Designation: F 976 – 99

Standard Specification for Portable Kerosine Containers for Consumer Use[1]

This standard is issued under the fixed designation F 976; 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 establishes nationally recognized performance requirements for portable kerosine containers for reuse by the consumer. This specification does not include single-trip packaged containers.

1.2 This standard is not a fire risk assessment standard, or a fire test standard, but a specification for portable kerosine containers for consumer use.

1.3 The following precautionary caveat pertains only to the test method portion, Section 7, of this specification: *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.* Additional precautionary information is given in Section 6.

2. Referenced Documents

2.1 *ASTM Standards:*

B 117 Practice for Operating Salt Spray (Fog) Apparatus[2]

D 471 Test Method for Rubber Property—Effect of Liquids[3]

D 572 Test Method for Rubber—Deterioration by Heat and Oxygen[3]

D 638 Test Method for Tensile Properties of Plastics[4]

D 794 Practice for Determining Permanent Effect of Heat on Plastics[4]

D 999 Methods for Vibration Testing of Shipping Containers[5]

D 2561 Test Method for Environmental Stress-Crack Resistance of Blow-Molded Polyethylene Containers[6]

D 2565 Practice for Operating Xenon Arc-Type Light-Exposure Apparatus With and Without Water for Exposure of Plastics[6]

D 3435 Specification for Plastic Containers (Jerry Cans) for Petroleum Products[7]

D 3699 Specification for Kerosine[8]

F 926 Specification for Cautionary Labeling of Portable Kerosine Containers for Consumer Use[9]

G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) with and without Water for Exposure of Nonmetallic Materials[10]

2.2 *ANSI Standard:*

B71.1b1977 Supplement to Safety Specifications for Power Lawn Mowers, Lawn and Garden Tractors, and Lawn Tractors[11]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *kerosine*, *n*—a hydrocarbon mixture obtained from petroleum distillation as specified in Specification D 3699.

3.1.2 *portable kerosine container*, *n*—a vessel designed to be carried by hand and used to transport kerosine from distribution point to use point.

3.1.3 *pouring vent*, *n*—the part of the container enabling free entry of air to replace the liquid being poured out.

3.1.4 *rated capacity*, *n*—the volume indicated on the container. It may also be termed nominal capacity or maximum filling level.

3.1.5 *spout*, *n*—a component through which the contents of the container can be dispensed.

3.1.6 *total volume*, *n*—rated capacity plus any remaining space within the container.

4. Requirements

4.1 The container shall evidence good workmanship and meet the following requirements:

4.2 *Color*—The container shall be predominately medium blue in color. Pigments, coatings, or other means used to impart color shall not be affected by kerosine.

4.3 *Capacity*—The maximum rated capacity shall be 25 L (6.6 gal).

4.3.1 The total volume of a container shall exceed its rated capacity by at least 5 %.

---

[1] This specification is under the jurisdiction of ASTM Committee F-15 on Consumer Products and is the direct responsibility of Subcommittee F15.10 on Safety Standards for Flammable Liquid Containers.

Current edition approved Mar. 10, 1999. Published June 1999. Originally published as ES 8 – 84. Last previous edition F 976–86(1996).

[2] *Annual Book of ASTM Standards*, Vol 03.02.

[3] *Annual Book of ASTM Standards*, Vol 09.01.

[4] *Annual Book of ASTM Standards*, Vol 08.01.

[5] *Annual Book of ASTM Standards*, Vol 15.09.

[6] *Annual Book of ASTM Standards*, Vol 08.02.

[7] *Annual Book of ASTM Standards*, Vol 08.03.

[8] *Annual Book of ASTM Standards*, Vol 05.02.

[9] *Annual Book of ASTM Standards*, Vol 15.07.

[10] *Annual Book of ASTM Standards*, Vol 14.02.

[11] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

4.3.2 Capacity shall be determined with the container and its contents at 23 ± 2°C (75 ± 3.6°F).

4.4 *Stability*—Each container shall not upset when tested in accordance with 7.1.

4.5 *Handle*—Each container shall be provided with a handle. The container shall not leak or evidence any handle detachment when tested in accordance with 7.2.

4.6 *Drop Strength*—Containers shall show no evidence of rupture, cracks, or leakage when tested in accordance with 7.3.

4.7 *Internal Pressure*—Containers shall show no evidence of leakage when tested in accordance with 7.4.

4.8 *Durability*:

4.8.1 *Aging*—This requirement applies only to nonmetallic containers. The material for the container shall retain at least 70 % of its original tensile strength when tested in accordance with 7.5.1 and 7.5.2.

4.8.2 *Permeability*—This requirement applies only to nonmetallic containers. The filled container shall not have a weight loss greater than 1 % when tested in accordance with 7.6.

4.8.3 *Kerosine Resistance*—This requirement applies only to nonmetallic containers. The container material shall show no pitting, crazing, softening, bubbling, cracking, tackiness, or decomposition when tested in accordance with 7.7.1. The material shall retain at least 60 % of its tensile yield strength when tested in accordance with 7.7.2.

4.8.4 *Stress Cracking*—This requirement applies only to containers molded of polyethylene. The container shall not crack in 120 h when tested in accordance with 7.8.

4.8.5 *Corrosion Resistance*—This requirement applies only to metal containers and/or metal components of containers. No leakage shall be evident when tested in accordance with 7.9.

4.8.6 *Heat Resistance*—This requirement applies only to nonmetallic containers. The container shall not leak when tested in accordance with 7.10.

4.9 *Openings*—Openings in containers shall be provided with a means of closure.

4.9.1 *Pouring*—The opening intended for pouring shall have an integral pouring spout, or it shall accept a pouring spout supplied with the container. The pouring spout shall be designed to permit kerosine to be poured without leakage.

4.9.2 *Pouring Vent*—The container shall be provided with a vented pouring spout or other means for venting the container during pouring.

4.9.3 *Filling*—The opening intended for filling the container shall have a minimum inside diameter of 31.7 mm (1.25 in.).

4.9.4 *Kerosine Resistance*—This requirement applies only to nonmetallic components. Closures, pouring spout, venting devices, and gaskets shall be resistant to aging and the action of kerosine when tested in accordance with 7.11.

4.10 *Closures*—Closures on the containers shall not leak when tested in accordance with 7.12.

5. Retest and Rejection

5.1 If any failure occurs, an additional container may be tested if the failure is judged to be nonrepresentative of production.

6. Precautions

6.1 Kerosine is used in some of the following tests. Cautionary standards for handling and disposal of hazardous materials should be observed. Containers containing kerosine should not be opened in the presence of open flame or other sources of ignition.

7. Test Methods

7.1 *Stability*—Fill a sample container with water at 23 ± 2°C (75 ± 3.6°F) to its rated capacity by volume. Secure the closures as in transportation and storage. Place the container with its base on an inclined plane forming an angle of 20° with the horizontal. During the test, rotate the container about its vertical axis so that stability can be checked with the sample facing any direction.

7.2 *Handle Strength*—Fill a sample container with an equivalent weight of water at 23 ± 2°C (75 ± 3.6°F) to its rated kerosine capacity. Secure the closures as in transportation and storage. Secure one end of a 9.5-mm (0.375-in.) diameter manila rope about 2 m (6.5 ft) long to a rigid point of suspension and attach the other end so as to distribute the load across the container handle. Suspend the container from the rope for 1 min, then raise 305 mm (12 in.) from the suspended position and allow to fall freely.

7.3 *Drop Strength Test*—Fill the container to its nominal capacity with water at 23 ± 2 °C (75 ± 5 °F) and secure the closures. Drop it, free fall, onto a flat, solid surface. Make drops in the following sequence: one drop on the bottom, one drop on a bottom corner, and one drop on a side. The distance of fall shall be 1.8 m (6 ft). Make the same tests with another container filled with a blend of 50 % glycol and 50 % water and with both the container and its contents cooled to −18 ± 1 °C (0 ± 2 °F). For these latter tests, the distance of fall shall be 1.2 m (4 ft).

NOTE 1—The location of the spout is considered to be the front of the container. The side is considered to be approximately 90° to either left or right of the nozzle area.

7.4 *Internal Pressure Test*:

7.4.1 *Hydrostatic Pressure Test*—Fill the container to its total volume with water at 23 ± 2°C (75 ± 5°F) and secure the closures. Increase the internal pressure to a gage pressure of 138 kPa (20 psi) and maintain for 2 min. Conduct the same test with a container filled to its total volume with water at 60 ± 3°C (140 ± 5°F). For plastic containers, apply the pressure by inserting and securing an adaptor through a drilled hole in a flat, heavy section of the container wall, and not on a pinch-off or parting line. For metal containers, the pressure can be applied through the fill or pour closure.

7.5 *Aging Test*—Perform the following two tests. In both tests, determine tensile strength in accordance with Test Method D 638 using five specimens and Speed C.

7.5.1 *Test 1*—Test the specimens for 2000 h in accordance with Procedure B of Recommended Practice D 2565 using Type B or BH apparatus or for 1400 h in accordance with Practice G 23 using a Type E carbon-arc weathering device (see Note 2). The test cycle for each method shall consist of 102 min of light followed by 18 min of light and spray. If Practice G 23 is used, the blackbody temperature shall be

62.8°C (145°F). In cases of disagreement, Recommended Practice D 2565 shall be the referee method.

NOTE 2—Limited data indicate that carbon-arc exposure is much more severe than xenon-arc exposure; therefore, less exposure time is required when using the carbon-arc equipment.

7.5.2 *Test 2*—Test the specimens for 60 days in accordance with Recommended Practice D 794, except that the oven temperature shall be 87 ± 2°C (189 ± 3.6°F).

7.6 *Permeability Test*—Fill the container to its rated capacity with Specification D 3699 No. 1K Kerosine and secure the closures. Weigh the container accurately. After storage for 30 days at 23 ± 2°C (75 ± 3.6°F), reweigh the container and calculate the weight loss.

7.7 *Kerosine Resistance Test*:

7.7.1 *Visual Test*—Upon completion of the permeability test in 7.6, empty the container and cut apart in a manner to allow visual inspection of all interior surfaces.

7.7.2 *Immersion Test*—Condition at least 20 specimens, taken from untested container, measuring about 125 mm (5 in.) by 16 mm (0.625 in.) at 23 ± 2°C (75 ± 3.6°F) for 18 h. Immerse specimen in Specification D 3699 No. 1K Kerosine. Use the remaining ten specimens as a control. Following exposure for 30 days, remove ten specimens from the solution and test to determine tensile yield strength in accordance with Test Method D 638 using Speed C.

7.8 *Stress Cracking Test*—Test two containers in accordance with Procedure B of Test Method D 2561, except do not expose the outside of the containers to the stress cracking agent.

7.9 *Corrosion Resistance Test*—Six container samples shall be filled to their nominal capacity with water. The closures shall be secured as in transportation and storage. The containers shall be tested in accordance with Practice B 117. The containers shall be exposed to a spray of 5% salt solution for 21 days, after which they shall be allowed to dry for 4 h at room temperature.

7.10 *Container Material Heat Resistance Test*—Determine the resistance of the container filled with water to a momentary exposure to heat and flame in accordance with 7.10.1 and 7.10.2. *These test methods should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions.*

7.10.1 *Test 1*—Fill a container completely with water at 23 ± 2°C (75 ± 3.6°F). Adjust a 9.5-mm (3⁄8-in.) diameter bunsen burner, using natural gas having a calorific value of approximately 37 MJm^3 (1000 Btu/ft^3) so that the outer blue flame is 25 mm (1 in.) in length and the inner blue cone is 9.5 mm (3⁄8 in.) long. The temperature of the flame just above the inner cone shall be a minimum of 930°C (1700°F) and the temperature of the flame, 19 mm (3⁄4 in.) above the burner shall be a minimum of 288°C (550°F). Tilt the burner about 18° from the normal 90° impingement and hold the tip of the burner 19 mm (3⁄4 in.) away from the container for 75 s. Test the container on the side, bottom, and any corner and examine for leaks. If the design of the container is such that it cannot be filled completely with water, apply the flame only to those areas that are water backed.

7.10.2 *Test 2*—Fill a container completely with water at 23 ± 2°C (75 ± 3.6°F). Heat a 12.7-mm (1⁄2-in.) diameter steel rod, 150 mm (6 in.) long, to 260 ± 6°C (500 ± 10.8°F) and immediately place on the bottom of an inverted container and allow it to cool to 23 ± 2°C (75 ± 3.6°F). Repeat this procedure, except place the heated rod on a side wall of the container. Examine the container for leaks.

7.11 *Kerosine Resistance Tests*:

7.11.1 A part made of an elastomer that may be affected by aging shall not crack or show visible evidence of deterioration following exposure for 96 h to oxygen at a pressure of 300 psi (2.1 MPa) and at a temperature of 70 ± 2°C (158 ± 3.6°F) when tested in accordance with Test Method D 572.

7.11.2 A nonmetallic part other than an elastomer that may be affected by aging shall not crack or show visible evidence of deterioration following exposure for 168 h in an air oven at a temperature of 100 ± 2°C (212 ± 3.6°F).

7.11.3 A nonmetallic part in contact with kerosine shall not show excessive volume change or loss of weight, when considered on the basis of its intended function, following immersion in Specification D 3699 No. 1K Kerosine in accordance with Test Method D 471 at 23 ± 2°C (75 ± 3.6°F) for 70 h.

7.11.4 A change in volume of not more than 25 % swelling or 1 % shrinkage and a weight loss (extraction) of not more than 10 % is considered as indicating compliance with 7.11.3.

7.12 *Closure Test*—Fill the container to its nominal capacity with water at 23 ± 2°C (75 ± 5°F) and secure the closures. Test the filled container in accordance with Procedure A of Methods D 999 for 2 h. After the 2-h test, invert the container for 5 min without tightening the closures.

7.13 *Precision and Bias*—Precision statements will be included in subsequent revisions after interlaboratory and intralaboratory comparisons are instituted, completed and properly evaluated.

8. Marking

8.1 The container shall be labeled in accordance withSpecification F 926.

8.2 The container shall be clearly marked with at least one of the following:

8.2.1 The manufacturer's name,

8.2.2 The private labeler's name, and

8.2.3 An identifying symbol.

8.3 The container shall be marked with its rated capacity in litres and in gallons.

8.4 Marking durability shall comply with the applicable requirements of ANSI B71.1b1977.