

MyTiCon Timber Connectors

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Understanding & Specifying Engineered Structural SWG ASSY® Screws



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General information

This document provides design concepts for roof purlin-to-beam connections using Code approved SWG ASSY® VG screws. The recommendations are based on the following conditions:

- Standard purlin sizes of 80 mm (3-1/8"), 130 mm (5-1/8") and 175 mm (6-7/8") widths and depths of 152—465 mm (6"— 18-3/8")
- Beams and Purlins of strength D-Fir, class 24f-E or better grade

Conditions of use

- Side member of the connection is a purlin of size and strength outlined in this document
- Main member of the connection is a D-Fir Glulam-beam with a minimum width **w** of 80 mm (3-1/8") and a minimum specified compression strength perpendicular to the grain of 7 MPa or greater
- One quarter of the bearing area of the purlin is assigned for compression bearing. The purlin must firmly be seated in compression on beam.

Compression stresses perpendicular to grain caused by forces other than "factored maximum lateral load" are to be considered separately and are not covered with this document.

Design and installation procedure

• Depending on the design load and purlin size select the appropriate screw diameter and screw type as per *table 3 & 4*.

The appropriate screw length to be selected as follows:

- Perpendicular screw:

min $L_{SWG ASSY^{\circ} VG screw} = 2*d + tip length (<math>\triangleq D$) max $L_{SWG ASSY^{\circ} VG screw} = d + h - 3/4"$

<u>45° inclined screw:</u>

min $L_{SWG ASSY^{\circ} VG screw} = 2.83*b + tip length (<math>\triangleq D$) max $L_{SWG ASSY^{\circ} VG screw} = 1.42*(b + h) - 3/4"$

- Spacing end and edge distances as per table 1
- Perpendicular SWG ASSY[®] VG screws are to be driven top flush.
 Inclined SWG ASSY[®] VG screws are to be driven at 45°-angle to the wood grain direction of the beam.
 Do not over-drive screw head in side member.





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Minimum spacing, end and edge distances for SWG ASSY[®] VG screws

 Table 1:
 minimum spacing for SWG ASSY[®] VG screws

		Screws axially loaded		
Min thickness = 4d	S _P Spacing parallel to grain	S _Q Spacing perpendicu- lar to grain	a end distance	e edge distance
SWG ASSY® VG	5d (7 .5 in D-Fir)	2.5d	5d (7.5d in D-Fir)	3d

Suggested resistances for SWG ASSY® VG screws in purlin-to-beam connections

The outlined resistances are based on the CSA 086-09, the issued CCMC report "CCMC 13677-R" and boundary conditions outlined in the European Technical Approval "ETA-11/0190". Maximum suggested resistances are provided in *table 2 to 4*.

Suggested resistances are based on the following conditions:

- Listed factored resistances apply to mean oven dry relative density resp. specific gravity of D-Fir (SG = 0.49) with a specified compression strength perpendicular to the grain of 7 MPa
- For the perpendicular inserted screw the angle between screw axis and wood grain is considered $\alpha = 90^{\circ}$ for both members.

Angle between screw axis and wood grain direction for the inclined screw is considered α = 90° in the side member and α = 45° in the main member.

- A wood moisture content of 12% ±2%
- Applied modification factors are $K_{SF} = 1$, $K_T = 1$ and $K_D = 1.0$
- For withdrawal resistance the threaded length only less one diameter for the tip is considered



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Table 2:factored withdrawal resistance in kN per 20 mm (lbf per inch) of thread penetration

		Factored ¹ withdrawal resistance ² in kN per 20 mm resp. lbf per inch of thread penetration								
	α:		Outer thread diameter in mm (inch)							
	angle	1	8 (5/16) 10 (3/8)							
Specific gravity	between screw	Tensile	kN per 20 mm	Tensile	lbf per inch	Tensile	kN per 20 mm	Tensile	lbf per inch	
	axis and	resistance	thread	resistance	thread	resistance	thread em-	resistance	thread	
	grain	[KN]	embedment	[tdt]	embedment	[KN]	bedment	[tdt]	embedment	
0.49	90°	15 12	1.60		456.1	10.2	2.00	4269 3	570.7	
(D-Fir)	45°	13.12	1.37	5557.4	388.7	19.2	1.71	4209.5	487.6	

<u>Notes:</u> ¹ K_{SF} = 1.0, K_T = 1.0, K_D = 1.0 and SWG ASSY[®] screws assembled as per <u>design and installation procedure</u>

² the minimum of withdrawal resistance times thread embedment and tensile resistance controls the design

Table 3:	maximum load in a roof shear connection with 8 mm (5/16") SWG ASSY® VG CYL screws
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Factored ¹ maximum lateral load [kN (lbs)] per connection ² of D-Fir purlin-to-beam roof shear connections								
				SWG ASSY® VG CYL				
D-Fir purlin size		D-Fir Glulan	n beam with width of	D [mm /(in)]				
		Inninan		8 (5/16)				
mm	in	mm	inch	kN	lbs			
90 x 152	2 1/9 x 6	80	3-1/8	1.54	347.0			
80 X 152	5-1/8 X 0	130	5-1/8	2.63	589.9			
80 v 100	2 1/9 7 1/2	80	3-1/8	1.73	388.5			
80 X 190	3-1/8 X 7-1/2	130	5-1/8	2.69	603.8			
60 x 220	2.1/00	80	3-1/8	1.44	323.8			
80 X 228	3-1/8 X 9	130	5-1/8	2.34	526.1			
130 x 152	5-1/8 x 6			5.61	1260.2			
130 x 190	5-1/8 x 7-1/2			5.74	1289.8			
175 x 190	7 x 7-1/2			8.49	1907.3			
175 x 228	7 x 9	80	3-1/8	7.68	1726.1			
175 x 266	7 x 10-1/2	11		6.58	1479.5			
175 x 304	7 x 12			5.76	1294.5			
175 x 342	7 x 13-1/2]		4.88	1096.2			

Notes: ¹ K_{SF} = 1.0, K_T = 1.0, K_D = 1.0 and SWG ASSY[®] screws assembled as per design and installation procedure

² connection = vertically inserted ASSY[®] VG screw + inclined ASSY[®] VG screw (45°)





Factored ¹ maximum lateral load [kN (lbs)] per connection ² of D-Fir purlin-to-beam roof shear connection								
				SWG ASS	/® VG CSK			
D-Fir purlin size	D-Fir Glulam bea widt	m with minimum t h of	D [mm /(in)]					
			¢	10 (3/8)				
mm	in	mm	inch	kN	lbs			
90 y 152	2 1/8 × 6	80	3-1/8	2.16	485.7			
80 X 192	5-1/8 × 0	130	5-1/8	3.31	742.8			
90 y 100	2 1/0 7 1/2	80	3-1/8	1.73	388.5			
80 x 190	3-1/8 X /-1/2	130	5-1/8	2.81	631.4			
00 220	2.1/00	80	3-1/8	1.44	323.8			
80 X 228	5-1/6 8 5	130	5-1/8	2.34	526.1			
120 - 152	F 1/0 ··· C	80	3-1/8	7.06	1586.8			
130 X 152	2-1/9 X 0	130	5-1/8	7.06	1586.8			
120 100	5-1/8 x 7-1/2	80	3-1/8	6.00	1348.8			
130 X 190		130	5-1/8	7.22	1621.6			
175 x 190	7 x 7-1/2			10.67	2397.8			
175 x 228	7 x 9			9.75	2191.8			
175 x 266	7 x 10-1/2			8.36	1878.7			
175 x 304	7 x 12		2.4/2	7.32	1643.9			
175 x 342	7 x 13-1/2	80	3-1/8	6.50	1461.2			
175 x 380	7 x 15			5.79	1301.7			
175 x 418	7 x 16-1/2			5.32	1195.5			
175 x 456	7 x 18			4.88	1095.9			

<u>Notes:</u> ¹ $K_{SF} = 1.0$, $K_T = 1.0$, $K_D = 1.0$ and SWG ASSY[®] screws assembled as per <u>design and installation procedure</u>

² connection = vertically inserted ASSY[®] VG screw + inclined ASSY[®] VG screw (45°)

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SWG ASSY[®] VG screw specifications

Maj	Major-Ø I		ength	Thread		Minor-Ø		Ļ		Head-Ø	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
		240	9-1/2	224	8-7/8						``````
		260	10-1/4	244	9-5/8						
		280	11	264	10-3/8						
		300	11-3/4	284	11-1/8						
		330	13	314	12-3/8						
8	5/16	360	14-1/8	344	13-1/2	5.0	0.196	8	5/16	10	0.389
		380	15	364	14-3/8						
		430	17	414	16-1/4						
		480	17-7/8	464	18-1/4						
		530	20-7/8	514	20-1/4						
		580	22-7/8	564	22-1/4						







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SWG ASSY[®] VG screw specifications

Major-Ø		Length		Th Le	read ngth	Minor-Ø		L		Head-Ø	
mm	in	mm	in	mm	in	mm	in	mm	in	mm	in
		240	9-1/2	225	8-7/8						
		260	10-1/4	245	9-5/8						
		280	11	265	10-3/8						
		300	11-3/4	280	11						
		320	12-5/8	305	12						
		340	13-3/8	325	12-3/4						
		360	14-1/8	345	13-5/8						
10	3/8	380	15	365	14-3/8	6.2	0.244	10	3/8	19.6	3/4
		400	15-3/4	385	15-1/8						
		430	17	415	16-3/8						
		480	18-7/8	465	18-1/4						
		530	20-3/4	512	20-1/8						
		580	22-7/8	562	22-1/8						
		650	25-1/2	632	24-7/8						
		700	27-1/2	682	26-7/8						

 Table 6:
 10 mm (3/8") SWG ASSY® VG CSK screw specifications







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