



To: ICC-ES Evaluation Committee
From: Michael O'Reardon, P.E.
Date: February 1, 2008
Subject: Proposed Acceptance Criteria for Composite Siding Containing
 Microspheres, Used as Exterior Wall Cladding, Subject AC389-
 0208-R1 (MO/MB/ST)

MEMO

Public comments have been received regarding the subject criteria. The comments are posted on our web site and will be available at the Evaluation Committee meeting.

The proponent, Microposite, has provided recommended revisions to the criteria as noted in their letter of January 23, 2008. A revised criteria with underline and ~~strikeout~~ is attached to this memo.

Staff supports the revisions to the draft as indicated by Microposite.

Staff also supports revising the title of the criteria and the definition of composite siding to clarify the product. The product is defined in Section 1.4.2 as:

1.4.2 Composite Siding: A proprietary composite siding material containing inorganic microspheres and proprietary resins, used as a exterior wall cladding.

The siding is a minimum of $\frac{5}{16}$ inch (8 mm) thick.

Staff supports the additional comments provided by Borjen Yeh of APA, in a letter dated January 23, 2008, concerning the following:

Section 1.1: Concern was expressed that the reference to Section R703 of the IRC is too broad in scope. Staff recommends revising this to reference R703.1 as shown in the attached draft. IBC references have also been revised in the attached draft to clarify scope of product use.

Sections 3.1.1, 3.1.2, 3.1.4 and 3.1.6: Request that the number of samples to be tested for each procedure be specified. Staff has requested this from the proponent.

Section 4: Comment requested that fastener withdrawal be added as a failure mode under negative wind pressure. Staff requests input from the commenter and interested parties as to how fastener withdrawal failure should be addressed in the test procedure described in Section 4.1.

Section 4.1: Comment requested that transverse load testing be conducted on each fastener type. Staff recommends addition of the following wording to Section 4.1: Testing shall be conducted using each type of fastener to be used with the siding product: nails, screws, and staples.

Section 4.2: Comment requested that pull-through testing be conducted for each type of fastener. Staff recommends revising the title of Section 4.2 to refer to fasteners and delete the reference to nails.

Staff has also made additional editorial modifications to the attached draft for clarification.

Thank you for your consideration of the above items.

MPO/II

Attachment



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

AC389

Proposed 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.

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.

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

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 2006 *International Building Code*[®] (IBC) and the 2006 *International Residential Code*[®] (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11. Applicable code sections are IBC ~~Chapter 14 (Exterior Walls)~~ Section 1403 (Exterior Walls - Performance Requirements), Section 1405.1 (Installation of Wall Coverings - General), Section 1405.2 (Weather Protection), and Section 1405.3 (Flashing) and IRC ~~Section R703 (Exterior Walls)~~ 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, Type 5 construction under the IBC, Type V construction under the BNBC and UBC, and Type VI construction under the SBC, unless the composite siding complies with Section 3.5

20 of this criteria. The siding is limited to nonfire-resistance-rated construction unless
21 testing in accordance with Section 3.4 is performed. The siding is not used to resist
22 racking shear loads.

23 **1.3 Codes and Referenced Standards:**

24 **1.3.1** 2006 *International Building Code*[®] (IBC), International Code
25 Council.

26 **1.3.2** 2006 *International Residential Code*[®] (IRC), International Code
27 Council.

28 **1.3.3** ASTM C 518-04, Standard Test Methods for Steady-State Thermal
29 Transmission Properties by Means of Heat Flow Meter Apparatus (*R*-Value), ASTM
30 International.

31 ~~**1.3.4** ASTM D 618-05, Standard Practice for Conditioning Plastics for
32 Testing, ASTM International.~~

33 **1.3.4** ASTM C1185-03, Standard Test Methods for Sampling and Testing
34 Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles and Clapboards,
35 ASTM International.

36 **1.3.5** ASTM D 1037-06a, Standard Test Methods for Evaluating
37 Properties of Wood-Base Fiber and Particle Panel Materials (Nail Pull-through), ASTM
38 International.

39 **1.3.6** ASTM D 1622-03, Standard Test Method for Apparent Density of
40 Rigid Cellular Plastics, ASTM International.

41 ~~1.3.7~~ ASTM D 2990-01, ~~Standard Test Methods for Tensile,~~
42 ~~Compressive, and Flexural Creep and Creep Rupture of Plastics (Tensile Strength,~~
43 ~~MOE), ASTM International.~~

44 ~~1.3.8~~ ASTM D 4226-05, ~~Standard Test Methods for Impact Resistance of~~
45 ~~Rigid Poly(VinylChloride)(PVC) Building Products, ASTM International.~~

46 ~~1.3.9~~ ASTM D 5229-92 (2004), ~~Test Method for Moisture Absorption~~
47 ~~Properties and Equilibrium Conditioning of Polymer Matrix Composite Materials, ASTM~~
48 ~~International.~~

49 1.3.7 ASTM D 6109-05, Standard Test Methods for Flexural Properties
50 of Unreinforced and Reinforced Plastic Lumber and Related Products (Flexural
51 Strength, MOR and Modulus), ASTM International.

52 1.3.8 ASTM D 6341-98 (2005), Standard Test Method for Determination
53 of the Linear Coefficient of Thermal Expansion of Plastic Lumber and Plastic Lumber
54 Shapes Between -30°F and 140°F (-34.4°C and 60°C), ASTM International.

55 1.3.9 ASTM E 72-02, Standard Test Methods of Conducting Strength
56 Test of Panels for Building Construction, ASTM International.

57 1.3.10 ASTM E 84-04, Test Method for Surface Burning
58 Characteristics of Building Materials (Flame spread and smoke generation), ASTM
59 International.

60 1.3.11 ASTM E 119-00, Test Methods for Fire Tests of Building
61 Construction and Materials, ASTM International.

62 ~~1.3.15~~ ~~ASTM E 136-99^{e0†}, Test Method for Behavior of Materials in~~
63 ~~a Vertical Tube Furnace at 750°C, ASTM International.~~

64 **1.3.12** ASTM E 330-02, Test Method for Structural Performance of
65 Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference,
66 ASTM International.

67 **1.3.13** ASTM E 331-00, Test Method for Water Penetration of
68 Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure
69 Difference, ASTM International.

70 **1.3.14** ASTM G 85-02^{e1}, Standard Practice for Modified Salt Spray
71 (Fog) Testing, ASTM International.

72 ~~1.3.19~~ ~~ASTM G 153-00a, Practice for Operating Enclosed Carbon~~
73 ~~Arc Light Apparatus for Exposure of Nonmetallic Materials, ASTM International.~~

74 **1.3.15** ASTM G 155-00a, Practice for Operating Xenon Arc Light
75 Apparatus for Exposure of Nonmetallic Materials, ASTM International.

76 **1.3.16** ICC-ES Acceptance Criteria for Polymer-based and
77 Polymer-modified Exterior and Interior Wall Cladding (AC92).

78 **1.4 Definitions:**

79 **1.4.1 Composite Siding:** A proprietary composite siding material
80 containing inorganic microspheres and proprietary resins used as exterior wall cladding.
81 The siding is a minimum of $\frac{5}{16}$ inch (8 mm) thick.

82 **1.4.2 Fastening System:** A fastening system is defined as a method to
83 mechanically attach the siding to framing or to an exterior sheathing, which in turn is
84 mechanically attached to the framing.

85 **2.0 BASIC INFORMATION**

86 **2.1 General:** The following information shall be submitted:

87 **2.1.1 Product Description:** Complete information concerning material
88 specifications, thickness, size and the manufacturing process.

89 **2.1.2 Installation Instructions and Field Preparation:** Installation
90 details and limitations, fastening methods, joint treatments, ~~and~~ face treatments, and
91 the methods of field-cutting, application and finishing.

92 **2.1.3 Packaging and Identification:** A description of the method of
93 packaging and field identification of the siding. Identification provisions shall include the
94 evaluation report number and the name or logo of the inspection agency.

95 ~~**2.1.4 Field Preparation:** A description of the methods of field-cutting,~~
96 ~~application and finishing.~~

97 **2.2 Testing Laboratories:** Testing laboratories shall comply with Section 2.0
98 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-
99 ES Rules of Procedure for Evaluation Reports.

100 **2.3 Test Reports:** Test reports shall comply with AC85.

101 **2.4 Product Sampling:** Products for testing shall be sampled in accordance
102 with Section 3.1 of AC85, and construction of wall assemblies shall be witnessed and
103 reported in accordance with Section 3.3 of AC85.

104 **2.5 Weather-resistive Considerations:** A water-resistive barrier complying
105 with Section 1403.2 of the IBC and Section R703.2 of the IRC is required. In
106 jurisdictions enforcing the IRC, the composite siding shall be installed as described in
107 IRC Table R703.4 for hardboard lap-siding—horizontal.

108 **3.0 TEST AND PERFORMANCE REQUIREMENTS**

109 **3.1 Physical Properties:** Reports of tests shall be submitted that
110 demonstrate compliance with Sections 3.1.1 through 3.1.85. When the test standard
111 does not identify the number of specimens, a minimum of five specimens shall be
112 tested. The following properties shall be determined and shall be used to establish
113 minimum property requirements for quality control purposes:

114 **3.1.1 Flexural Strength and Flexural Modulus of Rupture (MOR):**

115 Testing of lap siding shall be conducted in accordance with ASTM D 6109, Test Method
116 A. The minimum flexural strength shall be ~~[To be provided by the proponent prior to~~
117 ~~committee meeting.]~~ _____ in-lbs (_____ mm-N), and minimum MOR shall be _____
118 ~~[To be provided by the proponent prior to committee meeting.] [The number of~~
119 ~~samples to be tested and the method of determining the flexural strength and~~
120 ~~MOR must be documented, minimum test value for any one sample or average of~~
121 ~~all tested samples.]~~

122 **3.1.2 Tensile Strength and Modulus of Elasticity (MOE):** Testing shall

123 be conducted in accordance with ASTM D 2990. The minimum tensile stress shall be

124 ~~[To be provided by the proponent prior to committee meeting]~~ _____ psi (_____

125 KPa), and minimum MOE shall be _____ [~~To be provided by the proponent prior to~~
126 ~~committee meeting~~]. [~~The number of samples to be tested and the method of~~
127 ~~determining the MOE must be documented, minimum test value for any one~~
128 ~~sample or average of all tested samples.~~]

129 **3.1.2 Density:** Testing shall be conducted in accordance with ASTM D
130 1622. The value for density shall be consistent with the value stated by the
131 manufacturer.

132 **3.1.3 Linear Coefficient of Thermal Expansion (COE):** Testing shall be
133 conducted in accordance with ASTM D 6341, with a temperature between -30°C and
134 +80°C. [~~To be provided by the proponent prior to committee meeting, check~~
135 ~~maximum COE?~~]~~[The number of samples to be tested and the method of~~
136 ~~determining the COE must be documented, minimum test value for any one~~
137 ~~sample or average of all tested samples.]~~

138 **3.1.4 Impact Resistance:** Testing shall be conducted in accordance with
139 ASTM D 1037, Section 21.

140 **3.1.5 Water Absorption:** Testing shall be conducted in accordance with
141 ASTM C 1185, Section 9.

142 **3.2 Thermal Resistance:** Testing shall be conducted in accordance with
143 ASTM C 518, and the *R*-value for the product shall be reported in the evaluation report.

144 ~~3.1.6 Impact Resistance:~~ Testing shall be conducted in accordance with
145 ~~ASTM D 4226, Procedure A, ASTM D 1037, Section 21 using a minimum of five~~

146 ~~samples and the minimum average impact energy required to cause failure shall be~~
147 ~~_____ in-lbs (_____ mm-N) 12 inches (305 mm). [To be provided by the proponent~~
148 ~~prior to committee meeting]. [The number of samples to be tested and the~~
149 ~~method of determining the impact resistance must be documented, minimum test~~
150 ~~value for any one sample or average of all tested samples.]~~

151 ~~3.1.7 Water Absorption:~~ Testing shall be conducted in accordance with
152 ~~ASTM D 5229, ASTM D 1185, Section 9, with a minimum of five samples. The~~
153 ~~Evaluation Report shall state the water absorption as a percentage by weight using the~~
154 ~~average of the five samples, to determine relative tendency of the product to absorb~~
155 ~~water.~~

156 **3.3 Freeze/Thaw:** Samples shall be preconditioned in accordance with
157 Procedure A of ASTM D 618. Testing shall be in accordance with Section 4.2.1 of
158 AC92. Conditions of acceptance shall be in accordance with Sections 4.2.2 and 4.2.4 of
159 AC92.

160 ~~3.2 Weather-resistive Considerations:~~ A water-resistive barrier complying
161 with Section 1403.2 of the IBC and Section R703.2 of the IRC is required. In
162 jurisdictions enforcing the IRC, the composite siding shall be installed as described in
163 IRC Table R703.4 for hardboard lap-siding—horizontal.

164 **3.4 Transverse Load Tests:** Reports of transverse load tests in accordance
165 with Section 4.1 of this criteria shall be submitted.

166 **3.5 Fire-resistance-rated Construction:** When recognition is sought for use
167 on walls required to be of fire-resistance-rated construction, reports of tests in
168 accordance with ASTM E 119 shall be submitted.

169 ~~**3.5 Noncombustible Construction:** When recognition is sought for use on~~
170 ~~walls required to be of noncombustible construction under the IBC, BNBC, SBC or~~
171 ~~UBC, reports of tests in accordance ASTM E 136 shall be submitted.~~

172 **3.6 Accelerated Weathering:** Reports of accelerated weathering tests
173 conducted in accordance with Section 4.3 of this criteria shall be submitted.

174 **3.7 Surface Burning Characteristics:** Reports of surface burning
175 characteristics conducted in accordance with Section 4.4 of this criteria shall be
176 submitted.

177 **4.0 TEST METHODS**

178 **4.1 Transverse Load Tests:** Testing shall be in accordance with ASTM E
179 330, Procedure B, or ASTM E 72, Sections 11 and 12, using the chamber method of
180 loading for both positive and negative wind pressures. For negative wind pressure tests,
181 the airtight membrane shall be located between the composite siding and the
182 sheathing. At least three positive and three negative load tests shall be conducted with
183 the siding fastened to the framing system or sheathing in accordance with the published
184 installation instructions. Test assemblies shall be a minimum of 4 feet by 8 feet (1219
185 mm by 2438 mm). Application of loads to failure shall be in at least six increments, with
186 a 60-second load duration for each increment. Test assemblies shall be mounted

187 according to the applicable test standard. Framing supporting the siding shall be
188 located at the maximum spacing for which recognition is desired. ICC-ES shall approve
189 any variations from these spans prior to commencement of tests. Load deflection
190 readings at the midpoint of siding spans shall be reported. Testing shall be considered
191 using each type of fastener to be used with the products, nails, screws, and staples.

192 **Conditions of Acceptance:** ~~The evaluation report shall identify the~~
193 ~~design wind pressures for walls in accordance with IRC Table R301.2(2), adjusted for~~
194 ~~height and exposure using coefficients in Table R301.2(3), based on~~ The allowable
195 wind pressure loads are determined in accordance with the following:

- 196 1. Allowable loading shall be based on a factor of a safety of 3.0
197 applied to the average ultimate test load, if all of the following are satisfied:
- 198 a. No single test result shall vary by more than 15 percent from
199 the average of three tests. Variations exceeding this limit will result in larger safety
200 factors.
- 201 b. Allowable load shall not exceed established values for
202 mechanical connectors such as nails, screws and staples.
- 203 2. Other factors of safety can be considered based on unique
204 conditions of installation or material used.

205 **4.2 Nail Fastener Pull-through Test:** Testing in accordance with ASTM D
206 1037 shall be conducted to evaluate ~~alternative fasteners that have not been included~~
207 ~~in the transverse load assemblies tested under Section 4.1~~ to be recognized in the
208 evaluation report for attaching the siding materials.

209 **4.3 Accelerated Weathering Test:** Five 2.5-inch-by-5.0-inch (63.5 mm by
210 127 mm) specimens shall be prepared. Procedures outlined in ~~ASTM G 153, Cycle 1~~
211 ~~(ASTM G 23, Method 1)~~, or ASTM G 155, Cycle 1 (ASTM G 26, Test Method A), may
212 be used. The test shall be conducted for 2,000 hours with cycles of 102 minutes of light
213 followed by 18 minutes of light and water spray. Black panel temperature shall be 145°F
214 ± 5°F (63°C ± 2.2°C). Humidity is not controlled.

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

218 **4.4 Surface Burning Characteristics Testing:** The composite siding shall
219 be tested at the maximum thickness and density for surface burning characteristics, in
220 accordance with ASTM E 84.

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

223 **5.0 QUALITY CONTROL**

224 **5.1** The products shall be manufactured under an approved quality control
225 program with inspections by an inspection agency accredited by International
226 Accreditation Service (IAS) or otherwise acceptable to ICC-ES.

227 **5.2** Quality documentation complying with the ICC-ES Acceptance Criteria for
228 Quality Documentation (AC10) shall be submitted.

229 **5.3** Testing shall be conducted on a periodic basis as determined by the
230 inspection agency to verify the siding materials continue to comply with the physical
231 properties determined in accordance with Section 3.1.

232 **6.0 EVALUATION REPORT RECOGNITION**

233 **6.1** The evaluation report shall describe the product, including materials,
234 composition and size, and the method of identification in accordance with Section 2.1.3.

235 **6.2** The evaluation report shall describe the installation of the siding materials
236 in accordance with Section 2.1.2, and shall include the allowable positive and negative
237 wind pressures for the siding when installed as described in the evaluation report.

238 **6.3** The evaluation report shall include a condition of use that the wall must be
239 braced in accordance with the applicable code.

240 **6.4** The evaluation report shall identify the design wind pressures for walls in
241 accordance with IRC Table R301.2(2), adjusted for height and exposure using
242 coefficients in Table R301.2(3), and the allowable load based on testing in accordance
243 with Section 4.1 of this criteria must exceed the design wind pressure. ■

MOR/II