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Standard Test Method for Measuring the Yield for Aerosol Foam Sealants[1]

This standard is issued under the fixed designation C1536; 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~~determines the ~~determination~~quantity of ~~the~~ linear units of ~~specified diameter bead of foam sealant~~ a foam sealant having a specified bead diameter that ~~can~~may be obtained from a single can of aerosol product. Four (4) cans are required for each product determination.

1.2 The test method is intended to estimate the contents of the aerosol container (*1*) for purposes of label statements, and (*2*) to provide the user information needed to estimate job requirements.

~~1.3Such foam~~ 1.3 Foam sealants are used for a variety of end-use applications but are primarily intended to reduce air movement in the building envelope.

1.4 Currently, two main foam sealant types are applicable to this ~~standard,~~standard: single component polyurethane and ~~latex types.~~ latex.

1.5 There is no other known standard test method to measure aerosol foam sealant yield.

1.6 Values are reported in SI units only. Certain apparatus and supply items are referenced in inch-pound units for purchasing purposes.

1.7 *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.*

2. Referenced Documents

2.1 ~~*ASTM Standards:*~~

~~C717Terminology of Building Seals and Sealants~~ ASTM Standards:[2]

C717 Terminology of Building Seals and Sealants

C1620 Specification for Aerosol Polyurethane and Aerosol Latex Foam Sealants

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 ~~*aerosol foam sealant*—foam sealant, which is dispensed from any aerosol can, pressure cylinder or container, intended to seal cracks or gaps.~~

~~3.1.2~~*empty aerosol can (of foam sealant)*—the time at which the product flow of the foam sealant is less than 2.0 linear cm or 1.0 g of continuous foam bead during two continuous seconds of dispensing. ~~3.1.3*post dispensing contraction*—the decrease in the foam bead diameter or height that can occur immediately after initial foam sealant dispensing up to final curing or drying of the product.~~

~~3.1.4*post dispensing expansion*—the increase in the foam bead diameter or height that occurs immediately after initial foam sealant dispensing up to final curing or drying of the product.~~

~~3.1.5~~

3.1.2 *symbols*—letter symbols are used to represent physical measurements and are defined in ~~Tables 1 and~~ Table 1 and Table ~~2~~2.

~~3.1.6~~

3.1.3 *yield*—the yield for an aerosol can of foam sealant is the quantity of a specified nominal diameter of foam bead ~~which~~that is dispensed from a full can as defined by this test method.

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[1] This test method is under the jurisdiction of ASTM Committee C24 on Building Seals and Sealants and is the direct responsibility of Subcommittee C24.61 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 *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Data Acquisition and Calculation Form for Foam Yield Measurement Procedure A

Sample Description		Symbol
~~Canister~~	~~Avg. initial weight (g)~~	~~$(A_1+A_2)/2=A$~~
Canister	Avg. initial weight (g)	$A=(A_1+A_2)/2$
	~~Avg. weight after discharge (g)~~	~~$(B_1+B_2)/2=B$~~
	Avg. weight after discharge (g)	$B=(B_1+B_2)/2$
	Avg. max discharged weight (g)	$A-B$
Specimen Preparation	Temperature (°C)	. . .
	Relative humidity (%)	. . .
	~~Can's starting weight (g)~~	~~$E_1+E_2/2=E$~~
	Can's starting weight (g)	$E=(E_1+E_2)/2$
	~~Can's finishing weight (g)~~	~~$F_1+F_2/2=F$~~
	Can's finishing weight (g)	$F=(F_1+F_2)/2$
	Amount of discharged product (g)	$E-F$
~~Results~~	~~Total dischargeable volume of cured beads measured by water displacement (mL)~~	~~H~~
Results	Total dischargeable volume of cured beads measured by water displacement (mL)	$H=\sum_{n=1}^{10}\frac{P_n}{\rho_{water}}=\sum_{n=1}^{10}\frac{P_n}{1.0g/cc}$
	~~Yield (*Y*) based on linear metres of 1.0 cm bead per can~~	~~$Y=[(A-B)/(E-F)]\,[(H/2)\div 78.5]$~~
	Yield (*Y*) based on linear metres of 1.0 cm bead per can	$Y=\frac{H(A-B)}{2(E-F)}\cdot\left(\frac{1}{78.5}\right)$ [A]
	Total can Linear Yield (*Y*) in meters based on actual post cured bead diameter other than 1.0 cm, dispensed per can.	$Y=\frac{H(A-B)}{2(E-F)}\cdot\left(\frac{1}{25\pi D^2}\right)$

[A] 78.5 is the factor to convert volume (cm^3) to linear meter of 1 cm diameter bead.

TABLE 2 Data Acquisition and Calculation Form for Foam Yield Measurement Procedure B

Sample Description		Symbol
~~Canister~~	~~Avg. initial weight (g)~~	~~$(A_1+A_2)/2=A$~~
Canister	Avg. initial weight (g)	$A=(A_1+A_2)/2$
	~~Avg. weight after discharge (g)~~	~~$(B_1+B_2)/2=B$~~
	Avg. weight after discharge (g)	$B=(B_1+B_2)/2$
	Avg. max discharged weight (g)	$A-B$
Specimen Preparation	Temperature (°C)	. . .
	Relative humidity (%)	. . .
	~~Can's starting weight (g)~~	~~$E_1+E_2/2=E$~~
	Can's starting weight (g)	$E=(E_1+E_2)/2$
	~~Can's finishing weight (g)~~	~~$F_1+F_2/2=F$~~
	Can's finishing weight (g)	$F=(F_1+F_2)/2$
	Amount of discharged product (g)	$E-F$
	~~Total volume of cured beads measured and calculated by $\pi\cdot l^2\cdot L$ (cm^3)~~	~~H~~
	Total volume of cured beads measured and calculated by $\pi\cdot l^2\cdot L$ (cm^3) [A]	H
~~Results~~	~~Dischargeable volume o f cured beads, converted to (L)~~	~~$[(A-B)/(E-F)]$ $H/1000$~~
Results	Total dischargeable volume foam per can (cm^3)	$V=\frac{H(A-B)}{2(E-F)}$
	~~Yield (*Y*) based on linearmetres of 1.0 cm bead per can~~	~~$Y=\frac{H(A-B)}{2(E-F)}\cdot\left(\frac{1}{78.5}\right)$~~
	Total Linear Yield (*Y*) based on 1.0 cm diameter bead per can	$Y=\frac{H(A-B)}{2(E-F)}\cdot\left(\frac{1}{78.5}\right)$
	~~Total can Linear Yield (*Y* = [(*A* – *B*)/(*E* – *F*)] *in meters based on actual post cured bead diameter other than 1.0 cm dispensed per can.*~~	~~$Y=H/78.5$ [A,B]~~
	Total can Linear Yield (*Y*) in meters based on actual post cured bead diameter other than 1.0 cm dispensed per can.	$Y=\frac{H(A-B)}{2(E-F)}\cdot\left(\frac{1}{25\pi D^2}\right)$

[A] 78.5 is the factor to convert volume (cm^3) to linear meter of 1.0 cm diameter bead~~B *L* =cm and *l* = liters~~.

4. Summary of Test Method

4.1 *Procedure A*—~~Suitable for foams that can be measured by water displacement.~~

~~4.1.1The middle 100 g of the aerosol can's contents is dispensed as a specified size of bead segments.~~

~~4.1.2The dispensed foam volume is determined by measuring the volume of displaced water when the foam bead segments are submersed.~~ —Suitable for foams that can be measured by water displacement (intended only for polyurethane foams).

4.1.1 The middle of the aerosol can's contents is dispensed at specified bead size segments.

4.1.2 The dispensed foam volume is determined by submerging the foam bead segments in water and measuring the weight of the displaced water.

4.1.3 The yield (defined as the total bead length of a specified nominal bead diameter of cured foam per can) is calculated from the measured foam volume.

4.2 *Procedure B*—Suitable only for foam sealants that cannot be measured by water displacement (Intended only for latex foams).

4.2.1 The middle ~~100 g~~ of the container's contents is dispensed as a specified ~~size of~~ bead size segments.

~~4.2.2The~~4.2.2 The volume of the foam bead is directly measured from the dried or cured foam bead segments by direct measurement. Yield is calculated from these measurements.

NOTE 1—Procedure A uses tap water (see 11.10) to which 4.2 g of Dioctyl Sodium Sulfosuccinate (70 % solids) and 1.2 g of SAG 10 defoamer per 4 litres may be added as wetting agent/defoamer blend. This avoids false readings if air bubbles become a problem. The water is maintained at 23 ± 2°C during the submersion part of the test. It is permissible for a single batch of water to be used up to 48 h.

5. Significance and Use

~~5.1Yield~~ 5.1 The yield measurement of aerosol foam sealants ~~are~~is used to indicate the amount of foam sealant that can be obtained from a single can of product.

5.2 The yield does not predict the performance capability of the foam sealant product or its suitability for the intended application.

5.3 Procedure A was developed for use with products that can be volumetrically measured by submersion in water. Procedure B was developed for product that cannot be measured by using a water displacement method.

5.4 Yield is often dependent on the bead size dispensed. Extrapolation of test results using data measured for larger size beads to estimate smaller sized beads has shown inaccuracies. Since yield will be reported based on the diameter of the cured bead (not initial bead size), the operator shall determine the nominal initial bead size required to produce a specific nominal cured bead diameter. This foam characteristic, called "post dispensing contraction" or "post dispensing expansion," is defined in ~~3.1.3 and 3.1.4~~Terminology C717.

6. Apparatus

~~6.1*Dioctyl Sodium Sulfosuccinate*, or equivalent.~~

~~6.2*SAG 10 Defoamer*, or equivalent.~~

6.1 A container to hold water. Large enough to submerse foam samples.

6.2 A metal grating heavy enough to keep foam samples submersed.

6.3 *Top Loading Balance*, readable to 0.01 g.

6.4 ~~*Small Rigid Wooden, Metal, or Plastic Frame*, to support screen or mesh type substrates.~~

~~6.5*Water Tank and Wire Cage Apparatus*, shown in Figs. A1.1-A1.6to measure volume by water displacement for Procedure A.~~

~~6.6~~*PTFE Release Agent*, or equivalent.

~~6.7~~

6.5 *Fiberglass Insect Screening* , or equivalent.

~~6.8~~

6.6 *Polyolefin Film or Mesh*, available from various local supply companies, 2 mil thickness or greater film of smooth finish only, matte or textured finishes are not suitable.

~~6.9~~

6.7 *Corrugated Cardboard 200 Pound Weight Substrate*, available in various sizes, trimmable to 70 ± 10 × 120 ± 15 cm for convenient handling.

~~6.10~~

6.8 Uncoated smooth brown wrapping paper.

6.9 *Meter Stick*, readable to the nearest 0.1 cm.

~~6.11~~

6.10 *Vernier Caliper*, readable to the nearest 0.1 mm.

7. Test Specimens and Substrates

7.1 Prepare all test specimens at standard laboratory conditions of 23 ± 2°C and 50 ± 5 % relative humidity.

7.2 Polyurethane foam sealant ~~(typically measured~~ complying with Specification C1620 (measured using Procedure A) shall be dispensed directly on to polyolefin film covered rigid cardboard or suspended mesh mounted on a frame of convenient size, approximately ~~70~~40 × ~~120~~40 cm.

7.3 If in Procedure A, a fiberglass screen is used ~~for~~as the specimen ~~substrate in Procedure A~~ substrate, it shall be lightly coated with a PTFE aerosol spray composition and allowed to air dry ~~just~~ 30-45 s before the foam sealant is applied. If polyolefin film or mesh is ~~used the PTFE spray is not used.~~ used, do not use the PTFE spray.

7.4 Foam sealants complying with Specification C1620 that cannot be measured by water displacement, such as Latex (measured using Procedure B), shall be dispensed directly on to ~~Kraft~~brown paper or ~~Kraft paper covered~~ corrugated ~~rigid~~cardboard sheet of convenient size approximately 70 × 120 cm. The ~~Kraft~~brown paper is trimmed away from the specimens in order to facilitate measuring the height and width of the bead. The paper shall not be totally removed from the foam but only