



ACCEPTANCE CRITERIA FOR POLYPROPYLENE ROOF UNDERLAYMENTS

AC207

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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.

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1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for recognition of polypropylene roof underlayments in ICC-ES evaluation reports, under the *International Building Code*[®] (IBC), the *International Residential Code*[®] (IRC) and the *Uniform Building Code*[™] (UBC). Bases of recognition are IBC Section 104.11, IRC Section R401.11 and UBC Section 104.2.8.

1.2 Scope: This criteria is limited to spun bond polypropylene materials used as mechanically attached roofing underlayments installed over solid sheathing. The membrane materials are alternatives to the Type 15 and Type 30 underlayments specified in Chapter 15 of the UBC, and to the ASTM D 226, Type I and Type II, underlayments specified in Chapter 15 of the IBC and Chapter 9 of the IRC. The roof underlayment can be used when the applicable code requires two layers of underlayment cemented together.

The roof underlayments are limited to buildings permitted to have nonclassified (nonrated under the UBC) roofing in accordance with UBC Section 1504.3 and IBC Section 1505.5, unless successful fire tests are conducted in accordance with Section 3.9 of this criteria.

1.3 Referenced Documents:

1.3.1 2003 *International Building Code*[®], International Code Council.

1.3.2 2003 *International Residential Code*[®], International Code Council.

1.3.3 1997 *Uniform Building Code*[™].

1.3.4 ASTM D 1922-00a, Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method, ASTM International.

1.3.5 ASTM D 3018-90 (1994)^{e1}, Specification for Class A Asphalt Shingles Surfaced with Mineral Granules, ASTM International.

1.3.6 ASTM D 3462-97, Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules, ASTM International.

1.3.7 ASTM Standard D 4869-89 (1993)^{e1}, Specification for Asphalt-Saturated Organic Felt Shingle Underlayment Used in Roofing, ASTM International.

1.3.8 ASTM E 96-00, Water Vapor Transmission of Materials, ASTM International.

1.3.9 ASTM E 108-00, Fire Tests of Roof Coverings, ASTM International.

1.3.10 UL 790-97, Fire Resistance of Roof Covering Materials, Underwriters Laboratories Inc.

2.0 BASIC INFORMATION AND REPORTS OF TESTS

2.1 Product Description: A description of the underlayment sheet materials, and of the manufacturing process, shall be submitted.

2.2 Installation Instructions: Installation instructions shall be submitted.

2.3 Packaging and Identification: A description of the method of packaging and identification of the underlayment shall be submitted. Product labeling shall include the evaluation report number (ESR-xxxx) and the name of the inspection agency.

2.4 Testing Laboratories, Reports of Tests and Product Sampling:

2.4.1 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.

2.4.2 Test reports shall comply with AC85.

2.4.3 Products for testing shall be sampled in accordance with Section 3.1 of AC85. Products shall be sampled at the manufacturing site by an accredited inspection agency or testing laboratory. Exceptions to sampling at the manufacturing site, such as at a warehouse or distribution center, require written consent by ICC-ES. The sampled product shall be truly representative of the standard manufactured product for which recognition is sought.

2.4.4 Unless otherwise noted in this criteria, specimen sizes and quantities, and test configurations, are as noted in the referenced standards.

3.0 REQUIRED DATA

The following data shall be submitted:

3.1 Reports of water-vapor transmission tests in accordance with Section 4.1.

3.2 Reports of pliability tests in accordance with Section 4.2.

3.3 Reports of liquid water transmission tests in accordance with Section 4.3, on control specimens.

3.4 Reports of rupture resistance tests in accordance with Section 4.4, on control, accelerated-aged and ultraviolet-light-exposed specimens.

3.5 Reports of tear resistance tests in accordance with Section 4.5, on control, accelerated-aged and ultraviolet-light-exposed specimens.

3.6 Reports of accelerated aging in accordance with Section 4.6.

3.7 Reports of ultraviolet-light exposure tests in accordance with Section 4.7.

3.8 Reports of tests shall be submitted to demonstrate that the finished product does not crack, upon being unrolled at temperatures between 50°F and 140°F (10°C and 60°C).

3.9 For recognition of installation on buildings required by the applicable code to have classified or noncombustible roof coverings, reports of roof classification tests conducted in accordance with UBC Standard 15-2 (UBC) or ASTM E 108 or UL 790 (IBC, IRC) shall be submitted. See Section 4.8

4.0 TEST REQUIREMENTS

4.1 Water-vapor Transmission Test:

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4.1.1 General: Tests are to be conducted in accordance with ASTM E 96, Water Method.

4.1.2 Conditions of Acceptance: None. Results shall be reported in the evaluation report, in perms.

4.2 Pliability:

4.2.1 General: Five 1-inch-wide-by-8-inch-long (25.4 mm by 203 mm) specimens are maintained at $14 \pm 4^{\circ}\text{F}$ ($-10 \pm 2^{\circ}\text{C}$) for 24 hours and immediately bent over a $\frac{1}{8}$ -inch (3.2 mm) steel mandrel through a 90-degree angle.

4.2.2 Conditions of Acceptance: Specimens shall show no cracking or delamination.

4.3 Liquid Water Transmission Test:

4.3.1 General: Tests shall be conducted in accordance with Section 8.3 of ASTM D 4869.

4.3.2 Conditions of Acceptance: Test specimens shall meet the "Pass" requirements of Section 8.3.5 of ASTM D 4869.

4.4 Rupture Resistance:

4.4.1 General: A minimum of 10 specimens of the subject material shall be prepared and tested following the method specified in Section 8.1.11 of ASTM D 3462, with the following exceptions:

1. Fasteners shall be No. 12 gage roofing nails having $\frac{3}{8}$ -inch-diameter (9.5 mm) heads, and No. 16 gage staples having $\frac{7}{16}$ -inch (11.1 mm) crowns.

2. Specimens shall be conditioned and tested at $73 \pm 4^{\circ}\text{F}$ ($23 \pm 2^{\circ}\text{C}$).

3. Tests shall be conducted on control, accelerated-aged and ultraviolet-light exposed specimens.

4.4.2 Conditions of Acceptance: For each exposure condition, the average rupture resistance of the ten specimens of the subject material shall be a minimum of 25 lbf (111 kg) for the roofing nail and 17 lbf (76 kg) for the staple.

4.5 Tear Resistance:

4.5.1 General: Tests shall be conducted in accordance with ASTM D 1922 on specimens cut to form a constant-radius testing length. Tests shall be conducted on control, accelerated-aged and ultraviolet-light exposed specimens.

4.5.2 Conditions of Acceptance: For each exposure condition, the average tear resistance of the 10 specimens of the subject material in both the machine direction and the cross-machine direction shall be a minimum of 2560 grams-force (5.64 lbf).

4.6 Accelerated Aging:

4.6.1 General: Six specimens, 12 inches by 12 inches (305 mm by 305 mm) in size, are aged by the cyclic process described herein. Twenty-five cycles are required, with each cycle consisting of the following:

1. Oven-drying at 120°F (49°C) for three hours with all surfaces exposed.

2. Immersion in water maintained at room temperature for three hours, with all surfaces exposed.

3. Removal from water and blotting dry before air-drying for 18 hours at room temperature with all surfaces

exposed. Samples must be in the air-dry period over weekends and holidays, which should be confirmed in the test log. The room temperature shall be maintained at $73 \pm 5^{\circ}\text{F}$ ($23 \pm 3^{\circ}\text{C}$).

4.6.2 Conditions of Acceptance: No visible damage to the specimens, such as peeling, chipping, cracking, flaking or pitting. Additionally, accelerated-aged specimens shall be subjected to rupture and tear resistance tests in accordance with Sections 3.4 and 3.5, respectively. The average rupture and tear resistance results of the accelerated-aged specimens shall be in accordance with Sections 4.4.2 and 4.5.2, respectively.

4.7 Ultraviolet Exposure:

4.7.1 General: Exposure to ultraviolet sunlamps for 210 hours (10 hours per day for 21 days). Two 18-inch-by-48-inch (457 mm by 1219 mm) samples are required. Ultraviolet exposure shall be directed on the specimen surface that will be exposed to sunlight in normal application. Lamps and enclosure shall be adjusted so that the temperature on the sample is between 135°F and 140°F (57.2°C and 60°C). Sunlamp bulbs shall be General Electric Type H275 RUV (275 W) or equivalent bulbs providing UV characteristics of $5.0 \text{ W/m}^2/\text{nm}$ irradiance at a wavelength of 315 to 400 nm at one meter.

4.7.2 Conditions of Acceptance: No visible surface or structural changes, such as peeling, chipping, cracking, flaking or pitting when observed under minimum five-power magnification, are permitted. Additionally, ultraviolet-exposed specimens shall be subjected to rupture and tear resistance tests in accordance with Sections 3.4 and 3.5, respectively. The average rupture and tear resistance results of the ultraviolet-exposed specimens shall be in accordance with Sections 4.4.2 and 4.5.2, respectively.

4.8 Roofing Classification: Two Class A intermittent flame and four Class A burning brand decks shall be tested. The assemblies shall consist of a single layer of the subject underlayment installed over solid sheathing and a roof covering of three-tab asphalt shingles complying with ASTM D 3018 and having a maximum installed weight of 190 pounds per 100 square feet (9.28 kg/m^2). Tests shall be conducted at a slope of 5:12 (41.67%). Test decks shall be constructed with nominal $\frac{3}{8}$ -inch-thick (9.5 mm) plywood.

Based on successful completion of the tests, the evaluation report on the underlayment will state that the underlayment is permitted to be used as an alternative to the underlayment specified in the applicable code for roof coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or sheets, metal sheets and shingles and nonfire-retardant-treated wood. The noted roof coverings are permitted to be used in Section 1504.2 of the UBC, Section 1505.2 of the IBC and Section R902.1 of the IRC wherever a Class A, B or C roof covering assembly is required.

5.0 QUALITY CONTROL

The underlayment shall be produced under a quality control program administered by an inspection agency with current accreditation by International Accreditation Service, Inc. A quality control manual verifying ongoing compliance with this acceptance criteria, and complying with the ICC-ES Acceptance Criteria for Quality Control Manuals (AC10), shall be submitted.

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6.0 EVALUATION REPORT RECOGNITION

6.1 Installation of underlayments is limited to roof slopes of 2:12 (16.67%) and greater, and installations where the roof covering does not involve hot asphalt or coal tar pitch.

6.2 Underlayments recognized through compliance with this criteria are limited to use with roof coverings that are

mechanically fastened through the underlayment or onto batten systems that are attached to the sheathing or rafters. ■