Designation: C792 – 15

Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants[1]

This standard is issued under the fixed designation C792; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers a laboratory procedure for determining the effects of heat aging on weight loss, cracking, and chalking of cured-in-place elastomeric joint sealants (single- and multicomponent) for use in building construction.

1.2 *This standard does not purport to address all of the safety problems, 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.*

1.3 There is no known ISO equivalent to this test method.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C717 Terminology of Building Seals and Sealants

3. Terminology

3.1 *Definitions*—See Terminology C717 for definitions of the following terms used in this test method: compound, elastomeric, non-sag sealant, sealant, and self-leveling sealant.

4. Summary of Test Method

4.1 Three sealant specimens are spread on thin aluminum plates and, after determining net weights of sealant, are cured for 7 days at Standard Conditions. Immediately following this initial cure time two specimens are exposed in a forced-draft oven maintained at 70 ± 2°C (158± 3.6°F) for 21 days. At the end of this exposure the percentage weight loss of the sealant is determined and examination is made for presence of cracks and chalking.

5. Significance and Use

5.1 Weight loss through volatilization of components of a sealant in a building joint may affect sealant appearance because of shrinkage and sealant performance because of the loss of functional sealant components. Exposure to high-temperature environments will accelerate the loss of volatiles.

5.2 This test method measures weight loss. It can be used in combination with a knowledge of sealant density to estimate shrinkage. In addition, when compared to sealant theoretical weight solids, it provides an estimate of the extent to which functional sealant components can be volatilized when exposed to high service temperatures. Substantial losses of this type may help predict early failures in durability. Also, development of cracks or chalking, or both, lessens sealant service life. However, a sealant that develops no cracks or chalking, or low weight loss in this test method, does not necessarily assure good durability.

6. Apparatus

6.1 *Forced-Draft Oven,* controlled at 70 ± 2°C (158 ± 3.6°F).

6.2 *Balance,* sensitive to 0.01 g.

6.3 *Rectangular Brass Frame,* with inside dimensions 130 by 40 by 6.4 mm (5 by 1½ by ¼ in.).

6.4 *Aluminum Plates,* three, each 152 by 80 by 0.6 to 1.6 mm (24 to 16 gage).

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

6.6 *Thin Knife Blade.*

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

7. Procedure

7.1 Unless otherwise specified by those authorizing the test, standard conditions of temperature and relative humidity for the test shall be found in Terminology C717.

7.2 *Test of Multicomponent Sealants:*

[1] This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.20 on General Test Methods.

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[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.

7.2.1 Condition at least 400 g of base compound and appropriate amount of curing agent in a closed container for at least 24 h at standard conditions; then mix thoroughly for 5 min.

7.2.2 Weigh the three aluminum plates to the nearest 0.01 g.

7.2.3 Fill the rectangular frame, after centering it on an aluminum plate, with a portion of the conditioned compound, and strike it 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, weigh each to the nearest 0.01 g, and cure them for 7 days at standard conditions.

7.2.4 Following the 7-day curing period, place two of the three specimens in the draft oven for 21 days, leaving the third (control) specimen at standard conditions for the same period.

7.2.5 At the end of the 21-day period, remove the specimens from the oven and allow to cool for 1 h at standard conditions. Weigh them to the nearest 0.01 g and calculate the percent weight loss of the sealants as follows:

$$\text{Weight loss, } \% = \left[(W_2 - W_3)/(W_2 - W_1)\right] \times 100 \qquad (1)$$

where:

W_1 = weight of aluminum plate,
W_2 = weight of aluminum plate with fresh sealant, and
W_3 = weight of plate with sealant after heat aging 21 days.

7.2.6 Examine the sealants for cracking and chalking and compare with the third (control) specimen.

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

7.3 *Test of Single-Component Sealants:*

7.3.1 Condition at least 400 g of compound in a closed container for at least 24 h at standard conditions.

7.3.2 Follow the same procedure as specified in 7.2.1 – 7.2.6, eliminating the mixing necessary for multicomponent sealants.

8. Report

8.1 Report the following information for each sample tested:

8.1.1 Identification of the sealant tested.

8.1.2 Description of the type of sealant, such as single- or multicomponent, nonsag or self-leveling, color, etc.

8.1.3 Percent weight losses of the heat-treated specimens.

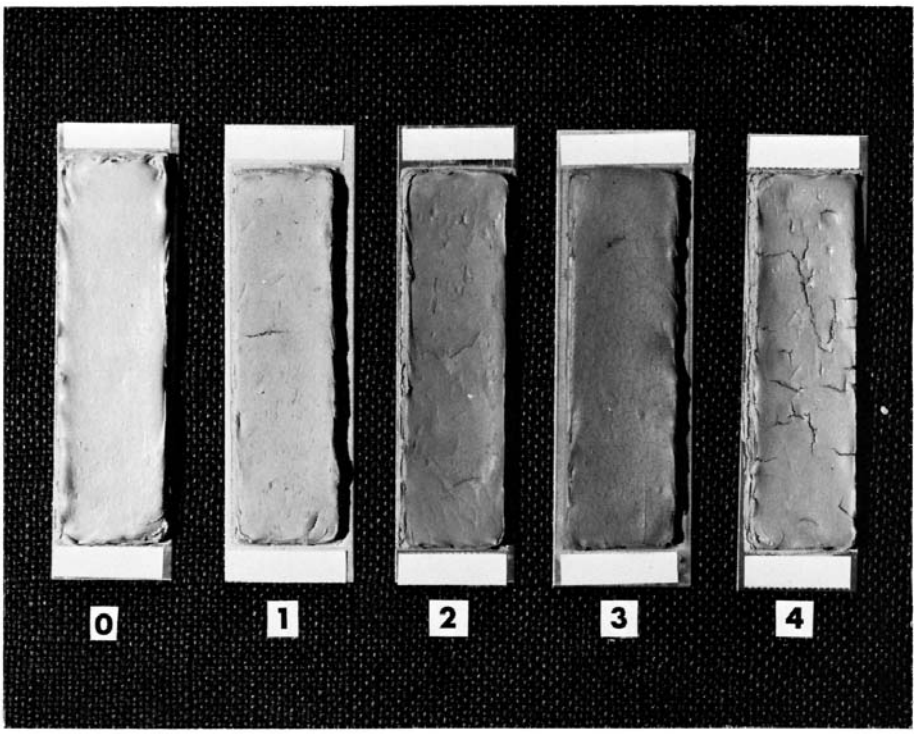
8.1.4 Presence of cracking and chalking as compared with the control specimen. Fig. 1 includes examples of cracking obtainable in this test. Number *0* represents no cracking.

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

9. Precision

9.1 A statistical analysis made from the results obtained from a round-robin test in which each of three laboratories tested seven sealant samples in accordance with the prescribed test for effect of heat aging on weight loss resulted in the following:

9.1.1 *Repeatability* (that is, the difference between two determinations of weight loss on the same sample within the same laboratory) was 0.51 % weight loss.



NOTE 1—Number *0* represents no cracking.

FIG. 1 Examples of Cracking Obtainable in This Test

9.1.2 *Reproducibility* (that is, the difference between the results of two laboratories, each making two weight loss determinations on the same sample) was 0.90 %.

9.2 The results obtained by the three laboratories in which each laboratory tested seven sealant samples in accordance with the prescribed test for the effect of cracking and chalking were close to unanimous. The exception was the report of one laboratory indicating no cracking or chalking of one sample, whereas the remaining two laboratories reported slight cracking and chalking.

10. Keywords

10.1 chalking; compound; cracking; elastomeric sealants; heat aging; non-sag sealants; self-leveling sealant; weight loss