



CERTIFICATION



Approved. Sealed. Code Compliant.

Technical Evaluation Report

TER 1308-11

**FastenMaster® ThruLOK® Pole Barn
Header Connection**

**OMG, Inc.
DBA FastenMaster®**

Product:

**ThruLOK® Screw Bolt
Fastening System**

Issue Date:

September 13, 2013

Revision Date:

September 13, 2022

Subject to Renewal:

October 1, 2023



COMPANY
INFORMATION:

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23 - Wood, Plastic, and Composite Fastenings
SECTION: 06 11 00 - Wood Framing

1 Product Evaluated¹

1.1 ThruLOK® Screw Bolt Fastening System

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®*

2.2 *Standards and Referenced Documents*

- 2.2.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 2.2.2 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*
- 2.2.3 *ASTM B695: Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel*
- 2.2.4 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood and Wood-Based Materials*
- 2.2.5 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

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.

3 Performance Evaluation

- 3.1 The ThruLOK® Screw Bolt Fastening System was evaluated to determine its ability to provide code complying attachment of horizontal roof headers to vertical columns (posts) to resist roof to header to column gravity loads and the associated load paths.
- 3.1.1 The evaluation includes both single header and double header configurations.
- 3.2 Use of the ThruLOK® Screw Bolt Fastening System for other connections is outside the scope of this technical evaluation report (TER).
- 3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.4 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 ThruLOK® Screw Bolt Fastening System is shown in Figure 1.

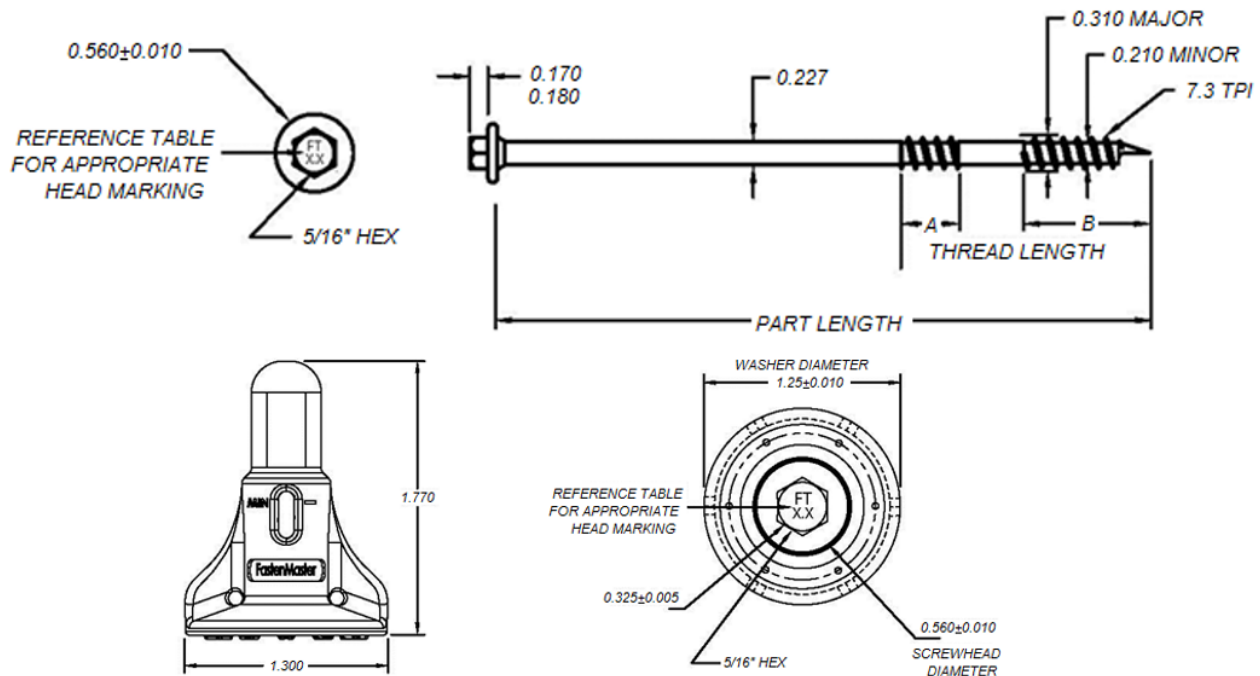


Figure 1. ThruLOK® Screw Bolt Fastening System

4.1.1 The FastenMaster® ThruLOK® series fasteners listed in Table 1 were evaluated.

Table 1. Fastener Specifications

Fastener Name	Fastener Designation	Head Marking	Length ¹ (in)	Length of Thread ² (in)		Unthreaded Shank Diameter (in)	Minor Thread (Root) Diameter (in)	Allowable Bending Yield ³ (psi)
				A	B			
ThruLOK®	THR912	FT9.5	9.5	0.56	1.2	0.227	0.210	218,400
	THR008	FT8.0	8.0	0.56	1.2	0.227	0.210	218,400

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

1. Measured from the underside of the head to the point of the tip.
2. The thread lengths given for the ThruLOK® are for zones A and B, as depicted in Figure 1.
3. Determined in accordance with methods specified in *ASTM F1575*, based on minor thread diameter using a 5% offset of the load displacement curves developed from bending tests.

4.1.2 ThruLOK® fastener heads have a ⁵/₁₆" hex drive.

4.1.3 Allowable bending yield and critical dimensions are found in Table 1.

4.1.4 ThruLOK® fasteners have a proprietary cutting point and are supplied with a ThruLOK® washer and nut.

4.1.5 ThruLOK® fasteners are manufactured with carbon steel grade 1022 or 10B21 wire conforming to *ASTM A510* with a minimum ultimate tensile strength of 60 ksi.

4.1.6 ThruLOK® fasteners are coated with mechanically applied zinc in accordance with *ASTM B695*, Class 55 as specified in *IRC Section R317.3.1*.

4.2 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.

5 Applications

5.1 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 Single Header Configuration

5.2.1 Figure 2 shows a single header connection using ThruLOK® fasteners to resist single shear of one header on one side of one column.

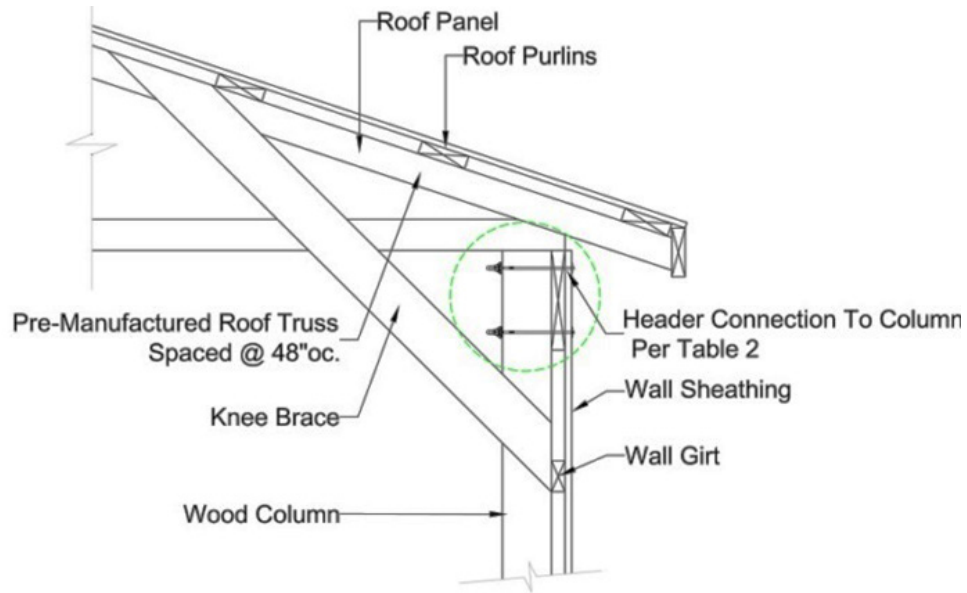


Figure 2. ThruLOK® Screw Bolt Fastening System – Roof to Header Detail

5.2.2 For the header configuration shown in Figure 2, it is assumed that the interior header will receive 75% of the load and the exterior header will receive 25% of the load.



5.2.3 Table 2 provides the number of ThruLOK® fasteners needed for various snow loading conditions.

Table 2. Single Shear – Truss Bearing on One Header to One Column^{1,3,4,5}

Building Width Including 1' Overhang Each End (ft)	Species ² (Pressure Treated)	Truss Spacing (ft)	Column Spacing (ft)	Number of 8" ThruLOK® Fasteners per Header		
				Loading (Snow + TC Dead + BC Dead) PSF		
				20+10+5 = 35	30+10+5 = 45	40+10+5 = 55
24	Hem-Fir	4	8	4	6	6
	Douglas-Fir			4	4	6
	Mixed Southern Yellow Pine			4	4	6
28	Hem-Fir	4	8	6	6	8
	Douglas-Fir			4	6	6
	Mixed Southern Yellow Pine			4	6	6
32	Hem-Fir	4	8	6	8	8
	Douglas-Fir			6	6	8
	Mixed Southern Yellow Pine			4	6	8
36	Hem-Fir	4	8	6	8	-
	Douglas-Fir			6	6	8
	Mixed Southern Yellow Pine			6	6	8
40	Hem-Fir	4	8	6	8	-
	Douglas-Fir			6	8	-
	Mixed Southern Yellow Pine			6	6	8
44	Hem-Fir	4	8	8	-	-
	Douglas-Fir			6	8	-
	Mixed Southern Yellow Pine			6	8	-
48	Hem-Fir	4	8	8	-	-
	Douglas-Fir			8	8	-
	Mixed Southern Yellow Pine			6	8	-
52	Hem-Fir	4	8	8	-	-
	Douglas-Fir			8	-	-
	Mixed Southern Yellow Pine			8	8	-

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Fastener designs were evaluated under *NDS* wet service (also known as wet use) conditions to account for the effects of higher header and/or column moisture content.
2. Lumber used shall be either treated Southern Pine, treated Hem-Fir, or treated Douglas Fir.
3. Connection design assumes that the header supports one truss located at midspan of the header. Trusses located at the columns shall be supported by bearing on the column and shall not apply loads to the header.
4. Design of all wood members (e.g., columns/posts, headers, trusses, girts, knee braces) and connections not shown are by others.
5. See Section 5.4 for information on minimum required edge and end distances.

5.3 Double Header Configuration

5.3.1 Figure 3 shows a double header connection using ThruLOK® fasteners to resist the shear of one header on one side of a single column and another header on the opposite side of the column.

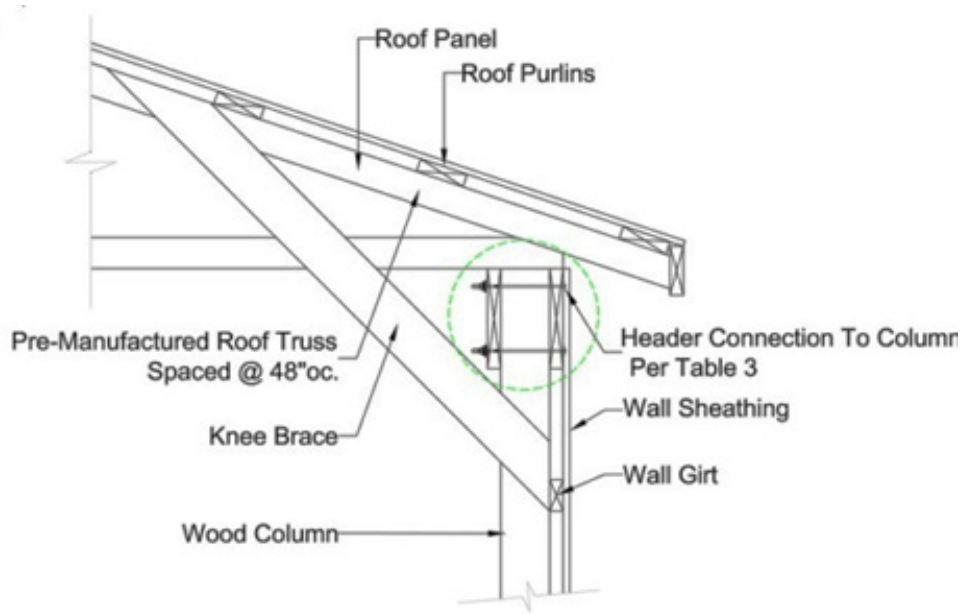


Figure 3. ThruLOK® Screw Bolt Fastening System – Roof to Header Detail

5.3.2 For the header configuration shown in Figure 3, it is assumed that the interior header will receive 75% of the load and exterior header will receive 25% of the load.



5.3.3 Table 3 provides the number of ThruLOK® fasteners needed for various snow loading conditions.

Table 3. Two-Beam Shear – Truss Bearing on Two Headers Connected to One Column^{1,3,4,5}

Building Width Including 1' Overhang Each End (ft)	Species ² (Pressure Treated)	Truss Spacing (ft)	Column Spacing (ft)	Number of 9½" ThruLOK® Fasteners per Header		
				Loading (Snow + TC Dead + BC Dead) PSF		
				20+10+5 = 35	30+10+5 = 45	40+10+5 = 55
24	Hem-Fir	4	8	4	4	6
	Douglas-Fir			4	4	4
	Mixed Southern Yellow Pine			4	4	4
28	Hem-Fir	4	8	4	6	6
	Douglas-Fir			4	4	6
	Mixed Southern Yellow Pine			4	4	4
32	Hem-Fir	4	8	4	6	6
	Douglas-Fir			4	4	6
	Mixed Southern Yellow Pine			4	4	6
36	Hem-Fir	4	8	6	6	8
	Douglas-Fir			4	6	6
	Mixed Southern Yellow Pine			4	6	6
40	Hem-Fir	4	8	6	6	8
	Douglas-Fir			4	6	8
	Mixed Southern Yellow Pine			4	6	6
44	Hem-Fir	4	8	6	8	8
	Douglas-Fir			6	8	8
	Mixed Southern Yellow Pine			4	6	8
48	Hem-Fir	4	8	6	8	-
	Douglas-Fir			6	6	8
	Mixed Southern Yellow Pine			6	6	8
52	Hem-Fir	4	8	6	8	-
	Douglas-Fir			6	8	8
	Mixed Southern Yellow Pine			6	6	8

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

1. Fastener designs were evaluated under *NDS* wet service (also known as wet use) conditions to account for the effects of higher header and/or column moisture content.
2. Lumber used shall be either treated Southern Pine, treated Hem-Fir, or treated Douglas-Fir.
3. Connection design assumes that the header supports one truss located at midspan of the header. Trusses located at the columns shall be supported by bearing on the column and shall not apply loads to the header.
4. See Section 5.4 for information on minimum required edge and end distances.
5. Design of all wood members (e.g., columns/posts, headers, trusses, girts) and connections not shown are by others.

5.4 Figure 4 and Table 4 provide the required edge and end distances for the applications described in this TER.

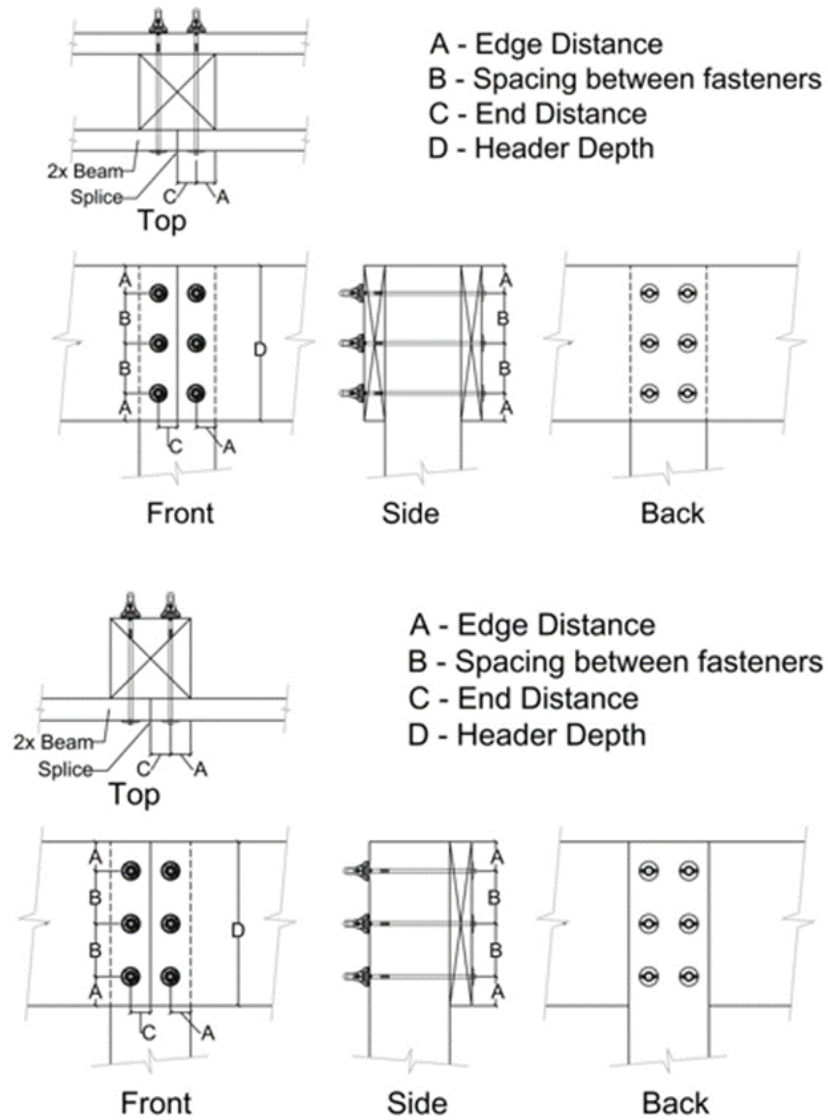


Figure 4. ThruLOK® Screw Bolt Fastening System – Edge, End, and Spacing Requirements

Table 4. Fastener Edge, End Distance, and Spacing for the ThruLOK® Fasteners Evaluated in this TER

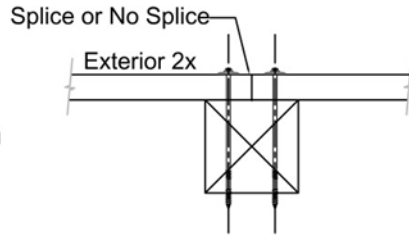
Fastener	Beam Size	Number of Fasteners	Header Member		Column Member		Fastener Spacing Between Rows (in)
			Min. Edge Distance (in)	Min. End Distance (in)	Min. Edge Distance (in)	Min. End Distance (in)	
8" & 9½" ThruLOK®	2x8	4	2	1	Greater of 1" or ½" spacing between rows	2	3¼
		6					1⅝
	2x10	4	2	1	Greater of 1" or ½" spacing between rows	2	5¼
		6					2⅝
		8					1¾
	2x12	4	2	1	Greater of 1" or ½" spacing between rows	2	5⅝
		6					3⅝
		8					2½

SI: 1 in = 25.4 mm

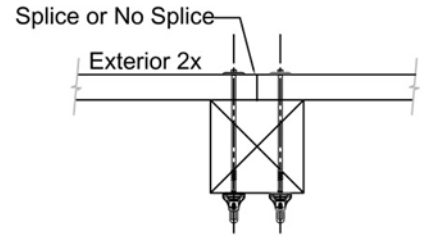
6 Installation

- 6.1 Installation shall comply with the manufacturer’s installation instructions, this TER, the approved construction documents, and the applicable building code.
- 6.2 In the event of a conflict between the manufacturer’s installation instructions and this TER, the more restrictive shall govern.
- 6.3 *Installation Procedure*
 - 6.3.1 The following installation instructions provide the general method of installing the FastenMaster® ThruLOK® Screw Bolt Fastening System for use with the specific applications as described in Section 5.
 - 6.3.2 Place the ThruLOK® washer on the ThruLOK® screw with the teeth of the washer facing away from the head of the fastener (toward the threads of the fastener).
 - 6.3.3 Using a high-torque, ½" variable-speed drill (18V if cordless) with a 5/16" hex-head driver bit, drive the ThruLOK® through the framing until the washer and hex head are just above the wood surface (approximately ¼"), and the point of the screw protrudes out of the other side of the connection.
 - 6.3.4 Thread the ThruLOK® nut onto the point of the fastener and hand tighten the nut until it is flush with the wood.
 - 6.3.5 Tighten the screw with the drill-driver.
 - 6.3.6 The point of the fastener must engage in the ThruLOK® nut to the “MIN” line or beyond (Figure 1).
 - 6.3.7 A diagram of the installation of a header with a splice on the interior side of a column is illustrated in Figure 5. A diagram of the installation of a header with a splice on the exterior side of a column is illustrated in Figure 6.

Installation procedure for when a single 2x header is installed at exterior of column.

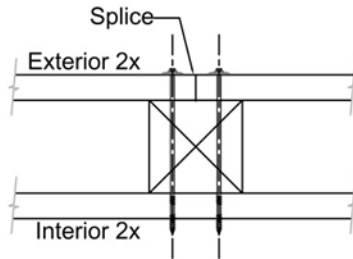


Step 1. Install ThruLok's from exterior 2x header side to ensure end and edge distances are maintained.

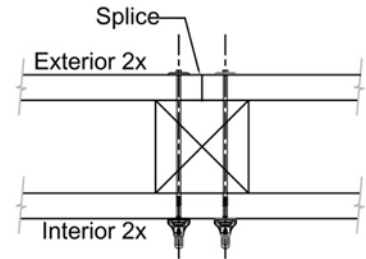


Step 2. Install nut on interior face and tighten

Installation procedure for when a header splice falls on exterior side of the column.



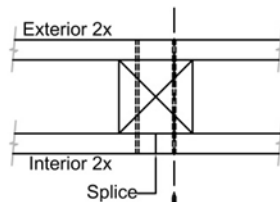
Step 1. Install ThruLok's from splice side (exterior 2x header side) to ensure end and edge distances are maintained.



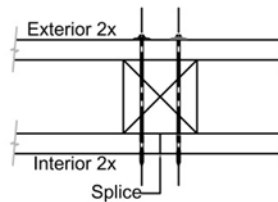
Step 2. Install nut on interior face and tighten

Figure 5. Installation of Header with Splice on Exterior Side of Column

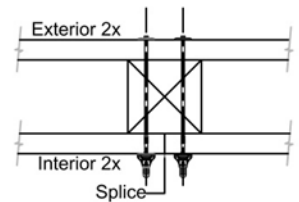
Installation procedure for when a header splice falls on interior side of the column.



Step 1. Predrill holes for the fastener from the interior side (spliced side) of assembly using the ThruLoks to ensure end and edge distances are maintained.



Step 2. Install ThruLok's through predrilled holes from exterior 2x header face as shown



Step 3. Install nut on interior face and tighten

Figure 6. Installation of Header with Splice on Interior Side of Column

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 Lateral resistance testing in accordance with *ASTM D1761*
 - 7.1.2 Bending yield testing in accordance with *ASTM F1575*
- 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 Fastening roof headers to columns for the conditions specified in Table 2 and Table 3.
- 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 104.10⁴ 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*.

⁴ 2018 IFC Section 104.9



9 Conditions of Use

- 9.1 Design properties shall not exceed those described in Section 5.
- 9.2 The ThruLOK® Screw Bolt Fastening System covered by this TER shall be subject to the following conditions:
 - 9.2.1 This TER and the installation instructions, when required by a code official, shall be available at the time of permit application.
 - 9.2.2 Installation shall comply with this TER and the manufacturer's installation instructions. In the event of a conflict between this TER and the manufacturer's installation instructions, the more restrictive shall govern.
 - 9.2.3 For conditions not covered in this TER, connections shall be designed in accordance with generally accepted engineering practice.
 - 9.2.4 Manufacturer's installation instructions shall be followed as provided in Section 6 and at [fastenmaster.com](https://www.fastenmaster.com).
 - 9.2.5 The ThruLOK® series fasteners are produced by OMG, Inc.'s facility located in Agawam, Massachusetts.
 - 9.2.6 The fasteners are identified by the designation "ThruLOK®" on the packaging. The head of the ThruLOK® fastener is marked with an "FT" followed by a number corresponding to the length of the fastener.
 - 9.2.6.1 The packaging shall include OMG's name and address, fastener size, third-party inspection agency, and this TER number.
 - 9.2.7 The ThruLOK® series fasteners are produced under a quality control program subject to periodic inspections in accordance with [IBC Section 1703.5.2](#).
- 9.3 When required by legal stipulation and enforced by the [building official](#), also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
 - 9.3.1 This TER and the installation instructions shall be submitted at the time of [permit](#) application.
 - 9.3.2 Any calculations, required to show compliance with this TER, incorporated as part of the construction documents that are to be examined for conformance to the requirements of the pertinent laws shall conform to accepted engineering practice, and be approved when requirements of the pertinent laws are met.
- 9.4 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](#).
- 9.5 [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).
- 9.6 At a minimum, this product shall be installed per Section 6 of this TER.
- 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](https://www.fastenmaster.com).

11 Review Schedule

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