



Designation: **C1635—06 C1635 – 14**

Standard Test Method to Evaluate Adhesion/Cohesion Properties of a Sealant at Fixed Extension¹

This standard is issued under the fixed designation C1635; 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 describes a laboratory procedure for measuring the adhesion/cohesion properties of a sealant when subjected to tensile loads resulting from an applied specified strain. The adhesion/cohesion properties are evaluated before, during, and after water immersion.

1.2 This test method examines the adhesive and cohesive performance of a sealant on a specified substrate at a strain equivalent to a multiple of the strain/movement capability designated by the manufacturer for the given sealant per Specification **C920**.

1.3 The values stated in SI (metric) units are to be regarded as the standard. The inch values given in parentheses are for information only.

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.*

1.5 Comparable Test:

1.5.1 ISO 10590, Building construction - Jointing products - Sealants - Determination of adhesion/cohesion properties at maintained extension after immersion in water

1.5.2 ISO 8340, Building construction - Jointing products - Sealants - Determination of tensile properties at maintained extension

2. Referenced Documents

2.1 ASTM Standards:²

C717 Terminology of Building Seals and Sealants

C719 Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)

C920 Specification for Elastomeric Joint Sealants

C1375 Guide for Substrates Used in Testing Building Seals and Sealants

3. Terminology

3.1 Definitions:

3.1.1 *casting spacers*—the spacers used in the fabrication of the joints made from wet sealant

3.1.2 *separators*—the device or item used to maintain the specimens at fixed extension.

4. Summary of Test Method

4.1 Test specimens made in accordance with dimensions set forth in Test Method **C719** are fabricated and allowed to cure.

4.2 Test specimens are extended at standard conditions as defined in Terminology **C717** to a specified strain and blocked at the strain for a specified period of time.

4.3 The test specimens are examined for adhesive or cohesive failure, or both, of the sealant at 0, 24 and 168 h.

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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.

4.4 A duplicate set of three test specimens are cured at standard ~~conditions~~, conditions as defined in Terminology [C717](#), extended to a specified strain, and then immersed (totally) in deionized water or specified medium (3 specimens/liter of liquid).

4.5 Immersed test specimens are observed at 0, 24 and 168 and other additional specified hours.

4.6 This test method uses ASTM standard substrates as described in Guide [C1375](#). This test method does not exclude the use of any other substrate that provides a suitable flat surface.

5. Significance and Use

5.1 In any sealant application, the sealant must be capable of maintaining an adhesive bond to the substrate when held in strain for its intended service life.

5.2 This test method is an indicator of a sealant’s ability to adhere under strain to a given substrate.

5.3 The default test strain is the movement ability of the sealant as designated by the manufacturer. The default joint configuration is 12.7 × 12.7 × 50.8 mm (½ × ½ × 2 in.). Other strains and joint configurations may be used and reported as noted in Section 8 and [Table 1](#).

6. Apparatus and Materials

6.1 *Container*, for immersion made of a material compatible with the immersion medium.

6.2 *Device*, to provide a strain on the test specimen.

6.3 *Spatulas*, for use in applying the sealant.

6.4 *Caulking Gun*, for extruding sealant from cartridges when applicable.

6.5 *Substrates*—Twelve substrates minimum of 25.4 × 76.2 mm (1 × 3 in.) of the same finish are required for each test sample.

6.6 *Casting Spacers*—Made from polytetrafluoroethylene (PTFE) or a suitable rigid material shall be used with each test specimen to which the test sealant will not bond and will provide the appropriate joint dimensions and configurations.

6.7 *Substrate Cleaning Materials*:

6.8 *Primer* (if needed).

6.9 *Separators*, to provide a constant strain on the specimen whilst maintaining parallel bond surfaces.

6.10 *Deionized Water*, or other specified liquid medium for immersion

6.11 *Suitable Probe Type Measuring Device*, capable of measuring defects in the sealant to 1 mm (½ in.)

7. Procedure

7.1 *Preparation of Test Specimens*. Six test specimens.

7.1.1 Standard conditions of temperature and relative humidity used throughout this test method are defined as in Terminology [C717](#).

7.1.2 Clean the substrates per the procedures set forth in Test Method [C719](#) and Guide [C1375](#).

7.1.3 *Primers*—Where use of primer is recommended by the sealant manufacturer, substrate materials shall be primed with the recommended primer or primers.

7.1.4 Apply a bead of sealant 12.7 × 12.7 × 50.8 mm (½ × ½ × 2 in.) between parallel 25.4 × 76.2 mm (1 × 3 in.) substrates (or of other desired dimensions and noted in the report). Use appropriate casting spacers to form the proper size bead. Use adhesive tape, rubber bands, or clamps to hold the test assembly together before and after filling it with the sealant. In the case of a pourable-type sealant, use masking or any other suitable tape to retain the sealant. Use masking tape on top surface of substrates to prevent sealant from curing on the top surface. Remove the tape immediately following filling the specimen joint cavity.

7.2 *Curing Method*

7.2.1 Cure specimens under one of the following cycles:

7.2.1.1 *Standard Conditions*—23 ± 2°C (73.4 ± 3.6 °F), 50 ± 5 % relative humidity for a minimum of 21 days.

TABLE 1 Suggested Strains for a 12.7-mm (0.50-in.) Wide Sealant Joint.

Sealant Movement Rating	Distance between panels at 1x movement rating	Distance between panels at 1.5x movement rating	Distance between panels at 2x movement rating	Distance between panels at 4x movement rating
12.5 %	14.0 mm (0.55 in.)	14.7 mm (0.58 in.)	15.5 mm (0.61 in.)	19.0 mm (0.75 in.)
25 %	15.5 mm (0.61 in.)	17.2 mm (0.68 in.)	19.0 mm (0.75 in.)	25.4 mm (1 in.)
50 %	19.0 mm (0.75 in.)	21.8 mm (0.86 in.)	25.4 mm (1 in.)	38.1 mm (1.5 in.)
100 %	25.4 mm (1 in.)	31.8 mm (1.25 in.)	38.1 mm (1.5 in.)	63.5 mm (2.5 in.)