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To: ICC-ES Evaluation Committee
From: David Pereg, P.E.
Date: May 29, 2009
Subject: Proposed Revisions to the Acceptance Criteria for Vinyl Siding,
Subject AC37-0609-R1 (DP/MB)

MEMO

Revisions to the subject acceptance criteria were proposed under cover of the staff letter dated April 30, 2009. Response letters were received from the Vinyl Siding Institute (VSI), American Plywood Association (APA), American Forest & Paper Association (AF&PA) and iLevel by Weyerhaeuser. The response letters are available at http://www.icc-es.org/Criteria_Development/0906-pre/Responses/index.shtml.

In response to the AF&PA and APA comments regarding the safety factors to be used in allowable pressure analyses, revisions are proposed to Sections 3.3.4.2.2 and 3.3.4.2.3.1, to require that the allowable load be based on the lower of: the lowest tested failure pressure divided by 1.5; or, the average tested failure pressure divided by 2.0. These revisions are offered to address the possibility that a 1.5 safety factor could be applied to the lowest tested failure pressure of a tightly-grouped set of data, which would result in a less-conservative allowable load than if a 2.0 safety factor were applied to the average of the same set of results. Additionally, a 2.0 safety factor is proposed to be applied to the lowest tested failure pressure when installation is to be in regions where the basic wind speed equals or exceeds 100 mph (45 m/s) in hurricane-prone regions, or 110 mph (49 m/s) elsewhere.

In response to the iLevel comments regarding specifications for the interior gypsum wallboard, Staff shares the concern where Sections 3.3.4.2.2.a and 3.3.4.2.3.1.a, provide a prescriptive PEF value of 0.7 for assemblies with gypsum wallboard on the interior of the wall assembly. Specifically, since the gypsum wallboard is expected to withstand at least 30 percent of the positive and negative design loads assigned to the wall assembly, the gypsum wallboard, and its attachment to framing, should be shown to have adequate allowable positive and negative load resistances. Accordingly, revisions are proposed that require that the gypsum wallboard to be shown to resist the applicable design wind pressures, both positive and negative. The proposed requirement is similar to existing requirements for sheathing in Sections 3.1 and 3.2.

Based on the comments in the above-noted submitted response letters, as well as comments in the VSI letter, the following revisions are proposed (additional revisions to the draft attached to the April 30 staff letter are noted in ~~strikeout~~ /double underline):

1. Revise Section 1.4.3, as follows:

1.4.3 Allowable Pressures: Where it states in this criteria that allowable pressure shall be determined in accordance with Annex A1 of ASTM D 3679, the allowable pressure shall be determined by solving for the design pressure, D_p , using the equation found in Section A1.2.2 as defined in Annex A1 of ASTM D 3679, using the maximum test pressure, P_t , determined from testing, the safety factor and the applicable pressure equalization factors (PEFs) noted in this criteria.

2. Revise Section 3.1.2, as follows:

3.1.2 Vinyl Siding: The siding shall conform to the requirements of ASTM D 3679.

EXCEPTION: For recognition under the 2006 IBC and/or the 2006 IRC, data to show compliance with the lead content requirements of Section 4.6 of ASTM D 3679, is not required.

3. Revise Section 3.2.5.3.4, as follows:

3.2.5.3.4 Conditions of Acceptance: The maximum average of the five pressure differential readings across the siding shall be divided by the maximum overall pressure reading across the test wall for a given test recorded at the same time as the maximum average pressure differential across the siding to determine the PEF for the product. The test shall be performed three times at each pressure level. Where the variation in the average value for the three tests at a given pressure exceeds 15 percent, the maximum value of PEF shall be used. If any of the three PEF results for each test pressure level varies by more than 15 percent from the average of the results for the three tests at that pressure level, the highest PEF shall be used. The PEF for the siding shall be the average of the three low, medium and high pressure PEF values, or 0.36, whichever is higher.

4. Revise Section 3.3.3, as follows:

3.3.3 Foam Plastic Sheathing: Foam plastic sheathing shall be recognized in an ICC-ES evaluation report as complying with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), as follows:

- 3.3.3.1 Minimum nominal by 1/2-inch-thick (12.7 mm) extruded polystyrene, complying with ASTM C 578 Type X, or
- 3.3.3.2 Minimum nominal by 1/2-inch-thick (12.7 mm), foil-faced, extruded polyisocyanurate, complying with ASTM C 1289 Type I Class 1, or
- 3.3.3.3 Minimum nominal 1-inch-thick (25.4 mm) expanded polystyrene, complying with ASTM C 578 Type II.
- 3.3.3.4 Measurement of thermal resistance under Section 4.5.7 of AC12 is not required.

5. Revise Section 3.3.4.2.2, as follows:

3.3.4.2.2 Negative wind resistance tests shall be conducted in accordance with ASTM D 5206, except the required plastic film shall be located between the foam plastic sheathing and the wall framing (not between the vinyl siding and the foam plastic sheathing) and the foam plastic sheathing shall not be perforated with 2-inch-diameter (51 mm) holes. The test assemblies shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report. A minimum of three identical assemblies shall be tested in accordance with ASTM D 5206 Section 9.5 (Procedure B) and the lowest tested failure pressure value (not the average for all specimens) shall be used as the failure pressure for the assembly.

The allowable negative wind pressure for the wall covering assembly (foam plastic sheathing plus siding) shall be taken as the lesser of the following:

1. The allowable pressure determined by solving for the design pressure, D_p , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the lowest tested failure pressure (not the average for all specimens) as P_t , the 1.5 safety factor and determined in accordance with Annex A1 of ASTM D 3679, using a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0; or assumed to be as follows:

2. The allowable pressure determined by solving for the design pressure, D_p , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the average failure test pressure as P_t , a 2.0 safety factor (not 1.5 noted in Annex A1) and a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0.

For installation in regions where the basic wind speed equals or exceeds 100 mph (45 m/s) in hurricane-prone regions, or 110 mph (49 m/s) elsewhere, the allowable negative wind pressure for the wall covering assembly (foam plastic sheathing plus siding) shall be determined by solving for the design pressure, D_p , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the lowest tested failure pressure (not the average for all specimens) as P_t , a 2.0 safety factor and a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0.

As an alternate to assuming a PEF of 1.0 for the above tested assemblies, the PEF may be as follows for the following prescriptive assemblies:

a. A PEF of 0.7 shall be used for wall covering assemblies consisting of unbacked vinyl siding and foam plastic sheathing complying with Section 3.3.3, when application is limited to use on wall assemblies having a minimum $\frac{1}{2}$ -inch-thick (12.7 mm) gypsum wallboard on the inside face. The gypsum wallboard shall comply, and be installed in accordance with IBC Chapter 25. The gypsum wallboard, and its attachment, shall be shown to resist the applied design loads, both positive and negative.

b. A PEF of 1.0 shall be used when wall covering assemblies as described in Item 4 a, above, are used on wall assemblies without a minimum 1/2-inch-thick (12.7 mm) gypsum wallboard on the inside face.

Individual report applicants may apply a different value for the PEF, provided testing in accordance with Section 3.2.5.3 (on a test wall constructed in a manner consistent with the recognition being sought) is submitted to ICC-ES. The PEF shall not be less than 0.6.

6. Revise Section 3.3.4.2.3.1, as follows:

3.3.4.2.3.1 Testing Approach: The allowable positive wind pressure resistance of the foam plastic sheathing alone shall be determined in accordance with ASTM E 330 using three, 4-foot by 8-foot (1219 by 2438 mm) full-scale wall assembly specimens. The test assembly shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report. A vertical joint in the foam plastic sheathing shall be located over the center of one of the intermediate studs. The minimum tested positive pressure resistance at foam plastic sheathing failure (rupture) or loss of bearing at sheathing edges shall be taken as the ultimate positive pressure resistance.

The allowable positive wind pressure for the foam plastic sheathing, and, thus, the wall covering assembly shall be taken as the lesser of the following 1.0; or as the following:

1. The allowable pressure determined by solving for the design pressure, D_P , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the lowest tested failure pressure (not the average for all specimens) as P_t , the 1.5 safety factor and a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0;

2. The allowable pressure determined by solving for the design pressure, D_P , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the average failure test pressure as P_t , a 2.0 safety factor (not 1.5 noted in Annex A1) and a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0.

For installation in regions where the basic wind speed equals or exceeds 100 mph (45 m/s) in hurricane-prone regions, or 110 mph (49 m/s) elsewhere, the allowable positive wind pressure for the foam plastic sheathing, and, thus, the wall covering assembly, shall be determined by solving for the design pressure, D_P , using the equation found in Section A1.2.2 in Annex A1 of ASTM D 3679, using the lowest tested failure pressure (not the average for all specimens) as P_t , a 2.0 safety factor and a pressure equalization factor (PEF) acting across the wall covering assembly assumed to be 1.0.

As an alternate to assuming a PEF of 1.0 for the above tested assemblies, the PEF may be as follows for the following prescriptive assemblies:

a. A PEF of 0.7 shall be used for wall covering assemblies consisting of unbacked vinyl siding and foam plastic sheathing complying with Section 3.3.3, when application is limited to use on wall assemblies having a minimum 1/2-inch-thick (12.7 mm) gypsum wallboard on the inside face. The gypsum wallboard shall comply, and be installed in accordance with IBC Chapter 25. The gypsum wallboard, and it's attachment, shall be shown to resist the applied design loads, both positive and negative.

b. A PEF of 1.0 shall be used when wall covering assemblies as described in Item 4 a, above, are used on wall assemblies without a minimum 1/2-inch-thick (12.7 mm) gypsum wallboard on the inside face.

As an alternate, the PEF may be determined by testing as described in Section 3.2.5.3, except the exterior of the test wall shall be constructed in a manner consistent with the construction methods and materials that are to be recognized in the evaluation report. A vertical joint in the foam plastic sheathing shall be located over the center of one of the intermediate studs. The test chamber shall be set up to apply a positive load to the exterior side of the test wall. The PEF shall be determined in accordance with Section 3.2.5.3.4, except the PEF shall be the maximum average pressure differential measured across the foam plastic sheathing divided by the maximum overall pressure reading across the test wall for a given test recorded at the same time as the maximum average pressure differential across the foam plastic sheathing. If any of the three PEF results for each test pressure level varies by more than 15 percent from the average of the results for the three tests at that pressure level, the highest PEF shall be used. The PEF for the foam plastic sheathing shall be the average of the low, medium and highest pressure PEF values, or 0.60, whichever is higher.