Designation: C 1246 – ~~99~~00

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

This standard is issued under the fixed designation C 1246; 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 heat aging on weight loss, cracking and chalking of 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 given in parentheses are for information only.

1.3 The committee having jurisdiction for this specification is not aware of any similar ISO standard.

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]

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[1] This test method is under the jurisdiction of ASTM Committee C-24 on Building Seals and Sealants and is the direct responsibility of C24.20 on General Sealant Standards.

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E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[3]

3. Terminology

3.1 Definitions—Definitions of the following terms are found in Terminology C 717: *cure, elastomeric, joint, sealant, self-leveling sealant*.

4. Summary of Test Method

4.1 Sealant is spread on three aluminum panels and the net weight of sealant on each panel is determined. After the three sealant specimens are allowed to cure for 28 days at standard conditions, two specimens are then heat-aged for 21 days in a forced-draft oven maintained at 70± 2°C (158 ± 3.6°F). The percentage weight lost during the heat aging period is then determined and examination is made for presence of cracks and chalking.

5. Significance and Use

5.1 Weight loss from a sealant after application in a building joint can be detrimental to long term sealant durability. A sealant's service life will be shortened if it contains components, critical to its durability, that are volatilized by high environmental temperatures. Also, development of cracks and chalking lessens a sealant's service life.

5.2 The test described herein measures weight loss, cracking, and chalking. The amount of weight lost during the heat aging period and any cracking or chalking helps predict premature sealant failure. However, a sealant developing no cracks or chalking, or low weight loss in this test, does not necessarily ensure 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 or TFE-Fluorocarbon Frame*, with inside dimensions 130 by 40 by 3.2 mm (5 by 1½ by ⅛ in.).
6.4 *Aluminum Panels*, three, each 152 by 80 by 0.6 to 1.6 mm (24 to 16 gage) (6 by 3 by 0.024 to 0.0625 in.).
6.5 *Straight Edge*, 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 23 ± 2°C (73 ± 3.6°F) and 50 ± 5 %, respectively.

7.2 *Test of Multicomponent Sealants*:

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

7.2.2 Weigh each of the three aluminum panels to the nearest 0.01 g.

7.2.3 Center the brass frame on an aluminum panel. Fill the frame with the mixed compound and strike it off flat with the straightedge. Run a thin-bladed knife along the inside of the frame to separate it from the sealant and immediately lift the frame from the sealant (Note 1). Prepare two more specimens the same way.

NOTE 1—In the case of self-leveling sealants, do not lift the brass frame until the sealant is sufficiently set that it will retain its rectangular shape.

7.2.4 Cure the three specimens for 28 days at standard conditions.

7.2.5 At the end of the 28 day cure period weigh each specimen to the nearest 0.01 g.

7.2.6 Place two of the three specimens in the forced-draft oven at 70± 2°C (158 ± 3.6°F) for 21 days, leaving the third (control) specimen at standard conditions for the same period.

7.2.7 At the end of the 21 day heat-aging period, remove the specimens from the oven and allow them to cool for 1 h at standard conditions. Then weigh each specimen to the nearest 0.01 g and calculate the percent weight loss during heat aging as follows:

~~$$\% WL_{ha} = (W_2 - W_1)/(W_2 - W_3) \times 100 \quad (1)$$~~

$$\% WL_{ha} = (W_2 - W_3)/(W_2 - W_1) \times 100 \quad (1)$$

where:
WL_{ha} = weight loss from cured sealant during heat aging,
W_1 = weight of aluminum panel,
W_2 = weight of panel and sealant after the 28 day cure period described in 7.2.4, and
W_3 = weight of panel and sealant after 21 day heat-aging period described in 7.2.6.

[2] *Annual Book of ASTM Standards*, Vol 04.07.
[3] *Annual Book of ASTM Standards*, Vol 14.02.

7.3 *Test of Single-Component Sealants*:

7.3.1 Follow the same procedure as specified in 7.2.1-7.2.7, eliminating curing agent and the mixing necessary for multicomponent sealants.

8. Report

8.1 Report the following information for each sealant 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 The percent weight losses during heat aging, % WL_{ha}, of the two heat aged specimens tested.

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 and Bias [4]

9.1 *Precision*—The precision information given below is based on an interlaboratory study conducted in 1992 in accordance with Practice E 691, in which four sealants were tested in each of four laboratories, with each laboratory obtaining two test results on each sealant. Each of the two test results was obtained on different days and is the average of two test determinations.

9.1.1 *Repeatability*:

9.1.1.1 *Weight Loss*— 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 0.658 % only about five percent of the time.

9.1.1.2 *Cracking or Chalking*—None of the sealants tested showed any cracking or chalking. Therefore, no repeatability with respect to cracking or chalking has been established.

9.1.2 *Reproducibility*:

9.1.2.1 *Weight Loss*— In the future use of this test method, the difference between two test results obtained in different laboratories on the same material will be expected to exceed 1.562 % only about five percent of the time.

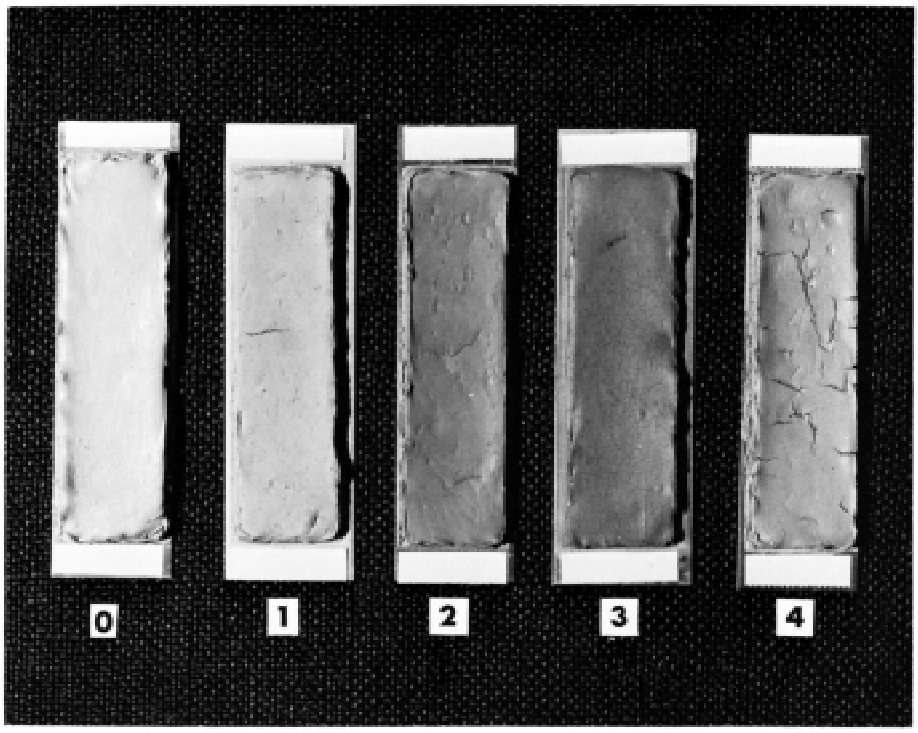
9.1.2.2 *Cracking or Chalking*—None of the sealants tested showed any cracking or chalking. Therefore, no reproducibility with repect to cracking and chalking has been established.

9.2 *Bias*—Since there is no accepted reference material for determining the bias for this test method for the effects of heat aging during cure on weight loss, cracking, and chalking, bias has not been determined.

10. Keywords

10.1 durability; sealant; weight loss

[4] Supporting data is available from ASTM Headquarters. Request RR: C24–1045.



NOTE 1—Number *0* represents no cracking.

FIG. 1 Examples of Cracking Obtainable in This Test