Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

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Framers Force Properties and Multi-Ply Connections

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 00 90 - Wood and Plastic Fastenings

Section: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Innovative Products Evaluated[1]

1.1 Framers Force Fasteners

1.1.1 $^{5}/_{16}$" x $3^{5}/_{8}$" Framers Force Fasteners

1.1.2 $^{5}/_{16}$" x 4" Framers Force Fasteners

1.1.3 $^{5}/_{16}$" x 5" Framers Force Fasteners

1.1.4 $^{5}/_{16}$" x 6" Framers Force Fasteners

2 Product Description and Materials

2.1 The innovative products evaluated in this report are shown in **Figure 1**.



Figure 1. Framers Force Fasteners

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2.2 *General*

2.2.1 Framers Force Fasteners are partially threaded, self-drilling, dowel-type fasteners designed for use in wood-to-wood connections.

2.2.1.1 Framers Force Fasteners heads are Torx-driven (T40) screws with a pancake head.

2.2.1.2 Framers Force Fasteners have a reverse knurl.

2.2.1.3 Framers Force Fasteners have a sawblade Type 17 self-drilling tip.

2.2.2 Framers Force Fasteners are manufactured with heat-treated carbon steel grade 10B21 wire using a standard cold-forming process.

2.3 *Corrosion Resistance*

2.3.1 Framers Force Fasteners are designed for exterior use and may be used where fasteners are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in preservative treated wood subject to the limitations of **Section 12.**

2.3.1.1 Framers Force Fasteners are available with the proprietary 3-Layer Ruspert coating, which exceeds the protection provided by code approved hot-dipped galvanized coatings meeting ASTM A153 (IBC Section 2304.10.6 and IRC Section R304.3[2]).

2.3.1.1.1 Framers Force Fasteners with the 3-Layer Ruspert coating are alternatives to hot-dipped, zinc-coated galvanized fasteners specified in IBC Section 2304.10.6.1, IBC Section 2304.10.6.3, IRC Section R304.3.1,[3] and IRC Section R304.3.3.[4]

2.3.2 *Pressure-Preservative Treated (PPT) Wood Applications*

2.3.2.1 Framers Force Fasteners, having the proprietary exterior coating, are recognized for use in PPT lumber, provided the conditions set forth by the PPT lumber manufacturer be met, including appropriate strength reductions.

2.3.3 *Fire-Retardant Treated (FRT) Wood Applications*

2.3.3.1 Framers Force Fasteners, having the proprietary exterior coating, are recognized for use in FRT lumber provided the conditions set forth by the FRT lumber manufacturer be met, including appropriate strength reductions.

2.4 *Framing Members*

2.4.1 Solid sawn wood members connected with Framers Force Fasteners shall consist of lumber species or species combinations having a specific gravity of 0.42 to 0.55.

2.4.2 Structural composite lumber (e.g., LVL, LSL, PSL, etc.) connected with Framers Force Fasteners shall be recognized in evaluation reports having published equivalent specific gravities for dowel bearing strength and withdrawal resistance.

2.4.2.1 Equivalent specific gravities for structural composite lumber may be used in the design of connections using the specific gravities shown in **Table 2** through **Table 7**.

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2.5 *Fastener Specifications*

2.5.1 Framers Force Fasteners evaluated in this report are set forth in **Table 1**.

Table 1. Framers Force Fasteners Specifications

Product Name	Fastener Designation[1]	Length[1,2] (in)		Diameter (in)				Bending Yield Strength,[3] F_{yb} (psi)	Allowable Tensile Strength[4] (lb)	Allowable Shear Strength (lb)	
		Fastener	Thread	Head	Shank	Minor	Major		Tensile	Shank	Thread
Framers Force Fasteners	$^5/_{16}$" x $3^5/_8$"	3.625	2.000	0.675	0.228	0.208	0.312	197,000	2,170	1,590	1,315
	$^5/_{16}$" x 4"	4.000	2.500								
	$^5/_{16}$" x 5"	5.000	2.750								
	$^5/_{16}$" x 6"	6.000	3.000								

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

1. Fastener length is measured from the underside of the head to the tip.
2. Thread length includes tapered tip (see **Figure 1**).
3. Bending yield strength, F_{yb}, is determined in accordance with ASTM F1575 using minor thread diameter when fastener is tested in the threaded section.
4. Allowable tensile strength evaluated within the threaded region.

2.6 All fasteners are produced in accordance with the approved quality control procedures referred to in **Section 12**.

2.7 As needed, review material properties for design in **Section 6** and the regulatory evaluation in **Section 8**.

3 Definitions[5]

3.1 New Materials[6] are defined as building materials, equipment, appliances, systems, or methods of construction, not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[7] The design strength and permissible stresses shall be established by tests[8] and/or engineering analysis.[9]

3.2 Duly authenticated reports[10] and research reports[11] are test reports and related engineering evaluations that are written by an approved agency[12] and/or an approved source.[13]

3.2.1 This report utilizes intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secrets under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[14]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is accredited and listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[15]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[16] ISO/IEC 17025 and ISO/IEC 17020 accredited.

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3.6 The regulatory authority shall enforce[17] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[18] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[19]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[20] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[21] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[22]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[23]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[24]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[25]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[26] and Part 3280[27] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.3 *Standards*

4.3.1 *AISI S904: Test Standard for Determining the Tensile and Shear Strengths of Steel Screws*

4.3.2 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

4.3.3 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*

4.3.4 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*

4.3.5 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*

4.3.6 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails, Spikes, and Dowel-Type Threaded Fasteners*

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5 Listed[28]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (e.g., CBI), an approved agency (e.g., CBI and DrJ), and/or an approved source (e.g., DrJ), or other organization(s) concerned with product evaluation (e.g., DrJ), that maintains periodic inspection (e.g., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General*

6.1.1 Framers Force Fasteners are self-tapping fasteners for wood-to-wood connections in conventional light frame construction. These screws provide resistance against withdrawal, head pull-through, axial, and shear loads. See **Section 9** for installation requirements.

6.1.1.1 Wood structural framing members may be solid sawn lumber or Structural Composite Lumber (SCL) conforming to all pertinent provisions of ASTM D5456.

6.1.1.2 Where connection property values for SCL are listed, SCL shall have a published equivalent specific gravity meeting the minimum specified value in the respective table. Refer to the SCL manufacturer for the details. See **Section 9** for installation requirements.

6.1.2 Framers Force Fasteners are permitted to be installed without lead holes as prescribed in the NDS.

6.2 *Design*

6.2.1 Design of Framers Force Fasteners is governed by the applicable code and the provisions for dowel-type fasteners in NDS.

6.2.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

6.3 *Framers Force Fasteners Reference Lateral Design Values*

6.3.1 Reference lateral design values for shear load perpendicular and parallel to grain using Framers Force Fasteners are specified in **Table 2** and **Table 3**.

6.3.1.1 Values in **Table 2** and **Table 3** are based on the assumption that the main member and the side member are of the same wood species or same product (e.g., SCL from the same manufacturer) and fasteners are installed through the wide face of the dimensional lumber.

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Table 2. Framers Force Fasteners Reference Lateral Design Values[1,2] (Z) – Face Grain

Fastener Designation[1]	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation			
					HF/SPF (0.42)		DF/SP (0.50)	
					Z_{Perp}	Z_{Para}	Z_{Perp}	Z_{Para}
5/16" x 3 5/8"	3.625	2.000	1.50	2.125	290	245	400	390
5/16" x 4"	4.000	2.500		2.500	325	245	415	390
5/16" x 5"	5.000	2.750		3.500	330	310	410	465
5/16" x 6"	6.000	3.000		4.500	330	310	410	465

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

HF = Hemlock-Fir, SPF = Spruce-Pine-Fir, DF = Douglas Fir, SP = Southern Pine

Z_{Perp} = lateral design value for connection with wood members loaded perpendicular to grain

Z_{Para} = lateral design value for connection with wood members loaded parallel to grain

1. Reference lateral design values apply to two-member, single-shear connections where both members are of the same specific gravity and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
2. Values shall be adjusted by all applicable adjustment factors per the NDS.

Table 3. Framers Force Fasteners Reference Lateral Design Values[1,2] (Z) for SCL– Face Grain

Fastener Designation[1]	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation	
					SCL (0.50)	
					Z_{Perp}	Z_{Para}
5/16" x 3 5/8"	3.625	2.000	1.75	1.875	530	430
5/16" x 4"	4.000	2.500		2.250	545	430
5/16" x 5"	5.000	2.750		3.250	550	470
5/16" x 6"	6.000	3.000		4.250	550	470

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

SCL = Structural Composite Lumber

Z_{Perp} = lateral design value for connection with wood members loaded perpendicular to grain

Z_{Para} = lateral design value for connection with wood members loaded parallel to grain

1. Reference lateral design values apply to two-member, single-shear connections where both members are of the same specific gravity and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
2. Values shall be adjusted by all applicable adjustment factors per the NDS.

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6.3.1.2 Reference lateral design values for shear load perpendicular to grain using Framers Force Fasteners are specified in **Table 4**.

6.3.1.2.1 Values in **Table 4** are based on the assumption that the main member and the side member are of the same wood species or same product (e.g., SCL from the same manufacturer if used) and fasteners are installed through the narrow face of the dimensional lumber.

Table 4. Framers Force Fasteners Reference Lateral Design Values (Z) – Edge Grain

Fastener Designation[1]	Fastener Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Main Member Penetration (in)	Lateral Design Values (lb) by Species (Specific Gravity) and Load Orientation			
					HF/SPF (0.42)		DF/SP (0.50)	
					Z_{Perp}	Z_{Para}	Z_{Perp}	Z_{Para}
$^5/_{16}$" x 5"	5.000	2.750	3.50	1.500	170	225	230	360
$^5/_{16}$" x 6"	6.000	3.000	3.50	2.500	220	285	295	435

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

HF = Hemlock-Fir, SPF = Spruce-Pine-Fir, DF = Douglas Fir, SP = Southern Pine

Z_{Perp} = lateral design value for connection with wood members loaded perpendicular to grain

Z_{Para} = lateral design value for connection with wood members loaded parallel to grain

1. Reference lateral design values apply to two-member, single-shear connections where both members are of the same specific gravity and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
2. Values shall be adjusted by all applicable adjustment factors per the NDS.

6.4 *Framers Force Fasteners Reference Withdrawal Design Values (W)*

6.4.1 *Framers Force Fasteners (Wood)*

6.4.1.1 Design provisions for withdrawal noted in NDS Table 12.2B apply to Framers Force Fasteners, unless otherwise noted in this report.

6.4.1.2 Reference withdrawal design values for Framers Force Fasteners in select lumber species are specified in **Table 5**.

6.4.1.3 Maximum withdrawal design values for Framers Force Fasteners in select lumber species are specified in **Table 6**.

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Table 5. Framers Force Fasteners (Wood) Reference Withdrawal Design Values (W) in Side Grain Applications[1,2,3,4]

Fastener Designation[1]	Fastener Length (in)	Thread Length (in)	Allowable Withdrawal Design Values by Species (Specific Gravity), (lb/in)			
			HF/SPF (0.42)		DF/SP/SCL (0.50)	
			1" Penetration	2" Penetration	1" Penetration	2" Penetration
5/16" x 3 5/8"	3.625	2.000	165	205	215	330
5/16" x 4"	4.000	2.500				
5/16" x 5"	5.000	2.750				
5/16" x 6"	6.000	3.000				

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Values shall be adjusted by all applicable adjustment factors per NDS Section 11.3 for wood screws.
2. Fastener penetration is the threaded length embedded in the main member, including the tip.
3. For Maximum Allowable Withdrawal Design Values, see **Table 6**.
4. Total Allowable Withdrawal Design Value as a function of penetration is determined as follows:

   For penetration ≤1":

   $$W_{total}\ (lb) = W_{1''}(p)$$

   For penetration >1":

   $$W_{total}\ (lb) = W_{1''}(1) + (2W_{2''} - W_{1''})(p - 1)$$

   where:

   $W_{1''}$ = value for withdrawal resistance at 1" penetration from this table [lb/in]

   $W_{2''}$ = value for withdrawal resistance at 2" penetration from this table [lb/in]

   p = penetration [in], value shall be limited to the threaded length if penetration into substrate exceeds fastener thread length

Table 6. Framers Force Fasteners Maximum Withdrawal Design Values (W_{max}) in Side Grain Applications

Fastener Designation[1]	Fastener Length (in)	Thread Length (in)	Allowable Maximum Withdrawal Design Values by Species[1,2] (Specific Gravity), (lb)	
			HF/SPF (0.42)	DF/SP/SCL (0.50)
5/16" x 3 5/8"	3.625	2.000	410	660
5/16" x 4"	4.000	2.500	535	885
5/16" x 5"	5.000	2.750	595	995
5/16" x 6"	6.000	3.000	655	1,105

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Values shall be adjusted by all applicable adjustment factors per NDS Section 11.3 for wood screws.
2. Maximum Withdrawal Design Values are based on full thread engagement, including the tip.

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6.5 *Framers Force Fasteners Head Pull-Through Design Values*

6.5.1 Reference design values for head pull-through for Framers Force Fasteners are specified in **Table 7**.

6.5.1.1 Design loads are applicable for flush installation.

Table 7. Framers Force Fasteners Reference Head Pull-Through Design Values (P)[1,2]

Product Name	Head Diameter (in)	Shank Diameter (in)	Minimum Side Member Thickness (in)	Allowable Maximum Head Pull-Through Design Values by Species[1,2] (Specific Gravity), (lb)	
				HF/SPF (0.42)	DF/SP (0.50)
$^{5}/_{16}$" Framers Force Fasteners	0.675	0.228	1.50	545	765

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Tabulated values are for a standard load duration. Values shall be factored by all applicable modification factors per the NDS for wood screws.
2. For structural composite lumber and wood structural panels, use the assigned specific gravity for the product and use the corresponding lumber design value shown above.

6.6 *Multi-Ply Connection Design Values for Solid Sawn Lumber*

6.6.1 Reference lateral design values for multi-ply beams secured with Framers Force Fasteners as depicted in **Figure 2** and specified in **Table 8** and **Table 9**.

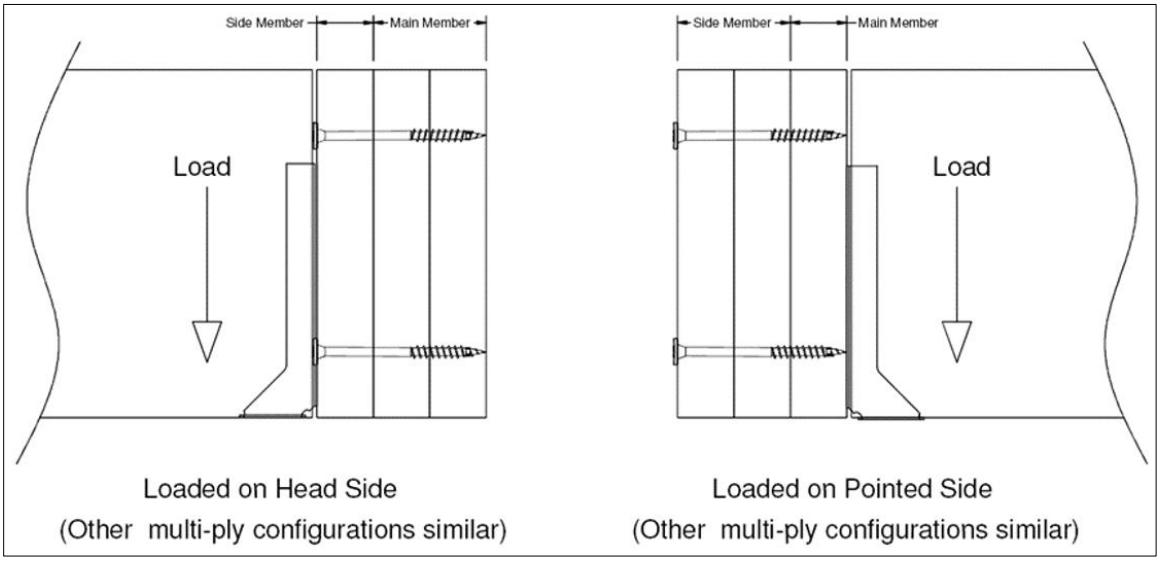

Figure 2. Loading Diagram for Shear Perpendicular to Grain

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6.6.2 Multi-ply solid sawn beam assembly configurations are shown in **Figure 3**.

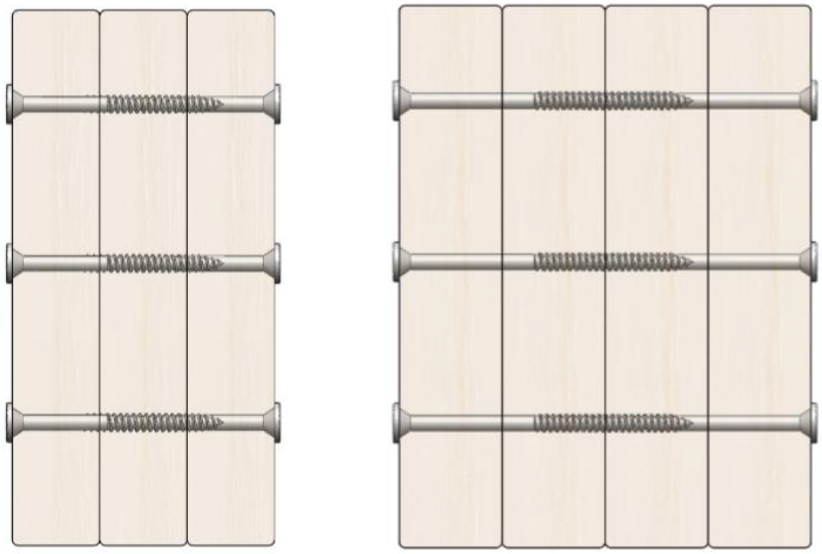

Figure 3. Multi-Ply Assemblies Installed with Framers Force Fasteners

6.6.3 Allowable uniform loads (plf), applied to either outside member (i.e., loaded on the head side of the fastener or loaded on the point side of the fastener), for multi-ply solid sawn lumber beams fastened with Framers Force Fasteners are provided in **Table 8**.

Table 8. $^{5}/_{16}$" Framers Force Fasteners Allowable Lateral Design Values Multi-Ply Connection Design Values for Solid Sawn Lumber[2,3,4,5] (plf)

Multi-Ply Members	Minimum Fastener Length[1] (in)	Loaded Side	SPF/HF (SG = 0.42)						DF/SP (SG = 0.50)					
			12" o.c.		16" o.c.		24" o.c.		12" o.c.		16" o.c.		24" o.c.	
			2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows
3-Ply $1^{1}/_{2}$"	3.625	Either	870	1,305	655	980	435	655	1,200	1,800	900	1,350	600	900
	4.000	Either	975	1,465	730	1,095	490	730	1,245	1,870	935	1,400	625	935
4-Ply $1^{1}/_{2}$"	5.000	Either	880	1,320	660	990	440	660	1,095	1,640	820	1,230	545	820
	6.000[6]													

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Fastener length is measured from the underside of the head to the top.
2. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than 0.50, use the tabulated values for specific gravity of 0.50.
3. Allowable design values are based on a load duration factor C_D = 1.0 and shall be multiplied by all applicable adjustment factors per the NDS.
4. Where loads are applied to both sides of the beam simultaneously, the load applied to either side of the beam shall not exceed the tabulated load for the corresponding side.
5. All design values are also applicable to top-loaded assemblies with even loading across the width of the entire assembly. For top-loaded members with even loading across the width of the entire assembly, fasteners shall be installed in two (2) rows with a maximum distance of 32" o.c. between fasteners in the same row.
6. $^{5}/_{16}$" x 6" Framers Force Fasteners do not need to be staggered between opposite faces as shown in **Figure 6**.

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6.7 *Multi-Ply Connection Design Values for Structural Composite Lumber (SCL)*

6.7.1 Multi-ply SCL beam assembly configurations are shown in **Figure 4**.

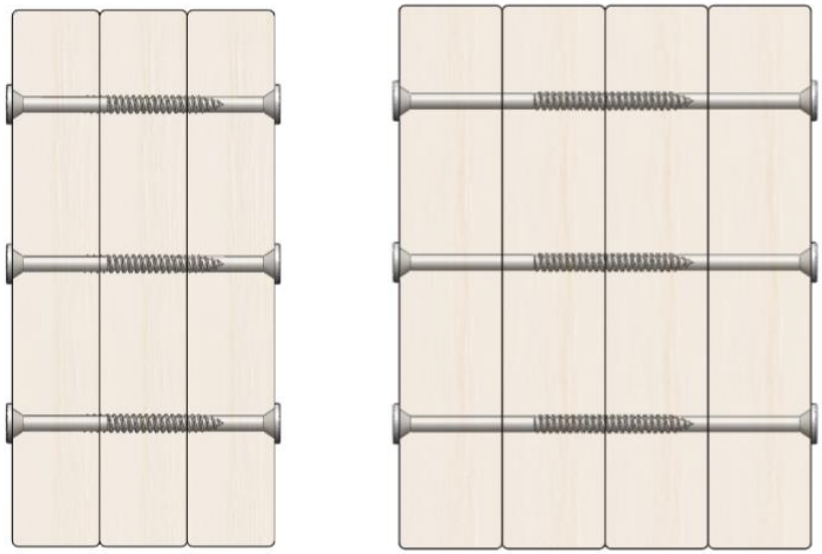

Figure 4. Multi-ply Assemblies Installed with Framers Force Fasteners

6.7.2 Allowable uniform loads (plf) applied to either outside member for multi-ply SCL beams fastened with Framers Force Fasteners are provided in **Table 9**.

Table 9. $^{5}/_{16}$" Framers Force Fasteners Allowable Lateral Design Values Multi-Ply Connection Design Values for Structural Composite Lumber (SCL)[2,3,4,5] (plf)

Multi-Ply Members	Minimum Fastener Length[1] (in)	Loaded Side	12" o.c.		16" o.c.		24" o.c.	
			2 Rows	3 Rows	2 Rows	3 Rows	2 Rows	3 Rows
3-Ply 1$^{3}/_{4}$"	3.625	Either	1,590	2,385	1,195	1,790	795	1,195
	4.000	Either	1,650	2,475	1,240	1,855	825	1,240
	5.000	Head	1,650	2,475	1,240	1,855	825	1,240
		Point	1,125	1,690	845	1,265	565	845
4-Ply 1$^{3}/_{4}$"	5.000	Either	1,465	2,200	1,100	1,650	735	1,100
	6.000							

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Fastener length is measured from the underside of the head to the top.
2. Wood members (SCL) shall have an equivalent specific gravity of 0.50 or greater.
3. Allowable design values are based on a load duration factor of C_D = 1.0 and shall be multiplied by all applicable adjustment factors per the NDS.
4. Where loads are applied to both sides of the beam simultaneously, the load applied to either side of the beam shall not exceed the tabulated load for the corresponding side.
5. All design values are also applicable to top-loaded assemblies with even loading across the width of the entire assembly. For top-loaded members with even loading across the width of the entire assembly, and a depth of 18" or less, fasteners shall be installed in two (2) rows with a maximum distance of 24" o.c. between fasteners in the same row. Use three (3) rows for members deeper than 18".

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6.8 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

7 Certified Performance[29]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[30]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[31]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 Framers Force Fasteners comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 Framers Force Fasteners were tested and evaluated to determine their structural resistance properties, which are used to develop reference design values for Allowable Stress Design (ASD).

8.1.1.1 The following properties were evaluated:

8.1.1.1.1 Bending yield in accordance with ASTM F1575

8.1.1.1.2 Tensile strength in accordance with AISI S904

8.1.1.1.3 Shear strength in accordance with AISI S904

8.1.1.1.4 Lateral strength in accordance with ASTM D1761

8.1.1.1.5 Withdrawal strength in accordance with ASTM D1761

8.1.1.1.6 Head pull-through strength in accordance with ASTM D1761

8.1.2 Corrosion resistance of fasteners with the proprietary black exterior coating meeting or exceeding the protection afforded hot-dipped galvanized fasteners in accordance with ASTM A153.

8.2 Any building code, regulation and/or accepted engineering evaluations (e.g., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[32] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[33] respectively.

8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which is also its areas of professional engineering competence.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

9.3 *Installation Procedure*

9.3.1 Framers Force Fasteners shall be installed using a high-torque, low-speed drill in accordance with the manufacturer installation instructions.

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9.3.2 The fasteners must be installed using a T40 Torx® driver bit.

9.3.3 Pre-drilling of pilot holes is not required but may be used where lumber is prone to splitting.

9.3.4 All fastener spacing, edge distance, and end distance shall be per **Table 10**.

9.3.4.1 Location of the distances are shown in **Figure 5**.

Table 10. Fastener Spacing Requirements for Framers Force Fasteners - Wood-Side Member

Fastener	Number (Figure 5)	Installed Condition	Minimum Distance or Spacing[1,2] (in)	
			Face	Edge
Framers Force Fasteners	1	Minimum End Distance	4 7/8	4 7/8
	2	Minimum Edge Distance	3/4	3/4
	3	Minimum Spacing Between Fasteners in a Row	4 7/8	4 7/8
	4	Minimum Spacing Between Non-Staggered Rows	1 5/8	N/A
	5	Minimum Spacing Between Staggered Rows	3/4	
	6	Minimum Stagger Between Fasteners in Adjacent Rows	3/4	

SI: 1 in = 25.4 mm

1. Edge distances, end distances, and spacing of fasteners shall be sufficient to prevent splitting of the wood or as shown in this table, whichever is the more restrictive.
2. Values for *"Spacing between Rows of Fasteners-Staggered"* apply where the screws in adjacent rows are offset by one-half of the *"Spacing between Fasteners in a Row."*

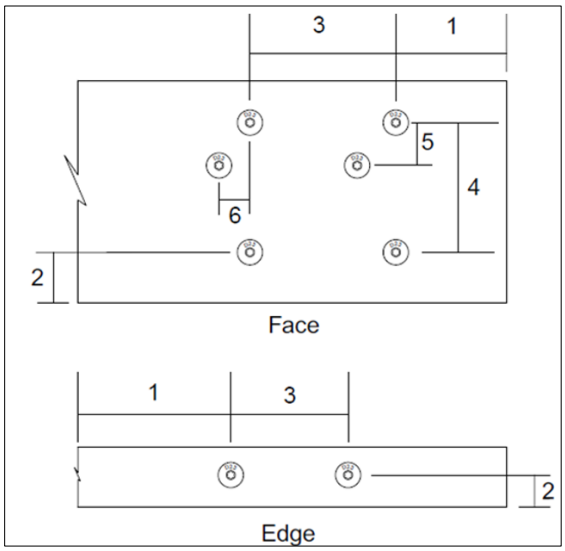

Figure 5. Framers Force Fasteners Spacing Diagram

9.3.5 Minimum penetration is 1" unless otherwise stated in this report. Install fasteners with head flush to the surface of the wood member.

9.3.6 Unless otherwise stated in **Table 8** and **Table 9**, where fastener lengths do not fully penetrate into the last ply, multi-ply beams shall be installed with fasteners in the opposite side, offset by half the specified spacing in **Table 8** and **Table 9** as shown in **Figure 6**.

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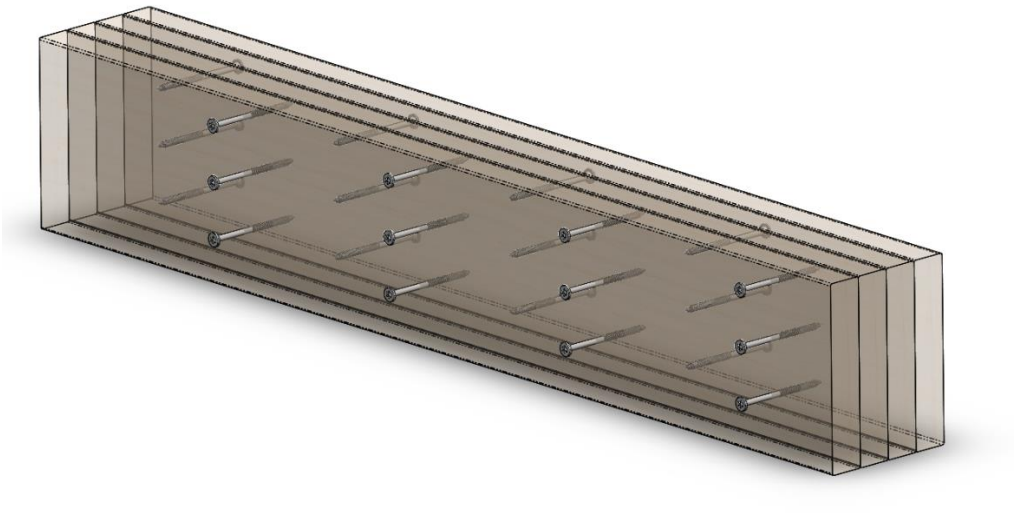

Figure 6. Framers Force Fasteners Spacing Diagram – Staggered

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Bending yield testing in accordance with ASTM F1575

10.1.2 Tensile strength testing in accordance with AISI S904

10.1.3 Shear strength testing in accordance with AISI S904

10.1.4 Lateral strength testing in accordance with ASTM D1761

10.1.5 Withdrawal strength testing in accordance with ASTM D1761

10.1.6 Head pull-through strength testing in accordance with ASTM D1761

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 *Testing and Engineering Analysis*

10.5.1 The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[34]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Framers Force Fasteners on the DrJ Certification website.

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11 Findings

11.1 As outlined in **Section 6**, Framers Force Fasteners have performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, Framers Force Fasteners shall be approved for the following applications:

11.2.1 As an alternative to those fasteners prescribed by the applicable code for wood-to-wood connections.

11.3 Unless exempt by state statute, when Framers Force Fasteners are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application-specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Midwest Supply Distribution.

11.5 IBC Section 104.2.3[35] (IRC Section R104.2.2[36] and IFC Section 104.2.3[37] are similar) in pertinent part state:

> **104.2.3 Alternative Materials, Design and Methods of Construction and Equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative is not specifically prohibited by this code and has been approved.

11.6 **Approved:**[38] Building regulations require that the building official shall accept duly authenticated reports.[39]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that, where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Arrangement (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[40]

12 Conditions of Use

12.1 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.2 As listed herein, Framers Force Fasteners shall be subjected to the following conditions:

12.2.1 When the capacity of a connection is controlled by fastener metal strength or the metal component of the connection rather than wood strength, the metal strength shall not be multiplied by the adjustment factors specified in the NDS.

12.2.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.

12.3 For conditions not covered in this report, connections shall be designed in accordance with generally accepted engineering practice.

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12.4 When required by adopted legislation and enforced by the building official, also known as the Authority Having Jurisdiction (AHJ) in which the project is to be constructed:

12.4.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.4.2 This report and the installation instructions shall be submitted at the time of permit application.

12.4.3 At a minimum, these innovative products shall be installed per **Section 9**.

12.4.4 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.4.5 These innovative products have an internal quality control program and a third-party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.4.6 The application of these innovative products in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

12.5 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.2.3,"* all of IBC Section 104, and IBC Section 105.3.

12.6 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.7 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 Framers Force Fasteners, as listed in **Section 1.1**, are identified by a label on the packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at midwestsupplydistribution.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

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Notes

1 For more information, visit drjcertification.org or call us at 608-310-6748.

2 2021 IRC Section R317.3

3 2021 IRC Section R317.3.1

4 2021 IRC Section R317.3.3

5 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

6 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

7 Alternative Materials, Design, and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

9 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.2.3.

11 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

12 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

13 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

14 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

15 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

16 https://www.cbitest.com/accreditation/

17 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

18 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

19 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

20 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

21 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

22 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

23 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

24 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

25 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

27 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

28 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

29 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

30 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

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[31] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[32] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

[33] https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

[34] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[35] 2021 IBC Section 104.11

[36] 2021 IRC Section R104.11

[37] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[38] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[39] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

[40] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

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