



Designation: ~~C461-81 (Reapproved 2003)~~ Designation: C 461 – 81 (Reapproved 2008)

## Standard Test Methods for Mastics and Coatings Used With Thermal Insulation<sup>1</sup>

This standard is issued under the fixed designation C 461; 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 ( $\epsilon$ ) 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 barrier finishes on thermal insulations and for other accessory use.

~~1.2 The values stated in inch-pound units are to be regarded as the standard. The metric equivalents of inch-pound units may be approximate.~~

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:

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

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

C 168 [Terminology Relating to Thermal Insulation](#)

C 419 [Practice for Making and Curing Test Specimens of Mastic Thermal Insulation Coatings](#)

D 56 [Test Method for Flash Point by Tag Closed Cup Tester](#)

D 71 [Test Method for Relative Density of Solid Pitch and Asphalt \(Displacement Method\)](#)

D 93 [Test Methods for Flash Point by Pensky-Martens Closed Cup Tester](#)

D 140 [Practice for Sampling Bituminous Materials](#)

D 217 [Test Methods for Cone Penetration of Lubricating Grease](#)

D 2196 [Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational \(Brookfield type\) Viscometer](#)

D 3278 [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 C 168.

### 4. Sampling

4.1 Prior to opening or sampling, or both, any mastic or coating, its Material Safety Data Sheet (MSDS) should 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.

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

Determine the number of containers sampled as required to represent a shipment in accordance with Practice D 140. 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.

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  $0 \pm 5^\circ\text{F}$  ( $-18 \pm 3^\circ\text{C}$ ) 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 may 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  $83.3 \pm 0.1$  g of water at  $77^\circ\text{F}$  ( $25^\circ\text{C}$ ).

7.2 *Procedure*—Condition the sample at  $77^\circ\text{F}$  ( $25^\circ\text{C}$ ) and fill the tared container with a slight excess. In filling the container, take precautions to ensure that no air is entrapped, jarring or vibrating the container until no further change in volume occurs is satisfactory. Remove excess with a straightedge flush with the top of the container and wipe the outside of the container clean. Then weigh the container and contents to within  $\pm 0.5$  g.

7.3 *Calculations*—Subtract the weight of the empty container and divide the remainder by the capacity of the container in cubic centimetres. The quotient is the density in grams per cubic centimetre which, multiplied by 83.3, gives the weight per gallon in pounds.

7.3.1 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 D 217 for apparatus and general procedure, with exceptions as noted in 8.2-8.4.

8.2 In a closed container bring to test temperature sufficient material to overfill the cup of the standard grease worker. Do this either in an air bath or water bath, being careful if the latter is used not to permit water to enter the container. Transfer the material to the standard cup, occasionally jarring the cup sharply on a hard surface and using a spatula for filling to avoid the inclusion of air. Scrape off the excess material extending above the rim of the cup by moving the blade of the spatula, held inclined toward the direction of motion at an angle of  $45^\circ$  across the rim of the cup.

8.3 Determine the cone-penetration reading in accordance with Section 5 of Test Method D 217, with minimum time between filling the cup and the reading to avoid temperature change of the sample. Report the average of the three tests to the nearest 0.1 mm as the penetration of the sample.

8.4 The practical limit of cone penetration is 375. If readings above this value are obtained, or if specified, an aluminum cone and shaft with a total weight of 50 g may be used in place of the 150-g cone and shaft specified in Test Method D 217. If with this modification, readings exceed a penetration of 375, consistency alternatively may be determined by Test Method D 2196. The helipath stand and T-bar spindles may be used.

## 9. Solids Content

9.1 Weigh about 5 g of material to the nearest 0.01 g into a weighed flat-bottom metal dish or container (Note 1). Place the dish and its contents in an oven at  $105 \pm 2^\circ\text{C}$  ( $220 \pm 5^\circ\text{F}$ ) for 2 to 4 h, or until the material shows a loss of not greater than 0.02 g on successive hourly weighings; then cool in a desiccator and weigh.

NOTE 1—A friction-top can plug, 50 to 80 mm in diameter, has been found convenient.

9.2 From the weight of the dried residue and the weight of the original sample, calculate the percent nonvolatile matter.