ICBO Evaluation Service, Inc.
A subsidiary corporation of the International Conference of Building Officials
5360 WORKMAN MILL ROAD • WHITTIER, CALIFORNIA 90601-2299 • (562) 699-0543
FAX (562) 695-4694

ACCEPTANCE CRITERIA FOR ROOFING SYSTEMS WITH STEEL-REINFORCED RUBBER SHAKES

AC146

April 1999
(Effective April 8, 1999)

PREFACE

Evaluation reports issued by ICBO Evaluation Service, Inc. (ICBO ES), are based upon performance features of the *Uniform Building Code*™, ICBO *Uniform Mechanical Code*™ and related codes. Section 104.2.8 of the *Uniform Building Code* is the primary charging section upon which evaluation reports are issued. Section 104.2.8 reads as follows:

> The provisions of this code are not intended to prevent the use of any material, alternate design or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.
>
> The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with 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 suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.
>
> The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency.

The attached acceptance criteria has been issued to provide all interested parties with guidelines on implementing performance features of the codes. The criteria was developed and adopted following public hearings conducted by the 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 a previous edition, solid vertical lines (▌) in the outer margin within the criteria indicate a technical change or addition from the previous edition. Deletion indicators (◗) are provided in the outer margins where a paragraph or item has been deleted if the deletion resulted from a technical change. This criteria may be further revised as the need dictates.

ICBO ES may consider alternate criteria, provided the proponent submits valid data demonstrating that the alternate criteria are at least equivalent to the attached criteria and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a material, type or method of construction, or equipment, meets the attached acceptance criteria, or that it can be demonstrated that valid alternate criteria are equivalent and otherwise meet the applicable performance requirements of the codes, if the material, product, system or equipment is such that either unusual care in 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 thereof, ICBO ES retains the right to refuse to issue or renew an evaluation report.

Published by

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1.0 INTRODUCTION

1.1 Scope: The purpose of this acceptance criteria is to establish requirements for recognition of rubber shake roof covering systems in ICBO Evaluation Service, Inc. (ICBO ES), evaluation reports, under the *Uniform Building Code*™ (UBC). The criteria herein apply only to shakes that are composed of steel-reinforced rubber and are surfaced on the weather side with mineral granules.

1.2 Reference Documents:

1.2.1 1997 *Uniform Building Code*.

1.2.2 1997 *Uniform Building Code Standards*™.

1.2.3 ICBO ES Acceptance Criteria for Special Roofing Systems (AC07).

1.2.4 ICBO ES Acceptance Criteria for Quality Control Manuals (AC10).

1.2.5 ICBO ES Acceptance Criteria for Test Reports and Product Sampling (AC85).

1.2.6 ICBO ES Acceptance Criteria for Laboratory Accreditation (AC89).

1.2.7 ICBO ES Acceptance Criteria for Cold, Liquid-applied, Below Grade, Exterior Dampproofing and Waterproofing Materials (AC29).

1.2.8 American Society for Testing and Materials, ASTM D 751, Standard Test Methods for Coated Fabrics.

1.2.9 American Society for Testing and Materials, ASTM D 2136, Standard Test Method for Coated Fabrics–Low Temperature Bend Test.

1.2.10 American Society for Testing and Materials, ASTM D 2137, Standard Test Methods for Rubber Property–Brittleness Point of Flexible Polymers and Coated Fabrics.

1.2.11 American Society for Testing and Materials, ASTM D 5601, Standard Test Method for Tearing Resistance of Roofing and Waterproofing Materials and Membranes.

1.2.12 Underwriters Laboratories, UL 2218, Standard for Impact Resistance of Prepared Roof Covering Materials.

2.0 BASIC INFORMATION AND REPORTS OF TESTS

2.1 The information described in Sections 2.1.1 through 2.1.4 must be submitted.

2.1.1 Product Description: Complete information, as applicable, concerning formulation, density, protective coatings and the manufacturing process.

2.1.2 Installation Instructions: Dimensioned scale drawings and installation details, noting installation limitations and all thicknesses, and size and location of fasteners. The application shall conform to Sections 1507.5 and 1508.2 and Table 15-B-1 of the code.

2.1.3 Packaging and Identification: Method of packaging and identifying components. Identification shall include the evaluation report number (ICBO ES ER-XXXX), the name or logo of the quality control agency, and notice of any product installation limitations. A copy of the installation instructions, as packaged with the product, shall be submitted.

2.1.4 Field Preparation: Method of field cutting, trimming or forming, and treatment of cut edges.

2.2 Testing Laboratories: Testing laboratories shall comply with the ICBO ES Acceptance Criteria for Laboratory Accreditation (AC89).

2.3 Test Reports: Test reports and product sampling shall comply with the ICBO ES Acceptance Criteria for Test Reports and Product Sampling (AC85). The test report must be in sufficient detail to identify specimen properties that might affect performance as a roof covering. A qualified representative of the testing agency must witness production methods, fabrication and installation of test specimens. The testing agency must verify and report dimensions, weight, density, chemical formulation, treatment, moisture content and other relevant physical properties of the major components. The testing agency also must verify and report the manner of installation, and describe fastening elements.

3.0 REQUIRED DATA

3.1 Accelerated Weathering:

3.1.1 Sample: Ten representative samples of the product shall be used, five of which must be held as controls.

3.1.2 Procedures: Details are in Table 1.

3.1.3 Conditions of Acceptance: Surface changes do not result in cracking, checking, crazing, erosion, or chalking. Loss in tensile strength and elongation after the weatherometer test will be evaluated in accordance with Section 3.9.2.

3.2 Roof Classification Tests:

3.2.1 Procedures: Roof classification tests shall be conducted in accordance with UBC Standard 15-2.

3.2.2 Condition of Acceptance: A minimum Class C classification is required.

3.3 Wind Uplift: Recognition may be granted for use in areas subject to a maximum basic wind speed of 80 mph (129 km/h) on structures a maximum of 40 feet (12 192 mm) in height in Exposure B areas, provided the proponent can verify, in writing, that an investigation has determined that the product will perform satisfactorily when installed under these conditions. Recognition beyond these limits requires, as an acceptable alternative, full-scale dynamic wind-uplift tests, static-uplift tests, structural calculations, or a combination thereof.

3.4 Penetration: Penetration shall be in accordance with the requirements of Section 4.2 of the ICBO ES Acceptance Criteria for Special Roofing Systems (AC07).

3.5 Uplift Bend: Uplift bend shall be in accordance with the requirements of Section 4.4 of the ICBO ES Acceptance Criteria for Special Roofing Systems (AC07).

3.6 Temperature Cycling: Temperature cycling shall be in accordance with the requirements of Section 4.8 of the ICBO ES Acceptance Criteria for Special Roofing Systems (AC07).

3.7 Tear Resistance:

3.7.1 Sampling and Test Procedure: Tear resistance sampling and testing is determined in accordance with ASTM D 5601.

3.7.2 Conditions of Acceptance: All specimens shall exhibit a tear resistance of at least 50 pounds per lineal inch (8.75 N/mm).

3.8 Impact Resistance:

3.8.1 Samples: Tests are done on three sample decks prepared in accordance with Underwriters Laboratories Standard UL 2218.

3.8.2 Test Procedure and Conditions of Acceptance: The test procedure and conditions of acceptance shall comply with Underwriters Laboratories Standard UL 2218.

3.9 Physical Properties:

3.9.1 Sampling and Test Procedures: Sampling and testing are done in accordance with ASTM D 751.

3.9.2 Breaking Strength and Elongation: Breaking strength and elongation shall be in accordance with

Sections 11 through 17 of ASTM D 751, using Procedure A–Grab Test Method. Five samples are subjected to the accelerated weathering tests in Section 3.1, in both longitudinal and transverse directions.

3.9.3 Hydrostatic Resistance: Hydrostatic resistance shall be in accordance with Section 4.4 of AC29, except soil conditioning is waived under Section 4.4.4.2, and specimen stretching under Section 4.4.4.3 is nonmandatory.

3.9.4 Low Temperature Bend: Low temperature bend shall be in accordance with Section 55 of ASTM D 751, which refers to ASTM D 2136.

3.9.5 Low Temperature Impact: Low temperature impact shall be in accordance with Section 56 of ASTM D 751, which refers to ASTM D 2137; Method B shall apply.

3.9.6 Conditions of Acceptance:

3.9.6.1 Breaking Strength and Elongation: All results shall be 90 lbf (400 N) or greater, and minimum 15 percent elongation.

3.9.6.2 Hydrostatic Resistance: All specimens shall resist a minimum of 30 psi (207 kPa).

3.9.6.3 Low Temperature Bend: All specimens shall exhibit no cracks or fracture at an exposure of –30°F (–34°C) or less. If failure is observed, a retest is permitted in accordance with Section 9.5 of ASTM D 2136.

3.9.6.4 Low Temperature Impact: All specimens shall exhibit no cracks or fracture at an exposure of –30°F (–34°C) or less.

4.0 REROOFING

4.1 General: Reroofing shall be in accordance with UBC Appendix Chapter 15.

4.2 Roof Classification: Systems to be installed over existing roof coverings shall be shown to satisfy minimum Class C classification requirements in accordance with UBC Standard 15-2 by testing the roof covering system installed over the selected existing roof covering.

Exception: Reroofing limited to nonrated roof coverings.

5.0 QUALITY CONTROL

The rubber shakes shall be produced under a quality control program administered by an inspection agency accredited by ICBO Evaluation Service, Inc., or recognized by the National Evaluation Service, Inc. A quality control manual developed in consultation with the approved agency, and complying with the ICBO ES Acceptance Criteria for Quality Control Manuals (AC10), must be submitted.

TABLE 1—ACCELERATED WEATHERING TEST METHODS FOR RUBBER SHINGLES

TEST METHOD	TIME (hours)	TEST CONDITIONS
Xenon-Arc Weathering Apparatus, ASTM G 26, Method A	2,000	Filters: Inner and outer borosilicate filters Water: Deionized water Light exposure: 0.035 W/m^2 at 340 nm Cycle: 690 minutes light and 30 minutes light and water spray Black panel temperature: 176°F ± 5°F Relative humidity: 50 ± 5 percent Spray nozzle: F-80 Reposition specimen every 250 hours Apparatus: Type BH
Fluorescent UV–Condensation Exposure, ASTM G 53	2,000	20 hours UV at 176°F 4 hours condensation at 122°F Black panel temperature: 176°F ± 5°F

For **SI:** t°C = (t°F – 32) ÷ 1.8.