Designation: C 793 – 02

# Standard Test Method for Effects of 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:*

C 717 Terminology of Building Seals and Sealants[2]

G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials[3]

## 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 to 250 h of ultraviolet radiation with intermittent water spray in a standard accelerated weathering machine. Following this treatment the specimens are exposed for 24 h in a freezer maintained at −26 ± 2°C (−15 ± 3.6°F). 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 ultraviolet radiation contributes to the degradation of sealants in exterior building joints. The use of a laboratory accelerated weathering machine with ultraviolet radiation and intermittent water spray appears to be a feasible means to give indications of early degradation by the appearance of sealant cracking. However, other factors such as UV exposure in combination with extension may produce more severe degradation than UV alone. The effect of the test is made more sensitive by the addition of the bending of the specimen at cold temperature.

## 6. Apparatus

6.1 *Exposure Apparatus*—An accelerated weathering machine, twin-enclosed carbon arc with 102-18 light/water spray cycle (102 min of light followed by 18 min of light and deionized water). It shall conform to Type D of Practice G 23.

NOTE 1—There are several other weathering machines described in Practice G 23 available for use, and these may or may not give different results from the one described under Type D. Instruments that have a means of humidification should operate without the humidifier.

6.2 *Freezer or Cold Box*, having a temperature controlled at −26 ± 2°C (−15 ± 3.6°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.).

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 of temperature and relative humidity shall be 23 ± 2°C (73.4 ± 3.6°F) and 50 ± 5 %, respectively.

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[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.

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

[3] Discontinued; see 1999 *Annual Book of ASTM Standards*, Vol 14.04.

## 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 2). Prepare three such specimens and cure them for 72 h at standard conditions.

8.1.3 At the end of the curing period, leave one (control) specimen at standard conditions and place the other two in the drum of the weathering machine and expose them for 250 h. The temperature at the specimen during operation shall be 60 ± 2.8°C (140 ± 5°F) and the water temperature shall be 23 ± 2°C (73.4 ± 3.6°F). Change carbons and clean glass globes daily during the exposure period.

8.1.4 At the end of 250 h of exposure, remove the specimens from the machine and note changes in appearance as compared with the control specimen.

8.1.5 Place all three specimens and the mandrel in the freezer, controlled at −26 ± 2°C (−15 ± 3.6°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.

NOTE 2—In the case of pourable grade compound, do not lift the brass frame until the sealant is sufficiently set that it will retain its rectangular shape.

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 Name and description of accelerated weathering machine.

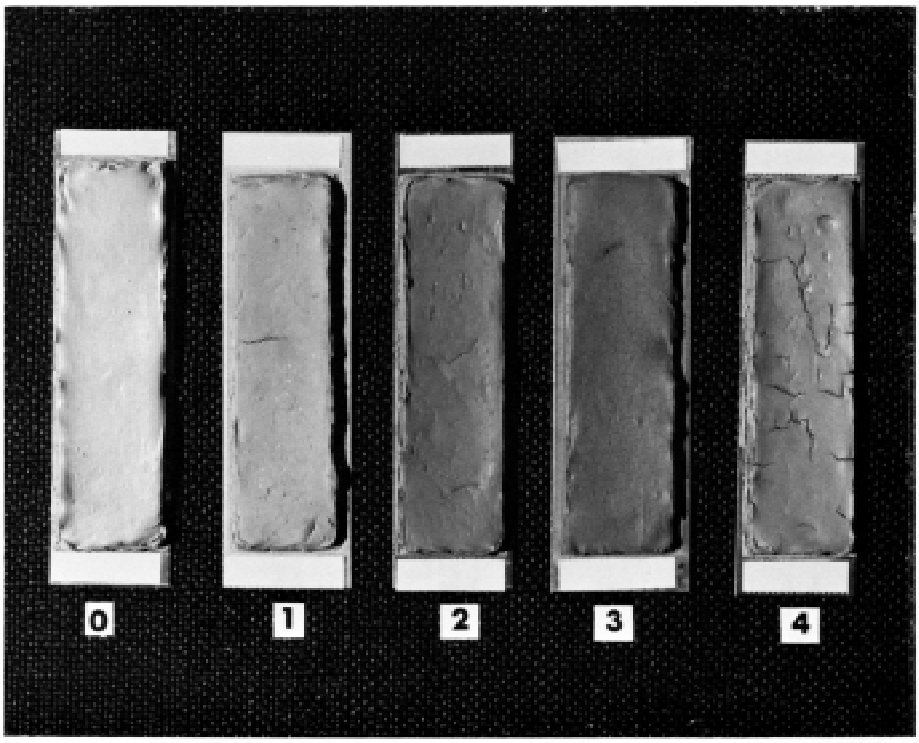
9.1.4 Description of specimens after 250 h of accelerated weathering, as compared to the control specimen. Fig. 1 includes examples of cracking obtainable after the ultraviolet test. Number *0* represents no cracks.

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.

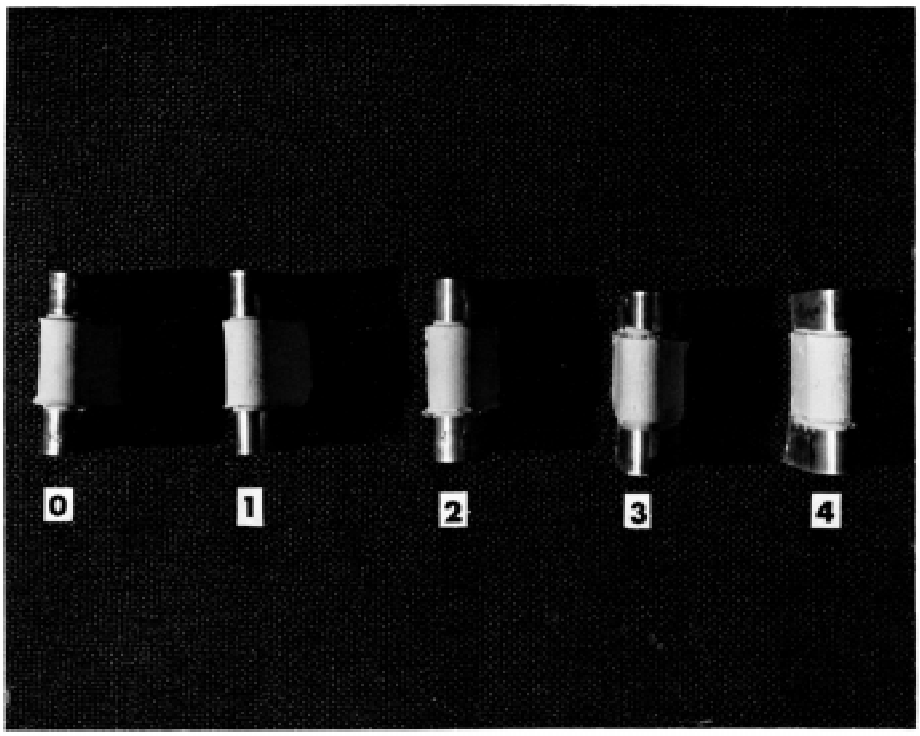
## 10. Precision

10.1 In a round-robin test in which each of four laboratories tested eight sealant samples to determine the effect of ultraviolet radiation on cracking as prescribed in the test, the laboratories agreed on 31 of the 32 determinations.




NOTE 1—Number *0* represents no cracks.

**FIG. 1 Examples of Cracking Obtainable After the Ultraviolet Test**




NOTE 1—Number *0* represents no cracks.
**FIG. 2 Examples of Cracking Obtainable After the Bend Test**

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