



Designation: D8631 – 25

Standard Specification for Unleaded Aviation Gasoline Test Fuel Containing Ethers¹

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1. Scope

1.1 This specification covers formulating specifications for purchases of orange-dyed UL100 unleaded aviation gasoline test fuels under contract and is intended solely for use by purchasing agencies for testing purposes.²

1.2 This specification defines a specific type of aviation gasoline for use as an aviation spark-ignition engine test fuel. It does not include all gasolines satisfactory for reciprocating aviation engines. Certain equipment or conditions of use may permit a wider, or require a narrower, range of characteristics than is shown by this specification.

1.3 The test fuels defined by this specification may not exhibit identical performance to those leaded fuels with which the existing aircraft and ground-based fuel handling equipment have been designed to operate. Therefore, the suitability of this fuel for use on any specific aircraft, aircraft engine, or ground-based fuel handling equipment should be evaluated before use on that equipment.

1.4 Issuance of this specification does not constitute approval to operate certificated aircraft with these fuels. Fuels used in certified engines and aircraft are ultimately approved by the certifying authority subsequent to formal submission of evidence to the authority as part of the certification program for that aircraft and engine model.

1.5 This specification, unless otherwise provided, prescribes the required properties of unleaded Specification D8631 test fuel at the time and place of delivery.

1.6 **Appendix X1** contains an explanation for the rationale of the specification. **Appendix X2** details the reasons for the individual specification requirements.

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

1.8 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:³

D86 Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure

D93 Test Methods for Flash Point by Pensky-Martens Closed Cup Tester

D130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test

D240 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter

D323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)

D357 Method of Test for Knock Characteristics of Motor Fuels Below 100 Octane Number by the Motor Method; Replaced by D 2700 (Withdrawn 1969)⁴

D381 Test Method for Gum Content in Fuels by Jet Evaporation

D614 Method of Test for Knock Characteristics of Aviation Fuels by the Aviation Method; Replaced by D 2700 (Withdrawn 1970)⁴

D873 Test Method for Oxidation Stability of Aviation Fuels (Potential Residue Method)

D909 Test Method for Supercharge Rating of Spark-Ignition Aviation Gasoline

D910 Specification for Leaded Aviation Gasolines

D1094 Test Method for Water Reaction of Aviation Fuels

¹ This specification is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.J0 on Aviation Fuels.

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² Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-2097. Contact ASTM Customer Service at www.astm.org/contact.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

- D1266** Test Method for Sulfur in Petroleum Products (Lamp Method) (Withdrawn 2025)⁴
- D1298** Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer 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
- D2624** Test Methods for Electrical Conductivity of Aviation and Distillate Fuels
- D2699** Test Method for Research Octane Number of Spark-Ignition Engine Fuel
- D2700** Test Method for Motor Octane Number of Spark-Ignition Engine Fuel
- D3120** Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry
- D3231** Test Method for Phosphorus in Gasoline
- D3237** Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
- D3338** Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
- D4052** Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- D4057** Practice for Manual Sampling of Petroleum and Petroleum Products
- D4171** Specification for Fuel System Icing Inhibitors
- D4177** Practice for Automatic Sampling of Petroleum and Petroleum Products
- D4294** Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry
- D4306** Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination
- D4529** Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
- D4809** Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)
- D4815** Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C₁ to C₄ Alcohols in Gasoline by Gas Chromatography
- D4865** Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems
- D4953** Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)
- D5006** Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
- D5059** Test Methods for Lead and Manganese in Gasoline by X-Ray Fluorescence Spectroscopy
- D5191** Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)
- D5386** Test Method for Color of Liquids Using Tristimulus Colorimetry
- D5453** Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
- D5482** Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method—Atmospheric)
- D5599** Test Method for Determination of Oxygenates in Gasoline by Gas Chromatography and Oxygen Selective Flame Ionization Detection
- D5845** Test Method for Determination of MTBE, ETBE, TAME, DIPE, Methanol, Ethanol and *tert*-Butanol in Gasoline by Infrared Spectroscopy
- D5983** Specification for Methyl Tertiary-Butyl Ether (MTBE) for Blending With Gasolines for Use as Automotive Spark-Ignition Engine Fuel
- D5972** Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)
- D6045** Test Method for Color of Petroleum Products by the Automatic Tristimulus Method
- D6227** Specification for Unleaded Aviation Gasoline Containing a Non-hydrocarbon Component
- D6469** Guide for Microbial Contamination in Fuels and Fuel Systems
- D6733** Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by 50-Metre Capillary High Resolution Gas Chromatography
- D7220** Test Method for Sulfur in Automotive, Heating, and Jet Fuels by Monochromatic Energy Dispersive X-ray Fluorescence Spectrometry
- D7618** Specification for Ethyl Tertiary-Butyl Ether (ETBE) for Blending with Aviation Spark-Ignition Engine Fuel
- D7719** Specification for High Aromatic Content Unleaded Hydrocarbon Aviation Gasoline Test Fuel
- D7796** Test Method for Analysis of Ethyl *tert*-Butyl Ether (ETBE) by Gas Chromatography
- D7826** Guide for Evaluation of New Aviation Gasolines and New Aviation Gasoline Additives
- D7920** Test Method for Determination of Fuel Methanol (M99) and Methanol Fuel Blends (M10 to M99) by Gas Chromatography
- E29** Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- 2.2 Other Standards:**
- MIL-PRF-25017** Inhibitor, Corrosion/Lubricity Improver, Fuel Soluble⁵
- GOST 1012–72** Aviation Petrols, Specifications⁶
- QPL-25017** Qualified Products List of Products Qualified under Performance Specification MIL-PRF-25017F⁵

3. Terminology

3.1 Definitions:

3.1.1 *aliphatic ether*, *n*—compound or compounds composed of carbon, hydrogen, and oxygen where the oxygen is bonded to two carbon atoms.

3.1.2 *aviation gasoline*, *n*—gasoline possessing specific properties suitable for fueling aircraft powered by reciprocating spark ignition engines.

⁵ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

⁶ Available from Russian Gost (RTTG), www.russiangost.com.