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FASTENMASTER LATERAL TENSION SYSTEM (LTS)

CSI Section:

06 05 23 Wood, Plastic, and Composite Fastenings

1.0 RECOGNITION

FastenMaster Lateral Tension System (LTS) recognized in this report has been evaluated for use in wood connections. The structural performance properties of the FastenMaster Lateral Tension System (LTS) complies with the intent of the provisions of the following codes and regulations:

- 2018, 2015, 2012, 2009 and 2006 International Building Code® (IBC)
- 2018, 2015, 2012, 2009 and 2006 International Residential Code® (IRC)

2.0 LIMITATIONS

Use of the FastenMaster Lateral Tension System (LTS) recognized in this report is subject to the following limitations:

2.1 The hold-down bracket and fasteners shall be manufactured, identified, and installed in accordance with this report and the manufacturer's published installation instructions. Where conflicts occur, the more restrictive shall govern. A copy of the manufacturer's published installation instructions shall be available at the job site at all times during installation.

2.2 Calculations and details showing compliance with this report shall be submitted to the building official. The calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

2.3 No further duration of load increase for wind or earthquake shall be allowed.

2.4 For compliance with the 2018, 2015, 2012, and 2009 IBC, a statement of special inspection shall be prepared by the registered design professional in responsible charge and submitted to the building official for approval, where required by Section 1704.3 of the 2018, 2015 and 2012 IBC, and Section 1705 of the 2009 IBC.

2.5 For compliance with the 2006 IBC, a quality assurance plan shall be submitted to the building official for approval, where required by Section 1705 and 1706 of the 2006 IBC.

2.6 Connected wood members and fasteners shall comply with Sections 4.2.2 and 4.2.3 of this report.

2.7 Adjustment factors noted in [Tables 2](#) through [4](#) of this report and the applicable codes shall be considered, where applicable.

2.8 The LTWS112 and LTWS912 fasteners are limited to use within the scope of this report and only available as part of the LTS hold-down bracket.

2.9 Use of the LTS hold-down brackets in contact with chemically-treated preservative wood is subject to the approval of the building official since the effect of corrosion of metal in contact with chemically-treated wood on the structural performances of the devices is outside the scope of this report.

2.10 Use of the LTS as anchorage for shear walls is outside the scope of this report.

2.11 The LTS hold-down brackets and LTWS112 & LTWS912 fasteners recognized in this report are produced by OMG, Inc. in Agawam, MA.

3.0 PRODUCT USE

3.1 General: The FastenMaster LTS described in this report consists of three components that when installed together act as a system capable of transferring tension loads between adjoining structural wood framing members. The LTS system may be used to attach exterior deck joists to horizontal plates or vertical studs. The LTS system provides the 750-pound (3336 N) minimum tension load required in the 2018 IRC Section R507.9.2 and 2015 IRC Section R507.2.4 for installations conforming to the 2018 IRC Figure R507.9.2(2) and 2015 IRC Figure R507.2.3(2), respectively.

3.2 Design of LTS Assembly: The allowable loads and deformations shown in [Tables 1](#) through [5](#) of this report are for LTS assemblies consisting of the following components: (1) a single LTS hold-down bracket; (2) a single LTWS912 fastener attached through the vertical hoop on this device; and (3) eight LTWS112 fasteners installed through the face of the device and into the wood member.

The allowable loads provided in the tables for this assembly are based on allowable stress design (ASD) and include a load duration factor (C_D) corresponding to the applicable loads in accordance with ANSI/AWC NDS-2018, -2015 or -2012 or ANSI/AF&PA NDS-2005 National Design

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.

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ISO/IEC 17065
Product Certification Body
#0675



Specification (NDS) for Wood Construction. The assembly shall have an allowable strength equal to or exceeding the required strength of the assembly under the ASD loads referenced in the applicable code.

When hold-downs are fastened to wood members having a moisture content greater than 19 percent for sawn lumber the allowable loads for wet service are shown in [Table 4](#) of this report.

When hold-downs are fastened to wood that will experience sustained exposure to temperatures exceeding 100°F (37.8°C), allowable loads shown in [Table 4](#) of this report shall be adjusted by the temperature factor, C_t , specified in the NDS.

The design of wood members fastened to the bracket hold-down devices shall consider combined stresses due to axial tension or compression and flexural bending induced by eccentricities in the connection about either or both axes relative to the centroid of the wood member. Stresses shall be evaluated at the critical net section for total combined stress in accordance with the NDS.

Total deflection values Δ_{all} and Δ_s at ASD-level and strength-level forces, respectively, for LTS assemblies, are shown in [Table 4](#) of this report and include all sources of device extension and fastener elongation where the length of the wood screw is a maximum of 9½ inches (241 mm).

The design of hold-downs used in series shall account for the cumulative deformation of all hold-downs within that series.

3.3 Installation: Installation of the FastenMaster LTS hold-down bracket shall be in accordance with this report and the manufacturer's published installation instructions.

4.0 PRODUCT DESCRIPTION

4.1 Product Information

4.1.1 LTS Hold-down Bracket: The LTS Hold-down Bracket is a single-piece of cold-formed structural steel with eight pre-punched holes for attachment to the face or edge of a structural member using the LTWS112 Bracket Mounting Fasteners and a raised hoop through which a single LTWS912 Tension Transfer Fastener is installed into the second framing member. This bracket converts the tension loads applied to the single tension fastener into shear loads shared amongst the eight bracket mounting fasteners. [Table 4](#) of this report lists allowable (ASD) loads.

4.1.2 LTWS112: The LTWS112 Bracket Mounting Fasteners are manufactured using a cold-forming process and consist of heat-treated carbon steel. The fasteners are 1-½ inches (38.1 mm) long, have a ¼ inch (6.35 mm) hex-head with an integral washer, rolled threads, and a sharp gimlet point. [Table 1](#) of this report provides fastener dimensions and bending yield strengths as well as allowable tensile and shear loads in accordance with ICC-ES AC233.

4.1.3 LTWS912: The LTWS912 Tension Transfer Fasteners are manufactured using a cold-forming process and consist of heat-treated carbon steel. The fasteners are 9-½ inches (241 mm) long, have a 5/16 inch (7.94 mm) hex-head with an integral washer, rolled threads, and a cutting point. [Table 1](#) of this report provides fastener dimensions and bending yield strength as well as allowable tensile and shear loads in accordance with ICC-ES AC233.

4.2 Materials

4.2.1 Steel: The LTS Bracket Hold-down described in this report is manufactured from ASTM A653 SS Grade 33, No. 14 gage galvanized steel having a minimum yield strength (F_y) of 33,000 psi (227 MPa) and a minimum ultimate tensile strength (F_u) of 45,000 psi. The bracket has a G185 zinc coating specification in accordance with ASTM A653.

The LTWS112 and LTWS912 fasteners are manufactured from Grade 1022 or 10B21 carbon steel wire and coated with mechanically applied zinc in accordance with ASTM B695, Class 55, Type I. A lubricious clear topcoat is added over this zinc to ease installation.

The lumber treater or FastenMaster shall be contacted for recommendations regarding the minimum corrosion resistance of steel connectors or fasteners in contact with the specific proprietary preservative-treated or fire-retardant-treated lumber.

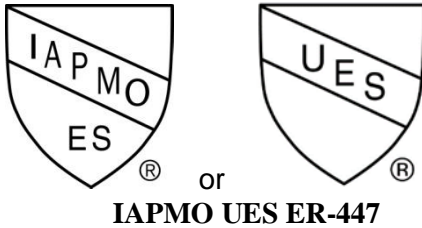
4.2.2 Wood: Wood members shall be sawn lumber having a minimum assigned specific gravity of 0.42. Assigned specific gravity shall be determined in accordance with Table 12.3.3A of the 2018 and 2015 NDS.

4.2.3 Fasteners: The LTWS112 and LTWS912 fasteners included with the LTS Bracket are the only fasteners approved for use with this system. These fasteners are limited to use within the scope of this report and therefore only sold as part of this system.



5.0 IDENTIFICATION

The LTS hold-down brackets and LTWS112 & LTWS912 fasteners are identified by the OMG, Inc. name and trademark, product name, and evaluation report number (ER-447). The identification includes the IAPMO Uniform Evaluation Service Mark of Conformity. Either Mark of Conformity may be used as shown below:



7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on FastenMaster Lateral Tension System (LTS) to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured at locations noted in Section 2.11 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Hold-Downs (Tie-Downs) Attached to Wood Members, AC155, approved May 2015 (Editorially Revised January 2018).

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Alternate Dowel-Type Threaded Fasteners, AC233, approved October 2018.

6.3 Test reports are from laboratories in compliance with ISO/IEC 17025.

TABLE 1 -FASTENER DIMENSIONS AND STRENGTHS

Fastener Designation	Head Marking	Screw Specifications (inches)				Nominal Bending Yield Strength (psi) ⁴	Allowable Fastener Strength (lbf) ⁵	
		Overall Length ¹	Thread Length ^{2,3}	Root Diameter	Shank Diameter		Tensile	Shear
LTWS112	F 1.5	1.50	1.25	0.130	0.150	193,800	650	470
LTWS912	F 9.5	9.50	3.00	0.200	0.228	218,400	1970	1280

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, lbf = 4.45N

¹. For purposes of measuring overall fastener length, fasteners shall be measured from the underside of the head to the bottom of the point.

². For the LTWS112 fastener, the length of the thread includes the point, as shown in Figure 1 of this report.

³. For the LTWS912 fastener, the length of the thread does not include the point, as shown in Figure 2 of this report.

⁴. Bending yield strength was derived in accordance with the methods specified in ASTM F1575 and based on the minor root diameter.

⁵. Allowable fastener strengths are based on the steel properties of the screw.

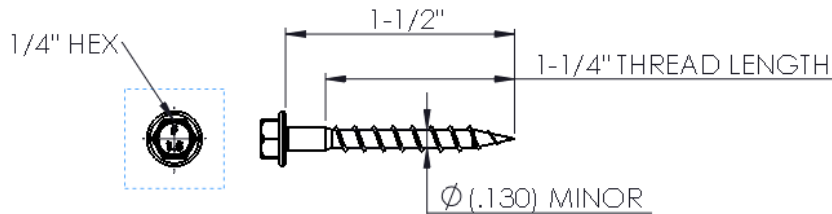


Figure 1: LTWS112 Wood Screw

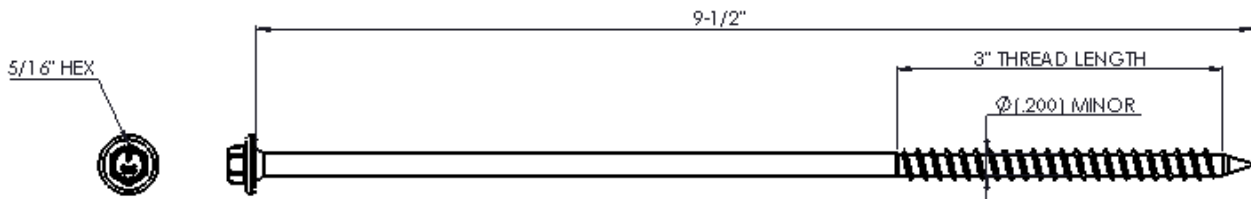


Figure 2: LTWS912 Wood Screw



Table 2 – Reference ASD Withdrawal Design Values (W) for LTWS912 Screws with Full Thread Embedment (lbf) ^{1,2,3,4}

Fastener Designation	Wood Specific Gravity ⁵					
	SG = 0.42		SG = 0.50		SG = 0.55	
	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6	C _D = 1.0	C _D = 1.6
LTWS912	523	836	582	931	879	1407

For SI: 1 inch = 25.4 mm, lbf = 4.45N

- Tabulated reference withdrawal design values (W) are in pounds assuming full thread penetration into the main member.
- Tabulated reference withdrawal design values (W) are shown at a C_D = 1.0 and 1.6. No further increases are allowed.
- For the LTS installation, the tabulated loads may be increased for load duration per the NDS up to a C_D = 1.6.
- Screws shall be installed straight into the side grain of the wood main member with the screw axis at a 90-degree angle to the wood fibers. Table 5 provides minimum edge distances.
- The main members shall be wood having a minimum NDS referenced specific gravity of 0.42 for Hem Fir, 0.50 for Douglas Fir-Larch, and 0.55 for Southern Pine.

Table 3 – Reference Lateral Design Values (Z) for Single Shear Steel-to-Wood Connections with LTWS1112 Wood Screws (lbf) ^{1,2,4}

Wood Specific Gravity ^{3,6}	0.42 to 0.49 SG				0.50 and Greater SG			
	Dry		Wet		Dry		Wet	
Moisture Condition	Dry		Wet		Dry		Wet	
Load Duration	C _D = 1.0	C _D = 1.6 ⁵	C _D = 1.0	C _D = 1.6 ⁵	C _D = 1.0	C _D = 1.6 ⁵	C _D = 1.0	C _D = 1.6 ⁵
Face Mounted Condition	120	192	78	125	106	170	101	162
Edge Mounted Condition	122	195	84	134	117	187	101	162

For SI: 1 inch = 25.4 mm, lbf = 4.45N

- Tabulated lateral design values are shown at C_D = 1.0 and 1.6. No further increases are allowed.
- This report is limited to steel described in Section 4.2.1 of this report.
- Specific gravity shall be the assigned specific gravity for sawn lumber per NDS Table 12.3.3A.
- The tabulated values have been determined in accordance with Section 3.4.3 of AC233.
- For the purposes of the LTS installation, the tabulated loads may be increased for load duration per the IBC up to a C_D = 1.6.
- The main members shall be wood having a minimum NDS referenced specific gravity of 0.42 for Hem Fir, 0.50 for Douglas Fir-Larch, and 0.55 for Southern Pine.

Table 4 – Allowable Loads for the LTS Bracket Hold-Down (lbf) ^{1,2,5,6,7}

Wood Specific Gravity	0.42 to 0.49 SG		0.50 and Greater SG		0.42 to 0.49 SG	0.50 and Greater SG	0.42 to 0.49 SG	0.50 and Greater SG
	–				Displacement at Allowable Design Loads (inches) Δ_{all}		Displacement at Strength-Level Resistance Loads (inches) Δ_s	
Moisture Condition	Dry ³	Wet ⁴	Dry ³	Wet ⁴	Average Dry	Average Wet	Average Dry	Average Wet
Face Mounted Condition	836	836	836	836	0.112	0.099	0.181	0.173
Edge Mounted Condition	836	800	808	802	0.118	0.116	0.181	0.169

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N

¹ Tabulated allowable loads are for the LTS Bracket Hold-Down attached to 1-1/2 inch thick (minimum 2x6 nominal) wood structural member with the fasteners described in Sections 4.1.2 and 4.1.3 of this report.

² The allowable loads for the LTS hold-down are based on allowable stress design (ASD) and include the load duration factors, C_D , corresponding with a ten-minute duration of load ($C_D = 1.6$). No further increase is allowed. The allowable values shall be reduced where other load durations govern.

³ Dry values are applicable to installations into the wood with a moisture content that does not exceed 19 percent.

⁴ Wet values are applicable to installations into the wood with a moisture content greater than 19 percent at the time of installation or in service.

⁵ The tabulated allowable (ASD) tension loads shall be multiplied by 1.4 to obtain the LRFD level loads associated with the tabulated Δ_s deformations.

⁶ The tabulated allowable loads assume the LTWS912 fastener to be installed in wood having a specific gravity of 0.42 or greater.

⁷ The minimum lumber grade used for Hem-Fir, Douglas Fir-Larch, and Southern Pine is No. 2 or better.

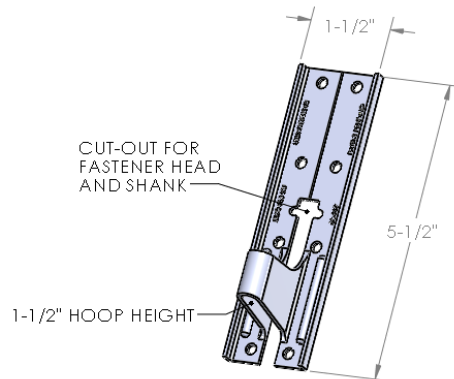


Figure 3: LTS Bracket Hold-down

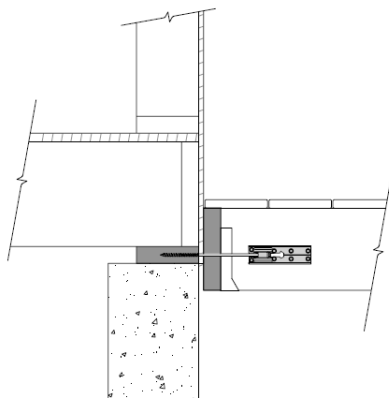


Figure 4: Joist Face-Mounted Application

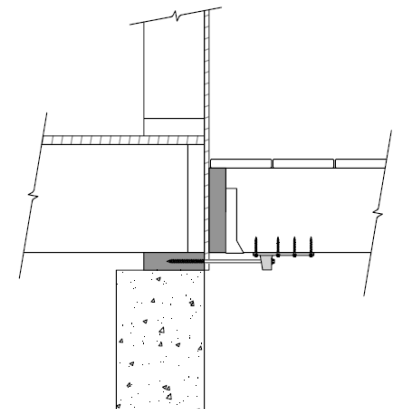


Figure 5: Joist Edge-Mounted Application



TABLE 5 - CONNECTION GEOMETRY REQUIREMENTS ¹

CONDITION		MINIMUM DISTANCE OR SPACING (inches)
End Distance	Loading toward end	1-1/2
	Loading away from end	3/4
Edge distance	Any load direction	3/8
Spacing between fasteners in a row	Loading parallel to grain	1-1/2
	Loading perpendicular to grain	3/4
Spacing between rows	In-line rows	1/2
	Staggered rows	3/8

For SI: 1 inch = 25.4 mm

¹: End distances, edge distances, and screw spacing shall be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.