



Standard Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing Systems¹

This standard is issued under the fixed designation D6694/D6694M; 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 specification covers a liquid-applied solvent dispersed elastomeric coating used as a roofing membrane for spray polyurethane foam (SPF) insulation whose principal polymer in the dispersion contains more than 95 % silicone.

1.2 This specification does not provide guidance for application.

1.3 The following precautionary caveat pertains only to the test method portions, Sections 5 and 6.

1.4 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.5 *This standard may involve hazardous materials, operations, and equipment. 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 requirements prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- D16 Terminology for Paint, Related Coatings, Materials, and Applications
- D522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
- D624 Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- D903 Test Method for Peel or Stripping Strength of Adhesive Bonds

¹ This specification is under the jurisdiction of ASTM Committee D08 on Roofing and Waterproofing and is the direct responsibility of Subcommittee D08.06 on Spray Polyurethane Foam Roof Systems.

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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.

- D1079 Terminology Relating to Roofing and Waterproofing
- D1644 Test Methods for Nonvolatile Content of Varnishes
- D2196 Test Methods for Rheological Properties of Non-Newtonian Materials by Rotational Viscometer
- D2370 Test Method for Tensile Properties of Organic Coatings
- D2697 Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings
- D4798 Practice for Accelerated Weathering Test Conditions and Procedures for Bituminous Materials (Xenon-Arc Method)
- E96/E96M Test Methods for Water Vapor Transmission of Materials
- E1953 Practice for Description of Thermal Analysis and Rheology Apparatus

3. Terminology

3.1 Definitions in Terminologies D16 and D1079 shall apply to this specification.

4. Materials and Manufacture

4.1 *Composition*—The product, as manufactured, shall be in liquid form for application to SPF surfaces by brushing, squeegeeing, rolling, or spraying. The product shall be composed of dispersion containing as the principal polymer more than 95 % silicone polymers to which various pigments and other additives have been added to give the required physical properties.

5. Liquid and Physical Properties

5.1 Although the product is supplied as a liquid, its performance is based on the functional properties of the cured material in film form. The coating is formed into a film fully adhered to the substrate.

5.2 *Liquid Property Requirements*—The liquid coating shall comply with the property requirements in Table 1.

5.3 Cured Film Physical Property Requirements:

5.3.1 *Specimen Preparation (Dry Time)* (Table 2)—Films are prepared by applying two coats, with a minimum of an 8-h drying period between coats, to a polyethylene sheet substrate (from Test Method D2370, 8.2.2) to give a total dry film thickness of 0.50 ± 0.5 mm [20 ± 2 mils]. The film is allowed



TABLE 1 Liquid Property Requirements

Physical Properties	ASTM Standard	Requirements
Viscosity	D2196	3500 to 50 000 CPS
Volume solids	D2697	57 % min
Weight solids	D1644	As listed by manufacturer

TABLE 2 Film Physical Property Requirements for Cured Silicone Coating for Use on Spray Polyurethane Foam

Physical Property	ASTM Standard	Requirement
Initial percent elongation (break)	D2370	min 100 %
Initial tensile strength (maximum stress)	D2370	min 1.03 MPa [150 psi]
Final percent elongation (break) after 5000 h accelerated weathering	D2370	min 100 %
Permeance	E96/E96M Procedure B	min 14.3×10^{-8} g/Pa·s·m ² [2.5 U.S. perms]
Accelerated weathering 5000 h	D4798	No cracking or checking; maintain at least 50 % of initial elongation
Adhesion to SPF	D903	Min 350 N/m [2.0 pli] wet
Tear resistance	D624	Min 3.5 kN·m [20 lb ft/in.]
Low-temperature flexibility	D522	Min pass 1.27 cm [$\frac{1}{2}$ in.] mandrel -26°C [-15°F]

to thoroughly dry at $23 \pm 2^\circ\text{C}$ [$73.4 \pm 3.6^\circ\text{F}$] and 50 ± 10 % relative humidity for 336 ± 12 h. The film shall be removed from the release paper and turned over after the first 168 h to allow for complete drying.

6. Test Methods

6.1 Viscosity (Test Methods D2196):

6.1.1 Rotational Viscometer (see Practice E1953) with 60 to 70 $\mu\text{N}\cdot\text{m}$ torque full scale equipped with a spindle of the type shown in Fig. 1 (with an active element nominally 3.2 mm in diameter and 31.0 mm in length) at rotational speed of 6 r/min.

6.2 Elongation and Tensile Strength (Test Method D2370):

6.2.1 Test methods: $23 \pm 2^\circ\text{C}$ at 50 ± 10 % [$73 \pm 3.6^\circ\text{F}$]/relative humidity and $-18 \pm 2^\circ\text{C}$ [$0 \pm 2^\circ\text{F}$].

6.2.2 Cut specimen measuring 75 mm [3 in.] long by 13 mm ± 10 % [$\frac{1}{2}$ in.] wide.

6.2.3 Test Type or Functional Equivalent:

Crosshead speed	25 mm/min [1.0 in./min]
Gage length	25 mm [1.0 in.]

6.3 Accelerated Weathering (Practice D4798):

Cycle employed	A
Uninsulated black panel temperature	$63 \pm 3^\circ\text{C}$
Filter	Daylight
Radiant exposure (minimum)	6300 KJ/(m ² · nm) at 340 nm 756 MJ/m ² at 300 to 400 nm

NOTE 1—In Practice D4798, the water temperature used for the specimen spray during exposure to light is specified as $7.2 \pm 3^\circ\text{C}$ [$45 \pm 5^\circ\text{F}$] to provide a thermal shock to the specimens. If thermal shock is not required for D6694/D6694M specimens, the water temperature can be $21 \pm 5^\circ\text{C}$ [$70 \pm 9^\circ\text{F}$], the typical temperature of water used for specimen spray. However, if ambient temperature is low and a holding

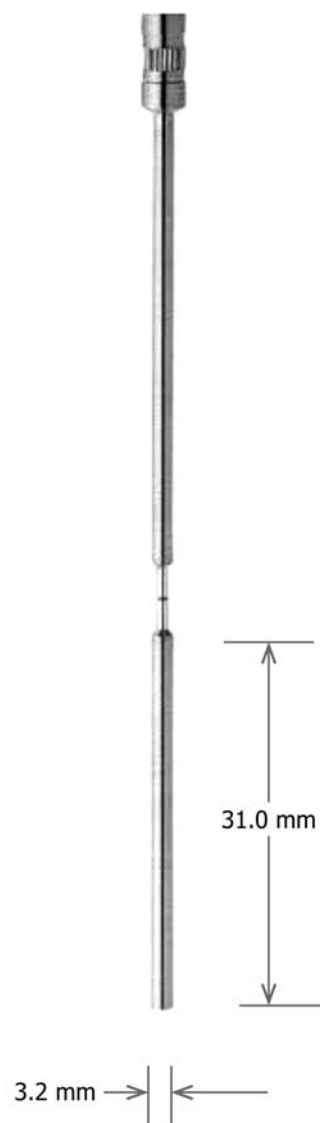


FIG. 1 Spindle Configuration

tank is not used to store purified water, the temperature of water can be below the typical range.

NOTE 2—Based on the irradiance level of $0.35 \text{ W}/(\text{m}^2 \cdot \text{nm})$ at 340 nm specified in Practice D4798, the exposure time required to accumulate the radiant energy specified in 6.3 is 5000 h.

6.4 Permeance Method (Test Method E96/E96M, Procedure B)—A 0.5-mm [20 mils] ± 10 % film shall be used.

6.4.1 Test conditions: $23 \pm 2^\circ\text{C}$ [$73.4 \pm 3.6^\circ\text{F}$]

6.4.2 Test is run in the inverted position with water in contact with the film.

6.4.3 Value is reported in inch-pound and SI units.

6.5 Adhesion to Specified Substrate Method (Test Method D903):

6.5.1 Crosshead speed 50 mm [2 in.]/min.

6.5.2 Specimens are prepared by brush applying two coats to the specified substrate with the cloth strip (as described in Test Method D903) embedded between the coats to give a total dry film thickness of 0.5 mm [20 mils] ± 10 %. The panels are allowed to dry for 336 ± 12 h at $23 \pm 2^\circ\text{C}$ [$73.4 \pm 3.6^\circ\text{F}$]



50 ± 10 % relative humidity before testing for wet adhesion. If a primer is specified, it shall be applied per the manufacturer's or supplier's direction.

6.6 *Tear Resistance Method (Test Method D624):*

6.6.1 Die C.

6.7 *Low-Temperature Flexibility Method (Test Method D522):*

6.7.1 Directly cast films to aluminum substrate to result in a dry film thickness of 0.35 mm [14 mil ± 10 %] and allow to dry 72 h at 23 ± 2°C [73.4 ± 3.6°F] and 50 ± 10 % relative humidity followed by 120 h at 50°C before testing.

7. Product Marking

7.1 Shipping containers shall be marked with the name of the material, the stock number, lot number, ASTM designation number and year of issue, quantity therein, shelf-life date, and the name of the manufacturer or supplier, unless otherwise agreed upon between supplier and purchaser.

8. Inspection

8.1 Inspection of the material shall be as agreed upon by involved parties.

9. Rejection and Resubmittal

9.1 Failure to conform to any one of the requirements prescribed in this specification shall constitute grounds for rejection. The seller shall have the right to reinspect the rejected shipment and resubmit the lot after removal of those packages not conforming to the specified requirements.

10. Precision and Bias

10.1 The precision statements for the test methods included in this specification are under development.

11. Keywords

11.1 elastomeric coating; roof; silicone; spray polyurethane foam

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