DrJ™ CERTIFICATION

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17065 PRODUCT CERTIFICATION BODY

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Technical Evaluation Report

TER 1503-03

Use of FastenMaster® FrameFAST™ Structural Wood Screw Fasteners to Provide Uplift & Lateral Resistance to Wood Trusses, Rafters, or Floor Joists Attached to the Tops of Walls

OMG®, Inc. DBA FastenMaster®

Product:

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

Issue Date:

May 17, 2016

Revision Date:

May 23, 2022

Subject to Renewal:

July 1, 2023

COMPANY INFORMATION:

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fastenmaster.com

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 00 90 - Wood and Plastic Fastenings

1 PRODUCT EVALUATED[1]

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

2 APPLICABLE CODES AND STANDARDS[2,3]

2.1 *Codes*

2.1.1 *IBC—15, 18, 21: International Building Code®*

2.1.2 *IRC—15, 18, 21: International Residential Code®*

2.1.3 *FBC-B—17, 20: Florida Building Code – Building[4] (Product Approval Number FL 21662)*

2.1.4 *FBC-R—17, 20: Florida Building Code – Residential[4] (Product Approval Number 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 F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

2.2.5 *ASTM F606: Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets*

2.2.6 *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 2021 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2018 versions of the referenced codes and the standards referenced therein.

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

[4] All references to *FBC-B* and *FBC-R* are the same as the 2018 *IBC* and 2018 IRC, respectively, unless otherwise noted in the supplement at the end of this TER.

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3 Performance Evaluation

3.1 FrameFAST™ fasteners were evaluated, using assembly tests to derive allowable design values, as an alternate means of attaching metal plate connected wood trusses, rafters, or floor joists to the tops of walls for the purpose of providing uplift and lateral load resistance. The following conditions were evaluated:

3.1.1 Withdrawal strength of FrameFAST™ fasteners for use as an alternative to toenail connections, metal hurricane and seismic clips/straps, or nails in tension (uplift) loaded applications.

3.1.2 Shear strength of FrameFAST™ fasteners for use as an alternative to toenail connections, hurricane and seismic clips/straps, or nails in shear (lateral) loaded applications either parallel or perpendicular to wood grain.

3.1.3 Head pull through strength of FrameFAST™ fasteners for use as an alternative to toenail connections, hurricane and seismic clips/straps, or nails in tension (uplift) loaded applications.

3.2 Any code compliance issues 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.

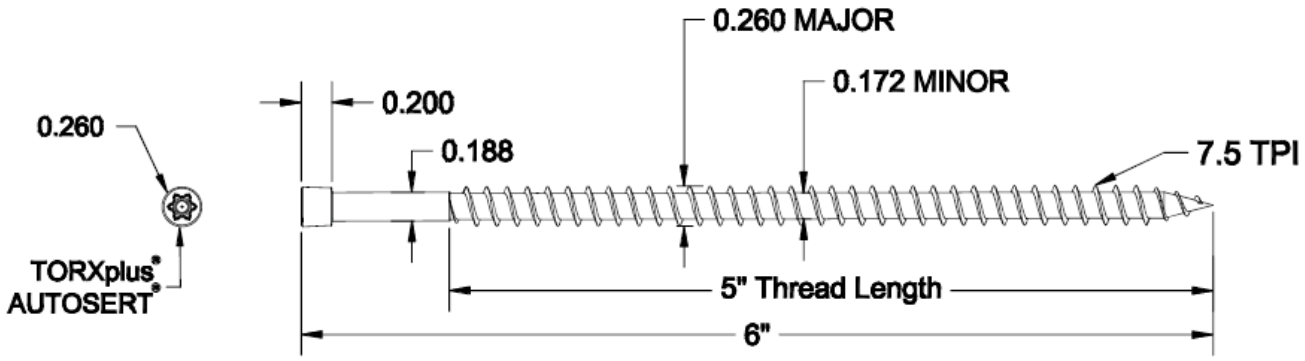


Figure 1. FrameFAST™ Fastener Specification

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.

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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 in Table 1.

TABLE 1. FASTENER SPECIFICATIONS

Fastener	Fastener Designation	Fastener Length[1] (in)	Thread Length[1] (in)	Head Diameter (in)	Head Height	Shank Diameter[2] (in)	Minor Thread (Root) Diameter (in)	Major Thread Diameter (in)	Bending Yield[2], f_{yb} (psi)	Allowable Fastener Strength[2] (lbf)	
										Tensile	Shear
FrameFAST™	FMFF006	6	5	0.260	0.200	0.188	0.172	0.260	166,600	980	980

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

1. Fastener length is measured from the top of the head to the tip. Thread length includes tapered tip (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 trusses, sawn lumber rafters, or floor joists to wood walls that meet the requirements of *IBC* Section 2308 or *IRC* Section R602 for wood structural framing members. The fasteners provide resistance to uplift or lateral loads applied parallel and/or perpendicular to the wall or structural framing member.

5.1.1 Walls shall consist, at a minimum, of a single or double top plate designed in accordance with *IBC* Section 2308.5.3.2 or *IRC* Section R602.3.2. More than two top plates is permitted.

5.1.2 See Table 2 for the design procedure and allowable design values for FrameFAST™ fasteners.

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.

5.2 *Design Concepts and Allowable Design Loads*

5.2.1 Allowable design loads for uplift and lateral resistance [parallel (F1) and perpendicular (F2) to the plane of the wall or structural member, Figure 2] are provided in Table 2 for FrameFAST™ fasteners. Allowable design loads are applicable a fastener is installed in accordance with the procedures described in Section 6.

5.2.1.1 Blocking requirements are shown in Figure 3 and Figure 4.

5.2.1.2 An example for calculating reduced uplift values based on embedment depth is shown in Figure 5.

5.2.1.3 An example top plate applications are shown in Figure 7, Figure 8, and Figure 9.

5.2.1.4 A header to truss application is shown in Figure 10.

5.2.1.5 Allowable uplift values for a two-screw connection, as detailed in Figure 6, are provided in Table 3.

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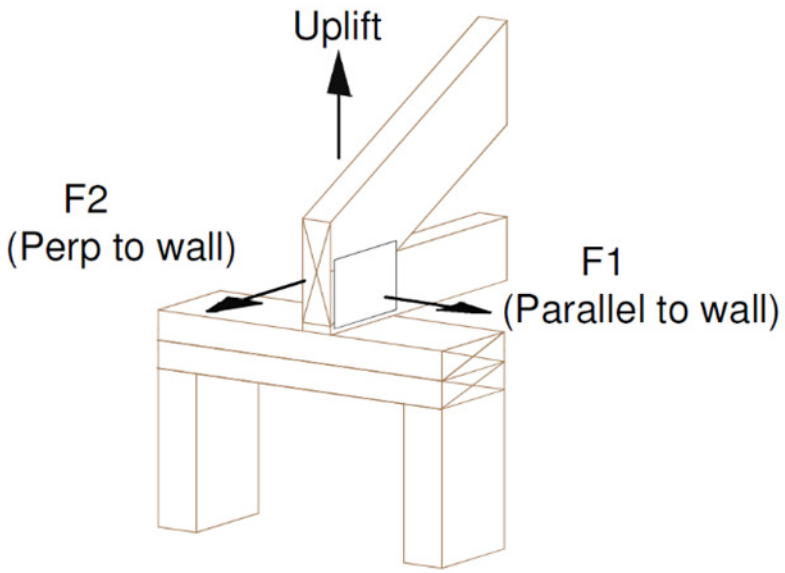


FIGURE 2. UPLIFT AND LATERAL LOAD ORIENTATIONS

TABLE 2. FRAMEFAST™ FASTENERS ALLOWABLE LOADS FOR UPLIFT & LATERAL RESISTANCE

Fastener Designation	Minimum Penetration into Truss/Rafter/Wood Structural Support[7] (in)	Species Group (Specific Gravity)[1,2,3]	Uplift[4,5] (lbf)	Lateral[4] (lbf)		
				F1 Parallel to Wall (Without Blocking)	F1 Parallel to Wall (With Blocking[6])	F2 Perpendicular to Wall
6" FMFF006	2½	So. Pine (0.55)	690	285	650	485
		Douglas Fir-Larch (0.50)	655	300	600	455
		Spruce-Pine-Fir/Hem-Fir (0.42)	595	330	520	400

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

1. Wood truss, rafter, or floor joist members shall be a minimum of 2" nominal thickness. Design of truss, rafter, or floor joist members is by others.
2. Equivalent specific gravity of structural composite lumber (SCL) shall be equal to or greater than the specific gravities provided in this table. Refer to product information from SCL manufacturer.
3. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
4. No further duration of load increases permitted.
5. Use reduction factor of 0.80 when connecting each ply of multiply trusses to the top plate.
6. See Figure 3 and Figure 4 for blocking requirements between trusses, rafter, or floor joists.
7. For embedment depths into main member of less than 2½" (full penetration), reduced allowable uplift shall be calculated using Section 5.2.3 and Figure 5 for embedment depths greater than 2½", no further increases allowed.

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5.2.2 In the F1 direction, design loads are given for assemblies with and without blocking between the roof or floor trusses. Blocking requirements are shown in Figure 3 and Figure 4.

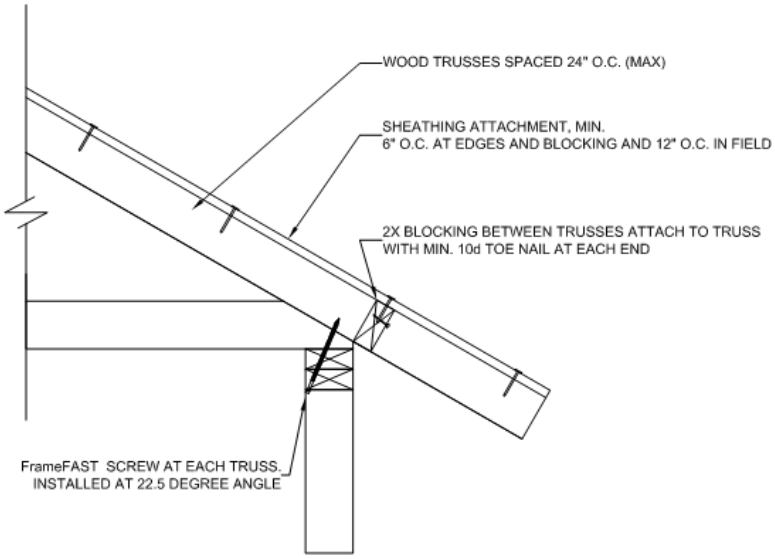


FIGURE 3. TRUSS BLOCKING DETAIL

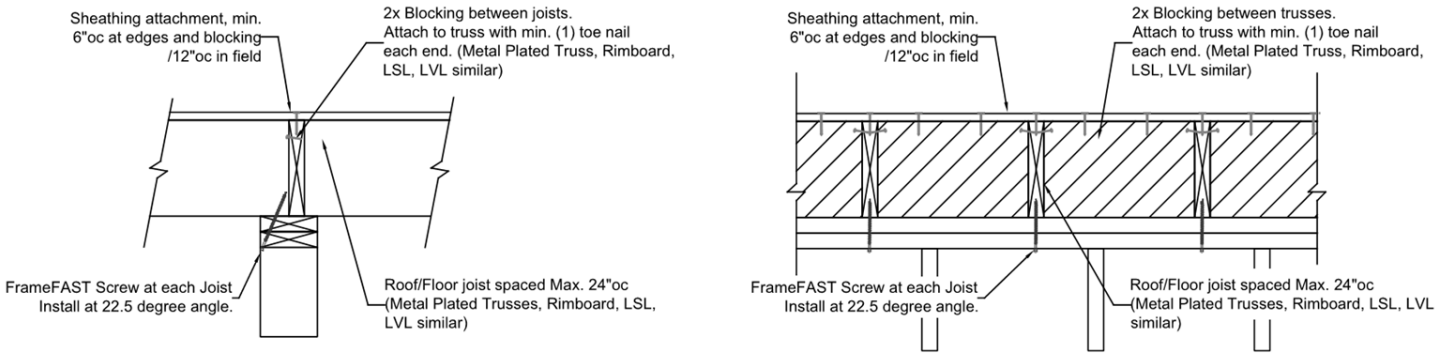


FIGURE 4. SECTION VIEW OF ROOF/FLOOR JOIST BLOCKING

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5.2.3 For applications where the embedment depth into the main member is less than 2½" (full penetration), calculate the reduced allowable uplift per Figure 5.

5.2.3.1 The reduced thread embedment length does not include the tapered tip.

5.2.3.2 For embedment depths greater than 2½", no further increases are allowed.

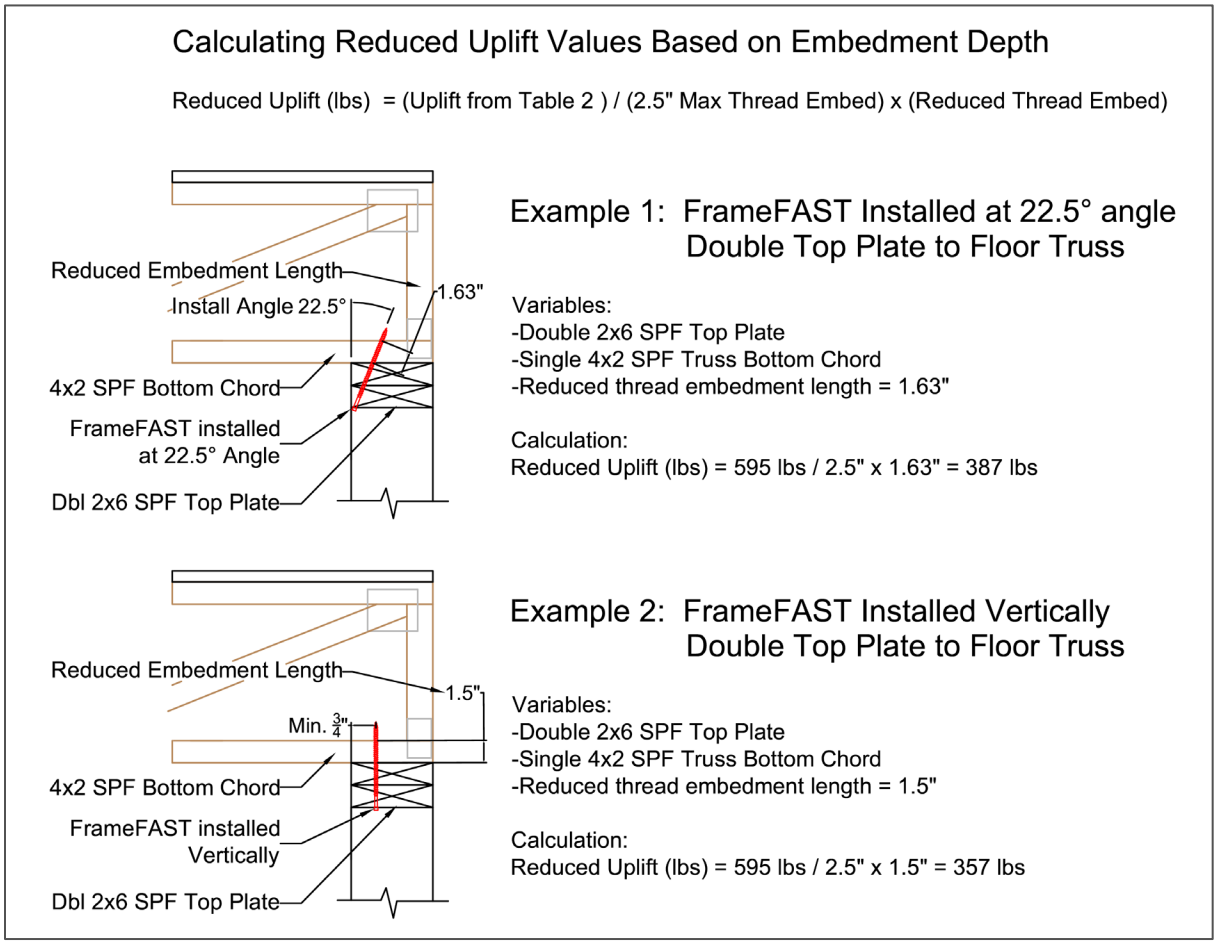


FIGURE 5. CALCULATION EXAMPLE FOR REDUCING UPLIFT VALUES BASED ON EMBEDMENT DEPTH

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5.2.4 For applications where two FrameFAST™ screws are installed as shown in Figure 6, allowable loads for the pair of screws are per Table 3.

5.2.4.1 The values in Table 3 are applicable to 2x4 and 2x6 walls.

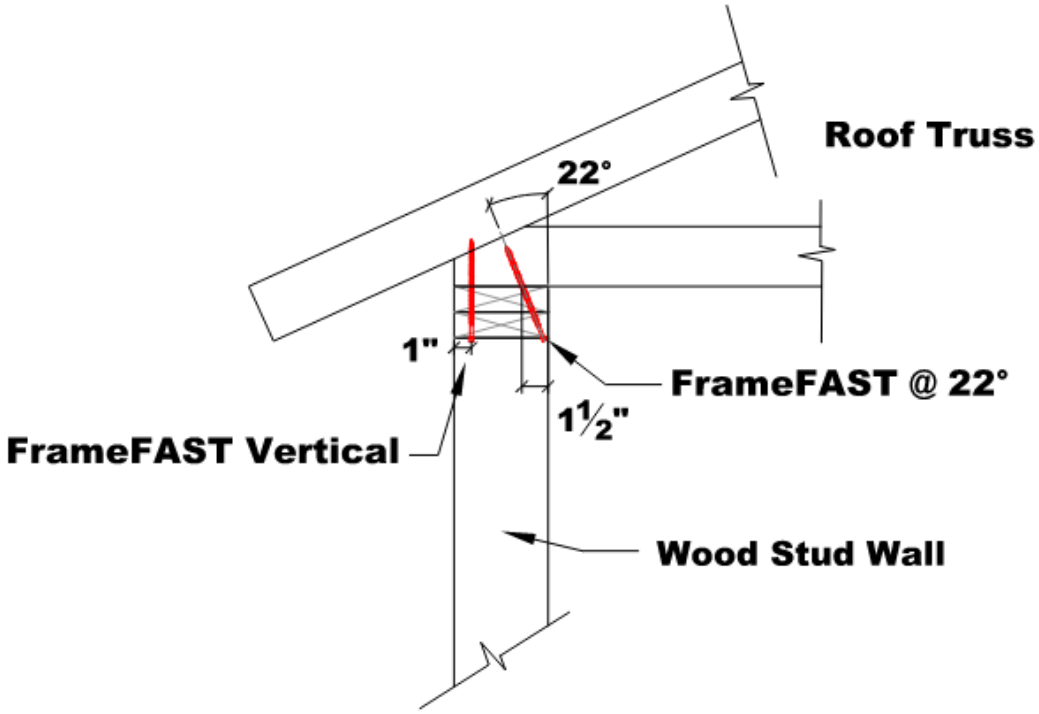


FIGURE 6. TWO-FRAMEFAST™ CONNECTION

TABLE 3. ALLOWABLE UPLIFT LOADS FOR TWO-FRAMEFAST™ CONNECTION[5]

Fastener Designation	Species Group (Specific Gravity)[1,2,3]	Uplift[4] (lbf)
6" FMFF006	So. Pine (0.55)	1105
	Douglas Fir-Larch (0.50)	1050
	Spruce-Pine-Fir/Hem-Fir (0.42)	950

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

1. Wood truss, rafter, or floor joist members shall be a minimum of 2" nominal thickness. Design of truss, rafter, or floor joist members is by others.
2. Equivalent specific gravity of structural composite lumber (SCL) shall be equal to or greater than the specific gravities provided in this table. Refer to product information from SCL manufacturer.
3. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
4. No further duration of load increases permitted.
5. See Figure 6 for connection detail requirements.

5.2.5 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.

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

5.2.6 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

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6 INSTALLATION

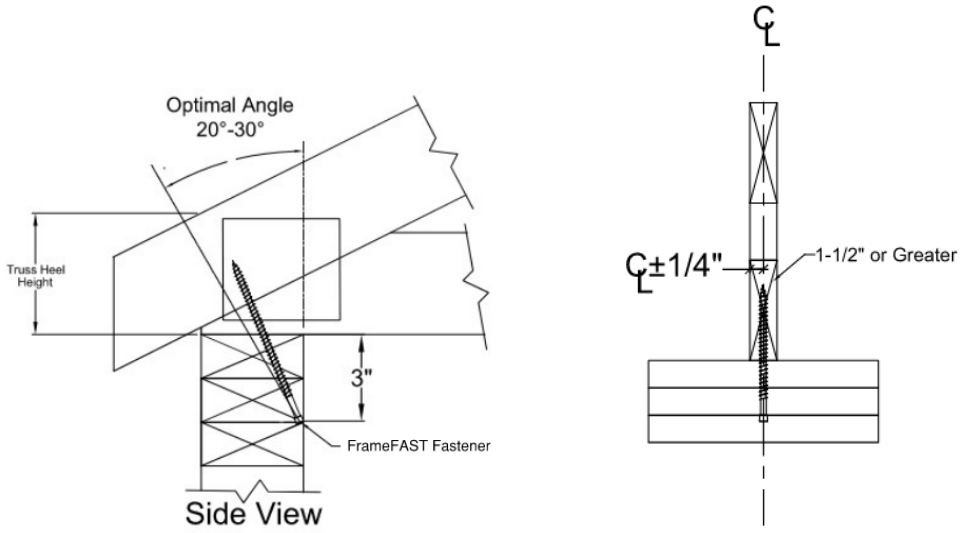


FIGURE 7. INSTALLATION OF FRAMEFAST™ FASTENERS ON WOOD TRUSS OR RAFTER TO TRIPLE TOP PLATE

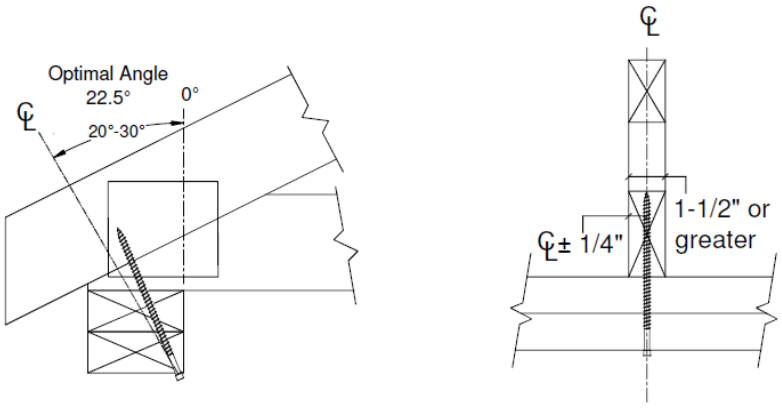


FIGURE 8. INSTALLATION OF FRAMEFAST™ FASTENERS ON WOOD TRUSS OR RAFTER TO DOUBLE TOP PLATE

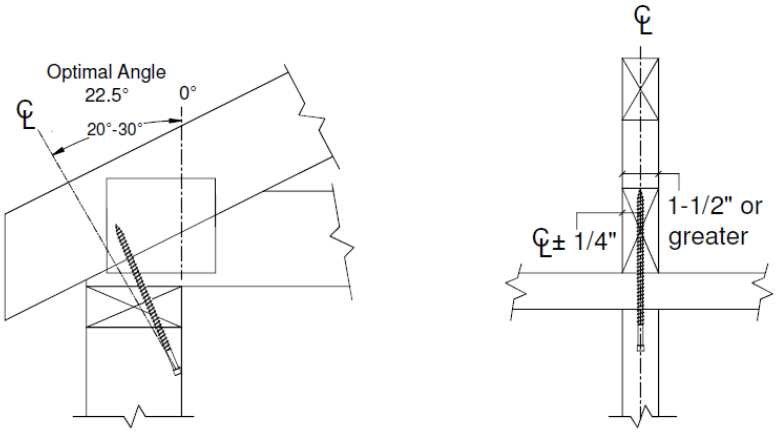


FIGURE 9. INSTALLATION OF FRAMEFAST™ FASTENERS ON WOOD TRUSS OR RAFTER TO SINGLE TOP PLATE

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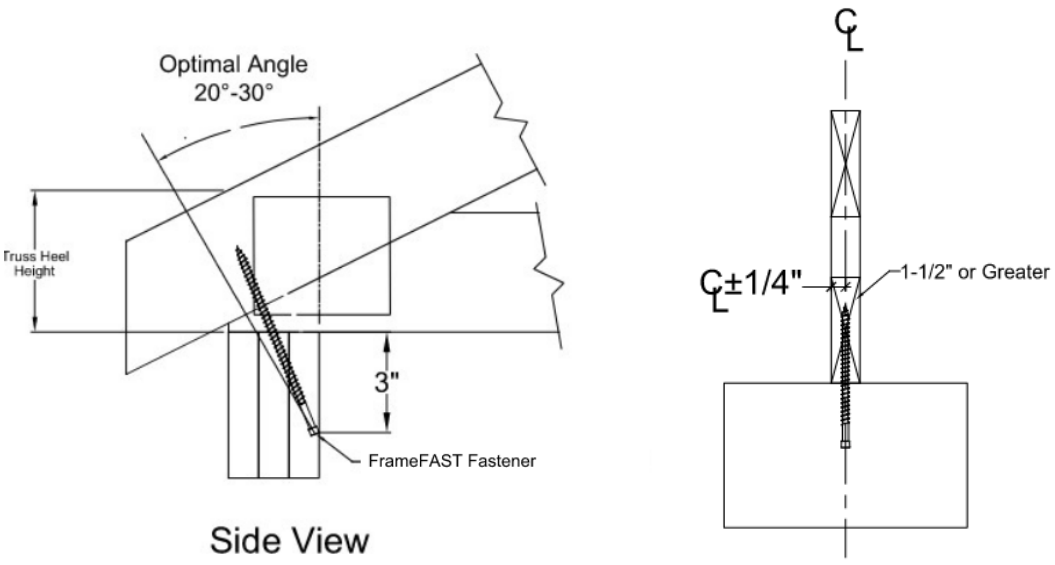


FIGURE 10. INSTALLATION OF FRAMEFAST™ FASTENERS ON WOOD TRUSS OR RAFTER TO HEADER

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 FrameFAST™ fastener with a length sufficient to fully embed 2½" of the fastener length into the truss or rafter. See Figure 7, Figure 8, and Figure 9 for guidance.

6.3 Install one (1) FrameFAST™ fastener upward through the wall top plates or wood structural framing member at the bottom corner of the top plates and into the center of the wood truss or rafter. The fastener shall be installed at a 20°-30° angle and shall penetrate the wood truss or rafter within ¼" of the centerline. See Figure 7, Figure 8, and Figure 9.

6.4 If the wood truss or rafter is located directly over a top plate splice, offset the fastener ¼" to one side of the splice and insert the fastener upward through the wall top plates or wood structural framing member at the bottom corner of the top plates and into the center of the truss or rafter. The fastener shall be installed at a 20°-30° angle.

6.5 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 testing in accordance with *ASTM D1761*

7.1.2 Fastener bending yield testing in accordance with *ASTM F1575*

7.1.3 Fastener shear strength testing in accordance with *ASTM F1575*

7.1.4 Fastener tensile strength testing in accordance with *ASTM F606*

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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 can be used as an acceptable alternative to the following:

8.1.1 Toenail connections, metal hurricane and seismic clips/straps, or nails to resist the uplift and lateral loads due to wind and seismic conditions as provided for in Table 2

8.1.2 Provide resistance to uplift loads due to wind negative pressure applied from the truss above lifting up on the top plate of the wall, per Table 2 and Table 3.

8.1.3 Provide resistance to lateral loads due to wind or seismic loads applied parallel or perpendicular to the wall, per Table 2

8.2 Building codes require data from valid *research reports* be obtained from *approved sources* (i.e., licensed *registered design professionals* [RDPs]).

8.2.1 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*.

8.3 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.

8.4 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."

8.5 *IBC* Section 104.11 (*IRC* Section R104.11 and *IFC* Section 104.10[5] 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*.

[5] 2018 *IFC* Section 104.9

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9 Conditions of Use

9.1 For conditions not covered in this TER, connections shall be designed in accordance with accepted engineering practice.

9.2 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.

9.3 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.

9.4 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).

9.5 At a minimum, this product shall be installed per Section 6 of this TER.

9.6 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.

9.7 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.

9.8 This TER shall be reviewed for code compliance by the AHJ in concert with *IBC* Section 104.

9.9 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.

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Issue Date: December 29, 2020
Subject to Renewal: July 1, 2023

FBC Supplement to TER 1503-03

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 1503-03, have 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*

2.2.2 *FBC-R—17, 20: Florida Building Code – Residential*

3 Conclusions

3.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners), described in Sections 2.0 through 11.0 of TER 1503-03, complies with *FBC-B* Section 2304 and *FBC-R* Section R602 and is subject to the conditions of use described in this supplement.

4 Conditions of Use

4.1 FastenMaster® FrameFAST™ Structural Wood Screw (FrameFAST™ Fasteners), described in TER 1503-03, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1503-03.

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 *International Building Code* (*IBC*) provisions noted in TER 1503-03.

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

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