

January 1, 2022

Re: Simpson Strong-Tie® Strong-Drive® SDHR COMBO-HEAD Screws

To Whom It May Concern:

This letter provides design information for Simpson Strong-Tie Strong-Drive SDHR COMBO-HEAD screws used in steel-to-wood connections in accordance with CSA Standard O86-14, CSA Standard O86:19 and NBC 2015, as evaluated by ICC-ES under ELC-3046.

The Strong-Drive SDHR COMBO-HEAD screws are structural fasteners designed for use with cross-laminated timber (CLT), mass timber construction and general interior applications. These partially threaded 10 mm and 12 mm diameter structural screws are available in four sizes and are designed to pull structural members together while providing excellent connection strength. The combination head allows for driving using either a hex driver bit or a T40 6-lobe driver bit. The Type-17 tip delivers fast starts under low torque driving.

The information and factored resistances shown in the tables below have been developed in accordance with CSA O86, based on testing per ICC-ES Acceptance Criteria for Dowel-type Threaded Fasteners used in Wood (AC233) and are applicable to standard term loading ($K_D = 1.00$) under dry service conditions ($K_{SF} = 1.00$). See Clause 12.6 CSA O86 for additional design information.

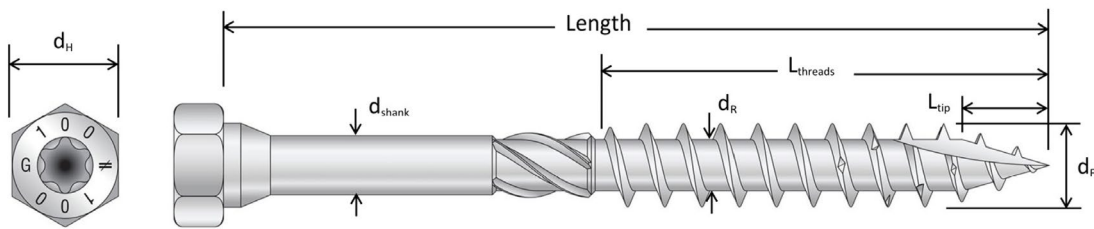


Figure 1 – Strong-Drive® SDHR COMBO-HEAD Screw

Table 1 – Fastener Dimensions and Factored Resistances

Model No.	Dimension (mm)							Bending Yield Strength ² (MPa)	Factored Resistance ¹ (kN)	
	Screw Length L	Thread Length L _{threads}	Tip Length L _{tip}	Thread Dia. d _F	Shank Dia. d _{shank}	Minor Dia. d _R	Head Dia. d _H		Tension	Shear
									φP _{nts}	φP _{nvs}
SDHR27400	100	55	11.5	9.9	7.1	6.2	14.9	1310	14.35	9.66
SDHR27614	160	110								
SDHR31400	100	55	12.8	11.9	8.1	6.9	16.9	1380	17.64	12.36
SDHR31614	160	110								

- The factored resistance values shown include a resistance factor $\phi = 0.43$ per Sections J4.3.2, J4.4.3 and K2.1.1 of CSA S136-16 and are based on the steel properties of the screw.
- Bending yield strength values determined in accordance with ASTM F1575 using the minor thread (root) diameter, d_R

Table 2 – Factored Withdrawal and Pull-Over Resistances

Model	Factored Resistance			
	Withdrawal, φY _w (N/mm)		Pull-Over, φP _{nov} (kN)	
	D.Fir-L	S-P-F	Steel Thickness (ga)	
			16	10
SDHR27	78	70	4.10	13.24
SDHR31			4.67	13.24

- Factored withdrawal resistances assume dry service condition ($K_{SF}=1.00$) under standard term loading ($K_D=1.00$). Adjust the withdrawal values per Clause 12.6.6.1 CSA O86:19 where other conditions or loading exists.
- Factored withdrawal resistances shown require a minimum thread penetration into the main member, including the tip, of 55 mm. Include the length of the tip when calculating the total factored withdrawal resistance (P_{rw}).
- For installation into the end grain (J_E), multiply the tabulated withdrawal resistances x 0.45 for D.Fir-L and 0.62 for S-P-F.
- Factored Pull-Over resistances include a resistance factor $\phi = 0.53$ per Section K2.1.1 of CSA S136-16.
- Steel thicknesses shown are based on Manufacturers Standard Gauge (MSG) per CSSBI-Facts 10-12 and are taken as: 16 ga = 1.52 mm, 10 ga = 3.42 mm.
- For CLT, multiply the factored withdrawal resistance x 0.40 for D.Fir-L and 0.55 for S-P-F when installed into the panel edge (J_E) and 0.90 for all other applications, per Clause 12.6.6.1 CSA O86:19.

Table 3 – Factored Lateral Resistance for Single Shear Steel-to-Wood Connections

Model No.	Factored Lateral Resistance (kN)											
	Side Member Thickness (ga)											
	16		14		12		10		7		3	
	P _r	Q _r	P _r	Q _r	P _r	Q _r	P _r	Q _r	P _r	Q _r	P _r	Q _r
S-P-F												
SDHR27400	2.18	1.37	2.35	1.54	2.72	1.92	3.10	2.31	3.92	2.61	3.92	2.61
SDHR27614	2.68	1.81	2.85	1.98	3.23	2.36	3.63	2.60	3.92	2.61	3.92	2.61
SDHR31400	2.45	1.55	2.64	1.74	3.06	2.17	3.50	2.62	5.21	3.41	5.21	3.35
SDHR31614	3.42	2.04	3.62	2.24	4.05	2.67	4.51	3.11	5.21	3.47	5.21	3.47
D.Fir-L or D.Fir-L Glulam												
SDHR27400	2.42	1.48	2.59	1.65	2.96	2.02	3.34	2.42	4.23	2.82	4.23	2.82
SDHR27614	2.83	1.99	3.00	2.16	3.38	2.54	3.78	2.80	4.23	2.82	4.23	2.82
SDHR31400	2.71	1.66	2.90	1.86	3.33	2.29	3.76	2.73	5.62	3.74	5.62	3.74
SDHR31614	3.62	2.24	3.82	2.44	4.25	2.87	4.71	3.31	5.62	3.74	5.62	3.74
Spruce-Pine Glulam												
SDHR27400	2.25	1.40	2.42	1.57	2.79	1.95	3.17	2.34	4.01	2.67	4.01	2.67
SDHR27614	2.72	1.86	2.89	2.03	3.28	2.41	3.67	2.66	4.01	2.67	4.01	2.67
SDHR31400	2.52	1.58	2.71	1.77	3.14	2.21	3.57	2.65	5.33	3.55	5.33	3.51
SDHR31614	3.48	2.10	3.67	2.29	4.11	2.72	4.57	3.17	5.33	3.55	5.33	3.55
S-P-F CLT												
SDHR27400	2.04	1.37	2.20	1.54	2.58	1.92	2.96	2.31	3.72	2.61	3.72	2.61
SDHR27614	2.58	1.81	2.75	1.98	3.14	2.36	3.53	2.60	3.72	2.61	3.72	2.61
SDHR31400	2.29	1.55	2.48	1.74	2.90	2.17	3.34	2.62	4.95	3.41	4.95	3.35
SDHR31614	3.29	2.04	3.49	2.24	3.91	2.67	4.36	3.11	4.95	3.47	4.95	3.47
D.Fir-L CLT												
SDHR27400	2.25	1.48	2.42	1.65	2.79	2.02	3.17	2.42	4.01	2.82	4.01	2.82
SDHR27614	2.72	1.99	2.89	2.16	3.28	2.54	3.68	2.80	4.01	2.82	4.01	2.82
SDHR31400	2.53	1.66	2.72	1.86	3.14	2.29	3.58	2.73	5.34	3.74	5.34	3.74
SDHR31614	3.48	2.24	3.68	2.44	4.12	2.87	4.57	3.31	5.34	3.74	5.34	3.74

1. P_r = main member loaded parallel to grain; Q_r = main member loaded perpendicular-to-grain
2. For installations into the edge grain of CLT use Q_r values x 0.50 for either parallel or perpendicular to grain loading per 12.6.5.3 CSA O86:19
3. Tabulated values are for dry service condition (K_{SF}=1.00) under standard term loading (K_D=1.00). Adjust the values per Clause 12.6.5.1.1 CSA O86:19 for other durations of load.
4. Values shown are for single fastener. For design of connections with multiple screws, see Clause 12.2.2.3 CSA O86:19.
5. Factored resistances assume ASTM A653 Grade 33 (F_u=310 MPa) for 16, 14, 12 and 10 ga and ASTM A1011 Grade 33 (F_u=358 MPa) for 7 and 3 ga steel side plates
6. Steel thicknesses shown are based on Manufacturers Standard Gauge (MSG) per CSSBI-Facts 10-12 and are taken as: 3 ga = 6.07 mm, 7 ga = 4.55 mm, 10 ga = 3.42 mm, 12 ga = 2.66 mm, 14 ga = 1.90 mm, 16 ga = 1.52 mm.

Table 4 – Minimum Spacing, End and Edge Distance Requirements

Model	Dimension (mm)											
	D.Fir-L						S-P-F					
	S_p	S_Q	a	a'	e	e'	S_p	S_Q	a	a'	e	e'
SDHR27	200	100	200	150	120	70	160	80	150	120	100	50
SDHR31	240	120	240	180	144	84	192	96	180	144	120	60

1. S_p = minimum fastener spacing parallel-to-grain
2. S_Q = minimum fastener spacing perpendicular-to-grain
3. a = minimum loaded end distance
4. a' = minimum unloaded end distance
5. e = minimum loaded edge distance
6. e' = minimum unloaded edge distance
7. See Figure 2 for additional information

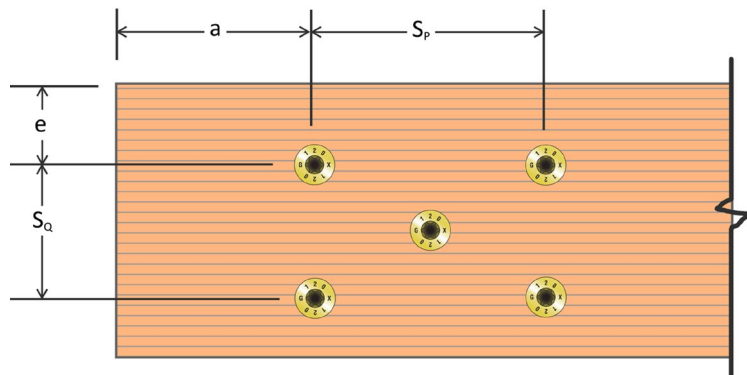


Figure 2 – Minimum Spacing, End and Edge Distance Requirements

The information in this letter is valid until **12/31/23** when it will be re-evaluated by Simpson Strong-Tie. Please visit strongtie.com for additional information. If you have questions or need further assistance regarding this matter, please contact the Simpson Strong-Tie Engineering Department at 1-800-999-5099.

Sincerely,

SIMPSON STRONG-TIE COMPANY INC.