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February 1, 2010

**TO: PARTIES INTERESTED IN PRECAST CONCRETE PIER  
FOUNDATION ASSEMBLIES**

**SUBJECT: Proposed Revisions to the Acceptance Criteria for Precast Concrete  
Pier Foundation Assemblies, Subject AC336-0210-R1 (DP/RK)**

Dear Madam or Sir:

The revisions proposed to the subject acceptance criteria, as presented in the enclosed criteria draft, are being posted on the ICC-ES web site to allow for public comment. The revisions are in Sections 1.2 and 4.2, to include ASTM C 231 as an alternate method to ASTM C 173 for determining air content. ASTM C 231 is a test method for determining air content by the pressure method, while ASTM C 173 is a test method for determining air content by the volumetric method. The basis for including ASTM C 231 can be found in Section 3.2 of ASTM C 231, which states that both methods (ASTM C 173 and C 231) give substantially the same air contents for concrete made with dense aggregates, which is consistent with normal-weight concrete piers within the scope of AC336. Furthermore, both air content test methods are referenced in code-referenced documents such as ACI-301, "Specifications for Structural Concrete".

You are cordially invited to submit written comments, within 30 days of the date of this letter. Please use the comment form on the web site attaching any letters to the form. An explanation of the alternate criteria process can be found on our web site at [http://www.icc-es.org/Criteria\\_Development/alternative\\_criteria\\_process.shtml](http://www.icc-es.org/Criteria_Development/alternative_criteria_process.shtml).

All comments received in the 30-day comment period will be considered. During this same 30-day period, however, the draft criteria will be balloted to the Evaluation Committee. If the public comments raise major issues, generate controversy, or require the criteria to be substantially rewritten, then ICC-ES staff may decide to reballot the criteria; or place a revised draft on the web site for further public comment; or put the criteria on the agenda for a future Evaluation Committee meeting.

Correspondence received and a memo outlining staff's resolution of the comments in the correspondence will be posted on the web site shortly after the close of the comment period.

Your cooperation is requested in forwarding to the Los Angeles business/regional office all material directed to the Evaluation Committee. Parties interested in the

deliberations of the committee should refrain from communicating, whether in writing or verbally, with committee members. The committee reserves the right to refuse communications that do not comply with this request.

Newly approved acceptance criteria may involve test methods or test protocols that are not currently included in the scope of testing services offered by accredited testing laboratories. As noted in the ICC-ES Rules of Procedure for Evaluation Reports, the scope of the laboratory's accreditation must include the type of testing that is to be reported to ICC-ES. We encourage accredited laboratories to expand their scopes of accreditation to include testing under newly approved acceptance criteria. Please note that testing laboratories must be accredited by the International Accreditation Service (IAS) or by another accreditation body that is a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement. For further information, please contact IAS at (562) 699-0541, extension 3309, or send an e-mail to [pmccullen@iasonline.org](mailto:pmccullen@iasonline.org).

Please submit all comments using the form on the web site. Attach any letters to the comment form. If you have any questions (not comments), please contact the undersigned at (800) 423-6587, extension 3275, or Russ Krivchuk, P.E., at extension 3275. You may also reach us by e-mail at [es@icc-es.org](mailto:es@icc-es.org).

Yours very truly,

A handwritten signature in black ink, appearing to read "D Pereg". The signature is stylized and cursive.

David Pereg, P.E.  
Staff Engineer

DP/cm

Enclosure

cc: Evaluation Committee

## PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR PRECAST CONCRETE PIER FOUNDATION ASSEMBLIES

AC336

Proposed February 2010

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.

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 proposed in this document, and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria proposed in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise meet the applicable performance requirements 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 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.*

# PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR PRECAST CONCRETE PIER FOUNDATION ASSEMBLIES

## 1.0 INTRODUCTION

**1.1 Purpose:** The purpose of this acceptance criteria is to establish requirements for precast concrete pier foundation assemblies to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2003, 2006 and 2009 *International Residential Code*<sup>®</sup> (IRC). The basis of recognition is IRC Section R104.11.

**1.2 Scope:** This acceptance criteria applies to pier foundation assemblies for use as the foundation of exterior porch deck, elevated walkway and stairway construction. The pier foundation assemblies consist of precast, normal-weight concrete piers and steel bearing pins that are driven into the underlying soil through precast holes in the piers. An anchor bolt is precast into the top of the pier for attachment of deck support posts or beams. Evaluation under this acceptance criteria pertains to establishing a minimum, 1-square-foot (0.093 m<sup>2</sup>) equivalent bearing pressure area of the pier foundation assemblies, for the support of gravity loads when installed in soils with a minimum presumptive load-bearing value of 1,500 psf (71.9 kN/m<sup>2</sup>), as defined in IRC Table R401.4.1. The pier foundation assemblies are intended for use in up to "severe" climate areas, as defined in IRC Figure R301.2(3).

### 1.3 Codes and Referenced Standards:

**1.3.1** 2009 *International Residential Code*<sup>®</sup> (2009 IRC), International Code Council.

**1.3.2** 2006 *International Residential Code*<sup>®</sup> (2006 IRC), International Code Council.

**1.3.3** 2003 *International Residential Code*<sup>®</sup> (2003 IRC), International Code Council.

**1.3.4** ASTM A 53-02, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless, ASTM International.

**1.3.5** ASTM A 307-04e01, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength, ASTM International.

**1.3.6** ASTM C 31- 98, Standard Practice for Making and Curing Concrete Test Specimens in the Field, ASTM International.

**1.3.7** ASTM C 39-99, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens, ASTM International.

**1.3.8** ASTM C 173-01<sup>e1</sup>, Air Content of Freshly Mixed Concrete by the Volumetric Method, ASTM International

**1.3.9** ASTM C 231-04, Air Content of Freshly Mixed Concrete by the Pressure Method, ASTM International.

**1.3.10** ASTM D 1143-81 (1994), Standard Test Method for Piles Under Static Axial Compressive Load, ASTM International.

## 2.0 BASIC INFORMATION

**2.1 General:** The following information shall be submitted:

**2.1.1 Product Description:** A detailed description of the pier foundation assemblies, including dimensioned drawings of the pier; description of the concrete mix design, including fibers, air-entraining admixtures and

curing conditions; description of the pin (steel specification, nominal size or outside diameter, nominal wall thickness, length, and corrosion-resistant coating); description of the pin caps (material specifications and size); description of the recommended sealant material for sealing the pin caps; and description of the precast, steel anchor bolt (steel specifications, size and length).

**2.1.2 Installation Instructions:** Manufacturer's published installation instructions shall be submitted

**2.1.3 Packaging and Identification:** A description of the method of packaging and field identification of the pier foundation assembly. Identification provisions shall include the evaluation report number, and the words, "For Use with One- and Two-Family Dwelling Construction Only."

**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 pier foundation assemblies for tests under this criteria shall comply with Section 3.1 of AC85.

## 3.0 TEST AND PERFORMANCE REQUIREMENTS

### 3.1 Concrete:

**3.1.1 Compressive Strength:** The concrete used to manufacture the concrete piers shall be tested for compressive strength in accordance with Section 4.1. The 28-day average compressive strength of three specimens shall be a minimum of 3,500 psi (24.1 kPa), with no individual test result being less than 3,000 psi (20.7 kPa). Section 4.3.1 of this criteria describes additional compressive strength testing requirements for concrete used to fabricate the assemblies that are subjected to load testing.

**3.1.2 Air Entrainment:** The concrete used to fabricate the assemblies used in the tests required in Section 3.5, shall be air-entrained, and shall be tested in accordance with Section 4.2. The total air content (percent by volume of concrete) shall not be less than 5 percent nor more than 7 percent.

**3.2 Fibers:** The fibers shall comply with the ICC-ES Acceptance Criteria for Concrete with Synthetic Fibers (AC32) or the ICC-ES Acceptance Criteria for Steel Fibers in Concrete (AC208), or be recognized as complying with AC32 or AC208 in a current ICC-ES evaluation report. The concrete used in AC32 or AC208 testing shall be shown to be representative of the concrete used to manufacture the concrete piers for which recognition is sought.

### 3.3 Steel Bearing Pins:

**3.3.1 General:** Reports of physical properties testing shall be submitted for the steel bearing pin material of the assemblies used in the testing required in Section 3.5. Test reports shall be generated by a mill or testing laboratory.

**3.3.2 Properties:** The steel bearing pins shall consist of Type E, Grade A (electric-resistance-welded), or Type S, Grade A (seamless), galvanized steel pipe complying with ASTM A 53.

## PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR PRECAST CONCRETE PIER FOUNDATION ASSEMBLIES

### 3.4 Precast Anchor Bolt:

**3.4.1 General:** The steel anchor bolt shall be a minimum of  $1/2$  inch (12.7 mm) in diameter.

**3.4.2 Properties:** The anchor bolt shall consist of steel complying with ASTM A 307, as Grade A. Test reports shall be generated by a mill or testing laboratory.

**3.4.3 Corrosion Resistance:** Evidence of durability shall be established in accordance with the corrosion test procedure in Factory Mutual Research Standard 4450 or 4470.

**3.5 Pier Foundation Assembly:** Vertical load bearing testing shall be performed in accordance with Section 4.3. The settlement at the anticipated design load, as defined in Section 4.3.2, shall be no greater than 0.5 inch (12.7 mm).

### 4.0 TEST METHODS

**4.1 Concrete Compressive Strength:** Concrete test cylinders shall be molded and laboratory-cured in accordance with Section 9.2 of ASTM C 31, and tested in accordance with ASTM C 39.

**4.2 Air Entrainment:** The total air content (percent by volume of concrete) shall be determined in accordance with ASTM C 173 or ASTM C 231.

### 4.3 Vertical Load Bearing Test:

**4.3.1 General:** The compressive strength of the concrete used to fabricate the concrete piers used in testing shall be determined as follows: Concrete test cylinders shall be molded, and cured for 28 days, with a five-day allowable minus tolerance, in accordance with Section 9.3 of ASTM C 31, in the same temperature and moisture environment as the concrete piers to be tested. Two tests of two cylinders each, prepared in accordance with ASTM C 39, shall be conducted and the average compressive strength shall be reported during a 24-hour period immediately preceding and following any testing on the pier foundation assemblies. The average of two cylinder strength results shall constitute one test. The average of the two tests (four cylinders total) shall establish the concrete compressive strength, which shall be within 10 percent of the nominal specified compressive strength [3,500 psi (24.1 kPa)].

A soils investigation shall be prepared by a registered geotechnical engineer to establish that the soils used in testing, within the zone of influence, yield a value within 10 percent of the presumptive soil load-bearing value for which recognition is sought. The pier foundation assembly to be tested shall be installed plumb and level in the soil in a manner consistent with the intended installation, and in accordance with the manufacturer's published installation instructions. Three tests are required in each condition for which recognition is sought, with none of the results varying by more than 15 percent from the average of the three, unless the lowest test value is used. The average result based on a minimum of five tests at each condition may be used regardless of the variations. The load and deflection measuring apparatus, equipment and configuration shall be as outlined in Sections 3 and 4 of ASTM D 1143. The soils investigation shall include determination of the minimum clear distance from the pier foundation assembly where the anchoring or cribbing

device(s) shall be installed, that is/are used to provide reactive capacity for the applied loads.

**4.3.2 Load Application:** The pier foundation assembly shall be loaded to 200 percent of the anticipated design load, in increments of approximately 25 percent of the anticipated design load of the installed pier foundation assembly. The anticipated design load shall be defined as the test soil load-bearing value, determined in Section 4.3.1 of this criteria, multiplied by a minimum 1-square-foot (0.093 m<sup>2</sup>) bearing area. Each load increment shall be maintained until the settlement has ceased or the rate of settlement becomes uniform, and shall not be less than 15 minutes nor longer than two hours. Provided that the pier foundation assembly has not failed, the test load is removed anytime after 12 hours if the settlement has ceased; otherwise, the total load is allowed to remain for 24 hours. After the required holding time, the test load is removed in decrements of 25 percent of the total test load, with one hour between decrements.

### 5.0 QUALITY CONTROL

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

**5.2** Third-party follow-up inspections are not required under this acceptance criteria.

### 6.0 EVALUATION REPORT RECOGNITION

**6.1** The evaluation report shall include the following statements:

**6.1.1** The bearing capacity of the site soil shall be determined in accordance with IRC Sections R401.4 and R401.4.1, and provided to the code official upon request.

**6.1.2** Use of the pier foundation assemblies where soil constituents, changing water levels or other factors indicate possible deleterious effects on the pier foundation assembly, is beyond the scope of this report.

**6.1.3** In areas requiring frost protection, decks on pier foundation assemblies may be supported by a dwelling when approved by the code official. See 2009 and 2006 IRC Section R403.1.4.1, Exception 3 and 2003 IRC Section R403.1.4.1, Exception 2, as applicable.

**6.1.4** Use of the pier foundation assemblies to resist lateral loads is beyond the scope of this report.

**6.1.5** Use of the pier foundation assemblies to resist uplift loads is beyond the scope of this report.

**6.1.6** Wood in contact with the concrete pier and precast anchor bolt shall be pressure-preservative-treated in accordance with 2009 IRC Sections R317 and R318; and 2006 and 2003 IRC Sections R319 and R320, as applicable. Compatibility of the concrete pier and precast anchor bolt with wood treatments not described in 2009 IRC Sections R317 and R318; and 2006 and 2003 IRC Sections R319 and R320, as applicable, shall be established based on a current ICC-ES evaluation report on the wood treatment.

**6.2** The evaluation report shall include the minimum spacing of the pier foundation assemblies, based on conditions of testing, as determined in Section 4.3 of this criteria. ■