



Standard Test Methods for Coated Fabrics Used for Oil Spill Control and Storage¹

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1. Scope

1.1 These test methods cover laboratory-conducted performance tests for coated fabrics used in spill control barriers or in temporary storage devices.

1.2 *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:

- D 86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure²
- D 93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester²
- D 97 Test Method for Pour Point of Petroleum Products²
- D 129 Test Method for Sulfur in Petroleum Products (General Bomb Method)²
- D 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test²
- D 287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)²
- D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (The Calculation of Dynamic Viscosity)²
- D 482 Test Method for Ash from Petroleum Products²
- D 524 Test Method for Ramsbottom Carbon Residue of Petroleum Products²
- D 543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents³
- D 613 Test Method for Cetane Number of Diesel Fuel Oil⁴
- D 664 Test Method for Acid Number of Petroleum Products by Potentiometric Titration²
- D 751 Test Methods for Coated Fabrics⁵

- D 975 Specification for Diesel Fuel Oils²
- D 1149 Test Method for Rubber Deterioration—Surface Ozone Cracking in a Chamber⁶
- D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)²
- D 1298 Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²
- D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²
- D 1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)²
- D 2425 Test Method for Hydrocarbon Types in Middle Distillates by Mass Spectrometry²
- D 2500 Test Method for Cloud Point of Petroleum Products²
- D 2644 Tolerances for Yarns Spun on the Woolen System⁷
- D 3117 Test Method for Wax Appearance Point of Distillate Fuels²
- D 4157 Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)⁸
- G 26 Practice for Operating Light-Exposure Apparatus (Xenon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials⁹

2.2 Federal Standard:

Fed. Std. No. 191A Textile Test Methods¹⁰

2.3 Military Specification:

MIL-T-6396 E Tank, Fuel, Oil, Water-Alcohol, Coolant Fluid, Non-Self-Sealing, Removable, Internal¹⁰

3. Significance and Use

3.1 Membrane materials are subjected to these tests in order to provide data that reasonably relate to membrane response under the actual conditions of spill control barrier or storage device use.

3.2 Although these test methods provide data on individual performance of membrane materials, all combinations of actual

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 08.01.

⁴ *Annual Book of ASTM Standards*, Vol 05.05.

⁵ *Annual Book of ASTM Standards*, Vol 09.02.

⁶ *Annual Book of ASTM Standards*, Vol 09.01.

⁷ *Annual Book of ASTM Standards*, Vol 07.01.

⁸ Discontinued; See 2001 *Annual Book of ASTM Standards*, Vol 07.02.

⁹ Discontinued; See 2000 *Annual Book of ASTM Standards*, Vol 14.04. Replaced by Practice G 155.

¹⁰ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, Attn: NPODS.

conditions of spill control barrier or storage device use are not simulated in this sequence of tests.

4. Base Line Tests

4.1 *Number of Specimens*—Subject specimens of spill control membrane materials to the tests prescribed in 4.2-4.11. Perform all tests in the direction of both the warp and fill of the fabric. The number of specimens to be tested are as specified in the procedures referenced in 4.2-4.11.

4.2 *Mass and Thickness*—Test Methods D 751.

4.3 *Tensile Strength and Elongation at Break*—Test Methods D 751 for Breaking Strength, Procedure A—Grab Test Method.

4.4 *Tear Strength*—Test Methods D 751 for Tearing Strength, Procedure B—Tongue Tear Method. If standard sample does not achieve true tear or if the fabric design requires roping to achieve high tear, sample size may be enlarged in order to achieve cord breakage, but all other procedures must be maintained. Such sample size change must be recorded in test results.

4.5 *Adhesion*—Test Methods D 751 after 5 days at 70°C in water.

4.6 *Puncture Resistance*—MIL-T-6396 E, procedure outlined in 4.6.17.

4.7 *Abrasion Resistance*—Test Method D 4157, abrade the specimen using a 2.72-kg (6-lb) dead weight load tension and

a 2.72-kg (6-lb) dead weight load using extra coarse, 40 grit sandpaper as the abradant. Cycle continuously to exposure of threads.

4.8 *Seam Strength*—Test Methods D 751. Perform test with seam orientation as in device design.

4.9 *Seam Adhesion*—Repeat adhesion test (see 4.5) for specimens containing a seam.

4.10 *Blocking Resistance*—Test Methods D 751.

4.11 *Mildew*—Fed. Std. No. 191A, Method 5762 (Mixed Cidal Spore Test).

5. Weather and Petroleum Sample Tests Related to Base Line Tests

5.1 *Specimen Preparation*—Subject samples of spill control barrier or storage device membrane material to the following preparations: weather resistance to be followed by resistance to petroleum products:

5.1.1 *Weather Resistance*—Practice G 26, Test Method 2 (also referred to as Test Method B—Alternate Exposure to Light and Darkness and Intermittent Exposure to Water Spray), using deionized water and a 7000 W xenon burner tube, 500-h exposure.

5.1.2 *Resistance to Petroleum Products*—Practices D 543, with 96-h exposure to Diesel Fuel Grade No. 2, as prescribed in Specification D 975 and further meeting the specifications shown in Table 1 (Note). Conduct tests at ambient temperature.

TABLE 1 Detailed Requirements for Test Diesel Fuel Caterpillar 1G2/1H2

NOTE 1—Diesel fuels meeting the detailed requirements in Table 1 are available from Howell Hydrocarbons and Chemical Incorporated, 1201 South Sheldon Road, Channelview, TX 77530.

Property	ASTM Test Method	Requirement
Flash point	D 93	140°F (60.0°C) min or legal
Pour point	D 97	20°F (–7°C) max
Cloud point	D 2500 or D 3117	Report
Water and Sediment	D 1796	0.05 vol % max
Ramsbottom carbon on 10 % residium	D 524	0.20 mass % max
Ash	D 482	0.01 mass % max
Distillation	D 86	IBP report 10 % report 50 % 500–530°F (260–277°C) 90 % 590–620°F (310–327°C) EP 650–690°F (343–366°C) 2.0–4.0 cSt (2.0–4.0 mm ² /s)
Kinematic viscosity at 104°F (40.0°C)	D 445	
Total sulfur (must be natural)	D 2644 (Alt. D 129 or D 1266)	0.380–0.420 mass %
Copper, corrosion (122°F, 50°C, 3 h)	D 130	No. 2 max
Acid number (TAN-E)	D 664	0.15 mg KOH/g max
Centane number	D 613	47.0–53.0
Density	D 287 or D 1298	report
API gravity	D 287 (Alt. D 1298)	33–35 API
Cracked stocks		none
Hydrocarbon types	D 1319	report
Hydrocarbon types	D 2425	Component mass %
		aliphatic paraffins 45.0–65.0
		monocycloparaffins, tetrocycloparaffins report
		dicycloparaffins 0.0–15.0
		alkylbenzenes 5.0–10.0
		indans/tetralins, indenenes report
		naphthalene report
		naphthalenes 5.0–15.0
		acenaphthenes, acenaphthylenes, tricyclic aromatics report

5.2 *Weather and Petroleum Sample Tests*—Perform each of the following tests within 1 h of the termination of the test in 5.1.2.

- 5.2.1 *Tensile Strength*—Same as base line test (4.3).
- 5.2.2 *Tear Strength*—Same as base line test (4.4).
- 5.2.3 *Adhesion*—Same as base line test (4.5).
- 5.2.4 *Puncture Resistance*—Same as base line test (4.6).
- 5.2.5 *Abrasion Resistance*—Same as base line test (4.7).
- 5.2.6 *Seam Strength*—Same as base line test (4.8).
- 5.2.7 *Seam Adhesion*—Same as base line test (4.9).
- 5.2.8 *Blocking Resistance*—Same as base line test (4.10).
- 5.2.9 *Low Temperature Resistance*—Fed. Std. No. 191A, Method 5874, 2-h soak at -29°C with a 2.5-kg mandrel roller

weight. Visually examine specimen and report signs of cracking or flaking. Do not perform hydrostatic resistance test.

5.2.10 *Ozone Resistance*—Test Method D 1149.

6. Precision and Bias

6.1 The precision and bias of test measurements are addressed in each individual test method cited in Sections 3-5.

7. Keywords

7.1 barrier; coated fabrics; membrane materials; membranes; oil spill; spill control; storage devices; temporary storage devices

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