TESTING APPLICATION STANDARD (TAS) 138-95

STANDARD REQUIREMENTS FOR ALUMINUM PIGMENTED EMULSIFIED ASPHALT USED AS A PROTECTIVE COATING FOR ROOFING

1. Scope:

1.1 This Protocol covers aluminum pigmented emulsified asphalt suitable for application as a protective coating for built-up roofs and other exposed surfaces by brush, roller or spray application.

1.2 All testing shall be conducted by an approved testing agency and all test reports shall be signed by an authorized signer of the testing agency and/or Professional Engineer.

2. Referenced Documents:

2.1 *ASTM Standards*

B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate

D 16 Terminology Relating to Paint, Varnish, Lacquer and Related Products

D 562 Standard Test Method for Consistency of Paints Using the Stormer Viscometer

D 1079 Definitions of Terms Relating to Roofing, Waterproofing, and Bituminous Materials

D 2824 Specification for Aluminum-Pigmented Asphalt Roof Coatings

D 2939 Standard Test Method of Testing Emulsified Bitumens Used as Protective Coatings

D 4798 Standard Test Method for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Xenon - ARC Method)

D 4799 Standard Test Method for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Fluorescent UV and Condensation Method)

E 380 Excerpts from Standard Practice for Use of the International System of Units (SI) (the Modernized Metric System)

G 26 Standard Test Method for Practice for Operating Light - Exposure Apparatus (Xenon - ARC Type) With and Without Water for Exposure of Non-metallic Materials

G 53 Standard Test Method for Operating Light- and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Non-metallic Materials

2.2 *The Florida Building Code, Building*

2.3 *Roof Consultants Institute*
Glossary of Terms

3. Terminology & Units:

3.1 Definitions - For definitions of terms used in this Protocol, refer to ASTM D 16; and/or ASTM D 1079; and/or Chapter 2 of the *Florida Building Code, Building* and/or the RCI Glossary of Terms. Definitions from the *Florida Building Code, Building* shall take precedence.

3.2 Units - For conversion of U.S. customary units to SI units, refer to ASTM E 380.

4. Limitations and Precautions:

4.1 This Protocol may involve hazardous materials, operations and equipment. This Protocol does not purport to address all of the safety problems associated with its use. It is the responsibility of whomever uses this Protocol to consult and establish appropriate safety and health practices

and determine the applicability of regulatory limitations prior to use.

4.2 The user is cautioned that aluminum pigmented emulsified asphalt may generate a reaction resulting in the evolution of Hydrogen gas. Use caution when opening containers.

5. Sampling:

5.1 Sampling shall be in compliance with requirements set forth in ASTM D 2939.

6. Materials and Manufacture:

6.1 Aluminum pigmented emulsified asphalts covered by this Protocol are of general types such as:

6.1.1 Type I Nonfibrated

6.1.2 Type III Fibrated (containing no asbestos fiber)

6.2 *Composition* - The aluminum pigmented emulsified asphalt shall conform to composition requirements as follows:

COMPONENT PROPERTY	TEST STANDARD	ALL TYPES	
		Min.	Max
Weight per U.S. Gallon, (lbs.)	D 2939 Section 5	8.4	10
Weight per Liter, (g)	D 2939 Section 5	1,008	1,200
Residue by Evaporation (mass %)	D 2939 Section 8	30	—
Water Content (volume %)	D 2939 Section 11	—	70.00
Consistency, 77°F (25°C), Krebs units (Ku)	D 562 Procedure A or B	50	125

7. Performance Requirements:

7.1 Physical Properties - The aluminum pigmented emulsified asphalt shall conform to physical property requirements as follows:

PHYSICAL PROPERTY	REFERENCE SECTION	ALL TYPES	
		Min.	Max
Reference, initial (%)	See Section 8.1	50	—
Reflectance, 500 hours, (% retained)	See Section 8.4.5	90	—
Firm Set, (hours)	See Section	—	24
Resistance to Water	See Section 8.3	No blistering, no reemulsification	

7.2 *Uniformity* - After a thoroughly stirred sample has stood for 72 hours at room temperature 77° ± 2.0°F (25° ± 1.1°C) the aluminum emulsion shall be of smooth, uniform consistency without separation or settlement in storage to the extent that it cannot be readily dispersed by moderate stirring.

7.3 *Workability* - The aluminum pigmented emulsified asphalt shall be of suitable consistency for application above freezing by brush, roller, or suitable spray equipment without thinning with water or heating, and shall bond to either damp or dry surfaces to produce a film in which the aluminum pigment forms a bright reflective surface on smooth surfaced emulsion, sheet metal, conventional BUR and modified bitumen systems when applied according to manufacturers recommendations.

7.4 Application of the aluminum pigmented emulsified asphalt shall be between 50°F (10°C) and 100°F (37.8°C) surface temperature. At temperatures above 100°F (37.8°C), a fine water mist to aid cooling of the roof surface to be coated prior to application is recommended.

7.5 The product is not intended for use where ponding water conditions exist.

8. Test Methods:

8.1 *Reflectance* - Test Method D 2824, Section 8.6

8.2 *Firm Set* - Test Method D 2939, Section 14

8.2.1 No reference lines shall be drawn across the faces of the panel.

8.2.2 Cure period shall be 24 hours.

8.3 *Resistance to Water* - Test Method D 2939, Section 17, Alternative B (17.3)

8.4 *Accelerated Weathering* - Test Method G 53 or G 26 (Test Method A)

8.4.1 Apparatus

8.4.1.1 For information on the test apparatus, refer to Section 9 of this Protocol.

8.4.2 Procedure

8.4.2.1 Thoroughly stir the sample to homogeneity. Clean the aluminum panels with industrial grade 1,1,1 trichloroethane, xylol, or an aliphatic solvent such as hexane followed by acetone prior to preparation of test specimens.

8.4.2.2 Prepare two (2) test specimens by spreading with a spatula through masks centered over two (2) metal, aluminum or aluminum alloy panels as described in Table 2 of Specification B 209 under alloy 3003-H14. Doctor off the excess level with a flat scraper. The mask shall have openings $2^1/_2$ by $4^1/_8$ in. (63.5 by 104.8 mm). The wet film thickness of non fibrated coating shall be 0.015 in. (0.38 mm) and fibrated coating shall be 0.020 in. (0.51 mm). Allow specimens to dry 48 hours at room temperature of 75.0° ± 3.0°F (23.9° ± 1.7° C).

8.4.2.3 Measure the initial percent luminous reflectance of each panel using Test Method D 2824, Section 8.6.

8.4.2.4 Place the coated panels into the weatherometer immediately after reflectance measurements.

8.4.2.5 Specimens shall always be placed in the QUV/Condensation chamber during the UV cycle.

8.4.2.6 Specimens shall always be placed in the Xenon-ARC during the "Light Only Time."

8.4.3 Evaluation Test Results

8.4.3.1 Inspect specimens at the end of a daily cycle during the UV period when the panels are thoroughly dry.

8.4.3.2 If using Xenon-ARC Method inspect specimens at the end of a complete cycle, 24 hours, during the light only period when the panels are thoroughly dry.

8.4.3.3 Periodically during, and at the conclusion of 500 hours, visually inspect specimens to determine physical changes. Accelerated weathering at 500 hours shall be as prescribed in Section 8.4, herein.

8.4.3.4 Repeat reflectance measurement as in Section 8.4.2.3, herein.

8.4.4 Accelerated Weathering Failures

8.4.4.1 *Cracking* At no time during the exposure cycles shall the film exhibit surface cracking as determined by viewing the weathered area through a microscope at 40x magnification.

8.4.4.2 *Sagging/Sliding* At no time during the exposure cycles shall the film show any signs of sagging or sliding beyond the exposed area of the draw down.

8.4.4.3 *Loss of Adhesion* Adhesion to the aluminum panels shall be maintained at 100 percent during the exposure cycles.

8.4.4.4 *Blistering* At no time during the exposure cycles shall the film exhibit development of blistering.

8.4.4.5 *Loss of Reflectance* At the conclusion of 500 hours exposure, the cured film shall maintain 90 percent of initial reflectance.

8.4.5 Reflectance Retained Calculation

8.4.5.1 Calculate the % reflectance retained after 500 hours as follows:

$$\% \ retained = \left(\frac{A}{B}\right) \times 100$$

where,

A = reflectance at 500 hours, and
B = initial reflectance.

8.4.6 Report

8.4.6.1 Designate the failure end point of the specimens as the exposure hours where cracking, sagging, sliding, loss of adhesion, blistering, or loss of more than 10% of initial reflectance first occurred.

9. Apparatus:

9.1 Operating light and water exposure apparatus (Fluorescent, UV Condensation Type) for Exposure of Nonmetallic Materials as described in Section 6 of Recommended Practice G 53. Unless otherwise specified, the lamps shall be UV-B lamps with a peak emission at 313 nm and a spectral energy distribution as shown in Figure 1 of Recommended Practice G 53.

9.2 Calibration and Standardization, G 53, Section 8.

9.3 Procedure, G 53, Section 9.

9.4 Test Conditions.

9.4.1 Unless otherwise specified, the apparatus shall be operated 7 days each week, two cycles per day, according to the following schedule. Each cycle shall consist of the following:

Exposure Type	Hours	Exposure Temperature
Ultra Violet (UV)	8	140.0°F ± 3°F (60°C ± 1.7°C)
Condensation	4.00	122.0°F ± 3°F (50°C ± 1.7°C)

9.5 Xenon-Arc Type as described in Section 6 of Procedure of Practice G 26, Test Method A.

10. Package and Package Marking:

10.1 Packaged material shall be certified by the manufacturer to be in compliance with this specification and shall be labeled in compliance with Section 1517 of the *Florida Building Code, Building*. Product Approval documents shall be provided to the purchaser or end user upon request.

10.2 Shipping containers shall be marked with the name of the material, stock number, lot number, year of issue and quantity therein and the name of the manufacturer or supplier.

11. Rejection and Reinspection:

11.1 The Authority Having Jurisdiction may periodically purchase commercial quantities of the approved product for testing at Approved Testing Agencies to confirm compliance with the provisions of this Protocol. Failure to meet the minimum requirements set forth in Sections 6 and 7 shall constitute grounds for rejection of the lots and suspension of the Product Approval. In cases of rejection the Authority Having Jurisdiction shall request removal of the rejected lot number(s) from commercial sale.

11.2 The Authority Having Jurisdiction may, after rejection of one or more lots, require third party quality control inspection as a provision to lifting of Approval suspension.

11.3 Shipping containers shall be marked with the name of the material, the stock number, lot number, quantity therein, and the name of the manufacturer or supplier.