



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1801-02

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

OMG, Inc.
DBA FastenMaster®

Product:

FastenMaster® FrameFAST™
Structural Wood Screw
(FrameFAST™ Fasteners)

Issue Date:

March 12, 2018

Revision Date:

June 28, 2021

Subject to Renewal:

July 1, 2022



COMPANY
INFORMATION:

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 PRODUCT EVALUATED¹

- 1.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners)

2 APPLICABLE CODES AND STANDARDS^{2,3}

2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*
- 2.1.3 *FBC-B—17, 20: Florida Building Code – Building (FL 21662)*
- 2.1.4 *FBC-R—17, 20: Florida Building Code – Residential (FL 21662)*

2.2 Standards and Referenced Documents

- 2.2.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 2.2.2 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
- 2.2.3 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 2.2.4 *ASTM D2395: Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials*
- 2.2.5 *ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials*
- 2.2.6 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*
- 2.2.7 *ASTM F606: Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets*
- 2.2.8 *AWC TR 12: General Dowel Equations for Calculating Lateral Connection Values*

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

² Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

³ All terms defined in the applicable building codes are italicized.

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 and lateral 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 Any code compliance issues or fastener connections not specifically addressed in this section are outside the scope of this TER.
- 3.3 Any engineering evaluation conducted for this TER was performed within DrJ's ANAB "accredited ICS code scope" and/or the defined professional engineering scope of work on the dates provided herein.

4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 The product evaluated in this TER is shown in Figure 1.

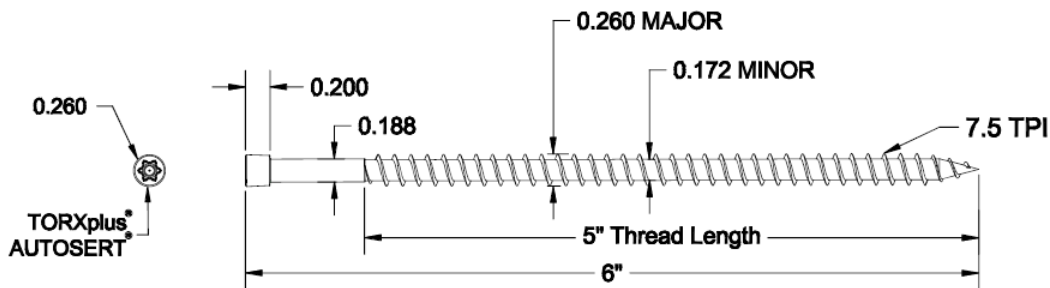


FIGURE 1. FRAMEFAST™ FASTENER SPECIFICATION

- 4.2 FrameFAST™ fasteners are manufactured with modified 10B21 carbon steel wire conforming to the manufacturers specifications and are coated with a proprietary finish.
- 4.3 FrameFAST™ fasteners are manufactured using a standard cold-formed process followed by a heat-treating process.
- 4.4 Fasteners are approved for use in fire-retardant-treated lumber, provided the conditions set forth by the fire-retardant-treated lumber manufacturer are met, including appropriate strength reductions.
- 4.5 FrameFAST™ fasteners are approved for use in interior and exterior conditions and in pressure-treated wood.
- 4.6 In-plant quality control procedures, under which the FrameFAST™ fasteners are manufactured, are audited through an inspection process performed by an approved agency.
- 4.7 The FrameFAST™ fasteners evaluated in this TER are designated as shown in Table 1.

TABLE 1. FASTENER SPECIFICATIONS

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

SI: 1" = 25.4 mm, 1 psi = 0.00689 MPa

- Fastener length is measured from the top of the head to the tip. Thread length includes tapered tip (Figure 1).
- 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 IBC Section 2308 and IRC Section R602. 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 IBC Section 2308.5.3.2⁴ and IRC Section R602.3.2.
 - 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.
 - 5.1.4 FrameFAST™ fasteners are used in buildings requiring design in accordance with IBC Section 1609 or wind analysis in accordance with IRC Section R301.2.1.
 - 5.1.5 FrameFAST™ fasteners are used in buildings requiring design in accordance with IBC Section 1613 or seismic analysis in accordance with IRC Section R301.2.2.
 - 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 3. 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 3.

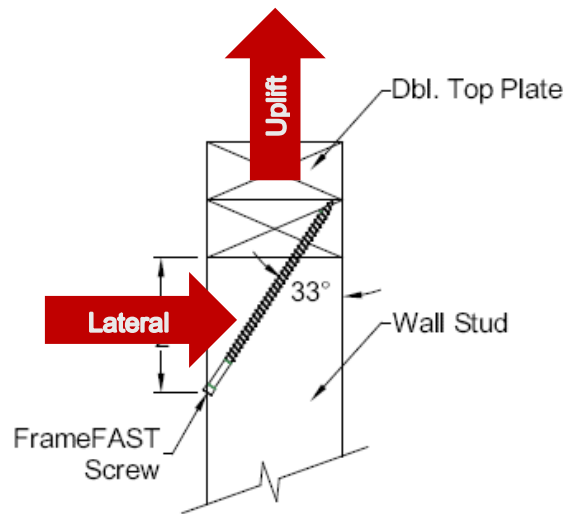
⁴ 2012 IBC Section 2308.9.2.1

TABLE 2. ALLOWABLE DESIGN VALUES FOR FRAMEFAST™ FASTENERS IN STUD TO PLATE CONFIGURATIONS

Lumber Species (Specific Gravity)	Allowable Design Value (lbf) ^{1,2,3,4}	
	Load Orientation ⁵	
	Uplift	Lateral
SPF (0.42)	340	220
DF-L (0.50)	560	360
SP (0.55)	665	430

SI: 1 lb = 4.45 N

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



Side Elevation Stud to Dbl Top Plate

FIGURE 2. ALLOWABLE DESIGN VALUE LOAD ORIENTATIONS

TABLE 3. ALLOWABLE DESIGN VALUES OF FRAMEFAST™ FASTENERS IN PLATE TO RIM BOARD CONFIGURATIONS

Load Direction	Configuration	Allowable Design Value (lbf) ^{1,2}					
		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
		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
Lateral	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

SI: 1 lb = 4.45 N

- For applications involving members with different specific gravities, G, 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.
- Design values are based on a load duration factor, C_D, of 1.6. No further duration of load increases permitted. Reduced design values for other load durations as applicable.
- Equivalent specific gravity values are for withdrawal of nails or screws installed in edge.
- Equivalent specific gravity values are dowel bearing of nails or screws installed in edge.
- Equivalent specific gravity values are for withdrawal of nails installed in face.
- Equivalent specific gravity values are dowel bearing of nails or screws installed in face.
- See Figure 4 for blocking requirements.

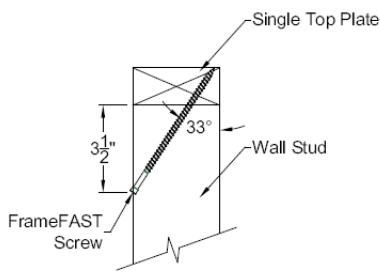
5.2.2 Where it is anticipated that loads will be applied to a single fastener simultaneously in more than one direction, additional evaluation is required to account for the combined effect of these loads using accepted engineering practice.

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

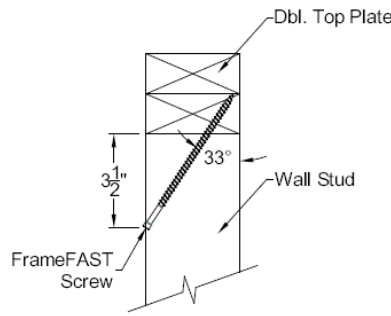
6 INSTALLATION

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.

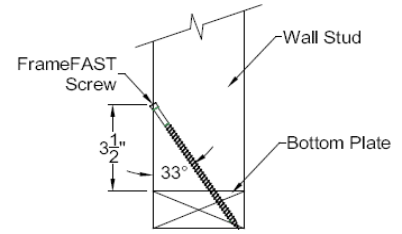
6.2 Installation Procedure



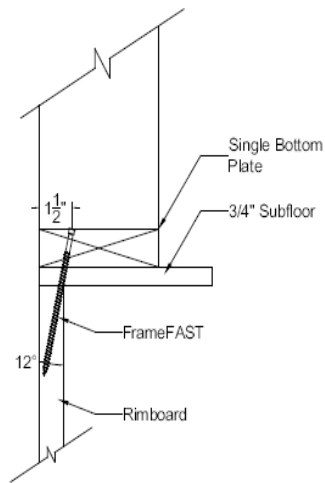
Side Elevation Stud to Single Top Plate



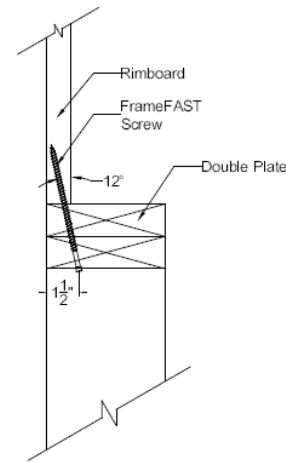
Side Elevation Stud to Dbl Top Plate



Side Elevation Stud to Bottom Plate



Bottom Plate to Rimboard



Top Plate to Rimboard

FIGURE 3. INSTALLATION OF FRAMEFAST™ FASTENERS FOR SPECIFIC APPLICATIONS

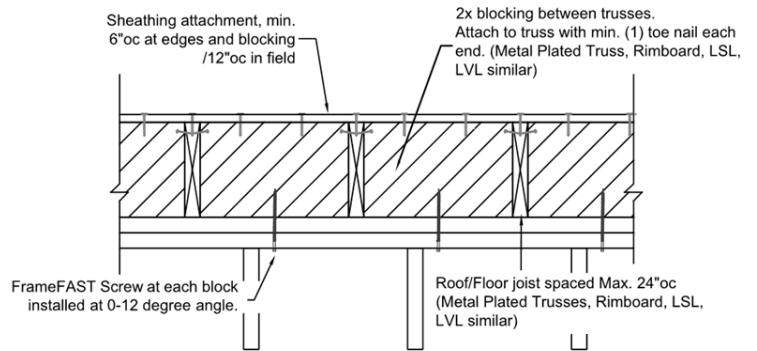
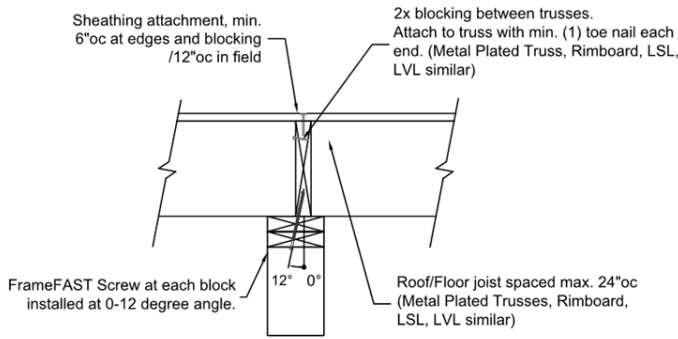


FIGURE 4. SECTION VIEWS OF FRAMEFAST™ FASTENERS WITH BLOCKING

- 6.2.1 Select a 6" FrameFAST™ fastener to fully embed the fastener into the top plate, blocking, and rim board as shown in Figure 3 and Figure 4.
 - 6.2.1.1 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 3½" down from top of stud and within ¼" of the centerline (Figure 3).
 - 6.2.1.2 Plate to Rim Connection – Install one (1) FrameFAST™ fastener upward (or downward) at a 0°-12° angle (optimal angle = 12°), 1½" from outside face of wall, through the plates, and into the rim (Figure 3 and Figure 4).
 - 6.2.1.3 Plate to Blocking Connection – Install one (1) FrameFAST™ fastener upward (or downward) at a 0°-12° angle (optimal angle = 12°), 1½" from outside face of wall, through the plates and into the blocking (Figure 3 and Figure 4).
 - 6.2.1.4 Plate to Rim/Blocking connection – Minimum required spacing and end distance of the FrameFAST™ fastener is 4" o.c (See Figure 5). Minimum edge and end distances are per Figure 3.

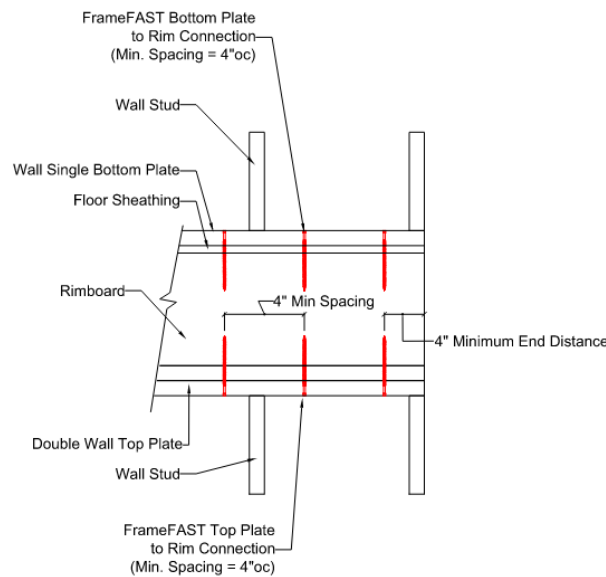


FIGURE 5. MINIMUM SPACING AND END DISTANCE OF FRAMEFAST™ FASTENERS PLATE TO RIM/BLOCKING CONNECTION

- 6.2.2 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 SUBSTANTIATING DATA

- 7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 7.1.1 Uplift and lateral resistance in stud to plate connections in accordance with *ASTM D1761*
 - 7.1.2 Uplift and lateral resistance in plate to rim board connections in accordance with *ASTM D1761*
- 7.2 Information contained herein is the result of testing and/or data analysis by sources which conform to IBC Section 1703 and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.

- 7.3 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a product as being equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
- 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 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 applicable to this TER, they are listed here.
- 8.2.1 No known variations
- 8.3 Building codes require data from valid research reports be obtained from approved sources (i.e., licensed registered design professionals [RDPs]).
- 8.3.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.4 Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the building official. DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs RDPs.
- 8.5 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere.”
- 8.6 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...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*.

9 CONDITIONS OF USE

- 9.1 Loads applied shall not exceed those recommended by the manufacturer or as defined in this TER.
- 9.2 The FrameFAST™ fasteners covered in this TER shall be installed in accordance with this TER and the manufacturer's installation instructions.
 - 9.2.1 For conditions not covered in this TER, connections shall be designed in accordance with accepted engineering practice.
- 9.3 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 authority having jurisdiction (AHJ) in which the project is to be constructed.



- 9.4 Where required by the building official, also known as 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.
- 9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.6 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 or RDP).
- 9.7 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.8 This product has an internal quality control program and a third-party quality assurance program in accordance with IBC Section 104.4 and Section 110.4 and IRC Section R104.4 and Section R109.2.
- 9.9 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.
- 9.10 This TER shall be reviewed for code compliance by the AHJ in concert with IBC Section 104.
- 9.11 The implementation of this TER for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by IBC Section 110.3, and any other code or regulatory requirements that may apply.

10 IDENTIFICATION

- 10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, 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, visit drjcertification.org.
- 11.2 For information on the current status of this TER, contact DrJ Certification.

Issue Date: December 29, 2020
Subject to Renewal: July 1, 2022

FBC Supplement to TER 1801-02

REPORT HOLDER: OMG, Inc.
DBA FastenMaster®

1 EVALUATION SUBJECT

1.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners)

2 PURPOSE AND SCOPE

2.1 Purpose

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners), recognized in TER 1801-02, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 Applicable Code Editions

2.2.1 *FBC-B—17, 20: Florida Building Code – Building (FL 21662)*

2.2.2 *FBC-R—17, 20: Florida Building Code – Residential (FL 21662)*

3 CONCLUSIONS

3.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners), described in TER 1801-02, complies with the *FBC-B* and *FBC-R* and is subject to the conditions of use described in this supplement.

3.2 Where there are variations between the *IBC* and *IRC* and the *FBC-B* and *FBC-R* applicable to this TER, they are listed here.

3.2.1 *FBC-B* Section 104.4, Section 110.4, and Section 2308 are reserved.

3.2.2 *FBC-R* Section R104, Section R109, and Section R602.3.2 are reserved.

4 CONDITIONS OF USE

4.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners), described in TER 1801-02, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1801-02

4.1.2 The design, installation, conditions of use, and identification of FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners) are in accordance with the 2018 *IBC* provisions noted in TER 1801-02.

4.1.3 The design, installation, and inspections are in accordance with additional requirements of *FBC-B* Chapter 16 and Chapter 17, as applicable.