Designation: C794 – 18 (Reapproved 2022)

Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants[1]

This standard is issued under the fixed designation C794; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This test method covers a laboratory procedure for determining the strength and characteristics of the peel properties of a cured-in-place elastomeric joint sealant, single- or multicomponent, for use in building construction.

1.2 The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.3 The committee with jurisdiction over this standard is not aware of any comparable standards published by other organizations.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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]

C717 Terminology of Building Seals and Sealants

C1375 Guide for Substrates Used in Testing Building Seals and Sealants

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 For the definitions used in this test method, see Terminology C717, standard conditions.

4. Summary of Test Method

4.1 This test method consists of preparing test specimens by embedding a wire mesh screen between two thin layers of the sealant being tested, on test substrates, curing these specimens under specified time and conditions, then placing the specimen in a tension-testing machine in such a way that the embedded wire mesh screen is peeled back from the substrate at 180°, while measuring the force exerted as well as the mode of failure of the sealant from the substrate.

5. Significance and Use

5.1 There are differences in opinion among those concerned with sealant technology whether or not this adhesion-in-peel test simulates the type of strain and e-tensile stresses encountered by a sealant in normal use. Nevertheless, this test provides a valuable measurement of the ability of the cured sealant to maintain a bond to the substrate under severe peel conditions.

5.2 Many sealant manufacturers utilize the adhesion-in-peel test for determining the adhesive characteristics of sealant/primer combinations with unusual or proprietary substrates. This test is especially useful for quality measurements comparing batches of the same sealant relative to adhesion or for studying adhesion of a given sealant to a variety of substrates.

5.3 This test method alone is not appropriate for comparing the overall performance of different sealants in a given application. The adhesive force that determines if a given sealant is useful in a given application also depends on the modulus of elasticity and the degree to which the sealant will be strained. This test, as it exists, does not consider the modulus of elasticity, nor amount of stress that will be produced by a given strain in an actual sealant in a moving joint. No known correlations are given to relate and apply modulus values to the peel values.

5.4 This test requires that the results indicate whether the failure mode is primarily adhesive or cohesive. It is important to note that a cohesive failure is not necessarily better than an

[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, 2022. Published July 2022. Originally approved in 1975. Last previous edition approved in 2018 as C794 – 18. DOI: 10.1520/C0794-18R22.

[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.

adhesive failure, if the adhesive value is sufficient for the application. Having adhesive failure allows one to study the change of adhesion with time and with the various stress conditions.

6. Apparatus and Materials

6.1 *Tensile Testing Machine* with tension grips capable of pulling at the rate of separation of approximately 50 mm (2 in.)/min, and having a chart indicator calibrated in 0.45 N (0.1-lbf) units.

6.2 *Standard Substrates*—This test method may be performed on a wide variety of substrates. See Guide C1375 for a description of standard substrates and recommended surface preparation. Since adhesive properties of a joint sealant are related to the nature of the substrate, it is strongly recommended that whenever possible that adhesion-in-peel testing be performed on substrate samples that are representative of the building materials. Examples of such substrates include brick, marble, limestone, granite, aluminum, stainless steel, plastic, ceramic tile, and others.

6.3 *Masking Tape,* paper, roll, 25 mm (1 in.) wide.

6.4 *Wire Mesh Screen,* stainless steel or aluminum, 20-mesh, 0.4 mm (0.016 in.) wire thickness, cut to a width of 25 mm + 0 mm, -2 mm (1.0 in. + 0 in., -0.08 in.) by a minimum length of 250 mm (10 in.). The wire mesh screen selected must be flexible yet strong enough to not tear during adhesion-in-peel testing. The wire mesh screen must be flat and free of kinks. To ensure adhesion of the joint sealant to the wire mesh, thoroughly clean the screen prior to use. Sealant primer on the wire mesh screen is generally recommended by the sealant manufacturer to enhance adhesion of the joint sealant to the screen. Sealant may also be pre-applied to the screen to enhance adhesion.

6.4.1 *Discussion*—Adhesion of the joint sealant to the mesh screen is essential to evaluate adhesion-in-peel properties of the sealant to the substrate. Due to the unique characteristics of each sealant, the sealant manufacturer must determine for each sealant the appropriate screen composition, mesh dimension, wire diameter and screen cleaning and priming procedure. Polyester mesh, fiberglass mesh, airplane cloth, fabric, plastic film or similar material can be used in lieu of a wire mesh provided that the material is pliable, of a thickness no greater than 0.5 mm (0.02 in.), does not adversely affect sealant cure and does not rupture during adhesion-in-peel testing.

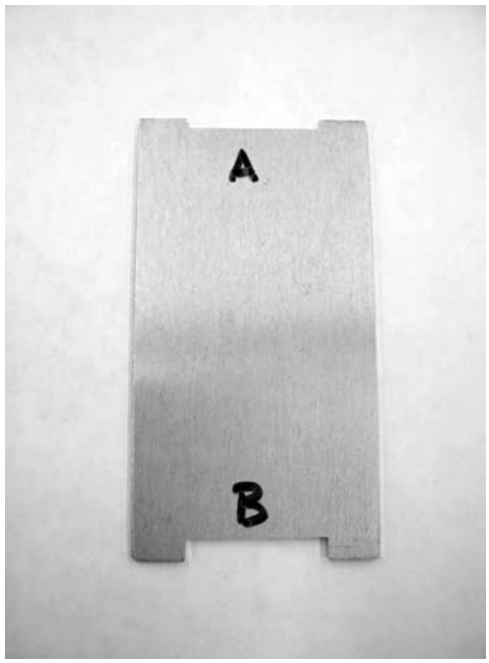
6.5 *Tooling Device*—aluminum or similar rigid material, created to produce a 2 mm (0.08 in.) by 25 mm (1 in.) sealant bead and 4 mm (0.16 in.) by 25 mm (1 in.) sealant bead after tooling (Fig. 1). The width of the tooling device may be up to 27 mm (1.06 in.) to allow easy tooling of the sealant without snagging the edges of the screen.

6.6 *Putty Knife,* rigid, approximately 40 mm (1.6 in.) wide.

6.7 *Knife,* with sharp razor-type blade.

7. Test Specimens and Cure Procedures

7.1 Four test specimens (adhesion-in-peel samples) shall be prepared on each of the substrates using the following procedures:



NOTE 1—A – 25 mm by 2 mm (1 in. by 0.08 in.) indentation
B – 25 mm by 4 mm (1 in. by 0.16 in.) indentation

FIG. 1 Special Tooling Device

7.1.1 Condition a minimum of 250 g of sealant for 24 h at standard conditions. Multi-component sealants will require mixing for 5 min or as recommended by the sealant manufacturer. Specific mixing equipment and mixing procedures may be recommended by the sealant manufacturer.

7.1.2 Clean and prepare the substrate samples as described in Guide C1375. Substrate materials not described in C1375 should be prepared in accordance with the sealant manufacturer's recommendations.

7.1.3 Apply primer(s) to the substrate(s) if recommended by the sealant manufacturer.

7.1.4 Masking tape can be applied to the substrate surfaces adjacent to the test area to allow easy removal of excess joint sealant.

7.1.5 Wire mesh screens must be thoroughly cleaned and primed, if required, as recommended by the sealant manufacturer.

7.1.6 For each substrate preparation/cleaning condition to be tested, apply a bead of sealant at least 100 mm (4 in.) in length to the substrate surface (Fig. 2).

7.1.7 Immediately place the wire mesh screen on the sealant bead and lightly tap it into the joint sealant (Fig. 3).

7.1.8 Holding the screen with a finger to prevent slippage, gently draw down the sealant imbedding the wire mesh into the wet sealant, using the special tooling device – side A (Fig. 1) at an 90° angle to the substrate (Fig. 4). The wire mesh screen should be imbedded to a uniform depth of 2 mm (0.08 in.) from the substrate surface (Fig. 5).

7.1.9 Immediately apply a second bead of joint sealant over the first bead of sealant and wire mesh screen (Fig. 6).

7.1.10 Again holding down the screen with a finger to prevent slippage, use the special tooling device – side B (Fig. 1) and draw down the sealant at a 90° angle to the substrate.