

ACCEPTANCE CRITERIA FOR COMPOSITE SIDING CONTAINING INORGANIC MICROSPHERES AND PROPRIETARY RESINS, USED AS AN EXTERIOR WALL CLADDING

AC389

Approved October 2009

Effective November 1, 2009

Previously approved February 2008

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.

This acceptance criteria has been issued to provide all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the ICC-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from the previous edition, a solid vertical line (|) in the margin within the criteria indicates a technical change, addition, or deletion from the previous edition. A deletion indicator (→) is provided in the margin where a paragraph has been deleted if the deletion involved a technical change. This criteria may be further revised as the need dictates.

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 set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria in this document and otherwise demonstrate compliance with the performance features 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 if 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 purposes of issuing ICC-ES evaluation reports.

ACCEPTANCE CRITERIA FOR COMPOSITE SIDING CONTAINING INORGANIC MICROSPHERES AND PROPRIETARY RESINS, USED AS AN EXTERIOR WALL CLADDING (AC389)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for a proprietary composite siding containing inorganic microspheres and proprietary resins to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2009 and 2006 *International Building Code*® (IBC) and the 2009 and 2006 *International Residential Code*® (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11. Applicable code sections are IBC Section 1403 (Exterior Walls - Performance Requirements), Section 1405.1 (Installation of Wall Coverings - General), Section 1405.2 (Weather Protection), and 2006 IBC Section 1405.3 (Flashing), 2009 IBC Section 1405.4 (Flashing) and IRC Section R703.1 (Exterior Walls - General).

The reason for the development of this criteria is to allow the evaluation of composite siding material containing inorganic microspheres and proprietary resins as an alternative exterior wall covering material in accordance with Chapter 14 of the IBC and Section R703 of the IRC, since the code does not provide standards for evaluation of composite siding used as exterior wall coverings.

1.2 Scope: This criteria is applicable to mechanically attached composite siding used as exterior wall cladding. Recognition is limited to the IRC and Type 5 construction under the IBC. The siding is limited to nonfire-resistance-rated construction unless testing in accordance with Section 3.6 is performed. The siding is not used to resist racking shear loads.

1.3 Codes and Referenced Standards:

1.3.1 2009 *International Building Code*® (IBC), International Code Council.

1.3.2 2006 *International Building Code*® (IBC), International Code Council.

1.3.3 2009 *International Residential Code*® (IRC), International Code Council.

1.3.4 2006 *International Residential Code*® (IRC), International Code Council.

1.3.5 ASTM C 518-04, Standard Test Methods for Steady-State Thermal Transmission Properties by Means of Heat Flow Meter Apparatus (*R-Value*), ASTM International.

1.3.6 ASTM C1185-03, Standard Test Methods for Sampling and Testing Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles and Clapboards, ASTM International.

1.3.7 ASTM D 1037-06a, Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials (Nail Pull-through), ASTM International.

1.3.8 ASTM D 1622-03, Standard Test Method for Apparent Density of Rigid Cellular Plastics, ASTM International.

1.3.9 ASTM D 6109-05, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber and Related Products (Flexural Strength, MOR), ASTM International.

1.3.10 ASTM D 6341-98 (2005), Standard Test Method for Determination of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber Shapes Between -30°F and 140°F (-34.4°C and 60°C), ASTM International.

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

1.3.12 ASTM E 84-[2006 IBC and IRC: -04; 2009 IBC and IRC: -07] Test Method for Surface Burning Characteristics of Building Materials (Flame spread and smoke generation), ASTM International.

1.3.13 ASTM E 119-[2006 IBC and IRC: -00; 2009 IBC and IRC: -07] Test Methods for Fire Tests of Building Construction and Materials, ASTM International.

1.3.14 ASTM E 330-02, Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference, ASTM International.

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

1.3.16 ASTM G 85-02^{e1}, Standard Practice for Modified Salt Spray (Fog) Testing, ASTM International.

1.3.17 ASTM G 155-[2006 IBC: -00a; 2009 IBC: -05a] Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials, ASTM International.

1.3.18 ICC-ES Acceptance Criteria for Polymer-based and Polymer-modified Exterior and Interior Wall Cladding (AC92).

1.4 Definitions:

1.4.1 Composite Siding: A proprietary composite siding material containing inorganic microspheres and proprietary resins used as exterior wall cladding. The siding is a minimum of ⁵/₁₆ inch (8 mm) thick.

1.4.2 Fastening System: A fastening system is defined as a method to mechanically attach the siding to framing or to an exterior sheathing, which in turn is mechanically attached to the framing.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information concerning material specifications, thickness, size and the manufacturing process.

2.1.2 Installation Instructions and Field Preparation: Installation details and limitations, fastening methods, joint treatments, face treatments, and the methods of field-cutting, application and finishing.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the siding. Identification provisions shall include the evaluation report number and the name or logo of the inspection agency.

ACCEPTANCE CRITERIA FOR COMPOSITE SIDING CONTAINING INORGANIC MICROSPHERES AND PROPRIETARY RESINS, USED AS AN EXTERIOR WALL CLADDING (AC389)

2.2 Testing Laboratories: Testing laboratories shall comply with Section 2.0 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

2.3 Test Reports: Test reports shall comply with AC85.

2.4 Product Sampling: Products for testing shall be sampled in accordance with Section 3.1 of AC85, and construction of wall assemblies shall be witnessed and reported in accordance with Section 3.3 of AC85.

2.5 Weather-resistive Considerations: A water-resistive barrier complying with Section 1403.2 of the IBC and Section R703.2 of the IRC is required. In jurisdictions enforcing the IRC, the composite siding shall be installed as described in IRC Table R703.4 for hardboard lap-siding—horizontal.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 Physical Properties: Reports of tests shall be submitted that demonstrate compliance with Sections 3.1.1 through 3.1.5. When the test standard does not identify the number of specimens, a minimum of five specimens shall be tested. The following properties shall be determined and shall be used to establish minimum property requirements for quality control purposes and shall be shown in the quality documentation submitted to staff, with tolerances:

3.1.1 Flexural Strength and Flexural Modulus of Rupture (MOR): Testing of lap siding shall be conducted in accordance with ASTM D 6109, Test Method A.

3.1.2 Density: Testing shall be conducted in accordance with ASTM D 1622. The value for density shall be consistent with the value stated by the manufacturer.

3.1.3 Linear Coefficient of Thermal Expansion (COE): Testing shall be conducted in accordance with ASTM D 6341.

3.1.4 Impact Resistance: Testing shall be conducted in accordance with ASTM D 1037, Section 21.

3.1.5 Water Absorption: Testing shall be conducted in accordance with ASTM C 1185, Section 9.

3.2 Thermal Resistance: Testing shall be conducted in accordance with ASTM C 518, and the R-value for the product shall be reported in the evaluation report.

3.3 Freeze/Thaw: Samples shall be preconditioned in accordance with Procedure A of ASTM D 618. Testing shall be in accordance with Section 4.2.1 of AC92. Conditions of acceptance shall be in accordance with Sections 4.2.2 and 4.2.4 of AC92.

3.4 Salt Spray: Testing shall be conducted and conditions of acceptance shall be in accordance with Section 4.5 of AC92.

3.5 Transverse Load Tests: Reports of transverse load tests in accordance with Section 4.1 of this criteria shall be submitted.

3.6 Fire-resistance-rated Construction: When recognition is sought for use on walls required to be of fire-resistance-rated construction, reports of tests in accordance with ASTM E 119 shall be submitted.

3.7 Accelerated Weathering: Reports of accelerated weathering tests conducted in accordance with Section 4.3 of this criteria shall be submitted.

3.8 Surface Burning Characteristics: Reports of surface burning characteristics conducted in accordance with Section 4.4 of this criteria shall be submitted.

4.0 TEST METHODS

4.1 Transverse Load Tests:

4.1.1 Panel Products: Testing shall be in accordance with ASTM E 330, Procedure B, or ASTM E 72, Sections 11 and 12, using the chamber method of loading for both positive and negative wind pressures. For negative wind pressure tests, the airtight membrane shall be located between the composite siding and the sheathing. At least three positive and three negative load tests shall be conducted with the siding fastened to the framing system or sheathing in accordance with the published installation instructions. Test assemblies shall be a minimum of 4 feet by 8 feet (1219 mm by 2438 mm). Application of loads to failure shall be in at least six increments, with a 60-second load duration for each increment. Test assemblies shall be mounted according to the applicable test standard. Framing supporting the siding shall be located at the maximum spacing for which recognition is desired. ICC-ES shall approve any variations from these spans prior to commencement of tests. Load deflection readings at the midpoint of siding spans shall be reported. Testing shall be considered using each type of fastener to be used with the products, nails, screws, and staples.

4.1.2 Lap Siding Products: For lap siding products, flexural testing shall be conducted in accordance with ASTM D 1037. Thirty specimens shall be tested to failure. The test specimen cross section shall be representative of the size of lap siding products to be recognized.

4.1.3 Conditions of Acceptance: The allowable wind pressure loads are determined in accordance with the following:

1. Allowable loading shall be based on a factor of a safety of 3.0 applied to the average ultimate test load, if all of the following are satisfied:

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

b. Allowable load shall not exceed established values for mechanical connectors such as nails, screws and staples.

2. Other factors of safety can be considered based on unique conditions of installation or material used.

4.1.4 Analysis of Transverse Load Testing: An engineering analysis shall be submitted evaluating test data developed in accordance with Sections 4.1.1, 4.1.2 and 4.1.3. The analysis shall derive the allowable transverse wind loads for the siding and shall take into account fastener pull-through testing in accordance with Section 4.2. The analysis shall be prepared by an independent registered engineer.

4.2 Fastener Pull-through Test: Testing in accordance with ASTM D 1037 shall be conducted to evaluate fasteners to be recognized in the evaluation

ACCEPTANCE CRITERIA FOR COMPOSITE SIDING CONTAINING INORGANIC MICROSPHERES AND PROPRIETARY RESINS, USED AS AN EXTERIOR WALL CLADDING (AC389)

report for attaching the siding materials. **Ten specimens of each fastener shall be tested to determine pull-through strength, minimum spacing, and minimum edge and end distances.**

4.3 Accelerated Weathering Test: Five 2.5-inch-by-5.0-inch (63.5 mm by 127 mm) specimens shall be prepared. Procedures are outlined in ASTM G 155, Cycle 1 (ASTM G 26, Test Method A). The test shall be conducted for 2,000 hours with cycles of 102 minutes of light followed by 18 minutes of light and water spray. Black panel temperature shall be 145°F ± 5°F (63°C ± 2.2°C). Humidity is not controlled.

Condition of Acceptance: After exposure, there shall be no cracking, checking, crazing, erosion or other characteristics that might affect product performance as an exterior wall cladding in any specimens, when viewed under 5x magnification.

4.4 Surface Burning Characteristics Testing: The composite siding shall be tested at the maximum thickness and density for surface burning characteristics, in accordance with ASTM E 84.

Conditions of Acceptance: The product shall demonstrate a flame-spread index no greater than 200. There are no requirements for smoke development.

5.0 QUALITY CONTROL

5.1 The products shall be manufactured under an approved quality control program with inspections by an inspection agency accredited by International Accreditation Service (IAS) or otherwise acceptable to ICC-ES.

5.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted.

5.3 Testing shall be conducted on a minimum quarterly basis and as determined by the inspection agency to verify the siding materials continue to comply with the physical properties determined in accordance with Section 3.1, fire-resistance-rated construction in accordance with Section 3.6 and surface burning characteristics in accordance with Section 3.8.

6.0 EVALUATION REPORT RECOGNITION

6.1 The evaluation report shall describe the product, including materials, composition and size, and the method of identification in accordance with Section 2.1.3.

6.2 The evaluation report shall describe the installation of the siding materials in accordance with Section 2.1.2, and shall include the allowable positive and negative wind pressures for the siding when installed as described in the evaluation report.

6.3 The evaluation report shall include a condition of use that the wall must be braced in accordance with the applicable code.

6.4 The evaluation report shall identify the design wind pressures for walls in accordance with IRC Table R301.2(2), adjusted for height and exposure using coefficients in Table R301.2(3), and the allowable load based on testing in accordance with Section 4.1 of this criteria must exceed the design wind pressure. ■