Evaluation Criteria for the Testing and Analysis of Joist Hangers and Miscellaneous Connectors

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PREFACE

Evaluation reports issued by IAPMO Evaluation Service, Inc. (IAPMO-ES), are based upon performance requirements of the *International Building Code®, Uniform Building Code®,* and other applicable Codes.

Section 104.11 of the *International Building Code® states*:

> The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

This evaluation provides all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the evaluation criteria. The criteria was adopted by the IAPMO-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date shall comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition if any. If the criteria is an updated version from the previous version, the change or additional verbiage will be shown underlined, and the deletion will be shown with a strikethrough. This criteria may be further revised as needed.

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1.0 INTRODUCTION

1.1 Purpose: The purpose of this criteria is to establish requirements for IAPMO Evaluation Service, Inc. (IAPMO-ES), recognition of joist hangers and miscellaneous connectors under Section 2303.5 of the 2006 *International Building Code*® (IBC), Section R104.11 of the 2006 *International Residential Code*® (IRC), and Sections 2304.3, 2304.4.2, and 2318.4 of the 1997 *Uniform Building Code*™ (UBC).

The reason for the development of this criteria is to provide a guideline for the evaluation of joist hangers and miscellaneous connectors, since the IBC, IRC, UBC and associated reference standards do not specify installation and quality requirements for these products.

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. 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. These metal devices may be used for wood-to-wood, wood-to-concrete/masonry, and wood-to-steel connections.

1.3 Referenced Documents:

1.3.1 For product recognition under the 1997 Uniform Building Code (UBC).

1.3.1.1 1997 UBC.

1.3.1.2 1991 National Design Specification for Wood Construction (NDS).

1.3.2 For product recognition under the 2000 International Building Code (IBC) / International Residential Code (IRC).

1.3.2.1 2000 IBC/IRC.

1.3.2.2 1997 National Design Specification for Wood Construction (NDS).

1.3.3 For product recognition under the 2003 International Building Code (IBC) / International Residential Code (IRC).

1.3.3.1 2003 IBC/IRC.

1.3.3.2 2001 National Design Specification for Wood Construction (NDS).

1.3.4 For product recognition under the 2006 International Building Code (IBC) / International Residential Code (IRC).

1.3.4.1 2005 National Design Specification for Wood Construction (NDS).

1.3.5 ASTM D 7147-05, Standard Specification for Testing and Establishing Allowable Loads of Joist Hangers.

1.3.6 ASTM D 1761-88 (2000), Test Methods for Mechanical Fasteners in Wood.

2.0 BASIC INFORMATION AND TEST REPORTS

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information pertaining to components, material specifications, and manufacturing processes. Materials shall comply with an appropriate recognized national standard(s).

2.1.2 Installation Instructions: Installation details and drawings, noting installation requirements and/or limitations.

2.1.3 Identification: Description of the method of identifying the product. Each device shall bear an imprint which clearly identifies the manufacturer or a registered trademark. Packaging shall include the IAPMO-ES evaluation report number.

2.2 Testing Laboratories: Testing laboratories shall be recognized by IAPMO-ES.

3.0 TESTING

3.1 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.

3.1.1 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.

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4.0 TEST REPORT

4.1 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 QUALITY CONTROL

Quality control shall be in accordance with the Licensing Agreement signed by the client.♦