

ACCEPTANCE CRITERIA FOR RIGID CELLULAR PVC NONLOAD-BEARING EXTERIOR TRIM

AC227

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PREFACE

Evaluation reports issued by ICC Evaluation Service, LLC (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.

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1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria to establish requirements for rigid cellular PVC nonload-bearing exterior trim to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2009 and 2006 *International Building Code*® (IBC), the 2009 and 2006 *International Residential Code*® (IRC), the BOCA® *National Building Code/1999* (BNBC), the 1999 *Standard Building Code*® (SBC), the 1997 *Uniform Building Code*™ (UBC), and the 1998 *International One- and Two-Family Dwelling Code*® (I1&2). Bases of recognition are IBC Section 104.11, IRC Section R104.11, BNBC Section 106.4, SBC Section 103.7, UBC Section 104.2.8 and I1&2 Section 108.1. Applicable code sections in the IBC are Sections 1401, 1403 and 1404; in the IRC are Sections R701 and R703; in the BNBC are Sections 1401.0, 1404.0 and 1405.0; in the SBC is Section 1401; in the UBC is Section 1401; and in the I1&2 are Sections 701 and 703.

The reason for development of this criteria is to allow the evaluation of rigid cellular PVC nonload-bearing exterior trim, since the code does not provide standards for evaluation of exterior trim.

1.2 Scope: Rigid cellular PVC nonload-bearing exterior trim is used as corner boards, soffits, fascia, battens, door pilasters, frieze boards, nonload-bearing rake boards, architectural millwork and door and window trim on buildings of combustible, nonfire-resistance-rated construction: IBC Type VB; BNBC Type 5 Unprotected; SBC Type VI Unprotected; UBC Type VN; and all construction types permitted under the IRC and I1&2. The trim is installed over solid backing material, either approved exterior sheathing or approved exterior wall coverings.

1.3 Codes and Referenced Standards: Where standards are referenced in this criteria, these standards shall be applied consistently with the code upon which compliance is based.

1.3.1 Codes:

1.3.1.1 2009 and 2006 *International Building Code*® (IBC), International Code Council.

1.3.1.2 2009 and 2006 *International Residential Code*® (IRC), International Code Council.

1.3.1.3 BOCA® *National Building Code/1999* (BNBC).

1.3.1.4 1999 *Standard Building Code*® (SBC).

1.3.1.5 1997 *Uniform Building Code*™ (UBC).

1.3.1.6 1998 *International One- and Two-Family Dwelling Code*® (I1&2), International Code Council.

1.3.2 Standards:

1.3.2.1 AATCC Test Method 127—1985, Hydrostatic Head Leakage Test, American Association of Textile Chemists and Colorists.

1.3.2.2 AWPA E 1-97, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites, American Wood-Preservers' Association.

1.3.2.3 AWPA E 12-94, Standard Method of Determining the Corrosion of Metals on Contact with Treated Wood, American Wood-Preservers' Association.

1.3.2.4 ASTM D 256-02e1, Standard Test Method for Determining the Izod Pendulum Impact Resistance of Plastics, ASTM International.

1.3.2.5 ASTM D 570-98, Standard Test Method for Water Absorption of Plastics, ASTM International.

1.3.2.6 ASTM D 638-02e, Standard Test Method for Tensile Properties of Plastics, ASTM International.

1.3.2.7 ASTM D 648-01, Standard Test Method for Deflection Temperature of Plastics under Flexural Load in Edgewise Position, ASTM International.

1.3.2.8 ASTM D 696-03, Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30° C and 30° C with a Vitreous Silica Dilatometer, ASTM International.

1.3.2.9 ASTM D 790-03, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials, ASTM International.

1.3.2.10 ASTM D 792-00, Standard Test Method for Density and Specific Gravity (Relative Density) of Plastics by Displacement, ASTM International.

1.3.2.11 ASTM D 1761-06, [-88 (2000)e1 under the 2006 IBC] Standard Test Method for Mechanical Fasteners in Wood, ASTM International.

1.3.2.12 ASTM D 3345-74 (1999) [-77(1985) under SBC, -88e1 under BNBC], Standard Test Method for Laboratory Evaluation of Wood and Other Cellulosic Materials for Resistance to Termites, ASTM International.

1.3.2.13 ASTM D 5420-98, Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact), ASTM International.

1.3.2.14 ASTM D 6117-97, Standard Test Method for Mechanical Fasteners in Plastic Lumber and Shapes, ASTM International.

1.3.2.15 ASTM D 6662-01, Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards, ASTM International.

1.3.2.16 ASTM E 84-07 [-04 under the 2006 IBC, -98e1 under BNBC, -95 under SBC, -84 under UBC], Standard Test Method for Surface Burning Characteristics of Building Material, ASTM International.

1.3.2.17 ASTM E 330-02 [-84 under the SBC], Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference, ASTM International.

1.3.2.18 ASTM G 152-06, [-04 under the 2006 IBC] Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials, ASTM International.

1.3.2.19 ASTM G 154-05, [00A under the 2006 IBC], Standard Practice for Operating Florescent Light Apparatus for Exposure of Nonmetallic Materials, ASTM International.

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1.3.2.20 ASTM G 155-05a, [-04 under the 2006 IBC] Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials, ASTM International.

1.4 Definitions:

1.4.1 Rigid Cellular PVC Nonload-bearing Exterior Trim: The trim is manufactured Polyvinyl Chloride polymer sheets, boards and preformed shapes that can be cut, shaped, routed and mitered with standard woodworking tools and attached to the structure with nails or screws.

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: Installation details and limitations, fastening methods, joint treatments, and face treatments.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the sheet, boards and preformed shapes. Identification provisions shall include the evaluation report number.

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

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 shall be sampled in accordance with Section 3.2 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 Exterior Weather Resistance: The rigid cellular PVC nonload-bearing exterior trim shall be subjected to accelerated weathering and freeze-thaw testing, with tested samples subjected to flexural and/or tension testing and compared to control samples similarly tested. The product shall also be tested for water absorption and resistance. The test methods and conditions of acceptance are noted in Section 4.1 of this criteria.

3.2 Termite Resistance: The product shall be subjected to testing for subterranean termite resistance. The test methods are noted in Section 4.2 of this criteria.

3.3 Surface Burning Characteristics: The product at a maximum thickness and density shall be tested for surface burning characteristics. The test method is noted in Section 4.3 of this criteria.

3.4 Mechanical Fasteners: Testing of mechanical fasteners used to attach the product is required. The test method is noted in Section 4.4 of this criteria.

3.5 Structural—Transverse Load Tests: Soffit boards and architectural-trim-use of the product shall be tested to demonstrate negative pressure resistance to transverse wind load. The test method is noted in Section 4.5 of this criteria.

3.6 Material Properties: The product shall be tested for physical properties to establish minimum values. The test methods are noted in Section 4.6 of this criteria.

3.7 Corrosion: Testing indicated in Section 4.7 of this criteria shall be performed.

4.0 TEST METHODS

4.1 Exterior Weather Resistance Testing:

4.1.1 Accelerated Weathering with Comparative Strength Testing: A minimum of five samples, using the minimum thickness produced, shall be subjected to 2000 hours of accelerated weathering under ASTM G 152, G 154, or G 155. Flexural load testing of weathered samples is conducted in accordance with ASTM D 790 or tensile testing in accordance with ASTM D 638. A minimum of five control samples, full size, shall be tested for flexural load or tension and compared to the weathered samples.

Conditions of Acceptance: The average flexural or tension strength of weathered samples shall be at least 90 percent that of the control samples tested.

4.1.2 Freeze-thaw Resistance with Comparative Strength Testing: A minimum of five full-size samples shall be subjected to hygrothermal cyclic testing under Section 6.3.3.1 of ASTM D 6662. Flexural load testing of hygrothermal cyclic tested samples shall be conducted in accordance with ASTM D 790, or there shall be tensile testing in accordance with ASTM D 638. A minimum of five full-size control samples shall be tested for flexural load or tension and compared to the hygrothermal cyclic tested samples.

Conditions of Acceptance: The average flexural or tension strength of weathered samples shall be at least 90 percent that of the control samples tested.

4.1.3 Water Absorption and Resistance: A minimum of five samples shall be tested for water absorption under ASTM D 570, using the thinnest product that is to be recognized in the evaluation report; and subjected to a hydrostatic head of water 55 centimeters for five hours per AATCC Test Method No. 127.

Conditions of Acceptance: There shall be no visible leakage during the five-hour test period.

4.2 Termite Resistance Testing: Samples shall be tested under ASTM D 3345 or AWPA E 1. The testing shall address Formosan termite resistance.

Conditions of Acceptance: The tested samples shall demonstrate equivalent termite resistance to that of an approved preservative-treated wood or naturally durable wood in accordance with the applicable code. The test report shall identify the wood preservative or naturally durable wood used as control samples.

4.3 Surface Burning Characteristics Testing: The product 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.

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4.4 Mechanical Fastener Testing: When code-complying fasteners are installed in approved wood substrates, the allowable fastener capacity shall be in accordance with the NDS. When alternative fasteners are used and/or installed in other than approved substrates, the following testing is required: A minimum of five tests shall be performed for each type and size of fastener (e.g., nails, screws) and load direction (e.g., lateral and pull-through) for which recognition is sought. Testing shall be in accordance with ASTM D 1761 or ASTM D 6117.

Conditions of Acceptance: The allowable load capacity of the fasteners shall be in accordance with the NDS (when applicable) or the average ultimate failure load of the five samples divided by a safety factor of 3.0. The allowable load pull-through strength shall be greater than the allowable negative transverse wind load as determined in Section 4.5 below.

4.5 Structural—Transverse Load Tests: A full-size soffit board assembly and other architectural-trim-shape assemblies with appropriate fasteners shall be load-tested in accordance with ASTM E 330 for negative pressures. The sample shall be loaded to failure. The assemblies shall be representative of field installations.

Conditions of Acceptance: The allowable load shall be the failure load divided by a safety factor of 2.5. The assembly as tested shall be described in the evaluation report, the description to include number, size, type and spacing of fasteners, and spacing of supports.

4.6 Material Properties: The following testing shall be conducted to establish physical properties for the product: density in accordance with ASTM D 792, Gardner impact in accordance with ASTM D 5420, Charpy impact in accordance with ASTM D 256, coefficient of linear expansion in accordance with ASTM D 696, and heat deflection temperature under flexural load in accordance with ASTM D 648.

Conditions of Acceptance: The physical properties testing described in this section shall be used to establish control values for quality control.

4.7 Corrosion: Corrosion of vinyl coupons by preservative-treated wood shall be in accordance with

modified AWPA E12-94.E12 for each preservative treatment to be recognized at the maximum anticipated retention level. The test is modified for vinyl coupons in lieu of metals, and the coupon density has to be determined in accordance with ASTM D 792-00, with results reported in grams per milliliter.

Conditions of Acceptance: There shall be no visual defects at 5× magnification, and weight loss of exposed vinyl coupons computed per E12 shall be a maximum of five percent.

5.0 QUALITY CONTROL

5.1 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted. The documentation shall be sufficient as to indicate continued compliance with the properties determined by the testing described in Section 4.0.

5.2 Third-party follow-up inspections are not required under this acceptance criteria.

6.0 EVALUATION REPORT RECOGNITION

The following shall be included in the evaluation report for rigid cellular PVC nonload-bearing exterior trim covered by this criteria:

6.1 The product shall be used only as nonload-bearing exterior trim on buildings of combustible construction.

6.2 The product shall be limited to use on buildings of combustible nonfire-resistance-rated construction: IBC Type VB; BNBC Type 5 Unprotected; SBC Type VI Unprotected; UBC Type VN; and all construction types permitted under the IRC and I1&2. The trim is installed over solid backing material, either approved exterior sheathing or approved exterior wall coverings.

6.3 The product shall be limited to the exterior trim and soffits that have been justified. The evaluation report shall identify the types of trim and soffits, including size, thickness and width.

6.4 The assemblies tested for transverse wind load shall be described in the evaluation report. The description shall include the number and types of fasteners; the size, length, and spacing of fasteners; and the spacing of supports with size of soffit boards tested.■