Designation: D 4799 – 00

Standard Test Method for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Fluorescent UV and Condensation Method)[1]

This standard is issued under the fixed designation D 4799; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method 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:*

D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)[2]

D 1669 Practice for Preparation of Test Panels for Accelerated and Outdoor Weathering of Bituminous Coatings[2]

D 1670 Test Method for Failure End Point in Accelerated and Outdoor Weathering of Bituminous Materials[2]

G 113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials[3]

G 141 Guide for Addressing Variability in Exposure Testing of Nonmetallic Materials[3]

G 147 Practice for Conditioning and Handling of Nonmetallic Materials for Natural and Artificial Weathering Tests[3]

G 151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices That Use Laboratory Light Sources[3]

G 154 Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials[3]

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 provides guidance regarding this issue.

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-B lamps as described in 6.1.3.3 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.

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.

---

[1] This test method is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials and is the direct responsibility of Subcommittee D08.02 on Prepared Roofings, Shingles, and Siding Materials.

Current edition approved Jan. 10, 2000. Published March 2000. Originally published as D 4799 – 88. Last previous edition D 4799 – 98.

[2] *Annual Book of ASTM Standards*, Vol 04.04.

[3] *Annual Book of ASTM Standards*, Vol 14.04.

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

7. Procedure

7.1 Proceed in accordance with Section 9 of Practice G 154.

7.2 Apparatus shall be operated continuously except for intervals for rotation or inspection of samples according to one of the following cycles:

Cycle A— 4 h UV light at 60°C, alternating with 4 h condensation at 50°C.
Cycle B— 20 h UV light at 60°C, alternating with 4 h condensation at 50°C.
Cycle C— 20 h UV light at 80°C, alternating with 4 h condensation at 50°C.

7.3 If inspection of the panels is to be performed at any stage in the cycle, the interruption of the test procedure should take only sufficient time to allow for such inspection. The time taken for inspection of the samples should not be counted as part of the exposure.

8. Period of Exposure and Evaluation of Results

8.1 The duration of the exposure under this test method shall be one of the following:

8.1.1 A mutually agreed upon number of hours of exposure,

8.1.2 The number of hours of exposure required to produce a mutually agreed upon minimum amount of change in the test specimen, or

8.1.3 The number of hours required to produce mutually agreed upon minimum acceptable change in either the test specimen or a mutually agreed upon standard sample.

8.2 Changes in the exposed samples may be evaluated visually each day by comparing them with unexposed samples, or in terms of the number of hours exposure required to produce physical or chemical changes as determined by Test Method D 1670.

9. Report

9.1 In addition to the items specified in Practice G 151, the report shall include the following:

9.1.1 Test cycle employed (in accordance with 7.2),

9.1.2 Manufacturer and designation of the fluorescent lamp employed, and

9.1.3 Coating thickness employed.

10. Precision and Bias

10.1 *Precision*—If the individual results of replicate specimens differ by more than 10 % from each other, they shall be considered suspect and be repeated.

10.2 *Bias*—Since there is no accepted reference material suitable for determining the bias for the procedure in this test method for measuring accelerated weathering of bituminous materials, bias has not been determined.

11. Keywords

11.1 accelerated weathering; bituminous materials; degradation; exposure; fluorescent UV and condesation; light exposure; roofing; ultraviolet; waterproofing