

**Use of FastenMaster® FrameFAST™ Structural Wood
Screw Fasteners in Stud to Plate and Plate to Rim Board
Applications**

TER No. 1801-02

**OMG®, Inc.
d/b/a/ FastenMaster®**

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DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES
Section: 06 00 90 – Wood and Plastic Fastenings

1. Product Evaluated

- 1.1. FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ fasteners)
- 1.2. For the most recent version of this Technical Evaluation Report (TER), visit drjcertification.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjcertification.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.
- 1.3. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily approved by authorities having jurisdiction using [DrJ's ANSI accreditation](#).
- 1.4. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements, such as those found in [IBC Section 1703](#). Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see drjcertification.org.

DrJ is a Professional Engineering Approved Source

 **Learn more about DrJ's Accreditation**

- DrJ is an ISO/IEC 17065 accredited product certification body through ANSI Accreditation Services.
- DrJ provides certified evaluations that are signed and sealed by a P.E.
- DrJ's work is backed up by professional liability insurance.
- DrJ is fully compliant with *IBC* Section 1703.

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- 1.5. Requiring an evaluation report from a specific private company (i.e., ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.6. DrJ's code compliance work:
 - 1.6.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.
 - 1.6.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ take professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:¹

- 2.1. 2012, 2015 and 2018 International Building Code (IBC)
- 2.2. 2012, 2015 and 2018 International Residential Code (IRC)
- 2.3. 2014 and 2017 Florida Building Code (FBC) - Product Approval Number FL21662
- 2.4. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- 2.5. ASTM D1761 – Standard Test Methods for Mechanical Fasteners in Wood
- 2.6. ASTM D2395 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials
- 2.7. ASTM D4442 – Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials
- 2.8. ASTM F1575 – Standard Test Method for Determining Bending Yield Moment of Nails
- 2.9. ASTM F606 – Standard Test Method for Determining Properties of Fasteners
- 2.10. AWC NDS – National Design Specification for Wood Construction, American Wood Council
- 2.11. AWC TR-12 – General Dowel Equations for Calculating Lateral Connection Values, American Wood Council

3. Performance Evaluation:

- 3.1. FrameFAST™ fasteners were evaluated as installed in the end use application to derive allowable design values as an alternate means of attaching wood studs to wall top and bottom plates and attaching wall top and bottom plates to the rim board with and without blocking. The following conditions were evaluated:
 - 3.1.1. Uplift resistance in stud to plate connections in accordance with ASTM D1761.
 - 3.1.2. Uplift and lateral resistance in plate to rim board connections in accordance with ASTM D1761.
- 3.2. Connections other than those addressed in [Section 3](#) are outside the scope of this TER.
- 3.3. Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

¹ Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any, see [Section 8](#).

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4. Product Description and Materials:

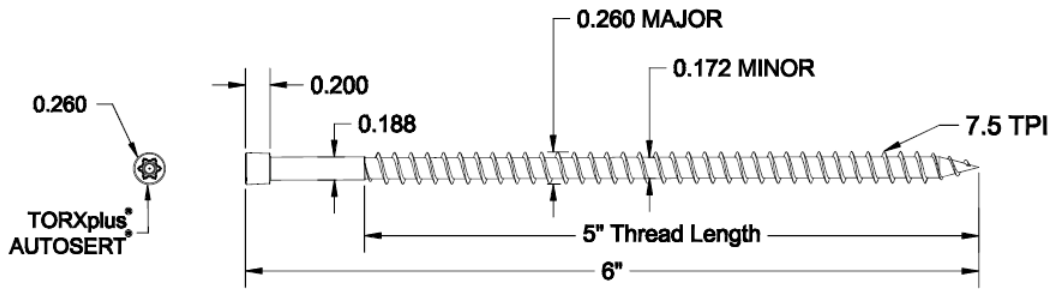


Figure 1: FrameFAST™ Fastener Specification

- 4.1. FrameFAST™ fasteners are manufactured with modified 10B21 carbon steel wire conforming to the manufacturers specifications and are coated with a proprietary finish.
- 4.2. FrameFAST™ fasteners are manufactured using a standard cold-formed process followed by a heat-treating process.
- 4.3. FrameFAST™ fasteners are approved for use in interior and exterior conditions and in pressure-treated wood.
- 4.4. In-plant quality control procedures, under which the FrameFAST™ fasteners are manufactured, are audited through an inspection process performed by an approved agency.
- 4.5. The FrameFAST™ fasteners evaluated in this TER are designated as follows:

Table 1: Fastener Designation for the Evaluated FrameFAST™ Fasteners

Fastener	Fastener Designation	Fastener Length ¹	Thread Length ¹	Head Diameter	Head Height	Shank Diameter ²	Minor Thread (Root) Diameter	Major Thread (Root) Diameter	Bending Yield Strength ² (psi)	Ultimate Fastener Strength ²	
										Tensile (psi)	Shear (psi)
FrameFAST™	FMFF006	6"	5"	0.260"	0.200"	0.188"	0.172"	0.260"	166,600	155,900	120,360

For SI: 1" = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.895 kPa.
 1. Fastener length is measured from the top of the head to the tip. Thread length includes tapered tip (see [Figure 1](#)).
 2. Bending yield, tension and shear values determined at minor root diameter.

5. Applications:

- 5.1. FrameFAST™ fasteners are used to attach minimum 1½"-wide wood studs to wall top and bottom plates and to attach wall top and bottom plates to rim board in the construction of walls that meet the requirements of [IRC Section R602](#) or [IBC Section 2308](#). The fasteners provide resistance to uplift and/or lateral loads applied parallel and/or perpendicular to the wall or structural framing member.
 - 5.1.1. Walls shall consist of a single or double top plate designed in accordance with [IRC Section R602.3.2](#) or [IBC Section 2308.5.3.2](#)².
 - 5.1.2. See [Table 2](#) and [Table 3](#) for the design requirements and the FrameFAST™ fasteners' allowable design values.
 - 5.1.3. See [Section 6](#) for installation requirements.

² [2012 IBC Section 2308.9.2.1](#)

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- 5.1.4. FrameFAST™ fasteners are used in buildings requiring wind analysis in accordance with [IRC Section R301.2.1](#), or design in accordance with [IBC Section 1609](#).
- 5.1.5. FrameFAST™ fasteners are used in buildings requiring seismic analysis in accordance with [IRC Section R301.2.2](#), or design in accordance with [IBC Section 1613](#).
- 5.1.6. Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience and technical judgment.

5.2. Design Concepts and Allowable Design Loads

- 5.2.1. Allowable design loads are provided in [Table 2](#) and [Table 3](#) for FrameFAST™ fasteners. Allowable design loads are applicable to fasteners installed in accordance with the procedures described in [Section 6](#). For stud to plate connections, allowable design loads are applicable for both single and double top plate applications as shown in [Figure 2](#). For plate to rim board connections, allowable design loads are applicable for both single bottom plate with OSB subfloor to rim board applications and to single or double top plate to blocking/rim board applications as shown in [Figure 2](#).

Table 2: Allowable Design Values of FrameFAST™ Fasteners in Stud to Plate Configurations

Allowable Design Value for Uplift (lbs) [DOL = 1.6] ^{1, 2, 4}			
Configuration	Lumber Species		
	SPF	DF-L	SP
Stud to Single or Double Top or Bottom Plate³	340	560	665

1. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity. Dimensional lumber members shall be minimum of 2" nominal thickness.
 2. Design values are based on a duration of load of 1.6. No further duration of load increases permitted. Reduced design values for other load durations as applicable.
 3. See [Figure 2](#) for installation details.
 4. Use reduction factor of 0.80 when connecting each ply of multi-ply stud columns to the top plate.

Table 3: Allowable Design Values of FrameFAST™ Fasteners in Plate to Rim Board Configurations

Allowable Design Value (lbs) [DOL = 1.6] ^{1, 2}							
Load Direction	Configuration	Rim Board Species (Specific Gravity or Equivalent Specific Gravity)					
		SPF (0.42)	DF-L (0.50)	SP (0.55)	1-1/8" OSB (0.50) ⁵	1-1/4" LSL (0.46) ³	1-1/4" LVL (0.47) ³
Uplift	Single Plate to Rim Board	210	245	325	195	165	110
	Double Plate to Rim Board	475	590	595	360	610	570
Lateral		SPF (0.42)	DF-L (0.50)	SP (0.55)	1-1/8" OSB (0.50) ⁶	1-1/4" LSL (0.50) ⁴	1-1/4" LVL (0.50) ⁴
	Single Plate to Rim Board	340	265	395	340	210	320
	Double Plate to Rim Board	495	595	650	230	485	440
	Double Plate to Blocking ⁷	495	595	650	230	485	440

1. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity. For EWP rim boards (i.e., OSB, LSL, & LVL), the top/bottom plates shall be minimum SPF dimensional lumber. Dimensional lumber members shall be minimum of 2" nominal thickness.
 2. Design values are based on a duration of load of 1.6. No further duration of load increases permitted. Reduced design values for other load durations as applicable.
 3. Equivalent specific gravity values are for withdrawal of nails or screws installed in edge.
 4. Equivalent specific gravity values are for withdrawal of nails or screws installed in edge.
 5. Equivalent specific gravity values are for withdrawal of nails installed in face.
 6. Equivalent specific gravity values are for withdrawal of nails installed in face.
 7. See [Figure 3](#) for blocking requirements.

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5.2.2. Where it is anticipated that loads will be applied to a single fastener simultaneously in more than one direction, additional evaluation is required to account for the combined effect of these loads using accepted engineering practice.

5.2.2.1. Consult a professional engineer, as needed, for complex design conditions.

6. Installation:

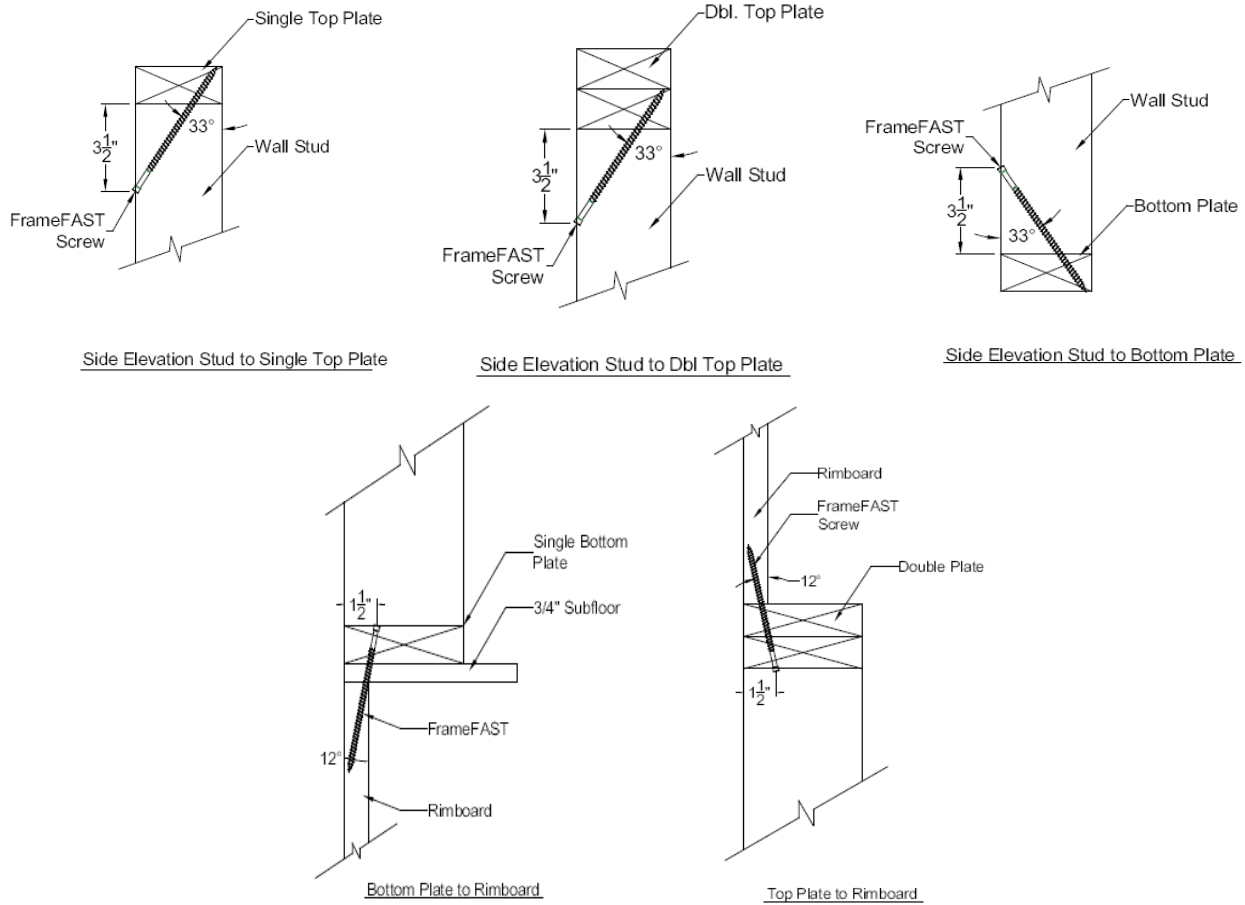


Figure 2: Installation of FrameFAST™ Fasteners for Specified Applications

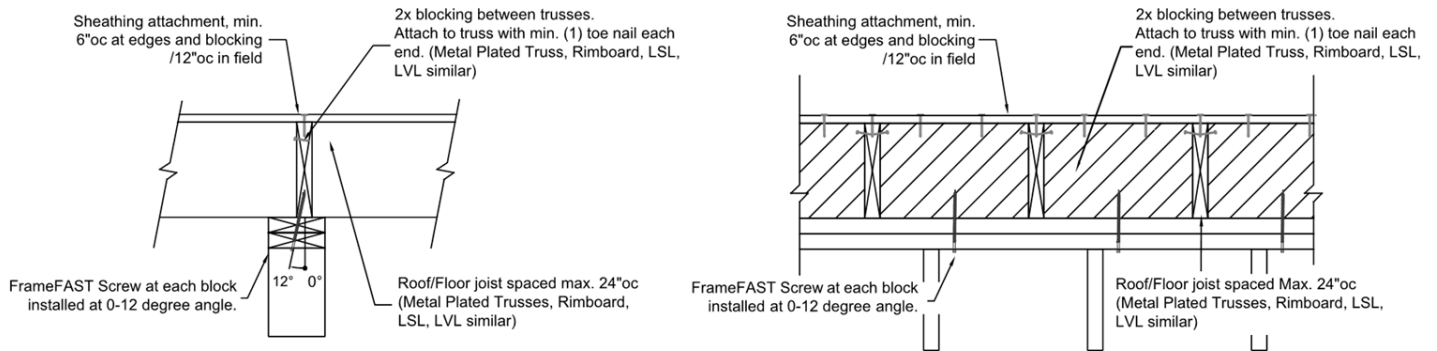


Figure 3: Section Views of FrameFAST™ Fasteners with Blocking

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- 6.1. Installation shall comply with the [manufacturer's installation instructions](#) and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.
- 6.2. Select a 6" FrameFAST™ fastener to fully embed the fastener into the top plate, blocking and rim board as shown in [Figure 2](#) and [Figure 3](#).
 - 6.2.1. Stud to Plate connection – Install one (1) FrameFAST™ fastener upward (or downward) through the center of the stud and into the plate. Install at a 25°-35° angle (optimal angle = 33°) and penetrate the wood stud 3-½" down from top of stud and within ¼" of the centerline. See [Figure 2](#).
 - 6.2.2. Plate to Rim Connection – Install one (1) FrameFAST™ fastener upward (or downward) at a 0°-12° angle (optimal angle = 12°), 1-½" from outside face of wall, through the plates and into the rim. See [Figure 2](#) and [Figure 3](#).
 - 6.2.3. Plate to Blocking Connection – Install one (1) FrameFAST™ fastener upward (or downward) at a 0°-12° angle (optimal angle = 12°), 1-½" from outside face of wall, through the plates and into the blocking. See [Figure 2](#) and [Figure 3](#).
- 6.3. Use a ½" low RPM/high torque drill to drive the fastener head flush with the surface of the wall framing or wood structural framing member.

7. Test and Engineering Substantiating Data:

- 7.1. FrameFAST™ fastener testing conduct by SBCRI, under contract with Qualtim, Inc., 2017 for the following conditions:
 - 7.1.1. FrameFAST™ fastener uplift performance when used in stud to plate and plate to rim board connections.
 - 7.1.2. FrameFAST™ fastener performance when loaded laterally in plate to rim board connections.
- 7.2. FrameFAST™ fastener testing conduct by SBCRI, under contract with Qualtim, Inc., 2018 for performance when laterally loaded with blocking.
- 7.3. Material property testing, conducted by the University of Montana - Wood Science Division, 2016.
- 7.4. The product(s) evaluated by this TER fall within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.
- 7.5. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineering mechanics based means of compliance. This TER assesses compliance with defined standards, accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.
- 7.6. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate, as it undertakes its engineering analysis.
- 7.7. DrJ has reviewed and found the data provided by other professional sources are credible. The information in this TER conforms to DrJ's procedure for acceptance of data from approved sources.
- 7.8. DrJ's responsibility for data provided by approved sources conforms to [IBC Section 1703](#) and any relevant professional engineering law.
- 7.9. Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS*, *NDS*®, *ACI*®, *AISI*, *PS-20*, *PS-2*, etc.). This includes review of code provisions and any related test data that aids comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, concrete, etc.), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

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8. Findings:

- 8.1. When used and installed in accordance with this TER and the manufacturer's installation instructions, FrameFAST™ fasteners can be used as an acceptable connection to:
 - 8.1.1. Provide resistance to lateral loads due to wind or seismic loads applied parallel or perpendicular to the wall in plate to rim board and plate to blocking applications, per [Table 3](#).
 - 8.1.2. Provide uplift resistance for all configurations considered per [Table 3](#).
 - 8.1.3. Fasten wall studs to single or double plate per [Table 2](#).
 - 8.1.4. Fasten double or single plate to blocking/rim board per [Table 3](#).
- 8.2. [IBC Section 104.11](#) ([IRC Section R104.11](#) and [IFC Section 104.9](#) are similar) states:

104.11 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 has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.
- 8.3. This product has been evaluated in the context of the codes listed in [Section 2](#), and is compliant with all known state and local building codes. Where there are known variations in state or local codes that are applicable to this evaluation, they are listed here:
 - 8.3.1. No known variations
- 8.4. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. Dr.J's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.
- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., Owner, Registered Design Professional, etc.).
- 9.4. The FrameFAST™ fasteners covered in this TER shall be installed in accordance with this TER and the manufacturer's installation instructions.
 - 9.4.1. For conditions not covered in this TER, connections shall be designed in accordance with accepted engineering practice.
- 9.5. Manufacturer's installation instructions shall be shipped to the jobsite with the materials or otherwise be available on the jobsite for inspection.
- 9.6. Structural framing members connected with FrameFAST™ fasteners shall be designed in accordance with the requirements of their specific design standards/specifications as referenced in the building code adopted by the AHJ in which the project is to be constructed.
- 9.7. Loads applied shall not exceed those recommended by the manufacturer or as defined in this TER.
- 9.8. FastenMaster® products are produced by OMG®, Inc. at its facility located in Agawam, Massachusetts.
- 9.9. FrameFAST™ fasteners are produced under a quality control program subject to periodic inspections in accordance with [IBC Section 1703.5.2](#).

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9.10. Design

9.10.1. Building Designer Responsibility

- 9.10.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with [IRC Section R106](#) and [IBC Section 107](#).
- 9.10.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section R301](#) and [IBC Section 1603](#).

9.10.2. Construction Documents

- 9.10.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

9.11. Responsibilities

- 9.11.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.
- 9.11.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
- 9.11.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.11.4. This product is manufactured under a third-party quality control program in accordance with [IRC Sections R104.4](#) and [R109.2](#) and [IBC Sections 104.4](#) and [110.4](#).
- 9.11.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.
- 9.11.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

- 10.1. The fasteners described in this TER are identified by the designation "FrameFAST™" on the packaging material bearing the manufacturer's name and address, product name, TER number, and other information to confirm code compliance.
- 10.2. Additional technical information can be found at fastenmaster.com.

11. Review Schedule:

- 11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjcertification.org.
- 11.2. For information on the current status of this TER, contact [DrJ Certification](#).



- [Mission, Belief and Independence](#)
- [Product Evaluation Policies](#)
- [Product Approval – Building Code, Administrative Law and P.E. Law](#)