



## Standard Specification for Kerosine<sup>1</sup>

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*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This specification covers two grades of kerosine suitable for use in critical kerosine burner applications:

1.1.1 *No. 1-K*—A special low-sulfur grade kerosine suitable for use in nonflue-connected kerosine burner appliances and for use in wick-fed illuminating lamps.

1.1.2 *No. 2-K*—A regular grade kerosine suitable for use in flue-connected burner appliances and for use in wick-fed illuminating lamps.

1.2 This specification is intended for use in purchasing, as a reference for industry and governmental standardization, and as a source of technical information.

1.3 This specification, unless otherwise provided by agreement between the purchaser and the supplier, prescribes the required properties of kerosine at the time and place of custody transfer.

1.4 Nothing in this specification shall preclude observance of federal, state, or local regulations which can be more restrictive.

1.5 All values are stated in SI units and are regarded as the standard.

NOTE 1—The generation and dissipation of static electricity can create problems in the handling of kerosines. For more information on the subject, see Guide D 4865.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- D 56 Test Method for Flash Point by Tag Closed Tester<sup>2</sup>
- D 86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure<sup>2</sup>
- D 130 Test Method for Detection of Copper Corrosion from Petroleum Products by the Copper Strip Tarnish Test<sup>2</sup>
- D 156 Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)<sup>2</sup>

- D 187 Test Method for Burning Quality of Kerosine<sup>2</sup>
  - D 445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (the Calculation of Dynamic Viscosity)<sup>2</sup>
  - D 1266 Test Method for Sulfur in Petroleum Products (Lamp Method)<sup>2</sup>
  - D 2386 Test Method for Freezing Point of Aviation Fuels<sup>2</sup>
  - D 2622 Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-Ray Fluorescence Spectrometry<sup>2</sup>
  - D 3227 Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)<sup>2</sup>
  - D 3828 Test Methods for Flash Point by Small Scale Closed Tester<sup>3</sup>
  - D 4294 Test Method for Sulfur in Petroleum Products by Energy Dispersive X-Ray Fluorescence Spectrometry<sup>3</sup>
  - D 4865 Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems<sup>3</sup>
  - D 4952 Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)<sup>3</sup>
  - D 5453 Test Method for Determination of Total Sulfur in Light Hydrocarbons, Motor Fuels and Oils by Ultraviolet Fluorescence<sup>4</sup>
  - D 5901 Test Method for Freezing Point of Aviation Fuels (Automatic Optical Method)<sup>4</sup>
  - D 5972 Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)<sup>4</sup>
  - D 6469 Guide for Microbial Contamination in Fuels and Fuel Systems<sup>5</sup>
- #### 2.2 IP Standard:
- IP 10 Burning Test—24 Hour<sup>6</sup>
- #### 2.3 Other Documents:

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.E0 on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 05.01.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 05.02.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 05.03.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 05.04.

<sup>6</sup> *Standard Methods for Analysis and Testing of Petroleum and Related Products*, Institute of Petroleum, 61 New Cavendish St., London, W7M 8AR, Vol 1.

**TABLE 1 Detailed Requirements for Kerosine**

Property	ASTM Test <sup>A</sup> Method	Limit <sup>B</sup>
Flash Point °C, min	D 56	38
Distillation temperature °C	D 86	
10 % volume recovered, max		205
Final boiling point, max		300
Kinematic viscosity at 40°C, mm <sup>2</sup> /s	D 445	
min		1.0
max		1.9
Sulfur, % mass	D 1266	
No. 1-K, max		0.04
No. 2-K, max		0.30
Mercaptan sulfur, % mass, max <sup>C</sup>	D 3227	0.003
Copper strip corrosion rating max, 3 h at 100°C	D 130	No. 3
Freezing point, °C, max	D 2386	- 30
Burning quality, min	D 187	pass (see 4.2)
Saybolt color, min	D 156	+ 16 <sup>D</sup>

<sup>A</sup> The test methods indicated are the approved referee methods. Other acceptable methods are indicated in Section 2.

<sup>B</sup> To meet special operating conditions, modifications of individual limiting requirements, except sulfur, can be agreed upon among purchaser, seller and manufacturer.

<sup>C</sup> The Mercaptan sulfur determination can be waived if the fuel is considered sweet by Test Method D 4952.

<sup>D</sup> Appendixes X1.1 and X1.12 contain additional information on color, red dye, and potential application problems.

26 CFR, Part 48 Diesel Fuel Excise Tax; Dye, Color, and Concentration<sup>7</sup>

### 3. General Requirements

3.1 Kerosine shall be a refined petroleum distillate consisting of a homogeneous mixture of hydrocarbons essentially free of water, inorganic acidic or basic compounds, and excessive amounts of particulate contaminants. Additive usage can be established by mutual agreement of the supplier and the purchaser.

### 4. Detailed Requirements

4.1 The kerosine shall conform to the detailed requirements prescribed in Table 1.

<sup>7</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

4.2 The kerosine shall conform to the following requirements when tested for burning quality as specified:

4.2.1 *Time of Burning*—A minimum of 16 h continuous burning after the first weighing shall be required.

4.2.2 *Rate of Burning*—After the first weighing, the rate of burning shall be 18 to 26 g/h with the Institute of Petroleum (IP) Test Method, IP 10.

4.2.3 *Appearance of Chimney at End of Tests*—The chimney shall have no more than a light, white deposit.

4.2.4 *Flame Characteristics at End of Test*—At the end of test, the width of the flame shall not vary by more than 6 mm, and the height of the flame shall not have lowered by more than 5 mm from the respective measurements recorded at the start of the test.

NOTE 2—The significance of ASTM specifications for kerosine is discussed in Appendix X1.

### 5. Test Methods

5.1 The requirements enumerated in this specification shall be determined in accordance with the following ASTM methods except as noted.

5.1.1 *Flash Point*—Test Method D 56, except where other methods are prescribed by law. Test Method D 3828 may be used as an alternate with the same limits. In case of a dispute, Test Method D 56 shall be used as the referee method.

5.1.2 *Distillation*—Test Method D 86.

5.1.3 *Viscosity*—Test Method D 445.

5.1.4 *Sulfur*—Test Method D 1266. Test Methods D 2622, D 4294, or D 5453 can also be used. In case of a dispute, Test Method D 1266 is the referee sulfur test method for this specification.

5.1.5 *Mercaptan Sulfur*—Test Method D 3227.

5.1.6 *Copper Strip Corrosion*—Test Method D 130, 3 h test at 100°C.

5.1.7 *Freezing Point*—Test Method D 2386. Automatic Test Methods D 5901 and D 5972 can be used as alternates with the same limits. In case of a dispute, Test Method D 2386 shall be used as referee.

5.1.8 *Burning Quality*—Test Method D 187.

5.1.9 *Saybolt Color*—Test Method D 156.

### 6. Keywords

6.1 fuel oil; kerosine; petroleum and petroleum products