



Standard Specification for Liquid-Applied Neoprene and Chlorosulfonated Polyethylene Used in Roofing and Waterproofing¹

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1. Scope

1.1 This specification covers liquid-applied neoprene and chlorosulfonated polyethylene synthetic rubber solutions suitable for use in roofing and waterproofing.

1.2 The following precautionary caveat pertains only to the test method portion, Section 9, of this specification: *This standard does not purport to address 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:

- D 412 Test Methods for Rubber Properties in Tension²
- D 429 Test Methods for Rubber Property—Adhesion to Rigid Substrates²
- D 471 Test Method for Rubber Property—Effect of Liquids²
- D 711 Test Method for No-Pick-Up Time of Traffic Paint³
- D 823 Practices for Producing Films of Uniform Thickness of Paint, Varnish, and Related Products on Test Panels⁴
- D 1149 Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber²
- D 1640 Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature⁴
- D 1644 Test Methods for Nonvolatile Content of Varnishes⁴
- D 1824 Test Method for Apparent Viscosity of Plastisols and Organisols at Low Shear Rates by Brookfield Viscometer⁵
- E 96 Test Methods for Water Vapor Transmission of Materials⁶

2.2 Department of Commerce Voluntary Product Standard:

PS-1 Construction and Industrial Plywood⁷

3. Classification

3.1 *Type I*—Neoprene synthetic rubber solutions for use alone or in combination with chlorosulfonated polyethylene synthetic rubber solutions:

3.1.1 *Grade 1*—Neoprene rubber solution.

3.1.2 *Grade 2*—Fiber-modified neoprene rubber solution.

3.2 *Type II*—Chlorosulfonated polyethylene synthetic rubber solutions.

4. Materials and Manufacture

4.1 The designated polymer shall comprise 100 % of the elastomer and a minimum of 60 % of the nonvolatile content.

4.2 The designated polymer shall be homogeneously compounded with pigments, extenders, stabilizers, antidegradants, and curatives. The product shall be free from graininess, gel particles, and foreign materials.

5. Physical Requirements

5.1 The material shall conform to the physical properties prescribed in Table 1.

6. Sampling

6.1 The sample shall be a 1-qt (1-L) aliquot consisting of a composite taken, when possible, from three or more separate containers chosen at random. Samples shall also be taken from any other containers that appear to be nonrepresentative and shall be tested separately. Before a sample is withdrawn, the contents in the container shall be mixed to uniform consistency. The sample shall be placed immediately in an airtight glass jar or metal can until tested.

7. Retest and Rejection

7.1 If the results of any test do not conform to the requirements of this specification, retesting to establish conformity may be performed as agreed upon between the purchaser and the seller.

8. Specimen Preparation

8.1 Prepare all film specimens in accordance with Method D

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² Annual Book of ASTM Standards, Vol 09.01.

³ Annual Book of ASTM Standards, Vol 06.02.

⁴ Annual Book of ASTM Standards, Vol 06.01.

⁵ Annual Book of ASTM Standards, Vol 08.01.

⁶ Annual Book of ASTM Standards, Vol 04.06.

⁷ Available from the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

TABLE 1 Physical Properties of Neoprene and Chlorosulfonated Polyethylene Synthetic Rubber Solutions and Cured Films

Property	Type I (Neoprene)				Type II (Chlorosulfonated Polyethylene)	
	Grade 1		Grade 2		min	max
	min	max	min	max		
<i>Synthetic rubber solutions:</i>						
Solids, weight %	±2 % of the qualification value ^A					
Viscosity, mPa·s (cP)	±20 % of the qualification value ^A					
Drying time, h:						
Dry-to-touch	...	4	...	12	...	4
Dry hard	...	16	...	24	...	24
Solids, volume %	20	...	20	...	20	...
<i>Cured films:</i>						
Tensile strength, psi (MPa)	1600 (11)	...	700 (4.8)	...	700 (4.8)	...
Elongation at 73.4±3.6°F (23 ± 2°C), %	450	...	450	...	350	...
Elongation at -0.4±3.6°F (-18± 2°C), %	120	...	120	...	120	...
Permanent set at break, %	...	50	...	50	...	50
Elongation of aged film at 73.4± 3.6°F (23 ± 2°C), %	100	...	100	...	200	...
Water absorption, %	...	4.0	...	4.0	...	4.0
Water vapor permeability, perm-inches (ng/Pa·s·m)	...	0.010 (0.0146)	...	0.010 (0.0146)	...	0.010 (0.0146)
Ozone resistance	no cracks under 10× magnification	
Adhesion, lbf/in. (kN/m) width	20 (3.5)	...	10 (1.8)

^AQualification value is that agreed upon between the seller and purchaser.

of Test Methods D 823.⁸ Take care to prevent puddling and keep specimens horizontal at all times. When more than one coat is required, allow each to dry to touch prior to application of subsequent coats.

8.2 Prepare 10-mil (0.25-mm) wet film specimens for determination of drying time on glass plates, approximately 5/8 by 3 in. (15 by 75 mm).

8.3 Prepare 30-mil (0.75-mm) wet film specimens for determination of solids, percent by volume, on a release surface⁹ approximately 3 by 6 in. (75 by 150 mm).

8.4 Prepare cured film specimens for all tests except adhesion on release paper⁹ approximately 10 by 14 in. (250 by 350 mm). Adjust the doctor blade to produce a wet film that will give a total dry film thickness of approximately 15 mils (0.40 mm) after two applications. Dry the specimens for 24 h at 73.4 ± 3.6°F (23 ± 2°C) and 50 ± 5 % relative humidity, and then cure them in accordance with the coating manufacturer's instructions. Condition the cured specimens for 72 h at 73.4 ± 3.6°F (23 ± 2°C) before carefully stripping the film from the release paper.

8.5 Prepare cured film specimens for the adhesion test on the A face of a 1/2-in. (13-mm) exterior grade plywood sheet conforming to the requirements of Voluntary Product Standard PS - 1, approximately 9 by 18 by 1/4 in. (225 by 450 by 6 mm), with 6 in. (150 mm) at one end covered by kraft paper. Use strips of cellophane pressure-sensitive tape along each edge of the kraft paper to ensure smooth, tight contact with the plywood sheet. Prepare a primer consisting of one part of the

test coating and two parts of xylene, well stirred together. Brush-apply a coat of primer to the plywood sheet including the paper-covered end, and allow to dry to touch. Then apply two coats of the undiluted test coating, each coat having a minimum wet-film thickness of 30 mils (0.75 mm). When the final test coat has dried for 24 h, brush-apply two coats of neoprene contact adhesive¹⁰ to the test specimen and to a 9 by 24-in. (225 by 600-mm) strip of No. 10 canvas duck.¹¹ Allow both surfaces to dry to a tacky state and then mate the coated side of the canvas strip to the test specimen to facilitate stripping of the film. Cure the test specimens in accordance with the coating manufacturer's instructions, and then condition the cured specimens for 72 h at 73.4 ± 3.6°F (23 ± 2°C). After conditioning, strip back the cellophane tape holding the kraft paper to the plywood sheet and trim off. Cut through the canvas with a sharp knife or razor blade to make 1-in. (25-mm) strips.

9. Test Methods

9.1 *Solids, Weight Percent*—Method B of Test Methods D 1644.

9.2 *Viscosity*—Test Method D 1824, Section 7, at 20 rpm.

9.3 *Drying Time*:

9.3.1 *Scope*—This value indicates time between successive coats and time to be provided before permitting access to a roof or deck.

9.3.2 *Significance and Use*—Dry-to-touch indicates time during which the wet coating is susceptible to pick-up of dust or light debris, or both. Dry-hard time corresponds to the minimum allowable time for permitting access for recoating

⁸ Hand-operated doctor blades are acceptable, provided that bubble-free films varying no more than 5 % in thickness can be produced.

⁹ Trifoil TFE-fluorocarbon-coated aluminum foil tape applied to a flat surface such as glass has been found to be satisfactory. This material is available from Tri-Point Industries, Inc., 1 Teflon Way, Long Island, NY 11725.

¹⁰ Manufacturers of neoprene roofing materials shall supply test quantities of a compatible contact adhesive to facilitate testing of their coatings.

¹¹ Available from tent and awning supply houses.

purposes. The manufacturer may specify longer times before permitting access by other trades or the public.

9.3.3 *Apparatus*—A weighted spherical pin designed to contact the surface of the test specimen, connected by an arm to the shaft of an electric timing motor which completes one revolution in 24 h.¹² The pin scribes an arc in the test coating until the film has dried. The time along the arc is then measured with a circular metal template marked from 0 to 24 h.

9.3.4 *Procedure*—Place the weighted spherical pin on the wet-film specimen and start the electric motor. Run until only slight scratching of the film is discernible. This is the dry-hard time. Dry-to-touch time, as measured with the template, is the time when the coating no longer flows back into the channel and the spherical pin begins to leave an irregular trace.

9.3.5 *Precision*—Humidity, temperature, and air circulation may cause wide variations in drying time. Consequently, most compounds will dry much faster than the specified maximums. The specified maximum dry time is provided for the purposes of excluding compounds which could cause application problems.

9.4 *Solids, Volume Percent:*

9.4.1 *Scope*—This test value, in percent, expresses the volume of film forming material contained in a given volume of coating.

9.4.2 *Significance and Use*—This test procedure provides means for determining the quantity of material needed to provide the proper film thickness on any given area.

9.4.3 *Test Procedure*—Measure wet-film thickness immediately after casting with an Interchemical or Nordson Wet Film Gage¹³ in at least six positions which are a minimum of 2 in. (50 mm) from any edge. Dry, cure, and condition the film specimens as described in 8.4. Carefully strip the film from the release surface and measure the dry film thickness with a micrometer in at least six positions, a minimum of 2 in. (50 mm) from any edge. Calculate as follows:

$$\text{Solids, volume \%} = (\text{avg dry film thickness} / \text{avg wet film thickness}) \times 100 \quad (1)$$

¹² A Gardner Circular Drying Time Recorder (DG-9300-A), available from Gardner Laboratory, Inc., Neotec Inst.-Div., Pacific Scientific Co., 2431 Linden Lane, Silver Spring, MD 20910.

¹³ The Interchemical Wet Film Thickness Gage. Catalog No. GG-6280F, available from Gardner Laboratory, Inc., Neotec Inst.-Div., Pacific Scientific Co., 2431 Linden Lane, Silver Spring, MD 20910.

9.4.4 *Precision and Bias*—This test procedure is normally accurate within -0 to $+5$ %. Care must be taken to measure wet film thickness prior to significant loss of solvent; micrometers tend to measure high spots.

9.5 *Tensile Strength, Elongation, and Permanent Set at Break*—Test Methods D 412. For elongation tests on aged film, place film specimens in an oven at $215.6 \pm 3.6^\circ\text{F}$ ($102 \pm 2^\circ\text{C}$) for 7 days. Cool to $73.4 \pm 3.6^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$) before testing.

9.6 *Water Absorption*—Test Method D 471, 7 days at $73.4 \pm 3.6^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$).

9.7 *Water Vapor Permeability*—Procedure BW of Test Methods E 96.

9.8 *Ozone Resistance*—Test Method D 1149, except that the test specimens shall be subjected to 50 % elongation, the ozone concentration shall be 3 ppm, the period of exposure shall be 7 days, and the observation magnification shall be $10\times$.

9.9 *Adhesion*—Test Methods D 429, Method B.

10. Inspection

10.1 Inspection of the material shall be made as agreed upon between the purchaser and the seller as part of the purchase contract.

11. Packaging and Marking

11.1 The material shall be packaged in open-head containers, so constructed as to ensure acceptance by common or other carrier for safe transportation at the lowest rate to the point of delivery.

11.2 Containers shall be marked with the following information:

11.2.1 Material name, type, and color,

11.2.2 Quantity contained,

11.2.3 Manufacturer's lot number,

11.2.4 Order number,

11.2.5 Appropriate toxicity and hazard statement for solvents,

11.2.6 Lead-cured materials to be labeled in accordance with the Consumer Product Safety Commission's Regulations.

11.2.7 Usable shelf life and proper storage conditions, and

11.2.8 Volume percent solids.

12. Keywords

12.1 chloroprene; coating; hypalon; liquid-applied; roofing

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