Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 1009-01

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Use of FastenMaster® HeadLOK® Fasteners to Attach Cladding and/or Furring to Wood Framing Through Foam Sheathing

Trade Secret Report Holder:

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CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

Section: 06 02 00 - Design Information

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

Section: 06 11 00 - Wood Framing

Section: 06 12 00 - Structural Panels

Section: 06 16 00 - Sheathing

Section: 06 17 00 - Shop-Fabricated Structural Wood

1 Innovative Product Evaluated[1]

1.1 FastenMaster HeadLOK Heavy Duty Flat Head Fasteners

2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1** and **Figure 2**.

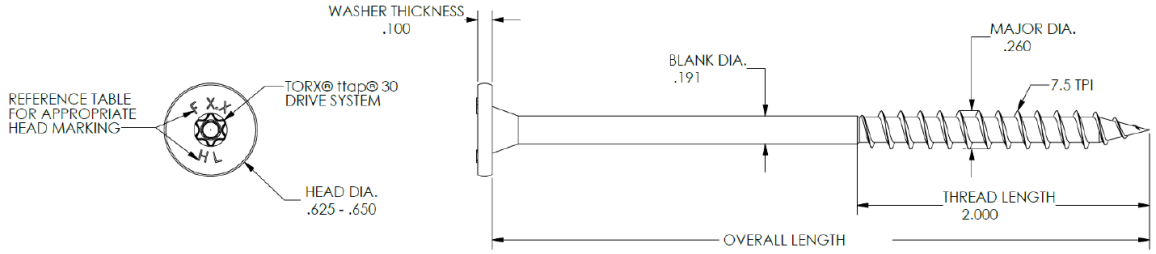

Figure 1. HeadLOK Heavy Duty Fastener – TORX® ttap® 30 Drive System

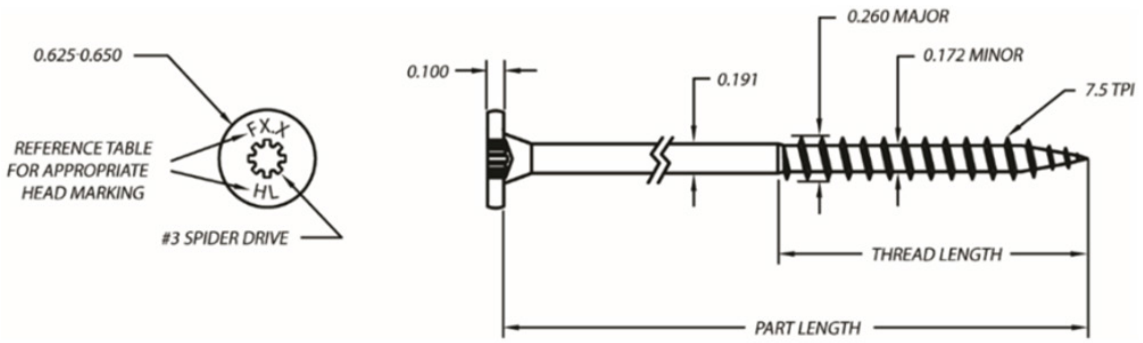

Figure 2. HeadLOK Heavy Duty Fastener – Spider Drive

2.2 HeadLOK fasteners are partially threaded, dowel-type fasteners with a flat head and a gimlet point designed to be installed in wood without the need for predrilling.

2.2.1 HeadLOK fasteners are available in two drive systems as shown in **Figure 1** and **Figure 2**:

2.2.1.1 T30 Torx drive

2.2.1.2 #3 Spider drive

2.3 HeadLOK fasteners are manufactured using a standard cold-formed process followed by a heat-treating process from 1022 carbon steel or 10B21 wire conforming to ASTM A510 with a minimum ultimate tensile strength of 60-ksi.

2.4 HeadLOK fastener specifications are shown in **Table 1**.

Table 1. Fastener Specifications for Evaluated HeadLOK Fasteners

Fastener Designation[1]	Dimension (in)					Bending Yield Strength,[4] F_{yb} (psi)	Allowable Fastener Strength (lb)	
	Fastener Length[2]	Thread Length[3]	Shank Diameter	Minor Diameter	Major Diameter		Tensile	Shear[5]
FMHLGM158	1 5/8	2	0.191	0.172	0.260	187,300	1,215	965
FMHLGM278	2 7/8							
FMHLGM334	3 3/4							
FMHLGM412	4 1/2							
FMHLGM005	5							
FMHLGM512	5 1/2							
FMHLGM006	6							
FMHLGM612	6 1/2							
FMHLGM007	7							
FMHLGM712	7 1/2							
FMHLGM008	8							
FMHLGM812	8 1/2							
FMHLGM009	9							

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	Fastener Length[2]	Thread Length[3]	Shank Diameter	Minor Diameter	Major Diameter		Tensile	Shear[5]
FMHLGM912	9 1/2	2	0.191	0.172	0.260	187,300	1,215	965
FMHLGM010	10							
FMHLGM011	11							
FMHLGM012	12							
FMHLGM013	13							
FMHLGM014	14							
FMHLGM015	15							
FMHLGM016	16							
FMHLGM018	18							

SI: 1 in = 25.4 mm, 1 psi = 6.895 kPa, 1 lb = 4.448 N

1. Fastener designations are found on the product packaging. Individual fasteners may be marked according to this table.
2. Fastener length is measured from the tip to bottom surface of the head.
3. Length of thread includes the tip.
4. Bending yield strength determined from ASTM F1575 and calculated using the minor diameter.
5. Allowable shear strength values apply to the unthreaded shank portion of the fastener.

2.5 *Corrosion Resistance*

2.5.1 HeadLOK fasteners have a proprietary coating that may be used as an alternative to the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.6[2] and IRC Section R304.3[3]).

2.5.1.1 HeadLOK fasteners may be used where screws are required to exhibit corrosion resistance when exposed to adverse environmental conditions, which are subject to the limitations of this report. HeadLOK fasteners have been evaluated for use in wood treated with waterborne alkaline copper quaternary, type D (ACQ-D) preservatives with a retention of 0.40-pcf (6.4 kg/m^3).

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

2.6.1 HeadLOK fasteners, with the proprietary coating, are recognized for use in PPT lumber provided the conditions set forth by the PPT lumber manufacturer be met, including appropriate strength reductions.

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

2.7.1 With the proprietary coating, HeadLOK fasteners are recognized for use in FRT lumber provided the conditions set forth by the FRT lumber manufacturer be met, including appropriate strength reductions.

2.8 HeadLOK fasteners are approved for use in interior applications.

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

3 Definitions[4]

3.1 New Materials[5] 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.[6] The design strength and permissible stresses shall be established by tests[7] and/or engineering analysis.[8]

3.2 Duly authenticated reports[9] and research reports[10] are test reports and related engineering evaluations that are written by an approved agency[11] and/or an approved source.[12]

3.2.1 These reports utilize 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).[13]

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.[14]

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[15] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[16] 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[17] 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.[18]

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.[19] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[20] 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.[21]

4 Applicable Local, State, and Federal Approvals; Standards; Regulations[22]

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.[23]

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.[24]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[25] and Part 3280[26] 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 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

4.3.2 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

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 B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*

4.3.6 *AWC TR 12: General Dowel Equations for Calculating Lateral Connection Values*

5 Listed[27]

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 and 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 HeadLOK fasteners are used to attach wall sheathing, furring, and/or cladding to the wall framing through an intermediate layer of foam sheathing to provide resistance to transverse loads in conventional light-frame wood construction.

6.1.1 See **Table 2** for a prescriptive solution to fastener spacing requirements for various installation conditions.

6.2 HeadLOK fasteners are used to support the dead load of wall sheathing, furring, and/or cladding when connected to the wall framing through an intermediate layer of foam sheathing.

6.2.1 See **Table 2** for fastening requirements for various siding weight and framing conditions.

6.3 *Design Procedure*

6.3.1 *Calculate Fastener Spacing:*

6.3.1.1 *Step 1:* Determine the spacing between studs or framing members, either 16" or 24" o.c.

6.3.1.2 *Step 2:* Calculate the correct thickness of rigid foam, up to 4", needed to obtain the required insulation effect or R-value.

6.3.1.3 *Step 3:* Choose the furring or sheathing (substrate) material to which the cladding will be affixed:

6.3.1.3.1 Minimum $^{3}/_{4}$" x $3^{1}/_{2}$" wood or Wood Structural Panel (WSP) furring

6.3.1.3.2 Minimum $^{3}/_{8}$" WSP sheathing

6.3.1.3.3 Ensure that the substrate allows for cladding connections that are compliant with the cladding manufacturer installation and connection instructions and meet the applicable building code.

6.3.1.4 *Step 4:* Determine the actual weight for the cladding materials to be installed, per square foot, as given by the cladding manufacturer specifications.

6.3.1.4.1 Typical cladding weights are 1.3-psf for vinyl siding, 2.5-psf for cement board siding, 11-psf for Portland cement stucco and 25-psf for adhered masonry veneer; use actual weights for materials installed.

6.3.1.4.2 Wood furring may add up to 1-psf of additional weight; wood sheathing may add up to 1.5-psf, depending on the thickness.

6.3.1.5 *Step 5:* Using these four values together, find the proper fastening pattern of between 6" and 24" o.c. using **Table 2**.

Table 2. Recommended Fastener Spacing for Various Thicknesses of Foam Sheathing, Stud Spacing, and Cladding Weight when Connected to Wood Studs Using HeadLOK Fasteners[1,2,3,4,6,7,8,9]

Stud Spacing[1]	Foam Thickness (in)	Maximum Allowable Cladding Weight (psf) to be Supported[5,10]									
		10	15	20	25	30	10	15	20	25	30
		Fastener Spacing (in) When Using Minimum 3/4" x 3 1/2" Wood or WSP Furring					Fastener Spacing (in) When Using Minimum 3/8" WSP Sheathing				
16" o.c.	1.0	24 o.c.			16 o.c.		12 o.c.				
	1.5	24 o.c.		16 o.c.		12 o.c.	12 o.c.				
	2.0	24 o.c.	16 o.c.		12 o.c.	8 o.c.	12 o.c.				8 o.c.
	3.0	24 o.c.	16 o.c.	12 o.c.	8 o.c.		12 o.c.		8 o.c.		6 o.c.
	4.0	16 o.c.	12 o.c.	8 o.c.		6 o.c.	12 o.c.	8 o.c.		6 o.c.	N/A
24" o.c.	1.0	24 o.c.		16 o.c.	12 o.c.		12 o.c.				8 o.c.
	1.5	16 o.c.		12 o.c.	8 o.c.		12 o.c.			8 o.c.	
	2.0	16 o.c.	12 o.c.	8 o.c.		6 o.c.	12 o.c.		8 o.c.		6 o.c.
	3.0	16 o.c.	8 o.c.		6 o.c.	N/A	12 o.c.	8 o.c.	6 o.c.		N/A
	4.0	12 o.c.	8 o.c.	6 o.c.	N/A		8 o.c.	6 o.c.	N/A		

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

1. Wood framing (studs) shall be a minimum of 2" nominal thickness.
2. Wood framing and furring shall be minimum Spruce-Pine-Fir or any species with specific gravity, G, of 0.42 or greater.
3. Wood framing, furring, and sheathing shall be designed by others and shall be of adequate size, species, and grade to resist design loads and requirements in accordance with the applicable building code.
4. Furring may be installed vertically or horizontally and shall be installed at the same on-center spacing as the studs. All fasteners shall be installed through the furring and into the studs with a minimum 2" of penetration. Alternately, where the furring is installed horizontally and where the required fastener spacing is 8" o.c. or 12" o.c., the furring may be installed at 16" o.c. or 24" o.c., respectively, provided two (2) fasteners are installed at stud location. Likewise, where the fastener spacing is 6" o.c., the furring may be installed horizontally at 12" o.c. and two (2) fasteners used at each stud. Where multiple fasteners are used, furring or sheathing (substrate) shall be of adequate size to provide proper edge, end, and fastener spacing distances.
5. Maximum allowable cladding weight shall include weight of furring, sheathing, cladding, and other supported materials.
6. Furring type and thickness shall be selected based on the cladding manufacturer installation requirements (i.e., required fastener penetration into furring).
7. When using horizontal furring, or where durability of the furring is a concern due to moisture between the cladding and the sheathing, consideration should be given to using preservative treated furring.
8. Tabulated solutions are limited to 4" maximum thickness of foam sheathing. Special design required for thicknesses of foam sheathing greater than 4". For cladding attachment over foam sheathing exceeding 4" thickness, a design professional should be consulted.
9. Foam plastic insulation shall be a minimum 15-psi compressive strength and shall be in conformance to ASTM C578 or ASTM C1289, as applicable.
10. For cladding system weights exceeding 30-psf, a design professional should be consulted.

6.3.2 *Check for Wind Resistance:*

6.3.2.1 *Step 1:* Using the information derived from *Step 1* through *Step 5* in **Section 6.3.1**, determine the allowable design wind pressure using the HeadLOK fasteners from **Table 3**.

Table 3. Allowable Design Wind Pressure for Connections Using HeadLOK Fasteners[1,3,4]

Furring or WSP Installation Condition	Minimum 1 x 4 Wood Furring[2] 16" o.c. Studs				Minimum 1 x 4 Wood Furring[2] 24" o.c. Studs				Minimum 3/8" WSP[2] 16" o.c. Studs			Minimum 3/8" WSP[2] 24" o.c. Studs		
HeadLOK Fastener Spacing in Furring or Sheathing (in)	24	16	12	8	24	16	12	8	12	8	6	12	8	6
Connection Allowable Design Wind Pressure (psf)[5]	49	73	98	147	33	49	65	98	49	73	98	33	49	65

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

1. Wood framing and furring shall be minimum Spruce-Pine-Fir or any species with specific gravity, G, of 0.42 or greater.
2. Wood framing, furring, and sheathing shall be designed by others and shall be of adequate size, species, and grade to resist design loads and requirements in accordance with the applicable building code.
3. Connection allowable design wind pressure applies to connection resistance only and shall meet or exceed design wind pressure.
4. Where required by the applicable building code, adequate resistance of connections and materials to seismic forces shall be provided based on local seismic ground motion hazard and the weight of the supported cladding system.
5. For use with the Allowable Stress Design load combinations of ASCE 7.

6.3.2.2 *Step 2:* Based on the design wind speed (105 - 150 mph) and wind exposure category (B - D) specific to your region, determine the design wind pressure to be resisted for your application from **Table 4**.

Table 4. Example of Components and Cladding Design Wind Loads[1,3,4,5,7]

Exposure Category:[2]	Wind Speed (V_{ult}) (mph) / Exposure						
B	105	110	115	120	130	140	150
C	-	-	-	-	110	120	130
D	-	-	-	-	-	110	120
Design Negative Wind Pressure Load to be Resisted (psf)[6]	15.9	17.5	19.1	20.8	24.4	29.1	34.5

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

1. Mean roof height shall not exceed 30' (measured vertically from grade plane to middle of roof slope),
   a. Exposure B: Kz = 0.70
   b. Exposure C: Kz = 0.98
   c. Exposure D: Kz = 1.16
2. Refer to applicable building code for wind exposure descriptions (B = typical suburban/wooded terrain; C = open flat terrain; D = ocean/lake exposure).
3. Where topographic effects occur (i.e., wind speed up due to hilltop exposure), refer to the building code for wind load.
4. Tabulated wind pressures are from ASCE 7-22, for wall corner zones. For lesser values away from wall corners, refer to the building code.
5. Tabulated wind pressures assume 100% of wind load is resisted by the cladding/foam sheathing or furring/foam sheathing layer and are not otherwise distributed or shared with other wall assembly layers.
6. Wind pressures, W, are given as 0.6W as defined in ASCE 7-22 for comparison to the allowable Design Wind Pressure of the fasteners as shown in **Table 3**.
7. Topographic factor K_{zt} = 1.0, Ground elevation factor K_e = 1.0, Wind directionality factor K_d = 0.85, Enclosed building GC_{pi} = 0.18.

6.3.2.3 *Step 3:* Verify that the allowable design wind pressure using HeadLOK fasteners (**Table 3**) meets or exceeds the design wind pressure for your project (**Table 4**).

6.3.3 *Design Example:*

Given:

Foam Sheathing Thickness:	3"
Cladding Material:	Fiber cement lap siding
Cladding Weight from Manufacturer Data:	3-psf
Design Wind Speed/Exposure:	120 / Exp. B
Seismic Design Category:	B (exempt)
Wood Framing:	2 x 6 at 24" o.c.

Solution:

Step 1: Choose the furring type and orientation that will be used. This example uses 1 x 4 (minimum) wood furring in a vertical orientation over studs (**Figure 3**).

Step 2: Consult siding manufacturer data for siding weight (3-psf) and add 1-psf for furring. Total = 4-psf.

Step 3: Using **Table 2**, minimum 1 x 4 wood furring at 24" o.c. attached to studs at 24" o.c. supporting up to 10-psf requires maximum 16" o.c. fastener spacing.

Step 4: From **Table 3**, the connection allowable design wind pressure resistance is 49-psf.

Step 5: Check the applicable building code to verify the wind pressure resistance required. **Table 4** gives an example of the IBC wind pressures (ASCE 7-22), and this example's connection resistance of 49-psf exceeds the required resistance of 34.5-psf for wind speeds of 150 mph in Exposure B, 130 mph in Exposure C, and 120 mph in Exposure D.

Step 6: The required minimum length of HeadLOK fasteners is $^3/_4$" (furring) + 3" (foam) + 2" (penetration) = $5^3/_4$". Select a 6" HeadLOK fastener.

Notes:

1. Add length for thickness of additional sheathing material layer behind foam, if included.
2. Verify that furring provides adequate thickness for siding fastener per code or siding manufacturer installation instructions, or specify an appropriate siding fastener for use in $^3/_4$" thick furring.
3. Verify that furring is adequate to resist the required design loads.

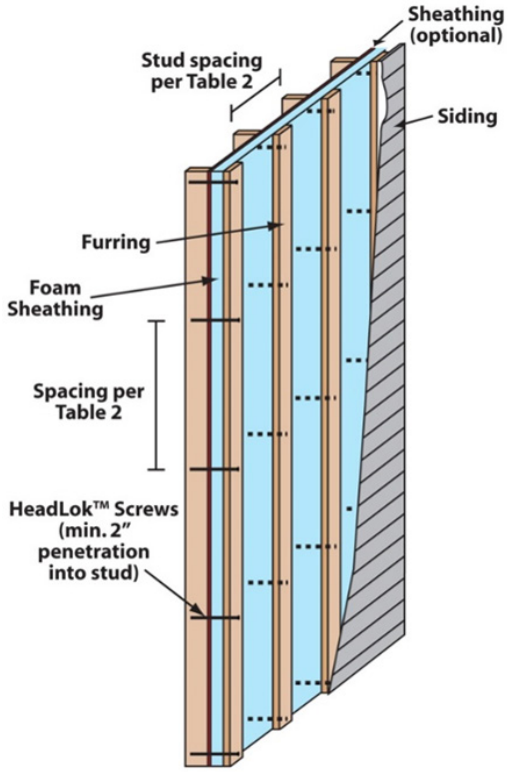

Figure 3. Exterior Wall Covering Assembly with Vertically Oriented Furring

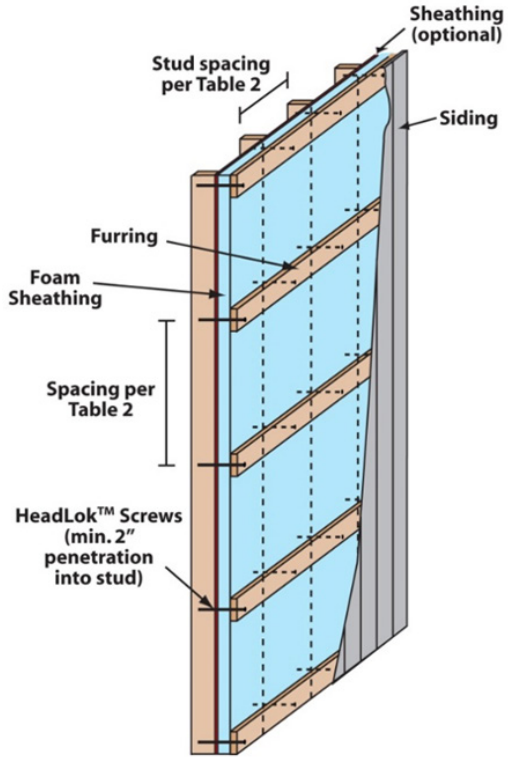

Figure 4. Exterior Wall Covering Assembly with Horizontally Oriented Furring

6.4 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[28]

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.[29]

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.[30]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 HeadLOK fasteners comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 HeadLOK fasteners were evaluated, using their tested allowable design values described below, as an alternate means of attaching cladding systems over exterior mounted rigid foam insulation. The following properties were evaluated:

8.1.1.1 Dowel bending strength of HeadLOK fasteners for use as an alternative to wood screws or lag screws in shear, where the fasteners are applied horizontally and the load is applied vertically.

8.1.1.2 Withdrawal strength of HeadLOK fasteners for use as an alternative to wood screws or lag screws in tension where the fasteners are applied horizontally and the load is applied vertically causing the fastener to pull out.

8.1.1.3 Head pull through strength of HeadLOK fasteners for use as an alternative to wood screws or lag screws in tension where the fasteners are applied horizontally and the load is applied vertically causing the fastener head to pull through.

8.1.1.4 Shear strength of the HeadLOK fasteners for use as an alternative to wood screws or lag screws in shear where the fasteners are applied horizontally and the load is applied vertically either parallel or perpendicular to wood grain.

8.1.1.5 Corrosion resistance in accordance with ASTM B117 (modified with freshwater instead of saltwater exposure) for use as an alternative to fasteners and connectors prescribed in IBC Section 2304.10.6[31] and IRC Section R304.3.[32]

8.2 Any building code, regulation and/or accepted engineering evaluations (i.e., 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[33] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[34] 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 Add up the total thickness of furring, rigid insulation, and sheathing, and then select the appropriate length of HeadLOK fastener (see **Table 1**) that will attach these combined materials and provide a minimum 2" penetration into the wood framing.

9.3.2 Using a high torque 1/2" drill, drive the HeadLOK fastener through the center of the furring strip and into the insulation and wall framing.

9.3.2.1 Lead holes are not required, but may be used if wood is prone to splitting.

9.3.2.2 Lead holes shall be bored in accordance with NDS Section 12.1.

9.3.3 HeadLOK fasteners should be aligned perpendicular to the face of the wall stud so that the point engages the center of the wall stud and at a minimum distance of 3" from the end of the stud or furring material.

9.3.4 HeadLOK fasteners must be installed in a manner to avoid over-driving yet snug enough to remove any gaps between the layers of materials being fastened.

9.3.5 **Figure 3** and **Figure 4** provide example graphics of two types of furring installations as a guide.

9.4 Install fasteners prior to utility installations in exterior walls to avoid accidental penetration of utilities (e.g., electrical wiring, plumbing, etc.).

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 HeadLOK fastener design property calculations for HeadLOK screws based on TR 12, NDS, and NYSERDA reports; Crandell

10.1.2 HeadLOK fastener performance from the FastenMaster Technical Bulletin for HeadLOK fasteners

10.1.3 FastenMaster installation instructions for HeadLOK fasteners

10.1.4 Cladding Attachment Over Thick Exterior Insulating Sheathing; P. Baker, P. Eng, and R. Lepage, Building Science Corporation

10.1.5 Initial and Long-Term Movement of Cladding Installed Over Exterior Rigid Insulation; Peter Baker; Building Science Corporation

10.1.6 Corrosion resistance performance from an approved source

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.[35]

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

11 Findings

11.1 As outlined in **Section 6**, HeadLOK 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, HeadLOK shall be approved for the following applications:

11.2.1 Use as an alternative material, design, and method of construction for the attachment of furring, sheathing, or cladding over foam sheathing and into wood framing.

11.2.2 Use per the listed editions of the IRC for positive and negative wind pressure resistance.

11.2.3 Use per the listed editions of the IRC for lateral shear strength to support cladding materials installed over foam sheathing.

11.2.4 Use per the listed editions of the IBC for positive and negative wind pressure resistance.

11.2.5 Use per the listed editions of the IBC for lateral shear strength to support cladding materials installed over foam sheathing.

11.2.6 Pressure-treated (ACQ) lumber, provided the conditions set forth by the pressure-treated lumber manufacturer be met, including appropriate strength reductions.

11.2.7 Fire-retardant treated lumber, provided the conditions set forth by the fire-retardant treated lumber manufacturer be met, including appropriate strength reductions.

11.2.8 Areas with exposure to freshwater.

11.2.8.1 Allowable loads shall be adjusted with the wet service factor, C_M, where applicable.

11.3 Unless exempt by state statute, when HeadLOK 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 FastenMaster.

11.5 IBC Section 104.2.3[36] (IRC Section R104.2.2[37] and IFC Section 104.2.3[38] 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:**[39] Building regulations require that the building official shall accept duly authenticated reports.[40]

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.[41]

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 HeadLOK fasteners covered by this report shall be installed in accordance with this report and the manufacturer installation instructions.

12.3 As listed herein, HeadLOK fasteners shall be subjected to the following conditions:

12.3.1 HeadLOK fastener spacing shall not exceed **Table 2** for the installation conditions considered.

12.3.1.1 Foam sheathing shall be minimum Type II (expanded polystyrene) or Type X (extruded polystyrene) conforming to ASTM C578 or Type 1 (polyiso) conforming to ASTM C1289.

12.3.1.2 Types with greater compressive strength are acceptable.

12.3.1.3 Ensure furring or sheathing material provides adequate substrate and thickness for the application of the siding fastener per the code requirements for siding application and the siding manufacturer installation instructions.

12.3.1.3.1 For example, if the siding manufacturer requires the fastener for the siding to penetrate more than $^{3}/_{4}$" into the furring, a 1 x 4 furring strip (actual dimension of $^{3}/_{4}$" x $3^{1}/_{2}$") would not be adequate and a thicker furring strip, such as a 2 x 4, would be required.

12.4 Use of HeadLOK fasteners to connect bracing materials in braced wall panels or shear walls is outside the scope of this report.

12.5 Use of HeadLOK fasteners shall be limited to dry service conditions in treated or untreated wood.

12.5.1 Exposure to freshwater water is permitted. Wet service factor shall be applied to the listed allowable values in **Section 6**, as applicable.

12.5.2 Use of HeadLOK fasteners in environments with the possibility of exposure to saltwater is outside the scope of this report.

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

12.7 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:

12.7.1 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.

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

12.7.3 This innovative product has an internal quality control program and a third-party quality assurance program.

12.7.4 At a minimum, this innovative product shall be installed per **Section 9**.

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

12.7.6 This innovative product has 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.

12.7.7 The application of this innovative product 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.

12.8 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.

12.9 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).

12.10 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 FastenMaster HeadLOK Heavy Duty Flat Head Fasteners, as listed in **Section 1.1**, are identified by a label on the board or 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 www.fastenmaster.com.

14 Review Schedule

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

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

Notes

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

2 2018 IBC Section 2304.10.5

3 2021 IRC Section R317.3

4 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.

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

6 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

7 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

8 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

9 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.

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

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

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

13 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.

14 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/

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

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

17 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

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

19 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

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

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

22 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.

23 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

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

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

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

27 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

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

29 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

30 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

31 2018 IBC Section 2304.10.5

32 2021 IRC Section R317.3

33 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.

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

35 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

36 2021 IBC Section 104.11

37 2021 IRC Section R104.11

38 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

39 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.

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

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