



# Standard Test Method for Accelerated Weathering of Solvent-Release-Type Sealants<sup>1</sup>

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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method includes two laboratory accelerated exposure procedures for predicting the effects of ultraviolet or ultraviolet/visible radiation, heat, and moisture 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.*

1.4 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

**C 717** Terminology of Building Seals and Sealants

**C 1442** Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus

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

**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

**G 155** Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

<sup>1</sup> 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 Sept. 1, 2006. Published September 2006. Originally approved in 1994. Last previous edition approved in 2006 as C 1257-06.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 3. Terminology

### 3.1 Definitions

3.1.1 Refer to Terminology **C 717** and **G 113** for definitions of terms used in this test method.

## 4. Summary of Test Method

4.1 Four test specimens are prepared in U-shaped aluminum channels. After curing, three of the specimens are exposed in the laboratory accelerated weathering device and the fourth specimen is stored under standard conditions as an unexposed file specimen. At the end of the exposure period, the specimens are examined for chalking, color change, center cracking, edge cracking, and loss of adhesion versus the unexposed file specimen.

## 5. Significance and Use

5.1 It is difficult to establish a precise correlation between laboratory accelerated and natural weathering because of (1) geographical climatic variations, local weather variation from normal, and local pollutants and (2) the fact that the acceleration factor is material dependent, varying with the type of material as well as its formulation. This test method is used to determine the resistance of a sealant to laboratory accelerated weathering and, if a control material with known outdoor weathering performance is used, the relative weathering performance of the sealant against that of the control material.

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

## 6. Apparatus

### 6.1 Exposure Apparatus:

6.1.1 *Fluorescent UV/Condensation Apparatus*, that conforms to the requirements in Practices **G 151** and **G 154** with UVA-340 type lamps.

6.1.2 *Xenon-Arc Apparatus*, that conforms to the requirements in Practices **G 151** and **G 155** with daylight type filters.

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  $23 \pm 2^\circ\text{C}$  ( $73 \pm 3.6^\circ\text{F}$ ) and relative humidity of  $50 \pm 5\%$ .

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  $70^\circ\text{C}$  ( $158^\circ\text{F}$ ).

7.4 After the curing period, place three of the specimens in one of the laboratory accelerated exposure devices listed below. Choice of the type of apparatus shall be by mutual agreement among the interested parties. Because of differences in type of light source and test conditions, test results may differ with the type of apparatus used. Consult Practices G 154 and G 155 for differences in the spectral power distributions of the exposure sources and Practice C 1442 for differences in test parameters in two types of apparatus specified. Place three replicate specimens of the control material, if used, in the device along with the test material. Attach the specimens to the sample holder such that the open or top surface of the channel is in contact with the sample holder and the sealant surface

faces the light source. Keep the fourth test specimen as an unexposed file specimen of the test material and store at standard conditions.

7.4.1 Procedure for Fluorescent UV/Condensation Apparatus—Operate the device in accordance with the procedure in Section 7.3 of Practice C 1442. Remove the specimens from the apparatus after a minimum of 1000 h of exposure.

7.4.2 Procedure for Xenon-Arc Apparatus—Operate the device in accordance with the procedure in Section 7.2 of Practice C 1442. When operated at the preferred irradiance level of  $0.51 \text{ W}/(\text{m}^2 \cdot \text{nm})$  at 340 nm, remove the specimens from the apparatus after a minimum of 1000 h ( $1835 \text{ kJ}/(\text{m}^2 \cdot \text{nm})$  at 340 nm). See Annex A1 in C 1442 for determining the exposure time required to provide the same radiant exposure at other irradiance levels.

7.5 Condition the samples at  $23 \pm 2^\circ\text{C}$  ( $73 \pm 4^\circ\text{F}$ ) and  $50 \pm 5\%$  relative humidity for 2 h. Inspect the specimens for chalking, color change, center cracking, edge cracking, and loss of adhesion versus the unexposed file specimen. Compare the effect of exposure on the test specimens with the effect on the control material, if used, to determine the relative performance of the test material.

**8. Report**

8.1 In addition to the items specified in Practice G 151, 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 unexposed file specimen and specimens of the control material, if used, 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

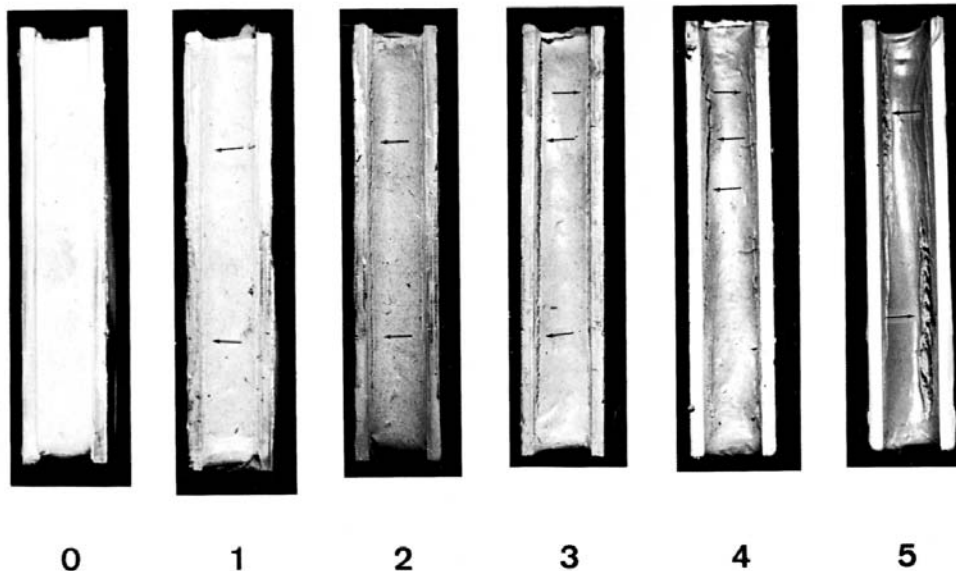


FIG. 1 Edge Cracking

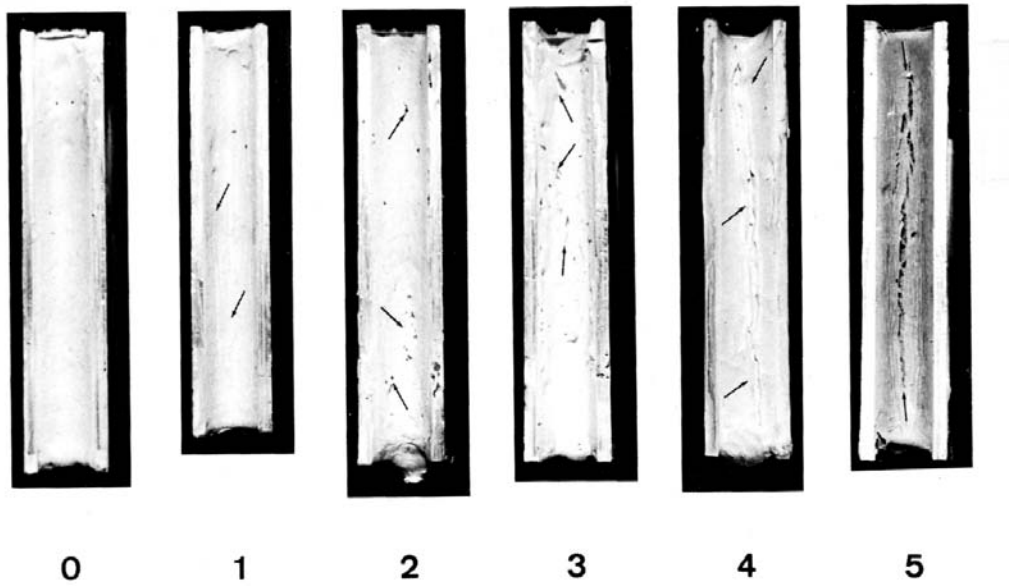


FIG. 2 Center Cracking

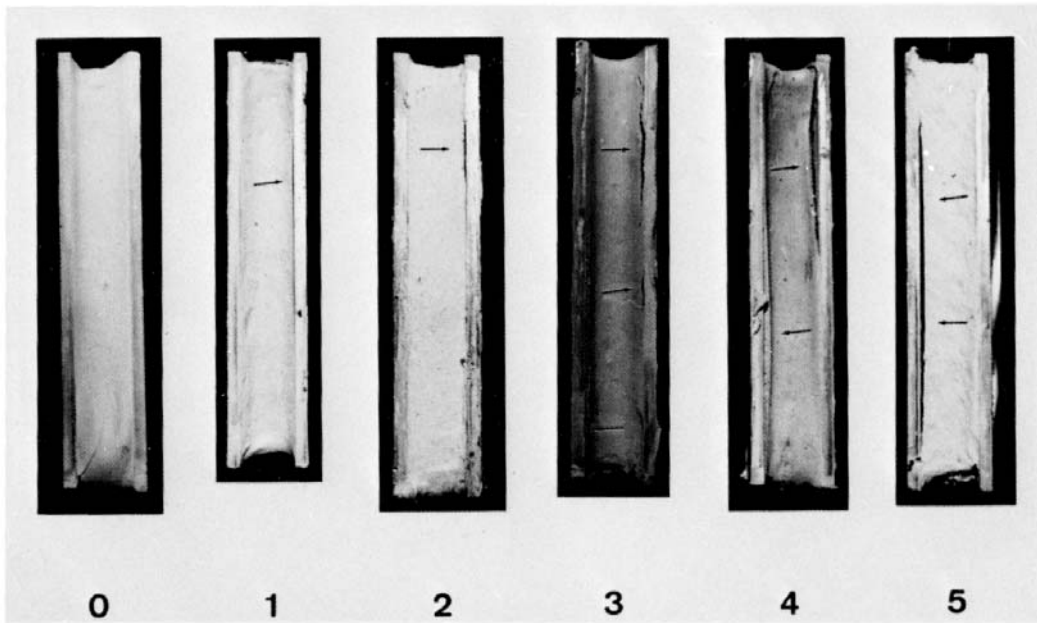


FIG. 3 Adhesion

damage, to 5, severe damage. The unexposed file specimen 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.

8.1.6 Total number of hours test specimens were exposed in weathering device.

### 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.

## 10. Keywords

10.1 accelerated weathering; sealant; solvent-release sealant

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).*