ICC EVALUATION SERVICE

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February 2, 2009

TO: **PARTIES INTERESTED IN EVALUATION REPORTS ON REINFORCED CEMENTITIOUS SHEETS**

SUBJECT: Proposed Revisions to the Acceptance Criteria for Reinforced Cementitious Sheets Used as Wall Sheathing and Floor Underlayment, Subject AC376-0209-R1 (YM/MB)

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. An evaluation report holder has requested the criteria be revised to include recognition of the reinforced cementitious sheets for use in ceiling applications. The following revisions are proposed:

1. Revise title and scope of criteria to include ceiling applications.

2. Add ASTM C 473 to the list of referenced standards.

3. Add language to Section 3.3 of the criteria to clarify that the room-corner fire test assemblies need to include wall and ceiling sheets.

4. Add humidified deflection and fastener holding tests, as described in Section 3.9 of the enclosed criteria, for recognition in ceiling applications. These requirements are based on the same requirements used to evaluate fiber-cement substrate sheets used in ceiling applications as described in the ICC-ES Acceptance Criteria for Fiber-cement Interior Substrate Sheets Used in Wet and Dry Areas (AC378).

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.

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.

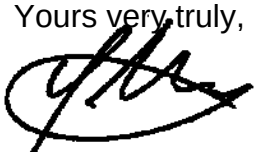
Correspondence received and a memo outlining staff's resolution of the comments in the correspondence will be posted on the web site shortly after the close of the comment period.

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.

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 3260, or Michael Beaton, P.E., Vice President-Whittier Operations, at extension 3275. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,



Yamil Moya, P.E.
Staff Engineer

YM/ll:raf

Enclosure

cc: Evaluation Committee

ICC EVALUATION SERVICE

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PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR REINFORCED CEMENTITIOUS SHEETS USED AS WALL AND CEILING SHEATHING AND FLOOR UNDERLAYMENT

AC376

Proposed February 2009

Previously approved June 2007

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 for purposes of issuing ICC-ES evaluation reports.

PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR REINFORCED CEMENTITIOUS SHEETS USED AS WALL AND CEILING SHEATHING AND FLOOR UNDERLAYMENT

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish the basis by which reinforced cementitious sheets can be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2006 International Building Code® (IBC), the 2006 International Residential Code® (IRC) and the 1997 Uniform Building Code™ (UBC). Bases of recognition are IBC Section 104.11, IRC Section R104.11 and UBC Section 104.2.8.

The reason for development of this criteria is to establish test requirements that will permit the materials to be used in structural assemblies in combustible and/or noncombustible construction and in fire-resistance-rated construction, since the code does not provide requirements for reinforced cementitious sheets complying with ASTM C 1325 to be used in this manner.

1.2 Scope: This acceptance criteria applies to reinforced cementitious sheets used as sheathing in vertical applications in interior or exterior assemblies, or interior ceiling applications or as flooring underlayment. The reinforced cementitious sheets may contain fillers such as polystyrene aggregate. Recognition includes use to resist wind and seismic forces, in combustible and/or noncombustible construction and in fire-resistance-rated construction. A water-resistive barrier shall be applied either between the exterior side of the reinforced cementitious sheets and the exterior wall covering or immediately behind the reinforced cementitious sheets. Reinforced cementitious sheets complying with this criteria will not require a thermal barrier to be installed between the sheets and the interior of the building. However, this criteria does not qualify the reinforced cementitious sheets to act as a thermal barrier for foam plastic insulation. Sheets used as subfloor or single floor sheets shall comply with the ICC-ES Acceptance Criteria for Fiber-cement Sheet Structural Floor Sheathing (AC367).

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 1997 Uniform Building Code™ (UBC).

1.3.4 ASTM C 473-03, Test Method for Physical Testing of Gypsum Panel Products, ASTM International.

1.3.5 ASTM C 1325-04, Standard Specification for Non-asbestos Fiber-mat Reinforced Cement Substrate Sheets, ASTM International.

1.3.6 ASTM C 1396-02, Standard Specification for Gypsum Wallboard, ASTM International.

1.3.7 ASTM D 1037-06a, Standard Test Methods for Evaluating Properties of Wood-based Fiber and Particle Panel Materials, ASTM International

1.3.8 ASTM E 72-02, Standard Test Methods for Conducting Strength Tests of Sheets for Building Construction, ASTM International.

1.3.9 ASTM E 84-04, Test Methods for Surface Burning Characteristics of Building Materials, ASTM International.

1.3.10 ASTM E 119-05a, Test Methods for Fire Tests of Building Construction and Materials, ASTM International.

1.3.11 ASTM E 136-02, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, ASTM International.

1.3.12 NFPA 285, Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components, National Fire Protection Association.

1.3.13 NFPA 286-00, Standard Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, National Fire Protection Association.

1.3.14 UL 1715-97, Fire Test of Interior Finish Material, with Revisions through 2002, Underwriters Laboratories Inc.

1.4 Definitions:

1.4.1 Reinforced Cementitious Sheets: Reinforced cementitious sheets are nailable, screwable sheets complying with ASTM C 1325. The sheets consist of a proprietary composition of portland cement that is reinforced by a fiber-mat or fiber scrim made of organic or inorganic fibers and may include polystyrene aggregate and additives and factory-applied coatings. The sheets are manufactured in various lengths and widths, and in thicknesses from 1/4 to 1 inch (6.3 to 25.4 mm).

1.4.2 Fastening System: The method used to attach the sheets to the framing. The system can include nails and screws.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information concerning material specifications, thickness, size and the manufacturing process. All constituents, including, but not limited to, polystyrene, other additives and factory-applied coatings, shall be identified. Reinforcement used in production of the sheet shall be unaffected by prolonged exposure to moisture.

2.1.2 Installation Instructions: Installation details on requirements and limitations, fastening methods, fabrication methods, joint treatments and face treatments. When installed as flooring underlayment, the subfloor shall have tongue-and-groove edges or blocked edges as required in IBC Table 2304.7 (3).

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the sheet. Identification shall include the evaluation report number 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 sheets for testing under this criteria shall comply with Sections 3.1, 3.3 and 3.4 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 Reinforced Cementitious Sheets: The reinforced cementitious sheets shall comply with the requirements of ASTM C 1325, including the supplementary requirements described in Section S1 of ASTM C 1325.

3.2 Flame Spread Characteristics: The reinforced cementitious sheets shall be tested in accordance with ASTM E 84 and shall have a flame-spread index of 10 or less and a smoke-developed index of 5 or less.

3.3 All Types of Construction: For interior or exterior use in combustible or noncombustible construction; and for reinforced cementitious sheets with polystyrene aggregate, to establish that a thermal barrier is not required to be installed over the reinforced cementitious sheets, room-corner fire tests shall be conducted on wall and ceiling assemblies constructed using both the reinforced cementitious sheets and gypsum board complying with ASTM C 1396. Tests shall be conducted in accordance with the procedures of, and shall comply with, either NFPA 286 or UL 1715. When testing in accordance with NFPA 286 or UL 1715, conditions of acceptance are as noted in IBC Section 803.2. In addition, maximum heat release rate, total heat released and smoke generation shall be determined for both materials, and the values for the reinforced cementitious sheets shall be no greater than the values for the gypsum board.

3.4 Noncombustible Construction: For use of the sheets in noncombustible construction, tests shall be conducted in accordance with either ASTM E 136 or NFPA 285.

3.5 Fire-resistance-rated Construction: For use in fire-resistance-rated construction, tests shall be conducted in accordance with ASTM E 119.

3.6 Racking Shear Resistance: For recognition of resistance to racking shear forces, tests shall be conducted in accordance with the Acceptance Criteria for Racking Shear Evaluation of Proprietary Sheathing Materials Used as Braced Wall Panels (AC269). A factor of safety of 3 shall be used. For exterior use, tests shall be conducted after wetting in accordance with Section 15 of ASTM E 72.

3.7 Resistance to Transverse Loads: Tests shall be conducted in accordance with Section 4.1 of this criteria.

3.8 Fasteners: Fastener withdrawal and pull-through testing shall be conducted in accordance with ASTM D 1037 and ASTM C 1325, as applicable, for each type of fastener, such as nails and screws, approved for use by the manufacturer of the reinforced cementitious sheets. Ten specimens of each fastener shall be tested to determine withdrawal and pull-through strength, minimum spacing and minimum edge and end distances.

3.9 Ceiling Applications:

3.9.1 Humidified Deflection: A report of tests on the reinforced cementitious sheets shall be submitted in accordance with Section 4.2 of this criteria. The humidified deflections shall be less than or equal to values described in Table 2 of this criteria.

3.9.2 Fastener Holding: A report shall be submitted of fastener lateral load tests in accordance with Section 4.3 of this criteria. The specifications of the fastener and connected material shall be representative of the end use. The lateral load strength of the tested configurations shall be greater than or equal to values described in Table 1 of this criteria

4.0 TEST METHODS

4.1 Resistance to Transverse Loads:

4.1.1 General: Structural tests are required to determine allowable positive (inward) and negative (outward) pressures that may be imposed on the sheets and their fastening system. The test specimens shall represent the critical conditions of installation. This includes maximum size and support spacing and minimum sheet thickness, support material thickness, density, connections, and any other conditions that affect the structural performance of the sheets.

4.1.2 Testing shall be done according to ASTM E 72. At least three positive and three negative load tests shall be conducted with sheets fastened to the framing system in accordance with the published installation instructions. Tests shall be conducted on systems assembled without the use of adhesives.

4.1.3 Test assemblies shall be a minimum of 4 feet by 8 feet (1219 mm by 2438 mm). [Four-foot by 4-foot (1219 mm by 1219 mm) specimens can be used if the sheet spans between framing members without bearing on the top and bottom headers.] Load deflection readings at the midpoint of sheet spans shall be reported.

4.1.4 Conditions of Acceptance: Allowable loading shall be based on a factor of safety of 3 applied to the average ultimate load, if all of the following are satisfied:

4.1.4.1 Allowable load does not exceed established values for mechanical connectors such as nails and screws.

4.1.4.2 No single test result varies by more than 15 percent from the average of three tests. Variations exceeding this limit will result in larger safety factors.

4.2 Humidified Deflection: Tests shall be in accordance with ASTM C 473, Section 14. A minimum of three specimens shall be used.

4.3 Fastener Lateral Load: Testing shall be in accordance with ASTM D 1037, Sections 41 through 46. A

minimum of five specimens for each environmental exposure condition shall be used.

5.0 QUALITY CONTROL

5.1 The sheets 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.■

TABLE 1— FASTENER LATERAL LOAD PERFORMANCE CRITERIA

PANEL THICKNESS	MINIMUM PEAK LOAD (lbf)
Less than $^1/_2$ inch	60
$^1/_2$ inch or greater	90

For **SI:** 1 inch=25.4 mm; 1 lbf=4.48 N.

TABLE 2— HUMIDIFIED DEFLECTION PERFORMANCE CRITERIA

INTENDED USE	DEFLECTION (INCH)
Ceiling finish (textured or painted)	$^5/_{16}$
Base for tile	0.0639[1]

For **SI:** 1 inch=25.4 mm; 1 lbf=4.48 N.

[1]Based on 1/360 of 23-inch test span