



Designation: D8147 – 24

Standard Specification for Special-Purpose Test Fuels for Aviation Compression- Ignition Engines¹

This standard is issued under the fixed designation D8147; 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 is intended to support purchasing agencies when formulating specifications for purchases of aviation distillate fuel under contract.

1.2 This specification defines specialized property requirements to produce special-purpose aviation distillate test fuels that are intended only for engineering and certification testing of aircraft, engines, and aircraft equipment. Use of this specification for engineering and certification testing of aircraft is not mandatory. Its use is at the discretion of the aircraft manufacturer, engine manufacturer, or certification authorities when determining criteria for validation of aircraft equipment design.

1.3 This specification defines special-purpose test fuels that may be used to evaluate the operability, performance and durability of aviation compression-ignition engines when operating with fuels of marginal performance. The aviation distillate test fuels defined in this specification are not intended for general purpose use in aircraft. This specification also lists acceptable additives for aviation distillate special-purpose test fuels.

1.4 Specification D8147 is directed at civil applications, and maintained as such, but may be adopted for military, government, or other specialized uses.

1.5 This specification can be used as a standard in describing the quality of aviation distillate fuel from production to the aircraft. However, this specification does not define the quality assurance testing and procedures necessary to ensure that fuel continues to comply with this specification after batch certification.

1.6 This specification does not include all fuels satisfactory for aviation compression-ignition (CI) engines.

1.7 The values stated in SI units are to be regarded as standard.

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.J0.02 on Aviation Piston Engine Fuels.

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1.7.1 *Exception*—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:²

- D56 Test Method for Flash Point by Tag Closed Cup Tester
- 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
- D381 Test Method for Gum Content in Fuels by Jet Evaporation
- 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)
- D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- D1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption
- D1322 Test Method for Smoke Point of Kerosene and Aviation Turbine Fuel

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

- D1655** Specification for Aviation Turbine Fuels
- D1840** Test Method for Naphthalene Hydrocarbons in Aviation Turbine Fuels by Ultraviolet Spectrophotometry
- D2276** Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling
- 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
- D2887** Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography
- D3120** Test Method for Trace Quantities of Sulfur in Light Liquid Petroleum Hydrocarbons by Oxidative Microcoulometry
- D3227** Test Method for (Thiol Mercaptan) Sulfur in Gasoline, Kerosine, Aviation Turbine, and Distillate Fuels (Potentiometric Method)
- D3240** Test Method for Undissolved Water In Aviation Turbine Fuels
- D3241** Test Method for Thermal Oxidation Stability of Aviation Turbine Fuels
- D3242** Test Method for Acidity in Aviation Turbine Fuel
- D3338** Test Method for Estimation of Net Heat of Combustion of Aviation Fuels
- D3828** Test Methods for Flash Point by Small Scale Closed Cup Tester
- D3948** Test Method for Determining Water Separation Characteristics of Aviation Turbine Fuels by Portable Separometer
- D4052** Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- D4171** Specification for Fuel System Icing Inhibitors
- D4175** Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- D4176** Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)
- D4294** Test Method for Sulfur in Petroleum and Petroleum Products by Energy Dispersive X-ray Fluorescence Spectrometry
- 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)
- D4952** Test Method for Qualitative Analysis for Active Sulfur Species in Fuels and Solvents (Doctor Test)
- D5006** Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels
- D5453** Test Method for Determination of Total Sulfur in Light Hydrocarbons, Spark Ignition Engine Fuel, Diesel Engine Fuel, and Engine Oil by Ultraviolet Fluorescence
- D5972** Test Method for Freezing Point of Aviation Fuels (Automatic Phase Transition Method)
- D6079** Test Method for Evaluating Lubricity of Diesel Fuels by the High-Frequency Reciprocating Rig (HFRR)
- D6379** Test Method for Determination of Aromatic Hydrocarbon Types in Aviation Fuels and Petroleum Distillates—High Performance Liquid Chromatography Method with Refractive Index Detection
- D6890** Test Method for Determination of Ignition Delay and Derived Cetane Number (DCN) of Diesel Fuel Oils by Combustion in a Constant Volume Chamber
- D7042** Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)
- D7153** Test Method for Freezing Point of Aviation Fuels (Automatic Laser Method)
- D7154** Test Method for Freezing Point of Aviation Fuels (Automatic Fiber Optical Method)
- D7345** Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure (Micro Distillation Method)
- D7524** Test Method for Determination of Static Dissipater Additives (SDA) in Aviation Turbine Fuel and Middle Distillate Fuels—High Performance Liquid Chromatograph (HPLC) Method
- E29** Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- 2.2 IP Standards:**³
- IP 12** Determination of specific energy
- IP 16** Determination of freezing point of aviation fuels—Manual method
- IP 71 Section 1** Petroleum products—Transparent and opaque liquids—Determination of kinematic viscosity and calculation of dynamic viscosity
- IP 123** Petroleum products—Determination of distillation characteristics at atmospheric pressure
- IP 154** Petroleum products—Corrosiveness to copper—Copper strip test
- IP 156** Petroleum products and related materials—Determination of hydrocarbon types—Fluorescent indicator adsorption method
- IP 160** Crude petroleum and liquid petroleum products—Laboratory determination of density—Hydrometer method
- IP 170** Determination of flash point—Abel closed-cup method
- IP 274** Determination of electrical conductivity of aviation and distillate fuels
- IP 323** Determination of thermal oxidation stability of gas turbine fuels
- IP 336** Petroleum products—Determination of sulfur content—Energy-dispersive X-ray fluorescence spectrometry
- IP 342** Petroleum products—Determination of thiol (mercaptan) sulfur in light and middle distillate fuels—Potentiometric method
- IP 354** Determination of the acid number of aviation fuels—colour-indicator titration method
- IP 365** Crude petroleum and petroleum products—Determination of density—Oscillating U-tube method
- IP 406** Petroleum products—Determination of boiling range

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.