81	3,06
8	100	*4*		2,80	3,17	3,47	3,71	1,44	1,64	1,84	2,00	2,66	3,05	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,66	1,90	2,13	2,33	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,85	2,12	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		2,90	3,32	3,72	4,05	1,54	1,74	1,94	2,11	2,75	3,14	3,52	3,83
	100	*4*		3,41	3,92	4,34	4,64	1,77	2,01	2,25	2,45	3,24	3,71	4,17	4,48
10	120	*4 3/4*	19,1	3,87	4,32	4,74	5,08	2,03	2,32	2,61	2,84	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*3/4*	4,10	4,58	5,04	5,41	2,26	2,59	2,91	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,52	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,09	4,68	5,26	5,74	2,13	2,43	2,71	2,94	3,87	4,43	4,98	5,43
	120	*4 3/4*		4,68	5,25	5,75	6,16	2,40	2,74	3,07	3,34	4,43	5,06	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,71	3,10	3,48	3,80	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	2,93	3,36	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,24	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 11.

geometry				SHEAR[4]											
				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] [3]				factored lateral resistance N_r			
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	0.55
[mm] *[in]*	[mm]	*[in]*	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*		1,83	2,08	2,31	2,50	0,91	1,09	1,25	1,35	1,73	1,96	2,19	2,37
	80	*3 1/8*		2,28	2,61	2,92	3,18	1,21	1,37	1,52	1,65	2,16	2,47	2,76	3,01
8	100	*4*		2,77	3,17	3,47	3,71	1,43	1,63	1,82	1,98	2,62	3,01	3,35	3,58
0.32	120	*4 3/4*		3,09	3,45	3,79	4,06	1,64	1,88	2,11	2,31	2,99	3,34	3,67	3,94
	140	*5 1/2*		3,28	3,66	4,03	4,33	1,83	2,10	2,34	2,51	3,17	3,55	3,91	4,20
	160	*6 1/4*		3,52	3,95	4,35	4,68	2,03	2,27	2,50	2,68	3,42	3,83	4,23	4,55
	80	*3 1/8*		2,83	3,22	3,61	3,93	1,50	1,70	1,90	2,05	2,68	3,06	3,42	3,72
	100	*4*		3,37	3,87	4,34	4,64	1,75	1,99	2,22	2,42	3,20	3,66	4,12	4,48
10	120	*4 3/4*	22,2	3,87	4,32	4,74	5,08	2,01	2,30	2,58	2,82	3,74	4,17	4,58	4,92
0.40	140	*5 1/2*	*7/8*	4,10	4,58	5,04	5,41	2,24	2,57	2,89	3,14	3,97	4,44	4,88	5,25
	160	*6 1/4*		4,40	4,94	5,44	5,85	2,50	2,85	3,13	3,36	4,27	4,79	5,28	5,68
	180	*7 1/8*		4,71	5,29	5,76	5,94	2,70	3,02	3,33	3,58	4,58	5,15	5,61	5,78
	100	*4*		4,03	4,62	5,19	5,66	2,11	2,40	2,68	2,91	3,83	4,38	4,91	5,36
	120	*4 3/4*		4,63	5,25	5,75	6,16	2,38	2,71	3,04	3,31	4,39	5,04	5,55	5,95
12	140	*5 1/2*		5,08	5,67	6,23	6,68	2,69	3,08	3,46	3,77	4,91	5,49	6,03	6,47
0.48	160	*6 1/4*		5,26	5,88	6,47	6,95	2,91	3,34	3,75	4,02	5,09	5,70	6,27	6,74
	180	*7 1/8*		5,63	6,31	6,95	7,47	3,22	3,63	3,99	4,29	5,46	6,12	6,75	7,26
	200	*8*		5,99	6,73	7,43	8,00	3,44	3,85	4,23	4,55	5,83	6,55	7,23	7,79

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).
- Head pull-through values have been determined in accordance with CSA O86:24, Clause A.12.12.8.3. Withdrawal and head pull-through values given in this datasheet are likewise applicable to CLT connections.
- 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.
- Connection design requires comparing head pull-through resistance to both screw tensile capacity and thread withdrawal - the minimum of the three governs.
- 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) HBS screws installed in the end grain may not meet the minimum penetration requirement for withdrawal (20 d_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 side-member thickness, A, for HBS PLATE 8 x 60 mm was set to 15 mm to ensure the connection is not governed by failure mode (a).