Designation: C1642 – 20

Standard Practice for Determining Air Leakage Rates of Aerosol Foam Sealants and Other Construction Joint Fill and Insulation Materials[1]

This standard is issued under the fixed designation C1642; 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 practice is intended to determine the air leakage rate of aerosol foam sealants as measured in a standardized jig. This practice provides a procedure for preparing the test apparatus and further describes the application of aerosol foam sealant and other joint fillers to the apparatus prior to conducting Test Method E283.

1.2 This practice allows testing laboratories to quantify the air leakage rate of aerosol foam sealants or joint filling products using Test Method E283 and reporting the data in $L/(s \cdot m^2)$ according to Practice E29.

1.3 This practice is used in conjunction with Test Method E283. Although Test Method E283 is a laboratory test method used with fenestration products, individuals interested in performing field air leakage tests on installed units should reference Test Method E783 and AAMA 502.

1.4 Aerosol foam sealants are used for a variety of end use applications generally intended to reduce air leakage in the building envelope.

1.5 Insulating type materials also will be found suitable for evaluation with this practice.

1.6 There are no other known practices or test methods that specify the preparation of the assemblies used to determine the air leakage rate of gap filling sealants, dry preformed foams or insulations.

1.7 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.

1.8 *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.*

1.9 *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

C1330 Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants

C1620 Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

E631 Terminology of Building Constructions

E783 Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

2.2 *Other Standards:*

AAMA 502 Voluntary Specification for Field Testing of Newly Installed Fenestration Products[3]

ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories[4]

3. Terminology

3.1 *Definitions:* See also Terminology E631.

3.1.1 *air barrier*—the assembly of material(s) used in building construction to reduce or retard the uncontrolled passage of air into and out of the building.

[1] This practice is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.61 on Aerosol Foam Sealants.

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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 *Anual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Architectural Manufacturers Association (AAMA), 1827 Walden Office Square, Suite 550, Schaumburg, IL 60173-4268, http://www.aamanet.org.

[4] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

***A Summary of Changes section appears at the end of this standard**

3.1.2 *exfiltration*—air flow direction from building interior toward exterior.

3.1.3 *infiltration*—air flow direction from building exterior toward interior.

3.1.4 *preformed dry foam material*—any cellular product designed for filling construction joints to resist air leakage.

3.1.5 *preformed pre-compressed tapes*—any cellular tape supplied compressed from its fully expanded shape and designed for filling construction joints to resist air leakage.

3.1.6 *rough opening gap*—the open space between the building frame and the fenestration product.

3.1.7 *test effective area*—is located at and comprised of gaps between aluminum rectangular tubing with each gap having dimensions of 9.5-mm (0.375-in.) wide by 864-mm (34-in.) long. A single gap area is 0.008 m^2 (12.75 $in.^2$). The total effective area of all five gaps is 0.041 m^2 (63.8 $in.^2$).

4. Summary of Practice

4.1 This practice establishes specimen preparation and a test protocol for determining the air leakage rates of aerosol foam sealants per Test Method E283. Calibration of the air leakage test equipment shall be performed by ISO 17025 calibration provider than can validate the flow meter accuracy of ±1 % of reading in the range of 0.05 to 0.02 cfm. Application of foam sealant shall be in accordance with all manufacturer's recommendations and in a manner reflecting in use conditions such as the depth and width of the joint or gap. In the event that the manufacturer's instructions are not available, this practice shall be the default application method for the test material (joint width and depth).

NOTE 1—Apply according to manufacturer's recommendations which may include a water spray to surfaces or other special surface preparation.

4.2 This practice references the following material types:

4.2.1 Type I Material (Aerosol Foam Sealants)
A) Polyurethane
B) Latex

4.2.2 Type II Material (Preformed dry material)
A) Closed cell foam
B) Bi-cellular foam

4.2.3 Type III Material (Batt-Insulation)
A) Faced
B) Un-Faced

5. Significance and Use

5.1 This practice is intended to measure air flow through materials used to fill joints found in building construction.

5.2 This practice does not purport to establish all required criteria for the selection of an air barrier assembly. Therefore, the results should be used only for comparison purposes and should not be seen as the equivalent to field installed building systems.

6. Sampling

6.1 One test jig shall be required for each material type.

7. Test Apparatus

7.1 The jig required for testing is shown in Fig. 1 and Fig. 2.

NOTE 2—See Annex A1 for the detailed construction and assembly details of the test apparatus.

8. Sample Preparation

8.1 *General Description*—The test sample is a jig containing five air permeability test areas that consist of joint gaps between aluminum rectangular tubing sections with each having the following dimensions: 9.525-mm (0.375-in.) wide by 863.6-mm (34-in.) long by 101.6-mm (4-in.) deep.

NOTE 3—Cavity length is the distance between the 0.375-in. thick spacer at each end. The extrusions are enclosed by a wooden buck frame comprised of 50.8 by 152.4-mm (2 by 6-in.) dimension lumber (See Annex A1 drawings).

8.2 The buck shall be sealed at all extraneous points with silicone sealant and butyl tape. This seal shall extend across the termination joint between aluminum tube and the wood buck surround. During assembly of the test specimen, silicone sealant should be applied to both planar faces of the 50.8 by 101.6-mm (2 by 4-in.) aluminum spacers between aluminum rectangular tubing. This will prevent air leakage at spacer locations. The areas within the wood buck that include the aluminum spacers are blocked during testing. This can be done by filling the gap between aluminum rectangular tubing with

FIG. 1 An Assembled Test Jig Apparatus Ready for Joint Filling with a Perimeter Seal Applied in the Wood Test Buck

NOTE 1—All five (5) test area gaps are shown and filled with test sample foam sealant. Blocked areas are not included for air leakage test.
FIG. 2 Specimen Mounted into Wood Surround (test buck) – View from Interior Side.

sealant and covering with impermeable material such as weather resistant tape. See drawings.

8.3 *Applying the Test Material in the Jig:*

8.3.1 *Foam Sealant Applicaion*—The foam may be applied in multi passes as desired. Approximately one half of the cavity depth should be filled on the first pass and allowed to cure until the surface is tack free (see Specification C1620 for definition). A sharp knife should be used to trim the foam. Do not attempt to trim the foam until it has cured for 24 h. It is not necessary to trim the cured foam on the exterior side of the joint, however the inside face should be trimmed flush with the aluminum if the foam expands beyond the surface.

NOTE 4—Only one pass or more than two passes is required to fully fill the cavities. Enter this information as a note in the test report. Use Standard Laboratory Conditions for sample preparation and cure of the foam sealant.

8.3.2 *Pre-formed Foam Application*—Cut a continuous length of Type II material measuring 12.7 mm (½ in.) longer than the channel length. Align the cut length with the channel gap to be filled. Carefully use a blunt or round device to push the aligned material into the total length of the 9.525-mm (0.375-in.) gap. If material is punctured, cut, or otherwise damaged during insertion, it shall be removed, discarded, and replaced with a new length of material. Since by design, the cut material length is slightly longer, the ends should be compressed on both ends to provide a tight fit against the spacers and channels. The inserted material *(1)* shall be between the channel with no visible material protruding to either the interior or the exterior sides, *(2)* shall provide a continuous contact surface between the channels and spacers, and *(3)* shall be positioned at the same depth in the channel with a variance of ±6.35 mm (0.25 in.). This procedure applies for each additional continuous length that is positioned in the channel. Reported information shall include the depth of the material into the joint, material cross-sectional dimensions prior to insertion, number of pieces if more than one length of foam is used, length of each piece, and type and class of material, (Type shall be bi-cellular or closed cell per Terminology C717. Class would be C, closed cell or B, bi-cellular per Specification C1330 or other).

8.3.3 *Batt Material Installation*—Cut a continuous length of Type III material measuring 88.9 mm (3.5 in.) by 19.05 mm (0.75 in.) by 1177.73 mm (45.38 in.). The batt material length is 25.4 mm (1.0 in.) longer than the aluminum channel. Align the cut length with the channel gap to be filled. Carefully use a blunt or round device to push the aligned material into the total length of the 9.525-mm (0.375-in.) gap. Ensure specimen completely fills the cavity with no visible material protruding to either the interior or the exterior sides.

9. Test Procedure

9.1 *Air Leakage:*