TBS

FLANGE HEAD SCREW

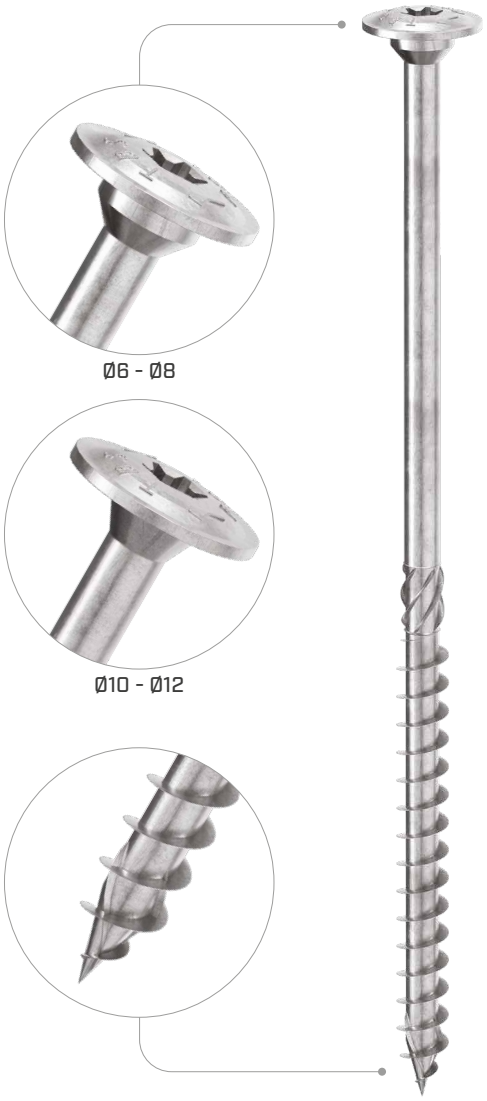
ELC-4645 ESR-4645 UKTA-0836 22/6195 ETA-11/0030

INTEGRATED WASHER
The flange head serves as washer and ensures high head strength and pull-through. Ideal in the presence of wind or variations in timber dimensions.

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.

NEW-GENERATION WOODS
Tested and certified for use on a wide variety of engineered timbers such as CLT, GL, LVL, OSB and Beech LVL. Extremely versatile, the TBS screw guarantees the use of new-generation woods for the creation of increasingly innovative and sustainable structures.

FAST
With the 3 THORNS tip, screw grip becomes more reliable and faster, while maintaining the usual mechanical performance. More speed, less effort.



BIT INCLUDED

DIAMETER [mm]	6 **6 – 12** 16
LENGTH [mm]	40 **40 – 1000** 1000
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.

FIELDS OF USE
- timber based panels
- fibreboard and MDF panels
- solid timber and glulam
- CLT and LVL
- high density woods

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

rothoblaas

SECONDARY BEAMS

Ideal for fastening joists to sill beams to achieve high wind uplift resistance. The flange head guarantees excellent tensile strength which means the use of additional lateral fastening systems can be avoided.

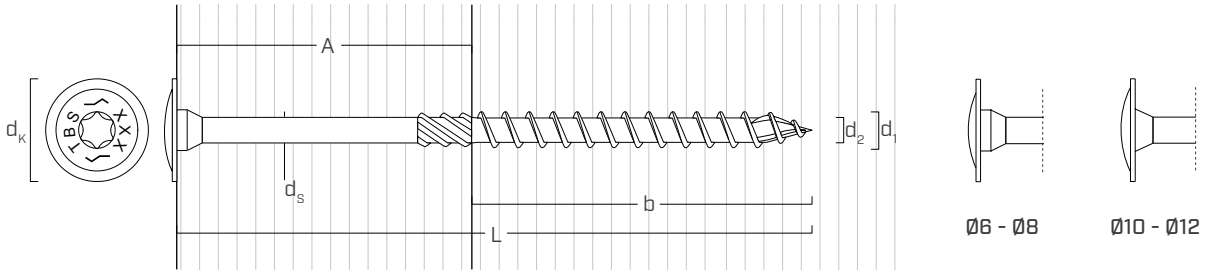
I-JOIST

Values also tested, certified and calculated for CLT and high density woods such as LVL.

Fastening SIP panels with 8 mm diameter TBS screws.

Fastening CLT walls with TBS screws.

GEOMETRY AND MECHANICAL CHARACTERISTICS



GEOMETRY

Nominal diameter	**d_1**	**[mm]**	**6**	**8**	**10**	**12**
Head diameter	d_K	[mm]	15,50	19,00	25,00	29,00
Root diameter	d_2	[mm]	3,95	5,40	6,40	6,80
Shank diameter	d_S	[mm]	4,30	5,80	7,00	8,00
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	4,0	5,0	6,0	7,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	4,0	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]**		**6**	**8**	**10**	**12**
Factored tensile strength	Φf_u	[kN]		8,56	14,70	19,51	22,11
Bending yield strength	F_{yb}	[MPa]		1188	1047	1080	1114
Factored shear strength of the screw	Φv_s	[kN]		4,71	8,79	12,35	13,95
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	52,38	69,83	87,29	104,75
			G=0.42	60,60	80,80	101,00	121,20
			G=0.49	68,55	91,40	114,26	137,11
			G=0.55	75,19	100,25	125,32	150,38
Specified head pull-through resistance per screw	F_{pt}	[kN]	G=0.35	1,79	2,51	3,85	4,78
			G=0.42	2,15	3,01	4,62	5,74
			G=0.49	2,50	3,51	5,39	6,69
			G=0.55	2,81	3,94	6,05	7,51

CODES AND DIMENSIONS

d_1 [mm]	d_K [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
6 TX 30	15,5	TBS660	60	40	20	100
		TBS670	70	40	30	100
		TBS680	80	50	30	100
		TBS690	90	50	40	100
		TBS6100	100	60	40	100
		TBS6120	120	75	45	100
		TBS6140	140	75	65	100
		TBS6160	160	75	85	100
		TBS6180	180	75	105	100
		TBS6200	200	75	125	100
		TBS6220	220	100	120	100
		TBS6240	240	100	140	100
		TBS6260	260	100	160	100
		TBS6280	280	100	180	100
		TBS6300	300	100	200	100
		TBS6320	320	100	220	100
		TBS6360	360	100	260	100
		TBS6400	400	100	300	100
8 TX 40	19,0	TBS840	40	32	8	100
		TBS860	60	52	8	100
		TBS880	80	52	28	50
		TBS8100	100	52	48	50
		TBS8120	120	80	40	50
		TBS8140	140	80	60	50
		TBS8160	160	100	60	50
		TBS8180	180	100	80	50
		TBS8200	200	100	100	50
		TBS8220	220	100	120	50
		TBS8240	240	100	140	50
		TBS8260	260	100	160	50
		TBS8280	280	100	180	50
		TBS8300	300	100	200	50
		TBS8320	320	100	220	50
		TBS8340	340	100	240	50
		TBS8360	360	100	260	50
		TBS8380	380	100	280	50
		TBS8400	400	100	300	50
		TBS8440	440	100	340	50
		TBS8480	480	100	380	50
		TBS8520	520	100	420	50
		TBS8560	560	100	460	50
		TBS8580	580	100	480	50
		TBS8600	600	100	500	50

d_1 [mm]	d_K [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
10 TX 50	25,0	TBS10100	100	52	48	50
		TBS10120	120	60	60	50
		TBS10140	140	60	80	50
		TBS10160	160	80	80	50
		TBS10180	180	80	100	50
		TBS10200	200	100	100	50
		TBS10220	220	100	120	50
		TBS10240	240	100	140	50
		TBS10260	260	100	160	50
		TBS10280	280	100	180	50
		TBS10300	300	100	200	50
		TBS10320	320	120	200	50
		TBS10340	340	120	220	50
		TBS10360	360	120	240	50
		TBS10380	380	120	260	50
		TBS10400	400	120	280	50
		TBS10440	440	120	320	50
		TBS10480	480	120	360	50
		TBS10520	520	120	400	50
		TBS10560	560	120	440	50
		TBS10600	600	120	480	50
12 TX 50	29,0	TBS12200	200	120	80	25
		TBS12240	240	120	120	25
		TBS12280	280	120	160	25
		TBS12320	320	120	200	25
		TBS12360	360	120	240	25
		TBS12400	400	140	260	25
		TBS12440	440	140	300	25
		TBS12480	480	140	340	25
		TBS12520	520	140	380	25
		TBS12560	560	140	420	25
		TBS12600	600	140	460	25
		TBS12800	800	160	640	25
		TBS121000	1000	160	840	25

RELATED PRODUCTS

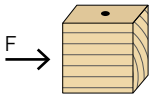
TBS MAX

XYLOFON WASHER

TORQUE LIMITER

MINIMUM DISTANCES FOR SHEAR LOADS | TIMBER

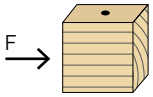
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



d_1		6 [mm]	*0.24 [in]*	8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	**12·d‡**	72	*2 13/16*	96	*3 3/4*	120	*4 3/4*	144	*5 11/16*
S_Q	**5·d**	30	*1 3/16*	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*
a_L	**15·d‡**	90	*3 1/2*	120	*4 3/4*	150	*6*	180	*7 1/8*
a	**10·d‡**	60	*2 3/8*	80	*3 1/8*	100	*4*	120	*4 3/4*
e_Q	**10·d**	60	*2 3/8*	80	*3 1/8*	100	*4*	120	*4 3/4*
e_P	**5·d**	30	*1 3/16*	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*

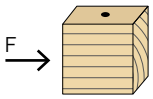
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



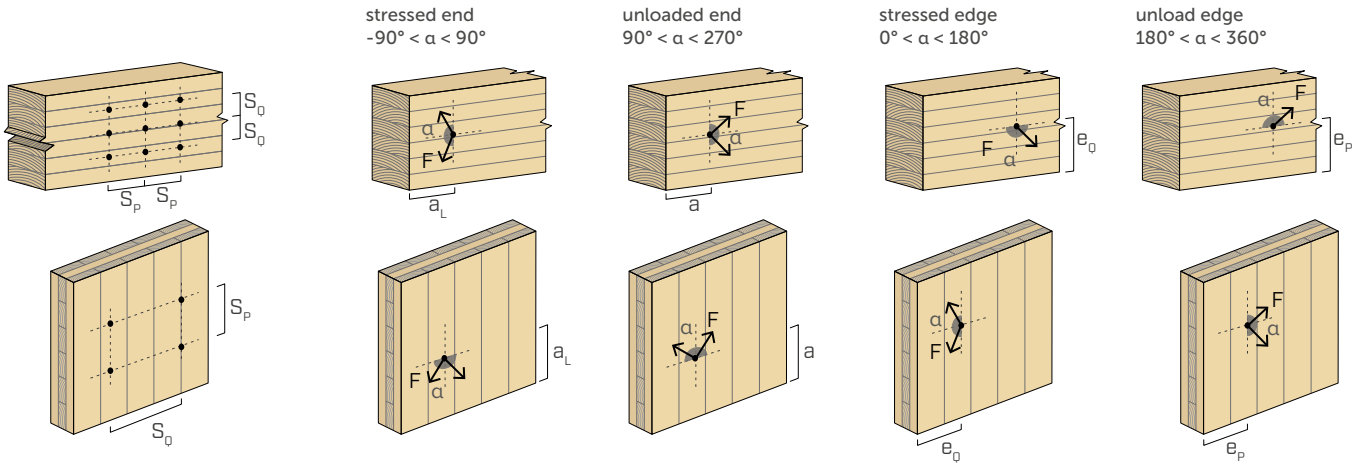
d_1		6 [mm]	*0.24 [in]*	8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	**18·d**	108	*4 1/4*	144	*5 11/16*	180	*7 1/8*	216	*8 1/2*
S_Q	**7·d**	42	*1 5/8*	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
a_L	**22·d**	132	*5 3/16*	176	*6 15/16*	220	*8 5/8*	264	*10 3/8*
a	**15·d**	90	*3 1/2*	120	*4 3/4*	150	*6*	180	*7 1/8*
e_Q	**12·d**	72	*2 13/16*	96	*3 3/4*	120	*4 3/4*	*144*	*5 11/16*
e_P	**7·d**	42	*1 5/8*	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*

screws inserted **WITH pre-drilled hole**



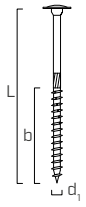
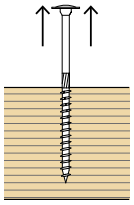
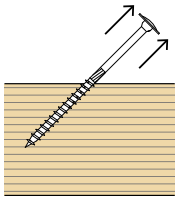
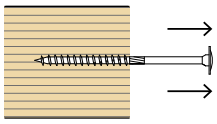
d_1		6 [mm]	*0.24 [in]*	8 [mm]	*0.32 [in]*	10 [mm]	*0.40 [in]*	12 [mm]	*0.48 [in]*
S_P	**5·d†**	30	*1 3/16*	40	*1 9/16*	50	*1 15/16*	60	*2 3/8*
S_Q	**4·d**	24	*15/16*	32	*1 1/4*	40	*1 9/16*	48	*1 7/8*
a_L	**12·d†**	72	*2 13/16*	96	*3 3/4*	120	*4 3/4*	144	*5 11/16*
a	**7·d†**	42	*1 5/8*	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
e_Q	**7·d**	42	*1 5/8*	56	*2 3/16*	70	*2 3/4*	84	*3 5/16*
e_P	**3·d**	18	*11/16*	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



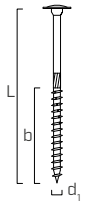
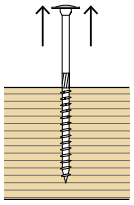
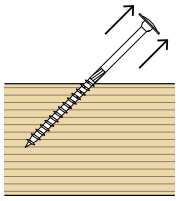
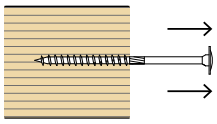
NOTES

- 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								end grain				
			α = 90°				α = 45°				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]
6 *0.24*	60	*2 3/8*	40	1,25	1,44	1,63	1,79	1,13	1,31	1,48	1,63	0,62	0,72	0,82	0,89	8,56
	70	*2 3/4*	40	1,25	1,44	1,63	1,79	1,13	1,31	1,48	1,63	0,62	0,72	0,82	0,89	
	80	*3 1/8*	50	1,61	1,87	2,11	2,32	1,47	1,70	1,92	2,11	0,81	0,93	1,06	1,16	
	90	*3 1/2*	50	1,61	1,87	2,11	2,32	1,47	1,70	1,92	2,11	0,81	0,93	1,06	1,16	
	100	*4*	60	1,98	2,29	2,59	2,84	1,80	2,08	2,36	2,58	0,99	1,15	1,30	1,42	
	120	*4 3/4*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	140	*5 1/2*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	160	*6 1/4*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	180	*7 1/8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	200	*8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	220	*8 5/8*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	240	*9 1/2*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	260	*10 1/4*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	280	*11*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	300	*11 3/4*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	320	*12 5/8*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	360	*14 1/4*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
	400	*15 3/4*	100	3,45	3,99	4,51	4,95	3,13	3,62	4,10	4,50	1,72	1,99	2,26	2,47	
8 *0.32*	40	*1 9/16*	32	1,17	1,36	1,54	1,68	1,07	1,23	1,40	1,53	0,59	0,68	0,77	0,84	14,7
	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	
	80	*3 1/8*	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	
	100	*4*	52	2,15	2,49	2,82	3,09	1,96	2,26	2,56	2,81	1,08	1,24	1,41	1,54	
	120	*4 3/4*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	140	*5 1/2*	80	3,52	4,07	4,61	5,05	3,20	3,70	4,19	4,59	1,76	2,04	2,30	2,53	
	160	*6 1/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	180	*7 1/8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	200	*8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	220	*8 5/8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	240	*9 1/2*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	260	*10 1/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	280	*11*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	300	*11 3/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	320	*12 5/8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	340	*13 3/8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	360	*14 1/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	380	*15*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	400	*15 3/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	440	*17 1/4*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	480	*19*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	520	*20 1/2*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	560	*22*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	580	*22 13/16*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	
	600	*23 5/8*	100	4,50	5,20	5,89	6,46	4,09	4,73	5,35	5,87	2,25	2,60	2,94	3,23	

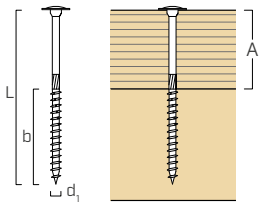
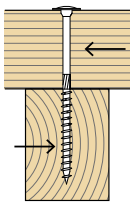
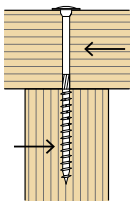
α = screw-to-grain angle

TENSION[1]

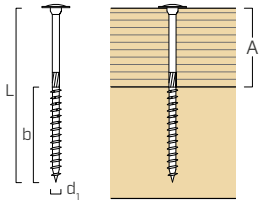
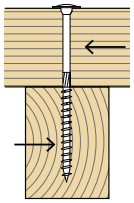
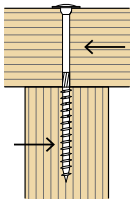
geometry				thread withdrawal α = 90°				thread withdrawal α = 45°				thread withdrawal end grain α = 0°				steel tension
																
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}[2][3]				factored tension resistance T_{rs}
d_1	L		b	G				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]
10 *0.40*	100	*4*	52	2,57	2,97	3,36	3,68	2,33	2,70	3,05	3,35	1,28	1,48	1,68	1,84	19,51
	120	*4 3/4*	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	
	140	*5 1/2*	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	
	160	*6 1/4*	80	4,28	4,95	5,60	6,14	3,89	4,50	5,09	5,58	2,14	2,47	2,80	3,07	
	180	*7 1/8*	80	4,28	4,95	5,60	6,14	3,89	4,50	5,09	5,58	2,14	2,47	2,80	3,07	
	200	*8*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	220	*8 5/8*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	240	*9 1/2*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	260	*10 1/4*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	280	*11*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	300	*11 3/4*	100	5,50	6,36	7,20	7,90	5,00	5,78	6,55	7,18	2,75	3,18	3,60	3,95	
	320	*12 5/8*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	340	*13 3/8*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	360	*14 1/4*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	380	*15*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	400	*15 3/4*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	440	*17 1/4*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	480	*19*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	520	*20 1/2*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	560	*22*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
	600	*23 5/8*	120	6,72	7,78	8,80	9,65	6,11	7,07	8,00	8,77	3,36	3,89	4,40	4,82	
12 *0.48*	200	*8*	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	22,11
	240	*9 1/2*	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	
	280	*11*	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	
	320	*12 5/8*	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	
	360	*14 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	
	400	*15 3/4*	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	
	440	*17 1/4*	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	
	480	*19*	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	
	520	*20 1/2*	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	
	560	*22*	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	
	600	*23 5/8*	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	
	800	*31 1/2*	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	
	1000	*39 3/8*	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 14.

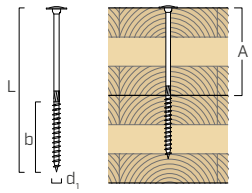
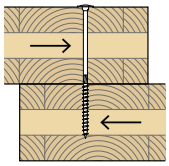
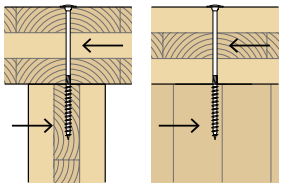
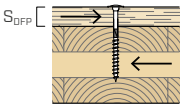
geometry					SHEAR[4]							
					timber-to-timber α = 90°				timber-to-timber α = 0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r[2] [3]			
d_1	L		b	A[5]	G				G			
					0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*	40	20	0,90	1,07	1,23	1,37	0,51	0,60	0,70	0,78
	70	*2 3/4*	40	30	1,00	1,18	1,37	1,52	0,61	0,72	0,84	0,93
	80	*3 1/8*	50	30	1,10	1,27	1,43	1,57	0,69	0,82	0,95	1,06
	90	*3 1/2*	50	40	1,19	1,38	1,57	1,72	0,77	0,87	0,98	1,06
	100	*4*	60	40	1,19	1,38	1,57	1,72	0,85	0,97	1,09	1,19
	120	*4 3/4*	75	45	1,24	1,44	1,60	1,72	0,98	1,12	1,26	1,38
	140	*5 1/2*	75	65	1,29	1,45	1,60	1,72	0,98	1,12	1,26	1,38
	160	*6 1/4*	75	85	1,29	1,45	1,60	1,72	0,98	1,12	1,26	1,38
6	180	*7 1/8*	75	105	1,29	1,45	1,60	1,72	0,98	1,12	1,26	1,38
0.24	200	*8*	75	125	1,29	1,45	1,60	1,72	0,98	1,12	1,26	1,38
	220	*8 5/8*	100	120	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	240	*9 1/2*	100	140	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	260	*10 1/4*	100	160	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	280	*11*	100	180	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	300	*11 3/4*	100	200	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	320	*12 5/8*	100	220	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	360	*14 1/4*	100	260	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	400	*15 3/4*	100	300	1,29	1,45	1,60	1,72	1,05	1,19	1,31	1,42
	40	*1 9/16*	32	10	0,77	0,92	1,06	1,18	0,41	0,49	0,56	0,63
	60	*2 3/8*	52	15	1,16	1,39	1,62	1,82	0,66	0,79	0,91	1,01
	80	*3 1/8*	52	28	1,40	1,68	1,96	2,20	0,85	1,01	1,17	1,31
	100	*4*	52	48	1,64	1,97	2,29	2,58	1,09	1,28	1,43	1,55
	120	*4 3/4*	80	40	1,73	1,99	2,25	2,46	1,30	1,55	1,79	1,99
	140	*5 1/2*	80	60	1,97	2,28	2,54	2,73	1,44	1,64	1,84	2,00
	160	*6 1/4*	100	60	1,97	2,28	2,54	2,73	1,53	1,77	2,01	2,21
	180	*7 1/8*	100	80	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	200	*8*	100	100	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	220	*8 5/8*	100	120	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	240	*9 1/2*	100	140	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	260	*10 1/4*	100	160	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
8	280	*11*	100	180	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
0.32	300	*11 3/4*	100	200	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	320	*12 5/8*	100	220	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	340	*13 3/8*	100	240	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	360	*14 1/4*	100	260	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	380	*15*	100	280	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	400	*15 3/4*	100	300	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	440	*17 1/4*	100	340	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	480	*19*	100	380	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	520	*20 1/2*	100	420	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	560	*22*	100	460	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	580	*22 13/16*	100	480	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21
	600	*23 5/8*	100	500	2,06	2,31	2,54	2,73	1,53	1,77	2,01	2,21

α = screw-to-grain angle

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]
	100	*4*	52	48	2,04	2,43	2,80	3,13	1,29	1,53	1,77	1,98
	120	*4 3/4*	60	60	2,36	2,83	3,30	3,70	1,56	1,80	2,00	2,17
	140	*5 1/2*	60	80	2,64	3,08	3,48	3,82	1,59	1,80	2,00	2,17
	160	*6 1/4*	80	80	2,92	3,33	3,67	3,94	1,85	2,11	2,36	2,56
	180	*7 1/8*	80	100	2,95	3,33	3,67	3,94	1,85	2,11	2,36	2,56
	200	*8*	100	100	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
	220	*8 5/8*	100	120	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
	240	*9 1/2*	100	140	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
	260	*10 1/4*	100	160	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
	280	*11*	100	180	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
10	300	*11 3/4*	100	200	2,97	3,33	3,67	3,94	2,10	2,42	2,72	2,96
0.40	320	*12 5/8*	120	200	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	340	*13 3/8*	120	220	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	360	*14 1/4*	120	240	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	380	*15*	120	260	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	400	*15 3/4*	120	280	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	440	*17 1/4*	120	320	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	480	*19*	120	360	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	520	*20 1/2*	120	400	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	560	*22*	120	440	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	600	*23 5/8*	120	480	2,97	3,33	3,67	3,94	2,22	2,57	2,92	3,21
	200	*8*	120	80	3,48	3,99	4,40	4,74	2,63	3,05	3,46	3,81
	240	*9 1/2*	120	120	3,57	3,99	4,40	4,74	2,63	3,05	3,46	3,81
	280	*11*	120	160	3,57	3,99	4,40	4,74	2,63	3,05	3,46	3,81
	320	*12 5/8*	120	200	3,57	3,99	4,40	4,74	2,63	3,05	3,46	3,81
	360	*14 1/4*	120	240	3,57	3,99	4,40	4,74	2,63	3,05	3,46	3,81
	400	*15 3/4*	140	260	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
	440	*17 1/4*	140	300	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
12	480	*19*	140	340	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
0.48	520	*20 1/2*	140	380	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
	560	*22*	140	420	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
	600	*23 5/8*	140	460	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
	700	*27 1/2*	140	560	3,57	3,99	4,40	4,74	2,76	3,20	3,61	3,90
	800	*31 1/2*	160	640	3,57	3,99	4,40	4,74	2,89	3,26	3,61	3,90
	900	*35 1/2*	160	740	3,57	3,99	4,40	4,74	2,89	3,26	3,61	3,90
	1000	*39 3/8*	160	840	3,57	3,99	4,40	4,74	2,89	3,26	3,61	3,90

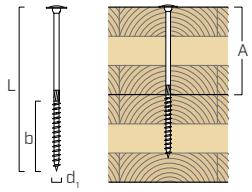
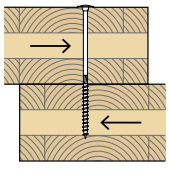
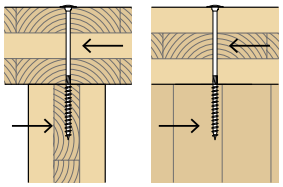
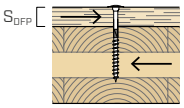
α = screw-to-grain angle

NOTES and **GENERAL PRINCIPLES** on page 14.

geometry					SHEAR[4]											
					CLT-CLT lateral face α = 90°				CLT-CLT α = 0°				spline joint lateral face α = 90°			
																
					factored lateral resistance N_r (6)				factored lateral resistance N_r (2)(3)					factored lateral resistance N_r		
d_1	L		b	A(6)	G				G				S_{DFP}	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]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*	40	35	0,70	0,84	0,97	1,08	0,48	0,58	0,65	0,70		1,00	1,13	1,27	1,35
	70	*2 3/4*	40	40	0,84	1,00	1,15	1,29	0,57	0,64	0,71	0,76		1,09	1,22	1,30	1,35
	80	*3 1/8*	50	45	0,97	1,16	1,33	1,45	0,61	0,69	0,76	0,83		1,23	1,30	1,33	1,35
	90	*3 1/2*	50	50	1,11	1,29	1,45	1,58	0,65	0,73	0,82	0,89		1,23	1,30	1,33	1,35
	100	*4*	60	55	1,17	1,36	1,54	1,66	0,69	0,78	0,87	0,95		1,26	1,30	1,33	1,35
	120	*4 3/4*	75	65	1,24	1,39	1,54	1,66	0,77	0,88	0,98	1,07		1,26	1,30	1,33	1,35
	140	*5 1/2*	75	75	1,24	1,39	1,54	1,66	0,85	0,97	1,09	1,19		1,26	1,30	1,33	1,35
	160	*6 1/4*	75	85	1,24	1,39	1,54	1,66	0,93	1,07	1,20	1,31		1,26	1,30	1,33	1,35
6	180	*7 1/8*	75	105	1,24	1,39	1,54	1,66	0,93	1,07	1,20	1,31	12,7	1,26	1,30	1,33	1,35
0.24	200	*8*	75	125	1,24	1,39	1,54	1,66	0,93	1,07	1,20	1,31	*1/2*	1,26	1,30	1,33	1,35
	220	*8 5/8*	100	120	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	240	*9 1/2*	100	140	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	260	*10 1/4*	100	160	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	280	*11*	100	180	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	300	*11 3/4*	100	200	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	320	*12 5/8*	100	220	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	360	*14 1/4*	100	260	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	400	*15 3/4*	100	300	1,24	1,39	1,54	1,66	1,01	1,14	1,27	1,37		1,26	1,30	1,33	1,35
	40	*1 9/16*	32	25	0,52	0,62	0,72	0,80	0,32	0,39	0,45	0,51		1,02	1,11	1,20	1,28
	60	*2 3/8*	52	35	0,86	1,02	1,18	1,32	0,59	0,70	0,82	0,91		1,48	1,64	1,73	1,81
	80	*3 1/8*	52	45	1,19	1,42	1,64	1,83	0,80	0,96	1,11	1,20		1,70	1,90	2,04	2,15
	100	*4*	52	55	1,52	1,82	2,10	2,35	1,00	1,13	1,26	1,36		1,91	2,09	2,14	2,18
	120	*4 3/4*	80	65	1,73	2,08	2,36	2,59	1,11	1,26	1,40	1,52		2,03	2,09	2,14	2,18
	140	*5 1/2*	80	75	1,91	2,21	2,44	2,62	1,21	1,38	1,54	1,67		2,03	2,09	2,14	2,18
	160	*6 1/4*	100	85	1,98	2,21	2,44	2,62	1,32	1,50	1,68	1,83		2,03	2,09	2,14	2,18
	180	*7 1/8*	100	95	1,98	2,21	2,44	2,62	1,39	1,61	1,82	1,98		2,03	2,09	2,14	2,18
	200	*8*	100	100	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	220	*8 5/8*	100	120	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	240	*9 1/2*	100	140	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	260	*10 1/4*	100	160	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
8	280	*11*	100	180	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10	19,1	2,03	2,09	2,14	2,18
0.32	300	*11 3/4*	100	200	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10	*3/4*	2,03	2,09	2,14	2,18
	320	*12 5/8*	100	220	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	340	*13 3/8*	100	240	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	360	*14 1/4*	100	260	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	380	*15*	100	280	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	400	*15 3/4*	100	300	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	440	*17 1/4*	100	340	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	480	*19*	100	380	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	520	*20 1/2*	100	420	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	560	*22*	100	460	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	580	*22 13/16*	100	480	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18
	600	*23 5/8*	100	500	1,98	2,21	2,44	2,62	1,45	1,68	1,91	2,10		2,03	2,09	2,14	2,18

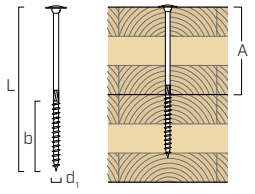
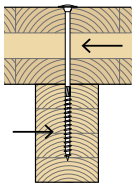
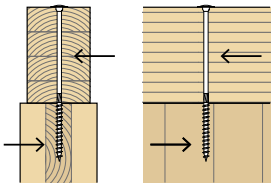
α = screw-to-grain angle

SHEAR[4]

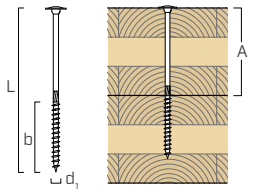
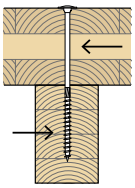
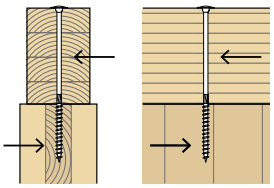
geometry					CLT-CLT lateral face α = 90°				CLT-CLT α = 0°				spline joint lateral face α = 90°				
																	
					factored lateral resistance N_r (6)				factored lateral resistance N_r (2)(3)					factored lateral resistance N_r			
d_1	L		b	A(6)	G				G				S_{DFP}	G			
					0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55		0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[mm] *[in]*	[kN]	[kN]	[kN]	[kN]
10 *0.40*	100	*4*	52	55	1,80	2,13	2,47	2,75	1,19	1,42	1,64	1,78	25,4 *1*	2,36	2,65	2,94	3,18
	120	*4 3/4*	60	60	2,19	2,63	3,06	3,44	1,44	1,71	1,90	2,06		2,74	3,05	3,18	3,23
	140	*5 1/2*	60	80	2,44	2,91	3,30	3,62	1,51	1,71	1,90	2,06		2,84	3,05	3,18	3,23
	160	*6 1/4*	80	80	2,69	3,20	3,53	3,80	1,76	2,01	2,24	2,44		3,02	3,10	3,18	3,23
	180	*7 1/8*	80	100	2,78	3,20	3,53	3,80	1,76	2,01	2,24	2,44		3,02	3,10	3,18	3,23
	200	*8*	100	100	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	220	*8 5/8*	100	120	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	240	*9 1/2*	100	140	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	260	*10 1/4*	100	160	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	280	*11*	100	180	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	300	*11 3/4*	100	200	2,86	3,20	3,53	3,80	2,00	2,31	2,58	2,82		3,02	3,10	3,18	3,23
	320	*12 5/8*	120	200	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	340	*13 3/8*	120	220	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	360	*14 1/4*	120	240	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	380	*15*	120	260	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	400	*15 3/4*	120	280	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	440	*17 1/4*	120	320	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	480	*19*	120	360	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	520	*20 1/2*	120	400	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	560	*22*	120	440	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
	600	*23 5/8*	120	480	2,86	3,20	3,53	3,80	2,10	2,44	2,77	3,05		3,02	3,10	3,18	3,23
12 *0.48*	200	*8*	120	105	3,43	3,84	4,23	4,56	2,28	2,61	2,92	3,18	25,4 *1*	3,60	3,70	3,78	3,84
	240	*9 1/2*	120	120	3,43	3,84	4,23	4,56	2,50	2,90	3,29	3,62		3,60	3,70	3,78	3,84
	280	*11*	120	160	3,43	3,84	4,23	4,56	2,50	2,90	3,29	3,62		3,60	3,70	3,78	3,84
	320	*12 5/8*	120	200	3,43	3,84	4,23	4,56	2,50	2,90	3,29	3,62		3,60	3,70	3,78	3,84
	360	*14 1/4*	120	240	3,43	3,84	4,23	4,56	2,50	2,90	3,29	3,62		3,60	3,70	3,78	3,84
	400	*15 3/4*	140	260	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	440	*17 1/4*	140	300	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	480	*19*	140	340	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	520	*20 1/2*	140	380	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	560	*22*	140	420	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	600	*23 5/8*	140	460	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	700	*27 1/2*	140	560	3,43	3,84	4,23	4,56	2,62	3,04	3,45	3,77		3,60	3,70	3,78	3,84
	800	*31 1/2*	160	640	3,43	3,84	4,23	4,56	2,73	3,15	3,49	3,77		3,60	3,70	3,78	3,84
	900	*35 1/2*	160	740	3,43	3,84	4,23	4,56	2,73	3,15	3,49	3,77		3,60	3,70	3,78	3,84
	1000	*39 3/8*	160	840	3,43	3,84	4,23	4,56	2,73	3,15	3,49	3,77		3,60	3,70	3,78	3,84

α = screw-to-grain angle

NOTES and **GENERAL PRINCIPLES** on page 14.

geometry					SHEAR[4]							
					CLT-timber lateral face α = 90°				timber-CLT narrow face α = 0°			
												
					factored lateral resistance N_r				factored lateral resistance N_r [2][3]			
					G				G			
d_1	L		b	A	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
	60	*2 3/8*	40	20	0,88	1,04	1,20	1,32	0,49	0,59	0,68	0,75
	70	*2 3/4*	40	30	0,97	1,15	1,33	1,46	0,59	0,70	0,81	0,89
	80	*3 1/8*	50	30	1,05	1,22	1,37	1,51	0,67	0,80	0,92	1,01
	90	*3 1/2*	50	40	1,14	1,32	1,50	1,64	0,73	0,84	0,93	1,01
	100	*4*	60	40	1,14	1,32	1,50	1,64	0,82	0,93	1,04	1,13
	120	*4 3/4*	75	45	1,19	1,37	1,56	1,69	0,93	1,07	1,21	1,32
	140	*5 1/2*	75	65	1,27	1,42	1,57	1,69	0,93	1,07	1,21	1,32
	160	*6 1/4*	75	85	1,27	1,42	1,57	1,69	0,93	1,07	1,21	1,32
6	180	*7 1/8*	75	105	1,27	1,42	1,57	1,69	0,93	1,07	1,21	1,32
0.24	200	*8*	75	125	1,27	1,42	1,57	1,69	0,93	1,07	1,21	1,32
	220	*8 5/8*	100	120	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	240	*9 1/2*	100	140	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	260	*10 1/4*	100	160	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	280	*11*	100	180	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	300	*11 3/4*	100	200	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	320	*12 5/8*	100	220	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	360	*14 1/4*	100	260	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	400	*15 3/4*	100	300	1,27	1,42	1,57	1,69	1,02	1,16	1,28	1,38
	40	*1 9/16*	32	10	0,79	0,93	1,07	1,19	0,40	0,48	0,55	0,62
	60	*2 3/8*	52	15	1,22	1,47	1,71	1,92	0,67	0,80	0,92	1,02
	80	*3 1/8*	52	28	1,37	1,64	1,91	2,15	0,83	0,98	1,14	1,27
	100	*4*	52	48	1,58	1,90	2,21	2,48	1,07	1,23	1,37	1,48
	120	*4 3/4*	80	40	1,66	1,91	2,15	2,36	1,26	1,50	1,73	1,92
	140	*5 1/2*	80	60	1,88	2,17	2,46	2,67	1,38	1,57	1,76	1,92
	160	*6 1/4*	100	60	1,88	2,17	2,46	2,67	1,46	1,69	1,92	2,11
	180	*7 1/8*	100	80	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	200	*8*	100	100	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	220	*8 5/8*	100	120	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	240	*9 1/2*	100	140	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	260	*10 1/4*	100	160	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
8	280	*11*	100	180	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
0.32	300	*11 3/4*	100	200	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	320	*12 5/8*	100	220	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	340	*13 3/8*	100	240	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	360	*14 1/4*	100	260	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	380	*15*	100	280	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	400	*15 3/4*	100	300	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	440	*17 1/4*	100	340	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	480	*19*	100	380	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	520	*20 1/2*	100	420	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	560	*22*	100	460	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	580	*22 13/16*	100	480	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11
	600	*23 5/8*	100	500	2,02	2,26	2,48	2,67	1,46	1,69	1,92	2,11

α = screw-to-grain angle

geometry				SHEAR[4]							
				CLT-timber lateral face α = 90°				timber-CLT narrow face α = 0°			
											
				factored lateral resistance N_r				factored lateral resistance N_r [2][3]			
				G				G			
d_1 [mm] *[in]*	L [mm]	L *[in]*	b [mm]	A [mm]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]	0.35 [kN]	0.42 [kN]	0.49 [kN]	0.55 [kN]
	100	*4*	52	48	1,98	2,35	2,71	3,02	1,26	1,49	1,73	1,92
	120	*4 3/4*	60	60	2,27	2,73	3,18	3,57	1,52	1,72	1,92	2,07
	140	*5 1/2*	60	80	2,53	3,03	3,45	3,79	1,52	1,72	1,92	2,07
	160	*6 1/4*	80	80	2,80	3,25	3,59	3,87	1,78	2,02	2,26	2,45
	180	*7 1/8*	80	100	2,91	3,26	3,59	3,87	1,78	2,02	2,26	2,45
	200	*8*	100	100	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
	220	*8 5/8*	100	120	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
	240	*9 1/2*	100	140	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
	260	*10 1/4*	100	160	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
	280	*11*	100	180	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
10 *0.40*	300	*11 3/4*	100	200	2,91	3,26	3,59	3,87	2,02	2,32	2,60	2,83
	320	*12 5/8*	120	200	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	340	*13 3/8*	120	220	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	360	*14 1/4*	120	240	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	380	*15*	120	260	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	400	*15 3/4*	120	280	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	440	*17 1/4*	120	320	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	480	*19*	120	360	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	520	*20 1/2*	120	400	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	560	*22*	120	440	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	600	*23 5/8*	120	480	2,91	3,26	3,59	3,87	2,12	2,45	2,78	3,06
	200	*8*	120	80	3,31	3,84	4,31	4,64	2,52	2,92	3,31	3,64
	240	*9 1/2*	120	120	3,49	3,91	4,31	4,64	2,52	2,92	3,31	3,64
	280	*11*	120	160	3,49	3,91	4,31	4,64	2,52	2,92	3,31	3,64
	320	*12 5/8*	120	200	3,49	3,91	4,31	4,64	2,52	2,92	3,31	3,64
	360	*14 1/4*	120	240	3,49	3,91	4,31	4,64	2,52	2,92	3,31	3,64
	400	*15 3/4*	140	260	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	440	*17 1/4*	140	300	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
12 *0.48*	480	*19*	140	340	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	520	*20 1/2*	140	380	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	560	*22*	140	420	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	600	*23 5/8*	140	460	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	700	*27 1/2*	140	560	3,49	3,91	4,31	4,64	2,63	3,06	3,47	3,80
	800	*31 1/2*	160	640	3,49	3,91	4,31	4,64	2,75	3,18	3,52	3,80
	900	*35 1/2*	160	740	3,49	3,91	4,31	4,64	2,75	3,18	3,52	3,80
	1000	*39 3/8*	160	840	3,49	3,91	4,31	4,64	2,75	3,18	3,52	3,80

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 14.

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 specified head pull-through design values are taken from the ELC-4645 report. The withdrawal and head pull-through values provided in this datasheet are also applicable to CLT connections.
- The steel plate is assumed to be ASTM A36 with a minimum ultimate tensile strength, f_u, equal to 58 ksi (400 MPa).
- 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.
- TBS 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) TBS screws installed in the end grain may not meet the minimum penetration requirement for withdrawal ($20d_1$) specified in CSA O86:24 Clause 12.12.6.1. Discretion and engineering judgment must be exercised to evaluate the impact of reduced penetration on the connection's capacity.

(4) Lateral resistances are factored and according to CSA O86:24 Clause 12.12.10. Values apply to dry service conditions and are representative of a single screw.

(5) The side-member thickness, A, for TBS 8 x 40 mm and 8 x 60 mm was set to 10 mm and 15 mm, respectively, to ensure the connection is not governed by failure mode (a).

(6) The CLT-to-CLT boundary conditions are equally applicable to half-lap connections. Use the nearest connection geometry to determine the appropriate values.