Designation: C 793 – 05

Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants[1]

This standard is issued under the fixed designation C 793; 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 covers a laboratory procedure for determining the effects of accelerated weathering on cured-in-place elastomeric joint sealants (single- and multicomponent) for use in building construction.

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

1.3 The committee with jurisdiction over this standard is not aware of any comparable standards published by other ASTM committees or other organizations.

1.4 *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]

C 717 Terminology of Building Seals and Sealants

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

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

3. Terminology

3.1 *Definitions*—See Terminology C 717 for applicable definitions of the following terms: cure, elastomeric, joint, sealant, and substrate.

4. Summary of Test Method

4.1 Three sealant specimens are spread on aluminum plates and exposed in one of the laboratory accelerated weathering chambers specified in Section 6 and operated in accordance with specifications in Section 8 and Practice C 1442.

4.2 Following this treatment the specimens are exposed for 24 h in a freezer maintained at −26 ± 2°C (−15 ± 4°F).

4.3 At the end of the cold exposure, the specimens are bent over a mandrel within 1 s at the specified temperature.

5. Significance and Use

5.1 It is known that solar radiation contributes to the degradation of sealants in exterior building joints. The use of a laboratory accelerated weathering machine with actinic radiation, moisture and heat appears to be a feasible means to give indications of early degradation by the appearance of sealant cracking. However, simulated weather factors in combination with extension may produce more severe degradation than weather factors only. Therefore, the effect of the weathering test is made more sensitive by the addition of the bending of the specimen at cold temperature.

6. Apparatus

6.1 *Exposure Apparatus*—The exposure apparatus shall be one of the three types of laboratory accelerated weathering devices described in Practice C 1442 that use either xenon arc, fluorescent UV, or open flame carbon arc radiation. Consult Practice C 1442, Section 7 for the differences in test parameters among the devices. Because of differences in test conditions, test results may differ with the type of device used. The choice of device shall be by mutual agreement among the interested parties.

6.2 *Freezer or Cold Box*, having a temperature controlled at −26 ± 2°C (−15 ± 4°F).

6.3 *Rectangular Brass Frame*, with inside dimensions 130 by 40 by 3 mm (5 by 1½ by ⅛ in.).

6.4 *Aluminum Plates*, three, each 152 by 80 by 0.3 mm (6 by 3 by 0.01 in.).

[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 July 1, 2005. Published August 2005. Originally approved in 1975. Last previous edition approved in 2004 as C 793 – 04.

[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* volume information, refer to the standard's Document Summary page on the ASTM website.

6.5 *Steel Mandrel*, 12.7 mm (½ in.) in diameter and about 102 mm (4 in.) long.

6.6 *Thin-Bladed Knife*.

6.7 *Straightedge*, metal or plastic, about 152 mm (6 in.) long.

6.8 *Spatula*, steel, about 152 mm (6 in.) long.

7. Standard Test Conditions

7.1 Unless otherwise specified by those authorizing the test, standard conditions shall be as described in Terminology C 717.

8. Procedure

8.1 *Test of Multicomponent Sealants*:

8.1.1 Condition at least 200 g of base compound and appropriate amount of curing agent and pigment, if required, in a closed container for at least 24 h at standard conditions; then mix thoroughly for 5 min.

8.1.2 Fill the brass frame, after centering it on the aluminum plate, with a portion of the mixed compound and strike if off flat with a straightedge. Immediately lift the frame from the sealant after separating it by running a thin-bladed knife along the inside of the frame (Note 1). Prepare three such specimens and cure them for 21 days at standard conditions.

NOTE 1—In the case of pourable grade compound, do not lift the brass frame until the sealant is sufficiently set so that it will retain its rectangular shape.

8.1.3 At the end of the curing period, leave one specimen unexposed at standard conditions to be used as an unexposed file specimen and place the other two in the weathering device selected. Condition test specimens in the artificial weathering device with the sealant surface facing the exposure source and positioned at the specified distance from the source. Specimens should 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 151, Section 5.1.4 to ensure equal radiant exposure on all specimens or compensation for differences within the exposure chamber. If the specimens do not completely fill the racks, fill the empty spaces with blank metal panels to maintain the test conditions within the chamber. Test conditions in each type of device are in accordance with the procedures in C 1442, Section 7 on Apparatus and the following:

8.1.3.1 Unless the default cycle is selected by mutual agreement, the exposure cycle shall be the cycle described in 7.2.4 and 7.4.3 of Practice C 1442 for the xenon arc and open flame carbon arc devices, respectively.

8.1.3.2 The exposure duration shall be a minimum of 250 h for the fluorescent UV/condensation and open flame carbon arc tests. The exposure duration for the xenon arc test shall be a minimum of 250 h exposure at an irradiance level of 0.51 W/(m^2· nm) at 340 nm (459 kJ/(m^2· nm) at 340 nm).

NOTE 2—See Annex A1 in Practice C 1442 for determining the xenon arc exposure time required to obtain the same radiant exposure at other irradiance levels.

8.1.4 At the end of exposure, remove the specimens from the machine and note changes in appearance as compared with the unexposed file specimen.

8.1.5 Place all three specimens and the mandrel in the freezer, controlled at −26 ± 2°C (−15 ± 4°F) for 24 h. At the end of this period, while in the freezer at this temperature, bend each specimen, with sealant side outward, across its width, 180° around the mandrel within 1 s. Examine each specimen for cracks developed over the bend area.

8.2 *Test of Single-Component Sealants*:

8.2.1 Condition at least 200 g of compound in a closed container for at least 24 h at standard conditions.

8.2.2 Follow the same procedure as specified in 8.1.2-8.1.4.

9. Report

9.1 The report shall include the following information for each sample tested:

9.1.1 Identification of the sealant tested.

9.1.2 Description of the type of sealant, such as single- or multicomponent, nonsag or pourable, color, etc.

9.1.3 Type, manufacturer and model of artificial weathering apparatus used. Irradiance level and actual time (number of hours) in weathering apparatus.

9.1.4 Description of specimens after accelerated weathering, as compared to the unexposed file specimen. Fig. 1 includes examples of cracking obtainable after the weathering test. Number *0* represents no cracks.

9.1.5 Description of specimens after bend test. Fig. 2 includes examples of cracking obtainable after the bend test. Number *0* represents no cracks.

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

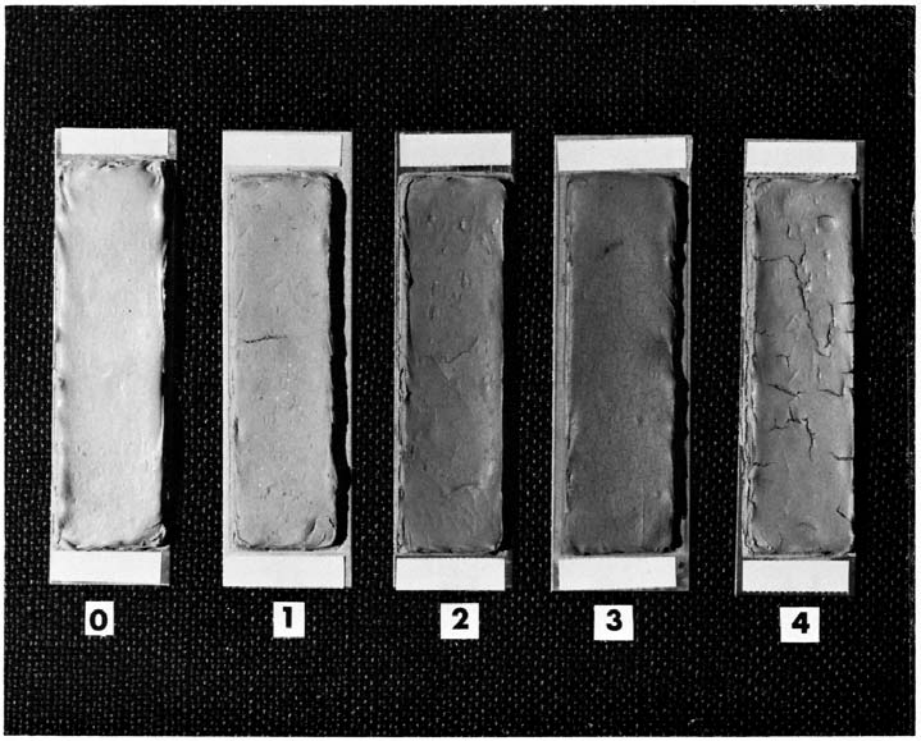
10. Precision

10.1 Round robin tests to provide a precision statement on determination of the effects of laboratory accelerated weathering on elastomeric joint sealants based on the tests in this test method are pending.

10.2 In a round-robin test in which each of three laboratories tested eight sealant samples to determine the effect of bend test at −26°C (−15°F) after ultraviolet exposure, as prescribed in the test, the laboratories agreed on 22 of the 24 determinations.

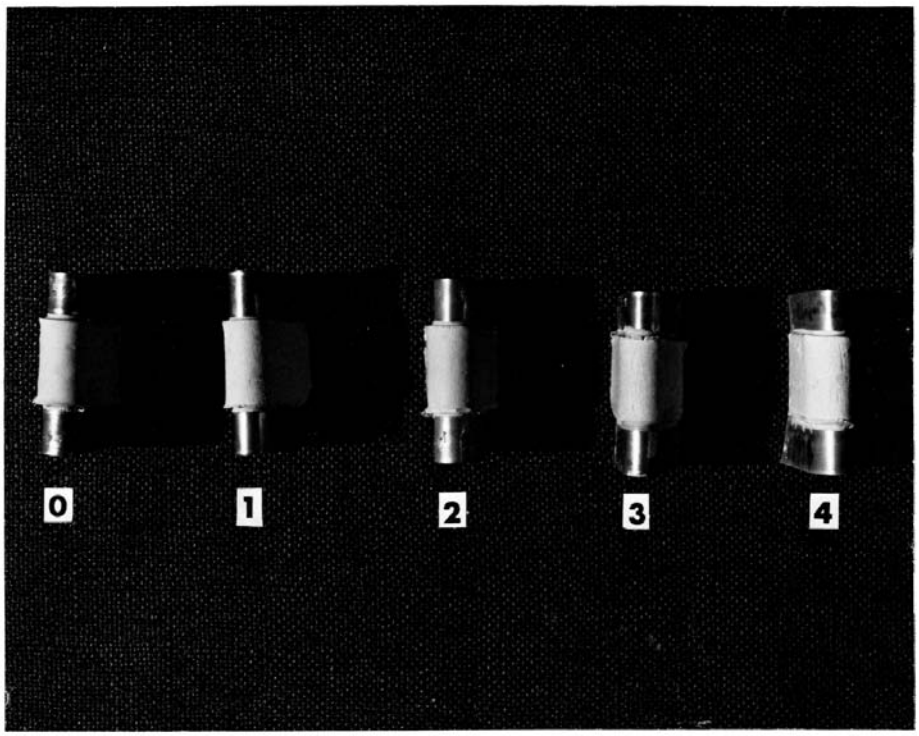
11. Keywords

11.1 accelerated weathering; sealant; ultraviolet; weathering



NOTE 1—Number *0* represents no cracks.

FIG. 1 Examples of Cracking Obtainable After the Weathering Test



NOTE 1—Number *0* represents no cracks.

FIG. 2 Examples of Cracking Obtainable After the Bend Test