BASF

The Chemical Company

September 17, 2009

Mr. Yamil Moya, PE
ICC Evaluation Services, Inc.
5360 Workman Mill Rd.
Whittier, CA 90601

Subject: Proposed modifications to Acceptance Criteria for Water Resistive Coatings Used as Water Resistive Barriers over Exterior Sheathing, Subject AC 212-B-1009-R1 (YM/MB)

Dear Yamil:

As proponent of the above referenced proposal and follow up to my prior request, be advised the proposal contains two revisions which your cover letter designates as 1 (air barriers/E 2178) and 2 (eliminating intervening layer in stucco applications). Since these items are unrelated, we request they be considered separately as this will likely ease the deliberation process. To further simplify matters, I've enclosed a copy of the proposed revisions with changes related to item 1 (E 2178) designated with a single asterisk (*) and changes related to item 2 (eliminating intervening layer in stucco applications) designated with two asterisks (**)

Please feel free to contact me if you have any questions or comments.

Sincerely,

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PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR WATER-RESISTIVE COATINGS USED AS WATER-RESISTIVE BARRIERS OVER EXTERIOR SHEATHING

AC212-B

Proposed September 2009

Previously approved February 2005, June 2004 and June 2003

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 purpose of issuing ICC-ES evaluation reports.

PROPOSED REVISIONS TO THE ACCEPTANCE CRITERIA FOR WATER-RESISTIVE COATINGS USED AS WATER-RESISTIVE BARRIERS OVER EXTERIOR SHEATHING

1.0 INTRODUCTION

1.1 Purpose: The purpose of this criteria is to establish requirements for recognition of water-resistive coatings, used as water-resistive barriers over exterior sheathing, in ICC Evaluation Service, Inc. (ICC-ES), evaluation reports under the 2006 *International Building Code*® (IBC), the 2006 International Energy Conservation Code (IECC), the 2006 *International Residential Code*® (IRC), the BOCA® *National Building Code*/1999 (BNBC), the 1999 *Standard Building Code*© (SBC) and the 1997 *Uniform Building Code*™ (UBC). The bases of recognition are IBC Section 104.11, IRC Section R104.11, BNBC Section 106.4, SBC Section 103.7 and UBC Section 104.2.8.

1.2 Scope: This criteria is limited to coatings that are used on exterior walls as alternatives to the water-resistive barriers specified in Section 1404.2 of the IBC, Section R703.2 of the IRC and Section 1406.3.6 of the BNBC, the weather-resistant sheathing paper specified Section 703.2 of the SBC, and the weather-resistive barriers specified in Section 1402.1 of the UBC, and optionally as an air barrier material under IECC Sections 402.4.1 and 502.4.3. The coatings are covered with either a code-approved exterior wall covering, or one that is recognized in a current ICC-ES evaluation report. Substrates that can be considered under this criteria are wood-based and gypsum-based sheathings, and cementitious backer units complying with ANSI A118.9, or equivalent.

When the water-resistive coating is intended to be the intervening material between two layers of exterior cementitious coatings, detrimental relative movement of the system shall be considered.

For exterior cement plaster and one-coat stucco applications with installation over wood-based sheathing, two layers of Grade D building paper are required. When the water-resistive coating is used as the water-resistive barrier, the water-resistive coating must be equivalent to 60-minute Grade D paper and have an intervening layer between the water-resistive coating and the stucco. If the intervening layer is excluded, the water-resistive coating shall be evaluated in accordance with Section 4.9.

This criteria is applicable to coatings that overlap flashing and accessories.

1.3 Definitions:

1.3.1 Water-resistive Barrier: For the purposes of this criteria, the term "water-resistive barrier" includes within its scope water-resistive barriers under Section 1404.2 of the IBC, Section R703 of the IRC and Section 1404.6.3.6 of the BNBC, weather-resistant sheathing paper under Section 703.2 of the SBC, weather-resistive barriers under Section 1402.1 of the UBC, and water-repellent panel sheathing under Section 1402.1 of the UBC.

1.3.2 Air Barrier Material: A material in building construction that is designed and installed to reduce air leakage either into or through an opaque wall.

1.4 Codes and Referenced Standards:

1.4.1 2006 *International Building Code*®, International Code Council.

1.4.2 2006 *International Residential Code*®, International Code Council.

1.4.3 2006 *International Energy Conservation Code Code*®, International Code Council.

1.4.4 BOCA® *National Building Code*/1999.

1.4.5 1999 *Standard Building Code*©.

1.4.6 1997 *Uniform Building Code*™.

1.4.7 AATCC Test Method 127-1985, Water Resistance: Hydrostatic Pressure Test, American Association of Textile Chemists and Colorists.

1.4.8 ANSI A118.9-1999, Test Method and Specifications for Cementitious Backer Units, American National Standards Institute.

1.4.9 ASTM C 297-94, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions, ASTM International.

1.4.10 ASTM D 2247-97, Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity, ASTM International.

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

1.4.12 ASTM E 96-00^{e01}, Standard Test Method for Water Vapor Transmission of Materials, ASTM International.

1.4.13 ASTM E 331-00, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference, ASTM International.

1.4.14 ASTM E 1233-97, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclical Static Air Pressure Differential, ASTM International.

1.4.15 ASTM E 2178-03, Standard Test Method for Air Permeance of Building Materials, ASTM International.

1.4.16 ASTM C 1208-97, Standard Test Method for Determining the Static Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method, ASTM International.

1.4.17 ASTM C 190-85, Standard Test Method for Tensile Strength of Hydraulic Cement Mortars, ASTM International.

2.0 BASIC INFORMATION AND REPORTS OF TESTS

2.1 The following information shall be submitted:

2.1.1 Product Description: A complete description of the water-resistive coating material, including base material and the thinning agent, shall be submitted and shall include the following, as applicable:

2.1.1.1 Percent-solids content of the water-resistive coating material.

2.1.1.2 Type and amount of priming material applied to the substrate prior to the application of the coating.

2.1.1.3 Amount of liquid material per shipping container, and density.

2.1.1.4 Statements on product-use limitations, including ultraviolet exposure.

2.1.2 Installation Instructions: Printed installation procedures, available to the installer, shall be submitted, and shall include information as indicated below:

2.1.2.1 Application rate of liquid material applied to the substrate, measured in gallons per square foot (l/m2), and dry film thickness, shall be specified. Application procedures shall specify substrates. Conditions necessary for proper application, such as ambient temperature, site conditions (such as wet or muddy), and the material temperature, shall be included, as applicable.

2.1.2.2 Substrate preparation shall address the following:

2.1.2.2.1 Removal of deleterious materials that may affect bond and performance.

2.1.2.2.2 Treatments of voids, cracks, substrate joints and other excessively rough areas.

2.1.2.2.3 Applications of primers and other substrate conditioning materials with the water-resistive coating material.

2.1.2.2.4 Age of substrate and substrate temperature at time of preparation and coating application.

2.1.2.3 Cure time, drying period and other time-related requirements shall be specified.

2.1.2.4 Preparation of materials prior to application, including components, proportions, temperature and humidity conditions, method of mixing and pot life of mixture, shall be specified.

2.1.2.5 Type, location, and installation procedures for all flashing, counterflashing, caulking and other special treatments shall be specified.

2.1.2.6 Illustrative details shall be provided, showing water-resistive coating application, including interface with terminations, openings, penetrations, and other discontinuities, as applicable.

2.1.2.7 If the material is to be evaluated as an air barrier material in addition to a water-resistive barrier, installation instructions shall identify specific installation provisions for air barrier material applications.

2.1.3 Packaging and Identification: A description of the method of packaging and identifying the material shall be submitted. Labeling for field identification shall include the following:

1. Name and address of manufacturer.
2. Product name.
3. Identification of components.
4. Lot or batch number.
5. Quantity of material in packaged mix.
6. Storage instructions and shelf life.
7. Expiration date (when applicable).
8. 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 the AC85.

2.4 Product Sampling: Test specimens shall be sampled in accordance with Sections 3.2, 3.3 and 3.4 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 Report(s) of tensile bond testing as set forth in Section 4.1 of this criteria.

3.2 Report(s) of freeze-thaw testing as set forth in Section 4.2 of this criteria.

3.3 Report(s) of water-resistance testing as set forth in Section 4.3 of this criteria.

3.4 Report(s) of water-vapor transmission testing as set forth in Section 4.4 of this criteria.

3.5 Report(s) of water-penetration testing as set forth in Section 4.5 of this criteria. This requirement applies to exterior wall coverings capable of demonstrating water-penetration resistance in accordance with ASTM E 331 with a minimum 2.86 psf (137 Pa) static air pressure differential on a minimum 4-foot-by-8-foot (1219 mm by 2438 mm) sample.

3.6 Report(s) of structural, racking, and restrained environmental conditioning as set forth in Section 4.6 of this criteria. This requirement limits the products' use beneath exterior wall coverings capable of demonstrating water-penetration resistance in accordance with ASTM E 331 with a minimum 2.86 psf (137 Pa) static air pressure differential on a minimum 4-foot-by-8-foot (1219 mm by 2438 mm) sample.

3.7 Report(s) of structural, racking, restrained environmental conditioning and water-penetration tests as set forth in Section 4.7 of this criteria. This requirement permits use of water-resistive coatings beneath all exterior wall coverings.

3.8 Report(s) of ultraviolet light exposure and water resistance testing as set forth in Section 4.8 of this criteria.

3.9 When the product is to be evaluated as an air barrier material, reports of air permeance testing in accordance with ASTM E 2178 shall be submitted. A minimum of three specimens shall be tested. Minimum conditions of acceptance shall be an air permeance less than or equal to 0.2 L/sAm^2 at 75 Pa (0.004 cfm/ft^2 at 0.3 inch w.g. (1.57 psf)) for each specimen.

4.0 TEST METHODS

4.1 Tensile Bond Testing:

4.1.1 Testing shall comply with ASTM C 297. Specimens shall be representative of those used in actual construction.

4.1.1.1 For each sheathing substrate for which recognition is sought, five specimens are prepared by applying the water-resistive coating to the sheathing substrate. The purpose of this test is to determine the adhesive performance of the coating when applied to a substrate. If joint treatment material is the same material

as is used on the substrate surface, only testing set forth in Section 4.1.1.2 of this criteria is required.

4.1.1.2 For each sheathing substrate for which recognition is sought, five specimens, with joints, are prepared by applying the water-resistive coating and the joint treatment material to the sheathing substrate. The purpose of this test is to determine the adhesive performance of the coating and joint treatment when applied to a substrate.

4.1.1.3 For each flashing (including weep screed) material for which recognition is sought, five specimens are prepared by applying the water-resistive coating, and the flashing treatment, to the flashing material. The purpose of this test is to determine the adhesive performance of the coating and flashing treatment when applied to flashing.

4.1.2 Conditions of Acceptance: The flatwise tensile strength of each specimen shall be a minimum of 15 psi (105 kPa).

4.2 Freeze-thaw Tests:

4.2.1 For each sheathing substrate for which recognition is sought, five 6-inch-square (23 226 mm^2) specimens are tested. Sheathing specimens shall consist of two sheathing sections assembled with a $^1/_8$-inch-wide (3.2 mm) joint. The joint is treated as it would be in the field and the water-resistive coating is applied to the substrate surface in accordance with the manufacturer's recommended application instructions. The backs and sides of the specimens shall be sealed with an impervious material that need not be the coating. Specimens shall be representative of those used in actual construction.

4.2.2 Specimens are subjected to 10 freeze-thaw cycles. Each cycle consists of air-drying at a temperature of 120°F (49°C) for a minimum of eight hours, followed by total immersion in water at 70°F to 80°F (21.1°C to 26.7°C) for eight hours, and exposure to a temperature of –20°F (–28.9°C) for 16 hours.

4.2.3 Conditions of Acceptance: Failure is defined as surface changes, as viewed by minimum 5× magnification, such as cracking, checking, crazing, erosion or other characteristics, that may affect performance as a water-resistive barrier. There shall be no delamination, or indications of delamination, between components.

4.3 Water-resistance Testing:

4.3.1 For each sheathing substrate for which recognition is sought, three specimens, a minimum of 4 inches by 6 inches (102 mm by 152 mm) in size, and containing a $^1/_4$-inch-wide (6.4 mm) joint, are tested. Sheathing specimens shall consist of two sheathing sections assembled with a $^1/_4$-inch-wide (6.4 mm) joint. The joint is treated as described in Section 2.1.2.2.2 of this criteria, and the water-resistive coating is applied to the substrate surface in accordance with the manufacturer's recommended application instructions. The backs and sides of the specimens shall be sealed with the coating or other impervious material. Specimens shall be representative of those used in actual construction. The evaluation report shall include details for support of joints larger than those tested.

4.3.2 Testing shall be in accordance with ASTM D 2247. Periodic inspections shall be conducted. Testing may be concluded after 14 days, or after deleterious effects of exposure to water are observed.

4.3.3 Conditions of Acceptance: There shall be no deleterious effects from 14 days of exposure to water, such as cracking, checking, crazing, erosion or other characteristics, that may affect performance as a water-resistive barrier.

4.4 Water-vapor Transmission Testing:

4.4.1 Three specimens of the water-resistive coating are prepared by applying the coating, at the recommended thickness, to a nonadhesive surface. After curing for a duration specified by the manufacturer, the films are removed from the surface; the average thickness is determined from material density, area, and weight. The films are used to set up three wet cups in accordance with ASTM E 96, Water Method. Specimens are conditioned at 75°F ± 5°F (24°C ± 3°C) and 50 percent relative humidity for 40 hours before testing. Each cup is placed in a room with controlled conditions of 75°F ± 5°F (24°C ± 3°C) and 50 percent relative humidity. Reduction in weight is recorded daily. Water vapor transmission and permeance are calculated in accordance with Section 13 of ASTM E 96, and reported in grams per square meter per 24 hours and perms, respectively.

If the coating is applied such that a lap or seam occurs in the installed materials, an additional three specimens shall be tested with the lap or seam, applied in accordance with the manufacturer's recommended installation instructions.

4.4.2 Conditions of Acceptance: Water vapor transmission shall satisfy one of the grade requirements in Table 14-1-A of UBC Standard 14-1 or Table 1 of the ICC-ES Acceptance Criteria for Weather-resistive Barriers (AC38).

4.5 Water-Penetration Testing: Three samples are prepared by applying the water-resistive barrier coating to the substrate. The substrate shall be attached to the supporting framework as required by the substrate manufacturer. The test samples shall be a minimum of 4 feet by 8 feet (1219 mm by 2438 mm) in size, and shall include a minimum of two vertical joints and one horizontal joint within the sheathing substrate. Joints within the substrates shall be a minimum of $^1/_8$ inch (3.2 mm) wide.

Each sample shall be tested in accordance with ASTM E 331. A minimum 2.86 psf (137 Pa) air-pressure differential shall be maintained, across the test specimen, for 15 minutes.

4.5.1 Conditions of Acceptance: There shall be no visible water penetration at sheathing joints, as viewed from the back of the panel.

4.6 Structural, Racking and Restrained Environmental Conditioning Tests: (Limits product use to wall coverings demonstrating water-penetration resistance in accordance with ASTM E 331 with a minimum 2.86 psf (137 Pa) static air pressure differential)

4.6.1 Transverse Load (Structural): One specimen is prepared by applying the water-resistive coating to each applicable sheathing substrate. The substrate shall be attached to either steel or wood framing members (size of wood or size and gage of steel shall be specified).

The test specimen shall be a minimum of 8 feet by 8 feet (2438 mm by 2438 mm) in size, and substrates shall include a minimum of two vertical joints and one horizontal joint within the sheathing substrate. Joints within the substrate shall be a minimum of $^1/_8$ inch (3.2 mm) wide. If flashing is to be recognized, it shall be included in the specimen. The water-resistive coating is applied to the substrate surface, including joints, in accordance with the coating manufacturer's recommended application instructions. The specimen shall be tested in accordance with ASTM E 1233, Procedure A, at a specified deflection (specified by proponent) in accordance with Table 1604.3 of the IBC. The specimen shall be cycled for a minimum of 10 positive load cycles.

4.6.1.1 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing. If there is cracking, the racking test shall not go forward.

4.6.2 Racking: The intent of the racking procedure is to subject the water-resistive barrier (coating) to racking stress. Test setup, measurements and application of load shall comply with ASTM E 72.

4.6.2.1 Test shall be conducted on the same specimen used under Section 4.6.1 of this criteria. Application of load shall be in increments as described in the ASTM E 72 test method with or without hold-downs. Load shall be applied until a $^1/_2$-inch (12.7 mm) net deflection without hold-downs or $^1/_8$-inch (3.2 mm) net deflection with hold-downs is achieved. As an alternate, load shall be applied until the shear design value of the sheathing is achieved, except net deflection shall not exceed $^1/_2$ inch (12.7 mm) without hold-downs or $^1/_8$ inch (3.2 mm) with hold-downs. Throughout the test, the coated surface of the wall shall be inspected for signs of cracking or tearing of the water-resistive coating within the field of the panel, and at substrate joints, and at the interface of the flashing.

4.6.2.2 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing.

4.6.3 Restrained Environmental Conditioning: The intent of this test is to evaluate the cracking performance of the water-resistive coating after exposure to cycles of wetting and drying and change in temperature when the coating is applied to sheathing in a manner representative of in-service conditions.

4.6.3.1 The test shall be conducted on the same specimen used under Sections 4.6.1 and 4.6.2 of this criteria. There shall be a water spray apparatus capable of uniformly wetting the entire test surface, and a radiant heater capable of providing a uniform radiant heat of 120°F ± 5°F (49°C ± 2.8°C) as measured on a 1 mm thick aluminum plate painted mat black and affixed to the test surface at a minimum of four locations, symmetrically distributed. Temperature shall be measured with a covered thermocouple attached to the surface of the black plate. The top edge of the water-resistive coating shall be flashed and the back side of the assembly protected from moisture. Periods of exposure to ambient conditions not exceeding 48 hours are permitted during the tests, to accommodate laboratory operations.

4.6.3.2 The entire surface is subjected to five cycles of the following uniform exposure conditions:

1. Water spray—24 hours
2. Radiant heat—24 hours

4.6.3.3 Throughout the test, the wall surface is inspected for signs of cracking of the coating within the field of the panel and at the substrate joints.

4.6.3.4 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing.

4.7 Structural, Racking, Restrained Environmental Conditioning, and Water Penetration Testing:

4.7.1 Transverse Load (Structural): One specimen is prepared by applying the water-resistive coating to each applicable sheathing substrate. The substrate shall be attached to either steel or wood framing members (size of wood or size and gage of steel shall be specified). The test specimen shall be a minimum of 8 feet by 8 feet (2438 mm by 2438 mm) in size, and substrates shall include a minimum of two vertical joints and one horizontal joint within the sheathing substrate. Joints within the substrate shall be a minimum of $^1/_8$ inch (3.2 mm) wide. If flashing is to be recognized, it shall be included in the specimen. The water-resistive coating is applied to the substrate surface, including joints, in accordance with the coating manufacturer's recommended application instructions. The specimen shall be tested in accordance with ASTM E 1233, Procedure A, at a specified deflection (specified by proponent) in accordance with Table 1604.3 of the IBC. The specimen shall be cycled for a minimum of 10 positive load cycles.

4.7.1.1 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing. If there is cracking, the racking test protocol shall not go forward.

4.7.2 Racking: The intent of the racking procedure is to subject the water-resistive barrier coating to racking stress. Test setup, measurements and application of load shall comply with ASTM E 72.

4.7.2.1 Test shall be conducted on the same specimen used under Section 4.7.1 of this criteria. Application of load shall be in increments as described in the ASTM E 72 test method with or without hold-downs. Load shall be applied until a $^1/_2$-inch (12.7 mm) net deflection without hold-downs or $^1/_8$-inch (3.2 mm) net deflection with hold-downs is achieved. As an alternate, load shall be applied until the shear design value of the sheathing is achieved, except net deflection shall not exceed $^1/_2$ inch (12.7 mm) without hold-downs or $^1/_8$ inch (3.2 mm) with hold-downs. Throughout the test, the coated surface of the wall shall be inspected for signs of cracking or tearing of the water-resistive coating within the field of the panel, and at substrate joints, and at the interface of the flashing.

4.7.2.2 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing. If there is cracking, the restrained environmental test protocol shall not go forward.

4.7.3 Restrained Environmental Cycling Test: The intent of this test is to evaluate the cracking performance of the water-resistive coating after exposure to cycles of wetting and drying and changes in temperature, when the coating is applied to sheathing in a manner representative of in-service conditions.

4.7.3.1 Test shall be conducted on the same specimen used under Sections 4.7.1 and 4.7.2 of this criteria. There shall be a water spray apparatus capable of uniformly wetting the entire test surface, and a radiant heater capable of providing a uniform radiant heat of 120°F ± 5°F (49°C ± 2.8°C) as measured on a 1 mm thick aluminum plate painted mat black and affixed to the test surface at a minimum of four locations, symmetrically distributed. Temperature shall be measured with a covered thermocouple attached to the surface of the black plate. The top edge of the water-resistive coating shall be flashed and the back side of the assembly protected from moisture. Periods of exposure to ambient conditions not exceeding 48 hours are permitted during the tests, to accommodate laboratory operations.

4.7.3.2 The entire exterior surface is subjected to five cycles of the following uniform exposure conditions:

1. Water spray—24 hours
2. Radiant heat—24 hours

4.7.3.3 Throughout the test, the wall surface is inspected for signs of cracking of the coating within the field of the panel and at the substrate joints.

4.7.3.4 Conditions of Acceptance: There shall be no cracking of the water-resistive coating as determined by visual examination within the field of the panel, at substrate joints and at the interface of the flashing.

4.7.4 Water Penetration Testing:

4.7.4.1 Test shall be conducted on the same specimen used under Sections 4.7.1, 4.7.2, and 4.7.3. The sample shall be tested in accordance with ASTM E 331. A minimum 2.86 psf (137 Pa) air pressure differential shall be maintained across the test specimen for 15 minutes.

4.7.4.2 Conditions of Acceptance: There shall be no visible water penetration at sheathing joints, as viewed from the back of the panel.

4.8 Weathering Test: Five specimens are prepared in accordance with Section 4.3.1, except the sides only shall be sealed with an impervious material that need not be the coating. These samples shall be exposed to light from ultraviolet light, followed by accelerated aging in accordance with Sections 4.8.1 and 4.8.2 of this criteria, respectively. Following exposure, the specimens shall be tested in accordance with Section 4.8.3 of this criteria.

4.8.1 Ultraviolet Light Exposure: The samples shall be exposed to light from ultraviolet sun lamps for 210 hours (10 hours per day for 21 days) in an enclosure. Ultraviolet light exposure must be directed on the entire sample surfaces that will be exposed to sunlight in normal application. Lamps and enclosure shall be adjusted so the specimen temperature is between 135°F and 140°F (57°C and 60°C). Sunlamp bulbs shall be General Electric Type H275 RUV (275 W) or equivalent bulbs, providing UV characteristics of 5.0 W/m^2/nm irradiance at a wavelength of 315 to 400 nm at 1 meter. Bulbs shall be located 2 feet (610 mm) above samples.

4.8.2 Accelerated Aging: The samples shall be subjected to 25 cycles of drying and soaking as follows:

1. Oven drying at 120°F (49°C) for three hours, with all surfaces exposed.
2. The coating surface shall be immersed in room temperature water for three hours.
3. After removal from the water, specimens are blotted dry, then air-dried for 18 hours at a 75°F ± 5°F (23.8°C ± 2.8°C) room temperature, with all surfaces exposed.

4.8.3 Hydrostatic Pressure Test: The samples shall be tested in accordance with AATCC Test Method 127-1985, except that the specimens shall be held at a hydrostatic head of 550 millimeters for a period of 5 hours.

4.8.4 Conditions of Acceptance: There shall be no cracking of the coating, or bond failure between the coating and the substrate. There shall be no water penetration on the plane of the exterior facing side of the substrate.

4.9 Detrimental Relative Movement Evaluation

4.9.1 Detrimental Movement Test:

4.9.1.1 Minimum of five samples consisting of minimum 1/2-inch (12.7 mm) thick by 12-inches (305 mm) by 12-inches (305 mm) exterior plywood (grade C-D or better) or 7/16-inch Exposure 1 Oriented Strand Board (OSB) sheathing shall be prepared. Apply water-resistive coating in accordance with manufacturer's application instructions over sheathing and allow to dry, minimum of 24 hours. In the center of the water-resistive coated samples, apply (without lath) the minimum 3/8-inch (10 mm) thick cementitious exterior wall coating (one-coat stucco), or minimum 7/8-inch (22 mm) thick Portland Cement Plaster (Stucco) in a 6-inch (152 mm) by 6-inch (152 mm) area. The Portland cement plaster shall comply with accordance with ASTM C 926.

4.9.1.2 After curing the one-coat stucco or stucco for minimum of 28 days, apply shear load parallel to the coating/stucco interface using a suitable load measuring instrument such as a dynamometer described in ASTM C 1028 or Universal Tester with load cell capable or reporting results to 0.1 psi (689 Pa) increments.

4.9.2 Tensile Strength of One-coat Stucco or Stucco.

4.9.2.1 A minimum of five samples are prepared in accordance with ASTM C 190 using the same batch for the test specimens described in Section 4.9.2.1 of this criteria.

4.9.2.2 Conduct tests minimum 28 days after molding of the specimens.

4.9.3 Conditions of Acceptance: The maximum average load at failure in the Detrimental Movement Test shall be no more than 1 psi (6894 Pa), and the minimum average tensile strength of the one-coat stucco or stucco material shall not be less than 100 psi (689 kPa).

5.0 QUALITY CONTROL

5.1 Water-resistive coatings shall be manufactured under a quality control program documented in accordance with the ICC-ES Acceptance Criteria for Quality Documentation (AC10). The program shall include, but not be limited to, verification of coating properties described in Section 2.1 of this criteria.

5.2 Follow-up inspections by an inspection agency are not required under this criteria.

5.3 Field Inspection and Reporting:

5.3.1 Installation shall be by a contractor recognized by the evaluation report holder as being trained to perform such installations. A list of the names and addresses of recognized contractors shall be maintained by the evaluation report holder, and shall be made available to the building official or ICC-ES upon request.

5.3.2 UBC: An installation card, having the format shown in Exhibit A, shall be completed by the recognized contractor and shall be presented to the building official at the completion of each project.

5.3.3 IBC, IRC and BNBC: For recognition under the IBC, IRC or BNBC, special inspections are required at the jobsite in accordance with Sections 1704.1 and 1704.14 of the IBC, which also apply to the IRC, or Sections 1705.1 and 1705.13 of the BNBC. Duties of the inspector include verifying field preparation of materials, expiration dates, installation of components, curing of components, installation of joints and sealants, applied dry-film thickness and interface of coating material with flashings.

6.0 EVALUATION REPORT RECOGNITION

The evaluation report shall include the following information:

1. Product description, installation instructions, and packaging and identification information, based on requirements in Section 2.1 of this criteria.

2. Permitted substrates qualified by the tests described in Section 4.0 of this criteria.

3. Water vapor transmission values, described in Section 4.4.2 of this criteria.

4. Special inspection or installation certification, based on Sections 5.3.2 and 5.3.3 of this criteria.■

EXHIBIT A

(WATER-RESISTIVE COATING CONTRACTOR NAME)

Completion Date:_____

THE WATER-RESISTIVE COATING INSTALLED ON THE STRUCTURE LOCATED AT THE ADDRESS INDICATED BELOW:

_____ CONFORMS

TO (WATER-RESISTIVE COATING MANUFACTURER NAME) RECOMMENDED INSTALLATION PRACTICES AND SECTION (S) _____ OF EVALUATION REPORT ESR-_____.

Address of Structure:

_____

_____

_____

Product Component Names:

Reinforcing Fabric_____

Coating _____

INSTALLATION	CONFORMS
A. Substrate Type and Tolerance	_____
B. Water-resistive Coating	_____

C. The information entered above is offered in testimony that the water-resistive coating application conforms with the manufacturer's installation methods and procedures, and the water-resistive coating manufacturer's evaluation report.

NOTE: An installation card shall be received from the water-resistive coating installer indicating that the water-resistive coating application conforms with the water-resistive coating evaluation report and water-resistive coating manufacturer's installation methods and procedures must accompany this declaration.

Water-resistive Coating Contractor Company Name and Address:

_____
_____
_____
_____

Signature of responsible Officer:_____
Typed Name and Title of Officer:_____
Telephone Number:(_____)_____

cc: Original Building Department
Copy: Water-resistive Coating Manufacturer

BASF

The Chemical Company

September 18, 2009

Mr. Yamil Moya, PE
ICC Evaluation Services, Inc.
5360 Workman Mill Rd.
Whittier, CA 90601

Subject: Proposed modifications to Acceptance Criteria for Water Resistive Coatings Used as Water Resistive Barriers over Exterior Sheathing, Subject AC 212-B-1009-R1 (YM/MB)

Dear Yamil:

As proponents of the above referenced proposal, the following supplemental information is provided in response to ICC ES staff comments described in your correspondence dated September 1, 2009:

Item 1 (air barrier/E 2178)

Attachment 1 summarizes current ABAA requirements for a fluid/liquid applied membrane that serves as an air barrier compared to the requirements proposed in AC 212. With the exception of the fastener sealability test which is not in AC 212 or AC 38, the ABAA air barrier requirements are virtually identical to those in proposed AC 212.

Item 2 (elimination of intervening layer in stucco applications)

As a point of clarification, our proposal sought to eliminate the intervening layer on all hard substrates used with framed construction which would include gypsum sheathing in addition to wood based products. Also, the intervening layer is typically a sheet type water resistive barrier so this proposal assumes the water resistive coating functions as the intervening layer as well as the water resistive barrier.

2a and 2c. The objective of the proposal is to provide a quantitative means (test) to define what level of adhesion meets the intent of an 'intervening, substantially non water absorbing layer or drainage space'. Clearly the adhesion, if any, between the stucco and intervening layer should be minimal and not result in detrimental effects to the stucco.

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BASF

The Chemical Company

Although our tested values have often been significantly lower, the maximum allowable tensile shear load value of 1 psi between the stucco and intervening layer (water resistive coating) was selected for numerous reasons including accuracy, relationships to other types of intervening layers, etc. Additionally, assuming the maximum allowable tensile shear value of 1 psi is felt by the stucco, a stucco with a minimum tensile strength of 100 psi would not be expected to be impacted by this type of simulated detrimental movement. Although the tensile strength of stucco is not typically referenced in plaster standards, the 100 psi is assumed to be representative of a low strength stucco since the stucco mix was based on ASTM C 926 using the maximum amount of sand.

2b. Moisture at the stucco/intervening layer is mitigated presumably by absorption through the stucco and/or through drainage however there do not appear to be quantifiable requirements or performance criteria that demonstrates this. Replacing the typical intervening layer with a water resistive coating functions, as with sheet type products, to break the bond between the stucco and weather barrier thereby also creating a drainage plane.

Please feel free to contact me if you have any questions or comments.

Sincerely,

William F. Egan

William F. Egan
Manager, Engineering & Development

ATTACHMENT 1

Summary/ Comparison TO AC 212 Criteria

4.1.5.2 Liquid Applied Membranes

All testing shall be conducted with the applied liquid material within the minimum / maximum range. The specific thickness of the material which was used when conducting the following tests shall be recorded on the test report and shall be the site installed thickness.

The manufacturer shall submit the following additional test reports.

Product Property	Test Standard	Test Standard Title	Unit	Requirement		
				Min	Max	
Air Permeance	ASTM E 2178-03	Standard Test Method for Air Permeance of Building Materials	L/(s·m²) at a pressure difference of 75 Pa	-	0.02 L(s·m²) (0.004 cfm/ft²at a pressure difference of 1.56 lb/ft²)	Same as proposed for AC 212
Water Resistance	AATCC 127 - 03	Water Resistance: Hydrostatic Pressure Test for 5 h	cm	55		Same as AC 212
Fastener Sealability	ASTM D 1970-01	Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection - Section 7.9 Nail Sealability	-	Pass or specify sealing detail around fasteners	-	Not contained in AC 212 (or AC 38)
Pull Adhesion	ASTM D 4541-05	Modified Version of Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete using Portable Pull-Off Adhesion Testers– Specify substrates and surface preparation for glass fiber faced gypsum sheathing and concrete block. Declare failure mode.	kPa	110 or report force at substrate failure	-	Different Tensile Bond method in AC 212 min. value 105 kPa
Crack Bridging	ES-AC 212 OR	Acceptance Criteria for Water-Restive Coatings used as Water-Restive Barriers over Exterior Sheeting	-	Pass	-	Same as AC 212
	ASTM C 1305	Standard Test Method for Crack Bridging Ability of Liquid Applied Waterproofing Membrane– Report thickness and joint treatment (158° for 2 weeks)	-	Pass		
						Same Test as AC 212 although ABAA does not have min. Performance Criteria
Water Vapor Transmission (at applied thickness)	ASTM E 96-00e1	Standard Test Methods for Water Vapor Transmission of Materials – Water and Desiccant Method	Ng/(Pa·s·m²)	Declare		

5401 Jefferson Davis Highway
Spot 197/ Donnelly Bldg Room 104
Richmond, VA 23234
Tel: 804-383-4031
Fax: 804-383-3109

September 18, 2009

RE: ICC-ES Evaluation Committee Agenda Item #14, *Proposed Revisions to the Acceptance Criteria for Water-resistive Coatings Used as Water-resistive Barriers over Exterior Sheathing*. Subject AC212-B-1009-R1 (YM/MB)

Dear Mr. Moya,

I am writing to comment on the proposed revisions to AC212 Acceptance Criteria for Water Resistive coatings used as Water-Resistive Barriers.

Item 1: **Addition of Air Barrier Criteria – New Section 3.9**

ASTM E 2178 is an industry accepted test method for measuring air permeance. However, the test method does not currently prescribe details for the preparation of coatings to be tested by this method. Modification of E 2178 to address this issue is currently under discussion by the ASTM sub-committee.E06.41.

The apparatus requires a 1 meter by 1 meter sample. In order to test a coating on this apparatus, you would either have to either apply the coating to a medium and peel the coating for testing or cast the coating onto a substrate and test the combined substrate and coating. When the coating and medium are tested together, the air permeance of the medium must be accounted for.

In order to use the existing version of ASTM E2178 effectively within AC212, AC212 would need to add a standard method used to prepare coating specimens to be tested in accordance with E 2178.

I am the ASTM Technical Contact for ASTM E 2178 as well as the Chair of ASTM E06.41 and can provide a summary of ASTM activity in this area to ICC-ES. Please let me know if you would like me to do this.

Item 2: Removal of the 2 layer Water Resistive Barrier (WRB) requirement (New Section 3.10) and addition of Detrimental Movement Testing (New section 4.9)

I urge you to reconsider granting this exception to the 2 layer requirement or removal of the alternate intervening layer. Granting this exception for coatings without considering the same/similar exceptions for mechanically attached materials creates an unlevel playing field. Historically, the implementation of two layers of a WRB over wood based sheathing was implemented because *material testing* did not ensure adequate *system performance*. Additional work to identify and test all of the factors involved in an acceptable one layer system needs to be developed across all WRB material types.

The 2 layer water resistive barrier requirement serves purposes other than addressing detrimental movement between the plaster veneer and the sheathing and addressing adhesion of stucco to the application surface. One such purpose is to provide drainage. Regardless of adhesion, wet applied stucco conforms to the contour of the application surface; this potentially obstructs drainage.

The exception to the two-layer requirement, described in Section R703.6.3 of the 2009 IRC states:

> ***Water-resistive barriers. …***
> ***Exception:*** *Where the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60 minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space.*

This description clearly shows that a layer or space designed to counteract the form fitting characteristics of the stucco is desired.

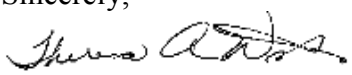
Providing a plane as a means of drainage is also supported by other industry discussions and building science research. A few of the conclusions in the Final Report for Energy Efficient, Mold-Resistant Materials and Construction Practices for New California Homes (California Energy Commission August 2008) are as follows:

- *A Capillary break between stucco and WRB is required for optimal gravity drainage.*
- *Double layer provides space, outer layer provides bond break.*
- *Sill pan drains to the interior layer (the functional WRB).*

Additionally, the test method described in the Section 4.9 of this criterion does not adequately address the issue of stucco adhesion raised in the cover letter. There are multiple chemical and mechanical variables involved that effect adhesion of stucco to *any* material. The test method attempts to isolate and measure the effects of one variable without accounting for the interactions between variables. The test method does not include lath, typically used in residential construction; which provides excellent keying mechanism. Method of stucco application, surface and composition of sheathing membrane and joints, stucco curing conditions and stucco composition, including sand quality and additives are also key variables that impact adhesion. (Note: Today many stucco manufacturers include additives, to improve curing time and product strength; these same additives often increase the likelihood that the stucco will adhere to the substrate.) Isolating one variable for a laboratory test will not adequately predict performance in the field.

Thank you for your time in considering my comments.

Sincerely,



Theresa A. Weston
DuPont Building Innovations

From: Peter.Harrison@parexlahabra.com [mailto:Peter.Harrison@parexlahabra.com]
Sent: Friday, September 18, 2009 2:56 PM
To: es
Subject: AC212-B-1009-R1 (YM/MB) Comments

AC 212 Comments:

Recognition in AC212 of water-resistive barrier coatings for application behind portland cement plaster and similar direct mortar contact applications has been proposed without an intervening sheet to prevent bonding. Some investigation suggests that several kinds of conditioning of the coating is warranted before and after plaster application to assure a lack of bond..

Coatings may incorporate various technologies to prevent bonding that can be affected by real-world construction exposures that compromise the bond prevention.

A few examples are:

Water-soluble compounds intended to migrate from the coating to the plaster to prevent a bond. Sufficient rain exposure prior to plastering could wash out enough of such a compound to reduce it below its effective concentration.

Technology that interrupts cement hydration to provide a low cohesive strength contact layer with the coating can be negated by subsequent wetting that greatly strengthens the originally weak cohesive layer, creating a strong bond. An example of this effect is given below.

Coatings whose surfaces are effective at preventing a bond may lose that characteristic with excessive ultraviolet exposure prior to plastering.

Coatings may prevent bonding except that very high wall temperatures may induce softening or tackiness, to the point of establishing a bond that remains or even strengthens after temperatures decrease.

A determination of suitable conditioning methods should be made and incorporated into AC212 before recognizing coatings used on sheathing without a bond preventing sheet.

Peter Harrison
ParexLahabra, Inc.
peter.harrison@parexlahabra.com
(866) 516-0061 x 4536
1870 Stone Mountain-Lithoinia Rd
PO Box 189
Redan, GA 30074

PAREXLAHABRA WATER-RESISITIVE BARRIER COATING STUCCO BOND TEST

Water Conditioning After Stucco Cure

1. Stucco basecoat was applied to dry WRB coating. Stucco was formed around a small paper cup to create a well in which to introduce water following curing of the stucco basecoat. The paper cup was removed after stucco hardened.

2. Stucco basecoat cured 14 days. The well in the stucco was then filled with water every 3 or four days until it had been filled a total of 4 times. Between fillings, all of the water migrated out of the well into the surrounding stucco or stucco –WRB coating interface.

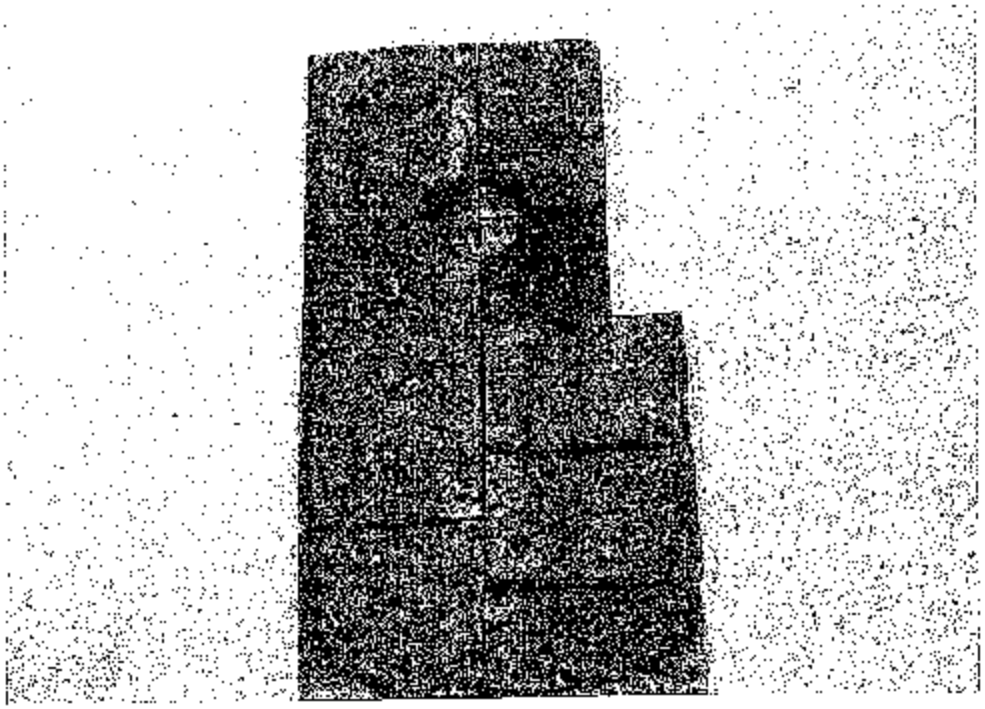
A distinct ring showed on the surface of the stucco base where absorbed water migrated outward from the well.

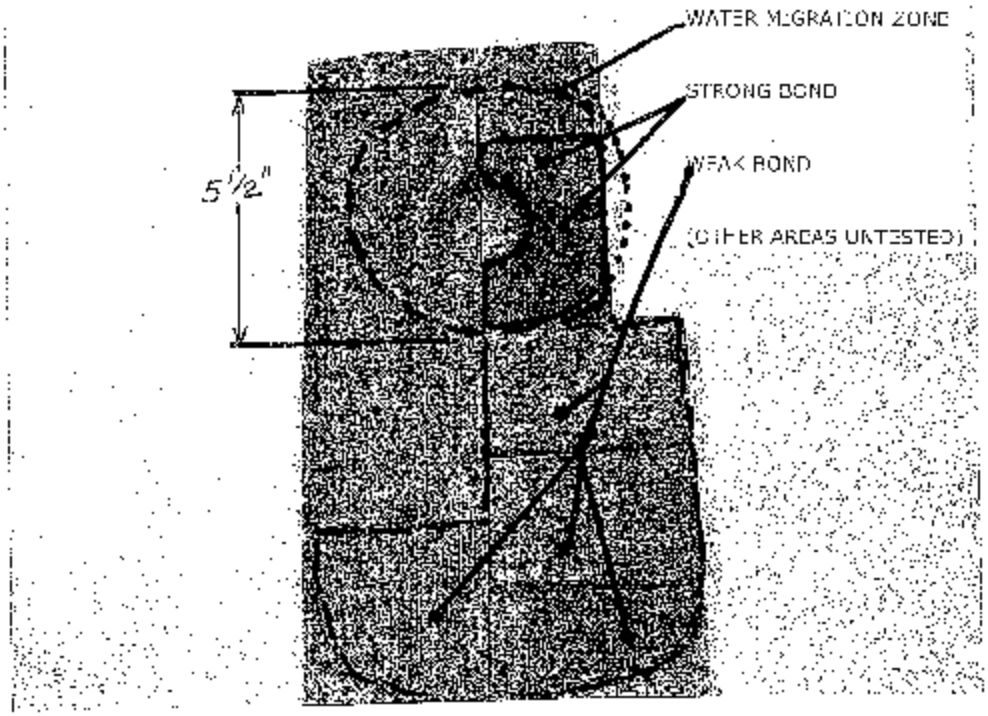
3. 14 days after the last water was put into the well, the test panel was cut into sections with a wet diamond tile saw blade. Cuts were placed so that some sections were within the ring zone that indicated water migration and other sections were outside that zone.

4. Sections of stucco within the moisture migration zone were very strongly bonded to the WRB coating. Sections outside that zone were only weakly bonded.

5. Conclusion: Exposure to water at the stucco to WRB coating interface line after stucco curing can cause an otherwise weak bond to become strong for some technologies. Water exposure at the interface must be expected. If it were not expected, there would be no need for a water–resistive barrier in the first place.

Some conditioning to this effect should be done to qualify a WRB coating for use without a bond breaker sheet.




WATER MIGRATION ZONE
STRONG BOND
WEAK BOND
(OTHER AREAS UNTESTED)
5 1/2"