HBS PLATE

PAN HEAD SCREW FOR PLATES

ELC-4645 ESR-4645 ETA-11/0030

NEW GEOMETRY

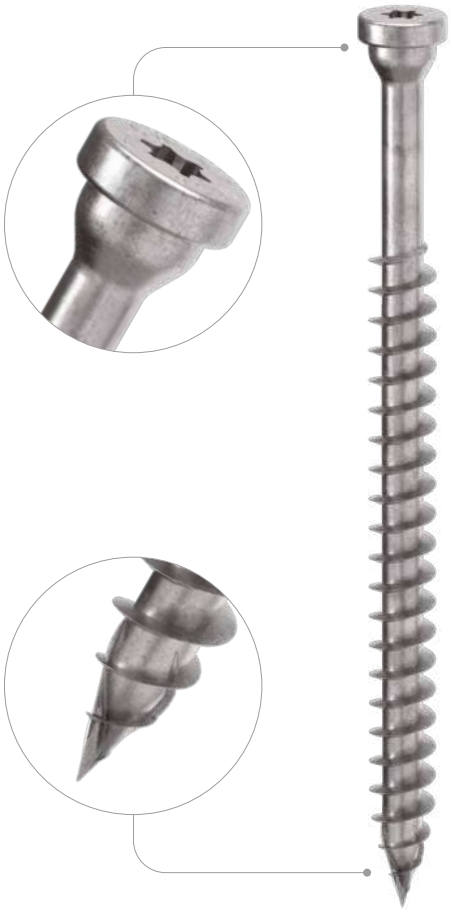
The inner core diameter of the Ø8, Ø10 and Ø12 mm screws has been increased to ensure higher performance in thick plate applications. In steel-timber connections, the new geometry achieves a strength increase of more than 15%.

PLATE FASTENING

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.

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.



MANUALS

BIT INCLUDED

DIAMETER [mm]	3	8 – 12	12
LENGTH [mm]	25	60 – 200	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)

CANADIAN DESIGN VALUES

USA, EU and more design values available online.

METAL-to-TIMBER recommended use:

NO IMPACT

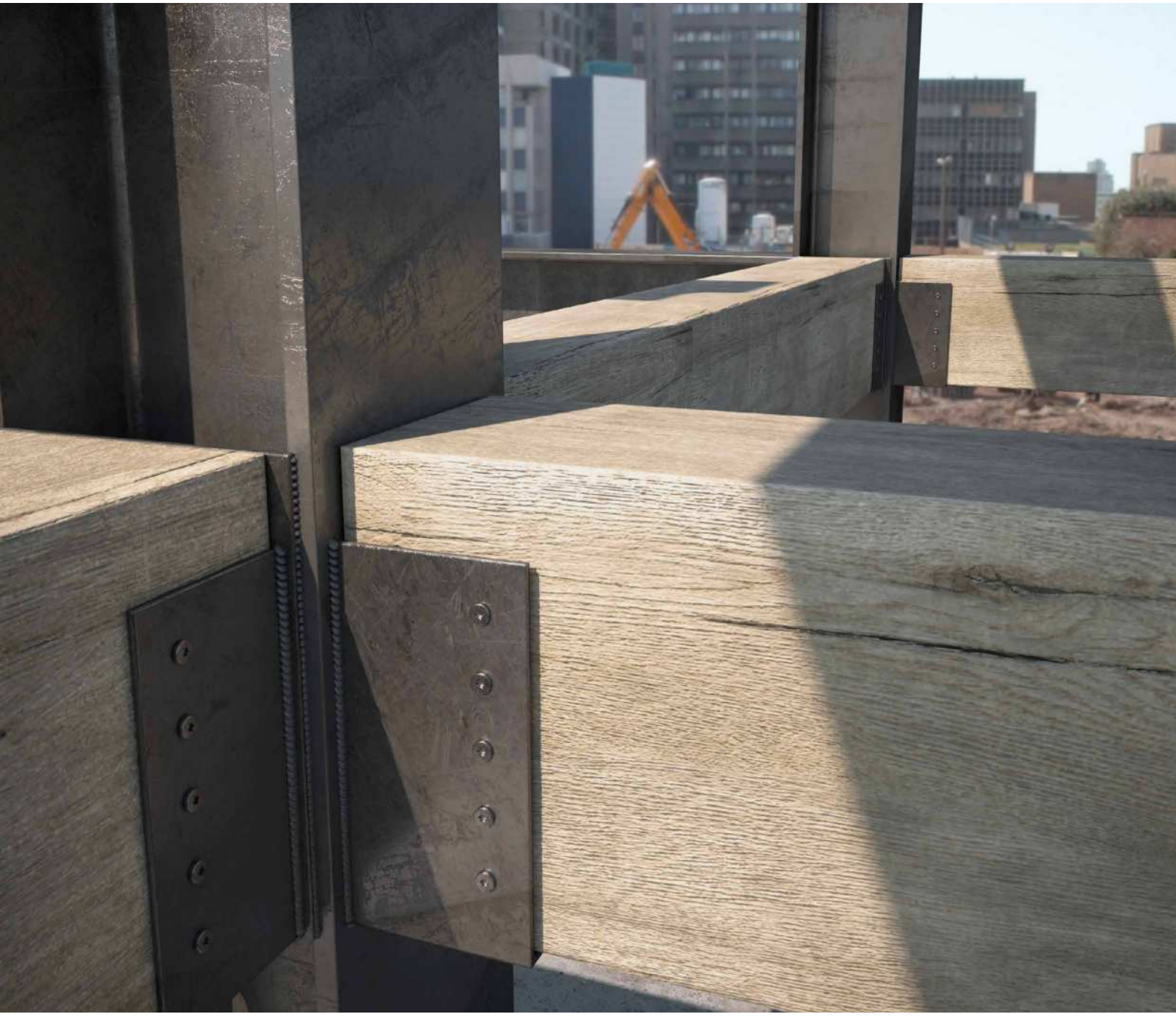
TORQUE LIMITER

$M_{ins,rec}$

FIELDS OF USE

- timber based panels
- solid timber
- glulam (Glued Laminated Timber)
- CLT and LVL
- high density woods

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



MULTISTOREY

Ideal for steel-to-timber joints with large customized plates, designed for multi-story timber buildings.

TITAN

Values also tested, certified and calculated for fastening standard Rothoblaas plates.

CODES AND DIMENSIONS

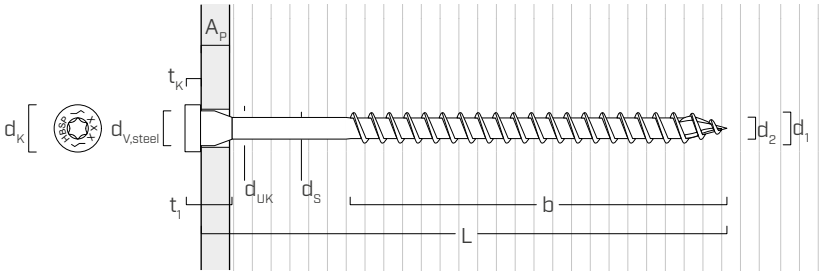
d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
8 TX 40	**HBSPL860**	60	52	1 - 10	100
	HBSPL880	80	55	1 - 15	100
	HBSPL8100	100	75	1 - 15	100
	HBSPL8120	120	95	1 - 15	100
	HBSPL8140	140	110	1 - 20	100
	HBSPL8160	160	130	1 - 20	100
10 TX 40	**HBSPL1080**	80	60	1 - 10	50
	HBSPL10100	100	75	1 - 15	50
	HBSPL10120	120	95	1 - 15	50
	HBSPL10140	140	110	1 - 20	50
	HBSPL10160	160	130	1 - 20	50
	HBSPL10180	180	150	1 - 20	50

d_1 [mm]	CODE	L [mm]	b [mm]	A_P [mm]	pcs
12 TX 50	**HBSPL12100**	100	75	1 - 15	25
	HBSPL12120	120	90	1 - 20	25
	HBSPL12140	140	110	1 - 20	25
	HBSPL12160	160	120	1 - 30	25
	HBSPL12180	180	140	1 - 30	25
	HBSPL12200	200	160	1 - 30	25

RELATED PRODUCTS

TORQUE LIMITER
TORQUE LIMITER

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	**d_1**	**[mm]**	**8**	**10**	**12**
Head diameter	d_K	[mm]	13,50	16,50	18,50
Root 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]	13,50	16,50	19,50
Washer thickness	t_K	[mm]	4,50	5,00	5,50
Underhead diameter	d_{UK}	[mm]	10,00	12,00	13,00
Hole diameter on steel plate	$d_{V,steel}$	[mm]	11,0	13,0	14,0
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	5,0	6,0	7,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	6,0	7,0	8,0

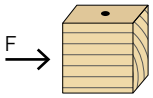
(1) Pre-drilling valid for softwood.
(2) Pre-drilling valid for hardwood and beech LVL.

MECHANICAL PROPERTIES

Nominal diameter	**d_1**	**[mm]**		**8**	**10**	**12**
Factored tensile strength	Φf_u	[kN]		19,18	24,17	31,08
Bending yield strength	F_{yb}	[MPa]		1018	969	1060
Factored shear strength of the screw	Φv_s	[kN]		10,51	13,14	16,07
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

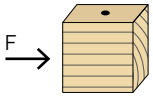
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



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*

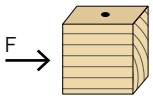
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



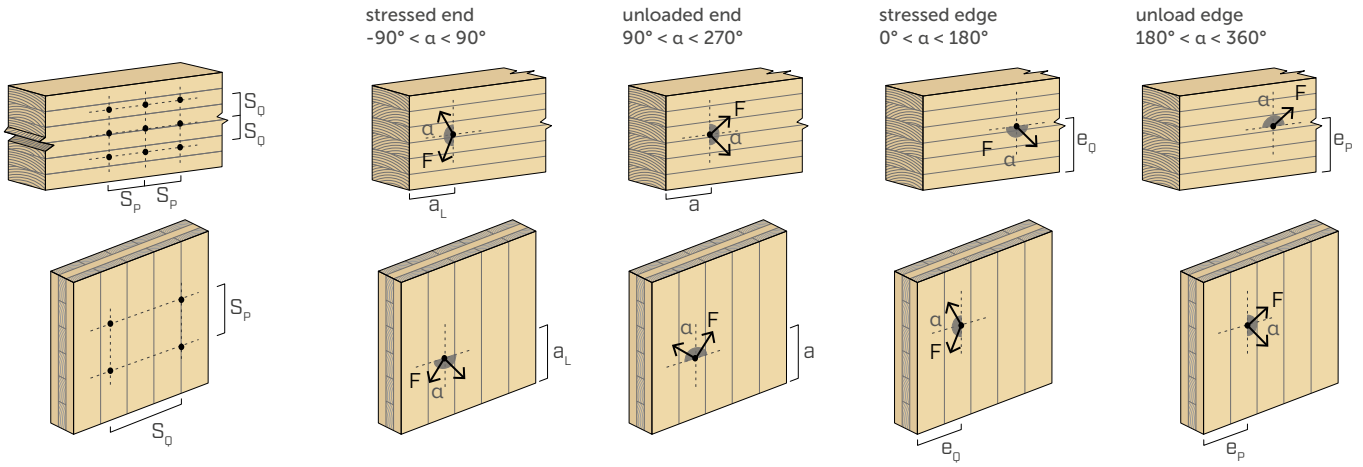
d_1		8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	18·d	144	*5 11/16*	180	*7 1/8*	216	*8 1/2*
S_Q	7·d	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
a_L	22·d	176	*6 15/16*	220	*8 5/8*	264	*10 3/8*
a	15·d	120	*4 3/4*	150	*6*	180	*7 1/8*
e_Q	12·d	96	*3 3/4*	120	*4 3/4*	*144*	*5 11/16*
e_P	7·d	56	*2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

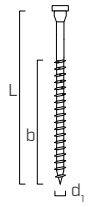
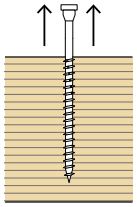
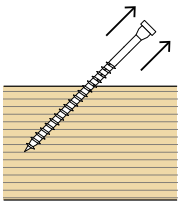
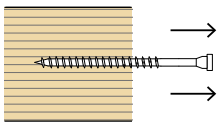
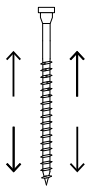
† For Douglas Fir–Larch and Western Red Cedar, this minimum spacing shall be increased by 50%.
d = d_1 = nominal diameter of the screw
α = load-to-grain angle



NOTES

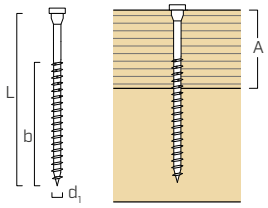
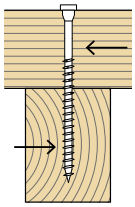
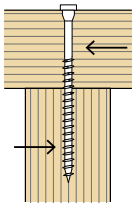
- The minimum spacing and distances comply with Clause 12.12.5 of CSA O86:24, where d_1 refers to the nominal diameter of the self-tapping screw.
- The spacing, end, and edge distances for Rothoblaas screws installed in the narrow face of CLT panels shall comply with the specifications outlined in ETA-11/0030.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

TENSION[1]

geometry				thread withdrawal α = 90°				thread withdrawal α = 45°				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				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]
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	19,18
	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	24,17
	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	31,08
	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	

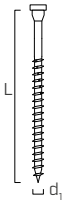
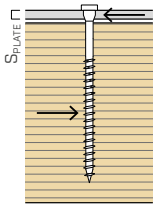
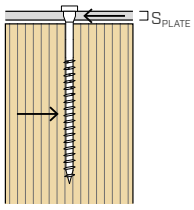
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 12.

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]
	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	1,62	1,82	0,76	0,91	1,07	1,20
8	100	*4*	75	25	1,40	1,60	1,78	1,93	0,86	1,03	1,20	1,35
0.32	120	*4 3/4*	95	25	1,41	1,60	1,78	1,93	0,95	1,14	1,34	1,50
	140	*5 1/2*	110	30	1,47	1,67	1,86	2,02	1,09	1,30	1,52	1,71
	160	*6 1/4*	130	30	1,47	1,67	1,86	2,02	1,18	1,42	1,60	1,74
	80	*3 1/8*	60	20	1,40	1,68	1,96	2,20	0,90	1,07	1,25	1,41
	100	*4*	75	25	1,68	2,01	2,23	2,42	1,05	1,26	1,47	1,65
10	120	*4 3/4*	95	25	1,77	2,01	2,23	2,42	1,16	1,39	1,63	1,83
0.40	140	*5 1/2*	110	30	1,84	2,09	2,33	2,53	1,32	1,58	1,84	2,07
	160	*6 1/4*	130	30	1,84	2,09	2,33	2,53	1,43	1,71	2,00	2,18
	180	*7 1/8*	150	30	1,84	2,09	2,33	2,53	1,54	1,78	2,00	2,18
	100	*4*	75	25	1,93	2,32	2,70	3,01	1,21	1,46	1,70	1,91
	120	*4 3/4*	90	30	2,25	2,60	2,89	3,14	1,39	1,67	1,94	2,18
12	140	*5 1/2*	110	30	2,29	2,60	2,89	3,14	1,52	1,82	2,12	2,38
0.48	160	*6 1/4*	120	40	2,45	2,79	3,11	3,39	1,74	2,09	2,43	2,73
	180	*7 1/8*	140	40	2,45	2,79	3,11	3,39	1,87	2,24	2,61	2,93
	200	*8*	160	40	2,45	2,79	3,11	3,39	1,99	2,39	2,69	2,93

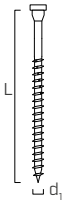
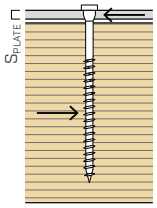
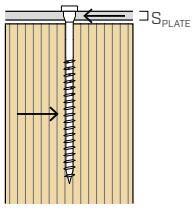
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 12.

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*		2,51	2,85	3,18	3,46	1,36	1,53	1,70	1,84	2,37	2,70	3,01	3,27
	80	*3 1/8*		2,79	3,18	3,57	3,89	1,47	1,67	1,86	2,01	2,63	3,00	3,36	3,66
8	100	*4*		3,27	3,75	4,12	4,40	1,69	1,93	2,15	2,34	3,09	3,54	3,96	4,24
0.32	120	*4 3/4*		3,64	4,05	4,44	4,75	1,91	2,18	2,45	2,67	3,51	3,91	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,10	2,40	2,70	2,94	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,32	2,65	2,91	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,45	3,94	4,41	4,80	1,83	2,08	2,31	2,50	3,26	3,72	4,16	4,53
	100	*4*		3,96	4,54	5,10	5,45	2,06	2,34	2,62	2,84	3,74	4,29	4,82	5,25
10	120	*4 3/4*	3,2	4,52	5,02	5,50	5,89	2,32	2,65	2,97	3,24	4,30	4,84	5,31	5,68
0.40	140	*5 1/2*	*1/8*	4,74	5,29	5,80	6,22	2,55	2,92	3,28	3,58	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,82	3,23	3,61	3,87	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	3,08	3,47	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,78	5,47	6,14	6,69	2,52	2,86	3,18	3,46	4,52	5,17	5,80	6,32
	120	*4 3/4*		5,38	6,17	6,80	7,27	2,78	3,17	3,54	3,85	5,09	5,83	6,55	7,01
12	140	*5 1/2*		5,97	6,65	7,28	7,80	3,09	3,53	3,96	4,32	5,74	6,41	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,31	3,79	4,26	4,65	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,62	4,16	4,66	5,00	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,93	4,47	4,90	5,26	6,67	7,47	8,23	8,85
	60	*2 3/8*		2,47	2,81	3,13	3,40	1,29	1,51	1,68	1,81	2,34	2,66	2,96	3,21
	80	*3 1/8*		2,75	3,14	3,51	3,83	1,46	1,65	1,84	1,99	2,59	2,96	3,31	3,60
8	100	*4*		3,23	3,71	4,12	4,40	1,68	1,91	2,13	2,32	3,05	3,50	3,93	4,24
0.32	120	*4 3/4*		3,64	4,05	4,44	4,75	1,89	2,16	2,43	2,64	3,51	3,91	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,08	2,39	2,68	2,93	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,30	2,64	2,91	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,41	3,88	4,35	4,73	1,81	2,05	2,28	2,47	3,22	3,67	4,11	4,47
	100	*4*		3,92	4,49	5,04	5,45	2,04	2,32	2,59	2,82	3,70	4,24	4,76	5,19
10	120	*4 3/4*	6,4	4,50	5,02	5,50	5,89	2,31	2,63	2,95	3,21	4,26	4,84	5,31	5,68
0.40	140	*5 1/2*	*1/4*	4,74	5,29	5,80	6,22	2,53	2,90	3,26	3,55	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,80	3,21	3,61	3,87	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	3,06	3,47	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,73	5,41	6,07	6,61	2,50	2,83	3,16	3,42	4,48	5,12	5,73	6,25
	120	*4 3/4*		5,33	6,11	6,80	7,27	2,76	3,14	3,51	3,82	5,04	5,78	6,49	7,01
12	140	*5 1/2*		5,97	6,65	7,28	7,80	3,07	3,51	3,93	4,29	5,69	6,41	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,29	3,77	4,23	4,62	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,60	4,13	4,65	5,00	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,91	4,47	4,90	5,26	6,67	7,47	8,23	8,85

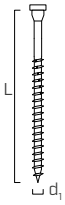
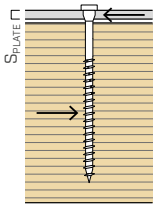
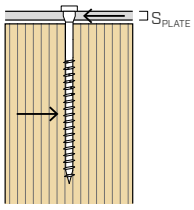
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 12.

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*		2,41	2,74	3,05	3,31	1,21	1,45	1,64	1,78	2,29	2,59	2,89	3,13
	80	*3 1/8*		2,71	3,09	3,46	3,77	1,44	1,63	1,82	1,97	2,56	2,92	3,26	3,55
8	100	*4*		3,19	3,66	4,11	4,40	1,66	1,89	2,11	2,29	3,02	3,46	3,88	4,24
0.32	120	*4 3/4*		3,64	4,05	4,44	4,75	1,88	2,15	2,40	2,62	3,48	3,91	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,07	2,37	2,66	2,90	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,28	2,62	2,91	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,36	3,83	4,28	4,66	1,80	2,03	2,26	2,45	3,18	3,62	4,05	4,41
	100	*4*		3,87	4,43	4,98	5,43	2,02	2,30	2,57	2,79	3,66	4,19	4,70	5,13
10	120	*4 3/4*	9,5	4,46	5,02	5,50	5,89	2,29	2,61	2,92	3,18	4,22	4,84	5,31	5,68
0.40	140	*5 1/2*	*3/8*	4,74	5,29	5,80	6,22	2,52	2,88	3,23	3,52	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,78	3,19	3,59	3,87	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	3,05	3,47	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,68	5,35	6,00	6,53	2,48	2,81	3,13	3,39	4,43	5,06	5,67	6,18
	120	*4 3/4*		5,28	6,05	6,80	7,27	2,74	3,12	3,49	3,79	5,00	5,72	6,43	7,01
12	140	*5 1/2*		5,96	6,65	7,28	7,80	3,05	3,49	3,90	4,25	5,65	6,41	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,27	3,74	4,20	4,59	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,58	4,11	4,62	5,00	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,89	4,47	4,90	5,26	6,67	7,47	8,23	8,85
	60	*2 3/8*		2,34	2,65	2,95	3,19	1,14	1,36	1,59	1,72	2,21	2,51	2,79	3,02
	80	*3 1/8*		2,67	3,04	3,40	3,71	1,43	1,61	1,79	1,94	2,52	2,88	3,21	3,50
8	100	*4*		3,16	3,62	4,06	4,40	1,65	1,87	2,09	2,27	2,98	3,42	3,84	4,19
0.32	120	*4 3/4*		3,64	4,05	4,44	4,75	1,86	2,13	2,38	2,60	3,45	3,91	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,05	2,35	2,64	2,88	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,27	2,61	2,91	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,32	3,78	4,22	4,59	1,78	2,01	2,23	2,42	3,14	3,57	3,99	4,34
	100	*4*		3,83	4,38	4,92	5,36	2,01	2,28	2,54	2,76	3,62	4,14	4,65	5,07
10	120	*4 3/4*	12,7	4,41	5,02	5,50	5,89	2,27	2,59	2,90	3,16	4,18	4,80	5,31	5,68
0.40	140	*5 1/2*	*1/2*	4,74	5,29	5,80	6,22	2,50	2,86	3,21	3,50	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,76	3,17	3,56	3,87	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	3,03	3,47	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,63	5,29	5,93	6,46	2,46	2,78	3,10	3,36	4,39	5,01	5,61	6,10
	120	*4 3/4*		5,23	5,99	6,73	7,27	2,72	3,10	3,46	3,76	4,95	5,67	6,37	6,95
12	140	*5 1/2*		5,91	6,65	7,28	7,80	3,03	3,46	3,88	4,22	5,60	6,41	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,25	3,72	4,17	4,55	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,56	4,09	4,59	5,00	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,87	4,45	4,90	5,26	6,67	7,47	8,23	8,85

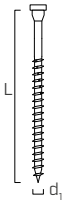
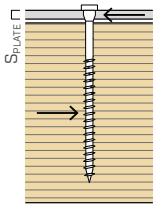
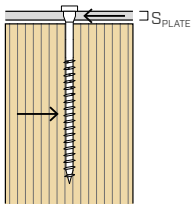
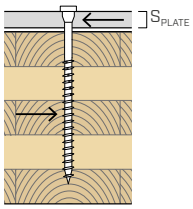
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 12.

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*		2,26	2,56	2,84	3,08	1,06	1,27	1,48	1,66	2,14	2,42	2,69	2,91
	80	*3 1/8*		2,63	3,00	3,35	3,65	1,41	1,60	1,77	1,92	2,49	2,83	3,17	3,44
8	100	*4*		3,12	3,57	4,01	4,37	1,63	1,85	2,07	2,25	2,95	3,38	3,79	4,13
0.32	120	*4 3/4*		3,60	4,05	4,44	4,75	1,85	2,11	2,36	2,57	3,41	3,91	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,04	2,33	2,62	2,85	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,25	2,59	2,91	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,27	3,72	4,16	4,52	1,76	1,99	2,21	2,39	3,10	3,53	3,94	4,28
	100	*4*		3,78	4,33	4,85	5,29	1,99	2,26	2,52	2,73	3,58	4,10	4,59	5,01
10	120	*4 3/4*	15,9	4,37	5,02	5,50	5,89	2,25	2,57	2,87	3,13	4,14	4,75	5,31	5,68
0.40	140	*5 1/2*	*5/8*	4,74	5,29	5,80	6,22	2,48	2,84	3,18	3,47	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,75	3,15	3,54	3,86	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	3,01	3,46	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,58	5,23	5,85	6,38	2,44	2,76	3,07	3,33	4,34	4,95	5,54	6,03
	120	*4 3/4*		5,18	5,93	6,66	7,27	2,70	3,07	3,43	3,73	4,90	5,61	6,30	6,88
12	140	*5 1/2*		5,86	6,65	7,28	7,80	3,01	3,44	3,85	4,19	5,56	6,38	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,23	3,70	4,15	4,52	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,54	4,06	4,56	4,99	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,85	4,43	4,90	5,26	6,67	7,47	8,23	8,85
	60	*2 3/8*		2,18	2,47	2,74	2,96	0,98	1,18	1,38	1,54	2,07	2,34	2,59	2,80
	80	*3 1/8*		2,59	2,95	3,30	3,59	1,40	1,58	1,75	1,90	2,46	2,79	3,12	3,39
8	100	*4*		3,08	3,52	3,95	4,31	1,61	1,83	2,05	2,22	2,92	3,34	3,74	4,08
0.32	120	*4 3/4*		3,56	4,05	4,44	4,75	1,83	2,09	2,34	2,55	3,38	3,88	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,02	2,31	2,59	2,83	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,24	2,57	2,89	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,23	3,67	4,10	4,45	1,71	1,97	2,18	2,36	3,06	3,48	3,88	4,22
	100	*4*		3,74	4,27	4,79	5,22	1,97	2,24	2,49	2,70	3,54	4,05	4,53	4,94
10	120	*4 3/4*	19,1	4,32	4,96	5,50	5,89	2,24	2,55	2,85	3,10	4,10	4,70	5,29	5,68
0.40	140	*5 1/2*	*3/4*	4,74	5,29	5,80	6,22	2,46	2,81	3,16	3,44	4,58	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,73	3,13	3,51	3,84	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	2,99	3,44	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,53	5,17	5,78	6,30	2,42	2,74	3,04	3,30	4,30	4,90	5,48	5,96
	120	*4 3/4*		5,13	5,87	6,59	7,19	2,68	3,05	3,40	3,69	4,86	5,56	6,24	6,81
12	140	*5 1/2*		5,81	6,65	7,28	7,80	2,99	3,41	3,82	4,16	5,51	6,33	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,21	3,67	4,12	4,49	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,52	4,04	4,54	4,95	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,83	4,40	4,90	5,26	6,67	7,47	8,23	8,85

α = screw-to-grain angle

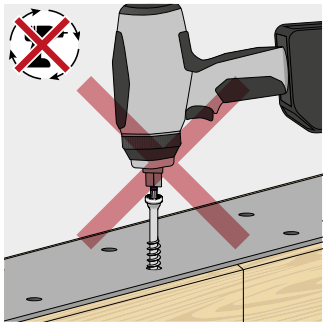
NOTES and **GENERAL PRINCIPLES** on page 12.

geometry				SHEAR[4]											
				steel-to-timber α = 90°				steel-to-timber α = 0°				steel-to-timber α = 90°			
															
d_1	L		S_{PLATE}	factored lateral resistance N_r				factored lateral resistance N_r[2] [3]				factored lateral resistance N_r			
				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*		2,11	2,38	2,63	2,85	0,91	1,09	1,27	1,43	1,99	2,25	2,49	2,69
	80	*3 1/8*		2,56	2,91	3,24	3,53	1,38	1,56	1,73	1,87	2,42	2,75	3,07	3,34
8	100	*4*		3,04	3,48	3,90	4,25	1,60	1,82	2,02	2,20	2,88	3,29	3,69	4,03
0.32	120	*4 3/4*		3,53	4,05	4,44	4,75	1,82	2,07	2,32	2,52	3,34	3,84	4,28	4,59
	140	*5 1/2*		3,82	4,26	4,68	5,01	2,01	2,29	2,57	2,81	3,69	4,12	4,52	4,85
	160	*6 1/4*		4,07	4,55	5,00	5,36	2,22	2,55	2,87	3,12	3,94	4,40	4,84	5,20
	80	*3 1/8*		3,15	3,58	3,99	4,33	1,62	1,93	2,14	2,31	2,99	3,39	3,78	4,10
	100	*4*		3,69	4,22	4,73	5,15	1,95	2,21	2,47	2,68	3,50	4,00	4,48	4,88
10	120	*4 3/4*	22,2	4,28	4,91	5,50	5,89	2,22	2,53	2,82	3,07	4,06	4,66	5,23	5,68
0.40	140	*5 1/2*	*7/8*	4,74	5,29	5,80	6,22	2,44	2,79	3,13	3,41	4,54	5,11	5,61	6,01
	160	*6 1/4*		5,05	5,64	6,20	6,66	2,71	3,11	3,49	3,81	4,89	5,46	6,01	6,45
	180	*7 1/8*		5,36	6,00	6,60	7,09	2,97	3,42	3,81	4,09	5,19	5,82	6,41	6,89
	100	*4*		4,48	5,11	5,71	6,22	2,40	2,71	3,01	3,26	4,25	4,84	5,41	5,89
	120	*4 3/4*		5,08	5,81	6,52	7,11	2,66	3,02	3,37	3,66	4,81	5,51	6,18	6,74
12	140	*5 1/2*		5,76	6,62	7,28	7,80	2,97	3,39	3,79	4,13	5,47	6,27	7,03	7,53
0.48	160	*6 1/4*		6,15	6,86	7,52	8,06	3,19	3,65	4,09	4,46	5,94	6,63	7,27	7,80
	180	*7 1/8*		6,52	7,28	8,00	8,59	3,50	4,01	4,51	4,92	6,31	7,05	7,75	8,32
	200	*8*		6,89	7,71	8,48	9,12	3,81	4,38	4,90	5,26	6,67	7,47	8,23	8,85

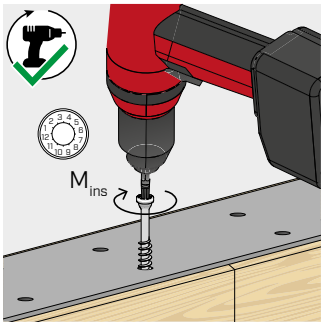
α = screw-to-grain angle

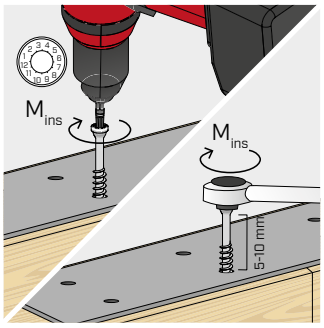
NOTES and GENERAL PRINCIPLES on page 12.

INSTALLATION



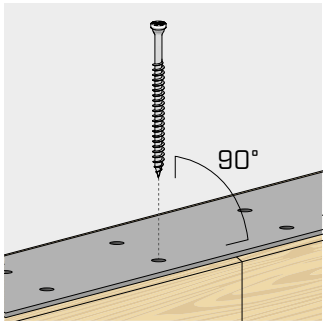
The use of pulse screw guns/impact wrenches is not permitted.



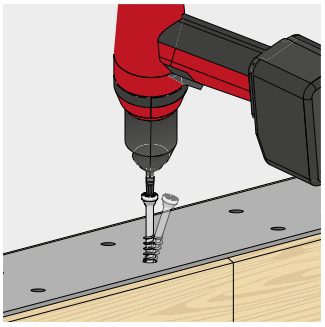


Ensure correct tightening.
We recommend the use of torque-controlled screwdrivers, e.g. with TORQUE LIMITER. Alternatively, tighten with a torque wrench.

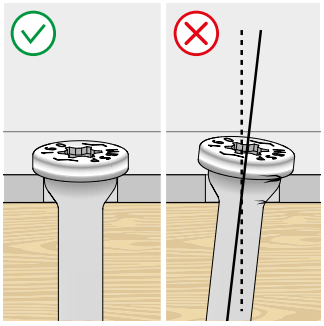
HBSPL	d_1 [mm]	$M_{ins,rec}$ [Nm]
Ø8	8	20
Ø10	10	30
Ø12	12	40



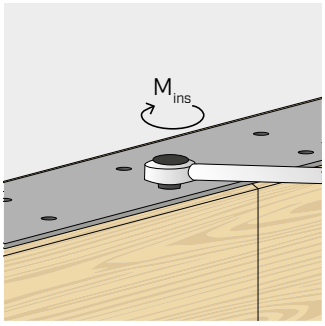
Respect the insertion angle. For very precise inclinations, the use of guide holes or pre-drilling is recommended.



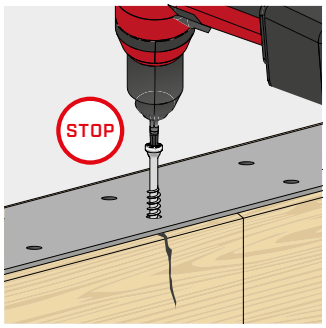
Avoid bending.



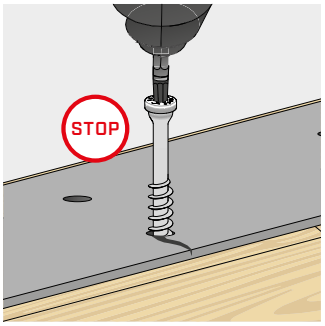
Ensure full contact between the entire surface of the screw head and the metal element



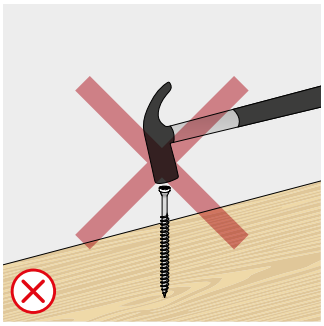
After installation, the fasteners can be inspected using a torque wrench.



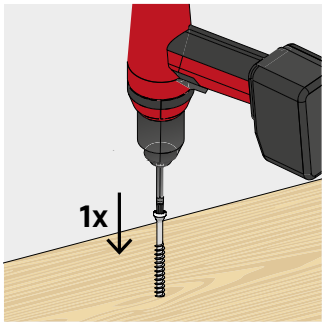
Stop installation if damage to the fastener or timber is noticed.



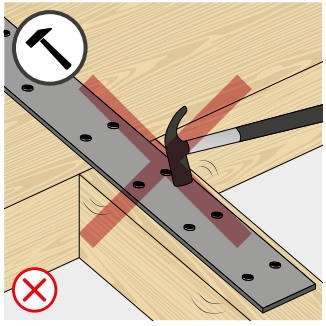
Stop installation if damage to the fastener or metal plates is noticed.



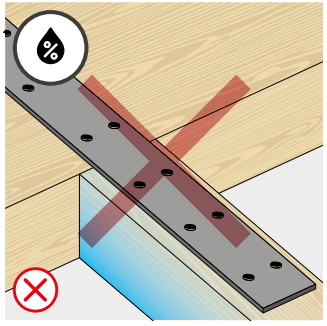
Do not hammer the screw tips into the timber.



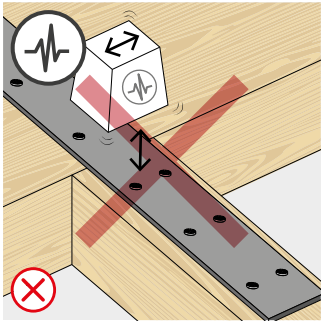
Install screws in one continuous stroke.



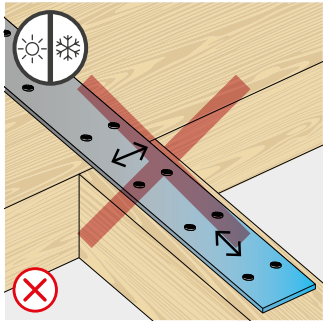
Avoid accidental stress during installation.



Protect the connection and avoid moisture changes and shrinkage and swelling of the timber.



Use not permitted for dynamic loads.



Avoid dimensional changes to the metal.

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.
- 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 ($4d_1$) or the main member ($8d_1$). Engineering discretion and judgment should be applied to evaluate the potential impact of reduced penetration on the connection's load-carrying capacity.
- HBSP 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. 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).