



Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)^{1,2}

This standard is issued under the fixed designation C 719; 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 is an accelerated laboratory procedure for evaluating the performance of a building sealant in a test configuration that is subjected to water immersion, cyclic movement, and temperature change.³

1.2 The values stated in inch-pound units are to be regarded as the standard. The values 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.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 33 Specification for Concrete Aggregates⁴

C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)⁵

C 150 Specification for Portland Cement⁵

C 717 Terminology of Building Seals and Sealants⁶

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology C 717.

4. Summary of Test Method

4.1 This test method consists of subjecting standard joint specimens to a series of treatments as follows: (a) immersion in water for seven days; (b) exposure in an oven for seven days while under compression; (c) automatic compression and extension cycling at room temperature at a specified rate and

amount of joint movement; and (d) alternate compression and extension of the joint at high and low temperatures, respectively, under specified conditions described herein.

4.2 The effects of the test shall be evaluated by visual inspection for cohesive and adhesive failures, sealant deformation, and bubble formation within the sealant.

4.3 This test method is applicable to any joint movement. The most common test movements are ± 12.5 and ± 25 % as used in the examples.

5. Significance and Use

5.1 The failure of a building sealant in an active joint is usually manifested by cohesive failure in the sealant or adhesive failure between the sealant and the substrate, or both. The method described in this test method relates only to the performance of the sealant when properly installed with recommended primers, and does not evaluate sealant failures caused by improper joint design, excessive joint movement, improper application practices, and other factors known to cause sealant failure in buildings and building areas.

6. Apparatus

6.1 *Compression-Extension Machine*,⁷ designed to automatically compress the joint width of the test specimen from $\frac{1}{2}$ in. (12.7 mm) to the minimum dimension desired (Table 1, Column C) and extend the specimen from $\frac{1}{2}$ in. to the maximum extension desired (Table 1, Column E) at a constant rate of $\frac{1}{8}$ in./h (3.2 mm/h). The machine shall be equipped with grips of sufficient strength to withstand, without bending, the resistance of high tensile strength sealants (see Figs. 1-3).

6.2 *Cold Box or Chamber*, maintained at $-15 \pm 3^\circ\text{F}$ ($-26.1 \pm 1.7^\circ\text{C}$).

6.3 *Forced-Draft Oven*, controlled at $158 \pm 3.6^\circ\text{F}$ ($70 \pm 2^\circ\text{C}$).

6.4 *C-clamps*, or other device for maintaining the specimen under compression.

6.5 *Spacer Blocks*.

¹ This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.30 on Adhesion.

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² This test method is also known as the Hockman Cycle in recognition of Arthur Hockman who originated the method at the National Bureau of Standards.

³ Supporting data are available from ASTM Headquarters. Request RR: C24-1013.

⁴ *Annual Book of ASTM Standards*, Vol 04.02.

⁵ *Annual Book of ASTM Standards*, Vol 04.01.

⁶ *Annual Book of ASTM Standards*, Vol 04.07.

⁷ Series 520 Sealing Compound Tester, manufactured by Applied Test Systems Inc., 348 New Castle Rd., Butler, PA 16001, and a durability tester manufactured by Ambard, Inc., 269-11 81st Ave., New Hyde Park, NY 11040, have been found suitable for this purpose (Fig. 1(a)). For extension of the joint at cold temperature, the machine may be designed for extension only (Fig. 3).