



Designation: C647 – 19

Standard Guide to Properties and Tests of Mastics and Coating Finishes for Thermal Insulation¹

This standard is issued under the fixed designation C647; 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 guide identifies properties of mastics and coating finishes characterizing their performance as finishes for thermal insulation.

1.2 These properties relate to application and service. Each property is defined, and its significance and suggested test methods are described.

1.3 The properties appear in the following order in this guide.

	Paragraph
Application Properties	6
Consistency	6.1
Coverage	6.2
Build	6.3
Wet Flammability	6.4
Toxicity	6.5
Temperature and Humidity Range	6.6
Surface Wetting and Adhesion	6.7
Gap Filling and Bridging	6.8
Sizing and Sealing	6.9
Corrosion or Solvent Attack	6.10
Drying Time and Curing Time	6.11
Shrinkage	6.12
Storage Stability	6.13
Freeze-Thaw Stability	6.14
Service Properties	7
Specimen Preparation	7.1
Outdoor Durability	7.2
Environmental Resistance	7.3
Temperature Limits	7.3.1
Chemicals and Water Resistance	7.3.2
Mold and Mildew Resistance	7.3.3
Surface Flammability	7.4
Water-Vapor Transmission Rate	7.5
Adhesion	7.6
Damage Resistance	7.7
Impact Resistance	7.7.1
Abrasion Resistance	7.7.2
Stress Resistance	7.8
Flexure	7.8.1
Elongation	7.8.2
Color	7.9
Odor	7.10

Other Properties

8

1.4 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.

1.5 *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
- C461 Test Methods for Mastics and Coatings Used With Thermal Insulation
- C488 Test Method for Conducting Exterior Exposure Tests of Finishes for Thermal Insulation
- C681 Test Method for Volatility of Oil- and Resin-Based, Knife-Grade, Channel Glazing Compounds
- C755 Practice for Selection of Water Vapor Retarders for Thermal Insulation
- C792 Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants
- D36/D36M Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
- D56 Test Method for Flash Point by Tag Closed Cup Tester
- D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester
- D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents
- D562 Test Method for Consistency of Paints Measuring

¹ This guide is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.33 on Insulation Finishes and Moisture.

Current edition approved March 1, 2019. Published April 2019. Originally approved in 1969. Last previous edition approved in 2013 as C647 – 08 (2013). DOI: 10.1520/C0647-19.

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.

Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer

D638 Test Method for Tensile Properties of Plastics

D747 Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam (Withdrawn 2019)³

D790 Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

D822/D822M Practice for Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings

D903 Test Method for Peel or Stripping Strength of Adhesive Bonds

D968 Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive

D1310 Test Method for Flash Point and Fire Point of Liquids by Tag Open-Cup Apparatus

D1640 Test Methods for Drying, Curing, or Film Formation of Organic Coatings

D1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

D1729 Practice for Visual Appraisal of Colors and Color Differences of Diffusely-Illuminated Opaque Materials

D1849 Test Method for Package Stability of Paint

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

D2243 Test Method for Freeze-Thaw Resistance of Water-Borne Coatings

D2354 Test Method for Minimum Film Formation Temperature (MFFT) of Emulsion Vehicles

D2444 Practice for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

D2453 Test Method for Shrinkage and Tenacity of Oil- and Resin-Base Caulking Compounds

D2485 Test Methods for Evaluating Coatings For High Temperature Service

D2507 Terminology of Rheological Properties of Gelled Rocket Propellants (Withdrawn 2003)³

D3134 Practice for Establishing Color and Gloss Tolerances

D3274 Test Method for Evaluating Degree of Surface Disfigurement of Paint Films by Fungal or Algal Growth, or Soil and Dirt Accumulation

D3361/D3361M Practice for Unfiltered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings

D3828 Test Methods for Flash Point by Small Scale Closed Cup Tester

D4339 Test Method for Determination of the Odor of Adhesives

D5590 Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay

E84 Test Method for Surface Burning Characteristics of Building Materials

E96/E96M Test Methods for Water Vapor Transmission of Materials

E162 Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source

E659 Test Method for Autoignition Temperature of Chemicals

F1249 Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor

G21 Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

3. Terminology

3.1 Terminology C168 shall be considered as applying to the terms used in this specification.

3.2 General Definitions:

3.2.1 *application properties*—properties that influence or affect the effective installation of finishes.

3.2.2 *coating*—a liquid or semiliquid protective finish capable of application to thermal insulation or other surfaces, usually by brush or spray, in moderate thickness, 30 mils (0.76 mm).

3.2.3 *mastic*—a protective finish of relatively thick consistency capable of application to thermal insulation or other surfaces usually by spray or trowel, in thick coats greater than 30 mils (0.03 in.) (0.76 mm).

3.2.4 *service properties*—properties that govern performance of finishes after installation.

3.3 *Specific Definitions*—Terms specific to Sections 6 and 7 are defined as appropriate.

4. Significance and Use

4.1 Each of the properties listed should be considered in selecting materials for specific projects. A list of the selected properties with limiting values assigned will form a part of the product specification.

4.2 All of the properties are not required, and all of the tests outlined are not required. A condition to any specification must be an evaluation of the proposed use to determine which properties shall be required.

4.3 Membrane reinforcements are frequently specified and used with mastics and coatings. Service properties of such systems of finishes are often different from the unreinforced finishes; therefore, it is essential to test specimens of the reinforced system.

5. Classification of Mastics and Coatings

5.1 *Vapor-Retarder Type*—A finish intended for service on insulated units that are operated below ambient temperature at least part of the time.

NOTE 1—Practice C755 provides additional guidance.

5.1.1 Outdoor service.

5.1.2 Indoor service.

5.2 *Vapor-Permeable Type*—A finish intended for service on insulated units that are operated above ambient temperature. (See 7.6.2. Sometimes referred to as a “breather” finish.)

5.2.1 Outdoor service.

³ The last approved version of this historical standard is referenced on www.astm.org.