ICC EVALUATION SERVICE

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December 29, 2009

TO: **PARTIES INTERESTED IN $^1/_2$-INCH SAG-RESISTANT GYPSUM CEILING BOARD INSTALLED WITH TWO-PART POLYURETHANE ADHESIVE**

SUBJECT: Proposed Acceptance Criteria for $^1/_2$-inch Sag-resistant Gypsum Ceiling Board Installed with Two-part Polyurethane Adhesive, Subject AC417-0210-R2 (BB/GN)

Hearing Information:
Tuesday, February 2, 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 subject proposed new acceptance criteria will be on the agenda of the Evaluation Committee hearing noted above. The criteria is needed to provide a means to evaluate $^1/_2$-inch-thick sag-resistant gypsum ceiling board for installation with the long dimension parallel to 24-inch-on-center framing, using two-part polyurethane adhesive, and for finishing with a water-based texture. The criteria proposal is a modification of the proposal which was brought before the committee in October 2009. The modifications to the original proposal address comments received during the public review process and are noted in the enclosed criteria as underline and ~~strikeout~~. The following is a list of significant changes:

- The codes section was changed to reference the 2009 IBC and the 2009 IRC instead of the 2006 versions of those codes.

- The term “enhanced” was removed from the title and from the description of the ceiling board because the ceiling board is simply sag-resistant ceiling board complying with ASTM C 1396. For this criteria, the increase in sag resistance is provided by the method of construction rather than the board itself. Polyurethane foam installation was also included in the title, which limits the use of this construction technique to factory installation.

- References to wet sprayed cellulosic insulation were removed from the criteria. A provision was added that, unless moist-installed insulation was specifically tested, a condition of use statement must be added to the evaluation report to indicate that moist-installed insulation is outside scope of the report.

- Sections 3.6 and 3.7 were removed from the criteria.

- The test method was revised and simplified.

- The comparative deflection option was removed from the conditions of acceptance, leaving only the maximum deflection criteria of Section 4.2.

- Condition of use statements were added and others clarified.

- Standards ASTM E 84, ASTM E 136, and NFPA 286 were added to the referenced standards.

The following rationale is proposed as justification for accepting this criteria:

The code places limitations on the installation of gypsum ceiling board, to prevent excessive sag in finished ceilings. These limitations were established under the assumption that the ceiling board would be installed in the code-prescribed manner using mechanical fasteners. A construction technique, which is used in a factory setting, allows for the use of two-part polyurethane adhesive for attaching the gypsum board. The adhesive is applied in a wide and continuous bead, which can result in a relatively rigid connection compared to that of code-prescribed fastening, and a consequent reduction in deflection. The proposed criteria would allow the use of this construction technique provided the gypsum ceiling board is shown to perform within acceptable limits when the technique is used.

The code allows substitutions where the installations include water-based textured finishes. The code prescribes a stepwise increase in thickness to gain the extra rigidity needed to offset the tendency of the board to sag more under these more humid conditions. Thus, $^{1}/_{2}$-inch-thick ceiling board is required, instead of $^{3}/_{8}$-inch board, for installations perpendicular to 16-inch-on-center framing where water-based texturing is involved. Similarly, $^{5}/_{8}$-inch-thick ceiling board is required, instead of $^{1}/_{2}$-inch-thick board, for perpendicular-to-24-inch-on-center framing installations with the texturing. This stepwise increase relationship might be applied to ceiling board installed parallel to framing, except for the perpendicular-to-framing limitation set forth above. If the relationship is reliable, $^{5}/_{8}$-inch-thick ceiling board, which may be installed parallel to 24-inch-on-center framing, could be finished with water-based texturing, provided its rigidity were doubled. Half-inch-thick, sag-resistant, gypsum ceiling board exhibits humidified deflection half that of $^{5}/_{8}$-inch-thick gypsum board; and this product is already allowed but only as a prescriptive substitute for the $^{5}/_{8}$-inch board under the same conditions. If we further increase the rigidity of the ceiling board through installation practices, however, to $^{5}/_{32}$-inch humidified deflection, we believe that would justify the sag-resistant gypsum ceiling board being installed parallel to framing.

The above references to the rigidity of the ceiling board have been based on the humidified deflection criteria in the standard used in qualifying gypsum board, ASTM C 1396. The deflection in the standard is determined with specimens mounted in the testing apparatus in a simple span configuration, so humidified deflections are intended only to be used as comparisons. The ceiling board is installed over at least two spans in reality, so the actual deflections are somewhat less in practice. And there is the problem of conditioning; humidified deflection testing is carried out under conditions that do not necessarily resemble end-use. Determining deflection in an end-use condition would be more direct. Additionally, there are ceiling height variances inherent in the type of construction where this product will be used. Differences in plate height, inconsistencies in bottom chord or ceiling framing height, installation issues, and the irregularities in texturing all contribute to differences in ceiling height. Ceiling board deflection should not be required to be more precisely measured than the error in these.

Staff is proposing end-use-condition deflection testing as a means to justify the application. Staff is proposing a maximum deflection of $^{3}/_{16}$ inch (the standard requires measuring to the nearest $^{1}/_{16}$ inch only).

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.

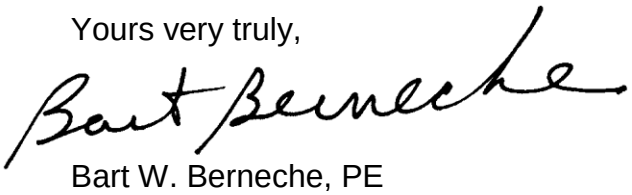
7. Any visual aids for viewing at committee meetings (charts, overhead transparencies, slides, videos, electronic presentations, etc.) will be permitted only if a copy is provided to ICC-ES, before the presentation, in a medium that can be retained with other records of the meeting.

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 5593. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,



Bart W. Berneche, PE
Staff Engineer

BWB/raf

Enclosure

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 ($^2/_3$) 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) 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

ICC EVALUATION SERVICE

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

PROPOSED ACCEPTANCE CRITERIA FOR ~~ENHANCED~~ 1/2-INCH SAG-RESISTANT GYPSUM CEILING BOARD INSTALLED WITH TWO-PART POLYURETHANE ADHESIVE

AC417

Proposed ~~September 2009~~ 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 for purposes of issuing ICC-ES evaluation reports.

PROPOSED ACCEPTANCE CRITERIA FOR ~~ENHANCED~~ 1/2-INCH SAG-RESISTANT GYPSUM CEILING BOARD INSTALLED WITH TWO-PART POLYURETHANE ADHESIVE

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for ~~enhanced~~ sag-resistant gypsum ceiling board, installed parallel to 24-inch-on-center framing using a two-part polyurethane adhesive, to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the ~~2006~~ 2009 *International Building Code*® (IBC) and the ~~2006~~ 2009 *International Residential Code*® (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11. Applicable code sections are IBC Sections 2506.2 and 2508, IRC Section R702.3, and IRC Table R702.3.5.

The reason for the development of this criteria is to set requirements for evaluation of ~~enhanced~~ sag-resistant gypsum ceiling board installed parallel to 24-inch-on-center ceiling framing, since the codes do not provide requirements for evaluation of such products for this use.

1.2 Scope: This acceptance criteria is applicable to 1/2-inch-thick sag-resistant gypsum ceiling board fastened ~~with conventional gypsum ceiling board fasteners or,~~ in a factory setting, to wood frame construction, ~~with~~ using polyurethane ~~foam~~ adhesive complying with AC223 (the Acceptance Criteria for Two-part Polyurethane Adhesives Used to Attach Gypsum Board to Wood Framing).

This criteria includes provisions for evaluating 1/2-inch-thick sag-resistant gypsum ceiling board ~~for use with water-based texture and wet-sprayed cellulosic insulation~~, installed with the long dimension parallel to 24-inch-on-center framing and finished with

water-based texture. The sag-resistant gypsum ceiling board is an alternative to the prescriptive application and installation requirements of gypsum ceiling board in IRC Table R702.3.5, and gypsum ceiling board installation standards referenced in the IBC~~.~~ ~~These standards limit~~ , which limits gypsum wallboard installation with water-based textures to minimum $^{5}/_{8}$-inch-thick gypsum wallboard, installed perpendicular to framing for applications with ceilings framed at 24 inches on center.

The sag-resistant gypsum ceiling board qualified by this criteria is not intended for use in areas described in IBC Section 2509 or IRC Section R702.3.8.

1.3 Codes and Referenced Standards:

1.3.1 ~~2006~~ 2009 *International Building Code*®, International Code Council.

1.3.2 ~~2006~~ 2009 *International Residential Code*®, International Code Council.

1.3.3 ASTM International:

1.3.3.1. ASTM C 1396-~~02~~06a, Standard Specification for Gypsum Board.

1.3.3.2. ASTM C 1264-05, Standard Specification for Sampling, Inspection, Rejection, Certification, Packaging, Marking, Shipping, Handling, and Storage of Gypsum Panel Products.

1.3.3.3. ASTM C 473-~~03~~06a, Standard Test Methods for Physical Testing of Gypsum Panel Products.

1.3.3.4. ASTM C 840-~~04~~07, Standard Specification for Application and Finishing of Gypsum Board.

1.3.3.5. ASTM E 84-07, Test Methods for Surface Burning Characteristics of Building Materials.

~~**1.3.3.6.** ASTM E 119-00, Standard Test Methods for Fire Tests of Building Construction and Materials.~~

1.3.3.7. ASTM E 136-99e01, Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

~~**1.3.4** GA-214-07, Recommended Levels of Gypsum Board Finish, Gypsum Association.~~

1.3.5 NFPA 286-06, Standard Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, National Fire Protection Association.

1.3.6 UL 1715-97, Fire Test of Interior Finish Material – with Revisions through March 2004. Underwriters Laboratories Inc.

1.3.7 Acceptance Criteria for Two-part Polyurethane Adhesives Used to Attach Gypsum Board to Wood Framing (AC223), ICC Evaluation Service, Inc.

~~**1.4 Definition: Enhanced Sag-resistant Gypsum Ceiling Board:** Enhanced sag-resistant gypsum ceiling board is a proprietary gypsum panel product which exhibits deflection characteristics, under moist conditions, in accordance with this acceptance criteria.~~

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information on the boards, including material specifications, available board sizes, board thickness and tolerances.

2.1.2 Installation Instructions: Complete instructions on recommended installation methods and practices, including ~~allowable fastening methods and~~ limitations on the use of insulation and polyurethane ~~foam~~ adhesives ~~and blown-in cellulosic insulation~~.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the board. Identification provisions shall include the ICC-ES evaluation report number.

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. Reports of tests under Section 4.0 shall include:

2.3.1 A complete description of the test, including diagrams.

2.3.2 A complete description of the tested assembly.

2.3.3 A statement of purpose for the test.

2.3.4 Material descriptions.

2.3.5 A description of the assembly and its construction methods.

2.3.6 Photographs of the assembly and the condition of the ceiling board before and after testing.

2.3.7 Numerical and graphical results of testing.

2.3.8 An analysis of the results.

2.3.9 A conclusion statement about the acceptability of the ceiling board for use as ~~enhanced~~ sag-resistant ceiling board and the reasons for acceptance. Conclusions shall address whether the boards performed adequately as fastened.

2.4 Product Sampling: Sampling of the ~~enhanced~~ sag-resistant gypsum ceiling board for tests under this criteria shall comply with Section 3.2 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 The board shall be tested in accordance with ASTM C 473 and shall meet the minimum criteria for flexural strength, humidified deflection, nail pull resistance, and dimensions and tolerances for gypsum ceiling board in Section 12 of ASTM C 1396.

3.2 The ~~gypsum ceiling~~ board shall be tested in accordance with Section 4.1 ~~in~~ to simulate full-scale, end-use installation conditions, and must meet the conditions in Section 4.2.

3.3 Proprietary ~~foam~~ polyurethane adhesives used to fasten ~~gypsum ceiling~~ the board to wood framing shall be evaluated for conformance with AC223 ~~or~~ and shall be recognized in a current ICC-ES evaluation report as conforming to AC223.

3.4 The ~~gypsum ceiling~~ board shall ~~have a flame spread index of not more than 25 when tested in accordance with Test Method~~ be tested in accordance with ASTM E 84~~. The panels~~ and shall be classified as Class A in accordance with Section 803.1 of the IBC or shall meet the requirements of Section R~~315~~316.3 of the IRC, as applicable.

3.5 The gypsum core of the board shall be tested for noncombustibility in accordance with ASTM E 136, and the paper facing of the board shall have a flame spread rating complying with IBC Section 703.4.2 for recognition as a noncombustible material under Section 703.4 of the IBC.

~~**3.6** (Optional) For recognition of use as a thermal barrier, unless fastened as prescribed by the applicable code, the gypsum ceiling board shall be tested in accordance with the procedures noted in Section 2603.4 of the IBC or Section R314.4 of the IRC. The testing shall document use of the panels as a 15-minute thermal barrier for separating foam plastic.~~

~~**3.7** (Optional) For recognition of assemblies as part of fire-resistance-rated assemblies, the assemblies shall be tested in accordance with ASTM E 119.~~

4.0 TEST METHODS

4.1 End-use-condition Deflection Testing: The actual deflection expected under end-use conditions shall be determined by full-scale testing. The test protocol ~~shall be submitted for approval by ICC-ES prior to testing and~~ shall include the following: The assembly shall be subjected to a conditioning regimen to subject the ~~ceiling~~ board to high temperature and humidity conditions and to simulate the effects of ambient condition changes. The room shall be kept closed to maintain the hot and humid conditions [greater than 90 percent relative humidity and 85°F (29°C)] for a minimum of 30 days, with deflection, humidity, and temperature readings taken at maximum 24-hour intervals. The minimum number of panels tested shall be three, and the minimum size of the full-scale test assembly shall be 12 feet by 8 feet. The ~~gypsum ceiling~~ board shall be installed onto 24-inch-on-center ceiling framing, with the long edge of the ~~gypsum ceiling~~ boards installed parallel to the framing direction, and the gypsum board end joints shall not be staggered. Deflection readings shall be taken to the nearest $^{1}/_{16}$ inch, with initial readings taken before the ~~ceiling~~ board is loaded, and after the insulation load and texturing, in turn, are applied.

~~The type and spacing of the fasteners used to attach the gypsum board to the ceiling framing shall be described to establish a lower limit on the allowable fastener specifications. If recognition is sought for the use of proprietary foam adhesives for fastening the gypsum ceiling board to wood framing, the foam~~ A two-part polyurethane adhesive complying with AC223, and recognized in a current ICC-ES evaluation report, shall be used to attach the ~~gypsum ceiling~~ board in the tested assembly ~~and shall be installed~~ in a manner to simulate end-use installation procedures. ~~Wet-sprayed cellulosic insulation~~ Top loading shall be used to simulate the loading effects of end-use insulation. The loading shall be installed onto the upper surface of the ~~gypsum ceiling~~ board to ~~a depth which~~ represent~~s~~ a maximum of 2.2 ~~psf~~ pounds per square foot ~~minimum~~ of ~~overburden~~ distributed load. If recognition is sought for the use of moist installed insulation, the material used to simulate top loading must also simulate the moisture effects likely to occur. The ~~gypsum ceiling~~ board shall be ~~textured with water-based texturing compound~~ finished to a Level 3 finish in accordance with ~~Recommended Levels of Gypsum Board Finish (GA-214)~~ ASTM C 840, in preparation to receive the water-based texture, and the texturing shall be applied. The texturing compound shall be a gypsum-base perlite-aggregate.

~~Ceiling b~~Board deflection measurements shall be taken at mid-span between, and relative to, the supporting framing. A minimum of three locations shall be measured in each framing bay, for a minimum of six deflection measurements for each of the three boards tested. If global deflection measurements are taken, deflection measurements of the framing adjacent to the deflection locations shall be subtracted from the measurements taken at those locations.

4.2 Conditions of Acceptance: ~~The test results shall meet one of the following conditions:~~ The actual deflection of the sag-resistant gypsum ceiling board at a given location shall be defined as: the difference in elevation between the average of the bottom surfaces of the gypsum ceiling board directly beneath adjacent framing members, and the lowest point of the bottom surface of the ceiling board between these two adjacent framing members, at that location. The deflection at each of the 18 measurement locations shall be a maximum of 3/16 inch.

~~**4.2.1 Comparative Deflection:** The average deflection of the 1/2-inch-thick enhanced sag-resistant gypsum ceiling board, tested in accordance with Section 4.1, shall be less than the average deflection of a 5/8-inch-thick gypsum wallboard tested in accordance with Section 4.1, except the 5/8-inch-thick wallboard shall be installed with the panel long dimension perpendicular to the ceiling framing direction. The 5/8-inch-thick gypsum board shall be fastened as prescribed in IRC Table R702.3.5. The 5/8-inch-thick gypsum wallboard shall be demonstrated to marginally comply with the minimum acceptance standards of ASTM C 1396 for 5/8-inch-thick gypsum wallboard.~~

~~**4.2.2 Maximum Deflection:** The average actual deflection of the gypsum ceiling board shall be a maximum of 3/16 inch between the supporting framing members for the gypsum board fastened parallel to 24-inch-on-center framing.~~

5.0 QUALITY CONTROL

5.1 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10), describing the procedures of the manufacturer(s) of the ~~enhanced~~ sag-resistant gypsum ceiling board, 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 details of the allowable proprietary ~~foam~~ polyurethane adhesives ~~and nonproprietary fastening systems~~ justified for use with the sag-resistant gypsum ceiling board. The evaluation report shall be limited to the specific polyurethane adhesive used in the tests. The minimum adhesive bead size ~~fastener specification and maximum fastener spacing~~ used in testing shall be identified ~~included~~.

~~**6.2** If an assembly incorporating foam adhesive complying with AC223 is qualified through testing for parallel-to-framing installation of the board, a statement shall be included as to the acceptability of using the foam adhesive complying with AC223. The evaluation report shall be limited to the specific foam adhesive used in the tests.~~

6.3 The report shall specify the maximum allowable insulation ~~thickness and density~~ weight, which shall be consistent with the limitations of the tested assembly ~~limitations~~.

6.4 The following conditions of use shall be included in the evaluation report:

6.4.1 ~~The following statement shall be included when foam adhesive is allowed as an optional fastening medium: "When using foam adhesive~~ "Where a vapor-retarder is required, no vapor retarder is to be installed in locations where it ~~used where this~~ might prevent the two-part polyurethane adhesive from properly adhering to the ~~ceiling~~ board."

6.4.2 ~~The evaluation report shall state that the~~ "Sag-resistant gypsum ceiling board ~~is not intended to be used as a horizontal diaphragm, and is not intended for service~~ must not be used in unusually moist environments such as gang showers."

6.4.3 Unless moist-installed insulation was used specifically in qualifying testing: "Moist installed insulation must not be used."

6.4.4 Unless testing is provided that shows that the sag-resistant gypsum ceiling board, installed using a two-part polyurethane adhesive, will remain in place for a minimum of 15 minutes when tested in accordance with UL 1715 or NFPA 286: "The gypsum ceiling board must not be used as a thermal barrier for separating foam plastic from the interior of the building in accordance with IBC Section 2603.4."

6.4.5 "Horizontal diaphragm applications with sag-resistant gypsum ceiling board have not been evaluated." ■