



Designation: D3699 – 13

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

This standard is issued under the fixed designation D3699; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*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.

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 [D4865](#).

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

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

[D56](#) Test Method for Flash Point by Tag Closed Cup Tester

[D86](#) Test Method for Distillation of Petroleum Products at Atmospheric Pressure

<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> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[D130](#) Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

[D156](#) Test Method for Saybolt Color of Petroleum Products (Saybolt Chromometer Method)

[D187](#) Test Method for Burning Quality of Kerosine

[D445](#) Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

[D1266](#) Test Method for Sulfur in Petroleum Products (Lamp Method)

[D2386](#) Test Method for Freezing Point of Aviation Fuels

[D2622](#) Test Method for Sulfur in Petroleum Products by Wavelength Dispersive X-ray Fluorescence Spectrometry

[D2887](#) Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography

[D3227](#) Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)

[D3828](#) Test Methods for Flash Point by Small Scale Closed Cup Tester

[D4294](#) Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry

[D4865](#) Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems

[D4952](#) Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)

[D5453](#) Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence

[D5901](#) Test Method for Freezing Point of Aviation Fuels (Automated Optical Method) (Withdrawn 2010)<sup>3</sup>

[D5972](#) Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)

[D6469](#) Guide for Microbial Contamination in Fuels and Fuel Systems

[D7220](#) Test Method for Sulfur in Automotive, Heating, and Jet Fuels by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry

<sup>3</sup> The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

\*A Summary of Changes section appears at the end of this standard

**TABLE 1 Detailed Requirements for Kerosine**

Property	ASTM Test Method	Limit <sup>A</sup>
Flash Point °C, min	D56	38
Distillation temperature, °C	D86	
10 % volume recovered, max		205
Final boiling point, max		300
Kinematic viscosity at 40°C, mm <sup>2</sup> /s	D445	
min		1.0
max		1.9
Sulfur, % mass	D1266	
No. 1-K, max		0.04
No. 2-K, max		0.30
Mercaptan sulfur, % mass, max <sup>B</sup>	D3227	0.003
Copper strip corrosion rating max, 3 h at 100°C	D130	No. 3
Freezing point, °C, max	D2386	-30
Burn Quality		
Time of Burning	D187	Minimum 16 h continuous after first weighing
Rate of Burning	IP 10	18 to 26 g/h after first weighing
Chimney Appearance	D187	Maximum light white deposit (at end of test)
Flame Characteristics (comparison of properties from beginning and end of test)	D187	Maximum variance of flame width – 6 mm Maximum variance of flame height lowered – 5 mm
Saybolt color, min	D156	+16 <sup>C</sup>

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

<sup>B</sup> The Mercaptan sulfur determination can be waived if the fuel is considered sweet by Test Method D4952.

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

## 2.2 Energy Institute Standard:<sup>4</sup>

**IP 10 Burning Test—24 Hour, Standard Methods for Analysis and Testing of Petroleum and Related Products, Vol 1**

## 2.3 Other Documents:<sup>5</sup>

**26 CFR Part 48 Diesel Fuel Excise Tax; Dye, Color, and Concentration**

## 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**.

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 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.

<sup>4</sup> Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K.

<sup>5</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

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 D56, except where other methods are prescribed by law. Test Method D3828 may be used as an alternate with the same limits. In case of a dispute, Test Method D56 shall be used as the referee method.

5.1.2 *Distillation*—Distillation shall be determined in accordance with Test Methods D86 or D2887. Results from Test Method D2887 shall be reported as “Predicted D86” results by application of the correlation in Appendix X5 of Test Method D2887 to convert the values. In case of dispute, Test Method D86 shall be used as the referee test method.<sup>6</sup>

5.1.3 *Viscosity*—Test Method D445.

5.1.4 *Sulfur*—Test Method D1266. Test Methods D2622, D4294, or D5453 may also be used. Alternatively, Test Method D7220 may be used if the sulfur result is less than 942 mg/kg or 0.094 mass %. In case of a dispute, Test Method D1266 is the referee sulfur test method for this specification.

5.1.5 *Mercaptan Sulfur*—Test Method D3227.

<sup>6</sup> Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1553.