TECHNICAL BULLETIN

ALLOWABLE LOADS FOR REDUCED HEEL HEIGHTS



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Several considerations are involved in the selection of a hanger for a truss-to-truss connection. One of the responsibilities of the Designer is to verify that all of the dimensions of the wood members are sufficient to receive the specified fasteners.

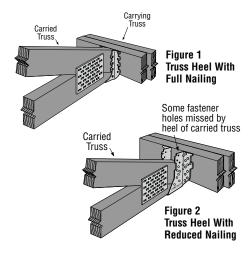
In addition to checking the carrying member for adequate size and thickness, the end condition of the carried truss (see Figure 1) must also be evaluated to determine whether there is adequate heel height in the hanger. If all of the required fastener holes do not have solid wood for the fasteners to penetrate, the allowable load for the hanger may be reduced. Figure 2 illustrates this condition.

The minimum heel height required to achieve full nailing varies from hanger to hanger, depending on the locations of the nail holes for the carried member. The minimum heel height for each hanger is defined as the distance from the top of the bearing seat to the upper most nail, plus 3%" for adequate edge distance. Minimum heel heights for several truss hangers are shown in the table below.

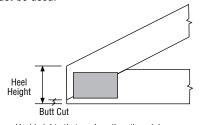
Table 1 - Minimum Heel Heights Required for Full Nailing

noighte mequitor for full manning											
Model No.	Min. Heel Height ¹	Fasteners in Carried Truss									
SINGLE 2x SIZES											
LUS26	41/4	4-10d									
MUS26	411/16	6-10d									
HUS26	45/16	6-16d									
HGUS26	49⁄16	8-16d									
LUS28	43/16	4-10d									
MUS28	65/16	8-10d									
HUS28	6½	8-16d									
HGUS28	5½	12-16d									
DO	UBLE 2x SI	ZES									
LUS26-2	4%16	4-16d									
HHUS26-2	45/16	6-160d									
HGUS26-2	4%16	8-16d									
HGUQ26-2	43/4	4-SDS1/4x3									
LUS28-2	49⁄16	4-16d									
HHUS28-2	6%16	8-16d									
HGUS28-2	6%16	12-16d									
HGUQ28-2	63/4	6-SDS1/4x3									
TF	RIPLE 3x SIZ	ES									
HGUS26-3	413/16	8-16d									
HGUQ26-3	4 ¹⁵ ⁄ ₁₆	4-SDS1/4x41/2									
HGUS28-3	613/16	12-16d									
HGUQ28-3	6 ¹⁵ ⁄ ₁₆	6-SDS1/4x4½									
QUADRUPLE 4x SIZES											
HGUQ26-4	49⁄16	4-SDS1/4x6									
HGUQ28-4	71/16	6-SDS1/4x6									

Minimum heel height shown is required to achieve full table loads in the Wood Construction Connectors Catalog. For heel heights less than the minimums listed, refer to the Reduced Heel Height Allowable Loads tables on pages 2 and 3.



The height of a truss heel depends on several factors, including the height of the butt cut, the size of the top chord, and the top chord pitch. Table 4 shows common heel heights for different combinations of top chord sizes and pitches, assuming a ½" butt cut. At each of these heel heights, the actual number of fasteners that can be installed into the heel of the carried truss is shown for the LUS, MUS, HUS, HHUS, and HGUS hangers. Where the actual number of fasteners in the carried truss heel is less than full nailing (see Table 1), allowable loads based on reduced nailing must be used.



Heel heights that are less than the minimums in Table 1 do not achieve full nailing in the carried truss (see Figure 2)

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Table 2 Reduced Heel Height Allowable Loads (DF/SP)



	Reduced	No. of	Carried Carrying		T		2x6 Carrying Member						x8 Car	rying l	Membe	er	2x10 Carrying Member				
Model No.	Heel	Carrying Member	Member	Member	Up	lift	Floor	Snow	Roof	Wind	Wind	Floor	Snow	Roof	Wind	Wind	Floor	Snow	Roof	Wind	Wind
NO.	Height	Plys	Fasteners	Fasteners	(133)	(160)	(100)	(115)	(125)	(133)	(160)	(100)	(115)	(125)	(133)	(160)	(100)	(115)	(125)	(133)	(160)
LUS26	37/8	1	3-10d	4-10d	730	875	700	805	875	935	1000	700	805	875	935	1000	700	800	800	800	800
L0320	378	2	3-10d	4-10d	730	875	775	890	970	1030	1235	775	890	970	1030	1235	775	800	800	800	800
MUS26	3½	1	4-10d	6-10d	725	725	1000	1150	1250	1330	1390	1000	1150	1250	1330	1390	1000	1150	1250	1330	1390
100020	372	2	4-10d	6-10d	725	725	1110	1280	1390	1420	1420	1110	1280	1390	1420	1420	1110	1280	1390	1420	1420
		1	4-10d	14-10d	865	865	1760	1950	1950	1950	1950	1500	1725	1880	1950	1950	1675	1925	1950	1950	1950
HUS26	3½		4-16d	14-16d	1035	1035	1980	2155	2155	2155	2155	1500	1725	1880	2000	2155	1675	1925	2095	2155	2155
110020	0,2	2	4-10d	14-10d	865	865	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950	1950
			4-16d	14-16d	1035	1035	2425	2695	2695	2695	2695	2425	2695	2695	2695	2695	2425	2695	2695	2695	2695
HGUS26 3%16	39/16	2	6-10d	20-10d	1510	1510	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350	2350
1100020	37.10		6-16d	20-16d	1745	1745	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830	2830
LUS28	37/8	1	3-10d	6-10d	730	875	700	805	875	935	1000	900	1035	1125	1200	1245	900	1035	1125	1200	1245
	0 /0	2	3-10d	6-10d	730	875	775	890	970	1030	1235	1010	1160	1260	1340	1480	1010	1160	1260	1340	1480
MUS28	3½	1	4-10d	8-10d	775	775	1000	1150	1250	1330	1390	1200	1300	1300	1300	1300	1200	1300	1300	1300	1300
0020	0,2	2	4-10d	8-10d	775	775	1110	1280	1390	1420	1420	1345	1550	1685	1690	1690	1345	1550	1685	1690	1690
		1	4-10d	22-10d	835	835	1760	1950	1950	1950	1950	1980	1980	1980	1980	1980	1980	1980	1980	1980	1980
HUS28	3½	·	4-16d	22-16d	1000	1000	1980	2155	2155	2155	2155	2810	2980	2980	2980	2980	2145	2465	2680	2860	2980
		2	4-10d	22-10d	835	835	1950	1950	1950	1950	1950	2475	2475	2475	2475	2475	2475	2475	2475	2475	2475
			4-16d	22-16d	1000	1000	2425	2695	2695	2695	2695	3210	3270	3310	3340	3450	3210	3270	3310	3340	3450
HGUS28	3%16	2	6-10d	36-10d	1395	1395	2350	2350	2350	2350	2350	3105	3105	3105	3105	3105	3105	3105	3105	3105	3105
			6-16d	36-16d	1610	1610	2830	2830	2830	2830	2830	3740	3740	3740	3740	3740	3740	3740	3740	3740	3740
		1	3-10d	4-10d	730	730	670	770	840	890	1070	670	770	840	890	1070	670	770	800	800	800
LUS26-2	37/8		3-16d	4-16d	875	875	790	905	985	1050	1260	790	905	985	1050	1260	790	800	800	800	800
		2	3-10d	4-10d	730	730	745	855	930	990	1190	745	855	930	990	1190	745	800	800	800	800
			3-16d	4-16d	875	875	915	1050	1145	1215	1465	915	1050	1145	1215	1465	800	800	800	800	800
HHUS26-2	3½	2	4-10d	14-16d	865	865	2030	2335	2485	2485	2485	2030	2335	2485	2485	2485	2030	2335	2485	2485	2485
			4-16d	14-16d	1035	1035	2440	2805	2995	2995	2995	2440	2805	2995	2995	2995	2440	2805	2995	2995	2995
HGUS26-2	39/16	2	6-10d	20-10d	1510	1510	3140	3590	3590	3590	3590	3140	3590	3590	3590	3590	3140	3590	3590	3590	3590
11011000	21/	•	6-16d	20-16d	1745	1745	3700	4255	4325	4325	4325	3150	3620	3935	4190	4325	3370	3875	4210	4325	4325
HGUQ26-2	3½	2	2-SDS1/4x3	12-SDS1/4x3	820	820	3485	3485	3485	3485	3485	2810	3230	3485	3485	3485	800	800	800	800	800
		1	3-10d	6-10d	730	730	670	770	840	890	1030	870	1000	1085	1155	1190	870	1000	1085	1155	1190
LUS28-2	37/8		3-16d	6-16d	875	875	790	905	985	1050	1215	1000	1150	1250	1330	1470	1000	1150	1250	1330	1470
		2	3-10d	6-10d	730	730	745	855	930	990	1190	980	1125	1220	1260	1260	980	1125	1220		1260
			3-16d	6-16d	875	875	915	1050	1145	1215	1465	1190	1370	1490	1555	1555	1190	1370	1490	1555	1555
HHUS28-2	3½	2	4-10d	22-10d	840	840	2030	2335	2485	2485	2485	2985	3070	3070	3070	3070	2985	3070	3070	3070	3070
			4-16d	22-16d	1000	1000	2440	2805	2995	2995	2995	3560	3700	3700	3700	3700	3560	3700	3700	3700	3700
HGUS28-2	3%16	2	6-10d	36-10d	1395	1395	3140	3590	3590	3590	3590	4230	4230	4230	4230	4230	4230	4230	4230	4230	4230
11011000.0	01/	0	6-16d	36-16d	1610	1610	3700	4255	4325	4325	4325	5100	5100	5100	5100	5100	4360	5015	5100	5100	5100
HGUQ28-2	3½	2	2-SDS1/4x3	20-SDS1/4x3	820	855	3485	3485	3485	3485	3485	5700	5700	5700	5700	5700	4065	4675	5085	5410	5700
HGUS26-3	3%16	2	6-10d	20-10d	1510	1510	3140	3590	3590	3590	3590	3140	3590	3590	3590	3590	3140	3590	3590	3590	3590
LICHOOC 0	01/	2	6-16d	20-16d	1745	1745	3700	4255	4325	4325	4325	3150	3620	3935	4190	4325	3370	3875	4210		4325
HGUQ26-3	3½	2	2-SDS1/4x4.5	12-SDS1/4x3	820	820	3685	4035	4035	4035	4035	2980	3320	3610	3840	4035	3330	3830	4035	4035	4035
HGUS28-3	3%16	2	6-10d	36-10d	1395	1395	3140	3590	3590	3590	3590	4230	4230	4230	4230	4230	4230	4230	4230	4230	4230
HGUQ28-3	31/2	2	6-16d	36-16d	1610	1610	3700 3685	4255	4325	4325	4325	5100	5100	5100	5100	5100	4360	5015	5100	5100	5100
			2-SDS1/4x4.5	20-SDS1/4X3	820	855		4035	4035	4035	4035	5700	5700	5700	5700	5700	4220	4855	5275	5615	5700
HGUQ26-4	3½ 3½	2	2-SDS1/4X6	12-SDS1/4X3	820	985	3685	4035	4035	4035	4035	2985	3430	3730	3965	4035	3340	3845	4035	4035	4035
HGUQ28-4	31/2	2	2-SDS1/4X6	20-SDS1/4X3	820	985	3685	4035	4035	4035	4035	5700	5700	5700	5700	5700	4400	5060	5500	5700	5700

^{1.} See General Notes, page 4.



	Reduced	No. of	Carried	Carrying			2x6 Carrying Member						x8 Car	rying l	Memb	er	2x10 Carrying Member				
Model No.	Heel Height	Carrying Member Plys	Member Fasteners	Member Fasteners	(133)	olift (160)	Floor	Snow	Roof (125)	Wind (133)	Wind (160)	Floor (100)	Snow (115)	Roof (125)	Wind (133)	Wind (160)	Floor (100)	Snow (115)	Roof (125)	Wind (133)	Wind
	_	1 1	3-10d	4-10d	625	(160) 755	600	(115) 675	675	675	675	600	675	675	675	675	600	675	675	675	675
LUS26	37⁄8	2	3-10d 3-10d	4-10d 4-10d	625	755	665	675	675	675	675	665	675	675	675	675	665	675	675	675	675
		1	4-10d	6-10d	625		860	895	895	895	895	860	895	895	895	895	860		895		
MUS26	31/2	2				625						1					1	895		895	895
			4-10d	6-10d	625	625	895	895	895	895	895	895	895	895	895	895	895	895	895	895	895
		1	4-10d	14-10d	745	745	1505	1505	1505	1505	1505	1125	1295	1410	1500	1505	1255	1445	1505	1505	1505
HUS26	31/2		4-16d	14-16d	890	890	1695	1720	1720	1720	1720	1125	1295	1405	1500	1720	1255	1445		1670	1720
		2	4-10d	14-10d	745	745	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505	1505
			4-16d	14-16d	890	890	2075	2150	2150	2150	2150	2075		2150	2150		2075	2150	2150	2150	2150
HGUS26	39/16	2	6-10d	20-10d	1300	1300	1965	1965	1965	1965	1965	1965		1965	1965	1965	1965	1965	1965	1965	1965
			6-16d	20-16d	1500	1500	2365	2365	2365	2365	2365	2360		2365	2365		2365	2365	2365	2365	2365
LUS28	37/8	1	3-10d	6-10d	625	755	600	675	675	675	675	775	830	830	830	830	775	830	830	830	830
		2	3-10d	6-10d	625	755	665	675	675	675	675	870	1000	1085	1140	1140	870	1000	1085	1140	1140
MUS28	31/2	1	4-10d	8-10d	670	670	860	945	945	945	945	1035	1100	1100	1100	1100	1035	1100	1100	1100	1100
1110020	072	2	4-10d	8-10d	670	670	895	895	895	895	895	1160	1280	1280	1280	1280	1160	1280	1280	1280	1280
		1	4-10d	22-10d	720	720	1505	1505	1505	1505	1505	1795	1795	1795	1795	1795	1610	1795	1795	1795	1795
HUS28	3½	'	4-16d	22-16d	860	860	1695	1720	1720	1720	1720	2260	2315	2350	2375	2380	1610	1850	2010	2140	2380
110320	372	2	4-10d	22-10d	720	720	1505	1505	1505	1505	1505	2085	2085	2085	2085	2085	2085	2085	2085	2085	2085
		2	4-16d	22-16d	860	860	2075	2150	2150	2150	2150	2260	2315	2350	2375	2470	2260	2315	2350	2375	2470
HGUS28	39/16	2	6-10d	36-10d	1200	1200	1965	1965	1965	1965	1965	2535	2535	2535	2535	2535	2535	2535	2535	2535	2535
HGU528	3%16	2	6-16d	36-16d	1385	1385	2365	2365	2365	2365	2365	3120	3120	3120	3120	3120	3120	3120	3120	3120	3120
		_	3-10d	4-10d	630	630	575	660	720	770	775	575	660	720	770	775	575	660	720	770	775
	07/	1	3-16d	4-16d	750	750	675	780	845	900	955	675	780	845	900	955	675	780	800	800	800
LUS26-2	37/8		3-10d	4-10d	630	630	640	735	785	785	785	640	735	785	785	785	640	735	785	785	785
		2	3-16d	4-16d	750	750	785	905	970	970	970	785	905	970	970	970	785	800	800	800	800
			4-10d	14-16d	745	745	1760	1975	1975	1975	1975	1760		1975	1975		1760	1975	1975	1975	1975
HHUS26-2	3½	2	4-16d	14-16d	890	890	2110	2380	2380	2380	2380	2110		2380	2380	2380	2110	2380	2380	2380	2380
			6-10d	20-10d	1300	1300	2200	2200	2200	2200	2200	2200	_	2200	2200		2200	2200	2200	2200	2200
HGUS26-2	39⁄16	2	6-16d	20-16d	1500	1500	2315	2315	2315	2315	2315	2315		2315	2315		2315	2315	2315	2315	2315
HGUQ26-2	31/2	2	2-SDS ¹ / ₄ x3	12-SDS1/4x3	705	705	2700	3100	3370	3590	3660	2110		2635	2805		800	800	800	800	800
	372	_	3-10d	6-10d	630	630	575	660	720	770	775	745	860	915	915	915	745	860	915	915	915
		1	3-16d	6-16d	750	750	675	780	845	900	955	860	990	1075	1130		860	990	1075	1130	1130
LUS28-2	37/8		3-10d 3-10d	6-10d	630	630	640	735	785	785	785	840	970	970	970	970	840	970	970	970	970
		2	3-16d	6-16d	750	750	785	905	970	970	970	1025		1200	1200		1025	1180	1200	1200	1200
			4-10d	22-10d	720	720	1760	1975	1975	1975	1975	2585		2960	2960	_	2585	2960	2960	2960	2960
HHUS28-2	31/2	2			860	860	2110		2380			1					1	3540			
			4-16d	22-16d				2380		2380	2380	3075		3565	3565		3075		3565	3565 3330	3565
HGUS28-2	3%16	2	6-10d	36-10d	1200	1200	2200	2200	2200	2200	2200	1		3330	3330		3270	3330	3330		3330
HGUQ28-2	01/	2	6-16d 2-SDS1/4x3	36-16d 20-SDS1/4x3	1385	1385 735	2315 2700	2315 3100	2315 3370	2315 3590	2315 3660	4130 5300		4130 5765	4130 5805		3270 3050	3765 3510	4090 3815	4130 4055	4130 4880
пGUQ26-2	3½	2			705							_					_				
HGUS26-3	39⁄16	2	6-10d	20-10d	1200	1200	2200	2200	2200	2200	2200	2200		2200	2200		2200	2200			2200
11011000	21/	•	6-16d	20-16d	1500	1500	2315	2315	2315	2315	2315	2315		2315	2315		2315	2315		2315	2315
HGUQ26-3	3½	2	2-SDS1/4x4.5	12-SDS1/4x3	705	705	3150	3625	3660	3660	3660	2165	_	2710	2880	_	2500	2875		3325	3660
HGUS28-3	39/16	2	6-10d	36-10d	1200	1200	2200	2200	2200	2200	2200	3330		3330	3330		3270	3330		3330	3330
			6-16d	36-16d	1385	1385	2315	2315	2315	2315	2315	4130		4130	4130		3270	3765	4090	4130	4130
HGUQ28-3	3½	2	2-SDS1/4x4.5	20-SDS1/4X3	705	735	3150	3625	3660	3660	3660	5300		5830	5830	5830	3165			4210	5065
HGUQ26-4	3½	2	2-SDS1/4X6	12-SDS1/4X3	705	850	3180	3625	3660	3660	3660	2235		2795	2795	3580	2505	2885	3135	3335	3660
HGUQ28-4	31/2	2	2-SDS1/4X6	20-SDS1/4X3	705	850	3180	3625	3660	3660	3660	5300	5830	5830	5830	5830	3300	3795	4125	4390	5280

See General Notes, page 4.

ALLOWABLE LOADS FOR REDUCED HEEL HEIGHTS



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Table 4 – Common Heel Heights with 1/4" Butt Cut and Effective Hanger Fasteners

T.C. Size	T.C. Pitch	Calculated Heel Height with 1/4" Butt Cut	Actual ¹ Number of Effective Fasteners in Carried Truss Based on Available Heel Height ²								
		(in)	LUS	MUS	HUS	HHUS	HGUS				
	1 over 12	3¾	3	4	4	4	6				
	2 over 12	313/16	3	4	4	4	6				
	3 over 12	37/8	3	4	4	4	6				
	4 over 12	315/16	3	. 4	5	5	6				
	5 over 12	41/16	4	4	5	5	6				
2 x 4	6 over 12	43/16	4	4	5	5	7				
2 × 4	7 over 12	45/16	4	4	5	5	7				
	8 over 12	47/16	4	4	6	6	7				
	9 over 12	45/8	4	5	6	6	8				
	10 over 12	413/16	4	6	6	6	8				
	11 over 12	5	4	6	6	6	8				
	12 over 12	53/16	4	6	6	6	9				
	1 over 12	53/4	4	6	6	6	10				
	2 over 12	5 ¹³ / ₁₆	4	6	6	6	10				
	3 over 12	5 ¹⁵ ⁄16	4	6	6	6	10				
	4 over 12	61/16	4	6	6	6	10				
	5 over 12	63/16	4	7	6	6	11				
2 x 6	6 over 12	6%16	4	8	7	7	11				
2 X O	7 over 12	65%	4	8	8	8	12				
	8 over 12	67//8	4	8	8	8	12				
	9 over 12	71/8	4	8	8	8	12				
	10 over 12	77/16	4	8	8	8	12				
	11 over 12	711/16	4	8	8	8	12				
	12 over 12	8	4	8	8	8	12				

- 1. Actual refers to the number of hanger nails that can be installed into the area of solid wood provided by the truss heel.
- 2. Minimum %" nail edge distance from top of heel to uppermost nail in carried member is required to consider nail effective.

REDUCED NAILING IN 2X6 AND LARGER HANGERS

Nail quantities in this area do not meet the required number of fasteners to achieve full catalog loads. Refer to the Reduced Heel Height Allowable Loads on pages 2 and 3.

FULL NAILING FOR 2X4 AND 2X6 HANGERS

Nail quantities in this area meet the required number of fasteners in the carried truss to use full catalog loads for: LUS24, LUS26, LUS26-2, LUS28, LUS28-2, MUS26, HUS26, HHUS26-2, HGUS26, HGUS26-2, HGUS26-3.

FULL NAILING FOR 2X8 HANGERS

Nail quantities in this area meet the required number of fasteners in the carried truss to use full catalog loads for: MUS28, HUS28, HHUS28-2, HGUS28, HGUS28-2, HGUS28-3.

The effect of the reduced number of nails on the hanger capacity can vary for different hanger models, species, fastener types, and type of load, i.e., download or uplift. Therefore, the reduction cannot be determined by calculation, such as by ratio. Testing was performed to establish allowable loads for reduced heel heights with less than full nailing. These allowable loads are given in Tables on pages 2 and 3.

General Notes

- 1. Allowable loads provided in these tables consider ANSI/TPI 1-2002 wood member design criteria.
- 2. Allowable loads are based on the carried member fasteners installed in the lowest fastener holes. Fasteners shall be distributed evenly on each side of the carried member in the lowest fastener holes, except LUS hangers. For LUS hangers, install fasteners into the two lowest holes on the right side of the hanger and the lowest hole on the left side.
- 3. All specified nails are common nails, 16d Sinkers may be used in place of the specified 10d commons; no other substitutions are permitted.
- 4. Uplift loads have been increased 33% for earthquake or wind loading with no further increase is allowed.
- 5. Wind (133) and (160) is a download rating.

- 6. HGUS, HHUS, and HGUQ hangers installed with the reduced fastener quantities shown in tables on pages 2 and 3 should be installed on a minimum 2-ply 2x carrying member.
- 7. Refer to the current Simpson Strong-Tie Wood Construction Connectors catalog for additional information and notes regarding the installation of the hangers covered in this bulletin.
- 8. Hangers not included in Tables 2 and 3 and having full allowable loads with reduced heel heights include the HTU (min. nailing) and THA29 with min. heel heights of 37/8" and 31/2" respectively. See the current Wood Construction Connectors catalog for more information.
- 9. Tabulated loads are based on a minimum truss top chord pitch of 3/12.

This bulletin is effective until January 31, 2009. and reflects information available as of March 1. 2007. This information is updated periodically and should not be relied upon after January 31, 2009; contact Simpson for current information and limited warranty or see www.strongtie.com.

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