Designation: C 1257 – 94 (Reapproved 2000)

Standard Test Method for Accelerated Weathering of Solvent-Release-Type Sealants[1]

This standard is issued under the fixed designation C 1257; 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 provides an accelerated procedure for predicting the effects of ultraviolet light, heat, and moisture exposure on color, chalking, cracking, and adhesion of solvent-release sealants.

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:*

C 717 Terminology of Building Seals and Sealants[2]

G 53 Practice for Operating Light and Water Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials[3]

3. Terminology

3.1 *Definitions*—Definitions of the following terms are found in Terminology C 717: adhesive failure (adhesion loss), compound, cure, sealant, solvent-release sealant, substrate.

4. Summary of Test Method

4.1 The test specimens are prepared in U-shaped aluminum channels. After curing, the specimens are exposed to alternating cycles of ultraviolet light at elevated temperature and condensing humidity at elevated temperature. At the end of the exposure period, the specimens are examined for chalking, color change, center cracking, edge cracking, and loss of adhesion versus an unexposed control sample.

5. Significance and Use

5.1 It is difficult to establish a precise correlation between accelerated and natural weathering because of geographical climatic variations, local weather variation from normal, and local pollutants. This test method is used to determine the relative weathering performance of a sealant against an unexposed control or a reference material for which the outdoor weathering characteristics are known.

5.2 This test method is conducted using aluminum channels. Other substrate materials may show different results.

6. Apparatus

6.1 *Fluorescent UV and Condensation Apparatus*, complying with Practice G 53.[4]

6.1.1 The UV light source shall be UVA-340 fluorescent lamps as described in 6.2 of Practice G 53.

6.2 *Four-Mill Finish Aluminum U-Channels*, 76 mm long by 19 mm wide by 9.5 mm deep (3 by ¾ by ⅜ in.) inside dimensions. Additional substrate materials may be specified.

6.3 *Steel Spatula*.

7. Procedure

7.1 Condition sufficient compound in an original closed container for at least 24 h at standard conditions. Standard conditions are to be a temperature of 23 ± 2°C (73 ± 3.6°F) and relative humidity of 50 ± 5 %.

7.2 Prepare four sealant test specimens in aluminum U-channels.

7.2.1 Thoroughly clean channels using a suitable solvent such as methyl ethyl ketone (MEK). Allow to dry before filling with sealant.

7.2.2 Block the ends of the U-channels with masking tape and overfill the entire channel with conditioned compound from the bottom up being careful to avoid air entrapment. Strike the channel off flat with a spatula. Do not remove the masking tape. It is to stay in place for the entire test. Removing it may disturb the uncured or cured sealant.

7.3 Cure the test specimens at standard conditions for 21 days.

NOTE 1—The producer may request conditions other than those specified in 7.3 for the curing period, provided they meet the following requirements: the curing period must extend for 21 days, and the temperature during the curing period shall not exceed 70°C (158°F).

[1] This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.40 on Weathering.

Current edition approved Jan. 15, 1994. Published April 1994.

[2] *Annual Book of ASTM Standards*, Vol 04.07.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] Apparatus and lamps from Q-Panel Co., 26200 First St., Cleveland, Ohio 44145; and Atlas Electric Devices Co., 4114 N. Ravenswood Ave., Chicago, IL 60613, have been found satisfactory.

7.4 After the curing period, place three of the specimens in the weathering apparatus. The sealant surface shall be facing the inside of the chamber. Attach the specimens to the sample holder such that the open or top surface of the channel is in contact with the sample holder. Portions of the sample holder windows not covered by test samples must be covered with blank panels to prevent vapor leakage out of the chamber. Initiate the exposure at the beginning of the UV cycle. Keep the fourth test specimen as an unexposed control and store at standard conditions.

7.5 Proceed in accordance with the procedure section of Practice G 53 with particular attention to sample and lamp rotation for uniform degradation among exposure of the various specimens.

7.6 Operate the apparatus 24 h each day, 7 days each week in accordance with the following cycle: 8 h UV at 60°C (140°F), alternating with 4 h of dark with water condensation at 50°C (122°F).

7.7 Remove the specimens from the apparatus after 1000 total hours. Condition the samples at 23 ± 2°C (73 ± 4°F) and 50 ± 5 % relative humidity for 2 h. Inspect the samples for chalking, color change, center cracking, edge cracking, and loss of adhesion versus an unexposed control sample.

8. Report

8.1 In addition to the items specified in Practice G 53, report the following for each sample tested:

8.1.1 Identification of sealant tested.

8.1.2 Sealant cure cycle employed.

8.1.3 Qualitative visual description of the test specimens after exposure compared to the control with regard to chalking and color change.

8.1.4 Quantitative visual description of edge cracking, center cracking, and adhesion loss using the photographic reference standards shown in Figs. 1-3. Ratings range from 0, no damage, to 5, severe damage. The control is also rated so that it can be determined if the cracking or adhesion loss was the sole result of exposure.

8.1.5 Variations, if any, from the specified test procedure.

9. Precision and Bias

9.1 The precision and bias calculations were based on edge cracking, center cracking, and adhesion loss results from five laboratories testing six materials.

9.1.1 The edge cracking repeatability (within a given laboratory) interval is 1.281. In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed 1.281 only about 5 % of the time. The edge cracking reproducibility (between given laboratories) interval is 3.691. In future use of this test method, the difference between two test results obtained in a different laboratory on the same material will be expected to exceed 3.691 only about 5 % of the time.

9.1.2 The center cracking repeatability (within a given laboratory) interval is 0.820. In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed 0.820 only about 5 % of the time. The center cracking reproducibility (between given laboratories) interval is 3.124. In future use of this test method, the difference between two test results obtained in a different laboratory on the same material will be expected to exceed 3.124 only about 5 % of the time.

9.1.3 The adhesion loss repeatability (within a given laboratory) interval is 1.216. In future use of this test method, the difference between two test results obtained in the same laboratory on the same material will be expected to exceed 1.216 only about 5 % of the time. The adhesion loss reproducibility (between given laboratories) interval is 3.643. In future use of this test method, the difference between two test results obtained in a different laboratory on the same material will be expected to exceed 3.643 only about 5 % of the time.

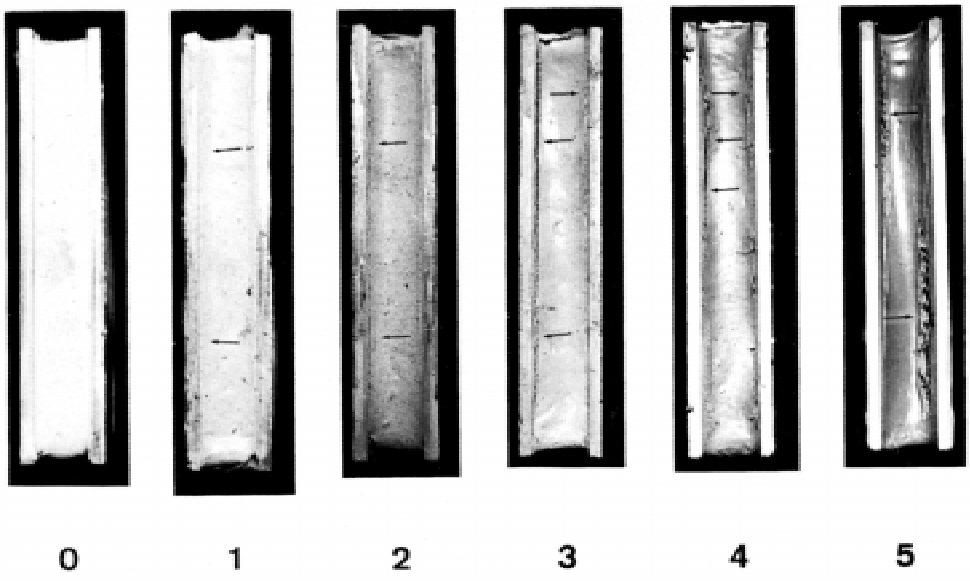

FIG. 1 Edge Cracking

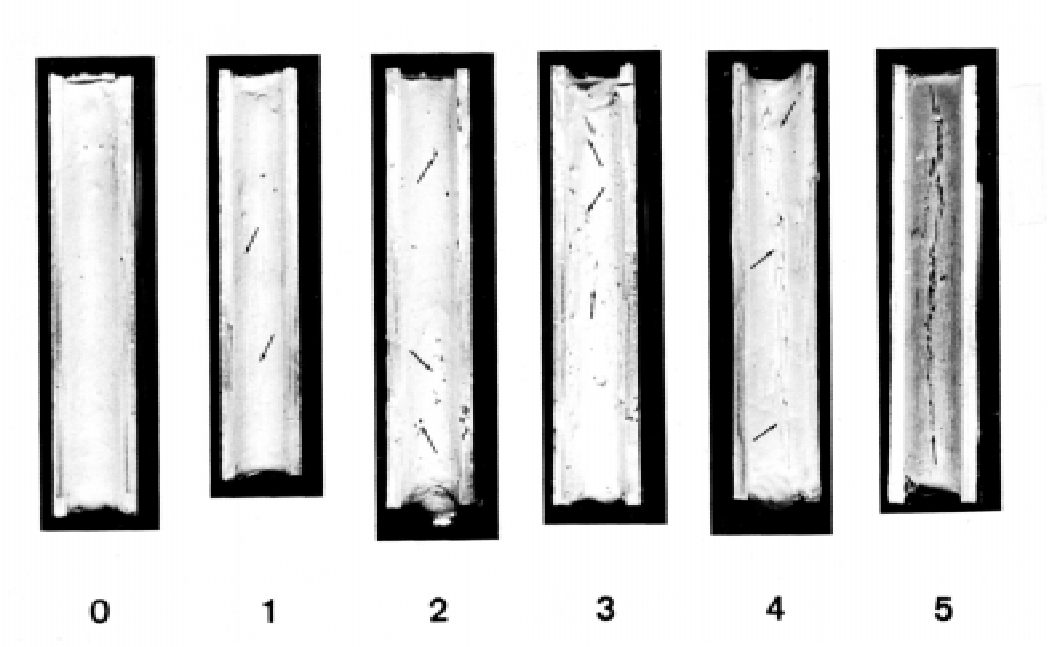

FIG. 2 Center Cracking

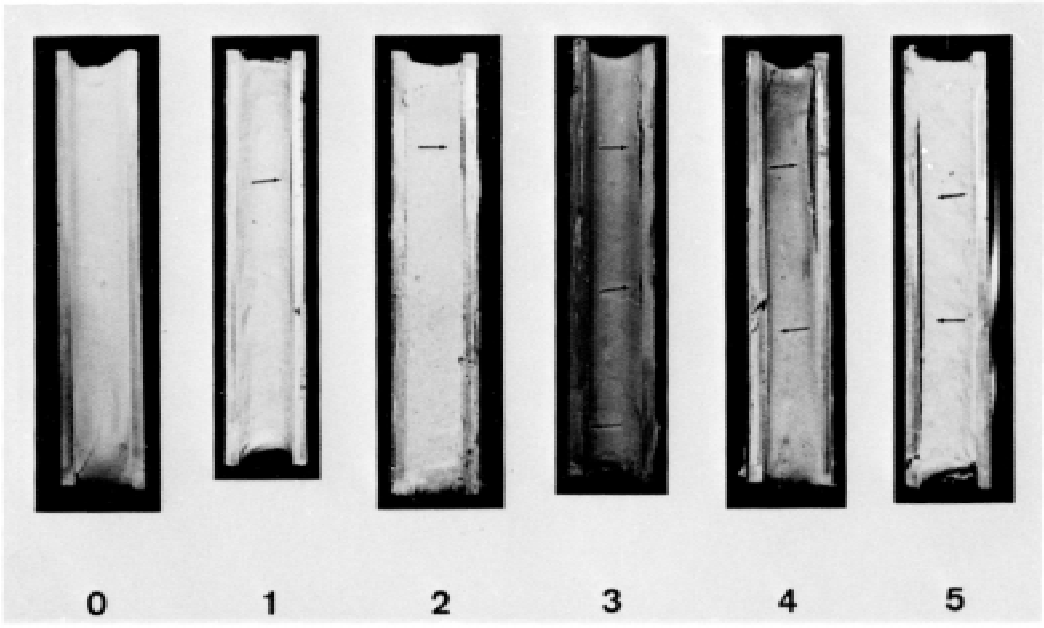

FIG. 3 Adhesion

10. Keywords

10.1 accelerated weathering; sealant; solvent-release sealant