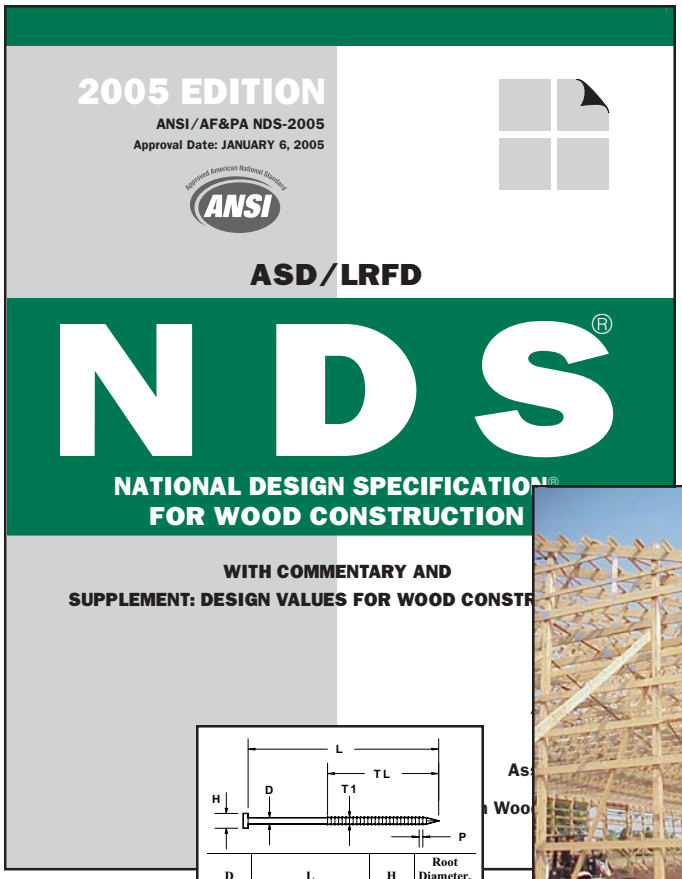
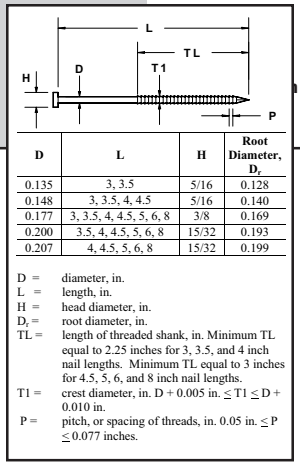
POST FRAME RING SHANK NAILS





D	L	H	Root Diameter, D_r
0.135	3, 3.5	5/16	0.128
0.148	3, 3.5, 4, 4.5	5/16	0.140
0.177	3, 3.5, 4, 4.5, 5, 6, 8	3/8	0.169
0.200	3.5, 4, 4.5, 5, 6, 8	15/32	0.193
0.207	4, 4.5, 5, 6, 8	15/32	0.199

D = diameter, in.
L = length, in.
H = head diameter, in.
D_r = root diameter, in.
TL = length of threaded shank, in. Minimum TL equal to 2.25 inches for 3, 3.5, and 4 inch nail lengths. Minimum TL equal to 3 inches for 4.5, 5, 6, and 8 inch nail lengths.
T1 = crest diameter, in. D + 0.005 in. ≤ T1 ≤ D + 0.010 in.
P = pitch, or spacing of threads, in. 0.05 in. ≤ P ≤ 0.077 inches.

American Wood Council

DESIGN AID No. 4

American Forest & Paper Association

POST FRAME RING SHANK NAILS

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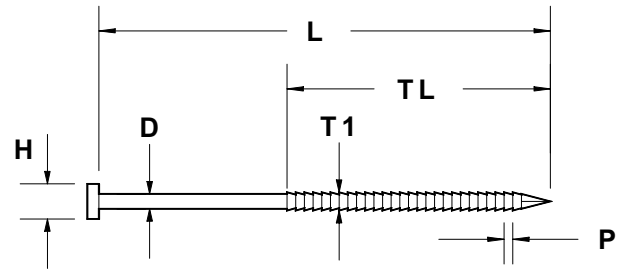
Introduction

Reference design values for post frame ring shank nails in accordance with *ASTM F 1667 Standard for Driven Fasteners: Nails, Spikes, and Staples* (see Table 1 for typical dimensions) are provided herein. Tabulated values are calculated in accordance with the *2005 National Design Specification® (NDS®) for Wood Construction* Table 11.3.1A Yield Limit Equations and Table 11.3.1B Reduction Terms based on the assumptions that 1) the root diameter, D_r, provides moment and bearing resistance; and 2) the bending yield strength, F_{yb}, of the post frame ring shank nails is in accordance with footnote 2 of the supplemental tables.

Tables:
Supplemental Table 11N Post Frame Ring Shank Nails provides reference design values for single shear wood-to-wood connections.

Supplemental Table 11P Post Frame Ring Shank Nails provides reference design values for single shear metal-to-wood connections.

TABLE 1. Post-Frame Ring Shank Nails



D	L	H	Root Diameter, D_r
0.135	3, 3.5	5/16	0.128
0.148	3, 3.5, 4, 4.5	5/16	0.140
0.177	3, 3.5, 4, 4.5, 5, 6, 8	3/8	0.169
0.200	3.5, 4, 4.5, 5, 6, 8	15/32	0.193
0.207	4, 4.5, 5, 6, 8	15/32	0.199

D = diameter, in.
L = length, in.
H = head diameter, in.
D_r = root diameter, in.
TL = length of threaded shank, in. Minimum TL equal to 2.25 inches for 3, 3.5, and 4 inch nail lengths. Minimum TL equal to 3 inches for 4.5, 5, 6, and 8 inch nail lengths.
T1 = crest diameter, in. D + 0.005 in. $\leq$ T1 $\leq$ D + 0.010 in.
P = pitch, or spacing of threads, in. 0.05 in. $\leq$ P $\leq$ 0.077 inches.

Supplemental Table 11N Post Frame Ring Shank Nail: Design Values (Z) for **Single Shear** (two-member) Connections[1,2,3,4]

for Sawn Lumber or SCL with both members of identical specific gravity

Side Member Thickness	Nail Diameter	Nail Length	G=0.67 Red Oak	G=0.55 Mixed Maple Southern Pine	G=0.5 Douglas Fir-Larch	G=0.49 Douglas Fir-Larch (N)	G=0.46 Douglas Fir(S) Hem-Fir(N)	G=0.43 Hem-Fir	G=0.42 Spruce-Pine-Fir	G=0.37 Redwood (open grain)	G=0.36 Eastern Softwoods Spruce-Pine-Fir (S) Western Cedars Western	G=0.35 Northern Species
t_s	D	L										
in.	in.	in.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1/2	0.135	3, 3.5	114	89	80	78	73	67	65	57	56	54
	0.148	3 - 4.5	127	100	89	87	81	75	73	64	63	61
	0.177	3 - 8	173	139	125	122	115	107	105	93	91	88
	0.200	3.5 - 8	188	151	137	134	126	118	115	102	100	95
	0.207	4 - 8	193	156	142	138	131	122	119	106	102	96
3/4	0.135	3, 3.5	138	106	93	90	83	75	73	62	61	58
	0.148	3 - 4.5	156	118	103	100	92	84	81	70	68	65
	0.177	3 - 8	204	157	139	134	125	115	112	97	94	91
	0.200	3.5 - 8	218	168	149	145	135	124	121	105	103	99
	0.207	4 - 8	223	173	153	149	139	128	125	109	106	103
1	0.135	3, 3.5	138	115	106	103	97	87	84	70	68	65
	0.148	3 - 4.5	156	130	119	116	107	96	93	78	76	73
	0.177	3 - 8	227	181	158	153	141	128	124	105	102	98
	0.200	3.5 - 8	250	193	168	163	151	137	133	113	110	106
	0.207	4 - 8	259	197	172	166	154	140	136	116	113	109
1 1/4	0.135	3, 3.5	138	115	106	103	98	92	90	80	77	74
	0.148	3 - 4.5	156	130	119	116	110	103	101	88	86	82
	0.177	3 - 8	227	189	173	170	160	143	139	116	112	107
	0.200	3.5 - 8	250	208	191	184	169	152	147	123	120	115
	0.207	4 - 8	259	216	195	188	172	155	150	126	123	118
1 1/2	0.135	3, 3.5	138	115	106	103	98	92	90	80	78	76
	0.148	3 - 4.5	156	130	119	116	110	103	101	90	88	85
	0.177	3 - 8	227	189	173	170	161	150	147	128	124	118
	0.200	3.5 - 8	250	208	191	187	177	166	162	136	132	126
	0.207	4 - 8	259	216	198	194	184	172	167	139	134	128
1 3/4	0.135	3, 3.5	138	115	106	103	98	92	90	80	78	76
	0.148	3 - 4.5	156	130	119	116	110	103	101	90	88	85
	0.177	3[4], 3.5[4],4 - 8	227	189	173	170	161	150	147	131	128	125
	0.200	3.5[4], 4 - 8	250	208	191	187	177	166	162	144	141	137
	0.207	4 - 8	259	216	198	194	184	172	168	149	147	140
2 1/2	0.135	3.5[4]	138	115	106	103	98	92	90	80	78	76
	0.148	3.5[4], 4, 4.5	156	130	119	116	110	103	101	90	88	85
	0.177	4[4], 4.5, 5, 6, 8	227	189	173	170	161	150	147	131	128	125
	0.200	4[4], 4.5, 5, 6, 8	250	208	191	187	177	166	162	144	141	137
	0.207	4[4], 4.5[4], 5, 6, 8	259	216	198	194	184	172	168	149	147	142
3 1/2	0.148	4.5[4]	156	130	119	116	110	103	101	90	88	85
	0.177	5[4], 6, 8	227	189	173	170	161	150	147	131	128	125
	0.200	5[4], 6, 8	250	208	191	187	177	166	162	144	141	137
	0.207	5[4], 6, 8	259	216	198	194	184	172	168	149	147	142

1. Tabulated lateral design values (Z) shall be multiplied by all applicable adjustment factors (see NDS Table 10.3.1).
2. Tabulated lateral design values (Z) are for post frame ring shank nails per ASTM F1667 (see Table 1) inserted in side grain with nail axis perpendicular to wood fibers; minimum nail penetration, p, into the main member equal to 10D; and nail bending yield strengths (F_{yb}):

   F_{yb} = 130,000 psi for 0.120"<D≤0.142" F_{yb} = 115,000 psi for 0.142"<D≤0.192" F_{yb} = 100,000 psi for 0.192"<D≤0.207"
3. When 6D≤p<10D, tabulated lateral design values (Z) shall be multiplied by p/10D.
4. Nail length is insufficient to provide 10D penetration. Tabulated lateral design values (Z) shall be adjusted per footnote 3.

Supplemental TABLE 11P Post Frame Ring Shank Nail Design Values (Z) for Single Shear (two-member) Connections[1,2,3]
with ASTM A653, Grade 33 steel side plates

Side Member Thickness t_s in.	Nail Diameter D in.	Nail Length L in.	G=0.67 Red Oak lbs.	G=0.55 Mixed Maple Southern Pine lbs.	G=0.5 Douglas Fir-Larch lbs.	G=0.49 Douglas Fir-Larch (N) lbs.	G=0.46 Douglas Fir(S) Hem-Fir(N) lbs.	G=0.43 Hem-Fir lbs.	G=0.42 Spruce-Pine-Fir lbs.	G=0.37 Redwood (open grain) lbs.	G=0.36 Eastern Softwoods Spruce-Pine-Fir (S) Western Cedars Western Woods lbs.	G=0.35 Northern Species lbs.
0.036	0.135	3, 3.5	130	111	102	100	95	89	88	78	77	75
(20 gage)	0.148	3 - 4.5	142	125	115	113	107	101	99	88	87	84
	0.177	3 - 8	171	171	167	164	156	146	143	128	126	122
	0.200	3.5 - 8	177	177	177	177	172	161	158	141	139	135
	0.207	4 - 8	178	178	178	178	178	167	164	146	144	140
0.048	0.135	3, 3.5	131	111	103	101	96	90	88	79	78	76
(18 gage)	0.148	3 - 4.5	147	125	116	113	108	101	99	89	87	85
	0.177	3 - 8	213	182	168	164	156	147	144	129	127	123
	0.200	3.5 - 8	235	200	184	181	172	162	158	142	139	135
	0.207	4 - 8	237	207	191	187	178	168	164	147	144	140
0.060	0.135	3, 3.5	132	113	104	102	97	92	90	81	79	77
(16 gage)	0.148	3 - 4.5	148	126	117	115	109	103	101	90	89	86
	0.177	3 - 8	214	183	169	165	157	148	145	130	128	124
	0.200	3.5 - 8	235	201	185	182	173	163	159	143	140	136
	0.207	4 - 8	244	208	192	188	179	168	165	148	145	141
0.075	0.135	3, 3.5	134	115	106	104	100	94	92	83	81	79
(14 gage)	0.148	3 - 4.5	150	129	119	117	112	105	103	93	91	88
	0.177	3 - 8	216	185	171	167	160	150	147	132	130	126
	0.200	3.5 - 8	237	203	187	183	175	164	161	145	142	138
	0.207	4 - 8	246	210	194	190	181	170	167	150	147	143
0.105	0.135	3, 3.5	142	122	113	111	106	100	98	88	87	83
(12 gage)	0.148	3 - 4.5	159	137	127	124	119	112	110	99	97	94
	0.177	3 - 8	223	192	178	174	166	157	154	138	136	132
	0.200	3.5 - 8	244	209	194	190	181	171	167	150	148	144
	0.207	4 - 8	252	216	200	196	187	176	173	155	153	148
0.120	0.135	3, 3.5	147	127	118	115	110	104	102	92	90	86
(11 gage)	0.148	3 - 4.5	164	141	131	129	123	116	114	103	101	98
	0.177	3 - 8	228	197	182	179	171	161	158	142	140	136
	0.200	3.5 - 8	249	214	198	194	185	175	171	154	152	147
	0.207	4 - 8	257	221	204	200	191	180	177	159	156	152
0.134	0.135	3, 3.5	152	132	122	120	115	108	106	96	93	88
(10 gage)	0.148	3 - 4.5	169	147	136	134	128	120	118	107	105	102
	0.177	3 - 8	234	202	187	184	175	165	162	146	144	140
	0.200	3.5 - 8	254	219	203	199	190	179	176	158	156	151
	0.207	4 - 8	262	225	209	205	196	185	181	163	160	156
0.179	0.135	3, 3.5	172	149	139	136	131	123	121	105	102	98
(7 gage)	0.148	3 - 4.5	191	166	154	151	145	137	134	121	118	113
	0.177	3 - 8	256	222	206	202	193	183	179	162	159	153
	0.200	3.5 - 8	276	238	221	217	208	196	192	174	171	166
	0.207	4 - 8	283	245	227	223	213	201	197	178	175	170
0.239	0.135	3, 3.5	184	156	144	141	134	126	124	106	102	98
(3 gage)	0.148	3 - 4.5	207	176	162	159	151	142	139	124	120	114
	0.177	3 - 8	293	255	236	232	220	207	203	179	174	165
	0.200	3.5 - 8	312	271	252	248	237	224	220	199	195	189
	0.207	4 - 8	319	277	258	253	242	229	224	203	199	194

1. Tabulated lateral design values (Z) shall be multiplied by all applicable adjustment factors (see NDS Table 10.3.1).
2. Tabulated lateral design values (Z) are for post frame ring shank nails per ASTM F1667 (see Table 1) inserted in side grain with nail axis perpendicular to wood fibers; minimum nail penetration, p, into the main member equal to 10D; dowel bearing strengths (F_e) of 61,850 psi for ASTM A653, Grade 33 steel and nail bending yield strengths (F_{yb}):
   F_{yb} = 130,000 psi for 0.120"<D≤0.142" F_{yb} = 115,000 psi for 0.142"<D≤0.192" F_{yb} = 100,000 psi for 0.192"<D≤0.207"
3. When 6D≤p<10D, tabulated lateral design values (Z) shall be multiplied by p/10D.

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