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Standard Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Fluorescent UV, Water Spray, and Condensation Method)¹

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1. Scope

1.1 This practice describes test conditions and procedures for fluorescent UV and condensation exposures conducted according to Practices G 151 and G 154 for bituminous roofing and waterproofing materials that have a minimum softening point of approximately 95°C (200°F) as determined by Test Method D 36. (Also see Terminology G 113.)

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D 1669 Practice for Preparation of Test Panels for Accelerated and Outdoor Weathering of Bituminous Coatings

D 1670 Test Method for Failure End Point in Accelerated and Outdoor Weathering of Bituminous Materials

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials

G 141 Guide for Addressing Variability in Exposure Testing of Nonmetallic Materials

G 147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests

G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

3. Summary of Test Method

3.1 Thin films of bitumen are uniformly applied to aluminum panels. Shingles and similar materials are cut to size and exposed to specified cycles of temperature, light, and water. A choice of three test cycles is given along with options for determining the period of exposure and evaluating results.

4. Significance and Use

~~4.1 This weathering apparatus is used for comparing the weathering characteristics of bituminous materials against a reference material in which the outdoor weathering characteristics are known. It is not possible to establish a precise correlation between accelerated and natural weathering because of geographical climatic variations, local weather variation from normal, and local pollutants. Guide G 141~~

4.1 This weathering apparatus is used for comparing the weathering characteristics of bituminous materials against a control material for which the outdoor weathering characteristics are known. It is not possible to establish a precise correlation between accelerated and natural weathering because (1) there are geographical climatic variations, local weather variations, and variations in local pollutants, and (2) the relation between accelerated and natural weathering is material dependent. Acceleration factors differ between materials as well as between formulations of the same material. Guide G 141 provides guidance regarding this issue.

NOTE 1—This practice can be used for other than bituminous materials, but the significance and use have not been evaluated.

¹ This practice is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.02 on Prepared Roofings, ~~Shingles, Shingles~~ and Siding Materials.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards*, Vol 04.04, volume information, refer to the standard's Document Summary page on the ASTM website.

5. Apparatus

5.1 The fluorescent UV and condensation apparatus used shall conform to the requirements defined in Practices G 151 and G 154.

5.2 *Lamps*—Unless otherwise specified, the lamps shall be fluorescent ~~UV~~-BUVA-340 lamps as described in ~~6.1.3.36.1.3.1~~ of Practice G 154.

5.2.1 Other fluorescent UV lamps meeting the size and electrical characteristics in 5.2 may be used if mutually agreed upon and provided that the lamp and spectral energy distribution are reported in conformance with Section 9.

5.3 *Moisture*—It is permitted to expose the test specimens to moisture in the form of water spray, condensation, or high humidity.

5.3.1 *Water Spray*—It is permitted to equip the test chamber with a means to introduce intermittent water spray onto the test specimens under specified conditions. The spray shall be uniformly distributed over the samples. The spray system shall be made from corrosion resistant materials that do not contaminate the water used.

5.3.1.1 *Spray Water Quality*—Spray water shall have a conductivity below 5 $\mu\text{S}/\text{cm}$, contain less than 1-ppm solids, and leave no observable stains or deposits on the specimens. Very low levels of silica in spray water can cause significant deposits on the surface of test specimens. Care should be taken to keep silica levels below 0.1 ppm. In addition to distillation, a combination of deionization and reverse osmosis can effectively produce water of the required quality. The pH of the water used shall be reported. See Practice G 151 for detailed water quality instructions.

6. Test Specimens

6.1 Unless otherwise agreed upon, test specimens shall be approximately 3 by 6 in. (75 by 150 mm). Bituminous materials shall be applied as uniform coatings on aluminum panels in accordance with Practice D 1669. Fabricated materials such as bituminous roofing, shingles, and similar products shall be cut to size and their weather surfaces exposed. If these are too flexible to sustain their own weight in a vertical position, they may be mounted on aluminum panels.

6.1.1 Replicate specimens are desirable to provide a record of degradation at different time intervals. Retention of an unexposed specimen is recommended as it is difficult to mask a specimen to prevent exposure to condensation.

6.1.2 Follow the procedures described in Practice G 147 for identification, conditioning, and handling of specimens of test, control, test and reference control materials prior to, during, and after exposure.

7. Procedure

7.1 Proceed in accordance with Section 9 of Practice G 154. ~~D4799-08~~

~~7.2 Apparatus shall be operated continuously except for intervals for rotation or inspection of samples according to one of the following cycles:~~ Apparatus shall be operated continuously, except for intervals for repositioning of samples or inspection of samples, according to one of the following cycles. The temperature specifications are for an uninsulated black panel thermometer. For equipment that requires an irradiance setting for its operation, it shall be $0.89 \pm 0.02 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm. Specimens shall be confined to an exposure area in which the irradiance is at least 90 % of the irradiance at the center of the exposure area. Unless it is known that irradiance uniformity meets this requirement, use one of the procedures described in Practice G 154, Section 9.5, to ensure equal radiant exposure on all specimens or to compensate for differences within the exposure chamber. If the specimens do not completely fill all of the spaces, fill the empty spaces with blank panels of corrosion resistant material to maintain the test conditions within the chamber.