

Subfloor and Sheathing Fastening

Strong-Drive® WSV SUBFLOOR Screw

For more information, see p. 200, C-F-2019 Fastening Systems Catalog

1 3/4"–3" WSV Fasteners Meet Code Requirements

As listed in ICC-ES ESR-1472, WSV screws meet code requirements for the 2015 and 2018 International Building Code (IBC) and International Residential Code (IRC). Evaluation report recognized uses of WSV screws include the following applications:

- Substitute for 8d and 10d common nails in horizontal diaphragms per AWC SDPWS 2015, Tables 4.2A, 4.2C, and 4.2D; IBC 2018 and 2015, Table 2304.10.1, and IRC 2018 and 2015, Table R602.3(1).
- Code prescribed connections per IBC 2018 and 2015, Table 2304.10.1 and IRC 2015 and 2018, Table R602.3(1).
- Single and diagonally-sheathed lumber diaphragms per AWC SDPWS 2015, Table 4.2D.
- Prescriptive sheathing applications in IRC 2018 and 2015, Table R602.3(1) and in structures regulated by the IRC where the engineered design is submitted in accordance with IRC R301.1.3.

Guidelines for Fastening Diaphragms Without Glue

The design of wood floor systems constructed with wood structural panel (WSP) sheathing fastened to framing considers the diaphragm performance of the system as presented in the codes (as affected by framing, sheathing thickness, sheathing layout and fastening) and may also consider the composite action of the sheathing with the framing system (composite action is the combined stiffness of the joist with the sheathing). The framing systems can be grouped into two classes: (1) sawn lumber and parallel-chord wood trusses, and (2) wood I-joists. WSV screws may be used as alternate fasteners to common nails in each floor class subject to certain constraints.

For Diaphragms with a Framing System that Is Sawn Lumber or Parallel-Chord Wood Trusses

Simpson Strong-Tie WSV screws may be used as one-for-one substitutes for 10d common and smaller nails that are specified for horizontal diaphragm design in accordance with the AWC SDPWS 2015, and IBC and IRC 2015 and 2018.



For Diaphragms with Wood I-Joist Framing Systems

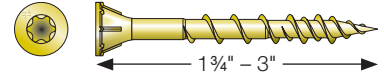
I-joist manufacturers use the extra stiffness resulting from composite action when developing allowable floor joist span tables. Therefore, I-joist floor span tables generally assume glued-nailed construction.

1. For floor systems designed or intended to be glued-nailed:
 - WSV screws may be substituted one-for-one for common nails, without glue, provided the maximum allowable I-joist span is reduced by 12" compared to the I-joist manufacturer's glued-nailed spans. The screws shall have at least 1 1/4" penetration into the I-joist flange (or full penetration for flanges less than 1 1/4" thick).
 - Where glue is used with the screws, no reduction in span is required.
 - Check with the I-joist manufacturer for any additional diaphragm requirements.
2. For floor systems designed or intended to be nailed-only:
 - WSV screws may be substituted one-for-one for common nails, with no reduction in span, provided at least 1 1/4" penetration into the I-joist flange is achieved (or full penetration for flanges less than 1 1/4" thick).
 - Check with the I-joist manufacturer for any additional diaphragm requirements.

Subfloor and Sheathing Fastening

Strong-Drive® WSV SUBFLOOR Screw (cont.)

Codes/Standards: ICC-ES ESR-1472



WSV — Allowable Shear Loads for DFL/SP and SPF/HF

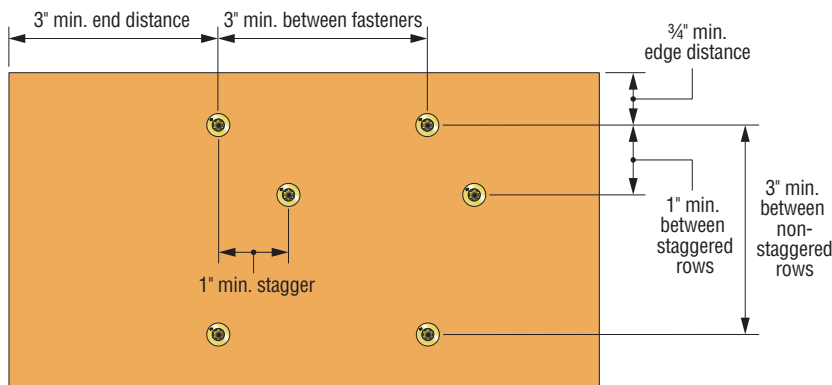
Size (in.)	Model No.	Diameter (in.)	Thread Length (in.)	Reference Shear (lb.) for 1 1/2" Side Member Thickness	
				DFL/SP	SPF/HF
#9 x 2 1/2	WSV212S	0.13	2.0	93	73
#9 x 3	WSV3S	0.13	2.2	102	87

1. Table values are based on attachment of a 1 1/2" side member to a 1 1/2" main member of the same species and grade.
2. Table values are based on the 2018 NDS, C_D = 1.0. Values shall be multiplied by all applicable factors, such as duration of load, etc., except where noted.
3. Specific Gravities (G) assumed: DFL G = 0.50, SP G = 0.55, SPF G = 0.42.
4. The spacing of applied uniform loads to a multi-ply member shall not exceed 24 inches on center.

WSV — Allowable Pull-Through and Withdrawal

Size (in.)	Model No.	Thread Length (in.)	Reference Allowable Pull-Through (lb.)						Reference Allowable Withdrawal Load			
			Minimum Nominal Panel Thickness (in.)				Minimum Thickness (in.)		DFL/SP (lb./in.) W	DFL/SP (lbs.) W _{max}	SPF/HF (lb./in.) W	SPF/HF (lbs.) W _{max}
			OSB/Plywood Rated Sheathing, Exposure 1				DFL/SP 1 1/2	SPF/HH 1 1/2				
			7/16	15/32	19/32	23/32						
#9 x 1 3/4	WSV134S	1.20	66	66	96	109	195	141	123	147	98	117
#9 x 2	WSV2S	1.45							128	185	99	144
#9 x 2 1/2	WSV212S	2.00							128	256	117	233
#9 x 3	WSV3S	2.20							141	311	121	266

1. Use the lower of the pull-through or withdrawal values to determine axial design value.
2. Screws must be installed normal to the side grain of the wood main member with the screw axis at a 90° angle to the wood fibers.
3. The main framing member must be wood having a minimum specific gravity of 0.50 for DFL and SP main members, and 0.42 for SPF and HF main members. DFL is Douglas Fir-Larch. SP is Southern Pine. SPF is Spruce-Pine-Fir. HF is Hem-Fir.
4. Withdrawal values, W, are in pounds per inch of the thread penetration in to the main member. W_{max} is the maximum reference withdrawal value.
5. Allowable loads are shown at the wood load duration factor of C_D = 1.0. Loads may be increased for load duration up to C_D = 1.6.



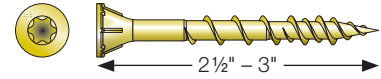
Strong-Drive WSV Subfloor Screw Spacing Detail

Multi-Ply Fastening

Strong-Drive® WSV SUBFLOOR Screw

Simpson Strong-Tie® Strong Drive® WSV flathead, countersunk wood screws are a fast and reliable method for attaching two-ply and three-ply girder trusses.

For more information, see p. 202, C-F-2019 Fastening Systems Catalog



WSV — Allowable Loads Comparison of Common Fasteners Used to Attach Truss Plies Together

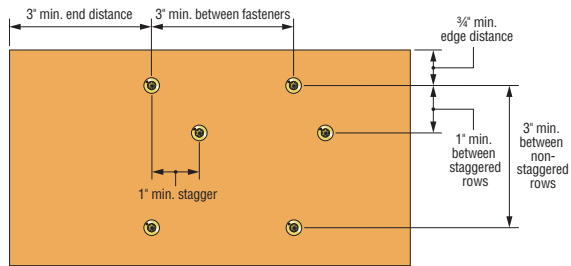
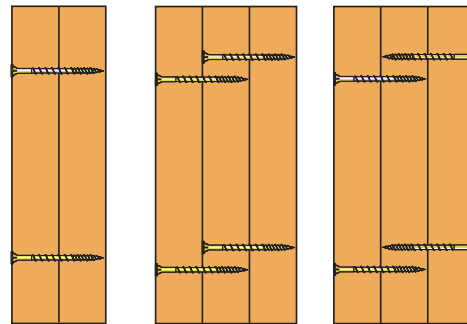
Size (in.)	Model No.	Diameter (in.)	Reference Shear (lb.)		Reference Withdrawal (lb.)	
			DFL/SP	SPF/HF	DFL/SP	SPF/HF
#9 x 2½	WSV212S	0.132	93	73	128	141
#9 x 3	WSV3S	0.132	102	87	211	141
0.120 x 3 nail ⁵	—	0.120	81	69	44	28
0.131 x 3 nail ⁵	—	0.131	97	82	48	31

1. Table values are based on attachment of a 1½" side member to a 1½" main member of the same species and grade.
2. Table values are based on the NDS, C₀=1.0. Values shall be multiplied by all applicable factors, such as duration of load, etc. except where noted.
3. Specific Gravities (G) assumed: DFL G = 0.50, SP G = 0.55, SPF G = 0.42.
4. For a series of loads to be considered a uniform load, the loads must be applied no further apart than 24" o.c.
5. Assumes nail F_{yB} = 100 ksi.
6. WSV212S and WSV3S withdrawal values based on testing per AC233.

Installation:

- Screw spacing shall be in accordance with the fastener schedule provided on the Truss Design Drawing or as otherwise approved by the Truss Designer. Screw spacing shall not exceed 12" on center and shall not be less than 3" on center.
- WSV screws may be installed with the screw heads in either the loaded or unloaded ply. Do not overdrive screws.
- For three-ply girder assemblies, the WSV screws may be installed from the same side as each ply is applied (no flipping of the truss is required) in accordance with BCSI (2006 edition). Girders that are fastened together at the jobsite must have the fastener heads visible for inspection.
- Stagger the screws in the third ply a minimum of 1" from the screws installed into the first two plies.
- Individual screw locations may be adjusted up to ½ of the required screw spacing to avoid conflicts with other hardware or to avoid lumber defects. (3" minimum spacing still required.)
- Use minimum of 3"-long fasteners to attach hangers to the girder truss.
- A 2,500-rpm motor is recommended

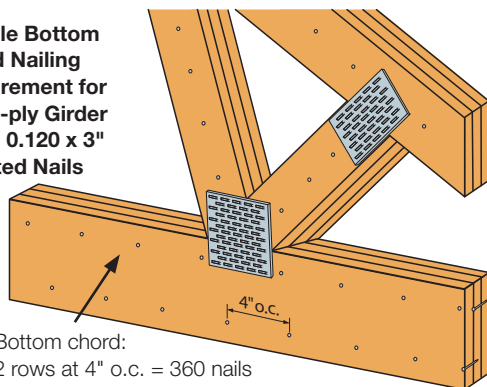
Two-Ply Assembly Three-Ply Assemblies



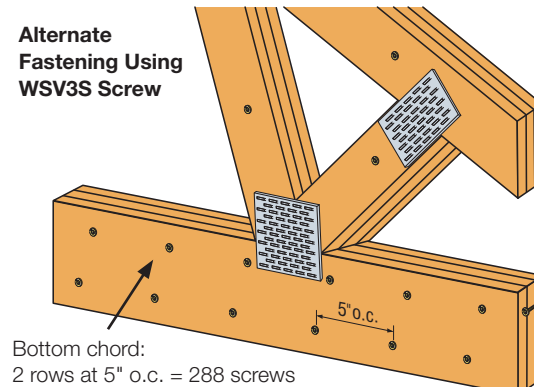
Typical Spacing for WSV Screw

Ply-to-Ply Connection Comparison for a 30'-Long Three-Ply Girder — Bottom Chord Loading

Sample Bottom Chord Nailing Requirement for Three-ply Girder Using 0.120 x 3" Collated Nails



Alternate Fastening Using WSV3S Screw



Examples based on three-ply girder spanning 30', 2x6 southern pine bottom chords, 825 plf bottom cord load and 1.15 load duration. Nail and screw spacing is repeated for each layer.



Collated Interior Screws

Strong-Drive® WSV SUBFLOOR Screw

Subfloor and Sheathing Projects

Simpson Strong-Tie has re-engineered its popular subfloor screw to reduce driving force and increase installation speed. The new Strong-Drive WSV Subfloor screw has been developed for fastening subfloor sheathing using the Quik Drive® auto-feed screw driving system.

Features:

- Redesigned tip and thread pattern provides easy starts and up to 25% less torque while driving¹ — makes for up to 20% faster driving²
- Less installation torque also means less wear on tools
- Deep six-lobe recessed ribbed head provides clean countersinking and more secure bit retention for fewer cam-outs
- The holding power of WSV screws reduces the gaps between the joist and subfloor that cause floor squeaks
- WSV screws can be easily backed out allowing for future access to floor cavities
- 6-lobe T-25 drive bit (replacement bit BITTX25)

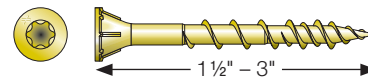
1. Test data shows the Strong-Drive WSV Subfloor screw requires up to 25% less driving torque in single-material LVL.

2. Test data indicates this redesigned WSV thread pattern will result in 20% faster screw installations.

Codes/Standards: ICC-ES ESR 1472

For Technical Data and Loads, see Technical Supplement

Yellow Zinc Coating



Length (in.)	Shank Size	Retail Pack		Contractor Pack		PRO200S	PRO250G2	PRO300S
		Fasteners Per Pack	Model No.	Fasteners Per Pack	Model No.			
1¼	#9	1,000	HCKWSV134S	2000	WSV134S	✓	✓	
2	#9	1,000	HCKWSV2S	2000	WSV2S	✓	✓	✓
2½	#9	750	HCKWSV212S	1500	WSV212S		✓	✓
3	#9	—	—	1000	WSV3S			✓