Designation: C461 – 23

Standard Test Methods for Mastics and Coatings Used With Thermal Insulation[1]

This standard is issued under the fixed designation C461; 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 These test methods cover procedures for sampling and testing mastics and coatings for use as weather and vapor retarder finishes on thermal insulations and for other accessory use.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 The test methods appear in the following order:

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]

C168 Terminology Relating to Thermal Insulation

C419 Practice for Making and Curing Test Specimens of Mastic Thermal Insulation Coatings

D56 Test Method for Flash Point by Tag Closed Cup Tester

D71 Test Method for Relative Density of Solid Pitch and Asphalt (Displacement Method)

D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

D140 Practice for Sampling Asphalt Materials

D1475 Test Method for Density of Liquid Coatings, Inks, and Related Products

D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer

D2369 Test Method for Volatile Content of Coatings

D3278 Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus

3. Terminology

3.1 *Definitions*—For definitions of terms used in these test methods, see Terminology C168.

4. Sampling

4.1 Prior to opening or sampling, or both, any mastic or coating, its Safety Data Sheet (SDS) shall be reviewed to ensure appropriate precautions or personal protective equipment, or both, are utilized.

4.2 Take the samples for laboratory examination from the original containers immediately after stirring to a uniform condition. Determine the number of containers sampled as required to represent a shipment in accordance with Practice D140. Restir the composite sample immediately before taking out portions for individual tests.

5. Uniformity and Storage Stability

5.1 Open the original containers and examine them for uniformity of contents. Record the degree of separation, if any, into portions of appreciably different consistency, such as thick or thin layers, sedimentation or coagulation, etc., also of difficulty encountered in stirring to a uniform condition.

5.2 Examine the contents of a full container of not less than 1 qt (1 L) that has stood undisturbed for 48 h. Make notation of any separation of solvent or water, coagulation, or settlement of suspended matter, that cannot be overcome by moderate agitation.

[1] These test methods are under the jurisdiction of ASTM Committee C16 on Thermal Insulation and are the direct responsibility of Subcommittee C16.33 on Insulation Finishes and Moisture.

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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.

5.3 Additionally, if required, examine and report the condition in the container after 3 months' storage, examining for uniformity in accordance with 5.1.

6. Stability Under Freezing

6.1 Fill a 1-pt (500-mL) press-top tin can three quarters full with the coating, and hold the filled and closed container in a chamber at a temperature of 0 ± 5°F (−18 ± 3°C) for a minimum of 12 h consecutively under natural convection conditions.

6.2 At the expiration of the freezing period, permit the coating to warm to room temperature by exposure of the container to the temperature of the laboratory for a minimum of 6 h. After the first operation of freezing and thawing, repeat the procedure twice so that the coating will have been subjected to three cycles of freezing and thawing.

6.3 After the completion of the third cycle, open the container, and note any separation of solvent or water, coagulation, settlement of suspended matter, or the presence of distinct layers, or a combination of these. If the compound cannot be rendered homogeneous by moderate stirring at laboratory temperature, report that it has coagulated.

7. Density and Weight per Gallon

7.1 *Apparatus:*

7.1.1 *Container*—Any suitable container of known volume shall be used. 7.1.1.1 describes one such container.

7.1.1.1 *Brass Cylinder,* short, about 3 in. (80 mm) high and 1.5 in. (40 mm) in diameter, with the inside bottom angles rounded is most convenient. Adjust the capacity of such a cylinder to hold 83.3 ± 0.1 g of water at 77°F (25°C).

7.2 *Procedure*—Refer to Test Method D1475 for general procedure.

7.2.1 If the cylinder described in 7.1.1.1 is used, the weight of the contents in grams, divided by 10, is the weight per gallon in pounds.

8. Consistency

8.1 Refer to Test Method D2196 for apparatus and general procedure.

8.2 *Thixotropic Index*—Calculate the thixotropic index by dividing the apparent viscosity at a low rotational speed by the viscosity at a speed ten times higher. Typical speed combinations are 2 or 2.5 and 20 rpm, 5 and 50 rpm, 6 and 60 rpm, but selection is subject to the agreement between the producer and user. The resultant viscosity ratio is an index of the degree of shear thinning over that range of rotational speed with higher ratios indicating greater shear thinning.

9. Solids Content

9.1 Refer to Test Method D2369 for apparatus and general procedures.

9.2 Solids content by weight is synonymous to the nonvolatile matter as described in Test Method D2369.

10. Content of Volume Solids and Coverage of Mastics and Coatings

10.1 *Scope*—This test method covers the determination of the percent volume solids (nonvolatile matter) and the coverage rate required to achieve a given dry film thickness of a mastic or coating. The volume solids are expressed as the percent of the original compound. The coverage is expressed in gallons / 100 ft^2 (liters / m^2) to achieve a desired dry film thickness in inches.

10.2 *Test Specimens*—To determine the density of the cured film, use three specimens at least 1 by 1 in. (25.4 by 25.4 mm) in area cut from a film with a wet thickness specified by the manufacturer. Prepare and cure these films on release film as specified in Practice C419, or on other suitable sheet material that can readily be removed after cure of the mastic or coating at room condition. Cure the film to constant weight at 120 ± 5°F (46 to 52°C) and the film removed as indicated in Practice C419 before determination of density of the cured film (D_s) in accordance with Test Method D71.

10.3 *Calculations*—From values for density of the coating as received (Section 7), and of the cured film, and the weight content of solids (Section 9), calculate the percent volume solids as follows:

$$S_v = S_w(D_1 / D_s) \quad (1)$$

where:

S_v = volume of solids, %,
S_w = weight of solids, % (Section 9),
D_1 = density of the coating as received (Section 7), and
D_s = density of the cured film.

10.3.1 Knowing the percent volume solids, S_v, calculate the coverage, expressed in gallons per 100 square feet for a given dry film thickness in inches.

$$\text{Coverage} = 6233\,(t_1 / S_v) \quad (2)$$

$$\text{Equivalent Wet Film Thickness} = (t_1 / S_v)*100 \quad (3)$$

where:

t_1 = desired dry film thickness in inches.

11. Sag Resistance (Build)

11.1 Application of the material to the test panels shall be in accordance with Practice C419, or to the thickness and by the method to be followed in practice, such as spray, brush, or trowel. The compound shall be at 77 ± 5°F (25 ± 3°C) unless otherwise specified such as for hot spray. Apply the material to 6 by 6-in. (152 by 152-mm) smooth calcium silicate insulation blocks, primed or unprimed in accordance with the instructions of the manufacturer, at a temperature of 77 ± 5°F. Other insulation types may be substituted, and shall be identified in the report. Mask the panel for 1 in. (25.4 mm) along the edges. Immediately after application remove the masking and suspend the panel in a vertical position in a room at 77 ± 5°F. After 1 h observe the coating for any flow, slippage, and sagging. Record the maximum movement to the nearest 1⁄32 in. (0.8 mm).