



ICC Evaluation Service, Inc.  
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December 29, 2009

**TO: PARTIES INTERESTED IN EVALUATION REPORTS ON  
CELLULAR-WOOD-FIBER-REINFORCED MASONRY UNITS**

**SUBJECT: Proposed Acceptance Criteria for Cellular-wood-fiber-reinforced  
Masonry Units, Subject AC396-0210-R1 (ME/BG)**

**Hearing Information:**

Thursday, February 4, 2010  
8:00 a.m.

**Sheraton Gateway Hotel Los Angeles**  
6101 West Century Boulevard  
Los Angeles, California 90045  
(888) 627-7104

Dear Madam or Sir:

The enclosed proposed new acceptance criteria, AC396, will be discussed at the hearing noted above. AC396 is applicable to cellular-wood-fiber-reinforced masonry units that are alternatives to masonry wall construction with concrete masonry units as defined in *International Building Code* (IBC) Section 2103.1 and used for unreinforced nonload-bearing walls. Cellular-wood-fiber-reinforced masonry units are intended to be installed with conventional mortar complying with Section 2103.8 of the IBC and Section R607.1 of the *International Residential Code* (IRC).

Staff is seeking public input in response to the following:

1. The enclosed draft criteria only mandates wall flexural tests (Section 4.3.4), because this product will only be used for unreinforced nonload-bearing wall construction. The proposed draft criteria includes wall compression testing (Section 4.3.5), wall flexural-compression test (Section 4.3.6) and in-plane wall shear test (Section 4.3.7) as optional tests. Staff would like to know whether conducting only the wall flexural tests is adequate to justify that masonry walls using cellular-wood-fiber-reinforced masonry units can be designed as nonload-bearing walls in accordance with the IBC and the IRC. Staff also asks for comments on the significance of the optional tests.

2. Section 6.5 of the proposed draft criteria requires weather protection in accordance with the IBC Section 1403.2. Staff seeks input on whether Exception 1 of Section 1403.2 of the IBC is applicable to a wall system constructed using cellular-wood-fiber-reinforced masonry units if the units have greater thickness than ASTM C 90 concrete masonry units and show water absorption equal to or less than ASTM C 90 concrete masonry units. Should wind-driven rain testing be included in the criteria?
3. Staff requests input in regard on structural connection qualification such as for attachment of roof joists or use of mechanical fasteners in these cellular-wood-fiber-reinforced masonry units.
4. Input is also needed on what properties the fibers need to exhibit and what testing is needed to determine the properties. See Section 4.2.2 of the proposed draft.

You are cordially invited to submit written comments on agenda items, or to attend the Evaluation Committee hearing and present verbal comments. If you wish to contribute to the hearing, please note the following:

1. Written comments that are received by the Los Angeles business/regional office by **January 19, 2010**, will be forwarded to the committee prior to the hearing, and will be posted on the ICC-ES web site shortly after the comment deadline.
2. Written comments received up to ten days before the meeting, and staff memos responding to comments, will be posted to the web site on **January 28, 2010**.
3. ICC-ES is no longer providing printed copies at the meeting of proposed acceptance criteria, staff memos or public comments. These documents will be available on a limited number of CDs at the meeting, for uploading to computers; and ICC-ES will make arrangements with the hotel business center to have hard copies available for photocopying.
4. Written comments that miss the deadline noted in item (1), above, will only be available at the meeting if you provide 35 copies, collated, stapled, and three-hole punched, either at the meeting itself or to the Los Angeles business/regional office by **January 28, 2010**.
5. If you plan to speak for more than 15 minutes, or offer a visual presentation lasting longer, you should notify ICC-ES staff as far as possible in advance. There will be a computer, projector, and screen available at the meeting for anyone wishing to make a visual presentation, and presentations in most cases will need to be in PowerPoint format. Also, ICC-ES will need to be provided with your presentation at least a half-hour before the start of the

relevant meeting session (morning or afternoon) on either a CD or a flash card.

6. If you have any special needs related to a presentation, you should contact ICC-ES staff well in advance of the meeting.
7. Any visual aids for viewing at committee meetings (charts, overhead transparencies, slides, videos, electronic presentations, etc.) will be permitted only if a copy is provided to ICC-ES, before the presentation, in a medium that can be retained with other records of the meeting.
8. Any materials submitted for committee consideration are considered nonconfidential and available for public discussion, as noted in Section 2.7 of the ICC-ES Rules of Procedure for the Evaluation Committee.
9. Prior to the meeting, you should refrain from trying to communicate directly with committee members about agenda items, either verbally or in writing. Committee members reserve the right to refuse such communications.

Your cooperation with these guidelines is much appreciated, as is your interest in the deliberations of the Evaluation Committee. If you have any questions, please contact the undersigned at (800) 423-6587, extension 3724, or Brian Gerber, S.E., at extension 3260. 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 'M. Ekenel', followed by a horizontal line extending to the right.

Mahmut Ekenel, Ph.D., P.E.  
Staff Engineer

ME/BG/gh

Enclosures

cc: Evaluation Committee



## ICC EVALUATION SERVICE, INC., RULES OF PROCEDURE FOR THE EVALUATION COMMITTEE

### 1.0 PURPOSE

The purpose of the Evaluation Committee is to monitor the work of ICC-ES, in issuing evaluation reports; to evaluate and approve acceptance criteria on which evaluation reports may be based; and to sponsor related changes in the applicable codes.

### 2.0 MEETINGS

**2.1** The Evaluation Committee shall schedule meetings that are open to the public in discharging its duties under Section 1, subject to Section 3.

**2.2** All scheduled meetings shall be publicly announced.

**2.3** Two-thirds ( $\frac{2}{3}$ ) of the voting Evaluation Committee members shall constitute a quorum. A majority vote of members present is required on any action.

**2.4** In the absence of the nonvoting chairman-moderator, Evaluation Committee members present shall elect an alternate chairman from the committee for that meeting. The alternate chairman shall be counted as a voting committee member for purposes of maintaining a committee quorum and to cast a tie-breaking vote of the committee.

**2.5** Minutes of the meetings shall be kept.

**2.6** An electronic audio record of meetings shall be made by ICC-ES; no other audio, video, electronic or stenographic recordings of the meetings will be permitted. Visual aids (including, but not limited to, charts, overhead transparencies, slides, videos, or presentation software) viewed at meetings shall be permitted only if the presenter provides ICC-ES before presentation with a copy of the visual aid in a medium which can be retained by ICC-ES with its record of the meeting and which can also be provided to interested parties requesting a copy. A copy of the ICC-ES recording of the meeting and such visual aids, if any, will be available to interested parties upon written request made to ICC-ES together with a payment as required by ICC-ES to cover costs of preparation and duplication of the copy. These materials will be available beginning five days after the conclusion of the meeting but will no longer be available after one year from the conclusion of the meeting.

**2.7** Parties interested in the deliberations of the committee should refrain from communicating, whether in writing or verbally, with committee members regarding agenda items. All written communications and submissions regarding agenda items should be delivered to ICC-ES. All such written communications and submissions shall be considered nonconfidential and available for discussion in open session of an Evaluation Committee meeting, and shall be delivered at least ten days before the scheduled Evaluation Committee meeting if they are to be forwarded to the committee. Materials delivered to ICC-ES at least ten

days before the scheduled meeting will be posted on the ICC-ES web site ([www.icc-es.org](http://www.icc-es.org)) prior to the meeting. After this time, parties wishing to submit materials for consideration by the Evaluation Committee must deliver a sufficient number of copies as directed by ICC-ES. Consideration of materials not received by ICC-ES at least ten days before the meeting is at the discretion of the Evaluation Committee. Following the meeting, ICC-ES will make all materials considered by the Evaluation Committee available on the web site for a maximum period of one year following the meeting. The committee reserves the right to refuse recognition of communications which do not comply with the provisions of this section.

### 3.0 CLOSED SESSIONS

Evaluation Committee meetings shall be open except that the chairman may call for a closed session to seek advice of counsel.

### 4.0 ACCEPTANCE CRITERIA

**4.1** Acceptance criteria are established by the committee to provide a basis for issuing ICC-ES evaluation reports on products and systems under codes referenced in Section 2.0 of the Rules of Procedure for Evaluation Reports. They also clarify conditions of acceptance for products and systems specifically regulated by the codes.

Acceptance criteria may involve a product, material, method of construction, or service. Consideration of any acceptance criteria must be in conjunction with a current and valid application for an ICC-ES evaluation report, an existing ICC-ES evaluation report, or as otherwise determined by the Evaluation Committee.

#### 4.2 Procedure:

**4.2.1** Proposed acceptance criteria shall be developed by the ICC-ES staff and discussed in open session with the Evaluation Committee during a scheduled meeting, except as permitted in Section 5.0 of these rules.

**4.2.2** Proposed acceptance criteria shall be available to interested parties at least 30 days before discussion at the committee meeting.

**4.2.3** The committee shall be informed of all pertinent written communications received by ICC-ES.

**4.2.4** Attendees at Evaluation Committee meetings shall have the opportunity to speak on acceptance criteria listed on the meeting agenda, to provide information to committee members.

**4.3** Approval of acceptance criteria shall be as specified in Section 2.3 of these rules.

**4.4** Actions of the Evaluation Committee may be

appealed in accordance with the ICC-ES Rules of Procedure for Appeal of Acceptance Criteria or the ICC-ES Rules of Procedure for Appeals of Evaluation Committee Technical Decisions.

**5.0 COMMITTEE BALLOTING FOR ACCEPTANCE CRITERIA**

**5.1** Acceptance criteria may be issued without a public hearing following a 30-day public comment period and a majority vote for approval by the Evaluation Committee when, in the opinion of ICC-ES staff, one or more of the following conditions have been met:

1. The subject is nonstructural, does not involve life safety, and is addressed in nationally recognized standards or generally accepted industry standards.
2. The subject is a revision to an existing acceptance criteria that requires a formal action by the Evaluation Committee, and public comments raised were resolved by staff with commenters fully informed.
3. Other acceptance criteria and/or the code provide precedence for the revised criteria.

**5.2** Negative votes must be based upon one or more of the following, for the ballots to be considered valid and require resolution:

- a. *Lack of clarity:* There is insufficient explanation of the scope of the acceptance criteria or insufficient description of the intended use of the product or system; or the acceptance criteria is so unclear as to be unacceptable. (The areas where greater clarity is required must be specifically identified.)
- b. *Insufficiency:* The criteria is insufficient for proper evaluation of the product or system. (The provisions of the criteria that are in question must be specifically identified.)
- c. *The subject of the acceptance criteria is not within the scope of the applicable codes:* A report issued by ICC-ES is intended to provide a basis for approval under the codes. If the subject of the acceptance criteria is not regulated by the codes, there is no basis for issuing a report, or a criteria. (Specifics must be provided concerning the inapplicability of the code.)

d. *The subject of the acceptance criteria needs to be discussed in a public hearings.* The committee member requests additional input from other committee members, staff or industry.

**5.3** An Evaluation Committee member, in voting on an acceptance criteria, may only cast the following ballots:

- Approved
- Approved with Comments
- Negative: Do Not Proceed

**6.0 COMMITTEE COMMUNICATION**

Direct communication between committee members, and between committee members and an applicant or concerned party, with regard to the processing of a particular acceptance criteria or evaluation report shall take place only in a public hearing of the Evaluation Committee. Accordingly:

**6.1** Committee members receiving an electronic ballot should respond only to the sender (staff). Committee members who wish to discuss a particular matter with other committee members, before reaching a decision, should ballot accordingly and bring the matter to the attention of ICC-ES staff, so the issue can be placed on the agenda of a future committee meeting.

**6.2** Committee members who are contacted by an applicant or concerned party on a particular matter that will be brought to the committee will refrain from private communication and will encourage the applicant or concerned party to forward their concerns through the ICC-ES staff in writing, and/or make their concerns known by addressing the committee at a public hearing, so that their concerns can receive the attention of all committee members. ■

*Effective March 18, 2008*

## PROPOSED ACCEPTANCE CRITERIA FOR CELLULAR-WOOD-FIBER-REINFORCED MASONRY UNITS

AC396

Proposed December 2009

### 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 ACCEPTANCE CRITERIA FOR CELLULAR-WOOD-FIBER-REINFORCED MASONRY UNITS

### 1 1.0 INTRODUCTION

2     **1.1 Purpose:** The purpose of this criteria is to establish requirements for  
3 recognition of cellular-wood-fiber-reinforced masonry units in ICC Evaluation Service,  
4 Inc. (ICC-ES), evaluation reports under the 2009 *International Building Code*<sup>®</sup> (IBC)  
5 and the 2009 *International Residential Code*<sup>®</sup> (IRC). Bases of recognition are IBC  
6 Section 104.11 and IRC Section R104.11.

7     The reason for the development of this criteria is to provide guidelines for the  
8 evaluation of cellular-wood-fiber-reinforced masonry units, since the codes do not  
9 provide requirements for use of these products.

10    **1.2 Scope:** This criteria is applicable to cellular-wood-fiber-reinforced masonry  
11 units, which are used for unreinforced nonload-bearing wall construction and are  
12 alternatives to masonry wall construction with concrete masonry units as defined in IBC  
13 Section 2103.1. Cellular-wood-fiber-reinforced masonry units are installed in  
14 accordance with IBC Section 2104.1.2 using conventional mortar complying with  
15 Section 2103.8 of the IBC or Section R607.1 of the IRC. Cellular-wood-fiber-reinforced  
16 masonry walls are used in fire-resistance-rated or non-fire-resistance-rated,  
17 noncombustible or combustible construction.

18     This acceptance criteria is applicable to masonry construction designed in accordance  
19 with the requirements of IBC Section 2107 or IRC Section R606 (Allowable Stress  
20 Design), and IBC Section 2108 (Strength Design of Masonry).

21     **1.3   Codes and Referenced Standards:**

22         **1.3.1**    2009 *International Building Code*<sup>®</sup> (IBC), International Code Council.

23         **1.3.2**    2009 *International Residential Code*<sup>®</sup> (IRC), International Code Council.

24         **1.3.3**    ACI 530-08/ASCE 5-08/TMS 402-08, Building Code Requirements for  
25 Masonry Structures, American Concrete Institute.

26         **1.3.4**    ASTM C 90-06b, Standard Specification for Load-Bearing Concrete  
27 Masonry Units, ASTM International.

28         **1.3.5**    ASTM C 140-07, Standard Test Methods for Sampling and Testing  
29 Concrete Masonry Units and Related Units, ASTM International.

30         **1.3.6**    ASTM C 426-07, Standard Test Method for Linear Drying Shrinkage of  
31 Concrete Masonry Units, ASTM International.

32         **1.3.7**    ASTM C 618-03, Standard Specification for Coal Fly Ash and Raw or  
33 Calcined Natural Pozzolan for Use in Concrete, ASTM International.

34         **1.3.8**    ASTM C 666-03, Standard Test Method for Resistance of Concrete to  
35 Rapid Freezing and Thawing, ASTM International.

36         **1.3.9**    ASTM C 1072-06, Standard Test Method for Measurement of Masonry  
37 Flexural Bond Strength, ASTM International.

38         **1.3.10**  ASTM C 1314-07, Test Method for Compressive Strength of Masonry  
39 Prisms, ASTM International.

40         **1.3.11**  ASTM D 1413-07, Standard Test Method for Wood Preservatives by  
41 Laboratory Soil-Masonry Units Cultures, ASTM International.

42         **1.3.12**  ASTM D 2017-05, Standard Test Method of Accelerated Laboratory Test of  
43 Natural Decay Resistance of Woods, ASTM International.

44       **1.3.13** ASTM D 3345-08, Standard Test Method for Laboratory Evaluation of  
45 Wood and other Cellulosic Materials for Resistance to Termites, ASTM International.

46       **1.3.14** ASTM E 72-02, Method for Conducting Strength Tests of Panels for  
47 Building Construction, ASTM International.

48       **1.3.15** ASTM E 119-07, Standard Test Methods for Fire Tests of Building  
49 Construction Materials, ASTM International.

50       **1.3.16** ASTM E 136-04, Test Method for Behavior of Materials in Vertical Tube  
51 Furnace at 750°C, ASTM International.

52       **1.3.17** ASTM E 564-00, Standard Practice for Static Load Test for Shear  
53 Resistance of Framed Walls for Buildings, ASTM International.

54       **1.3.18** UL 263-03, Standard for Fire Tests of Building Construction Materials,  
55 Underwriters Laboratories Inc.

56       **1.4 Definition: Cellular-wood-fiber-reinforced Masonry Units:** Cellular-wood-  
57 fiber-reinforced masonry units are precast masonry units. The masonry units are  
58 manufactured using a mixture of fly ash, wood fiber, water and a proprietary hydration  
59 catalyst.

## 60 **2.0 BASIC INFORMATION**

61       **2.1 General:** The following information shall be submitted:

62       **2.1.1 Product Description:**

63           **2.1.1.1 Cellular-wood-fiber-reinforced masonry units:** Complete information  
64 concerning cellular-wood-fiber-reinforced masonry units to be recognized in the ICC-ES  
65 evaluation report shall be in the quality documentation required by Section 5.0 of this  
66 criteria, and shall include shapes, product dimensions and manufacturing tolerances,

67 product specifications, mix designs, manufacturing processes, and drawings with  
68 sufficient details illustrating the cellular-wood-fiber-reinforced masonry units. The  
69 description of the constituent materials of the cellular-wood-fiber-reinforced masonry  
70 units needs to address the following:

71 **2.1.1.1.1 Fly ash:** Fly ash shall conform to ASTM C 618, Class C.

72 **2.1.1.1.2 Cellular-wood Fibers:** Complete information concerning  
73 specifications of wood fibers, such as wood species and sizes.

74 **2.1.1.1.3 Proprietary Hydration Catalyst:** A description and specifications  
75 of the proprietary hydration catalyst shall be provided. Alternatively, the name of the  
76 controlled document describing the proprietary hydration catalyst, including revision  
77 level and date, shall be submitted to ICC-ES.

78 **2.1.1.1.4 Water:** Water shall be free from injurious amounts of oils, acids,  
79 alkalis, salts, organic materials, or other substances deleterious to the masonry units.  
80 Water shall be potable and contain no pronounced odor.

81 **2.1.2 Installation Instructions:** Installation instructions that include details and  
82 limitations, joint treatments, and face treatments shall be provided. Descriptions and  
83 illustrations of how the product or systems will be installed in the field shall be provided.  
84 The instructions shall include information regarding the orientation and bond pattern of  
85 the masonry units when installed, such as stack bond or running bond and mortar  
86 placement. The installation instructions shall describe the methods used to attach the  
87 masonry unit wall assembly to the supporting structure of the building.

88 **2.1.3 Packaging and Identification:** A description of the method of packaging  
89 and field identification of the cellular-wood-fiber-reinforced masonry units shall be

90 submitted. Identification provisions shall include the evaluation report number, report  
91 holder's and/or manufacturer's name and address, production facility location, lot  
92 number, production date, unit style, and name or logo of the inspection agency.

93 **2.1.4 Field Preparation:** A description of the methods of application, finishing,  
94 field-cutting and field modification.

95 **2.2 Testing Laboratories:** Testing laboratories shall comply with Section 2.0 of  
96 the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC ES  
97 Rules of Procedure for Evaluation Reports

98 **2.3 Test Reports:** Test reports shall comply with AC85. Structural load test reports  
99 shall include a complete description of the test specimens, including descriptions of the  
100 test specimen preparation, description of the masonry units orientation and installation  
101 pattern when installed, descriptions and illustrations of the test setup, rate and method  
102 of loading, loading directions and conditions, load-deformation measurements, modes  
103 of failure, discussion of overall performance and photographs of tested specimens  
104 before, during and after testing. The test reports shall be in sufficient detail to identify  
105 the specimen properties that might affect performance, such as mix design of cellular-  
106 wood-fiber-reinforced masonry units, and compressive strength of the masonry units at  
107 the time of load tests.

108 **2.4 Product Sampling:** Masonry units used as test specimens shall be sampled in  
109 accordance with Section 3.1 of AC85. Other components of test specimen assemblies  
110 shall be sampled in accordance with Section 3.1 or 3.2 of AC85. If the test specimen is  
111 an assembly, Section 3.3 of AC85 shall be implemented. The production of the cellular-  
112 wood-fiber-reinforced masonry units shall be witnessed by representatives of an

113 accredited testing laboratory or an accredited inspection agency and testing shall  
114 encompass specimens sampled from each manufacturing facility for which recognition  
115 is sought.

### 116 **3.0 TEST AND PERFORMANCE REQUIREMENTS**

117 **3.1 General:** The tests described in Section 4.0 of this criteria shall be performed  
118 on masonry units made with the same materials, mix design, and manufacturing  
119 process.

120 **3.2 Physical Properties Tests:** Physical properties tests shall be performed in  
121 accordance with Section 4.2 of this criteria.

122 **3.3 Durability Tests:** Durability tests shall be performed in accordance with  
123 Section 4.4 of this criteria.

### 124 **3.4 Structural Load Tests:**

125 **3.4.1 Qualification Test Plan:** A qualification test plan shall be submitted for  
126 ICC-ES review prior to any testing. The test plan shall specify all or part of the tests  
127 described in Section 4.3, as well as any additional tests identified as applicable for  
128 special features of the product or system. The test plan shall be a complete document.  
129 In general, qualification testing shall provide data on material properties, including  
130 density, strength, deformations and/or ductility, creep, and limit states or failure modes  
131 to support a rational analysis. Tests shall simulate the anticipated loading conditions  
132 and load levels. The testing details noted in Section 4.3 are intended for verification of  
133 the engineering analysis procedures, not for establishment of design stresses. It is the  
134 responsibility of the applicant to define additional tests necessary to qualify the design

135 data for unique components or systems. All tests shall be conducted by an accredited  
136 testing laboratory as set forth in Section 2.2.

137 **3.4.2 Final Submittal:** The final submittal shall consist of testing laboratory test  
138 reports and a design criteria report.

139 **3.4.3 Laboratory Test Report:** The testing laboratory shall report on the  
140 qualification testing performed in accordance with the approved test plan. Any  
141 deviations from the test plan shall be noted and explained. In addition to the information  
142 requested in Sections 2.0 and 3.0, the test report shall include the following:

- 143 1. Description of test specimens.
- 144 2. Description of test setup.
- 145 3. Rate and method of loading.
- 146 4. Deformation measurements.
- 147 5. Modes of failure.

148 **3.4.4 Design Criteria Report:** A design criteria report shall be submitted and  
149 shall include a complete analysis and interpretation of the qualification test results  
150 presented in the independent laboratory test report. Design stresses for concrete  
151 masonry, or characteristic strengths for concrete systems, shall be specified, based on  
152 the analysis. Design stresses or characteristic strengths used in the analysis and design  
153 shall be qualified by the test data. The safety factor procedure, or provisions of Chapter  
154 19 or 21 of the IBC, whichever is applicable, and an appropriate design analysis shall  
155 be used to assign design stresses or characteristic strengths that provide the degree of  
156 safety required by the applicable code. At the time of initial submittal, there shall be  
157 agreement between the applicant and ICC-ES on the selected procedure.

158       **3.4.5 Design Value:** The predicted design capacity, based on working stress or  
159 strength methods, shall be derived using the Safety Factor Procedure.

160       **3.4.5.1 Safety Factor Procedure:** Design Value  $\leq$  (Maximum Strength)  $\times$  (1/SF),  
161 where SF is a minimum of 5.0 for Working Stress Design or 1.8 for Strength Design.

162 Where three specimens are tested, the lowest peak test value shall be used in the data  
163 analysis as the maximum strength. As an alternative, the five-percent-fractile value may  
164 be used in the data analysis where the number of tested specimens is four or more.

165       **3.5 Fire-resistance-rated Construction (Optional):** For use of the units in fire-  
166 resistance-rated construction, tests shall be performed in accordance with ASTM E 119  
167 or UL 263 for each assembly configuration of the masonry units based on compressive  
168 strength, orientation and installation pattern and connection type, spacing and  
169 installation orientation. Testing of masonry unit compressive strength in accordance with  
170 ASTM C 140 shall be performed at the time the fire-resistance testing is conducted. The  
171 masonry unit compressive strength, shape, sizes, orientation and masonry unit  
172 installation pattern and connection type, size, spacing and installation orientation for  
173 ASTM E 119 tests, shall be consistent with the Section 4.3 test specimen.

174       **3.6 Flame-spread and Smoke-development Indices:** Reports of tests on the  
175 masonry units shall be submitted and shall demonstrate compliance with IBC Section  
176 803.1 or 803.2 or IRC Section R315.

177       **3.7 Noncombustible Construction (Optional):** When recognition is sought for use  
178 in building elements required to be of noncombustible construction under the IBC,  
179 reports of tests on the masonry units in accordance with ASTM E 136 shall be  
180 submitted.

181 **4.0 TEST METHODS**

182 **4.1 General:** The following shall be considered when specifying qualification tests:

183 (1) The tests shall demonstrate the applicability of the design provisions to  
184 representative configurations, and for anticipated uses. (2) The tests are required to  
185 show compliance with the design procedures noted in Chapter 21 of the IBC. (3)  
186 Additional tests, not covered by this acceptance criteria, may be required for unique  
187 features that cannot be qualified by established testing standards or requirements.

188 **4.2 Physical Properties Tests:**

189 **4.2.1 Fly ash:** Reports of tests shall be submitted demonstrating that **the** fly ash  
190 conforms to ASTM C 618, Class C.

191 **4.2.2 Cellular Wood Fibers:** - - - - -

192 **4.2.3 Masonry Unit Property Tests:** Reports of unit compressive strength,  
193 density, dimensional and water absorption tests on the masonry units in accordance  
194 with ASTM C 140 shall be submitted. Specimen sampling (e.g., test specimen selection,  
195 number of specimens and identification of specimens) shall conform to Section 4 of  
196 ASTM C 140.

197 **Conditions of Acceptance:** (a) Height, length and width tolerances shall be less  
198 than  $\pm 1/8$  inch (3.2 mm) from the specified dimensions. Dimensions of molded  
199 features (e.g., tongue-and-groove) shall be within  $\pm 1/16$  inch (1.6 mm) of the  
200 specified standard dimension and shall be within  $\pm 1/16$  inch (1.6 mm) of the specified  
201 placement of the molded feature, (b) Maximum water absorption shall comply with  
202 Table 2 of ASTM C 90.

203       **4.2.4 Linear Shrinkage:** Reports of linear shrinkage tests of the masonry units in  
204 accordance with ASTM C 426 shall be submitted. The test specimens and number of  
205 specimens shall conform to Section 6.0 of ASTM C 426. The length measurements  
206 shall be conducted at a temperature of  $73.4 \pm 2^{\circ}\text{F}$  ( $23 \pm 1.1^{\circ}\text{C}$ ). When the length  
207 measurements are taken at a temperature other than the specified temperature, there  
208 must be a means of correcting measurement readings that conforms to Sections 8.1  
209 and 8.2 of ASTM C 426.

210       **Conditions of Acceptance:** At the end of the manufacturer specified curing time,  
211 the linear shrinkage of each masonry unit shall not exceed 0.065 percent.

212       **4.3 Structural Tests:**

213       **4.3.1 Mortar Tests:** For recognition under the IBC, mortar shall be tested in  
214 accordance with ASTM C 270.

215       **4.3.2 Flexural Bond Strength Test:** The flexural bond strength shall be tested in  
216 accordance with ASTM C 1072, at a relative humidity of  $50 \pm 2$  percent and a  
217 temperature of  $73^{\circ}\text{F} \pm 2^{\circ}\text{F}$  ( $23.7^{\circ}\text{C} \pm 1.1^{\circ}\text{C}$ ). The value of the flexural bond strength  
218 shall be calculated using the section modulus, assuming a fully bedded area based on  
219 the full unit width.

220       **Conditions of Acceptance:** The average flexural bond strength determined in  
221 accordance with ASTM C 1072 shall be equal to, or higher than, the values given  
222 for portland cement/lime mortar, normal to bed joints in running or stack bond for  
223 solid units as shown in Table 2.2.3.2 of ACI 530-08/ASCE 5-08/TMS 402-08, with  
224 an applied safety factor of 3.33.

225           **4.3.3 Wall Flexural Test:** Wall flexural specimens shall be tested in accordance  
226 with the general guidelines of ASTM E 72, with the following exceptions:

- 227           1. Six specimens shall be tested, using three identical specimens at two  
228           different configurations and/or slenderness ratios.
- 229           2. Within 48 hours of the wall flexural tests, five masonry prisms shall be tested  
230           for correlation with the wall flexural tests in accordance with ASTM C 1314.
- 231           3. Loading in the out-of-plane direction may be applied by third-point loading or  
232           by using an air bag system.
- 233           4. In addition to the standard reporting and certification of test results,  
234           observations shall be reported, and photographs must be taken and  
235           submitted, of specimen response at significant stages of the loading process.

236           **4.3.4 Wall Compression Test (Optional):** Wall compression specimens having  
237 a minimum eccentricity of  $t/6$  shall be tested in accordance with the general guidelines  
238 of ASTM E 72, with the following exceptions:

- 239           1. Six specimens shall be tested, using three identical specimens at two  
240           different configurations and/or slenderness ratios.
- 241           2. Within 48 hours of the wall compression tests, five masonry prisms shall be  
242           tested for correlation of results with those of wall tests in accordance with  
243           ASTM C 1314.
- 244           3. In addition to the standard reporting and certification of test results,  
245           observations shall be reported, and photographs shall be taken and  
246           submitted, of specimen response at significant stages of the loading process.

247           **4.3.5 Wall Flexural-compression Test (Optional):** Wall flexural-compression  
248 specimens shall be tested in accordance with the general guidelines of ASTM E 72, with  
249 the following exceptions:

- 250           1. Six specimens shall be tested, using three identical specimens at two  
251           different configurations and/or slenderness ratios.
- 252           2. Within 48 hours of the wall flexural-compression tests, five masonry prisms  
253           shall be tested for correlation of results with those of wall tests in accordance  
254           with ASTM C 1314.
- 255           3. The applied axial loads shall be consistent with the submitted analysis, and  
256           acceptance will depend on the intended application. The lateral, out-of-plane,  
257           loads may be applied by third-point loading or by using an air-bag system.  
258           The wall shall be simultaneously loaded axially and transversely.
- 259           4. In addition to the standard reporting and certification of test results,  
260           observations shall be reported, and photographs shall be taken and  
261           submitted, of specimen response at significant stages of the loading process.

262           **4.3.6 In-plane Wall Shear Test (Optional):** Wall shear specimens shall be  
263 tested in accordance with the procedure defined in Section 4.2.7.1, and testing shall  
264 comply with the following requirements:

- 265           1. Six specimens shall be tested, using three identical specimens at two  
266           different configurations and/or slenderness ratios.
- 267           2. Within 48 hours of the wall shear tests, five masonry prisms shall be tested  
268           for correlation of results with those of wall tests in accordance with ASTM C  
269           1314.

270 3. In addition to the standard reporting and certification of test results, physical  
271 observations shall be reported, and photographs shall be taken and  
272 submitted, of specimen response at significant stages of the loading process.

273 **4.3.6.1** The method of conducting strength tests for masonry wall shear shall  
274 be based on the racking procedure developed for sheathed wood frames as described  
275 in ASTM E 72. As an alternative, procedures in ASTM E 564 may be used. For this test,  
276 the loading procedure described in ASTM E 72 shall be modified to apply the lateral  
277 racking and vertical loads through a continuous, reinforced concrete or steel member.  
278 Its attachment to the specimen shall be designed so that applied loads are uniformly  
279 distributed along the specimen length. The specimen shall be mounted on a base in a  
280 manner equivalent to the method commonly used in the field. In this regard, the  
281 attachment of the specimen to the base shall be constructed to avoid a concentrated  
282 reaction. In addition, where the superimposed vertical load is not sufficient to resist the  
283 overturning moment, hold-down devices shall be incorporated to prevent premature  
284 failure due to this action. The procedures and details of the specific test setup will  
285 depend on the product or system being tested, and these procedures and details shall  
286 be fully described in the test plan.

#### 287 **4.4 Durability Tests:**

288 **4.4.1 Freeze-thaw Resistance:** Reports of freeze-thaw tests on the masonry  
289 units in accordance with ASTM C 666, Method A shall be submitted. A minimum of five  
290 specimens shall be tested for 300 cycles. The same number of specimens made from  
291 same batch shall be kept in laboratory conditions [relative humidity of  $50 \pm 2$  percent  
292 and a temperature of  $73^{\circ}\text{F} \pm 2^{\circ}\text{F}$  ( $23.7^{\circ}\text{C} \pm 1.1^{\circ}\text{C}$ )] during the freeze-thaw testing. Mass

293 loss must be measured after each 50 cycles. At the end of the freeze-thaw cycles,  
294 freeze-thaw cycled conditioned specimens and laboratory conditioned specimens shall  
295 be tested for unit compressive strength in accordance with ASTM C 140.

296 **Conditions of acceptance:** No masonry unit shall lose more than 0.5 percent of its  
297 weight at the end of the freeze-thaw cycles or exhibit signs of breaking or cracking.

298 The average unit compressive strength of the freeze-thaw cycled specimens shall be  
299 at least 90 percent that of the laboratory conditioned specimens.

300 **4.4.2 Fungal Decay Resistance Test:** Representative material used to create  
301 the masonry units shall be tested for resistance to decay in accordance with ASTM D  
302 2017. A minimum of 20 samples shall be tested and each sample shall produce six  
303 blocks for each of the appropriate fungal decay specimens.

304 **Conditions of Acceptance:** Visual examination of the masonry units used in the  
305 ASTM D 1413 testing shall reveal no evidence of distortion, shrinkage, softening or  
306 other evidence of decay.

307 **4.4.3 Termite-resistance Test:** Representative material used to create the  
308 masonry units shall be tested for resistance to subterranean termites in accordance with  
309 ASTM D 3345. A minimum of five replicate blocks for each variable under test shall be  
310 tested.

311 **Condition of Acceptance:** Specimens shall demonstrate no evidence of termite  
312 attack.

## 313 **5.0 QUALITY CONTROL**

314 The cellular-wood-fiber-reinforced masonry units shall be manufactured under an  
315 approved quality control program with inspections by an inspection agency accredited

316 by International Accreditation Service (IAS) or otherwise acceptable to ICC-ES. Quality  
317 documentation complying with the ICC-ES Acceptance Criteria for Quality  
318 Documentation (AC10) shall be submitted.

319 The masonry units subsequently produced at the manufacturing facilities shall be  
320 correlated to the test data by ongoing quality control testing (i.e., compressive strength,  
321 density, dimensions, linear shrinkage, moisture content and water absorption tests)  
322 conducted as part of the production facility's quality assurance program. The test results  
323 shall be made available during follow-up inspections by the inspection agency.

## 324 **6.0 EVALUATION REPORT RECOGNITION**

325 The evaluation report shall include:

326 **6.1** Basic information required by Section 2.0.

327 **6.2** The compressive strength, density and dimensions of the cellular-wood-fiber-  
328 reinforced masonry units.

329 **6.3** Allowable loads for each wall assembly configuration.

330 **6.4** Descriptions of weather protection used for the cellular-wood-fiber-reinforced  
331 walls showing compliance with IBC Section 1403.2 or IRC Section R703, as applicable.

332 **6.5** A statement that door and window openings shall be designed using  
333 conventional construction materials to the satisfaction of the code official. The design  
334 shall be in accordance with the applicable code.

335 **6.6** A statement that special inspection, conforming to IBC Section 1704 shall be  
336 provided for installations under the IBC and IRC.

337 **6.7** The evaluation report shall be limited to the type of mortar used in the  
338 qualification tests.

339     **6.8**    If test results in accordance with Section 3.5 of this criteria are not submitted,  
340 masonry wall construction using cellular-wood-fiber-reinforced masonry blocks shall be  
341 limited to nonfire-resistance rated construction.

342     **6.9**    If test results in accordance with Section 3.7 of this criteria are not submitted,  
343 masonry wall construction using cellular-wood-fiber-reinforced masonry blocks shall be  
344 limited to combustible construction.