

**INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS, EVALUATION SERVICES**

**EVALUATION CRITERIA
FOR
JOIST HANGERS AND MISCELLANEOUS
CONNECTORS**

EC 02-2011

1.0 INTRODUCTION

- 1.1 Purpose:** This criteria establishes the requirements for reorganization by IAPMO Evaluation Services (IAPMO ES) of joist hangers and miscellaneous connectors under Section 2303.5 of the 2009 and 2006 *International Building Code*[®] (IBC), Section R104.11 of the 2009 and 2006 *International Residential Code*[®] (IRC), and Sections 2304.3, 2304.4.2, and 2318.4 of the 1997 *Uniform Building Code*[™] (UBC).

The development of this criteria is to provide guidelines for calculating and testing the performance of joist hangers and miscellaneous connectors, based on code provisions and the requirements in this evaluation criteria for conditions where the codes do not address the necessary requirements.

- 1.2 Scope:** This document describes the test procedures and analysis methods used to determine allowable loads for joist hangers for recognition in an IAPMO Evaluation Service Report.
- 1.2.1** These criteria may be modified as applicable for the analysis of other connector devices such as hurricane ties, strap ties, column caps and bases, bent plates, and truss connectors when such modifications result in conditions that more realistically model the end use of the connector.
- 1.2.2** These metal devices may be used for wood-to-wood, wood-to-concrete/masonry, and wood-to-steel connections.

2.0 REFERENCED STANDARDS

- 2.1** Standards referenced in this criteria shall be applied consistently with the specific code(s) complied.

2000, 2006, 2009 IBC	International Building Code [®]
2000, 2006, 2009 IRC	International Residential Code [®]
1991, 1997, 2001, 2005 NDS	National Design Specification for Wood Construction
1997 UBC	Uniform Building Code [®]
ASTM D 1761-88(R00)	Test Methods for Mechanical Fasteners in Wood

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3.0 BASIC INFORMATION

- 3.1 General:** Each submittal shall include the following information for an evaluation report:
- 3.1.1 Product Description:** Complete information pertaining to component including dimensional drawings, material specifications, and the manufacturing processes. Materials shall comply with an appropriate recognized national standard(s).
- 3.1.2 Installation Instructions:** Installation details and drawings, noting installation requirements and/or limitations.

4.0 TESTING AND PERFORMANCE REQUIREMENTS

- 4.1 Testing Laboratories:** Testing laboratories shall be recognized by IAPMO ES and in compliance with ISO 17025.
- 4.2** Test procedures, equipment, and materials shall be in accordance with ASTM D 7147 Sections 5 through 11 and the provisions of Section 3 of this document. These requirements are in compliance with ASTM D 1761.
- 4.2.1** For connections that rely in some part on wood bearing for resistance, such as joist hangers resisting vertical down loads, a composite wood member, such as laminated veneer lumber (LVL), may be substituted for solid sawn wood. For connections that rely solely on fasteners for resistance, such as joist hangers resisting vertical up loads, solid sawn wood shall be used in the test set up.
- 4.2.2** As listed in accordance with AF&PA NDS, joist and header lumber shall have a specific gravity of 0.49 or greater, but not greater than 0.55.
- 4.2.3** The minimum moisture content at the time of testing shall be greater than 11 percent.
- 4.3** The test report shall be in accordance with ASTM D 7147 Section 12.

5.0 DETERMINATION OF ALLOWABLE LOADS

- 5.1** The allowable loads for the connection devices shall be determined in accordance with ASTM D 7147 Sections 13 through 15 and Section 5 of this document.
- 5.2** Allowable Loads Based on Testing shall be in accordance with ASTM D 7147 Section 13.
- 5.2.1** When composite wood members are used in accordance with section 3.1.1 of this document, the reduction factor R_j need not be applied. It is understood that any connection limit based on solid sawn wood bearing will be investigated in the calculation section.

5.2.2 Adjustments to Test Strength Limit - the lowest of the specific gravity adjustment factors (Equations 1, 2, or 3) shall be multiplied by the moisture content reduction factor, R_{MC} (Equation 8). This product shall then be compared to the reduction factors derived from equations 7, 9, and 10. The value that causes the greatest reduction shall be multiplied to the tested design value from Section 13.3.1 of ASTM D 7147.

Exception: The adjustment factors and reduction factors of ASTM D 7147 Section 13 need not be applied to products recognized under the 1997 UBC nor the 2000 through 2006 IBC/IRC.

5.3 Allowable Loads Based on Calculations shall be in accordance with ASTM D 7147 Section 14.

6.0 EVALUATION REPORT RECOGNITION

6.1 Evaluation reports shall include the general information required in Section 2 of this EC.

6.2 The evaluation report shall also include the following special inspection requirements:

6.3 The report shall state the following:

1. Periodic special inspection shall be conducted when the product series are components within the main wind-force-resisting system of structures constructed in areas listed in the 2009 IBC Section 1706.1 (Section 1705.4 for the 2006 IBC). Special inspection requirements do not apply to structures, or portions thereof, that qualify for exception under the 2009 IBC Section 1704.1, 1704.4, 1706.2 or 1706.3 (Section 1704.1 and 1704.4 for the 2006 IBC).
2. Periodic special inspection shall be conducted in accordance with the applicable sections of Section 1707 when the product series are components within the seismic-force-resisting system of structures constructed in Seismic Design Category C, D, E or F. Special inspection requirements do not apply to structures, or portions thereof, that qualify for exception under IBC Section 1704.1, 1704.4, 1705.3, 1707.3 or Section 1707.4 of the 2009 IBC.
3. For installations under the IRC, special inspection is not normally required. However, for an engineered design where calculations are required to be signed by a registered design professional, periodic special inspection requirements and exemptions are as stated in Sections 4.3.1 and 4.3.2 as applicable for installations under the IRC.

6.4 It shall be noted in the ER that "Fasteners used in contact with fire-retardant-treated or preservative-treated lumber must comply with IBC Section 2304.9.5 or the 2009 IRC Section R317.3 (2006 IRC Section R319.3), as applicable. The report holder or lumber treater should be contacted for recommendations on minimum corrosion resistance and connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant treated lumber".

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