



Designation: **C1635–16** **C1635 – 22**

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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 (Class in accordance with Specification C920) designated by the manufacturer for the given sealant per in accordance with 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 after SI units are provided for information only and are not considered standard.

1.4 Comparable Tests—Other comparable tests are ISO 10590 and 8340.

1.5 *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, health, and environmental 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~~

1.6 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

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. Current edition approved June 1, 2016; June 1, 2022. Published July 2016; July 2022. Originally approved in 2006. Last previous edition approved in 2014 as C1635-14-16. DOI: 10.1520/C1635-16.10.1520/C1635-22.

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.

[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](#)

[2.2 ISO Standards:](#)³

[ISO 8340 Building construction — Sealants — Determination of tensile properties at maintained extension](#)

[ISO 10590 Building construction — Sealants — Determination of tensile properties of sealants at maintained extension after immersion in water](#)

3. Terminology

3.1 *Definitions*—Refer to Terminology [C717](#) for definitions of terms used in this standard, including but not limited to the following: adhesive failure, casting spacers, cohesive failure, standard conditions.

3.2 *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.

4.4 A duplicate set of three test specimens are cured at standard 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.

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

Sealant Movement Rating/Class	Distance between panels/substrates at 1x movement rating	Distance between panels/substrates at 1.5x movement rating	Distance between panels/substrates at 2x movement rating	Distance between panels/substrates 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.)
12.5 %	14.3 mm (0.56 in.)	14.5 mm (0.57 in.)	15.9 mm (0.63 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.)
25 %	15.9 mm (0.63 in.)	17.5 mm (0.69 in.)	19.0 mm (0.75 in.)	25.4 mm (1 in.)
35 %	17 mm (0.67 in.)	19.4 mm (0.76 in.)	21.6 mm (0.85 in.)	30.5 mm (1.2 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.)
50 %	19.0 mm (0.75 in.)	22.2 mm (0.88 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.)

³ Available from International Organization for Standardization (ISO), ISO Central Secretariat, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, <https://www.iso.org>.

5.3 The default test strain is the movement ability (Class in accordance with Specification C920) of the sealant as designated by the manufacturer. The default joint configuration is ~~12.7 × 12.7 × mm~~ by 12.7 mm by 50.8 mm (~~½ × in. by ½ × in. by 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~~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 × mm by 76.2 mm (1 × in. by 3 in.) of the same finish or type are required for each test sample. Substrates must be of sufficient thickness or rigidity, or both, so as not to bend or distort under the imposed strain.

6.6 ~~Casting Spacers~~—*Spacers*. ~~Made~~ 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.~~

7.1.1 Clean the substrates ~~per~~in accordance with the procedures set forth in Test Method C719 and Guide C1375.

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

7.1.3 Apply a bead of sealant ~~12.7 × 12.7 × mm~~ by 12.7 mm by 50.8 mm (~~½ × in. by ½ × in. by 2 in.~~) between parallel 25.4 × mm by 76.2 mm (1 × in. by 3 in.) substrates (or of other desired dimensions and noted in the report). Use appropriate casting spacers to form the ~~proper size bead~~, properly sized sealant geometry. 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~~Apply masking tape on the top surface of substrates to prevent any sealant oversmear from curing on the top surface. Remove the tape immediately ~~following~~after filling the specimen joint cavity.

7.2 *Curing Method*:

7.2.1 Cure specimens under one of the following cycles: