



**CERTIFICATION**



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## **Technical Evaluation Report**

**TER 1412-01**

FastenMaster® LedgerLOK™ Ledger  
Board Fasteners – Limit States

**OMG, Inc.**  
**DBA FastenMaster®**

**Product:**

**LedgerLOK™ Ledger Board  
Fasteners**

Issue Date:

April 10, 2015

Revision Date:

June 20, 2019

Subject to Renewal:

July 1, 2020

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COMPANY  
INFORMATION:

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OMG, Inc.  
DBA FastenMaster®

153 Bowles Rd.  
Agawam, MA 01001

413-789-0252

[fastenmaster.com](http://fastenmaster.com)

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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

SECTION: 06 15 00 - Wood Decking

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## 1 PRODUCT EVALUATED<sup>1</sup>

1.1 LedgerLOK™ Ledger Board Fasteners

## 2 APPLICABLE CODES AND STANDARDS<sup>2,3</sup>

### 2.1 Codes

2.1.1 *NBC—10, 15: National Building Code of Canada*

### 2.2 Standards and Referenced Documents

2.2.1 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*

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 F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

2.2.4 *CSA O86: Engineering Design in Wood*

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<sup>1</sup> Building codes require data from valid certification, evaluation, and qualification reports be obtained from accredited third-party organizations. An accredited certifying organization (a type of accredited third-party organization) is a certification body that performs "certification of a product, process, or system." An accredited third-party organization is accomplished via accreditation using ISO/IEC 17065 evaluation procedures meeting code requirements of independence, accredited testing, and professional personnel. DrJ is an ISO/IEC 17065 [ANSI-Accredited Product Certification Body – Accreditation #1131](#).

Through ANSI accreditation, DrJ certification can be used to obtain product approval in any country that is an IAF MLA Signatory, such as Canada, and covered by an IAF MLA Evaluation per the [Purpose of the MLA](#) – "certified once, accepted everywhere." Manufacturers can go to jurisdictions in any IAF MLA Signatory Country and have their products readily approved by *authorities having jurisdiction* using DrJ's ANSI accreditation. For more information about DrJ's accreditation, refer to this [letter](#) from the Standards Council of Canada (SCC).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, see [drjcertification.org](http://drjcertification.org).

<sup>2</sup> Unless otherwise noted, all references in this TER are from the 2015 version of the *NBC*. This *alternative solution* is also approved for use with the 2010 *NBC* and the standards referenced therein (e.g., *CAN/CSA*, *CAN/ULC*). Where this TER is not approved, the AHJ shall respond in writing stating the reasons this TER was not approved. For any variations in provincial, territorial, and local codes, see Section 8.

<sup>3</sup> All terms defined in the applicable building codes are italicized.

### 3 PERFORMANCE EVALUATION

- 3.1 LedgerLOK™ Ledger Board Fasteners were evaluated to determine their ability to provide code complying attachment of deck ledger boards to the building structure.
- 3.2 LedgerLOK™ Ledger Board Fasteners were evaluated for lateral resistance and withdrawal resistance in accordance with CSA O86 Clause 12.11.4 and 12.11.5.
  - 3.2.1 Where a band joist is not used, as in some truss installations, an engineered design is required.
- 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 on the dates provided in this TER and within Dr.J's professional scope of work.

### 4 PRODUCT DESCRIPTION AND MATERIALS

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

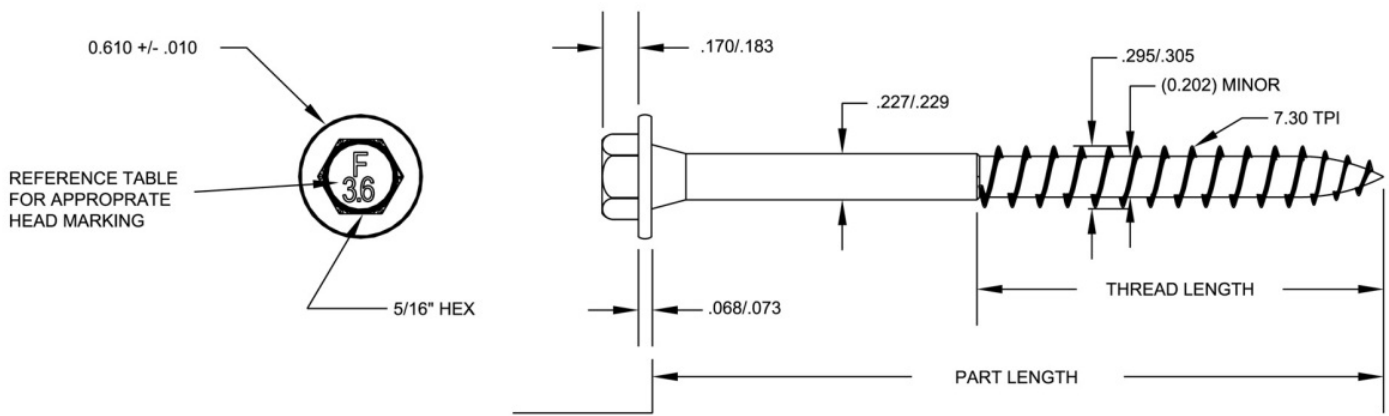


FIGURE 1. LEDGERLOK™ LEDGER BOARD FASTENERS (IN)

- 4.2 LedgerLOK™ fasteners are manufactured with carbon steel grade 1022 or 10B21 wire conforming to *ASTM A510* with a minimum ultimate tensile strength of 60 ksi.
- 4.3 LedgerLOK™ fasteners are manufactured using a standard cold-formed process followed by a heat-treating process. Critical dimensions, design values for lumber species and allowable bending yield are found in Figure 1, Table 1, and Table 2.
  - 4.3.1 LedgerLOK™ fastener heads are a 5/16" hex drive with a built-in oversized washer.
  - 4.3.2 LedgerLOK™ fasteners have a gimlet point.
  - 4.3.3 The LedgerLOK™ fasteners listed in Table 1 were evaluated for this TER.

TABLE 1. FASTENER DESIGNATION FOR THE LEDGERLOK™ FASTENERS EVALUATED IN THIS TER

Fastener Name	Fastener Designation	Head Marking	Length <sup>1</sup> in (mm)	Thread Length <sup>2</sup> in (mm)	Unthreaded Shank Diameter in (mm)	Minor Thread (Root) Diameter in (mm)	Nominal Bending Yield psi <sup>3</sup> (MPa)
LedgerLOK™	FMLL358	F3.6	3.63 (92)	2.00 (50)	0.227 (5.8)	0.202 (5.1)	200,700 (1383)
	FMLL005	F5.0	5.00 (127)	3.00 (76)			

SI: 25.4 mm = 1 in, 1 MPa = 145 psi

- Measured from the underside of the head to the bottom of the tip
- Includes tapered tip; see Figure 1.
- 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 the average of bending tests. Nominal bending yield based on the shank diameter using the same method is 186,790 psi (1290 MPa).

4.4 Factored lateral strength and withdrawal resistance values for LedgerLOK™ Ledger Board Fasteners are given in Table 2.

TABLE 2. DESIGN VALUES FOR LUMBER SPECIES GROUPS FOR LEDGERLOK™ FASTENERS

Property	Northern Species (G = 0.35)	Spruce-Pine-Fir (G = 0.42)	Hem Fir (G = 0.46)	Douglas Fir (G = 0.49)
Factored Withdrawal Resistance Values <sup>1</sup> lb/in (N/mm)	285 (50)	388 (68)	439 (77)	485 (85)
Factored Lateral Strength Resistance Values <sup>2</sup> lb (N)	192 (855)	243 (1080)	272 (1210)	295 (1310)

SI: 1 N = 0.225 lb, 1 kN/m = 737.6 lb/ft

- A phi factor ( $\Phi$ ) of 0.6 has been applied to the Factored Withdrawal Resistance Values. All other applicable factors shall be applied in accordance with *CSA O86* Clause 12.11.5.
- A phi factor ( $\Phi$ ) of 0.8 and a wet service factor (KSF) of 0.67 have been applied to the Factored Lateral Strength Resistance Values. All other applicable factors shall be applied in accordance with *CSA O86* Clause 12.11.4.
- Withdrawal resistance values are derived from testing using procedures consistent with *CSA-O86*.
- Withdrawal capacities only consider extraction of the threaded portion of the fastener from the connected materials. Head pull through resistance should be calculated in accordance with *CSA O86*, Clause 12.11.5.3.

4.5 The fasteners have a proprietary galvanized and epoxy coating, which provides corrosion protection that exceeds that provided by code approved hot-dipped galvanized coatings meeting *ASTM A153*.

4.5.1 Fasteners are approved for use in exterior conditions and in pressure-treated wood, including ground contact ACQ. Treatments other than ACQ that are found to be less corrosive than ACQ are also approved.

4.6 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.

4.7 In-plant quality control procedures, under which the LedgerLOK™ fasteners are manufactured, are audited through an inspection process performed by an approved agency.

## 5 APPLICATIONS

5.1 LedgerLOK™ Ledger Board Fasteners are designed specifically for attaching the deck ledger to the rim joist of a building in accordance with *NBC* Section 9.4.2.3.

5.1.1 Maximum spacing for LedgerLOK™ Ledger Board Fasteners with deck live load = 40, 60, 80 psf (1.91, 2.87, 3.83 kPa), plus deck dead load = 10 psf (0.48 kPa) is shown in Table 3.

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

TABLE 3. LEDGERLOK™ FASTENER SPACING – MATERIALS &amp; LOADING CONDITIONS

Loading Condition (Live Load, kPa)	2x Nominal Ledger Species	Maximum On-center Spacing of LedgerLOK™ Ledger Board Fasteners, in (mm)							
		Maximum Deck Joist Spans, ft (m)							
		Up to 6.5 (Up to 2)	8 (2.5)	10 (3)	11.5 (3.5)	13 (4)	14.5 (4.5)	16.5 (5)	18 (5.5)
40 psf (1.91 kPa)	Northern Species	10 (250)	8 (200)	6 (175)	6 (150)	5 (125)	4 (100)	4 (100)	4 (100)
	Spruce-Pine-Fir	12 (300)	10 (250)	8 (200)	7 (175)	6 (150)	5 (150)	5 (125)	4 (125)
	Hem Fir	14 (350)	11 (275)	9 (225)	8 (200)	7 (175)	6 (150)	5 (150)	5 (125)
	Douglas Fir	15 (375)	12 (300)	10 (250)	9 (225)	7 (200)	7 (175)	6 (150)	5 (125)
60 psf (2.87 kPa)	Northern Species	7 (175)	6 (150)	5 (125)	4 (100)	3 (75)	3 (75)	3 (75)	3 (75)
	Spruce-Pine-Fir	9 (225)	7 (175)	6 (150)	5 (125)	4 (100)	4 (100)	3 (100)	3 (75)
	Hem Fir	10 (250)	8 (200)	6 (175)	6 (150)	5 (125)	4 (100)	4 (100)	4 (100)
	Douglas Fir	11 (275)	8 (225)	7 (175)	6 (150)	5 (125)	5 (125)	4 (100)	4 (100)
80 psf (3.83 kPa)	Northern Species	7 (175)	6 (150)	5 (125)	4 (100)	3 (75)	3 (75)	3 (75)	3 (75)
	Spruce-Pine-Fir	7 (175)	5 (125)	4 (125)	4 (100)	3 (75)	3 (75)	3 (75)	2 (50)
	Hem Fir	8 (200)	6 (150)	5 (125)	4 (100)	4 (100)	3 (75)	3 (75)	3 (75)
	Douglas Fir	8 (200)	6 (175)	5 (150)	5 (125)	4 (100)	4 (100)	3 (75)	3 (75)

SI: 25.4 mm = 1 in

- Based on load duration of 1.0. Spacing may be adjusted by the applicable load duration as specified in *CSA O86*.
- Fasteners are required to have full thread penetration into the OSB and main member. Excess fastener length extending beyond the main member is not reflected in the table above.
- Solid sawn band joists shall be HF, SPF, DF-L, or Northern species, designed by others. For engineered wood band joists having a specific gravity of 0.5 and a minimum thickness of 1 1/8", on-center spacing for Douglas Fir may be used.
- Spacing is based on non-incised lumber. Where incised lumber is used, reduce spacing requirements by 15%.
- Table values assume 10 psf (0.48 kPa) dead load.
- The service condition factor, KSF = 0.67, has been applied.
- Sheathing shall be minimum 11 mm-thick OSB (SG = 0.5) or other sheathing with a specific gravity at equal to the specific gravity of the band joist material.

## 6 INSTALLATION

- 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.
- Choose a 3.63" (92 mm) or 5" (127 mm) LedgerLOK™ Ledger Board Fastener, so that the threads fully engage the band joist material and the fastener tip extends beyond the back face of the band joist material when the fastener head is fully seated against the installed ledger.
- Using a high-torque, 1/2" variable-speed drill (18V, if cordless), drive the fasteners through the ledger and sheathing. Continue into the rim joist until the built-in washer head is drawn firm and flush to the ledger board. Do not overdrive.
- Figure 2 shows a detail of the LedgerLOK™ Ledger Board Fastener deck connection, including minimum edge and end distances.

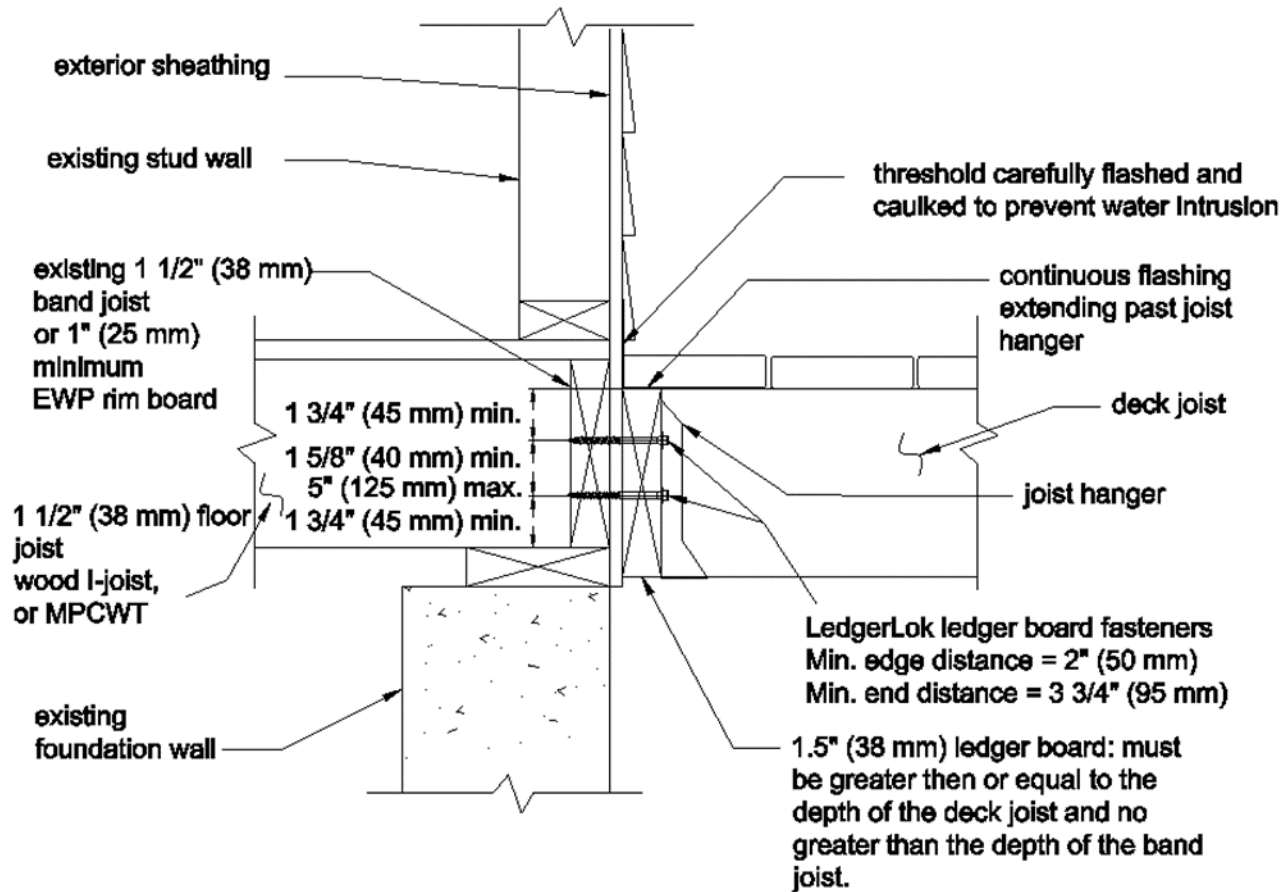


FIGURE 2. LEDGERLOK™ LEDGER BOARD FASTENER DECK CONNECTION

6.5 For applications outside the scope of this TER, an engineered design is required.

## 7 TEST ENGINEERING SUBSTANTIATING DATA

- 7.1 Testing analysis for derivation of design properties for FastenMaster® LOK® Screws, Wood Science and Technology Centre at the University of New Brunswick, 2009.
- 7.2 Testing conducted by Washington State University for OMG; Final report date: August 4, 2005
- 7.3 Testing conducted by the University of Montana Wood Science Laboratory for OMG, 2004
- 7.4 *CSA O86: Engineering Design in Wood*; Canadian Standards Association; Toronto, ON
- 7.5 Some information contained herein is the result of testing and/or data analysis by other sources which conform to *NBC* Volume I commentary on Conformity Assessment and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.
- 7.6 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *NBC*, *NECB*, *CAN/CSA*). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.

## 8 FINDINGS

- 8.1 When used in accordance with this TER and the manufacturer's installation instructions, FastenMaster® LedgerLOK™ Ledger Board Fasteners meet the requirements of *NBC* Section 9.4.2.3 for deck ledger attachments.
- 8.2 Testing and analysis of the LedgerLOK™ Ledger Board Fasteners are in accordance with the requirements of *CSA O86*.
- 8.3 *NBC* Article 1.2.1.1. states:
- 1.2.1.1. Compliance with this Code
- 1) Compliance with this Code shall be achieved by
- a) complying with the applicable acceptable solutions in Division B (see Note A-1.2.1.1.(1)(a)), or
- b) using alternative solutions that will achieve at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the applicable acceptable solutions (see Note A-1.2.1.1.(1)(b)).
- 2) For the purposes of compliance with this Code as required in Clause 1.2.1.1.(1)(b), the objectives and functional statements attributed to the acceptable solutions in Division B shall be the objectives and functional statements referred to in Subsection 1.1.2. of Division B.
- 8.4 *NBC* Division C Section 2.3 includes additional guidance for *alternative solutions*.
- 8.5 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known provincial, territorial, and local building codes. Where there are known variations in provincial, territorial, or local codes applicable to this evaluation, they are listed here.
- 8.5.1 No known variations

## 9 CONDITIONS OF USE

- 9.1 LedgerLOK™ fasteners covered by this TER shall be installed in accordance with Section 6 of this TER and the manufacturer's installation instructions.
- 9.2 LedgerLOK™ fastener spacing shall not exceed Table 3 for code compliance and the installation conditions considered.
- 9.3 For conditions not covered in this TER, connections shall be designed in accordance with generally accepted engineering practice.
- 9.4 Where required by the *authority having jurisdiction* in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.6 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the *designer* (e.g., *owner*).
- 9.7 This product is manufactured under a third-party quality control program with quality control inspections established by the governing legislation of the adopting province or territory, as described in *NBC* Volume 1 commentary on Conformity Assessment.
- 9.8 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. Therefore, the TER shall be reviewed for code compliance by the AHJ for acceptance.
- 9.9 The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the AHJ's inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.



## 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.
  - 10.1.1 The fasteners are identified by the designation "LedgerLOK™" on the packaging. The head of each fastener is marked with an "F" followed by a number corresponding to the length of the fastener.
  - 10.1.2 The packaging shall include OMG's name and address, fastener size, third-party inspection agency, and TER number.
- 10.2 Additional technical information can be found at [fastenmaster.com](http://fastenmaster.com).

## 11 REVIEW SCHEDULE

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