Designation: C1519 – 10 (Reapproved 2022)

Standard Test Method for Evaluating Durability of Building Construction Sealants by Laboratory Accelerated Weathering Procedures[1]

This standard is issued under the fixed designation C1519; 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 covers the method for the determination of the durability of a sealant based on its ability to function in cyclic movement maintaining adhesion and cohesion after repeated exposure to laboratory accelerated weathering procedures.

1.2 This test method describes two laboratory accelerated weathering procedures for evaluating the durability of a sealant.

1.3 RILEM TC139–DBS is related to this test method.

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

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

C1442 Practice for Conducting Tests on Sealants Using Artificial Weathering Apparatus

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

G113 Terminology Relating to Natural and Artificial Weathering Tests of Nonmetallic Materials

G141 Guide for Addressing Variability in Exposure Testing of Nonmetallic Materials

G151 Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources

G154 Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials

G155 Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials

2.2 *RILEM Standard:*[3]

RILEM TC139–DBS Determination of changes in adhesion, cohesion, and appearance of elastic weatherproofing sealants for high movement facade joints after exposure to artificial weathering

3. Terminology

3.1 The definitions given in Terminology C717 on terms relating to building seals and sealants and in Terminology G113 on terms relating to natural and artificial weathering tests are applicable to this test method.

4. Significance and Use

4.1 This test method describes the procedure to evaluate or compare, or both, the durability of sealants when subjected to accelerated weathering and cyclic movement in a joint.

4.2 Sealant installation procedures, design considerations and movement during cure affect the aging processes and are fundamental to the success of any sealant. These factors are not addressed with this test method.

4.3 The amount, type and frequency of movement a sealant experiences during its lifetime strongly depends on the materials used in construction and on the orientation of the joint toward sunlight and many other factors that are not uniform or consistent.

4.4 Climatic exposures will differ with the orientation of the building and shading as well as with local and regional climatic conditions. Climates in a given location can vary from year to year because of differences in solar radiation, temperature,

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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.

[3] Published in *Materials and Structures*, 2001, pp. 34, 579–588.

rainfall, and atmospheric conditions. Further, the quality and intensity of solar radiation on the earth's surface varies with geographic location, season, time of day, and cloud cover.

4.5 Variations in results may be expected when operating conditions are varied within the accepted limits of this test method. Therefore, all test results using this test method must be accompanied by a report of the specific operating conditions as required in Section 11. Refer to Practice G151 for detailed information on the caveats applicable to use of results obtained according to this test method.

4.6 The results of laboratory exposure cannot be directly extrapolated to estimate an absolute rate of deterioration caused by natural weathering because the acceleration factor is material dependent and can be significantly different for each material and for different formulations of the same material. However, exposure of a similar material of known outdoor performance, a control, along with the test specimens allows comparison of the durability relative to that of the control under the test conditions. Evaluation in terms of relative durability also greatly improves the agreement in test results among different laboratories.

4.7 Results of this procedure will depend on the care that is taken to operate the equipment according to Practices G154 and G155. Significant factors include regulation of the line voltage, freedom from salt or other deposits from water, temperature control, humidity control, where applicable, condition and age of the burners and filters in xenon arc equipment, and age of lamps in fluorescent UV equipment.

NOTE 1—Additional information on sources of variability and on strategies for addressing variability in the design, execution and data analysis of laboratory accelerated exposure tests is found in Guide G141.

5. Summary

5.1 For this procedure, specimens are prepared in which the sealant to be tested adheres to two parallel contact surfaces. This procedure uses the same type of specimens, in the same dimensions, and the same preparation and cure as described in Test Method C719. While any substrates can be specified and used, this procedure was developed with anodized aluminum substrates. Following cure, the specimens are placed in an artificial weathering chamber for 4 weeks. On removal from the weathering chamber, they are placed in a cyclic movement machine and subjected to 6 cyclic movements of extension and compression at room temperature according to the method of C719. Any degree of extension and compression can be used. After the movement cycles the sealant is blocked open at the recommended extension and examined for flaws. The cycle of weathering followed by movement testing and examination is repeated as often as specified. After each cycle, the number of cycles is recorded as well as the mode of failure, that is, cohesive or adhesive, amount of failure, the depth of any cracks or breaks and other pertinent observations, such as sealant deformation and bubble formation.

6. Apparatus

6.1 *Aluminum Supports,* for the preparation of test specimens (two supports for each specimen). Anodized aluminum is the standard substrate, but this method can be used with other substrates as well. Substrates should be compatible with the sealant, should not degrade under weathering, and should fit into the joint movement apparatus. If primer is recommended by the sealant manufacturer, it should be used in accordance with the manufacturer's recommendations.

6.2 *Spacers,* for the preparation of the specimens should be of a non-adherent material and of a shape to produce a sealant joint as depicted in Test Method C719.

NOTE 2—If the spacers are made of a material to which the sealant adheres, their surfaces should be made non-adherent, for example, by a thin wax coating.

6.3 *Non-Adherent Substance,* for the preparation of test specimens, for example, polytetrafluoroethylene (PTFE) film or vellum paper, preferably on the advice of the sealant manufacturer.

6.4 *Ventilated Convection-Type Oven,* capable of being maintained at 50 °C ± 2 °C.

6.5 *Artificial Weathering Device*—Choice of type of apparatus and duration of exposure shall be by mutual agreement among the interested parties. Because of differences in test conditions, test results may differ with the type of apparatus used. Consult Practices G154 and G155 for differences in the spectral power distributions of the exposure sources and Practice C1442 for the differences in test parameters in the two types of apparatus specified.

6.5.1 *Fluorescent UV/Condensation Apparatus*—Operate the device in accordance with Practice C1442, Section 7.3.

6.5.2 *Xenon Arc Light Apparatus*—Operate the device in accordance with Practice C1442, Section 7.2.

NOTE 3—The xenon arc ruggedness test was run at 70 % RH using an exposure cycle of 2 h light followed by 2 h light plus water spray for more thorough wetting. The test results compared well with those of outdoor exposures. Therefore, these conditions are considered an alternate to the default parameters.

7. Preparation of Test Specimens

7.1 Adhere the sealant to be tested to two parallel contact surfaces as described in Test Method C719. The user is to specify the number of specimens.

7.2 Unless specified otherwise, use anodized aluminum substrates.

7.3 For each specimen, assemble two supports and two spacers as shown in Test Method C719 and set up on the non-adherent substrate.

7.4 Follow the instructions of the sealant manufacturer, for instance, whether a primer is to be used.

7.5 Fill the hollow space formed by supports and spacers shall be with sealant previously conditioned for 24 h at 23 °C ± 2 °C. The following precautions shall be taken:

7.5.1 avoid the formation of air bubbles;

7.5.2 discard the first 5 g of sealant out of the tube, cartridge or dispenser;

7.5.3 press the sealant towards the contact surface of the supports; and

7.5.4 trim the sealant surfaces so that they are flush with the face of the supports and spacers.