Designation: C 1216 – 92 (Reapproved 1997)

# Standard Test Method for Adhesion and Cohesion of One-Part Elastomeric Solvent Release Sealants[1]

This standard is issued under the fixed designation C 1216; 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 a laboratory procedure that determines the adhesion and cohesion performance of one-part elastomeric, solvent release sealants at high and low temperatures by the extension and compression of test specimens.

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 *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.* For a specific precautionary statement, see Note 2.

## 2. Referenced Documents

2.1 *ASTM Standards:*

C 33 Specification for Concrete Aggregates[2]

C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)[3]

C 150 Specification for Portland Cement[3]

C 717 Terminology of Building Seals and Sealants[4]

2.2 *Aluminum Association Standard:*

DAF-45 Designation System for Aluminum Finishes[5]

## 3. Terminology

3.1 *Definitions*—Refer to Definitions C 717 for definitions of the following terms used in this test method: adhesive failure, bond breaker, cohesive failure, elastomeric, joint, primer, sealant, solvent release sealant, and substrate.

## 4. Significance and Use

4.1 The failure of a building sealant in a joint that experiences movement is manifested by cohesive failure in the sealant or adhesive failure between the sealant and substrate, or both. This test method evaluates the performance of one-part elastomeric solvent release sealants in joints subjected to movement and temperature aging.

## 5. Apparatus

5.1 *Extension-Compression Machine*, as shown in Fig. 1, designed to extend the test specimens automatically at a constant rate of 3.20 mm (⅛ in.)/h from a joint width of 11.2 mm (7⁄16 in.) to 14.29 mm (9⁄16 in.) at −12 ± 2.8°C ( +10± 5°F).[6]

5.2 *Oven*, forced-draft type, having the temperature controlled to 70 ± 1°C (158 ± 2°F).

5.3 *Oven*, convection type, having the temperature controlled to 50 ± 1°C (122 ± 2°F).

5.4 *Freezer Chest or Cold Box*, having the temperature controlled to −12 ± 2.8°C (+10 ± 5°F).

5.5 *C-Clamps*, or other clamping devices.

## 6. Reagents

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.[7] Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Acetone or Methyl Ethyl Ketone Solvents*.

6.3 *Detergent Solution*.[8]

6.4 *Distilled Water*.

6.5 *Primer*, if required.

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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 C24.20 on General Sealant Standards.

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[2] *Annual Book of ASTM Standards*, Vol 04.02.

[3] *Annual Book of ASTM Standards*, Vol 04.01.

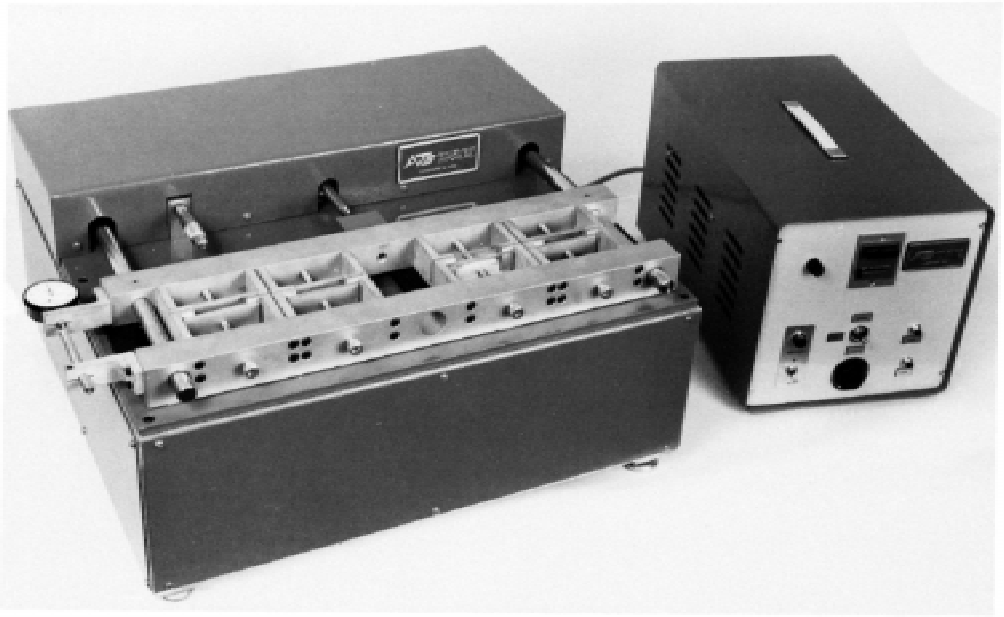
[4] *Annual Book of ASTM Standards*, Vol 04.07.

[5] Available from Aluminum Association, 818 Connecticut Ave. NW, Washington, DC 20006.

[6] Series 520 Sealant 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 Sist Ave., New Hyde Park, NY 11040, have been found suitable for this purpose.

[7] "Reagent Chemicals, American Chemical Society Specifications," Am. Chemical Soc., Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, NY, and the "United States Pharmacopeia."

[8] Dawn, a registered trademark of Proctor and Gamble, Co., P.O. Box 599, Cincinnati, OH 54201, or Palmolive Green, a registered trademark of Colgate Palmolive Co., 300-T Park Ave., New York, NY 10022, have been found suitable for this purpose.



NOTE 1—Three-dimensional view of compression-extension machine with automatic control units shows four specimens ready for compression-extension cycling.

**FIG. 1 Compression Extension Machine**

## 7. Sealants, Substrates, and Accessories

7.1 The sealants shall be obtained from previously unopened containers. Precondition the unopened containers of sealant at 23 ± 2°C (73.4 ± 3.6°F) and 50 ± 5 % relative humidity for a minimum of 24 h.

7.2 The standard substrates used in the test shall be Portland cement mortar, float glass, and aluminum alloy.

NOTE 1—When requested, other substrates such as brick, marble, etc. may be specified by the purchaser in addition to the standard substrates.

7.2.1 *Mortar blocks*, six, prepared as described in 8.2. The blocks shall be 25.4-mm (1-in.) wide by 76.2-mm (3-in.) long by 25.4-mm (1-in.) thick.

7.2.2 *Glass Plates*, six, of clear float glass 25.4-mm (1-in.) wide by 76.2-mm (3-in.) long by 6.35-mm (¼-in.) thick. The float glass may require reinforcement to survive the rigors of the subsequent test procedure. This must be completed prior to the compression-extension cycling described in Section 10. Reinforcement is provided by adhering aluminum plates, 25.4-mm wide by 76.2-mm long by 6.35-mm thick, to the outside surfaces of the glass. Commercially available two-part epoxies are suitable as adhesives. Although the time of reinforcement is not critical, it has been found convenient to apply the aluminum plates to the glass before preparing the test specimens.

7.2.3 *Aluminum Plates*, six, 6063-T5 or 6061-T6 alloy clear, 25.4-mm (1-in.) wide by 76.2-mm (3-in.) long by 6.35-mm (¼-in.) thick and anodized to AA-M32C12A31 quality as described by DAF-45.

7.3 *Rigid Spacer Bars*, nine, 12.7 mm (½ in.) by 12.7 mm by 50.8 mm (2 in.); 18 bars 12.7 mm by 12.7 mm by 25.4 mm (1 in.); 18 bars 14.29 mm (9⁄16 in.) by 6.35 mm (¼ in.) by 25.4 mm (1 in.); and 18 bars 11.1 mm (7⁄16 in.) by 6.35 mm by 25.4 mm.

7.4 *Release Paper*, or other suitable material, if necessary, to serve as a bond breaker to spacer bars for the preparation of test specimens.

## 8. Preparation of Substrates

8.1 Prior to use, the glass and aluminum (and, when specified, other metallic substrates) shall be cleaned by wiping the surface with methyl ethyl ketone or a similar solvent. Dip the surface in a 0.1 % detergent solution of a clear hand dishwashing detergent in distilled or deionized water. Rinse the surface without touching it in distilled or deionized water and allow it to air dry.

NOTE 2—Methyl ethyl ketone and similar solvents are toxic and flammable and should be handled with caution in a well-ventilated area.

8.2 *Mortar Slabs*—Prepare cement mortar slabs, each 76 by 25.4 by 25.4 mm (3 by 1 by 1 in.) in size, using one part of high early strength Portland cement conforming to Type III of Specification C 150 to two parts by weight of clean, uniformly graded, concrete fine aggregate (sand) conforming to Specification C 33. Use an amount of water sufficient to produce a flow of 100 ± 5 when tested in accordance with the procedure for the determination of consistency of cement mortar described in Test Method C 109. After curing for one day in moist air and six days in saturated lime water at 23 ± 2°C (73 ± 3°F), prepare the surface of 76 by 25.4 by 25.4 mm (3 by 1 by 1 in.) of each slab by wet grinding, either with a belt sander using No. 60 aluminum carbide sanding belt or by using an iron lap with No. 60 silicon carbide (or aluminum oxide) grain, until the aggregate is exposed uniformly. Return the slabs to saturated lime water storage until needed.

8.2.1 The slabs may be prepared and shipped to other locations for use. The slabs may be shipped dry and shall be returned to lime water storage upon arrival until needed.