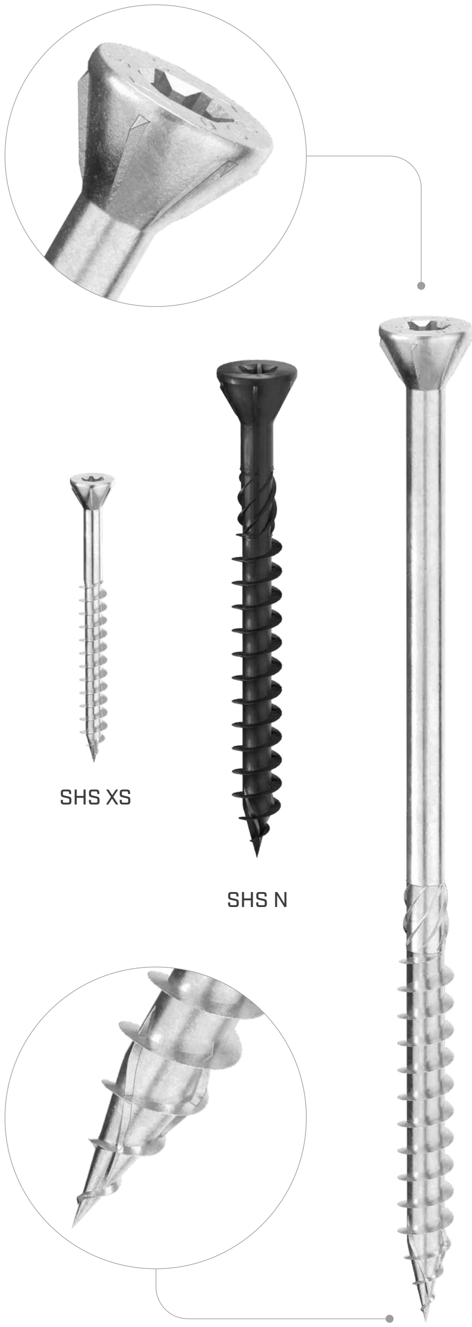
SHS AISI410

60° COUNTERSUNK SCREW

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



SMALL HEAD AND 3 THORNS TIP

The concealed 60° head and 3 THORNS tip allow easy insertion of the screw into small thickness without creating openings in the timber.

OUTDOOR ON ACID WOOD

Martensitic stainless steel. This stainless steels offers the highest mechanical performance compared to the other available stainless steels. Suitable for outdoor applications and on acid wood, but away from corrosive agents (chlorides, sulphides, etc.).

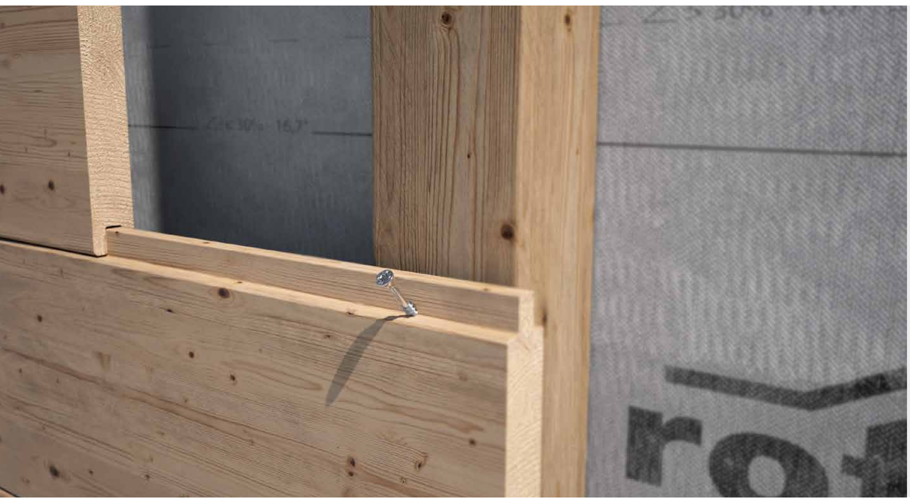
SMALL ELEMENTS FASTENING

The smaller diameter versions are ideal for fixing beads or small elements, the 3.5 mm diameter version is perfectly suited for fastening tongue-and-groove boards.

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

BIT INCLUDED

DIAMETER [mm]	3 (3,5 – 8) 12
LENGTH [mm]	12 (40 – 280) 1000
SERVICE CONDITION	EC1, EC3, WET
ATMOSPHERIC CORROSIVITY	C1, C2
WOOD CORROSIVITY	T1, T2, T3, T4
MATERIAL	410 AISI – martensitic stainless steel AISI 410



FIELDS OF USE

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

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WINDOWS AND DOORS ON THE OUTSIDE

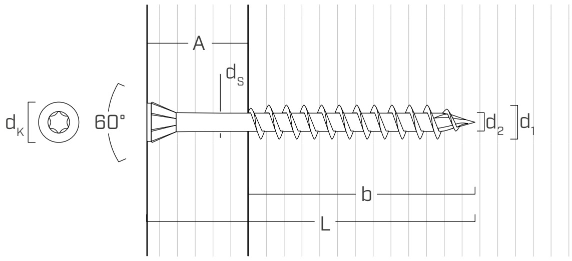
SHS AISI140 is the right choice for fastening small outdoor elements such as beads, façades and window/door frames.

External casing slats fixed with 6 and 8 mm diameter SHS AISI410 screws.

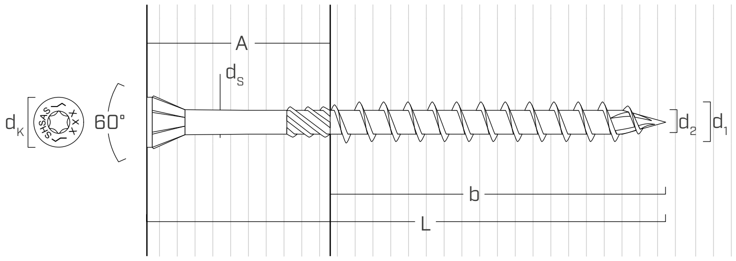
Fastening hardwood and acid wood in far-from-sea environments with SHS AISI410 8 mm diameter.

GEOMETRY AND MECHANICAL CHARACTERISTICS

SHSAS Ø3,5



SHSAS Ø4,5 - Ø5 - Ø6 - Ø8



GEOMETRY

Nominal diameter	d_1	[mm]	3,5	4,5	5	6	8
Head diameter	d_K	[mm]	5,75	7,50	8,50	11,00	13,00
Root diameter	d_2	[mm]	2,15	2,80	3,40	3,95	5,40
Shank diameter	d_S	[mm]	2,50	3,15	3,65	4,30	5,80
Pre-drilling hole diameter(1)	$d_{V,S}$	[mm]	2,0	2,5	3,0	4,0	5,0
Pre-drilling hole diameter(2)	$d_{V,H}$	[mm]	-	-	3,5	4,0	6,0

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

MECHANICAL PROPERTIES

Nominal diameter	d_1	[mm]		4,5	5	6	8
Factored tensile strength	Φf_u	[kN]		5,39	5,86	8,47	15,78
Bending yield strength	F_{yb}	[MPa]		1102	981	896	1074
Factored shear strength of the screw	Φv_s	[kN]		2,81	3,19	4,95	8,79
Specified withdrawal resistance per millimeter of threaded shank (tip included)	Y_w	[N/mm]	G=0.35	47,06	52,29	52,38	69,83
			G=0.42	54,45	60,50	60,60	80,80
			G=0.49	61,60	68,44	68,55	91,40
			G=0.55	67,56	75,07	75,19	100,3
Specified head pull-through resistance per screw	F_{pt}	[kN]	G=0.35	0,39	0,49	0,79	1,06
			G=0.42	0,47	0,59	0,95	1,27
			G=0.49	0,55	0,69	1,10	1,48
			G=0.55	0,62	0,78	1,24	1,66

CODES AND DIMENSIONS

SHS XS AISI410

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
3,5 TX 10	**SHS3540AS(*)**	40	26	14	500
	SHS3550AS(*)	50	34	16	500
	SHS3560AS(*)	60	40	20	500
4,5 TX 20	**SHS4550AS**	50	30	20	200
	SHS4560AS	60	35	25	200
	SHS4570AS	70	40	30	200
5 TX 25	**SHS550AS**	50	24	26	200
	SHS560AS	60	30	30	200
	SHS570AS	70	35	35	100
	SHS580AS	80	40	40	100
	SHS5100AS	100	50	50	100

(*) Not ELC-4645 addressed

SHS N AISI410 - black version

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
4,5 TX 20	**SHS4550ASN**	50	30	20	100
	SHS4560ASN	60	35	25	100
5 TX 25	**SHS550ASN**	50	24	26	100
	SHS560ASN	60	30	30	200

SHS AISI410

d_1 [mm]	CODE	L [mm]	b [mm]	A [mm]	pcs
6 TX 30	**SHS680AS**	80	40	40	100
	SHS6100AS	100	50	50	100
	SHS6120AS	120	60	60	100
	SHS6140AS	140	75	65	100
	SHS6160AS	160	75	85	100
	SHS6180AS	180	75	105	100
	SHS6200AS	200	75	125	100
8 TX 40	**SHS8120AS**	120	60	60	100
	SHS8140AS	140	60	80	100
	SHS8160AS	160	80	80	100
	SHS8180AS	180	80	100	100
	SHS8200AS	200	80	120	100
	SHS8220AS	220	80	140	100
	SHS8240AS	240	80	160	100
	SHS8260AS	260	80	180	100
	SHS8280AS	280	80	200	100

APPLICATION

Oak
Quercus petraea
ρ_k = 665-760 kg/m^3
pH ~ 3,9

Oak or European oak
Quercus robur
ρ_k = 690-960 kg/m^3
pH = 3,4-4,2

Douglas fir
Pseudotsuga menziesii
ρ_k = 510-750 kg/m^3
pH = 3,3-5,8

American black cherry
Prunus serotina
ρ_k = 490-630 kg/m^3
pH ~ 3,9

European chestnut
Castanea sativa
ρ_k = 580-600 kg/m^3
pH = 3,4-3,7

Red oak
Quercus rubra
ρ_k = 550-980 kg/m^3
pH = 3,8-4,2

Blue Douglas fir
Pseudotsuga taxifolia
ρ_k = 510-750 kg/m^3
pH = 3,1-4,4

Maritime pine
Pinus pinaster
ρ_k = 500-620 kg/m^3
pH ~ 3,8

Possible installation on acid wood but away from corrosive agents (chlorides, sulphides, etc.).

For further details, see the **"TIMBER SCREWS AND DECK FASTENING"** catalogue, available in the "Catalogues" section of the website www.rothoblaas.com

pH ≤ 4
"aggressive" woods high acidity

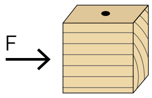
pH > 4
"standard" timbers low acidity

FAÇADES IN DARK TIMBER

Specially designed to match façades made of charred wood, the black SHS N variant ensures perfect compatibility and offers an excellent aesthetic result. Thanks to its strength to corrosion, it is suitable for outdoor use, allowing to create striking and long-lasting black façades.

MINIMUM DISTANCES FOR SHEAR LOADS

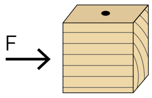
screws inserted **WITHOUT pre-drilled hole** — **G ≤ 0.44**



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

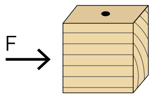
‡ For Western Red Cedar, this minimum spacing shall be increased by 50%.

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



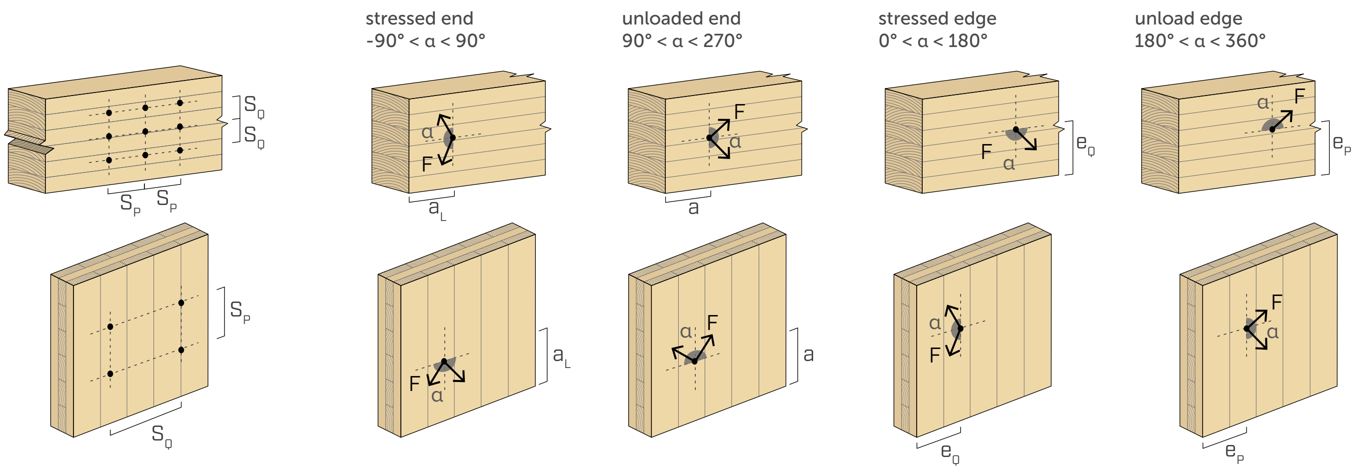
d_1		4,5 [mm]	*0.18 [in]*	5 [mm]	*0.20 [in]*	6 [mm]	*0.24 [in]*	8 [mm]	*0.32 [in]*
s_P	18·d	81	*3 3/16*	90	*3 1/2*	108	*4 1/4*	144	*5 11/16*
s_Q	7·d	32	*1 1/4*	35	*1 3/8*	42	*1 5/8*	56	*2 3/16*
a_L	22·d	99	*3 7/8*	110	*4 3/8*	132	*5 3/16*	176	*6 15/16*
a	15·d	68	*2 11/16*	75	*2 15/16*	90	*3 1/2*	120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

screws inserted **WITH pre-drilled hole**



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

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



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.

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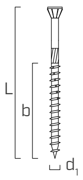
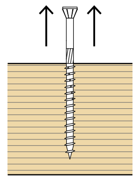
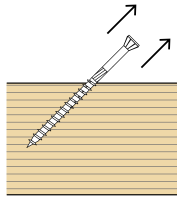
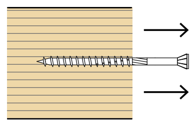
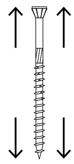
STRUCTURAL VALUES | AXIAL TENSION











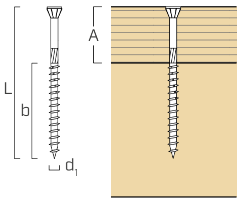
geometry				TENSION[1]												
				thread withdrawal												steel tension
				α = 90°				α = 45°				end grain α = 0°				
				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw}				factored withdrawal resistance P_{rw} (2)(3)				factored tension resistance T_{rs}
				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]
4.5 ***0.18***	50	*1 15/16*	30	0,84	0,97	1,10	1,21	0,76	0,88	1,00	1,10	0,42	0,49	0,55	0,60	5,39
	60	*2 3/8*	35	1,00	1,16	1,32	1,44	0,91	1,06	1,20	1,31	0,50	0,58	0,66	0,72	
	70	*2 3/4*	40	1,17	1,35	1,53	1,68	1,06	1,23	1,39	1,53	0,58	0,68	0,77	0,84	
5 ***0.20***	50	*1 15/16*	24	0,70	0,80	0,91	1,00	0,63	0,73	0,83	0,91	0,35	0,40	0,46	0,50	5,86
	60	*2 3/8*	30	0,92	1,06	1,20	1,31	0,83	0,96	1,09	1,19	0,46	0,53	0,60	0,66	
	70	*2 3/4*	35	1,10	1,27	1,44	1,58	1,00	1,16	1,31	1,43	0,55	0,64	0,72	0,79	
	80	*3 1/8*	40	1,28	1,48	1,68	1,84	1,16	1,35	1,52	1,67	0,64	0,74	0,84	0,92	
	100	*4*	50	1,65	1,91	2,16	2,36	1,50	1,73	1,96	2,15	0,82	0,95	1,08	1,18	
6 ***0.24***	80	*3 1/8*	40	1,25	1,44	1,63	1,79	1,13	1,31	1,48	1,63	0,62	0,72	0,82	0,89	8,47
	100	*4*	50	1,61	1,87	2,11	2,32	1,47	1,70	1,92	2,11	0,81	0,93	1,06	1,16	
	120	*4 3/4*	60	1,98	2,29	2,59	2,84	1,80	2,08	2,36	2,58	0,99	1,15	1,30	1,42	
	140	*5 1/2*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	160	*6 1/4*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	180	*7 1/8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
	200	*8*	75	2,53	2,93	3,31	3,63	2,30	2,66	3,01	3,30	1,26	1,46	1,66	1,82	
8 ***0.32***	120	*4 3/4*	60	2,54	2,94	3,33	3,65	2,31	2,67	3,02	3,32	1,27	1,47	1,66	1,83	15,78
	140	*5 1/2*	60	2,54	2,94	3,33	3,65	2,31	2,67	3,02	3,32	1,27	1,47	1,66	1,83	
	160	*6 1/4*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	180	*7 1/8*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	200	*8*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	220	*8 5/8*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	240	*9 1/2*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	260	*10 1/4*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	
	280	*11*	80	3,52	4,07	4,61	5,06	3,20	3,70	4,19	4,60	1,76	2,04	2,30	2,53	

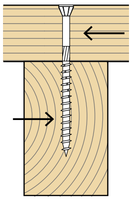
α = screw-to-grain angle

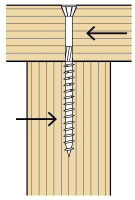
NOTES and GENERAL PRINCIPLES on page 10.

STRUCTURAL VALUES | LATERAL RESISTANCE

geometry					SHEAR[4] timber-to-timber α = 90°				SHEAR[4] timber-to-timber 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]
4.5 *0.18*	50	*1 15/16*	30	20	0,47	0,55	0,62	0,68	0,33	0,39	0,46	0,50
	60	*2 3/8*	35	25	0,52	0,60	0,68	0,74	0,37	0,43	0,48	0,53
	70	*2 3/4*	40	30	0,56	0,64	0,70	0,75	0,39	0,45	0,50	0,55
5 *0.20*	50	*1 15/16*	24	26	0,52	0,62	0,73	0,81	0,39	0,47	0,53	0,57
	60	*2 3/8*	30	30	0,60	0,73	0,85	0,95	0,44	0,50	0,56	0,61
	70	*2 3/4*	35	35	0,69	0,83	0,91	0,97	0,46	0,52	0,59	0,64
	80	*3 1/8*	40	40	0,75	0,83	0,91	0,97	0,48	0,55	0,61	0,67
	100	*4*	50	50	0,75	0,83	0,91	0,97	0,51	0,59	0,66	0,72
6 *0.24*	80	*3 1/8*	40	40	0,92	1,10	1,20	1,28	0,62	0,71	0,79	0,87
	100	*4*	50	50	0,99	1,10	1,20	1,28	0,66	0,75	0,85	0,93
	120	*4 3/4*	60	60	0,99	1,10	1,20	1,28	0,69	0,80	0,90	0,99
	140	*5 1/2*	75	65	0,99	1,10	1,20	1,28	0,75	0,87	0,95	1,02
	160	*6 1/4*	75	85	0,99	1,10	1,20	1,28	0,75	0,87	0,95	1,02
	180	*7 1/8*	75	105	0,99	1,10	1,20	1,28	0,75	0,87	0,95	1,02
	200	*8*	75	125	0,99	1,10	1,20	1,28	0,75	0,87	0,95	1,02
8 *0.32*	120	*4 3/4*	60	60	1,63	1,95	2,21	2,35	1,10	1,25	1,40	1,52
	140	*5 1/2*	60	80	1,73	1,99	2,21	2,35	1,10	1,25	1,40	1,52
	160	*6 1/4*	80	80	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	180	*7 1/8*	80	100	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	200	*8*	80	120	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	220	*8 5/8*	80	140	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	240	*9 1/2*	80	160	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	260	*10 1/4*	80	180	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67
	280	*11*	80	200	1,83	2,02	2,21	2,35	1,19	1,36	1,53	1,67

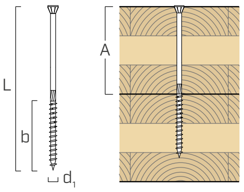


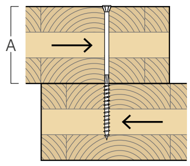


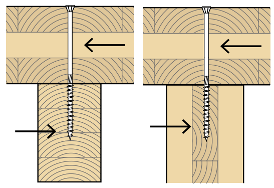


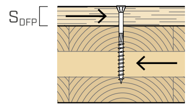
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 10.









					SHEAR[4]												
geometry					CLT-CLT lateral face α = 90°				CLT-CLT narrow face α = 0°				spline joint lateral face α = 90°				
					factored lateral resistance N_r (5)				factored lateral resistance N_r (2)(3)					factored lateral resistance N_r			
d_1	L		b	A	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]
6 *0.24*	80	*3 1/8*	40	40	0,84	1,01	1,15	1,23	0,58	0,67	0,75	0,82	12,7 *1/2*	0,95	0,98	1,00	1,02
	100	*4*	50	50	0,94	1,05	1,15	1,23	0,62	0,71	0,80	0,88		0,95	0,98	1,00	1,02
	120	*4 3/4*	60	60	0,94	1,05	1,15	1,23	0,65	0,75	0,85	0,93		0,95	0,98	1,00	1,02
	140	*5 1/2*	75	75	0,94	1,05	1,15	1,23	0,67	0,78	0,88	0,96		0,95	0,98	1,00	1,02
	160	*6 1/4*	75	85	0,94	1,05	1,15	1,23	0,71	0,82	0,91	0,98		0,95	0,98	1,00	1,02
	180	*7 1/8*	75	105	0,94	1,05	1,15	1,23	0,71	0,82	0,91	0,98		0,95	0,98	1,00	1,02
	200	*8*	75	125	0,94	1,05	1,15	1,23	0,71	0,82	0,91	0,98		0,95	0,98	1,00	1,02
8 *0.32*	120	*4 3/4*	60	60	1,48	1,78	2,07	2,25	1,03	1,18	1,32	1,44	19,1 *3/4*	1,69	1,75	1,80	1,84
	140	*5 1/2*	60	80	1,61	1,85	2,09	2,25	1,03	1,18	1,32	1,44		1,69	1,75	1,80	1,84
	160	*6 1/4*	80	80	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	180	*7 1/8*	80	100	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	200	*8*	80	120	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	220	*8 5/8*	80	140	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	240	*9 1/2*	80	160	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	260	*10 1/4*	80	180	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84
	280	*11*	80	200	1,75	1,93	2,11	2,25	1,12	1,28	1,44	1,57		1,69	1,75	1,80	1,84

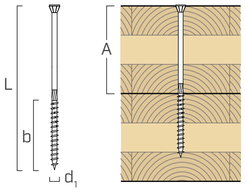
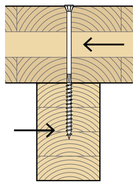
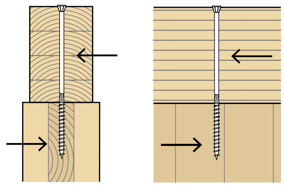
α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 10.

STRUCTURAL VALUES | LATERAL RESISTANCE

STRENGTH VALUES
CSA O86:24

SHEAR[4]

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

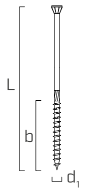
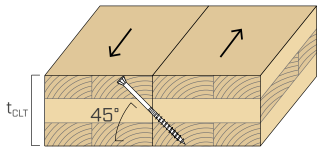
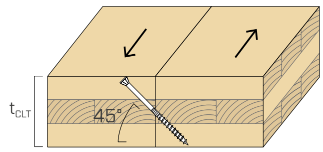
					factored lateral resistance N_r				factored lateral resistance N_r (2)(3)			
					G				G			
d_1	L		b	A	0.35	0.42	0.49	0.55	0.35	0.42	0.49	0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
6 *0.24*	80	*3 1/8*	40	40	0,88	1,04	1,17	1,25	0,59	0,67	0,76	0,83
	100	*4*	50	50	0,97	1,07	1,17	1,25	0,62	0,72	0,81	0,88
	120	*4 3/4*	60	60	0,97	1,07	1,17	1,25	0,66	0,76	0,86	0,94
	140	*5 1/2*	75	75	0,97	1,07	1,17	1,25	0,71	0,82	0,93	0,99
	160	*6 1/4*	75	85	0,97	1,07	1,17	1,25	0,71	0,82	0,93	0,99
	180	*7 1/8*	75	105	0,97	1,07	1,17	1,25	0,71	0,82	0,93	0,99
	200	*8*	75	125	0,97	1,07	1,17	1,25	0,71	0,82	0,93	0,99
8 *0.32*	120	*4 3/4*	60	60	1,55	1,86	2,11	2,30	1,04	1,19	1,33	1,45
	140	*5 1/2*	60	80	1,71	1,96	2,15	2,30	1,04	1,19	1,33	1,45
	160	*6 1/4*	80	80	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	180	*7 1/8*	80	100	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	200	*8*	80	120	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	220	*8 5/8*	80	140	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	240	*9 1/2*	80	160	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	260	*10 1/4*	80	180	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58
	280	*11*	80	200	1,79	1,98	2,15	2,30	1,13	1,29	1,45	1,58

α = screw-to-grain angle

NOTES and GENERAL PRINCIPLES on page 10.

rothoblaas

STRUCTURAL VALUES | LATERAL RESISTANCE

geometry					SHEAR[4][6] butt-joint α = 90°				SHEAR[4][6] butt-joint α = 45°			
												
					factored lateral resistance N_r				factored lateral resistance N_r			
d_1	L		b	t_{CLT}	G 0.35	G 0.42	G 0.49	G 0.55	G 0.35	G 0.42	G 0.49	G 0.55
[mm] *[in]*	[mm]	*[in]*	[mm]	[mm]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]	[kN]
6 *0.24*	100	*4*	50	70	0,81	0,88	0,95	1,01	0,50	0,61	0,71	0,76
	120	*4 3/4*	60	85	0,81	0,88	0,95	1,01	0,61	0,67	0,72	0,76
	140	*5 1/2*	75	100	0,81	0,88	0,95	1,01	0,61	0,67	0,72	0,76
	160	*6 1/4*	75	115	0,81	0,88	0,95	1,01	0,61	0,67	0,72	0,76
	180	*7 1/8*	75	125	0,81	0,88	0,95	1,01	0,61	0,67	0,72	0,76
	200	*8*	75	140	0,81	0,88	0,95	1,01	0,61	0,67	0,72	0,76
8 *0.32*	120	*4 3/4*	60	85	1,30	1,56	1,81	1,96	0,74	0,89	1,04	1,16
	140	*5 1/2*	60	100	1,43	1,63	1,83	1,96	0,86	1,04	1,21	1,32
	160	*6 1/4*	80	115	1,56	1,71	1,85	1,96	0,99	1,19	1,38	1,48
	180	*7 1/8*	80	125	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48
	200	*8*	80	140	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48
	220	*8 5/8*	80	155	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48
	240	*9 1/2*	80	170	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48
	260	*10 1/4*	80	185	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48
	280	*11*	80	200	1,56	1,71	1,85	1,96	1,08	1,24	1,39	1,48

α = screw-to-grain angle

STRUCTURAL VALUES

GENERAL PRINCIPLES

- The reference factored lateral resistance for self-tapping screws has been determined following the guidelines in Clause 12.12 of the CSA O86:24 including the withdrawal restraint effect. Listed values are based on standard long term load duration factor (K_D = 1.0), dry service condition factor (K_{SF} = 1.0), and treatment factor (K_T = 1.0).
- The 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.
- 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 ($4d_F$) 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.
- SHS AISI410 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 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) SHS AISI410 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 CLT-to-CLT boundary conditions are equally applicable to half-lap connections. Use the nearest connection geometry to determine the appropriate values.

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