



To: ICC-ES Evaluation Committee
From: Michael Beaton, P.E.
Date: May 21, 2008
Subject: Proposed Revisions to the ICC-ES Acceptance Criteria for Foam Plastic Insulation, Subject AC12-0508-R1 (MB/MO)

MEMO

The purpose of this memo is to summarize comments received regarding the proposed revisions to AC12 attached to the staff letter dated April 28, 2008, and to provide additional revisions resulting from those comments. Two responses were received, one from Hughes Associates, Inc., dated May 14, 2008, and the other from Polyisocyanurate Insulation Manufacturers Association (PIMA), dated May 14, 2008.

Staff considered the comments from the noted parties and offers the revisions contained within this memo as revisions to the proposed criteria attached to the April 28, 2008, staff letter. The additional revisions are as follows:

1. Replace Section 4.5.11.5 with the following:

4.5.11.5.1.1 Foam plastic insulation installed in attics where entry is made only for service of utilities shall be protected by an ignition barrier as set forth in IBC Section 2603.4.1.6, IRC Section R314.5.3 or Exception 4 of UBC Section 2602.4, except as noted in Section 4.5.11.5.1.2. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, plumbing, gas or electric hot water heaters, and gas or electric furnaces.

4.5.11.5.1.2 The ignition barrier shall not be required when satisfactory testing is conducted in accordance with either Section 4.5.11.5.1.2.1 or 4.5.11.5.1.2.2.

4.5.11.5.1.2.1 For Use on Walls or Floors of Attics or the Underside of Roof Decks in Attics with Limitations Noted in Section 4.5.11.5.1.2.3.2: Tests shall be conducted in accordance with NFPA 286 with the conditions of acceptance specified in IBC Section 803.2; or in accordance with UL 1715 or UBC Standard 26-3 with conditions of acceptance as specified in Section 4.5.2 of AC12. The tests shall be conducted with the foam plastic installed ~~in the manner~~ at the maximum thickness and maximum density for which recognition is sought over the gypsum wallboard or glass-reinforced cement board as described in the standard.

4.5.11.5.1.2.2 For Use on Walls or Floors of Attics or the Underside of Roof Decks in Attics with Limitations Noted in Section 4.5.11.5.1.2.3.1: Comparative room corner fire tests shall be conducted in accordance with the test procedures of NFPA 286, UL 1715 or UBC Standard 26-3. The foam plastic insulation shall be applied in the manner for which recognition is sought. The interior face of the control assembly shall consist of ¹/₄-inch-thick ~~interior CDX grade~~ plywood applied to the interior face of wood wall framing (plywood is permitted by IBC section 2603.4.1.6, IRC section R314.5.3 and UBC Section 2602.4, Exception 4, as a protective

material for foam plastic located in attics.) The exterior face shall be covered with $\frac{3}{8}$ -inch-thick exterior plywood. The second test assembly shall be identical, but without plywood on the interior face of the wall. Conditions of acceptance shall consider the time-to-failure of the control test assembly, as evidenced by flashover, which is flame exiting the door opening. The second assembly with exposed foam plastic shall be tested for at least the same duration of time. A successful comparison is based on no flashover of the second assembly within the time-to-failure of the control test assembly.

4.5.11.5.1.2.3 Limitations on Attic Installations:

4.5.11.5.1.2.3.1 When testing is in accordance with Section 4.5.11.5.1.2.2, the evaluation report shall include the following limitations:

- a. Entry to the attic is only to service utilities and no storage is permitted.
- b. There are no interconnected attic areas.
- c. Air in the attic is not circulated to other parts of the building.
- d. Attic ventilation is provided in accordance with IBC Section 1203.2 or IRC Section R806, as applicable.
- e. The foam plastic insulation is limited to the maximum thickness and density tested.
- f. Combustion air is provided in accordance with IMC Sections 701 and 703.

4.5.11.5.1.2.3.2 When testing is in accordance with Section 4.5.11.5.1.2.1, the evaluation report shall include the following limitations:

- ~~a. No storage is permitted.~~
- ~~a. b.~~ Attic ventilation is provided in accordance with IBC Section 1203.2 or IRC Section R806, as applicable.
- ~~b. e.~~ Combustion air is provided in accordance with IMC Sections 701 and 703.
- ~~c. d.~~ The foam plastic insulation is limited to the maximum thickness and density tested.

4.5.11.5.2 Crawl Spaces:

4.5.11.5.2.1 Foam plastic insulation installed in a crawl space where entry is made only for service of utilities shall be protected by an ignition barrier as set forth in IBC Section 2603.4.1.6,

IRC Section R314.5.4 or Exception 4 of UBC Section 2602.4, except as noted in Section 4.5.11.5.2.2. Utilities include, but are not limited to, mechanical equipment, electrical wiring, fans, plumbing, gas or electric hot water heaters, and gas or electric furnaces.

4.5.11.5.2.2 The ignition barrier shall not be required when satisfactory tests are conducted in accordance with either Section 4.5.11.5.2.2.1 or Section 4.5.11.5.2.2.2.

4.5.11.5.2.2.1 For Use on Walls of Crawl Spaces or the Underside of Floors in a Crawl Space with Limitations as Noted in Section 4.5.11.2.3.2: Tests shall be conducted in accordance with NFPA 286 with the conditions of acceptance specified in IBC Section 803.2; or in accordance with UL 1715 or UBC Standard 26-3 with conditions of acceptance as specified in Section 4.5.2 of AC12. The tests must be conducted with the foam plastic installed, ~~in the manner~~ at the maximum density and maximum thickness for which recognition is sought over the gypsum wallboard or glass-reinforced cement board as described in the standard.

4.5.11.5.2.2.2 For Use on Walls of Crawl Spaces or the Underside of Floors in a Crawl Space with Limitations Noted in Section 4.5.11.5.2.2.3.1: Comparative crawl space fire tests shall be conducted where the performance of the exposed foam plastic insulation is compared under identical test conditions to that of the foam plastic insulation covered with a code-approved ignition barrier. ~~See IBC Section 2603.4.1.6 and IRC Section R314.5.4 for the prescriptive list of ignition barriers.~~ The interior face of the control assembly shall consist of 1/4-inch-thick plywood applied to the interior face of wood wall framing. (Plywood is permitted by UBC Section 2602.4, Exception 4, IBC Section 2603.4.1.6 and IRC Section R314.5.3 as a protective material for foam plastic located in attics.) The time to flash over and the time to burn through the wood-framed floor/ceiling must be equal or greater for the exposed foam plastic insulation versus the foam plastic insulation covered with the ~~ignition barrier~~ 1/4-inch-thick plywood.

4.5.11.5.2.2.3 Limitations on Crawl Space Applications:

4.5.11.5.2.2.3.1 When testing is in accordance with Section 4.5.11.5.2.2.2, the evaluation report shall include the following limitations:

- a. Entry to the crawl space is only to service utilities and no storage is permitted.
- b. There are no interconnected crawl space areas.
- c. Air in the crawl space is not circulated to other parts of the building.
- d. Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable.
- e. The foam plastic insulation is limited to the maximum thickness and density tested.

703. f. Combustion air is provided in accordance with IMC Sections 701 and 703.

4.5.11.5.2.2.3.2 When testing is in accordance with Section 4.5.11.5.2.2.1, the evaluation report shall include the following limitations:

a. ~~No storage is permitted.~~

a. b. Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable.

b. e. Combustion air is provided in accordance with IMC Sections 701 and 703.

c. d. The foam plastic insulation is limited to the maximum thickness and density tested.

3. Add new Appendix A as follows:

Test Method for Crawl Space Evaluation

1.0 SCOPE

The objective of this test is to evaluate the fire performance of foam plastic insulation materials when tested in a simulated crawl space module to determine if the insulation is acceptable for use in attic or crawl space areas without a thermal barrier. The test provides a comparison of fire performance characteristics between insulated wood sub-floor assemblies.

2.0 TEST CONFIGURATION

A sub-floor assembly is mounted on top of a three-sided wall module. The simulated crawl space module consists of three 8-ft square (outside dimensions ± 2 in.) walls, each 48 ± 2 in. high, and built of nominal 4-in. wide \times 8-in. high \times 16-in. long concrete blocks with a full open space on one side of the structure. Masonry walls or module walls constructed of wood or metal studs with two layers of $\frac{1}{2}$ in. gypsum board are permitted provided the interior dimensions are the same as for a concrete block module, i.e., 88 ± 2 in. wide and 92 ± 2 in. deep. If wood or metal stud construction is used, the studs shall be located inside the module, i.e., the width of the module is equal to the distance between the interior faces of the gypsum board attached to the side walls and the depth is equal to the distance between the front opening and the interior face of the gypsum board attached to the back wall.

The floor/ceiling above the crawl space is built using nominal 2 \times 8-in. \times 8-ft floor joists on 16-in. centers, with 2 \times 8-in. joist headers, all bearing on 2 \times 4-in. sill plates and surfaced with 15/32-in. thick, 4-ply, APA graded A-C plywood sub-flooring. The use of joists and headers with a larger depth, e.g., 2 \times 10 in., 2 \times 12 in., etc. is permitted at the client's request.

Note 1: The use of CDX grade plywood is considered too variable in quality for comparison purposes required for this evaluation.

Note 2: All construction lumber (joists and studs, if used) shall be of the same species and grade for all tests conducted to qualify a foam plastic insulation.

The joists are perpendicular to the camera's line-of-sight, so that they tend to dam the flame front and hold it inside the test area. The floor of the test chamber is covered with approximately 1 in. of sand. To provide additional protection, it is acceptable to cover the floor with ½ in. gypsum board before installing the 1 in. layer of sand.

3.0 IGNITION SOURCE

The fire source is a 22-lb wood crib constructed of nominal 2 × 2-in. No. 1 select grade white pine (no knots), 15-in. square in plan, spaced approximately 1½-in. apart and fastened at right angles with a single nail at each end. The crib shall be conditioned to an average moisture content of $7.5 \pm 0.5\%$. The crib is placed in a rear corner of the crawl space 1 in. from each wall surface and supported approximately 4-in. above the floor on small sections of refractory brick. The crib sticks of the bottom layer shall be parallel to the side walls. Approximately 150 ml of ethyl alcohol in a circular or square metal pan with a surface area of 36 to 40 in² placed under the crib is used for ignition.

4.0 TEST DURATION AND END POINT COMPARISON CRITERIA

One or both of the following two criteria are established for test duration and relative comparison to between tests:

1. Time to flames emerging from the front of the crawl space.
2. Time to burn-through of the floor/deck system.

5.0 DOCUMENTATION

The test is recorded with photographs and video documentation positioned to view the entire front of the open side of the module. A timing reference, mechanical or electronic, is included in all photographic and video records.

6.0 REPORT

The report shall include:

- Name and location of facility where test is conducted.
- Date of specimen construction and date tested.
- A description of the tested assembly with emphasis on the insulation type (including facings), thickness, density, and attachment details.
- Photographic and video documentation: pre-test, during (including timing), and post-test.

- A summary of visual observations including time to flames exiting the module and/or burn through of the sub-floor assembly.
- Conclusions in the form of a statement of findings summarizing the fire performance of the assembly; and, as appropriate, compared to a baseline test.
- Signature of a representative engineer or officer of the test facility.