



February 26, 2008

TO: PARTIES INTERESTED IN EVALUATION REPORTS ON ADJUSTABLE STEEL COLUMNS

SUBJECT: Acceptance Criteria for Adjustable Steel Columns, Subject AC335-0208-R1 (DM/RK/EL)

Dear Madam or Sir:

Enclosed is a copy of the subject revised acceptance criteria approved by the ICC-ES Evaluation Committee on February 6, 2008, effective March 1, 2008.

Approved changes to the criteria include:

- The title of the criteria is changed to “Adjustable Steel Columns” to reflect a generic product.
- The criteria is updated to the 2006 codes. The code edition did not change with respect to this product. The reference standards and specifications for AISI and AISC documents, however, were updated to what is in the 2006 codes. The AISI was updated to include the 2004 Supplement, which did not affect this product. The AISC was updated to the AISC 360-05, which combined the HSS manual with the AISC specification, as well as bringing both the ASD and LRFD design approaches together in one book.
- Sections 2.1.3 and 6.2.2 have been revised to require the design thickness of the column to be on the label. This change is based on the fact that the steel pipe used to manufacture the columns may not be in compliance with the steel pipe size prescribed in IRC Section R407.3. The 3-inch-diameter standard pipe specified in this code section is ASTM A 53 pipe. An ASTM A 53 3-inch standard pipe has a 3.5-inch outside diameter (O.D.) and a 0.216-inch wall thickness. Columns evaluated for compliance with AC335 are for use in an engineered installation and are not evaluated for compliance with the prescriptive pipe size.

The revisions to Sections 2.1.3 and 6.2.2 are based on a terminology conflict that exists in describing the columns versus describing the specifications for pipe used in the columns. For instance, columns identified by a manufacturer as their heavy-duty model may actually be manufactured with steel pipe complying with

the requirements for standard steel pipe and not the requirements for heavy-duty pipe. The evaluation reports will clarify the specifications for the steel pipes used in the manufacturer's column models.

- Section 2.1.1 of AC335 is revised to clarify the requirements of Section R407 of the IRC. Each column is to be coated on both the inside and outside to provide corrosion resistance, since this cannot be determined after the bearing plates have been installed. This is an essential part of the quality control program and will need to address the requirement for the coatings.
- Section 3.2.2 of the criteria is revised to add a reference to Section F1.1(c) of AISI-NAS. This section of AISI-NAS requires adjustments to the test results when the steel of the tested column is a higher strength than what is specified for use in the design calculations and quality documentation.
- Section 4.2 has been added to provide for the acceptance of alternate materials for the columns. This section outlines two separate approaches to determining if an alternate material is acceptable.
 - a. The first approach in Section 4.2.1 is for materials used under the AISC design methodology
 - b. The second approach in Section 4.2.2 is for materials used under the AISI design methodology.
- Section 4.3 and Appendix A have been added to explain the relationship between the design thickness of the columns and the material, design approach, and material source.
- Section 6.1 is revised to require the column load values for both design strength (LRFD) and allowable strength (ASD) to be reported in each evaluation report.

The following are two items that involve committee action concerning the cancellation of legacy reports for steel columns:

- Legacy report holders have until July 1, 2008, to apply for conversion and to submit data to verify compliance with AC335, in order to ensure a timely transition from legacy reports to new ICC-ES reports.
- All legacy reports will be cancelled on January 1, 2009, if they have not completed the conversion to a new ICC-ES report.

Evaluation reports issued on or after the effective date noted above, and falling within the scope of this criteria, will be required to comply with the enclosed edition of the criteria. Evaluation reports issued prior to the effective date may be in compliance either with the enclosed acceptance criteria or with the previous edition. Evaluation reports based on a superseded version of an acceptance criteria must be brought into compliance with the most recent edition at the time the reports are reissued. Therefore, applicants should submit data verifying compliance at the time they apply for re-examination.

If you have any questions, please contact J. David Musselwhite, P.E., senior staff engineer, at (205) 599-9800, extension 5681. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,

A handwritten signature in black ink that reads "Kurt Stochlia". The signature is written in a cursive, flowing style.

Kurt Stochlia, P.E.
Vice President

KS/raf

Enclosure

cc: Evaluation Committee



ACCEPTANCE CRITERIA FOR ADJUSTABLE STEEL COLUMNS

AC335

Approved February 2008

Effective March 1, 2008

Previously approved October 2005

PREFACE

Evaluation reports issued by ICC Evaluation Service, Inc. (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.

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ACCEPTANCE CRITERIA FOR ADJUSTABLE STEEL COLUMNS

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for adjustable steel columns to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2006 *International Building Code*® (IBC) and the 2006 *International Residential Code*® (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11.

The reason for the development of this criteria is to provide test methods for determining load capacities, since the codes do not provide such methods.

1.2 Scope: This acceptance criteria applies to adjustable steel columns using threaded rods and steel plates and not part of the lateral force resisting system. The posts are made from structural tube or pipe sections with a steel plate over one end and a steel plug in the other end. The adjustable steel columns are used as axial load bearing permanent stay-in-place support columns for beams in areas that require varying column heights and initial field adjustments.

1.3 Codes and Referenced Standards:

1.3.1 2006 *International Building Code*® (IBC), International Code Council.

1.3.2 2006 *International Residential Code*® (IRC), International Code Council.

1.3.3 AISC 360-05 Specification for Structural Steel Buildings, American Institute of Steel Construction (AISC).

1.3.4 AISI-NAS-01, North American Specification for Design of Cold-formed Steel Structural Members, 2001 edition, with 2004 Supplement, published by the American Iron and Steel Institute (AISI). The United States provisions of AISI-NAS are applicable under this criteria.

1.3.5 ASTM E 72, Standard Test Method of Conducting Strength Tests of Panels for Building Construction, ASTM International.

1.3.6 ASTM A53-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless¹, ASTM International.

1.3.7 ASTM A500-07, Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes¹, ASTM International.

1.3.8 ASTM A513-07, Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing¹, ASTM International.

1.3.9 AWS D1.1-04, Structural Welding Code-Steel, American Welding Society.

1.3.10 AWS D1.3-98, Structural Welding Code-Sheet Steel, American Welding Society.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: The adjustable steel columns shall be identified by the ASTM grade of steel for each component used in the product as well as the diameter, thickness and finish of material. The finish of the columns, both inside and outside, shall conform to Section

R407.2 of the IRC. The method of connecting the components to each other shall be provided in detail. The method of anchoring the column to the supported structure and the supporting construction or foundation to provide lateral support to the column shall be provided in detail.

Required shop welds and field welds shall be adequately described in accordance with AWS D1.1, including the qualified weld designation where applicable.

2.1.2 Installation Instructions: Published installation instructions and engineered drawings which accompany the product to the jobsite shall be provided to ICC-ES for review. The instructions shall include any special instructions required for the product as well as weather protection and handling requirements. Where attachment requirements, lateral support details, framing details and bearing or connection requirements are not adequately covered by general notes, standard details and charts shall be included with the installation instructions, or specific drawings shall cover these requirements. The instructions shall include the proper orientation of the column (which end up), the maximum adjustment permitted, and the method used to fix the length of the column after adjustment.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the adjustable steel columns shall be provided. Identification provisions shall include the evaluation report number, name of the manufacturer, product name and model, design thickness of the column, and the name or logo of the inspection agency.

2.2 Testing Laboratories: Testing laboratories shall comply with Section 2.0 of 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.

2.4 Product Sampling: Sampling of the adjustable steel columns for tests under this criteria shall comply with Section 3.1 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 General: The test program and analytical approach shall be approved by ICC-ES prior to the commencement of any testing. The test program and analysis shall include and consider the following:

- Incidental eccentric loading (combined axial compression and bending)
- Thread shear
- Weld connection (base plate to pipe/tubing and end plug to pipe/tubing)
- Base plate and rod connection

3.2 Types of Tests: The following tests shall be conducted to verify the assigned design capacities and design assumptions:

3.2.1 Component Tests or Verification: Tests of individual components or verification of component properties, such as mill certification, or specified quality control tests or checks at the component manufacturing location, shall be required for the end plates, threaded rod and tube or pipe components.

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3.2.2 Full-scale Tests: A full-scale test program shall be developed for verification of the axial compression performance of the assembled adjustable steel columns. The components used in the full-scale test shall comply with Section 3.2.1, and the testing shall consider the following:

- Capacity of the base plate and the threaded rod connection
- Bending of the end plates
- Steel plug and threaded rod interaction

The full-scale tests shall be conducted in accordance with the methods and principles noted in ASTM E 72 for load location and load rate, or an equivalent test method. The test results from the full scale test shall be adjusted per Section F1.1(c) of AISI-NAS.

3.3 Special Details: Special details, such as load placement tolerances, anchors and bracing, shall conform to accepted engineering practice, and shall be acceptable to ICC-ES.

4.0 DESIGN PROPERTIES

4.1 General: Allowable axial compression loads shall be determined using appropriate analytical and statistical methods based on the established component properties. Design properties shall be verified from the testing required in Sections 3.1 and 3.2.

4.2 Material: Adjustable steel columns shall be manufactured from structural-grade steel pipe or tubing as listed in AISC specification (ASTM A 53, ASTM A 500 and ASTM A 501) or AISI specifications (ASTM A 500).

4.2.1 Alternatives to AISC materials shall be as follows:

- ASTM A 513 Type 1a or Type 2, Grades 1008, 1010 and 1015.
- Any other steel tubing or pipe that can be shown to meet the following criteria:
 - Hot-rolled or cold-formed
 - Chemical properties are within the range shown in ASTM A53, A500 or A501
 - Minimum elongation of 15 percent
 - Maximum yield to tensile ratio of 0.80

4.2.2 Alternatives to AISI materials shall be as follows:

- ASTM A 513 Type 2, Grades 1008, 1010, 1015, 1020 and 1021.
- Any other steel tubing or pipe that can be shown to meet the following criteria:

- Cold-formed
- Chemical properties are within the range shown in ASTM A 500
- Minimum elongation of 10 percent
- Minimum tensile to yield ratio of 1.08

4.3 Thickness: The nominal thickness of the columns shall be adjusted to a design thickness as indicated in Appendix A of this criteria.

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 otherwise acceptable to ICC-ES.

5.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted and include the following:

5.2.1 The documents shall address the verification of the components, as indicated in Section 3.2.1, above.

5.2.2 The documents shall address welder qualification and welding inspection. All welding will be considered structural by definition.

5.3 If Appendix A, AISI, Option 1, is used, continuous special inspection per IBC Section 1704.3.2 is required during manufacturing.

6.0 EVALUATION REPORT

6.1 The evaluation report shall include tables indicating the nominal post height, with both minimum and maximum; the concentric load for each column height [both design strength (LRFD) and allowable strength (ASD)]; and the exposed threaded rod length. Tables shall be prepared by a registered design professional in accordance with Section 4.1 of the ICC-ES Rules of Procedure for Evaluation Reports.

6.2 The evaluation report shall include the following statements:

6.2.1 Published installation instructions and engineering drawings shall accompany the product to the jobsite.

6.2.2 Identification provisions shall include the evaluation report number, the name of the manufacturer, product name and model, design thickness, and the name or logo of the inspection agency. ■

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APPENDIX A

The design capacity of the columns may be based on either AISC or AISI under the following conditions:

If AISC is used:

Option 1: The nominal thickness shall be equal to the design thickness, and ASTM A 53 pipe or A 501 tubing shall be used.

Option 2: The nominal thickness shall be reduced to an adjusted design thickness when ASTM A 500 or A 513 HSS tubing is used:

1. The design thickness shall be taken to equal 0.93 times the nominal thickness as stated in Chapter B, Section B3.12, of the ANSI/AISC 360-05 Specification.
2. The evaluation report will state that the values given in the report can only be used with AISC design specifications and can not be interchanged with AISI specifications.
3. Since nearly all the columns are shipped to the field with both ends of the pipe covered with end plates or screw assemblies, third-party inspection will be required of all manufacturing facilities to make sure the minimum thickness is provided.

If AISI is used:

Option 1: The nominal thickness is equal to the design thickness:

1. The nominal thickness is not adjusted for design.
2. The quality control system for receiving tubing must be in place to make sure the tubing received does not go below 95 percent of the nominal thickness specified (design thickness). ASTM A 500 and A 513 tubing has a tolerance of ± 10 percent. Therefore, special inspection, per Section 5.3 of the criteria, of each column is required to assure the product delivered to the jobsite has a thickness not less than the 95 percent of design thickness.
3. Due to Item 2 above, and the amount of possible rejections of material received by a column manufacturer, this option is only available to manufacturers who are also making the HSS members. Those purchasing pipe/tubing from outside sources need to use Option 2.

Option 2: The nominal thickness is reduced to an adjusted design thickness:

The design thickness shall not be more than the minimum thickness, as shown in the material specification, divided by 0.95.