

ACCEPTANCE CRITERIA FOR STEEL MOMENT FRAME CONNECTION SYSTEMS

AC129

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PREFACE

Evaluation reports issued by ICC Evaluation Service, LLC (ICC-ES), are based upon performance features of the International family of codes and other widely adopted code families, including the Uniform Codes, the BOCA National Codes, and the SBCCI Standard Codes. Section 104.11 of the *International Building Code*® reads as follows:

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.

Similar provisions are contained in the Uniform Codes, the National Codes, and the Standard Codes.

This acceptance criteria has been issued to provide all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the ICC-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from the previous edition, a solid vertical line (|) in the margin within the criteria indicates a technical change, addition, or deletion from the previous edition. A deletion indicator (→) is provided in the margin where a paragraph has been deleted if the deletion involved a technical change. This criteria may be further revised as the need dictates.

ICC-ES may consider alternate criteria, provided the report applicant submits valid data demonstrating that the alternate criteria are at least equivalent to the criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise demonstrate compliance with the performance features of the codes, ICC-ES retains the right to refuse to issue or renew an evaluation report, if the product, material, or type or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

Acceptance criteria are developed for use solely by ICC-ES for purposes of issuing ICC-ES evaluation reports.

ACCEPTANCE CRITERIA FOR STEEL MOMENT FRAME CONNECTION SYSTEMS (AC129)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for steel moment frame connection systems to be recognized in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under the 2009 and 2006 *International Building Code*[®] (IBC). Basis of recognition is IBC Section 104.11.

The reason for the development of this criteria is to allow for the recognition of steel moment frame connection systems, since the requirements of the codes need supplemental details for establishing the design, testing, fabrication, installation and inspection requirements of these systems.

1.2 Scope: This criteria establishes procedures for qualifying steel moment frame connection systems. Criteria issues include ductility, development of plastic hinging in the beam, sustained resistance under plastic rotations, ability to support dead and live loads, and adequate shear strength in the joint panel zone.

1.3 Reference Standards:

1.3.1 2009 *International Building Code*[®] (2009 IBC), International Code Council.

1.3.2 2006 *International Building Code*[®] (2006 IBC), International Code Council.

1.3.3 AISC 341-05, *Seismic Provisions for Structural Steel Buildings*, American Institute of Steel Construction.

1.3.4 AISC 360-05, *Specification for Structural Steel Buildings*, American Institute of Steel Construction.

1.3.5 AISC 303-05, *Code of Standard Practice for Steel Buildings and Bridges*, American Institute of Steel Construction (AISC).

1.3.6 AWS D1.1:2004, *Structural Welding Code – Steel*, American Welding Society.

1.3.7 AWS D1.8:2005, *Structural Welding Code – Seismic Supplement*, American Welding Society.

1.4 Definitions: Definitions in the IBC, AISC 360 and AISC 341 apply to this criteria.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: A detailed description of the connection system, including the following items:

1. Information concerning material specifications, dimensions, and the manufacturing process.
2. Restrictions or limitations on use.
3. Structural steel materials, which shall comply with requirements set forth in AISC 341.
4. Welding materials, which shall comply with requirements set forth in AISC 341, AWS D1.1, and AWS D1.8.

2.1.2 Installation Instructions: Instructions shall include the following items:

- a. Description of how the product or system will be used or installed at the project site.

- b. Procedures establishing quality control at project sites during installation.

- c. Requirements for product handling and storage.

- d. Weld or connector installation into structural elements.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the panel. Identification provisions shall include the evaluation report number and the name or logo of the inspection agency.

2.1.4 Field Preparation: A description of the methods of field-cutting, application and finishing.

2.2 Testing Laboratories: Testing laboratories shall comply with the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

2.3 Test Reports: Test reports shall comply with AC85. The test reports shall include information described in Section S9, Appendix S of AISC 341, and visual records of the test specimens before, during, and after testing.

2.4 Product Sampling: Sampling of the steel moment frame connection components for tests under this criteria shall comply with Section 3.1 of AC85. The fabrication of the test assemblies shall be witnessed by or verified by the testing laboratory.

2.5 Structural Design: The structural application system shall include the following:

- a. A complete description of the structural design process. The design procedures shall be based on prequalification requirements described in Section 3.4. The process shall fully develop design provisions set forth in AISC 360, and applicable supplemental requirements of AISC 341.

- b. Details and examples of how the product or system is designed and analyzed, including formulas, with procedures and properties for design analysis.

- c. Structural design drawings and specifications, shop drawings and erection drawings shall comply with Section 5 of AISC 341.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 The qualification plan shall follow the requirements set forth in Appendix P of AISC 341.

3.2 Cyclic test procedures are set forth in Section 4.0. Tests that are conducted shall consider extremes of anticipated member sizes, material strengths, moment connection configurations, assembly, and quality control processes.

3.3 The acceptance criteria for cyclic tests described in Section 4.0 is as follows:

3.3.1 Special Moment Frames (SMF): Section 9.2a of AISC 341.

3.3.2 Intermediate Moment Frames (IMF): Section 10.2a of AISC 341.

3.3.3 Eccentrically Braced Frames (EBF): Section 15.2 of AISC 341.

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3.4 Steel Moment Frame Prequalification: The steel moment frame connection prequalification by ICC-ES shall comply fully with Appendix P, AISC 341. Prequalification of a connection system and the associated limits of prequalification shall be established by ICC-ES, in compliance with Section P2.2, Authority for Prequalification. The analytical models shall include nonlinear finite element analysis to demonstrate that the behavior of the test subassemblages can be rationalized by accepted engineering principles and known material properties.

4.0 TEST METHODS

Structural cyclic testing shall conform to Appendix S, AISC 341.

5.0 QUALITY CONTROL

5.1 The products shall be manufactured under an approved quality control program with inspections by an inspection agency accredited by the International Accreditation Service (IAS), or as otherwise acceptable to ICC-ES.

5.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted.

5.3 Fabrication and assembly work requiring special inspection is permitted to be done on the premises of

approved fabricators. The quality assurance program for fabrication practices shall be documented and comply with the IAS Accreditation Criteria for Fabricator Inspection Programs for Structural Steel (AC172).

5.4 2009 IBC: Special inspection, testing and structural observations shall conform to Sections 1704.3, 1707.2, 1705, 1707.2, 1708.3, 1709, and 1710 of the 2009 IBC; Section 18 and Appendix Q of AISC 341; applicable portions of AISC 303; and Clause 7 of AWS D1.8.

5.5 2006 IBC: Special inspection, testing and structural observations shall conform to Sections 1704.3, 1705, 1706, 1707.2, 1708.4 and 1709 of the 2006 IBC; Section 18 and Appendix Q of AISC 341; applicable portions of AISC 303; and Clause 7 of AWS D1.8.

EVALUATION REPORT RECOGNITION

The following information shall be included in the evaluation report.

5.6 Information described in Section 2.1.

5.7 Structural design procedures described in Section 2.5.

5.8 Fabrication program as described in Section 5.3.

5.9 Provisions for quality assurance and special inspection as described in Sections 5.4 and 5.5. ■