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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23.13—NAILS
SECTION: 06 05 23.15—STAPLES

REPORT HOLDER:

INTERNATIONAL STAPLE, NAIL AND TOOL ASSOCIATION (ISANTA)

EVALUATION SUBJECT:

POWER-DRIVEN STAPLES AND NAILS

ICC-ES Evaluation Report

ESR-1539

Reissued July 2018
Revised June 2019
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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23.13—Nails
Section: 06 05 23.15—Staples

REPORT HOLDER:

INTERNATIONAL STAPLE, NAIL AND TOOL ASSOCIATION (ISANTA)

ADDITIONAL LISTEES:

AMERICAN FASTENERS CO. LTD.

BECK AMERICA, INC.

BUILDING MATERIAL DISTRIBUTORS, INC.

FALCON FASTENERS REG'D

HUTTIG BUILDING PRODUCTS

JAACO CORPORATION

KOKI HOLDINGS AMERICA LTD.

KYOCERA SENCO INDUSTRIAL TOOLS, INC.

MID-CONTINENT STEEL & WIRE (MID-CONTINENT NAIL)

OMAN FASTENERS, LLC.

PASLODE, AN ILLINOIS TOOL WORKS COMPANY

PEACE INDUSTRIES

PRIMESOURCE BUILDING PRODUCTS

SPECIALTY FASTENING SYSTEMS, INC.

STANLEY BLACK AND DECKER INC.

EVALUATION SUBJECT:

POWER-DRIVEN STAPLES AND NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2018, 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see the ESR-1539 LABC and LARC Supplement.

Properties evaluated:

- Bending yield strength
- Compliance with prescriptive requirements of the IBC and IRC.
- Compliance with material requirements, dimensions and tolerances of ASTM F1667.
- Use in diaphragms, shear walls and braced walls.
- Fastening schedules which are alternates to those included in the codes.

2.0 USES

The nails and staples described in this report are used for engineered and nonengineered (prescriptive) structural connections.

3.0 DESCRIPTION

3.1 General:

The fasteners recognized in this report are manufactured by and for the additional listees on this report, which are member companies of the International Staple, Nail and Tool Association (ISANTA). Appendix B of this report lists the fasteners recognized for each listee.

3.2 Staples:

Recognized staples are manufactured from bright or zinc-coated carbon steel wire. Recognized staples comply with Table 60 of ASTM F1667-17 and have the characteristics shown in the table below. The staples have a minimum crown width of $^7/_{16}$ inch (11.1 mm) and a minimum leg length of $1^1/_2$ inches (38 mm). The staples are collated into strips and cohered with polymer coatings. Staple crown widths and leg lengths specified in this report are overall dimensions.

TABLE 3.2—STAPLE CHARACTERISTICS

STAPLE GAGE	NOMINAL WIRE DIAMETER (inch)	NOMINAL STAPLE WIDTH (inch)	MINIMUM BENDING MOMENT (lbf.-in.)
14	0.080	0.0855	4.3
15	0.0720	0.073	4.0
16	0.0625	0.064	3.6

For **SI:** 1 inch = 25.4 mm; 1 lbf-in = 0.113 N-m.

3.3 Nails:

Recognized nails are manufactured from bright steel wire, galvanized steel wire, or stainless steel wire. The nails have full round heads or modified round heads, such as offset heads, clipped heads ("D" heads) and notched heads, as shown in Figure 1. Nails have smooth or deformed (threaded) shanks. Deformed shanks may be annularly threaded (ring shank) or helically threaded (screw shank). Dimensional tolerances conform to ASTM F1667.

Nails designated as Metal Hardware Nails (MHN) are primarily intended for use with metal hardware (e.g. joist hangers, strap anchors, etc.), but may also be used in other engineered and prescriptive wood-to-wood or metal-to-wood connections. They have full round heads and smooth or ring shanks.

Nails with coating designated as EG are electro-galvanized in accordance with ASTM A641, Class 1. Nails with coating designated as HDG are hot-dip galvanized and comply with the coating thickness requirement of ASTM A153, Class D. Both EG and HDG nails comply with the requirements of Section 10.1 of ASTM F1667.

Specific nail products are coated with proprietary polymer coatings as indicated in Appendix B. These coatings are intended to aid in the driving of nails when used with power tools.

Nails are collated and cohered into strips or coils for loading into a power driving tool. Typical recognized products are illustrated in Figure 1. Table 1 lists nail sizes addressed in this report. See Appendix B for detailed nail descriptions including bending yield strength for products recognized for each listee. Nails for each listee having the same diameter, shank type and finish type as those listed in Appendix B, are recognized for any length.

3.4 Wood:

Wood members must be as described in the tables in this report. Sawn lumber must have an assigned specific gravity (SG) equal to or greater than what is required in the applicable table. Where use of engineered wood products is addressed in tables in this report, the products must have an equivalent specific gravity (ESG) equal to or greater than the SG that is addressed in the table, as shown in the applicable ICC-ES evaluation report for the engineered wood product.

3.5 Steel Side Plates:

Steel side plates must comply with ASTM A653 SS Grade 33 or 40, or with ASTM A36, as indicated in Table 3B. The steel must have a minimum base steel thickness as indicated in Table 3B. Holes in steel side plates must be predrilled or prepunched to allow for the installation of the nails.

4.0 DESIGN AND INSTALLATION

4.1 Design for Staples:

4.1.1 Engineered Connections: Reference withdrawal design values for staples recognized in this report may be calculated in accordance with Section A2.3 of Appendix A. Reference withdrawal design values for select connections are shown in Table 4. The reference lateral design values for staples recognized in this report may be calculated in accordance with Section A2.2 of Appendix A.

4.1.2 Engineered Diaphragms and Shear Walls: The staples recognized in this report may be used in engineered diaphragms and shear walls, in accordance with the diaphragm and shear wall design tables in the IBC and Tables 5 through 9, when the staples comply with the requirements in the applicable table for gage, crown width and leg length. Diaphragm and shear wall deflection must be determined in accordance with Section A3.2.

4.1.3 Prescriptive Sheathing Attachments: The staples recognized in this report may be used to attach sheathing to wood framing as prescribed in the code tables referenced in Table 2, when the staples comply with the code requirements for gage, crown width and leg length.

4.2 Design for Nails:

4.2.1 Engineered Connections: All reference design values must be multiplied by all applicable adjustment factors in accordance with the ANSI/AWC National Design Specification for Wood Construction (NDS).

4.2.1.1 Reference Lateral Design Values: The nails recognized in this report comply with the requirements of IBC Section 2303.6 and may be used in lateral connections designed in accordance with the NDS, using the specified minimum bending yield strength and the nominal diameter shown in Appendix B, as applicable. The yield mode equations in the NDS for nails are shown in Section A1.2 of Appendix A to this report. Reference lateral design values for common wood-to-wood connections are shown in Table 3A, and reference lateral design values for common metal-side-plate-to-wood connections are shown in Table 3B.

4.2.1.2 Reference Withdrawal Design Values: The nails recognized in this report may be used in tension connections designed in accordance with the NDS, using the nominal diameter shown in Appendix B, as applicable, and the embedded length of the nail in the holding member. For stainless steel nails, the reference withdrawal design values must be determined in accordance with the 2018 NDS, for use under the 2018, 2015, 2012, 2009 and 2006 IBC. Reference withdrawal design values for common wood specific gravities are shown in Table 4. The withdrawal equations in the 2018 NDS for nails are shown in Section A1.3 of Appendix A to this report.

4.2.1.3 Reference Head Pull-through Design Values: For nails shown in Appendix B as having round heads, reference head pull-through values must be determined in accordance with Section 12.2.5 of the 2018 NDS, for use under the 2018, 2015, 2012, 2009 and 2006 IBC. For nails shown in Appendix B as having other head styles, determination of reference head pull-through design values is outside the scope of this report.

4.2.2 Prescriptive Framing Connections: The carbon steel nails may be used for prescriptive framing connections when the nails comply with the requirements in the applicable code for diameter and length. In addition, Tables 10, 11 and 12 show fastening designs for framing connections under the 2018, 2015 and 2012 IBC and IRC, which are alternatives to what is prescribed in 2018 and 2015 IBC Table 2304.10.1 (2012 IBC Table 2304.9.1) and in IRC Table R602.3(1). These alternative fastener designs address the use of stainless steel nails. The alternative fastener designs shown in Tables 10, 11 and 12 are summarized in Table 13.

4.2.3 Prescriptive Metal Hardware Connections: Nails designated as Metal Hardware Nails, as well as other nails recognized in this report as having full round heads and the applicable dimensions, may be used to attach metal hardware (e.g. joist hangers, foundation anchors) to wood framing members as prescribed in ICC-ES evaluation reports on metal hardware. Use of Metal Hardware Nails in diaphragms and shear walls is outside the scope of this report.

4.2.4 Engineered Diaphragms and Shear Walls: The nails may be used in shear walls and diaphragms designed in accordance with the ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS) and the tables in this report when they are of the required material, shank type, diameter and length indicated in Tables 5 through 8 of this report, and when indicated in Appendix B as meeting the head area requirements for use in lateral force resisting assemblies for the applicable nail size.

Allowable shear values for diaphragms comprised of wood structural panels attached to wood framing are shown in Tables 5 and 6. Design of roof diaphragms must consider uplift due to wind.

Allowable shear values for shear walls comprised of wood structural panels attached directly to wood framing or over gypsum sheathing are shown in Tables 7 and 8. Design of exterior shear walls must also consider transverse (out-of-plane) loads on sheathing due to wind.

Allowable shear values for shear walls comprised of fiberboard sheathing, gypsum lath and plaster, gypsum sheathing, gypsum wallboard, metal or wire lath and plaster, or plywood siding applied directly to wood framing are shown in Table 9.

Diaphragm and shear wall deflection must be determined in accordance with Section A3.1.

4.2.5 Prescriptive Sheathing Attachments: Table 2 references the code tables where nails are prescribed for attaching sheathing to framing. Carbon steel nails (bright or galvanized) shown in Appendix B as meeting the head area ratio requirements for use in lateral force resisting assemblies may be used where the same nail types and sizes are prescribed in the referenced code tables.

4.3 Installation:

The nails must be installed in accordance with this report, the listee's published installation instructions, the approved plans, if applicable, and the applicable prescriptions in the code.

Nails used with metal hardware (joist hangers, truss plates, etc.) must be installed in accordance with the metal hardware manufacturer's instructions and any applicable ICC-ES evaluation report.

The nails described in this report are packaged for use in power tools. The nails must be installed using a tool recommended by the applicable listee. Individual nails may also be manually driven.

Edge distances, end distances, and spacings must be sufficient to prevent splitting of the wood. Installation into sawn lumber must be in accordance with the applicable requirements of 2018 and 2015 NDS Section 12.1.6 (2012 NDS Section 11.1.6 for the 2012 IBC; 2005 NDS Section 11.1.5 for the 2009 and 2006 IBC).

4.4 Special Inspection:

Periodic special inspection of nailing used in the construction of main windforce-resisting systems is required by 2018 and 2015 IBC Section 1705.11.1 (2012 IBC Section 1705.10.1, 2009 IBC Section 1706.2) when the nail spacing is 4 inches (102 mm) or less. Periodic special inspection of nailing used in the construction of seismic force-resisting systems is required by 2018 and 2015 IBC Section 1705.12.2 (2012 IBC Section 1705.11.2, 2009 and 2006 IBC Section 1707.3) when the nail spacing is 4 inches (102 mm) or less.

4.5 Use in Treated Lumber: In accordance with 2018 and 2015 IBC Section 2304.10.5 (2012, 2009 and 2006 IBC Section 2304.9.5) and IRC Section R317.3 (2006 IRC Section R319.3), stainless steel (SS) and hot-dip galvanized (HDG) nails listed in Appendix B, may be used in preservative-treated and fire-retardant-treated lumber. Use of nails listed in Appendix B as having a proprietary coating for installation in preservative-treated lumber in specific Exposure Conditions, is addressed in Appendix B or in applicable ICC-ES evaluation reports referenced in Appendix B. Nails and staples listed in Appendix B as bright must not be used in treated lumber. Use of nails and staples with other coatings in treated lumber is outside the scope of this report.

5.0 CONDITIONS OF USE

The nails and staples described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The nails and staples must be installed in accordance with this report, the listee's published installation instructions, the approved plans (if applicable), and the applicable prescriptions in the code. In the case of a conflict amongst these documents, the most restrictive requirements govern.

5.2 The fastener dimensions specified in the design tables in this report are minimum nominal dimensions. When fasteners larger than those specified are used for any application, consideration must be given to restrictions on edge distance and close spacing.

5.3 See Section 4.5 regarding use of staples and nails in treated wood.

5.4 The nails and staples described in Appendix B of this report are manufactured under quality control programs with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Nails (AC116), dated March 2018.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Staples (AC201), dated March 2018.

7.0 IDENTIFICATION

7.1 Packages of nails and staples must be identified with one of the ISANTA logos shown below or the name of one of the listees identified in this report, the applicable brand name (shown in Appendix B), fastener size (nail diameter and length or staple gage, crown width and length), finish/coating designation, and country of origin. Packages are also identified with the evaluation report number (ESR-1539), ICC-ES mark and the evaluation report number (ESR-1539), "ICC-ES ESR-1539" or an ICC-ES machine readable code which includes the evaluation report number (ESR-1539) as shown below.

ISANTA Logos

ICC- ES Mark

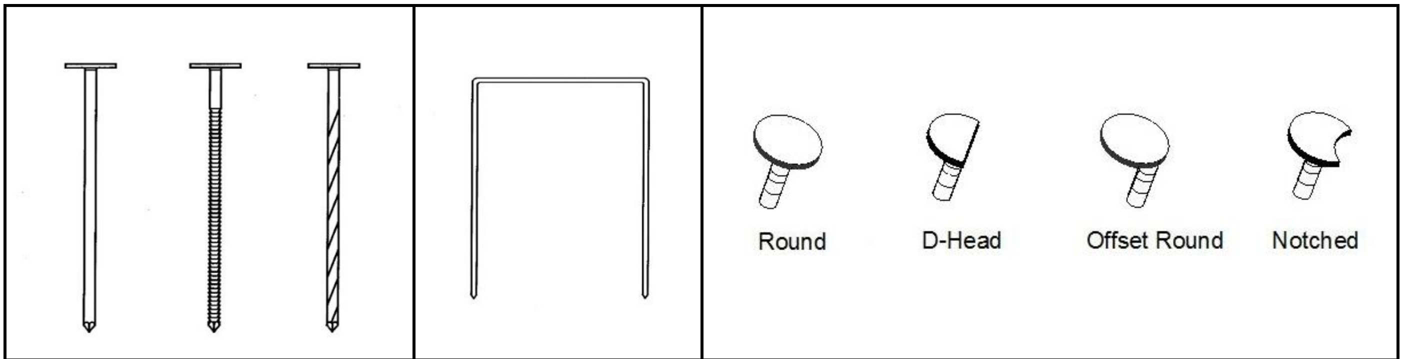
ICC-ES Machine-readable Code

7.2 The report holder's contact information is the following:

INTERNATIONAL STAPLE, NAIL AND TOOL ASSOCIATION
8735 WEST HIGGINS ROAD, SUITE 300
CHICAGO, ILLINOIS 60631
(847) 375-6454
www.isanta.org
info@isanta.org

7.3 The Additional Listees' contact information appears in the Table B1 of Appendix B.

INDEX TO TABLES, FIGURES AND APPENDICES



Smooth Ring Screw **NAIL SHANK STYLES**	**STAPLE**	**NAIL HEAD STYLES**

FIGURE 1—BASIC FASTENER STYLES

TABLE 1—NAIL DIAMETERS ADDRESSED IN THIS REPORT[1]

SHANK DIAMETER (inch)	**DESCRIBED IN ASTM F1667-17**				**OTHERS**	
	TYPE AND PENNYWEIGHT	**LENGTH (inches)**	**HEAD DIAMETER (inch)**	**SHANK STYLE**	**COMMONLY AVAILABLE LENGTHS (inches)**	**SHANK STYLES**
0.092	6d cooler	1 7/8	0.250	Smooth, Ring, Screw	1 1/4, 1 1/2, 1 5/8, 1 3/4, 2, 2 1/8, 2 3/16, 2 1/4, 2 3/8, 2 1/2	Smooth, Ring, Screw
0.099	6d box	2	0.266	Smooth	1 1/8, 1 1/2, 1 3/4, 1 7/8, 2, 2 1/4, 2 3/8	Smooth, Ring, Screw
0.113	6d common	2	0.266	Smooth	2, 2 1/4, 2 3/8, 2 1/2	Smooth, Ring, Screw
	8d box	2 1/2	0.297			
	8d cooler	2 3/8	0.281			
0.120	–	–	–	–	2, 2 1/4, 2 3/8, 2 1/2, 2 3/4, 3, 3 1/4, 3 1/2, 3 3/4, 4	Smooth, Ring, Screw
0.131	8d common	2 1/2	0.281	Smooth	2, 2 1/4, 2 3/8, 2 1/2, 2 3/4, 3, 3 1/4, 3 3/8, 3 1/2, 3 3/4, 4	Smooth, Ring, Screw
	Metal Hardware[2]	1 1/4, 1 1/2, 2 1/4, 2 3/8, 2 1/2	0.281	Smooth, Ring		
0.135	16d box	3 1/2	0.344	Smooth	2 3/8, 2 1/2, 3 1/2	Ring, Screw
0.148	10d common	3	0.312	Smooth	2, 2 1/8, 2 1/4, 2 3/8, 2 1/2, 3, 3 1/4, 3 1/2, 4	Smooth, Ring, Screw
	12d common	3 1/4	0.312			
	Metal Hardware[2]	1 1/4, 1 1/2, 2 1/2, 3, 3 1/2,	0.281	Smooth, Ring		
0.162	16d common	3 1/2	0.344	Smooth	3, 3 1/4, 3 1/2, 4	Smooth, Ring, Screw
	Metal Hardware[2]	2 1/2, 3, 3 1/2	0.281	Smooth, Ring		
0.180	–	–	–	–	5 3/8	Smooth
0.197	–	–	–	–	5 3/8	Smooth

For **SI:** 1 inch = 25.4 mm.

[1]See Appendix B for recognized nail products for each listee.
[2]Nails intended for use with metal hardware such as joist hangers. See Appendix B of this report for associated designations on product labels.

TABLE 2—APPLICABLE FASTENING SCHEDULES IN THE CODES FOR ATTACHMENT OF SHEATHING TO FRAMING

CONSTRUCTION	CODE	TABLE NUMBER
Roof Sheathing Attachment	2018 and 2015 IBC	2304.10.1
	2012, 2009 and 2006 IBC	2304.9.1
	2018, 2015, 2012, 2009 and 2006 IRC	R602.3(1), R602.3(2)
Wall Sheathing Attachment	2018 and 2015 IBC	2304.10.1
	2012, 2009 and 2006 IBC	2304.9.1
	2018, 2015, 2012, 2009 and 2006 IRC	R602.3(1), R602.3(2), R602.3(3)
Floor Sheathing Attachment	2018 and 2015 IBC	2304.10.1
	2012, 2009 and 2006 IBC	2304.9.1
	2018, 2015, 2012, 2009 and 2006 IRC	R602.3(1), R602.3(2)

TABLE 3A—REFERENCE LATERAL DESIGN VALUES OF FACE NAILED SINGLE SHEAR CONNECTIONS OF "2-BY" MEMBERS TO OTHER MEMBERS OF SAME SPECIES[1,2,3,4,5,6]

NAIL DIMENSIONS		REFERENCE LATERAL DESIGN VALUES FOR SPECIFIC GRAVITIES OF: (lbf)			
Length (inches)	Nail Shank Diameter (inches)	0.42 (e.g., Spruce-pine-fir)	0.43 (e.g., Hem-fir)	0.50 (e.g., Douglas Fir-larch)	0.55 (e.g., Southern Pine)
$3^1/_2$	0.162	111	113	131	143
$3^1/_4$	0.148	100	102	118	128
3	0.148	100	102	118	128
$3^1/_2$	0.135	88	89	103	113
$3^1/_4$	0.131	82	84	97	106
3	0.131	82	84	97	106
$2^1/_2$	0.131	63	64	74	81
$3^1/_4$	0.120	69	71	81	89
3	0.120	69	71	81	89
$2^1/_2$	0.113	54	56	64	70
$2^3/_8$	0.113	47	49	56	61
$2^1/_4$	0.099	36	36	42	46

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45N, 1 psi = 6.89 kPa.

[1]Design values are based on a normal load duration.
[2]Table values must be multiplied by all applicable adjustment factors in the NDS.
[3]Table is based upon a $1^1/_2$-inch actual thickness of both attached member and receiving ("main") member.
[4]Design values are for connections in which the nail shank is driven into the side grain with shank axis perpendicular to wood fibers. Tabulated values are based on a minimum fastener bending yield strength (F_{yb}) of 100,000 psi for nail diameters of 0.135 inch or less, and a minimum fastener bending yield strength (F_{yb}) of 90,000 psi for nail diameters of 0.148 and 0.162 inch.
[5]Calculations are based on a connection in which both members have the same specific gravity.
[6]Reference lateral design values apply to nails with either a smooth shank or a deformed shank.

TABLE 3B—REFERENCE LATERAL DESIGN VALUES OF FACE NAILED SINGLE SHEAR CONNECTIONS OF STEEL SIDE MEMBERS TO WOOD MEMBERS[1,2,3,4]

STEEL SIDE MEMBER THICKNESS[6] (inch)	REFERENCE LATERAL DESIGN VALUES FOR SPECIFIC GRAVITIES[5] OF: (lbf)														
	0.42 (e.g., Spruce-pine-fir)					0.50 (e.g., Douglas Fir-larch)					0.55 (e.g., Southern Pine)				
	Nail Diameter (inch)					Nail Diameter (inch)					Nail Diameter (inch)				
	0.131		0.148		0.162	0.131		0.148		0.162	0.131		0.148		0.162
	Nail Length (inches)					Nail Length (inches)					Nail Length (inches)				
	1 1/2	2 1/4, 2 3/8, 2 1/2	1 1/2	2 1/2, 3, 3 1/2	2 1/2, 3, 3 1/2	1 1/2	2 1/4, 2 3/8, 2 1/2	1 1/2	2 1/2, 3, 3 1/2	2 1/2, 3, 3 1/2	1 1/2	2 1/4, 2 3/8, 2 1/2	1 1/2	2 1/2, 3, 3 1/2	2 1/2, 3, 3 1/2
ASTM A653, Grade 33 Steel Side Plate															
0.033 - 0.036	82	82	97	97	117	94	94	112	113	136	102	102	122	123	147
0.044 - 0.048	83	83	97	98	117	95	95	112	114	136	102	102	122	124	148
0.055 - 0.060	84	84	97	99	118	96	96	113	115	138	104	104	122	125	149
0.068 - 0.075	86	86	98	102	121	98	98	114	118	140	106	106	123	127	151
0.097 - 0.105	93	93	103	108	127	105	105	118	125	147	113	113	128	135	159
0.127 - 0.134	102	102	109	118	137	115	115	126	135	157	124	124	135	146	170
0.171 - 0.179	116	116	123	137	157	132	132	138	154	177	142	142	149	166	190
0.228 - 0.240	111	116	119	140	168	127	132	137	160	192	138	144	148	174	209
ASTM A653, Grade 40 Steel Side Plate															
0.033 - 0.036	83	83	97	98	117	95	95	113	114	137	103	103	123	124	149
0.044 - 0.048	84	84	98	99	118	96	96	114	116	138	104	104	123	125	150
0.055 - 0.060	86	86	99	101	120	98	98	115	117	141	106	106	124	127	151
0.068 - 0.075	89	89	101	104	123	101	101	117	121	144	109	109	126	130	155
0.097 - 0.105	97	97	107	113	132	110	110	123	130	155	118	118	133	140	164
0.127 - 0.134	108	108	115	124	143	122	122	133	143	168	131	131	143	154	178
0.171 - 0.179	116	116	127	141	167	133	133	145	161	193	145	145	157	175	203
0.228 - 0.240	112	116	120	141	169	128	133	137	161	193	139	145	149	175	210
ASTM A36, Steel Side Plate															
0.250	111	117	117	139	169	128	134	137	162	194	139	145	157	186	222

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45N, 1 psi = 6.89 kPa.

[1]Design values are for normal load duration and must be multiplied by all applicable adjustment factors in the NDS.

[2]The tabulated values have been calculated in accordance with the Yield Mode Equations in Appendix A1.2. Dowel bearing strengths (F_{es}) used to calculate design values are 61,850 psi for ASTM A653, Grade 33; 75,600 psi for ASTM A653 Grade 40; and 87,000 psi for ASTM A36 side member material.

[3]Lateral design values are based on F_{yb} = 100,000 psi for 0.131-inch diameter nails; and F_{yb} = 90,000 psi for 0.148 and 0.162-inch diameter nails.

[4]Wood member must be of sufficient thickness for the nail point to be fully embedded in the wood.

[5]Specific Gravity values must be the assigned specific gravity from Table A or 2018 or 2015 NDS Table 12.3.3A for the 2018 and 2015 IBC (2012 NDS Table 11.3.3A for the 2012 IBC, 2005 NDS Table 11.3.2A for the 2009 and 2006 IBC) or the equivalent specific gravity for engineered wood products, as shown in an ICC-ES evaluation report.

[6]These thicknesses are base metal thicknesses and are based on typical steel thicknesses recognized in various ICC-ES evaluation reports for metal hardware and on the thicknesses addressed in Table 12P of the 2018 and 2015 NDS.

TABLE 4—NAIL AND STAPLE REFERENCE WITHDRAWAL DESIGN VALUES[1,2,3] (pounds-force per inch of penetration)

SPECIFIC GRAVITY[4]	SMOOTH AND DEFORMED[5] SHANK CARBON STEEL NAILS (BRIGHT OR GALVANIZED), DIAMETER IN INCHES										SMOOTH AND DEFORMED[5] SHANK STAINLESS STEEL NAILS, DIAMETER IN INCHES								STAPLE GAGE AND DIAMETER[6], in inches		
	0.092	0.099	0.113	0.120	0.131	0.135	0.148	0.162	0.180	0.197	0.092	0.099	0.113	0.120	0.131	0.135	0.148	0.162	16 gage 0.063	15 gage 0.072	14 gage 0.080
0.31	7	7	8	9	10	10	11	12	13	15	7	8	9	10	11	11	12	13	9	11	12
0.35	9	10	11	12	13	14	15	16	18	20	9	10	11	12	13	13	14	16	13	14	16
0.36	10	10	12	13	14	14	16	17	19	21	9	10	11	12	13	14	15	16	13	15	17
0.37	11	11	13	14	15	16	17	19	21	23	10	10	12	13	14	14	15	17	14	17	18
0.38	11	12	14	15	16	17	18	20	22	24	10	11	12	13	14	15	16	18	15	18	20
0.39	12	13	15	16	17	18	19	21	24	26	10	11	13	14	15	15	17	18	16	19	21
0.40	13	14	16	17	18	19	21	23	25	28	11	12	13	14	15	16	17	19	17	20	22
0.41	14	14	17	18	19	20	22	24	27	29	11	12	14	15	16	16	18	20	19	21	24
0.42	15	15	18	19	21	21	23	26	28	31	12	13	14	15	17	17	19	21	20	23	25
0.43	15	16	19	20	22	23	25	27	30	33	12	13	15	16	17	18	19	21	21	24	27
0.44	16	17	20	21	23	24	26	29	32	35	12	13	15	16	18	18	20	22	22	26	28
0.46	18	19	22	24	26	27	29	32	36	39	13	14	16	17	19	20	21	24	25	29	32
0.47	19	20	24	25	27	28	31	34	38	41	14	15	17	18	20	20	22	24	26	30	33
0.49	21	22	26	28	30	31	34	38	42	46	15	16	18	19	21	22	24	26	29	33	37
0.50	22	24	28	29	32	33	36	40	44	48	15	16	19	20	22	22	24	27	30	35	39
0.51	24	25	29	31	34	35	38	42	46	50	16	17	19	20	22	23	25	27	32	37	41
0.55	28	30	35	37	41	42	46	50	56	61	17	19	21	23	25	26	28	31	39	45	50
0.58	33	34	40	42	46	48	52	57	64	70	19	20	23	25	27	28	30	33	44	51	57
0.67	47	49	57	61	66	68	75	82	91	100	23	25	29	31	33	34	38	41	63	73	81
0.68	48	51	59	63	69	71	78	85	95	104	24	26	29	31	34	35	39	42	66	76	84
0.71	54	57	66	70	77	79	87	95	106	115	26	28	31	33	36	38	41	45	73	84	94
0.73	58	61	71	75	82	85	93	102	113	124	27	29	33	35	38	39	43	47	79	90	101

For **SI:** 1 inch = 25.4 mm, 1 pound-force per inch = 0.175 N/mm.

[1]Design values are based on a normal (10 year) duration of load.

[2]Table values must be multiplied by all applicable adjustment factors in the NDS.

[3]Withdrawal strengths are for fasteners driven perpendicular to the grain.

[4]Specific Gravity values must be the assigned specific gravity from Table A or 2018 or 2015 NDS Table 12.3.3A for the 2018 and 2015 IBC (2012 NDS Table 11.3.3A for the 2012 IBC, 2005 NDS Table 11.3.2A for the 2009 and 2006 IBC) or the equivalent specific gravity for engineered wood products, as shown in an ICC-ES evaluation report.

[5]Applies to deformed nails recognized in this report.

[6]Values account for both staple legs.

TABLE 5—ALLOWABLE SHEAR FOR WIND OR SEISMIC LOADING FOR WOOD STRUCTURAL PANEL HORIZONTAL DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE AND STRUCTURAL I SHEATHING (plf)[1,2,3,4,5,6,7,8,9]

NOMINAL NAIL DIAMETER (inch) or STAPLE GAGE Nails must be smooth or deformed, and must be carbon steel (bright or galvanized).	MINIMUM REQUIRED FASTENER LENGTH (inches)	MINIMUM WIDTH OF FRAMING MEMBER (inches)	BLOCKED DIAPHRAGMS								UNBLOCKED DIAPHRAGMS			
			FASTENER SPACING (inch) AT DIAPHRAGM BOUNDARIES (ALL CASES), AT CONTINUOUS PANEL EDGES PARALLEL TO LOAD (CASES 3, 4), AND AT ALL PANEL EDGES (CASES 5 & 6)								FASTENERS SPACED 6" MAX. AT SUPPORTED EDGES			
			6		4		2 1/2		2		Case 1 (No unblocked edges or continuous joints parallel to load)		All other configurations (Cases 2, 3, 4, 5 & 6)	
			Nail spacing at other panel edges (Cases 1, 2, 3 & 4)											
			6		6		4		3					
			Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind
3/8-inch Nominal Panel Thickness														
0.131	1 3/4	2	270	375	360	505	530	740	600	840	240	335	180	255
		3	300	420	400	560	600	840	675	945	265	370	200	280
0.120	1 3/4	2	230	320	305	435	455	635	515	720	200	290	150	220
		3	255	360	340	480	510	720	580	810	225	320	170	240
0.113	1 3/4	2	205	290	275	390	410	570	465	645	180	260	135	200
		3	230	325	305	430	460	645	520	725	205	285	155	215
14, 15, 16 Gage	1 1/2 Leg Length	2	175	245	235	330	350	490	400	560	155	215	115	160
		3	200	280	265	370	395	550	450	630	175	245	130	180
15/32-inch Nominal Panel Thickness														
0.148 smooth	2	2	320	445	425	595	640	895	730	1025	285	400	215	300
		3	360	505	480	670	720	1005	820	1150	320	445	240	335
0.135	2	2	285	395	380	530	570	795	650	910	255	355	195	270
		3	320	450	430	595	640	895	730	1020	285	395	215	300
0.131	2	2	270	375	360	505	540	755	610	865	240	340	180	255
		3	305	425	405	565	605	845	685	970	270	375	200	285
0.120	2	2	230	325	310	435	465	650	525	745	205	290	155	220
		3	260	370	350	490	520	730	590	835	230	325	175	245
0.113	2	2	210	295	280	395	420	590	475	675	185	265	140	200
		3	235	335	315	440	470	660	535	755	210	295	155	220
14, 15, 16 Gage	1 1/2 Leg Length	2	175	245	235	330	350	490	400	560	155	215	120	160
		3	200	280	265	370	395	550	450	630	175	245	130	180

See page 11 for footnote explanations and case diagrams.

TABLE 6—ALLOWABLE SHEAR FOR WIND OR SEISMIC LOADING FOR WOOD STRUCTURAL PANEL HORIZONTAL DIAPHRAGMS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE AND RATED SHEATHING (plf)[1,2,3,4,5,6,7,8,9]

NOMINAL NAIL DIAMETER (inch) or STAPLE GAGE (Nails must be smooth or deformed and must be carbon steel (bright or galvanized).)	MINIMUM REQUIRED FASTENER LENGTH (inches)	MINIMUM WIDTH OF FRAMING MEMBER (inches)	BLOCKED DIAPHRAGMS								UNBLOCKED DIAPHRAGMS			
			FASTENER SPACING (inch) AT DIAPHRAGM BOUNDARIES (ALL CASES), AT CONTINUOUS PANEL EDGES PARALLEL TO LOAD (CASES 3, 4), AND AT ALL PANEL EDGES (CASES 5 & 6)								FASTENERS SPACED 6" MAX. AT SUPPORTED EDGES			
			6		4		$2^1/_2$		2		Case 1 (No unblocked edges or continuous joints parallel to load)		All other configurations (Cases 2, 3, 4, 5 & 6)	
			Nail spacing at other panel edges (Cases 1, 2, 3 & 4)											
			6		6		4		3					
			Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind	Seismic	Wind
$^3/_8$-inch Nominal Panel Thickness														
0.131	$1^3/_4$	2	240	335	320	445	480	670	545	760	215	300	160	225
		3	270	375	360	505	540	755	610	855	240	335	180	250
0.120	$1^3/_4$	2	205	285	270	375	405	565	460	640	180	255	135	190
		3	230	315	305	425	455	640	515	720	205	285	150	210
0.113	$1^3/_4$	2	180	255	240	335	360	505	410	575	160	225	120	170
		3	205	285	270	380	405	570	460	645	180	255	135	190
14, 15,16 Gage	$1^1/_2$ Leg Length	2	160	225	210	295	315	440	360	505	140	195	105	145
		3	180	250	235	330	355	495	400	560	160	225	120	170
$^7/_{16}$-inch Nominal Panel Thickness														
0.131	2	2	255	360	340	475	505	705	575	805	230	320	170	235
		3	285	400	380	530	570	800	645	900	255	355	190	265
0.120	2	2	215	305	290	405	430	600	490	685	190	270	145	200
		3	240	340	325	450	485	680	550	765	215	300	160	225
0.113	2	2	195	275	260	360	385	540	440	615	175	245	130	180
		3	215	305	290	405	435	610	490	685	195	270	145	200
14, 15, 16 Gage	$1^1/_2$ Leg Length	2	165	230	225	315	335	470	380	530	150	210	110	155
		3	190	265	250	350	375	525	425	595	165	230	125	175
$^{15}/_{32}$-inch Nominal Panel Thickness														
0.148	2	2	290	405	385	540	575	805	655	920	255	360	190	265
		3	325	455	430	605	650	910	735	1030	290	405	215	300
0.135	2	2	255	355	340	475	505	710	580	810	225	315	170	235
		3	285	400	380	530	575	800	650	910	255	355	190	265
0.131	2	2	270	380	360	505	530	740	600	840	240	335	180	255
		3	300	420	400	560	600	840	675	945	265	370	200	280
0.120	2	2	230	325	305	430	450510	630	510	715	205	285	155	220
		3	255	360	340	480		715	575	805	225	315	170	240
0.113	2	2	205	290	275	385	405	570	460	645	185	255	140	195
		3	230	320	305	430	460	645	520	725	205	285	155	215
14, 15, 16 Gage	$1^1/_2$ Leg Length	2	160	225	210	295	315	440	360	505	140	195	105	145
		3	180	250	235	330	355	495	405	565	160	225	120	170
$^{19}/_{32}$-inch Nominal Panel Thickness[10]														
0.148	$2^1/_4$	2	320	445	425	595	640	895	730	1025	285	400	215	300
		3	360	505	480	675	720	1010	820	1150	320	445	240	335
0.135	$2^1/_4$	2	285	395	375	525	565	795	645	905	255	355	190	265
		3	320	450	425	595	640	895	725	1020	285	395	215	295
0.131	$2^1/_4$	2	270	375	360	500	540	755	615	860	240	335	180	255
		3	305	425	405	565	605	850	690	965	270	375	200	285
0.120	$2^1/_4$	2	235	325	310	435	465	650	530	745	205	290	155	220
		3	260	365	350	490	525	735	595	835	235	325	175	245
0.113	$2^1/_4$	2	210	295	280	395	420	590	480	675	190	265	140	200
		3	240	335	315	445	475	665	540	760	210	295	160	220
14, 15, 16 Gage	$1^1/_2$ Leg Length	2	175	245	235	330	350	490	400	560	155	215	115	160
		3	200	280	265	370	395	555	450	630	175	245	130	180

See page 11 for footnote explanations and case diagrams.

FOOTNOTE EXPLANATIONS FOR HORIZONTAL DIAPHRAGM TABLES 5 AND 6

[1]For **SI:** 1 inch = 25.4 mm, 1 plf = 14.6 N/m.

[2]Diaphragm construction using nails must be in accordance with Section 4.2.6 and 4.2.7 of the 2015 and 2008 AWC Special Design Provisions for Wind and Seismic (SPDWS), and diaphragm construction using staples must be in accordance with 2018 and 2015 IBC Tables 2306.2(1) and 2306.2(2) (similar for earlier codes), as applicable.

[3]Tabulated values are for short-time loading due to wind or seismic. The tabulated seismic values must be reduced by 37 percent and 44 percent for normal and permanent load duration, respectively.

[4]The tabulated values are for fasteners installed in Douglas Fir-larch or Southern Pine framing. For framing of other species: (1) Find the assigned specific gravity for the applicable species of lumber (see Section A1.3). (2) For staples find the shear value from Table 5 (regardless of actual sheathing grade) and multiply the value by 0.82 for species with specific gravity of 0.42 or greater, or by 0.65 for all other species. (3) For nails find the shear value from the applicable table and multiply value by the Specific Gravity Adjustment Factor = [1- (0.5 – G)], where *G* = Specific Gravity of the framing lumber. This adjustment factor must not be greater than 1.

[5]Diaphragm deflection must be determined in accordance with Section A3.0.

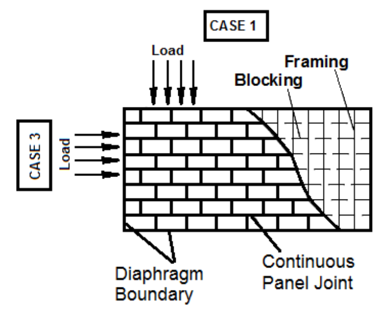
[6]Structural I panels must comply with DOC PS1 or PS2. Rated Sheathing includes Sheathing and Single-Floor grades and must comply with DOC PS1 or PS2.

[7]Nails must be bright or galvanized carbon steel, flat head nails denoted in Appendix B as meeting the head area ratio requirements for lateral force resisting assemblies. A deformed shank nail must have either a helical (screw) shank or an annular (ring) shank. Diaphragm values for stainless steel nails are outside the scope of this report.

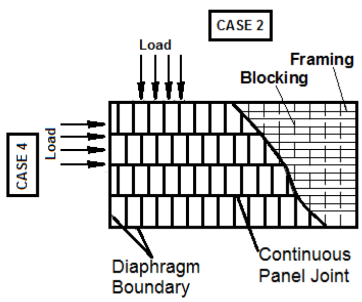
[8]Staples must have a $^{7}/_{16}$-inch minimum crown width and must be installed with their crowns parallel to the long dimension of the framing members and must be driven flush with the surface of the sheathing.

[9]Space fasteners maximum 12" o.c. along intermediate framing members (6 in. o.c. when supports are spaced 48 inches o.c.).

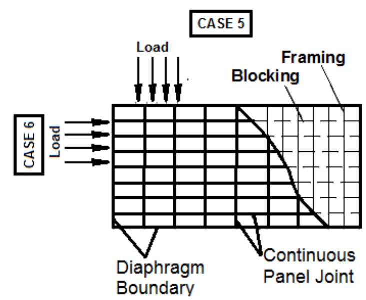
[10]Tabulated values apply to wood structural panels up to $1^{1}/_{8}$" in thickness, provided the nail penetration is at least $1^{1}/_{2}$ inches and the staple penetration is at least 1 inch.



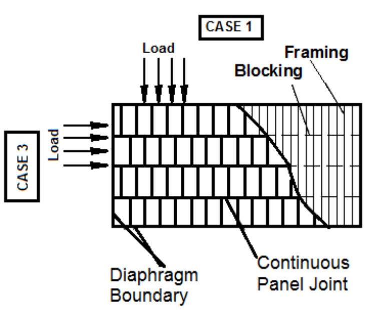
Continuous Panel Joints Perpendicular to Framing
Long Panel Direction Perpendicular to Support



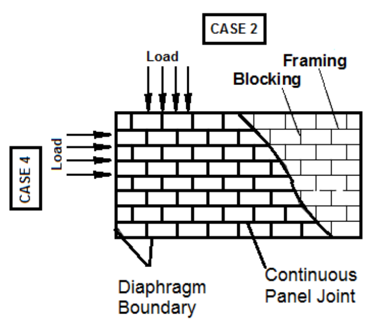
Continuous Panel Joints Parallel to Framing
Long Panel Direction Perpendicular to Supports



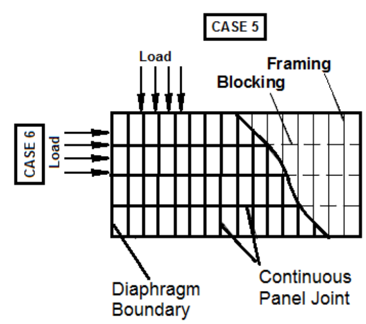
Continuous Panel Joints Perpendicular and Parallel To Framing
Long Panel Direction Perpendicular to Supports



Continuous Panel Joints Perpendicular to Framing
Long Panel Direction Parallel to Supports



Continuous Panel Joints Parallel to Framing
Long Panel Direction Parallel to Supports



Continuous Panel Joints Perpendicular and Parallel To Framing
Long Panel Direction Parallel to Supports

CASE DIAGRAMS FOR HORIZONTAL DIAPHRAGM TABLES 5 AND 6

TABLE 7—ALLOWABLE SHEAR FOR WIND OR SEISMIC LOADING FOR WOOD STRUCTURAL PANEL SHEAR WALLS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE AND STRUCTURAL I SHEATHING (plf)[1,2,3,4,5,6,7,8,9,10,11]

NOMINAL NAIL DIAMETER (inch) or STAPLE GAGE Nails must be smooth and must be carbon steel (bright or galvanized)	MINIMUM NOMINAL FASTENER LENGTH (inches)		SEISMIC				WIND			
	Panels Applied Directly to Framing	Panels Applied Over 1/2 inch or 5/8 inch Gypsum Sheathing	Fastener Spacing at Panel Edges (inches)				Fastener Spacing at Panel Edges (inches)			
			6	4	3	2	6	4	3	2
3/8-inch Nominal Panel Thickness										
0.148	2	—	230	360	460	610	320	505	645	855
	—	2 1/2	280	430	550	730	390	600	770	1020
0.135	2	—	230	360	460	610	320	505	645	855
	—	2 1/2	250	380	485	645	345	530	680	900
0.131	1 3/4	—	230	360	460	610	320	505	645	855
	—	2 1/2	235	360	460	610	330	505	645	855
0.120	1 3/4	—	200	310	395	520	275	435	550	730
	—	2 1/2	200	310	395	520	280	430	550	725
0.113	1 3/4	—	180	280	355	470	245	390	495	655
	—	2 1/2	180	275	355	470	250	385	495	655
14, 15, 16 Gage	1 1/2	—	155	235	315	400	215	330	440	560
14, 15, 16 Gage	—	2	155	235	310	400	215	330	435	560
7/16-inch Nominal Panel Thickness										
0.148	2	—	260	395	505	670	355	550	705	935
	—	2 1/2	280	430	550	730	390	600	770	1020
0.135	2	—	260	395	505	670	355	550	705	935
	—	2 1/2	250	385	490	650	345	535	685	905
0.131	2	—	260	395	505	670	355	550	705	935
	—	2 1/2	235	365	465	615	330	505	650	860
0.120	2	—	225	340	435	580	305	475	610	805
	—	2 1/2	205	310	400	530	285	435	555	735
0.113	2	—	205	310	395	520	280	430	550	730
	—	2 1/2	170	260	330	440	235	360	460	610
14, 15, 16 Gage	1 1/2	—	170	260	345	440	240	365	485	615
14, 15, 16 Gage	—	2	155	235	310	400	215	330	435	560
15/32-inch Nominal Panel Thickness										
0.148	2	—	340	510	665	870	475	715	930	1215
	—	2 1/2	280	430	550	730	390	600	770	1020
0.135	2	—	305	455	590	775	425	635	825	1080
	—	2 1/2	250	385	490	650	350	535	685	905
0.131	2	—	280	430	550	730	390	600	770	1020
	—	2 1/2	240	365	465	615	330	505	650	860
0.120	2	—	245	375	475	630	340	520	665	880
	—	2 1/2	205	315	400	530	285	435	560	740
0.113	2	—	220	340	430	570	305	470	605	800
	—	2 1/2	185	285	365	480	260	395	510	670
14, 15, 16 Gage	1 1/2	—	185	280	375	475	260	390	525	665
14, 15, 16 Gage	—	2	155	235	300	400	215	330	420	560

See page 14 for footnote explanations.

TABLE 8—ALLOWABLE SHEAR FOR WIND OR SEISMIC LOADING FOR WOOD STRUCTURAL PANEL SHEAR WALLS WITH FRAMING OF DOUGLAS FIR-LARCH OR SOUTHERN PINE AND RATED SHEATHING (plf)[1,2,3,4,5,6,7,8,9,10,11]

NOMINAL NAIL DIAMETER (inch) or STAPLE GAGE (Nails must be smooth and must be carbon steel (bright or galvanized))	MINIMUM NOMINAL FASTENER LENGTH (inches)		SEISMIC				WIND			
	Panels Applied Directly to Framing	Panels Applied Over $^1/_2$ inch or $^5/_8$ inch Gypsum Sheathing	Fastener Spacing at Panel Edges (inches)				Fastener Spacing at Panel Edges (inches)			
			6	4	3	2	6	4	3	2
$^3/_8$-inch Nominal Panel Thickness										
0.148	2	—	220	320	410	530	305	445	575	740
	—	$2^1/_2$	260	380	490	640	365	530	685	895
0.135	2	—	220	320	410	530	305	445	575	740
	—	$2^1/_2$	230	335	430	560	320	465	600	785
0.131	$1^3/_4$	—	220	320	410	530	305	445	575	740
	—	$2^1/_4$	200	300	390	510	280	420	545	715
0.120	$1^3/_4$	—	185	270	345	450	260	375	485	625
	—	$2^1/_2$	170	255	330	430	235	355	460	605
0.113	$1^3/_4$	—	200	300	390	510	280	420	545	715
	—	$2^1/_4$	150	225	295	385	210	315	410	540
14, 15, 16 Gage	$1^1/_2$	—	140	210	280	360	195	295	390	505
14, 15, 16 Gage	—	2	140	210	280	360	195	295	390	505
$^7/_{16}$-inch Nominal Panel Thickness										
0.148	$2^1/_2$	—	240	350	450	585	335	490	630	820
	—	$2^1/_2$	260	380	490	640	365	530	685	895
0.135	2	—	240	350	450	585	335	490	630	820
	—	$2^1/_2$	230	335	435	565	320	465	605	790
0.131	2	—	240	350	450	585	335	490	630	820
	—	$2^1/_2$	215	315	410	535	305	440	570	745
0.120	2	—	205	300	385	495	285	415	535	695
	—	$2^1/_2$	185	270	345	455	260	375	485	635
0.113	2	—	185	265	345	445	255	375	480	625
	—	$2^1/_2$	165	240	310	405	230	335	435	570
14, 15, 16 Gage	$1^1/_2$	—	155	230	310	395	215	320	435	555
14, 15, 16 Gage	—	2	140	210	280	360	195	295	390	505
$^{15}/_{32}$-inch Nominal Panel Thickness										
0.148	2	—	310	460	600	770	435	645	840	1075
	—	$2^1/_2$	260	380	490	640	365	530	685	895
0.135	2	—	275	405	530	680	385	570	740	950
	—	$2^1/_2$	230	335	430	565	320	465	605	790
0.131	2	—	260	380	490	640	365	530	685	895
	—	$2^1/_2$	215	315	410	535	305	440	570	745
0.120	2	—	220	325	420	545	310	450	585	765
	—	$2^1/_2$	185	270	350	455	260	375	490	635
0.113	2	—	200	290	375	490	280	405	525	685
	—	$2^1/_2$	165	245	315	410	235	340	440	575
14, 15, 16 Gage	$1^1/_2$	—	170	255	335	430	240	355	470	600
14, 15, 16 Gage	—	2	140	210	280	360	195	295	390	505
$^{19}/_{32}$-inch Nominal Panel Thickness										
0.148	$2^1/_4$	—	340	510	665	870	475	715	930	1215
0.135	$2^1/_4$	—	300	450	590	770	420	635	825	1075
0.131	$2^1/_4$	—	285	430	560	735	400	600	785	1025
0.120	$2^1/_4$	—	245	370	485	635	345	520	675	885
0.113	$2^1/_4$	—	225	335	440	575	315	470	615	800
14, 15, 16 Gage	$1^3/_4$	—	185	280	375	475	260	390	525	665

See page 14 for footnote explanations.

FOOTNOTE EXPLANATIONS FOR SHEAR WALL TABLES 7 AND 8

[1]For **SI:** 1 inch = 25.4 mm, 1 plf = 14.6 N/m.

[2]Shear wall construction using nails must be in accordance with Section 4.3.6 and 4.3.7 of the 2015 and 2008 AWC/AF&PA Special Design Provisions for Wind and Seismic (SPDWS), and shear wall construction using staples must be in accordance with 2018 and 2015 IBC Table 2306.3(1) (similar for earlier codes), as applicable.

[3]Tabulated values are for short-time loading due to wind or seismic. The tabulated seismic values must be reduced by 37 percent and 44 percent for normal and permanent load duration, respectively.

[4]The tabulated values are for fasteners installed in Douglas Fir-larch or Southern Pine. For framing of other species: (1) Find the assigned specific gravity for species of lumber (see Section A1.3) (2) For staples find shear value from Table 7 (regardless of actual sheathing grade) and multiply value by 0.82 for species with specific gravity of 0.42 or greater, or 0.65 for all other species. (3) For nails find shear value from the applicable table and multiply by the following Specific Gravity Adjustment Factor = [1 - (0.5 – *G*)], where *G* = Assigned Specific Gravity of the framing lumber. This adjustment factor must not be greater than 1.

[5]Shear wall deflection must be determined in accordance with Section A3.0.

[6]Structural I and Rated Sheathing panels must comply with DOC PS1 or PS2. Install panels either horizontally or vertically. All panel edges must be backed by framing members.

[7]In structures assigned to Seismic Design category D, E, or F, where the allowable shear design value exceeds 350 plf, all framing members receiving edge nailing from abutting panels must not be less than a single 3-inch nominal member. Panel joint and sill plate nailing must be staggered in all cases. See Section 4.3.6.4 of SDPWS, or 2006 IBC Section 2305.3.11 for sill plate size and anchorage requirements, as applicable.

[8]Space fasteners maximum 6 inches on center along intermediate framing members - Exception: When panel thickness is greater than $^{7}/_{16}$-inch or studs are spaced less than 24 inches on center, space fasteners maximum 12 inches on center.

[9]Nails must be bright or galvanized carbon steel, flat head nails denoted in Appendix B as meeting the head area ratio requirements for lateral force resisting assemblies. A deformed shank nail must have either a helical (screw) shank or an annular (ring) shank. Shear wall values for stainless steel nails are outside the scope of this report.

[10]Staples must have a $^{7}/_{16}$-inch minimum crown width and must be installed with their crown parallel to the long dimension of the framing members, and must be driven flush with the surface of the sheathing.

[11]The values for $^{3}/_{8}$-inch and $^{7}/_{16}$-inch panels applied directly to framing using nails may be increased to values shown for $^{15}/_{32}$-inch-thick panels of the same panel grade, provided studs are spaced a maximum of 16 inches on center or panels are applied with long dimension across studs.

TABLE 9—ALLOWABLE SHEAR FOR WIND OR SEISMIC LOADING FOR SHEAR WALLS WITH FIBERBOARD SHEATHING, GYPSUM LATH, GYPSUM SHEATHING, GYPSUM WALLBOARD, LATH AND PLASTER OR PLYWOOD SIDING OVER WOOD FRAMING (plf)[1,3,4,5]

SHEATHING MATERIAL	THICKNESS OF MATERIAL	WALL CONSTRUCTION	REQUIRED SPACING (inches on center)		SHEAR VALUE (plf)		FASTENER SPECIFICATIONS	COMMENTS
			Panel Edges	Field	Seismic	Wind		
Fiberboard Sheathing	1/2"	Blocked	4	6	150	210	1 1/4" long, 16, 15 & 14 gage staple	Reference 2018, 2015 and 2012 IBC Table 2306.3(2) [2009 IBC Table 2306.6] for applicable notes
			3		200	280		
			2		225	315		
			4		220	310	1 1/4" long, 1" crown, 16, 15 & 14 gage staple	
			3		290	405		
			2		325	455		
	25/32"	Blocked	4	6	150	210	1 1/2" long, 16, 15 & 14 gage staple	
			3		200	280		
			2		225	315		
			4		220	310	1 1/2" long, 1" crown, 16, 15 & 14 gage staple	
			3		290	405		
			2		325	455		
Gypsum Lath	3/8" + 1/2" Plaster	Unblocked	5		100		1 1/8" long, 3/4" crown, 16, 15 & 14 gage staple	Reference 2018, 2015 and 2012 IBC Table 2306.3(3) [2009 IBC Table 2306.7] for applicable notes
Gypsum Sheathing	1/2" x 2' x 8'	Unblocked	4		75		1 3/4" long, 16, 15 & 14 gage staple	
	1/2" x 4'	Blocked			175[2]			
		Unblocked	7		100			
Gypsum Wallboard	1/2"	Unblocked	7		75[2]		1 1/2" long, 16, 15 & 14 gage staple	
					100			
			4		110[2]			
					125			
		Blocked	7		125			
			4		150			
	5/8"	Unblocked	7		115[2]		1 5/8" long, 16, 15 & 14 gage staple	
			4		145[2]			
		Blocked	7		145			
			4		175			
		Blocked two-ply	Base Ply - 9		250		1 5/8" long, 16, 15 & 14 gage staple	
			Face Ply - 7				2 1/4" long, 15 & 14 gage staple	
Expanded metal or woven wire lath and Portland cement plaster	7/8"	Unblocked	6" On Center @ Each Framing Member		180		7/8" long, 3/4" crown, 16, 15 & 14 gage staple	
Plywood Panel Siding Shear Walls with Framing of Douglas Fir-Larch or Southern Pine[2]	3/8"	Panels Applied Directly To Framing	6	6	160	225	2 1/2 x 0.113 smooth nail (carbon steel)	Reference SDPWS Table 4.3A for applicable notes
			4		240	335		
			3		310	435		
			2		410	575		
			6	6	140	195	1 1/2" long, 16, 15 & 14 gage staple	Reference 2018, 2015 and 2012 IBC Table 2306.3(1) [2009 IBC Table 2306.3] for applicable notes
			4		210	295		
			3		280	390		
			2		360	505		
		Panels Applied Over 1/2" or 5/8" Gypsum Sheathing	6	6	160	225	3 x 0.131 smooth nail (carbon steel)	Reference SDPWS Table 4.3B for applicable notes
			4		240	335		
			3		310	435		
			2		410	575		
			6	6	140	195	2" long, 16, 15 & 14 gage staple	Reference 2018, 2015 and 2012 IBC Table 2306.3(1) [2009 IBC Table 2306.3] for applicable notes
			4		210	295		
			3		280	390		
			2		360	505		

For **SI**: 1 inch = 25.4 mm; 1 foot = 305 mm; 1 plf = 14.6 N/m.

[1]Shear values are based on maximum framing spacing of 16 inches on center, unless otherwise noted.
[2]Shear values are based on maximum framing spacing of 24 inches on center.
[3]Staples must have a minimum crown width of 7/16 inch, measured outside the legs, unless otherwise noted.
[4]Nails must be bright or galvanized carbon steel, flat head nails denoted in Appendix B as meeting the head area ratio requirements for lateral force resisting assemblies. Shear wall values for stainless steel nails are outside the scope of this report.
[5]In addition to requirements presented above for fastening of shear walls all other requirements of the applicable model code (such as, but not limited to, conditions of use and modification of design values for certain Seismic Design Categories) pertaining to shear wall design and construction must be met.

TABLE 10—FASTENING SCHEDULE–WALL FRAMING[1]

CONNECTION DESCRIPTION	MINIMUM FASTENING REQUIREMENTS PRESCRIBED IN THE CODE								ALTERNATIVE FASTENING REQUIREMENTS Nails may be carbon steel or stainless steel, except where noted otherwise.					
	2012 IBC Table 2304.9.1		2012 IRC Table R602.3(1)		2018 and 2015 IBC Table 2304.10.1		2018 and 2015 IRC Table R602.3(1)							
	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)
Stud-to-stud (double studs) **not** at **braced walls** See Figure 10A		Connection 9		Connection 12		Connection 8		Connection 8						
		@ 24" o.c.		@ 24" o.c.		@ 24" o.c.		@ 24" o.c.		@ 24" o.c.		@ 16" o.c.		@ 8" o.c.
	1	16d box ($3^1/_2$ x .135)	1	10d box (3 x .128)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	12d com ($3^1/_4$ x .148)	1	8d com ($2^1/_2$ x .131)
		@ 8" o.c.				@ 16" o.c.		@ 16" o.c.			1	10d com (3 x .148)	1	$3^1/_4$ x .120
	1	3 x .131			1	3 x .131	1	3 x .131			1	16d box ($3^1/_2$ x .135)	1	3 x .120
					1	10d box (3 x .128)	1	10d box (3 x .128)			1	$3^1/_4$ x .131		
											1	3 x .131		
Stud-to-stud and abutting studs at intersecting wall corners at **braced walls** See Figures 10A and 10B						Connection 9		Connection 9						
						@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 12" o.c.		@ 8" o.c.
					1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	12d com ($3^1/_4$ x .148)	1	$3^1/_4$ x .120
						@ 12" o.c.		@ 12" o.c.			1	10d com (3 x .148)	1	3 x .120
					1	3 x .131	1	3 x .131			1	16d box ($3^1/_2$ x .135)		
					1	16d box ($3^1/_2$ x .135)	1	16d box ($3^1/_2$ x .135)			1	$3^1/_4$ x .131		
											1	3 x .131		
Abutting studs at corners and intersections **not** at **braced walls** See Figure 10B		Connection 23		Connection 8		Connection 8		Connection 8						
		@ 24" o.c.		@ 12" o.c.		@ 24" o.c.		@ 24" o.c.		@ 12" o.c.		@ 8" o.c.		
	1	16d com ($3^1/_2$ x .162)	1	16d box ($3^1/_2$ x .135)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	$3^1/_4$ x .131		
		@ 16" o.c.				@ 16" o.c.		@ 16" o.c.	1	12d com ($3^1/_4$ x .148)	1	3 x .131		
	1	3 x .131			1	3 x .131	1	3 x .131	1	10d com (3 x .148)	1	8d com ($2^1/_2$ x .131)		
					1	10d box (3 x .128)	1	10d box (3 x .128)	1	16d box ($3^1/_2$ x .135)	1	$3^1/_4$ x .120		
											1	3 x .120		
Built-up header 2-by to 2-by (with or without $^1/_2$" spacer) See Figure 10C		Connection 14		Connection 9		Connection 10		Connection 10						
		@16" o.c. along each edge		@16" o.c. along each edge		@16" o.c. along each edge		@16" o.c. along each edge		@12" o.c. along each edge		@8" o.c. along each edge		
	1	16d com ($3^1/_2$ x .162)	1	16d box ($3^1/_2$ x .135)	1	16d com ($3^1/_2$ x .162)		16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	12d com ($3^1/_4$ x .148)		
						@12" o.c.		@12" o.c.	1	16d box ($3^1/_2$ x .135)	1	10d com (3 x .148)		
					1	16d box ($3^1/_2$ x .135)	1	16d box ($3^1/_2$ x .135)			1	$3^1/_4$ x .131		
											1	3 x .131		
											1	$3^1/_4$ x .120		
											1	3 x .120		
Continuous header to stud (toe-nail) See Figure 10D		Connection 16		Connection 9		Connection 11		Connection 11						
	4	8d com ($2^1/_2$ x .131)	4	8d box ($2^1/_2$ x .113)	4	8d com ($2^1/_2$ x .131)	4	8d com (2½ x .131)	3	16d com ($3^1/_2$ x .162)	4	$3^1/_4$ x .131	5	$3^1/_4$ x .120
					4	10d box (3 x .128)	4	10d box (3 x .128)	4	12d com ($3^1/_4$ x .148)	4	3 x .131	5	3 x .120
							5	8d box ($2^1/_2$ x .113)	4	10d com (3 x .148)	4	8d com ($2^1/_2$ x .131)	6	8d box ($2^1/_2$ x .113)
									4	16d box ($3^1/_2$ x .135)			6	$2^3/_8$ x .113
Double top plates to each other See Figure 10E		Connection 10a		Connection 13		Connection 12		Connection 12						
		@ 16" o.c.		@ 24" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 12" o.c.		@ 8" o.c.
	1	16d box ($3^1/_2$ x .135)	1	10d box (3 x .128)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	16d com ($3^1/_2$ x .162)	1	12d com ($3^1/_4$ x .148)	1	8d com ($2^1/_2$ x .131)
		@ 12" o.c.				@ 12" o.c.		@ 12" o.c.			1	10d com (3 x .148)	1	$3^1/_4$ x .120
	1	3 x .131			1	3 x .131	1	3 x .131			1	16d box ($3^1/_2$ x .135)	1	3 x .120
					1	10d box (3 x .128)	1	10d box (3 x .128)			1	$3^1/_4$ x .131		
											1	3 x .131		

(continued)

TABLE 10—FASTENING SCHEDULE–WALL FRAMING[1] (cont.)

CONNECTION DESCRIPTION	MINIMUM FASTENING REQUIREMENTS PRESCRIBED IN THE CODE								ALTERNATIVE FASTENING REQUIREMENTS Nails may be carbon steel or stainless steel, except where noted otherwise.					
	2012 IBC Table 2304.9.1		2012 IRC Table R602.3(1)		2018 and 2015 IBC Table 2304.10.1		2018 and 2015 IRC Table R602.3(1)							
	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)
Top plate to top plate @ end joint (lap splice) See Figure 10F	Connection 10b		Connection 14		Connection 13		Connection 13 (13a for the 2015 IRC)							
	Nails each side of joint								Nails each side of joint					
	8	16d com (3$^1/_2$ x .162)	8	16d box (3$^1/_2$ x .135)	8	16d com (3$^1/_2$ x .162)	8	16d com (3$^1/_2$ x .162)	8	16d com (3$^1/_2$ x .162)	12	16d box (3$^1/_2$ x .135)		
	12	3 x .131			12	3 x .131	12	16d box (3$^1/_2$ x .135)	12	12d com (3$^1/_4$ x .148)	12	3$^1/_4$ x .131		
					12	10d box (3 x .128)	12	3 x .131	12	10d com (3 x .148)	12	3 x .131		
							12	10d box (3 x .128)						
							Connection 13b (2015)							
							12	16d box (3$^1/_2$ x .135)	10	16d com (3$^1/_2$ x .162)	12	12d com (3$^1/_4$ x .148)	12	10d com (3 x .148)
Top plate overlap at corners and intersections See Figure 10G	Connection 13		Connection 19		Connection 18		Connection 17							
	2	16d com (3$^1/_2$ x .162)	2	10d box (3 x .128)	2	16d com (3$^1/_2$ x .162)	2	16d com (3$^1/_2$ x .162)	2	16d com (3$^1/_2$ x .162)	3	3$^1/_4$ x .131		
	3	3 x .131			3	3 x .131	3	3 x .131	3	12d com (3$^1/_4$ x .148)	3	3 x .131		
					3	10d box (3 x .128)	3	10d box (3 x .128)	3	10d com (3 x .148)	4	3$^1/_4$ x .120		
									3	16d box (3$^1/_2$ x .135)	4	3 x .120		
Bottom plate to joist, rim joist, band joist or blocking **not** at **braced walls** See Figure 10H	Connection 6a		Connection 15		Connection 14		Connection 14							
	@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 12" o.c.		@ 8" o.c.	
	1	16d box (3$^1/_2$ x .135)	1	16d box (3$^1/_2$ x .135)	1	16d com (3$^1/_2$ x .162)	1	16d com (3$^1/_2$ x .162)	1	16d com (3$^1/_2$ x .162)	1	12d com (3$^1/_4$ x .148)	1	3$^1/_4$ x .120
	@ 8" o.c.				@ 12" o.c.		@ 12" o.c.				1	10d com (3 x .148)	1	3 x .120
	1	3 x .131			1	3 x .131	1	3 x .131			1	16d box (3$^1/_2$ x .135)		
					1	16d box (3$^1/_2$ x .135)	1	16d box (3$^1/_2$ x .135)			1	3$^1/_4$ x .131		
											1	3 x .131		
Bottom plate to joist, rim joist, band joist or blocking at **braced walls** See Figure 10H	Connection 6b		Connection 16		Connection 15		Connection 15							
	@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 16" o.c.		@ 12" o.c.	
	3	16d box (3$^1/_2$ x .135)	3	16d box (3$^1/_2$ x .135)	2	16d com (3$^1/_2$ x .162)	2	16d com (3$^1/_2$ x .162)	3	12d com (3$^1/_4$ x .148)	4	3$^1/_4$ x .131	2	16d com (3$^1/_2$ x .162)
	4	3 x .131			3	16d box (3$^1/_2$ x .135)	3	16d box (3$^1/_2$ x .135)	3	10d com (3 x .148)	4	3 x .131		
					4	3 x .131	4	3 x .131	3	16d box (3$^1/_2$ x .135)	4	3$^1/_4$ x .120		
											5	3 x .120		
Top or bottom plate to stud (face/end nail) See Figure 10J	Connections 7 and 8b		Connection 18		Connections 17 (2015) and 16b		Connection 16b							
	2	16d com (3$^1/_2$ x .162)	2	16d box (3$^1/_2$ x .135)	2	16d com (3$^1/_2$ x .162)	2	16d com (3$^1/_2$ x .162)	3	16d com (3$^1/_2$ x .162)	4	3$^1/_4$ x .131	4	3$^1/_4$ x .120
	3	3 x .131			3	3 x .131	3	16d box (3$^1/_2$ x .135)	3	12d com (3$^1/_4$ x .148)	4	3 x .131	4	3 x .120
					3	10d box (3 x .128)	3	3 x .131	3	10d com (3 x .148)	4	8d com (2$^1/_2$ x .131)		
							3	10d box (3 x .128)	3	16d box (3$^1/_2$ x .135)				
Stud to top or bottom plate (toe nail) See Figure 10K	Connection 8		Connection 17		Connection 16a		Connection 16a							
	4	8d com (2$^1/_2$ x .131)	3	8d box (2$^1/_2$ x .113)	4	8d com (2$^1/_2$ x .131)	3	16d box (3$^1/_2$ x .135)	3	16d com (3$^1/_2$ x .162)	4	3$^1/_4$ x .131	5	3$^1/_4$ x .120
	4	3 x .131	2	16d box (3$^1/_2$ x .135)	4	3 x .131	4	8d com (2$^1/_2$ x .131)	4	12d com (3$^1/_4$ x .148)	4	3 x .131	5	3 x .120
					4	10d box (3 x .128)	4	3 x .131	4	10d com (3 x .148)	4	8d com (2$^1/_2$ x .131)	6	8d box (2$^1/_2$ x .113)
							4	10d box (3 x .128)	4	16d box (3$^1/_2$ x .135)			6	2$^3/_8$ x .113
							4	8d box (2$^1/_2$ x .113)					6	6d com (2 x .113)
1" Diagonal brace to stud/plate (face-nail) See Figure 10L	Connection 20		Connection 20		Connection 18 (19 for 2015 IBC)		Connection 18		Nails must be carbon steel, bright or galvanized.					
	2	8d com (2$^1/_2$ x .131)	2	8d box (2$^1/_2$ x .113)	2	8d com (2$^1/_2$ x .131)	2	8d com (2$^1/_2$ x .131)	2	16d com (3$^1/_2$ x .162)	2	3$^1/_4$ x .131	3	3$^1/_4$ x .120
	2	3 x .131			2	3 x .131	3	8d box (2$^1/_2$ x .113)	2	12d com (3$^1/_4$ x .148)	2	3 x .131	3	3 x .120
					2	10d box (3 x .128)	2	10d box (3 x .128)	2	10d com (3 x .148)	2	8d com (2$^1/_2$ x .131)	3	8d box (2$^1/_2$ x .113)
									2	16d box (3$^1/_2$ x .135)			3	2$^3/_8$ x .113
													4	2$^1/_4$ x .099

For **SI:** 1 inch = 25.4 mm

[1]Alternative fastening requirements shown in this table have been evaluated as alternatives to the 2018, 2015 and 2012 IBC and IRC. They can be used under earlier editions of the IBC and IRC where the prescriptive fastening requirements are no worse than those shown in the table above for the 2018, 2015 and 2012 codes.

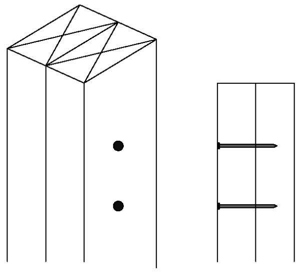


Figure 10A—Stud-to-Stud (Double Stud)

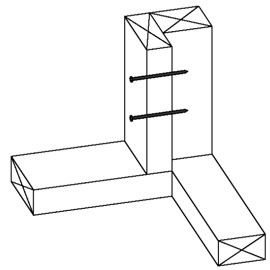


Figure 10B—Stud-to-Stud and Abutting Studs at Intersecting Wall Corners

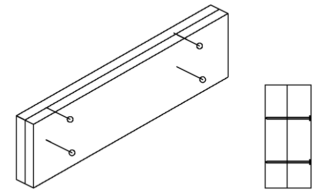


Figure 10C—Built-up Header (2-by to 2-by)

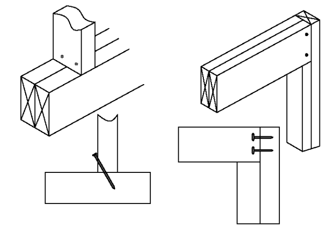


Figure 10D—Continuous Header to Stud (toe-nail)

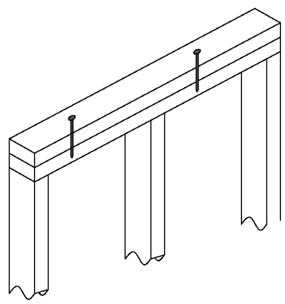


Figure 10E—Double Top Plates to Each Other

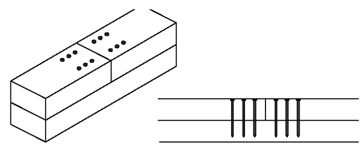


Figure 10F—Top Plate to Top Plate at End Joint (lap splice)

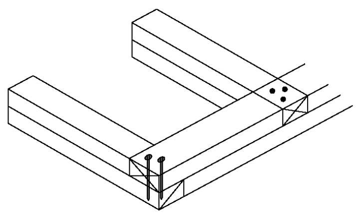


Figure 10G—Top Plate Overlap at Corners and Intersections

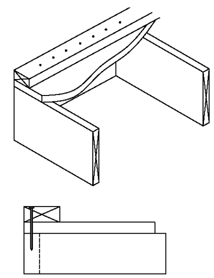


Figure 10H—Bottom Plate to Joist, Rim Joist, Band Joist or Blocking

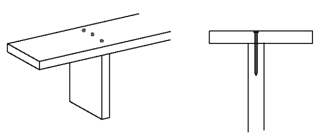


Figure 10J—Top or Bottom Plate To Stud (end nail)

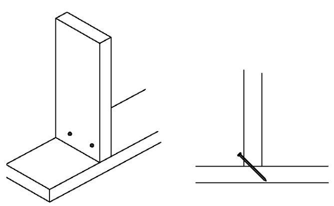


Figure 10K—Stud to Top or Bottom Plate (toe-nail)

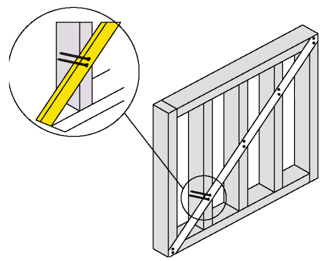


Figure 10L—1” Diagonal Brace to Stud / Plate (face nail)

FIGURE 10—PRESCRIPTIVE FASTENING DETAILS - WALL FRAMING

TABLE 11—FASTENING SCHEDULE–CEILING AND ROOF FRAMING[1]

CONNECTION DESCRIPTION	MINIMUM FASTENING REQUIREMENTS PRESCRIBED IN THE CODE								ALTERNATIVE FASTENING REQUIREMENTS Nails may be carbon steel or stainless steel, except where noted otherwise.					
	2012 IBC Table 2304.9.1		2012 IRC Table R602.3(1)		2018 and 2015 IBC Table 2304.10.1		2018 and 2015 IRC Table R602.3(1)							
	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)
Blocking between joists or rafter to top plate (toe-nail) See Figure 11A	Connection 11		Connection 1		Connection 1		Connection 1							
	Nails (total)		Nails (total)		Nails at each end		Nails (total)		Nails at each end					
	3	8d com ($2^1/_2$ x .131)	3	8d box ($2^1/_2$ x .113)	3	8d com ($2^1/_2$ x .131)	3	8d com ($2^1/_2$ x .131)	3	16d com ($3^1/_2$ x .162)	3	$3^1/_4$ x .131	4	$3^1/_4$ x .120
	3	3 x .131			3	3 x .131	3	3 x .131	3	12d com ($3^1/_4$ x .148)	3	3 x .131	4	3 x .120
					3	10d box (3 x .128)	3	10d box (3 x .128)	3	10d com (3 x .148)	3	8d com ($2^1/_2$ x .131)	5	8d box ($2^1/_2$ x .113)
							4	8d box ($2^1/_2$ x .113)	3	16d box ($3^1/_2$ x .135)				
Ceiling joist to plate (toe-nail) nail thru each side See Figure 11B	Connection 15		Connection 2		Connection 2		Connection 2		Nails must be carbon steel, bright or galvanized.					
	3	8d com ($2^1/_2$ x .131)	3	8d box ($2^1/_2$ x .113)	3	8d com ($2^1/_2$ x .131)	3	8d com ($2^1/_2$ x .131)	3	16d com ($3^1/_2$ x .162)	3	$3^1/_4$ x .131	5	8d box ($2^1/_2$ x .113)
	5	3 x .131			3	10d box (3 x .128)	3	10d box (3 x .128)	3	12d com ($3^1/_4$ x .148)	3	3 x .131	5	$2^3/_8$ x .113
					3	3 x .131	3	3 x .131	3	10d com (3 x .148)	4	$3^1/_4$ x .120	5	6d com (2 x .113)
									3	16d box ($3^1/_2$ x .135)	4	3 x .120		
Ceiling joist (not connected to parallel rafter - no thrust), laps over partition See Figure 11C	Connection 17		Connection 3		Connection 3		Connection 3							
	3	16d com ($3^1/_2$ x .162)	3	10d box (3 x .128)	3	16d com ($3^1/_2$ x .162)	3	16d com ($3^1/_2$ x .162)	3	16d com ($3^1/_2$ x .162)	4	16d box ($3^1/_2$ x .135)	5	$3^1/_4$ x .120
	4	3 x .131			4	3 x .131	4	3 x .131	4	12d com ($3^1/_4$ x .148)	4	$3^1/_4$ x .131	5	3 x .120
					4	10d box (3 x .128)	4	10d box (3 x .128)	4	10d com (3 x .148)	4	3 x .131		
Ceiling joist to parallel rafters and at laps See Figure 11D	Connection 18				Connection 4		Connection 4							
	See IBC Section 2308.1.4.1 and Table 2308.1.4.1				See IBC Section 2308.7.3.1 and Table 2308.7.3.1		See 2018 IRC Section R802.5.2 and Table R802.5.2 (2015 IRC Section R802.3.1, R802.3.2 & Table R802.5.1(9)							
Collar tie to rafter See Figure 11E	Connection 26		Connection 4		Connection 5		Connection 5							
	3	10d com (3 x .148)	3	10d box (3 x .128)	3	10d com (3 x .148)	3	10d com (3 x .148)	3	16d com ($3^1/_2$ x .162)	4	$3^1/_4$ x .131	5	$3^1/_4$ x .120
	4	3 x .131			4	10d box (3 x .128)	4	10d box (3 x .128)	3	12d com ($3^1/_4$ x .148)	4	3 x .131	5	3 x .120
					4	3 x .131	4	3 x .131	3	10d com (3 x .148)	5	8d com ($2^1/_2$ x .131)	6	8d box ($2^1/_2$ x .113)
									4	16d box ($3^1/_2$ x .135)				
Roof rafter to plate (toe-nail) See Figure 11F	Connection 19		Connection 5		Connection 6		Connection 6		Nails must be carbon steel, bright or galvanized.					
	3	8d com ($2^1/_2$ x .131)	3	10d com (3 x .148)	3	10d com (3 x .148)	3	10d com (3 x .148)	3	16d com ($3^1/_2$ x .162)	4	$3^1/_4$ x .131	4	$3^1/_4$ x .120
	3	3 x .131	3	16d box ($3^1/_2$ x .135)	3	16d box ($3^1/_2$ x .135)	3	16d box ($3^1/_2$ x .135)	3	12d com ($3^1/_4$ x .148)	4	3 x .131	4	3 x .120
	+ connectors per IBC Section 2308.10.1				4	3 x .131	4	3 x .131	3	10d com (3 x .148)	4	8d com ($2^1/_2$ x .131)		
					4	10d box (3 x .128)	4	10d box (3 x .128)	3	16d box ($3^1/_2$ x .135)				
					+ connectors per IBC Section 2308.7.5				+ connectors per IBC					
Ridge beam (face/end nail) See Figure 11G	Connection 28b		Connection 6		Connection 7a		Connection 7b							
	2	16d com ($3^1/_2$ x .162)	4	16d box ($3^1/_2$ x .135)	2	16d com ($3^1/_2$ x .162)	2	16d com ($3^1/_2$ x .162)	3	16d com ($3^1/_2$ x .162)	4	$3^1/_4$ x .131		
	3	3 x .131			3	3 x .131	3	16d box ($3^1/_2$ x .135)	4	16d com ($3^1/_2$ x .162)	4	3 x .131		
					3	10d box (3 x .128)	3	3 x .131	4	10d com (3 x .148)	5	$3^1/_4$ x .120		
							3	10d box (3 x .128)	4	16d box ($3^1/_2$ x .135)	5	3 x .120		
Roof rafter to 2-by ridge beam (toe nail) See Figure 11H	Connection 28a		Connection 6		Connection 7b		Connection 7a							
	2	16d com ($3^1/_2$ x .162)	4	16d box ($3^1/_2$ x .135)	3	10d com (3 x .148)	3	10d com (3 x .148)	3	16d com ($3^1/_2$ x .162)	5	$3^1/_4$ x .131	6	8d box ($2^1/_2$ x .113)
	3	3 x .131			3	16d box ($3^1/_2$ x .135)	4	16d box ($3^1/_2$ x .135)	4	12d com ($3^1/_4$ x .148)	5	3 x .131	6	$2^3/_8$ x .113
					4	3 x .131	4	3 x .131	4	10d com (3 x .148)	5	8d com ($2^1/_2$ x .131)	6	6d com (2 x .113)
					4	10d box (3 x .128)	4	10d box (3 x .128)	4	16d box ($3^1/_2$ x .135)	6	$3^1/_4$ x .120		
											6	3 x .120		

(continued)

TABLE 11—FASTENING SCHEDULE–CEILING AND ROOF FRAMING[1] (cont.)

CONNECTION DESCRIPTION	MINIMUM FASTENING REQUIREMENTS PRESCRIBED IN THE CODE								ALTERNATIVE FASTENING REQUIREMENTS Nails may be carbon steel or stainless steel, except where noted otherwise.					
	2012 IBC Table 2304.9.1		2012 IRC Table R602.3(1)		2018 and 2015 IBC Table 2304.10.1		2018 and 2015 IRC Table R602.3(1)							
	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)
Jack rafter to hip (toe nail) See Figure 11J	Connection 27a		Connection 6		Connection 7b		Connection 7a							
	3	10d com (3 x .148)	4	16d box ($3^{1}/_{2}$ x .135)	3	10d com (3 x .148)	3	10d com (3 x .148)	3	16d com ($3^{1}/_{2}$ x .162)	5	$3^{1}/_{4}$ x .131		
	4	3 x .131			3	16d box ($3^{1}/_{2}$ x .135)	4	16d box ($3^{1}/_{2}$ x .135)	4	12d com ($3^{1}/_{4}$ x .148)	5	3 x .131		
					4	3 x .131	4	3 x .131	4	10d com (3 x .148)	5	8d com ($2^{1}/_{2}$ x .131)		
					4	10d box (3 x .128)	4	10d box (3 x .128)	4	16d box ($3^{1}/_{2}$ x .135)				
Jack Rafter to Hip (face/end nail) See Figure 11K	Connection 27b		Connection 6		Connection 7a		Connection 7b							
	2	16d com ($3^{1}/_{2}$ x .162)	4	16d box ($3^{1}/_{2}$ x .135)	2	16d com ($3^{1}/_{2}$ x .162)	2	16d com ($3^{1}/_{2}$ x .162)	3	16d com ($3^{1}/_{2}$ x .162)				
	3	3 x .131			3	3 x .131	3	16d box ($3^{1}/_{2}$ x .135)	4	12d com ($3^{1}/_{4}$ x .148)				
					3	10d box (3 x .128)	3	3 x .131	4	10d com (3 x .148)				
							3	10d box (3 x .128)	4	16d box ($3^{1}/_{2}$ x .135)				

For **SI:** 1 inch = 25.4 mm

[1]Alternative fastening requirements shown in this table have been evaluated as alternatives to the 2018, 2015 and 2012 IBC and IRC. They can be used under earlier editions of the IBC and IRC where the prescriptive fastening requirements are no worse than those shown in the table above for the 2018, 2015 and 2012 codes.

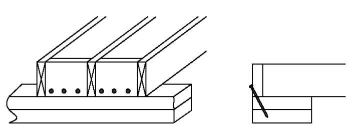


Figure 11A—Blocking Between Joists, Rafter or Trusses to Top Plate or Other Framing Below (toe-nail)

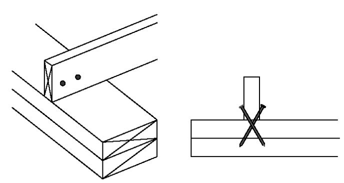


Figure 11B—Ceiling Joist to Plate (toe-nail through each side)

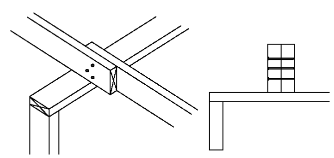


Figure 11C—Ceiling Joist (not connected to parallel rafter, no thrust) Laps Over Partition

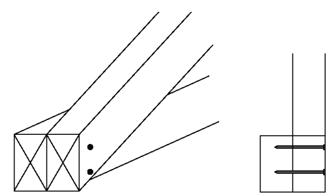


Figure 11D—Ceiling Joist to Paralled Rafters and at Laps

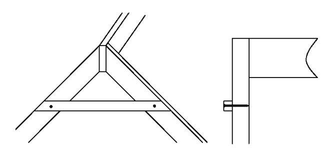


Figure 11E—Collar Tie to Rafter

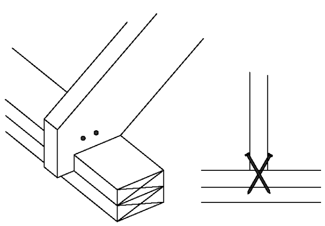


Figure 11F—Roof Rafter to Plate (toe-nail)

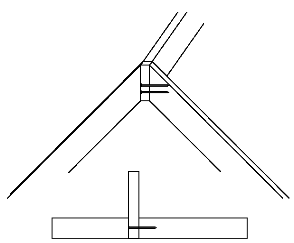


Figure 11G—Ridge Beam (end nail)

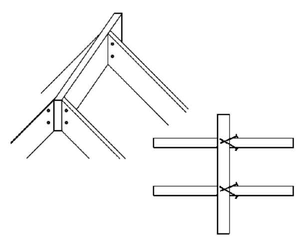


Figure 11H—Roof Rafter to 2-by Ridge Beam (toe-nail)

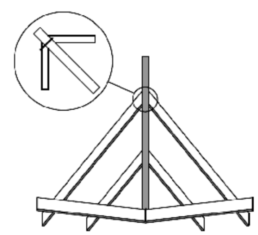


Figure 11J—Jack Rafter to Hip Rafter (toe-nail)

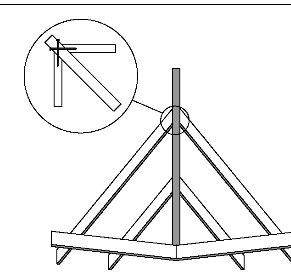


Figure 11K—Jack Rafter to Hip Rafter (end nail)

FIGURE 11—PRESCRIPTIVE FASTENING DETAILS - CEILING AND ROOF FRAMING

TABLE 12—FASTENING SCHEDULE–FLOOR FRAMING[1]

CONNECTION DESCRIPTION	MINIMUM FASTENING REQUIREMENTS PRESCRIBED IN THE CODE								ALTERNATIVE FASTENING REQUIREMENTS Nails may be carbon steel or stainless steel, except where noted otherwise.					
	2012 IBC Table 2304.9.1		2012 IRC Table R602.3(1)		2018 and 2015 IBC Table 2304.10.1		2018 and 2015 IRC Table R602.3(1)							
	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)	#	Nail Size (Type, inch)
Joist to sill or girder (toe-nail) nail thru each side See Figure 12A	Connection 1		Connection 24		Connection 21 (22 for the 2015 IBC)		Connection 21							
	3	8d com (2½ x .131)	3	8d box (2½ x .113)	3	8d com (2½ x .131)	3	8d com (2½ x .131)	3	16d com (3½ x .162)	3	3¼ x .131	4	3 x .120
	3	3 x .131			3	3 x .131	3	3 x .131	3	12d com (3¼ x .148)	3	3 x .131	5	8d box (2½ x .113)
					3	10d box (3 x .128)	3	10d box (3 x .128)	3	10d com (3 x .148)	3	8d com (2½ x .131)	5	2⅜ x .113
							4	8d box (2½ x .113)	3	16d box (3½ x .135)	4	3¼ x .120	5	6d com (2 x .113)
Rim joist to top plate (toe-nail) See Figure 12B	Connection 12		Connection 25		Connection 22 (23 for the 2015 IBC)		Connection 22							
	6" o.c.		6" o.c.		6" o.c.		4" o.c.		@ 6" o.c..		@ 6" o.c.		@ 4" o.c.	
	1	8d com (2½ x .131)	1	8d box (2½ x .113)	1	8d com (2½ x .131)	1	8d box (2½ x .113)	1	16d com (3½ x .162)	1	3 x .131	1	8d box (2½ x .113)
	1	3 x .131			1	3 x .131	6" o.c.		1	12d com (3¼ x .148)	1	8d com (2½ x .131)	1	2⅜ x .113
					1	10d box (3 x .128)	1	8d com (2½ x .131)	1	10d com (3 x .148)	@ 4" o.c.		@ 3" o.c.	
							1	3 x .131	1	16d box (3½ x .135)	1	3¼ x .120	1	2 x .113
							1	10d box (3 x .128)	1	3¼ x .131	1	3 x .120	1	2¼ x .099
Joist to band joist (face/end nail) See Figure 12C	Connection 29				Connection 28 (29 for the 2015 IBC)		Connection 26							
	3	16d com (3½ x .162)			3	16d com (3½ x .162)	3	16d com (3½ x .162)	3	16d com (3½ x .162)	4	16d box (3½ x .135)	6	3¼ x .120
	4	3 x .131			4	3 x .131	4	3 x .131	4	12d com (3¼ x .148)	4	3¼ x .131	6	3 x .120
					4	10d box (3 x .128)	4	10d box (3 x .128)	4	10d com (3 x .148)	4	3 x .131		
Built up girder or beam See Figure 12D	Connection 24		Connection 30		Connection 26 (27 for the 2015 IBC)		Connection 27							
	face nail at top and bottom staggered on opposite side:								face nail at top and bottom staggered on opposite side:					
	@ 32" o.c.		@ 32" o.c.		@ 32" o.c		@ 32" o.c		@ 32" o.c.		@ 24" o.c.		@ 16" o.c.	
	1	20d com (4 x .192)	1	10d box (3 x .128)	1	20d com (4 x .192)	1	20d com (4 x .192)	1	20d com (4 x .192)	1	10d com (3 x .148)	1	3¼ x .120
	@ 24" o.c.		.		@ 24" o.c		@ 24" o.c		@ 24" o.c.		1	16d box (3½ x .135)	1	3 x .120
	1	3 x .131			1	3 x .131	1	3 x .131	1	16d com (3 x .162)	1	3¼ x .131		
					1	10d box (3 x .128)	1	10d box (3 x .128)	1	12d com (3¼ x .148)	1	3 x .131		
	AND at each end or splice (face nail):								AND at each end or splice (face nail):					
	2	20d com (4 x 0.192)	2	10d box (3 x .128)	2	20d com (4 x .192)	2	20d com (4 x .192)	2	20d com (4 x .192)	3	10d com (3 x .148)	3	3 x .131
	3	3 x .131			3	3 x .131	3	3 x .131	3	16d com (3½ x .162)	3	16d box (3½ x .135)	3	3¼ x .120
					3	10d box (3 x .128)	3	10d box (3 x .128)	3	12d com (3¼ x .148)	3	3¼ x .131	4	3 x .120
Ledger strip (face nail) See Figure 12E	Connection 30		Connection 31		Connection 27 (28 for the 2015 IBC)		Connection 28							
	3	16d com (3½ x .162)	3	16d box (3½ x .135)	3	16d com (3½ x .162)	3	16d com (3½ x .162)	3	16d com (3½ x .162)	5	3¼ x .131	6	3¼ x .120
	4	3 x .131			4	3 x .131	4	16d box (3½ x .135)	4	12d com (3¼ x .148)	5	3 x .131	6	3 x .120
					4	10d box (3 x .128)	4	3 x .131	4	10d com (3 x .148)	6	8d com (2½ x .131)		
							4	10d box (3 x .128)	4	16d box (3½ x .135)				
Bridging to Joist (toe nail) See Figure 12F	Connection 2				Connection 29 (30 for the 2015 IBC)		Connection 29							
	Nails (total)				Nails at each end		Nails at each end		Nails at each end					
	2	8d com (2½ x .131)			2	8d com (2½ x .131)	2	10d box (3 x .128)	2	16d com (3½ x .162)	2	3¼ x .131	3	8d box (2½ x .113)
	2	3 x .131			2	3 x .131	(2018 IRC only)		2	12d com (3¼ x .148)	2	3 x .131	3	2⅜ x .113
					2	10d box (3 x .128)	2	8d com (2½ x .131)	2	10d com (3 x .148)	2	8d com (2½ x .131)	3	6d com (2 x .113)
							2	3 x .131	2	16d box (3½ x .135)	3	3¼ x .120	4	2¼ x .099
											3	3 x .120		

For **SI:** 1 inch = 25.4 mm

[1]Alternative fastening requirements shown in this table have been evaluated as alternatives to the 2018, 2015 and 2012 IBC and IRC. They can be used under earlier editions of the IBC and IRC where the prescriptive fastening requirements are no worse than those shown in the table above for the 2018, 2015 and 2012 codes.

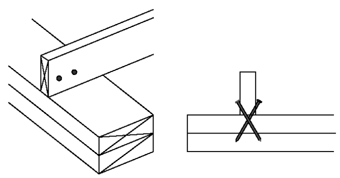


Figure 12A—Joist to Sill or Girder (toe-nail)

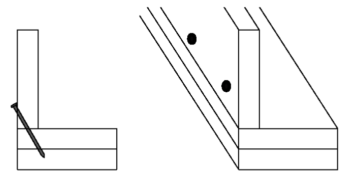


Figure 12B—Rim Joist to Top Plate (toe-nail)

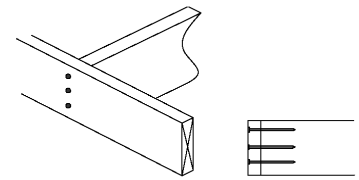


Figure 12C—Joist to Band Joist (face nail)

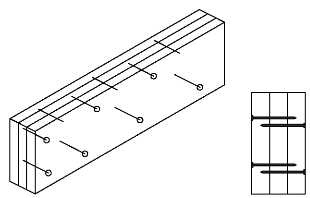


Figure 12D—Built-up Girder or Beam staggerd on both sides

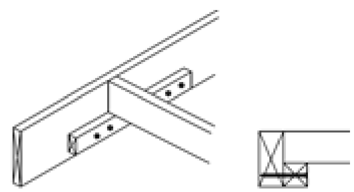


Figure 12E—Ledger Strip (face nail)

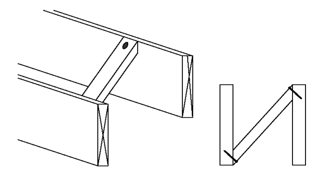


Figure 12F—Bridging to Joist (toe-nail)

FIGURE 12—PRESCRIPTIVE FASTENING DETAILS – FLOOR FRAMING

TABLE 13—SUMMARY OF ALTERNATIVE FASTENING DESIGNS RECOGNIZED IN TABLES 10 THROUGH 12[1,2,3,4]

CONNECTION	NAIL SIZE (DIAMETER X LENGTH) (inches)												
	3½ x 0.162	**3¼ x 0.148**	**3 x 0.148**	**3½ x 0.135**	**3¼ x 0.131**	**3 x 0.131**	**2½ x 0.131**	**3¼ x 0.120**	**3 x 0.120**	**2½ x 0.113**	**2⅜ x 0.113**	**2 x 0.113**	**2¼ x 0.099**
Wall Framing													
Double studs (face nail) Typical	24" o.c.	16" o.c.	16" o.c.	16" o.c.	16" o.c.	16" o.c.	8" o.c.	8" o.c.	8" o.c.				
At braced walls	16" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.		8" o.c.	8" o.c.				
Abutting studs at corners and intersections Typical	12" o.c.	12" o.c.	12" o.c.	12" o.c.	8" o.c.	8" o.c.	8" o.c.	8" o.c.	8" o.c.				
At braced walls	12" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.		8" o.c.	8" o.c.				
Built up header 2" to 2" w/ ½" spacer	12" o.c.	8" o.c.	8" o.c.	12" o.c.	8" o.c.	8" o.c.		8" o.c.	8" o.c.				
Continuous header to stud (toe nail)	3	4	4	4	4	4	4	5	5	6	6		
Double top plates to each other (face nail)	16" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.	8" o.c.	8" o.c.	8" o.c.				
Top plate to top plate at end joint (lap splice) (each side of joint)	8	12	12	12	12	12							
For 2015 IRC Connection 13b	10	12	12										
Top plate overlap at corners and intersections (face nail)	2	3	3	3	3	3		4	4				
Sole plate to joist or blocking not at braced wall panels	16" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.	12" o.c.		8" o.c.	8" o.c.				
Sole Plate to joist or blocking at braced wall panel	2 @ 16" o.c.	3 @ 16" o.c.	3 @ 16" o.c.	3 @ 16" o.c.	4 @ 16" o.c.	4 @ 16" o.c.		4 @ 16" o.c.	5 @ 16" o.c.				
Top or sole plate to stud (end nail)	3	3	3	3	4	4	4	4	4				
Stud to top or sole plate (toe-nail)	3	4	4	4	4	4	4	5	5	6	6	6	
Diagonal bracing to stud/plate[5]	2	2	2	2	2	2	2	3	3	3	3		4
Ceiling and Roof Framing													
Blocking Between Joists or Rafter to Top Plate (toe-nail) (each end)	3	3	3	3	3	3	3	4	4	5			
Ceiling joist to plate[5]	3	3	3	3	3	3	3	4	4	5	5	5	
Ceiling joists laps over partitions (no thrust)	3	4	4	4	4	4		5	5				
Ceiling joist to parallel rafter	See Table 11												
Collar tie to rafter	3	3	3	4	4	4	5	5	5	6			
Roof rafter to plate (toe-nail) (+ connectors per IBC)[5]	3	3	3	3	4	4	4	4	4				
Roof rafter to 2-by ridge beam (end-nail rafter to beam)	3	4	4	4	4	4		5	5				
Roof rafter to 2-by ridge beam (toe-nail rafter to beam)	3	4	4	4	5	5	5	6	6	6	6	6	
Jack rafter to hip (toe-nail)	3	4	4	4	5	5	5						
Jack rafter to hip (end nail)	3	4	4	4									
Floor Framing													
Joist to sill or girder (toe-nail)	3	3	3	3	3	3	3	4	4	5	5	5	
Rim joist to top plate(Toe-nail)	6" o.c.	6" o.c.	6" o.c.	6" o.c.	6" o.c.	6" o.c.	6" o.c.	4" o.c.	4" o.c.	4" o.c.	4" o.c.	3" o.c.	3" o.c.
Joist to band Joist (face nail)	3	4	4	4	4	4		6	6				
Built-up girders & beams Face-nail @ top and bottom	24" o.c.	24" o.c.	24" o.c.	24" o.c.	24" o.c.	24" o.c.		16" o.c.	16" o.c.				
PLUS # at ends or splice	3	3	3	3	3	3		3	4				
Ledger Strip	3	4	4	4	5	5	6	6	6				
Bridging to Joist (toe-nail)	2	2	2	2	2	2	2	3	3	3	3	3	4

For **SI:** 1 inch = 25.4 mm

[1]Alternative fastening requirements shown in this table have been evaluated as alternatives to the 2018, 2015 and 2012 IBC and the 2018, 2015 and 2012 IRC. They can be used under earlier editions of the IBC and IRC where the prescriptive fastening requirements are no worse than those shown in the Tables 10 through 12.

[2]This fastening schedule applies to framing members having an actual thickness of 1½" (nominal "2-by" lumber).

[3]Fastening schedule only applies to buildings of conventional wood frame construction where wind or seismic analysis is not required by the applicable code. In areas where wind or seismic analysis is required, required fastening must be determined by structural analysis.

[4]Nails may be carbon steel (bright or galvanized) or stainless steel, unless otherwise noted.

[5]Nails must be carbon steel (bright or galvanized).

APPENDIX A—REFERENCE DESIGN INFORMATION

A1.0 Reference Design Values for Nailed Connections:

The information in this section is applicable to the nails recognized in Appendix B of this report.

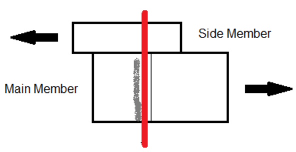
A1.1 Source:

The equations shown here for nailed connections are found in the 2018, 2015, 2012 and 2005 ANSI/AWC National Design Specification (NDS) for Wood Construction.

A1.2 Reference Lateral Design Values:

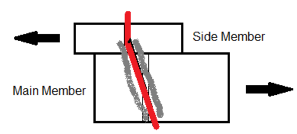
Reference lateral design values are based on the yielding of connections as wood fibers are crushed and/or fastener shanks are bent. Reference lateral design values are determined from the lowest resulting value from six yield limit equations. These equations and depictions of these yield modes are shown below:

For **Mode I_m**



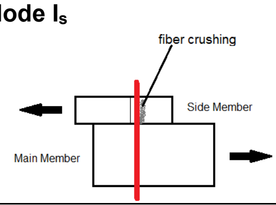
$$Z = \frac{D l_m F_{em}}{R_d}$$

For **Mode III_m**



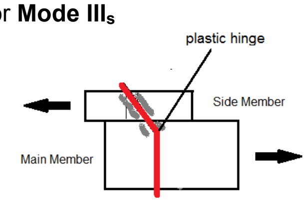
$$Z = \frac{k_2 D l_m F_{em}}{(1+2R_e)R_d}$$

For **Mode I_s**



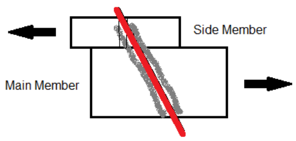
$$Z = \frac{D l_s F_{es}}{R_d}$$

For **Mode III_s**



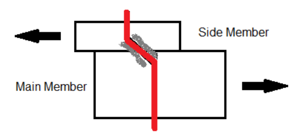
$$Z = \frac{k_3 D l_s F_{es}}{(2+R_e)R_d}$$

For **Mode II**



$$Z = \frac{k_1 D l_s F_{es}}{R_d}$$

For **Mode IV**



$$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$$

where:

$$K_1 = \frac{\sqrt{R_e + 2R_e^2(1+R_t+R_t^2) + R_t^2 R_e^3} - R_e(1+R_t)}{(1+R_e)}$$

$$K_2 = -1 + \sqrt{2(1+R_e) + \frac{2F_{yb}(1+2R_e)D^2}{3F_{em}l_m^{\,2}}}$$

$$K_3 = -1 + \sqrt{\frac{2(1+R_e)}{R_e} + \frac{2F_{yb}(2+R_e)D^2}{3F_{em}l_s^{\,2}}}$$

Z = *Reference lateral design value, lbf*
R_e = F_{em} / F_{es}
l_m = Length of nail in main member (member holding point), inches
l_s = Length of nail in side member, inches
F_{em} = Dowel bearing strength of main member (member holding point), psi [See 2018 and 2015 NDS Table 12.3.3 (2012 NDS Table 11.3.3, 2005 NDS Table 11.3.2)]
F_{es} = Dowel bearing strength of side member, psi [See 2018 and 2015 NDS Table 12.3.3 (2012 NDS Table 11.3.3, 2005 NDS Table 11.3.2)]
F_{yb} = Bending yield strength of nail, psi (see Appendix B)
D = Nominal nail diameter, inch (see Appendix B)
R_d = 2.2 for $D \leq 0.17"$, $10D + 0.5$ for $0.17 < D < 0.25$
R_t = l_m / l_s

A1.3 Reference Withdrawal Design Values:

A1.3.1 Smooth or Deformed Shank, Carbon Steel (Bright or Galvanized) Nails:

The reference withdrawal design value per unit length of penetration of a smooth or deformed shank, carbon steel nail driven into the side grain (perpendicular to the fiber) of the wood is calculated as follows:

$$W = 1380\, G^{5/2} D \qquad \text{(Eq. A1.3.1)}$$

Where:

W = Nail reference withdrawal design value in pounds-force per lineal inch of penetration into the member holding the nail point.

D = Nominal diameter of the nail shank in inches, for $0.092 \le D \le 0.375$.

G = The assigned specific gravity of the wood found in Table A or the tables indicated below, as applicable:

$$\text{For } \mathbf{SI:}\ W = 9.515\, G^{5/2} D \qquad \text{(Eq. A1.3.2)}$$

Where:

W = Nail reference withdrawal design value in Newtons per lineal millimeter of penetration into the member holding the nail point.

D = Nominal diameter of the nail shank in millimeters, for $2.33 \le D \le 9.525$.

G = The assigned specific gravity of the wood found in Table A or the tables indicated below, as applicable:

Code	Sawn Lumber	Wood Structural Panels
2018 and 2015 IBC	2018 and 2015 NDS Table 12.3.3A	2018 and 2015 NDS Table 12.3.3B
2012 IBC	2012 NDS Table 11.3.3A	2012 NDS Table 11.3.3B
2009 and 2006 IBC	2005 NDS Table 11.3.2A	2005 NDS Table 11.3.2B

A1.3.2 Smooth or Deformed Shank, Stainless Steel Nails:

The reference withdrawal design value per unit length of penetration of a smooth or deformed shank, stainless steel nail driven into the side grain (perpendicular to the fiber) of the wood is calculated as follows:

$$W = 465\, G^{3/2} D \qquad \text{(Eq. A1.3.3)}$$

Where:

W = Nail reference withdrawal design value in pounds-force per lineal inch of penetration into the member holding the nail point.

D = Nominal diameter of the nail shank in inches, for $0.092 \le D \le 0.375$.

G = The assigned specific gravity of the wood found in Table A or the tables referenced in Section A1.3.1, as applicable.

$$\text{For } \mathbf{SI:}\ W = 3.206\, G^{3/2} D \qquad \text{(Eq. A1.3.4)}$$

Where:

W = Nail reference withdrawal design value in Newtons per lineal millimeter of penetration into the member holding the nail point.

D = Nominal diameter of the nail shank in millimeters, for $2.33 \le D \le 9.525$.

G = The assigned specific gravity of the wood found in Table A or the tables referenced in Section A1.3.1, as applicable.

TABLE A—ASSIGNED SPECIFIC GRAVITY AND DOWEL BEARING STRENGTH FOR SELECT WOOD SPECIES

SPECIES	SPECIFIC GRAVITY[1]	DOWEL-BEARING STRENGTH F_e (psi)	
		Nailed Connections	Stapled Connections
Aspen	0.39	2,950	3,850
Balsam Fir	0.36	2,550	3,450
Beech-birch-hickory	0.71	8,850	9,750
Coast Sitka Spruce	0.39	2,950	3,850
Douglas Fir-larch	0.50	4,650	5,550
Douglas Fir-south	0.46	4,000	4,900
Eastern Hemlock	0.41	3,200	4,100
Eastern Hemlock-tamarack	0.41	3,200	4,100
Eastern Hemlock-tamarack (north)	0.47	4,150	5,050
Eastern softwoods	0.36	2,550	3,450
Eastern Spruce	0.41	3,200	4,100
Eastern White Pine	0.36	2,550	3,450
Hem-Fir	0.43	3,500	4,400
Mountain Hemlock	0.47	4,150	5,050
Northern Pine	0.42	3,350	4,250
Northern Species	0.35	2,400	3,300
Northern White Cedar	0.31	1,900	2,800
Ponderosa Pine	0.43	3,500	4,400
Red Oak	0.67	7,950	8,850
Red Pine	0.44	3,650	4,550
Sitka Spruce	0.43	3,500	4,400
Southern Pine	0.55	5,550	6,450
Spruce-Pine-Fir	0.42	3,350	4,250
Western Cedars	0.36	2,550	3,450
Western Cedars (North)	0.35	2,400	3,300
Western Hemlock	0.47	4,150	5,050
Western White Pine	0.40	3,100	4,000
White Oak	0.73	9,300	10,200
Yellow Poplar	0.43	3,500	4,400
WOOD STRUCTURAL PANELS			
Plywood: Structural 1, Marine	0.50	4,650	5,550
Plywood: Other Grades	0.42	3,350	4,250
Oriented Strand Board All Grades	0.50	4,650	5,550

For **SI:** 1 psi = 6.89 kN/m^2.

[1]Specific gravity based on weight and volume when oven dry.

A2.0 Reference Design Values for Stapled Connections:

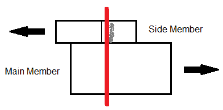
A2.1 Source:

The equations shown here for stapled connections are found in the ICC-ES Acceptance Criteria for Staples (AC201) dated March 2018.

A2.2 Reference Lateral Design Values:

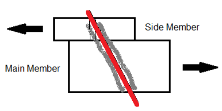
Reference lateral design values for stapled connections must be determined using the minimum result from the equations shown below. These equations are relevant to wood-to-wood connections and to connections in which steel sheet metal is stapled to wood. The steel side member shall have sufficient thickness to prevent tearing of the steel sheet when loaded. Determination of dowel bearing strength of the sheet metal must consider Section I.2 of Appendix I of the NDS. Reference lateral design values are for normal load duration and must be multiplied by all applicable adjustment factors in accordance with the NDS.

Yield Mode I:



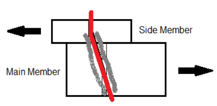
$$Z = \frac{2F_{es} l_s d}{K_D}$$

Yield Mode II:



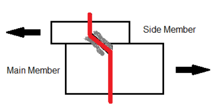
$$Z = \frac{2dF_{em}}{K_D}\left(\frac{l_m}{1+\frac{F_{es}}{F_{em}}}\right)\left[\left|\sqrt{\frac{F_{es}}{F_{em}} + 2\left(\frac{F_{es}}{F_{em}}\right)^2\left[1+\frac{l_s}{l_m}+\left(\frac{l_s}{l_m}\right)^2\right]+\left(\frac{F_{es}}{F_{em}}\right)^3\left(\frac{l_s}{l_m}\right)^2} - \frac{F_{es}}{F_{em}}\left(1+\frac{l_s}{l_m}\right)\right|\right]$$

Yield Mode III:



$$Z = \frac{2}{K_D}\left[\frac{-l_s F_{es} d}{2\frac{F_{es}}{F_{em}}+1} + F_{es} d\sqrt{\frac{l_s^2}{\left(2\frac{F_{es}}{F_{em}}+1\right)^2} + \frac{l_s^2}{2\frac{F_{es}}{F_{em}}+1} + \frac{4M}{F_{es} d\left(2\frac{F_{es}}{F_{em}}+1\right)}}\right]$$

Yield Mode IV:



$$Z = \frac{4F_{em} d}{K_D}\sqrt{\frac{M}{F_{em} d\left(1+\frac{F_{em}}{F_{es}}\right)}}$$

where:

Z = Reference lateral design value for staple (2 legs), lbf.

F_{em} = Dowel bearing strength of the main member, psi = 900 psi + F_e from 2018 and 2015 NDS Table 12.3.3 (2012 NDS Table 11.3.3, 2005 NDS Table 11.3.2) for D<$^1/_4$"

F_{es} = Dowel bearing strength of the side member, psi = 900 psi + F_e from 2018 and 2015 NDS Table 12.3.3 (2012 NDS Table 11.3.3, 2005 NDS Table 11.3.2) for D<$^1/_4$"

d = Nominal wire diameter, inch, from Table 3.2.

M = Minimum staple bending moment, in-lbs, from Table 3.2.

l_s = Length of staple in side member, inches.

l_m = Length of staple in main member, inches, (minimum of 12D, where D is the nominal wire diameter from Table 3.2).

K_D = Diameter coefficient for staple connections = 2.2

A2.3 Reference Withdrawal Design Values:

The reference withdrawal design value per unit length of penetration of staples driven into the side grain (perpendicular to the fiber) of the wood is calculated as follows:

$$W = 2760\ G^{5/2}\ D \qquad \text{(Eq. A1.3.5)}$$

where:

W = Staple reference withdrawal design value, in pounds-force per lineal inch of penetration into the member holding both staple legs.

G = the assigned specific gravity of the wood (see Table A and Section A1.3.1).

D = Nominal wire diameter, in inches, from Table 3.2.

For **SI**: $W = 19.03\ G^{5/2}\ D$ (Eq. A1.3.6)

where:

W = Staple reference withdrawal design value, in Newtons per linear millimeter of penetration into the member holding both staple legs.

G = The assigned specific gravity of the wood (see Table A and Section A1.3.1).

D = Nominal wire diameter, in millimeters, from Table 3.2.

A3.0 DESIGN INFORMATION FOR DEFLECTION CALCULATIONS FOR DIAPHRAGMS AND SHEAR WALLS

A3.1 NAILS:

To determine the deflection of diaphragms and shear walls constructed as described in Tables 5 through 9, refer to Sections 4.2.2 and 4.3.2 of the AWC Special Design Provisions for Wind and Seismic (SDPWS), respectively. For 0.120 inch nails, use the G_a values shown in the SDPWS for the 6d common nails.

A3.2 STAPLES:

The staple deformation values shown in Table B must be used to determine diaphragm deflection in accordance with the IBC Section 2305.2 or shear wall deflection in accordance with the IBC Section 2305.3, as applicable.

TABLE B—STAPLE DEFORMATION VALUES, e_n, FOR USE IN HORIZONTAL DIAPHRAGM AMD SHEAR WALL DEFLECTION ANALYSIS [1, 4]

Staple Gage	16		15		14	
Length (Inches)	**1$^1/_2$**	**2**	**1$^3/_4$**	**2$^1/_2$**	**2**	**2$^1/_2$**
Load Per Fastener[2] (Pounds)	Connection Deflection[3] (Inches)					
60	0.008	0.003	0.008	0.005	0.005	0.003
80	0.016	0.006	0.016	0.010	0.011	0.006
100	0.032	0.008	0.028	0.015	0.019	0.009
120	0.055	0.010	0.048	0.025	0.032	0.014
140	0.087	0.024	0.077	0.040	0.050	0.021
160	0.135	0.037	0.118	0.060	0.077	0.031
180	0.205	0.052	0.173	0.088	0.113	0.044
200	—	0.092	0.244	0.127	0.157	0.060
220	—	0.198	0.299	0.178	0.219	0.080
240	—	—	0.346	0.220	0.287	0.097

For **SI:** 1 inch = 25.4 mm 1 lbf = 4.45 N.

[1]Increase deformation value by 20% for plywood grades other than Structural I sheathing.
[2]Load per fastener is the diaphragm's maximum shear per foot divided by the number of fasteners per foot at interior panel edges.
[3]Values must be doubled for unseasoned lumber.
[4]Values are for e_n in equations found in the IBC.

APPENDIX B

RECOGNIZED FASTENERS BY LISTEE

TABLE B1—LISTEE INFORMATION AND INDEX TO LISTEE PRODUCT DESCRIPTIONS

LISTEE NAME, PRODUCT BRAND NAME(S), AND LISTEE ADDRESS	PAGE NO. FOR THE TABLE WITH LISTEE SPECIFIC PRODUCT DESCRIPTIONS
American Fasteners Company Ltd. (American Fasteners Brand) 11175 Inland Avenue Jurupa Valley, California 91752	31
Beck America, Inc. (Fasco, Fasco/Beck, Beck Fastener Group Brands) 105 Industrial Park Drive Muscle Shoals, Alabama 35661	33
Building Material Distributors, Inc. (Master Fasteners Brand) 225 Elm Avenue Galt, California 95632	31
Falcon Fasteners Reg'd 251 Nantucket Boulevard Toronto, Ontario M1P 2P2 CANADA	32
Huttig Building Products (Huttig-Grip Brand) 555 Maryville University Drive, Suite 400 St. Louis, Missouri 63141	34
JAACO Corporation (NailPro Brand) 18080 NE 68th Street, Suite C130 Redmond, Washington 98052	34
Koki Holdings America Ltd. (Metabo HPT Brand) 1111 Broadway Avenue Braselton, Georgia 30517	35
KYOCERA SENCO Industrial Tools, Inc. (Senco Brand) 4270 Ivy Pointe Boulevard Cincinnati, Ohio 45245	36
Mid-Continent Steel and Wire (Mid-Continent Nail) (Magnum Fasteners Brand) 2700 Central Avenue Poplar Bluff, Missouri 63901	37
Oman Fasteners, LLC. Plot No. 5117, Sohar PEIE Industrial Area – Phase 5, PO Box 584 Sohar, Sultanate of Oman, PC322	37
Paslode, an Illinois Tool Works Company (Paslode, Lightning Strike, Duo-Fast Brands) 155 Harlem Avenue Glenview, Illinois 60025	38
Peace Industries (Spotnails Brand) 1100 Hicks Road Rolling Meadows, Illinois 60008	38
PrimeSource Building Products (Grip-Rite, Fasteners Unlimited, Fits Rite Brands) 1321 Greenway Drive Irving, Texas 75038	39
Specialty Fastening Systems, Inc. (Specialty Fasteners Brand) 424 South Baggett Prairie Grove, Arkansas 72753	39
Stanley Black and Decker Inc. (BOSTITCH, DEWALT, Craftsman Brands) 701 East Joppa Road Towson, Maryland 21286	40

General Notes for Appendix B:

1. For **SI:** 1 inch = 25.4 mm, 1 psi = 6.89 kPa.
2. For each listee, nails having the diameter, shank type and finish type indicated in the applicable table are recognized for any length. Staples having the indicated diameter and finish are recognized for any leg length greater than $1^1/_2$ inches.
3. All nails are formed from carbon steel wire, unless designated in the tables below as stainless steel.
4. For a depiction of the various head styles, see Figure 1.

Terminology

LFRA = Lateral force resisting assembly: A diaphragm, shear wall or braced wall.

Head Area Ratio Requirements

Y =6d	=	Meets the head requirements for use in sheathing attachment in LFRAs where a 6d common nail is prescribed in the code.
Y =8d	=	Meets the head requirements for use in sheathing attachment in LFRAs where a 8d common nail is prescribed in the code.
Y =10d	=	Meets the head requirements for use in sheathing attachment in LFRAs where a 10d common nail is prescribed in the code.
Y =16d	=	Meets the head requirements for use in sheathing attachment in LFRAs where a 16d common nail is prescribed in the code.
Y ###	=	Meets the head requirements for a 0.### diameter nail for use in sheathing attachment in shear walls and diaphragms in accordance with Tables 5 through 8 of this report.
N	=	Not recognized for use in sheathing attachment in LFRAs.
n/a	=	Nail size is not prescribed in the code or listed in the diaphragm tables in this report for use in LFRAs. Use of Metal Hardware Nails in LFRAs is outside the scope of this report.

Shank Type

S	=	Smooth shank nail
R	=	Ring shank nail
Sc	=	Screw shank nail

Finish/ Coating Types

X	=	The fasteners are carbon steel, “bright” (ungalvanized, uncoated).
H	=	Hardened (Bright) = Bending yield strength complies with Table S1.2 of ASTM F1667.
HT	=	Bright, heat treated or hardened nail (may be the full nail or only a portion of the nail, such as the tip; compliance with Table S1.2 of F1667 has not been evaluated)
SS	=	Stainless Steel
HDG	=	Hot-dipped galvanized, complying with ASTM A153 Class D.
EG	=	Electrogalvanized, complying with ASTM A641, Class 1.
HHDG	=	Hardened and hot dip galvanized (Bending yield strength complies with Table S1.2 of ASTM F1667; galvanization complies with ASTM A153 Class D.)
HEG	=	Hardened and electrogalvanized (Bending yield strength complies with Table S1.2 of ASTM F1667; galvanization complies with ASTM A641 Class 1.)
HTHDG	=	Heat Treated or hardened and hot dip galvanized (Hardening may affect the full nail or only a portion of the nail, such as the tip; compliance with Table S1.2 of F1667 has not been evaluated. Galvanization complies with ASTM A153 Class D.)
PP	=	Proprietary polymer coating applied to nail shank to aid in driving collated nails. May be applied over ungalvanized, galvanized or stainless steel nails.
P#	=	Denotes a proprietary coating recognized in an ICC-ES evaluation report, as follows: P1 = ThickCoat™ recognized in ESR-1482.

AMERICAN FASTENERS COMPANY LTD.								
NAILS (Brand name: AMERICAN FASTENERS)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Plastic, paper	0.131	Full round	Y	Y =8d	S	X, HDG	Y	100,000
	0.135		Y	Y 135	S	X, HDG	Y	100,000
	0.148		Y	Y =10d	S	X, HDG	Y	90,000
Metal Hardware Nails **Designated as "Metal Connector Nail" on package labeling**								
Paper	0.131	Full round	Y	n/a	S	X, HDG	Y	100,000
	0.148		Y	n/a	S	X, HDG	Y	90,000

BUILDING MATERIAL DISTRIBUTORS, INC.								
NAILS (Brand name: MASTER FASTENERS)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire, plastic, paper	0.113	Full Round	Y	Y =6d	S	X, HDG, EG	Y	100,000
					R	X, EG	Y	
	0.120		Y	Y 120	S, Sc	X	Y	100,000
					R	X, EG	Y	
	0.131		Y	Y =8d	S	X	Y	100,000
					R	X, EG	Y	
	0.135		Y	n/a	S	X	Y	100,000
	0.148		Y	Y =10d	S	X, HDG	Y	90,000
					R	X	Y	
Plastic	0.162		Y	Y =16d	S	X, HDG	Y	90,000
Paper	0.113	Clipped	Y	Y =6d	S	X, HDG, EG	Y	100,000
					R	X, EG	Y	
	0.120		Y	Y 120	S, Sc	X	Y	100,000
					R	X, EG	Y	
	0.131		Y	Y =8d	S	X, HDG, EG	Y	100,000
					R	X, EG	Y	

FALCON FASTENERS REG'D								
NAILS								
TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Wire	0.092	Full round	Y*	n/a	S, R, Sc	X	Y	100,000
	0.099		Y	n/a	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
Wire, plastic, paper	0.113		Y	Y =6d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.120		Y	Y 120	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.131		Y	Y =8d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.148		Y	Y =10d	S	X, HDG, SS, HT, HTHDG	Y	90,000
					R	X, HDG, SS	Y	
	0.162		Y	Y =16d	S	X, HDG, HT, HTHDG	Y	90,000
Paper, wire	0.113	Notched	Y	Y =6d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.120		Y	Y 120	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.131		Y	Y =8d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
Paper	0.113	Clipped	Y	Y =6d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.120		Y	Y 120	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.131		Y	Y =8d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.148		Y	Y =10d	S	X, HDG, SS, HT, HTHDG	Y	90,000
					R	X, HDG, SS	Y	
Paper, wire	0.113	Offset	Y	Y =6d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.120		Y	Y 120	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.131		Y	Y =8d	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
					Sc	X, HDG	Y	
Paper	0.148		Y	Y =10d	S	X, HDG, SS, HT, HTHDG	Y	90,000
					R	X, HDG, SS	Y	
Metal Hardware Nails - Designated as "Metal Connector Nail" or "Joist Hanger Nail" on package labeling								
Paper	0.131	Full round**	Y	n/a	S	X, HDG, SS, HT, HTHDG	Y	100,000
					R	X, HDG, SS	Y	
	0.148		Y		S	X, HDG, SS, HT, HTHDG	Y	90,000
					R	X, HDG, SS	Y	
	0.162		Y		S	X, HDG, HT, HTHDG	Y	90,000

*Recognition is limited to use in connections subjected to tension only.

****Head markings for Metal Hardware Nails:**
'8' for $1^{1}/_{2}$ x 0.131; '8d' for $2^{1}/_{2}$ x 0.131; '10' for $1^{1}/_{2}$ x 0.148; '10L' for $2^{1}/_{2}$ x 0.148; '16' for $2^{1}/_{2}$ x 0.162

BECK AMERICA, INC.

NAILS (Brand names: FASCO, FASCO/BECK, BECK FASTENER GROUP)

TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Wire, plastic, paper	0.092	Full round	Y*	n/a	S, R	X, HDG,EG, SS	Y	100,000
					Sc	X, HDG, EG	Y	
	0.099		Y	n/a	S, R	X, HDG, EG, SS	Y	100,000
					Sc	X, HDG, EG	Y	
	0.113		Y	Y =6d	S, Sc	X, HDG, EG	Y	100,000
					R	X, HDG, EG, SS	Y	
	0.120		Y	Y 120	S	X, HDG, EG	Y	100,000
					R, Sc	X, HDG, EG, SS	Y	
	0.131		Y	Y =8d	S	X, HDG, EG	Y	100,000
					R, Sc	X	Y	
	0.135		Y	N	S, R, Sc	X	Y	100,000
	0.148		Y	Y =10d	S, R	X, HDG, EG	Y	90,000
					Sc	X, HDG	Y	
Wire, plastic	0.162		Y	N	S, Sc	X, HDG	Y	90,000
					R	X	Y	
Plastic	0.180		Y	n/a	S	X	Y	80,000
	0.197		Y	n/a	S	X	Y	80,000
Wire, plastic, paper	0.092	Clipped	Y*	n/a	S, R	X, HDG, EG, SS	Y	100,000
					Sc	X, HDG, EG	Y	
	0.113		Y	Y =6d	S, Sc	X, HDG, EG	Y	100,000
					R	X, HDG, EG, SS	Y	
	0.120		Y	Y 120	S	X, HDG, EG	Y	100,000
					R, Sc	X, HDG, EG, SS	Y	
	0.131		Y	N	S	X, HDG, EG	Y	100,000
					R, Sc	X	Y	
	0.135		Y	N	S, R, Sc	X	Y	100,000
Wire, plastic, paper	0.113	Offset	Y	Y =6d	S, Sc	X, HDG, EG	Y	100,000
					R	X, HDG, EG, SS	Y	
	0.120		Y	N	S	X, HDG, EG	Y	100,000
					R, Sc	X, HDG, EG, SS	Y	
	0.135		Y	N	S, R, Sc	X	Y	100,000
Metal Hardware Nails Designated “Paper Tape joist Hanger Nails” on package labeling								
Paper	0.131	Full Round	Y	n/a	S	X, HDG, EG	Y	100,000
	0.148		Y	n/a	S	X, HDG, EG	Y	90,000
	0.162		Y	n/a	S	X, HDG, EG	Y	90,000

STAPLES (Brand names: FASCO, FASCO/BECK, BECK FASTENER GROUP)

GAGE	NOMINAL CROWN WIDTH (inch)	FINISH/ COATING
16	$^{7}/_{16}$	X, EG
15	$^{7}/_{16}$	X, EG
14	1	X, EG

*Recognition is limited to use in connections subjected to tension only.

HUTTIG BUILDING PRODUCTS								
NAILS (Brand name: HUTTIG-GRIP)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire	0.092	Full round	Y*	n/a	S, R, Sc	X, HDG, EG	Y	100,000
	0.099		Y	n/a	S, R, Sc	X, HDG, EG	Y	100,000
Wire, Plastic	0.113		Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
Plastic	0.135		Y	Y 135	S	X	Y	100,000
	0.148		Y	Y =10d	S, R, Sc	X, HDG, EG	Y	90,000
	0.162		Y	Y =16d	S, R, Sc	X, HDG, EG	Y	90,000
Paper	0.113	Clipped	Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
	0.113	Offset	Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
Metal Hardware Nails (Designated “Metal Connector Nail” on package labeling)								
Paper	0.131	Full Round**	Y	n/a	S	H, HHDG, HEG	Y	130,000
	0.148		Y	n/a	S	H, HHDG, HEG	Y	115,000
	0.162		Y	n/a	S	H, HHDG, HEG	Y	115,000
*Recognition is limited to use in connections subjected to tension only.								
****Head markings for metal hardware nails:** ‘1’ for $1^1/_2$ x 0.131; ‘2’ for $2^1/_2$ x 0.131; ‘3’ for $1^1/_2$ x 0.148; ‘4’ for $2^1/_2$ x 0.148; ‘5’ for $2^1/_2$ x 0.162								

JAACO CORPORATION								
NAILS (Brand name: NAILPRO)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire, plastic	0.113	Full Round	Y	Y =6d	S	X	Y	100,000
	0.120		Y	Y 120	S, R	X	Y	100,000
Wire, plastic, paper	0.131		Y	Y =8d	S	X	Y	100,000
Paper	0.148		Y	N	S	X	Y	90,000
	0.162		Y	N	S	X	Y	90,000
Metal Hardware Nails Designated “Joist Hanger Nail” on package labeling								
Paper	0.131	Full Round	Y	n/a	S	X	N	100,000
	0.148		Y	n/a	S	X	N	90,000
	0.162		Y	n/a	S	X	N	90,000

KOKI HOLDINGS AMERICA LTD.								
NAILS (Brand name: METABO-HPT)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire, plastic, paper	0.092	Full round	Y*	n/a	S,R,Sc	X, EG, HDG, SS	Y	100,000
					Sc	X, EG, HDG	Y	
	0.099		Y	n/a	S, R, Sc	X, EG, HDG	Y	100,000
	0.113		Y	Y =6d	S	X, EG, HDG, SS, HT	Y	100,000
					R	X, EG, HDG, SS	Y	
					Sc	X, EG, HDG	Y	
	0.120		Y	Y 120	S	X, EG, HDG, SS, HT	Y	100,000
					R	X, EG, HDG, SS	Y	
					Sc	X, EG, HDG	Y	
	0.131		Y	Y =8d	S	X, EG, HDG, SS, HT	Y	100,000
					R	X, EG, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.148		Y	Y =10d	S	X, EG, HDG, SS, HT	Y	90,000
					R	X, EG, HDG, SS	Y	
					Sc	X, HDG	Y	
	0.162		Y	N	S	X, EG, HDG	Y	90,000
Paper	0.113	Clipped	Y	Y =6d	S, R, Sc	X, EG, HDG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, EG, HDG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, EG, HDG	Y	100,000
Wire, paper	0.113	Offset	Y	Y =6d	S, R, Sc	X, EG, HDG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, EG, HDG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, EG, HDG	Y	100,000
Metal Hardware Nails Designated "Strap-Tite" on package labeling								
Paper	0.131	Full round	Y	n/a	S	X, HHDG, HEG	Y	130,000
	0.148		Y	n/a	S	X, HHDG, HEG	Y	115,000
	0.162		Y	n/a	S	X, HHDG, HEG	Y	115,000
*Recognition is limited to use in connections subjected to tension only.								
****Head markings for metal hardware nails:** 'H1' for $1^{1}/_{2}$ x 0.131; 'H2' for $2^{1}/_{2}$ x 0.131; 'H3' for $1^{1}/_{2}$ x 0.148; 'H4' for $2^{1}/_{2}$ x 0.148; 'H5' for $2^{1}/_{2}$ x 0.162								

<table>
<tr><th colspan="9">KYOCERA SENCO INDUSTRIAL TOOLS, INC.</th></tr>
<tr><th colspan="9">NAILS (Brand name: SENCO)</th></tr>
<tr><th>TYPE OF COLLATION</th><th>NOMINAL DIAMETER (inch)</th><th>HEAD STYLE</th><th>RECOGNIZED FOR USE IN FRAMING</th><th>MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs</th><th>SHANK TYPE</th><th>FINISH/ COATING</th><th>PP COATING</th><th>SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)</th></tr>
<tr><td rowspan="3">Plastic, wire</td><td>0.113</td><td rowspan="9">Full Round</td><td>Y</td><td>Y =6d</td><td>S, R</td><td>X, EG, HDG</td><td>Y</td><td>100,000</td></tr>
<tr><td rowspan="2">0.120</td><td rowspan="2">Y</td><td rowspan="2">Y 120</td><td>S, Sc</td><td>X, EG, HDG</td><td>Y</td><td rowspan="2">100,000</td></tr>
<tr><td>R</td><td>X, HDG</td><td>Y</td></tr>
<tr><td rowspan="3">Plastic, paper, wire</td><td rowspan="2">0.131</td><td rowspan="2">Y</td><td rowspan="2">Y =8d</td><td>S</td><td>X, EG, HDG</td><td>Y</td><td rowspan="2">100,000</td></tr>
<tr><td>R</td><td>X, HDG</td><td>Y</td></tr>
<tr><td>0.135</td><td>Y</td><td>Y 135</td><td>S</td><td>X</td><td>Y</td><td>100,000</td></tr>
<tr><td>Plastic, paper</td><td>0.148</td><td>Y</td><td>Y =10d</td><td>S</td><td>X, HDG</td><td>Y</td><td>90,000</td></tr>
<tr><td>Paper</td><td>0.162</td><td>Y</td><td>Y =16d</td><td>S</td><td>X, HDG, HT</td><td>Y</td><td>90,000</td></tr>
<tr><td rowspan="6">Paper</td><td>0.113</td><td rowspan="6">Clipped</td><td>Y</td><td>Y =6d</td><td>S, R</td><td>X, EG, HDG</td><td>Y</td><td>100,000</td></tr>
<tr><td rowspan="2">0.120</td><td rowspan="2">Y</td><td rowspan="2">Y 120</td><td>S</td><td>X, EG, HDG</td><td>Y</td><td rowspan="2">100,000</td></tr>
<tr><td>R</td><td>X, HDG</td><td>Y</td></tr>
<tr><td rowspan="2">0.131</td><td rowspan="2">Y</td><td rowspan="2">Y =8d</td><td>S</td><td>X, EG, HDG</td><td>Y</td><td rowspan="2">100,000</td></tr>
<tr><td>R</td><td>X, HDG</td><td>Y</td></tr>
<tr><td>0.135</td><td>Y</td><td>Y 135</td><td>S</td><td>X</td><td>Y</td><td>100,000</td></tr>
<tr><td rowspan="3">Paper</td><td>0.113</td><td rowspan="3">Offset</td><td>Y</td><td>Y =6d</td><td>S, R</td><td>X, HDG</td><td>Y</td><td>100,000</td></tr>
<tr><td>0.120</td><td>Y</td><td>Y 120</td><td>S, R</td><td>X, HDG</td><td>Y</td><td>100,000</td></tr>
<tr><td>0.131</td><td>Y</td><td>Y =8d</td><td>S, R</td><td>X, HDG</td><td>Y</td><td>100,000</td></tr>
<tr><th colspan="9">Metal Hardware Nails
(Designated “Hardened Metal Connector Nails” on package labeling)</th></tr>
<tr><td rowspan="3">Paper</td><td>0.131</td><td rowspan="3">Full Round</td><td>Y</td><td>n/a</td><td>S</td><td>H, HHDG, HEG</td><td>Y</td><td>130,000</td></tr>
<tr><td>0.148</td><td>Y</td><td>n/a</td><td>S</td><td>H, HHDG, HEG</td><td>Y</td><td>115,000</td></tr>
<tr><td>0.162</td><td>Y</td><td>n/a</td><td>S</td><td>H, HHDG, HEG</td><td>Y</td><td>115,000</td></tr>
<tr><th colspan="9">STAPLES (Brand name: SENCO)</th></tr>
<tr><th colspan="3">GAGE</th><th colspan="3">NOMINAL CROWN WIDTH (inch)</th><th colspan="3">FINISH/ COATING</th></tr>
<tr><td colspan="3">14</td><td colspan="3">$^{7}/_{16}$</td><td colspan="3">X</td></tr>
<tr><td colspan="3">15</td><td colspan="3">$^{7}/_{16}$</td><td colspan="3">X, EG</td></tr>
<tr><td colspan="3">16</td><td colspan="3">$^{7}/_{16}$, 1</td><td colspan="3">X, EG</td></tr>
</table>

MID-CONTINENT STEEL AND WIRE (MID-CONTINENT NAIL)								
NAILS (Brand name: MAGNUM FASTENERS)								
TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Wire	0.099	Full round	Y	n/a	S,R,Sc	X, EG, HDG	Y	100,000
Wire, paper, plastic	0.113		Y	Y =6d	S,R,Sc	X, EG, HDG	Y	100,000
	0.120		Y	Y 120	S,R,Sc	X, EG, HDG	Y	100,000
	0.131		Y	Y =8d	S,R,Sc	X, EG, HDG	Y	100,000
Wire, plastic	0.135		Y	Y 135	S,R,Sc	X, EG, HDG	Y	100,000
Plastic	0.148		Y	Y =10d	S,R,Sc	X, EG, HDG	Y	90,000
	0.162		Y	N	S,R,Sc	X, EG, HDG	Y	90,000
Paper	0.113	Offset	Y	N	S,R,Sc	X, HDG	Y	100,000
	0.120		Y	N	S,R,Sc	X, HDG	Y	100,000
	0.131		Y	N	S,R,Sc	X, HDG	Y	100,000
Metal Hardware Nails Designated "Hardware Nails" on package labeling								
Paper, plastic	0.131	Full round	Y	n/a	S	X, HDG	Y*	100,000
	0.148		Y	n/a	S	X, HDG	Y*	90,000
	0.162		Y	n/a	S	X, HDG	Y*	90,000
*Proprietary polymer coating added to $2^1/_2$" length nails only.								

OMAN FASTENERS								
NAILS								
TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Wire	0.092	Full Round	Y*	n/a	S, R, Sc	X, HDG, EG	Y	100,000
	0.099		Y	n/a	S, R, Sc	X, HDG, EG	Y	100,000
Wire, plastic	0.113		Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
Plastic	0.148		Y	Y =10d	S, R, Sc	X, HDG, EG	Y	90,000
	0.162		Y	Y =16d	S, R, Sc	X, HDG, EG	Y	90,000
Paper	0.113	Clipped	Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
	0.113	Offset	Y	Y =6d	S, R, Sc	X, HDG, EG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG, EG	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X, HDG, EG	Y	100,000
Metal Hardware Nails (Designated "Hardened Joist Hanger Nail" on package labeling)								
Paper	0.131	Full Round**	Y	n/a	S	H, HHDG, HEG	Y	130,000
	0.148		Y	n/a	S	H, HHDG, HEG	Y	115,000
	0.162		Y	n/a	S	H, HHDG, HEG	Y	115,000
*Recognition is limited to use in connections subjected to tension only.								
Head markings for metal hardware nails: '1' for $1^1/_2$ x 0.131; '2' for $2^1/_2$ x 0.131; '3' for $1^1/_2$ x 0.148; '4' for $2^1/_2$ x 0.148; '5' for $2^1/_2$ x 0.162								

PASLODE, AN ILLINOIS TOOL WORKS COMPANY								
NAILS (Brand names: PASLODE, LIGHTNING STRIKE, DUO-FAST)								
TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE (Applicable Brand Name)	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Plastic, paper	0.113	Full Round	Y	Y =6d	S, R	X, HDG	Y	100,000
	0.120		Y	Y 120	R, Sc	HDG	Y	100,000
	0.131		Y	Y =8d	S	X, HDG	Y	100,000
					Sc	HDG	Y	
	0.148		Y	Y =10d	S	X	Y	90,000
Paper	0.113	Offset (RounDrive™)	Y	Y =6d	S, R	X, HDG	Y	100,000
	0.120		Y	Y 120	S, R	X	Y	100,000
	0.135		Y	Y 135	S	X	Y	100,000
Paper	0.113	Clipped (Paslode)	Y	Y =8d	S, R	HDG	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X, HDG	Y	100,000
	0.131		Y	N	S, R	X	Y	100,000

PEACE INDUSTRIES								
NAILS (Brand name: SPOTNAILS)								
TYPE OF COLLATION	NOMINAL DIAMETER (inch)	HEAD STYLE	RECOGNIZED FOR USE IN FRAMING	MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs	SHANK TYPE	FINISH/ COATING	PP COATING	SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)
Wire	0.099	Full Round	Y	n/a	S	X, EG	Y	100,000
					R	EG	Y	100,000
					Sc	X	Y	100,000
	0.113		Y	Y =6d	S, R	X	Y	100,000
	0.120		Y	Y 120	S	X, EG	Y	100,000
					R, Sc	X	Y	100,000
	0.131		Y	Y =8d	S	X	Y	100,000
Plastic	0.113		Y	Y =6d	S, Sc	X	Y	100,000
					R	X, EG	Y	100,000
	0.120		Y	Y 120	S, Sc	X	Y	100,000
					R	EG	Y	100,000
	0.131		Y	Y =8d	S	X	Y	100,000
Paper	0.113	Clipped	Y	Y =6d	R	X	Y	100,000
	0.120		Y	Y 120	R	HDG	Y	100,000
	0.131		Y	Y =8d	S	X	Y	100,000
Metal Hardware Nails (Designated "Joist Hanger Nail" on package labeling)								
Paper	0.131	Full Round	Y	n/a	S	H, HHDG, HEG	Y	130,000
	0.148		Y	n/a	S	H, HHDG, HEG	Y	115,000
	0.162		Y	n/a	S	H, HHDG, HEG	Y	115,000

PRIMESOURCE BUILDING PRODUCTS								
NAILS (Brand names: GRIP-RITE, FAS'NERS UNLIMITED, FITS RITE)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire	0.113	Full Round	Y	Y =6d	S, R, Sc	X	Y	100,000
	0.120		Y	Y 120	S, R, Sc	X	Y	100,000
	0.131		Y	Y =8d	S, R, Sc	X	Y	100,000
Plastic	0.135	Full Round	Y	Y 135	S	X	Y	100,000
	0.148		Y	Y =10d	S, R, Sc	X	Y	90,000
	0.162		Y	Y =16d	S, R, Sc	X	Y	90,000
Wire, paper	0.113	D head (clipped)	Y	Y =6d	S, R	X	Y	100,000
	0.120		Y	Y 120	S, R	X	Y	100,000
	0.131		Y	Y =8d	S, R	X	Y	100,000
Wire, paper	0.113	Offset	Y	Y =6d	S	X	Y	100,000
	0.120		Y	Y 120	S	X	Y	100,000
	0.131		Y	Y =8d	S	X	Y	100,000

SPECIALTY FASTENING SYSTEMS, INC.								
NAILS (Brand names: SPECIALTY NAIL CO., SPECIALTY FASTENERS)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Plastic, paper	0.092	Full round	Y*	n/a	S,R,Sc	X	N	100,000
	0.099		Y	n/a	S	X, HDG, SS, HT	N	100,000
					R	X, HDG, SS	N	
					Sc	X, HDG	N	
	0.113		Y	Y =6d	S	X, HDG, SS, HT	N	100,000
					R	X, HDG, SS	N	
					Sc	X, HDG	N	
	0.120		Y	Y 120	S	X, HDG, SS, HT	N	100,000
					R	X, HDG, SS	N	
					Sc	X, HDG	N	
	0.131		Y	Y =8d	S	X, HDG, SS, HT	N	100,000
					R	X, HDG, SS	N	
					Sc	X, HDG	N	
	0.148		Y	Y =10d	S	X, HDG, SS, HT	N	90,000
					R	X, HDG, SS	N	
	0.162		Y	Y =16d	S	X, HDG, HT	N	90,000
*Recognition is limited to use in connections subjected to tension only.								

STANLEY BLACK AND DECKER INC.								
NAILS (Brand name: BOSTITCH, DEWALT, CRAFTSMAN)								
TYPE OF COLLATION	**NOMINAL DIAMETER (inch)**	**HEAD STYLE**	**RECOGNIZED FOR USE IN FRAMING**	**MEETS HEAD AREA RATIO REQUIREMENTS FOR USE IN LFRAs**	**SHANK TYPE**	**FINISH/ COATING**	**PP COATING**	**SPECIFIED BENDING YIELD STRENGTH F_{yb} (psi)**
Wire, plastic	0.092	Full Round	Y	n/a	S, R	X, HDG	Y	100,000
					Sc	X	Y	
	0.099		Y	n/a	S, R, Sc	X, HDG, P1(B)[1]	Y	100,000
	0.113		Y	Y =6d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =6d	Sc	X, HDG, P1(B)	Y	
	0.120		Y	Y 120	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y 120	Sc	X, HDG, P1(B)	Y	
	0.131		Y	Y =8d	S	X, HDG, EG, P1	Y	100,000
			Y	Y =8d	R	X, HDG, EG	Y	
			Y	Y =8d	Sc	X, HDG, P1(B)	Y	
	0.135		Y	Y 135	S	X	Y	100,000
	0.148		Y	Y =10d	S, Sc	X	Y	90,000
	0.162		Y	N	S	X, P1(B)	Y	90,000
Paper	0.113	Clipped	Y	Y =6d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =6d	Sc	X, HDG, P1	Y	
	0.120		Y	Y 120	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y 120	Sc	X, HDG, P1	Y	
	0.131		Y	Y =8d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =8d	Sc	X, HDG, P1	Y	
Wire, paper	0.113	Offset	Y	Y =6d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =6d	Sc	X, HDG, P1	Y	
	0.120		Y	Y 120	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y 120	Sc	X, HDG, P1	Y	
	0.131		Y	Y =8d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =8d	Sc	X, HDG, P1	Y	
Wire	0.113	Notched	Y	Y =6d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =6d	Sc	X, HDG, P1	Y	
	0.120		Y	Y 120	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y 120	Sc	X, HDG, P1	Y	
	0.131		Y	Y =8d	S, R	X, HDG, EG, P1	Y	100,000
			Y	Y =8d	Sc	X, HDG, P1	Y	
Metal Hardware Nails Designated as "Metal Connector Nail" on package labeling**								
Paper, plastic	0.131	Full Round**	Y	n/a	S	X, P1, HT	Y	100,000
	0.148		Y	n/a	S	X, P1, HT	Y	90,000
	0.162		Y	n/a	S	X, P1, HT	Y	90,000

*Recognition is limited to use in connections subjected to tension only.

****When used, head markings for metal hardware nails are as follows:**
'B1' for $1^{1}/_{2}$ x 0.131; 'B2' for $2^{1}/_{2}$ x 0.131; 'B3' for $1^{1}/_{2}$ x 0.148; 'B4' for $2^{1}/_{2}$ x 0.148; 'B5' for $2^{1}/_{2}$ x 0.162

STAPLES (Brand name: BOSTITCH, DEWALT)		
GAGE	**NOMINAL CROWN WIDTH (inch)**	**FINISH/COATING**
16	$^{7}/_{16}$, $^{1}/_{2}$, 1	X, EG

[1]P1(B) means that the P1 coating is only available under the BOSTITCH Brand Name.

ICC-ES Evaluation Report

ESR-1539 LABC and LARC Supplement

Reissued July 2018
Revised June 2019
This report is subject to renewal July 2020.

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23.13—Nails
Section: 06 05 23.15—Staples

REPORT HOLDER:

INTERNATIONAL STAPLE, NAIL AND TOOL ASSOCIATION (ISANTA)

EVALUATION SUBJECT:

POWER-DRIVEN STAPLES AND NAILS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Power-Driven Staples and Nails described in ICC-ES master evaluation report ESR-1539, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2017 *City of Los Angeles Building Code* (LABC)
- 2017 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The Power-Driven Staples and Nails, described in Sections 2.0 through 7.0 of the master evaluation report ESR-1539, comply with the LABC Chapter 23 and the LARC and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Power-Driven Staples and Nails described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the master evaluation report ESR-1539.
- The design, installation, conditions of use and identification of the nails and staples are in accordance with the 2015 *International Building Code®* (2015 IBC) provisions noted in the master evaluation report ESR-1539.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, and Sections 2304.10, 2305, 2306 and 2308, and LARC Sections R502, R503, R602, R802 and R803, as applicable.
- In accordance with LABC Sections 2306.2 and 2306.3, engineered diaphragms and shear walls constructed with staples as described in Section 4.1.2 of the master evaluation report ESR-1539 are permitted only for structures assigned to Seismic Design Category A, B or C.
- Nails and staples made from bright steel wire must not be used in exterior or exposed conditions.
- The hillside building provisions in LABC Section 2301.1 are excluded from this supplement.

This supplement expires concurrently with the master report, reissued July 2018 and revised June 2019.

ICC-ES Evaluation Report

ESR-1539 FBC Supplement

Reissued July 2018

Revised June 2019

This report is subject to renewal July 2020.

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
Section: 06 05 23.13—Nails
Section: 06 05 23.15—Staples

REPORT HOLDER:

INTERNATIONAL STAPLE, NAIL AND TOOL ASSOCIATION (ISANTA)

EVALUATION SUBJECT:

POWER-DRIVEN STAPLES AND NAILS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Power-Driven Staples and Nails recognized in ICC-ES master evaluation report ESR-1539, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2017 *Florida Building Code—Building*
- 2017 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Power-Driven Staples and Nails, described in Sections 2.0 through 7.0 and Appendix B of the master evaluation report ESR-1539, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2015 *International Building Code®* (IBC) provisions noted in the master report under the following conditions:

- For stainless steel nails, the reference withdrawal design value must be determined in accordance with the 2018 ANSI/AWC National Design Specification (NDS).
- For nails shown as having round heads in Appendix B of the master report, reference head pull-through values must be determined in accordance with Section 12.2.5 of the 2018 NDS.

Use of the Power-Driven Staples and Nails has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report, reissued July 2018 and revised June 2019.