



Designation: D7719 – 21a

An American National Standard

Standard Specification for High Aromatic Content Unleaded Hydrocarbon Aviation Gasoline Test Fuel¹

This standard is issued under the fixed designation D7719; 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 covers formulating specifications for purchases of a high aromatic content unleaded hydrocarbon aviation gasoline test fuel under contract and is intended solely for use by purchasing agencies for testing purposes.²

1.2 This specification defines a specific type of high aromatic content unleaded hydrocarbon aviation gasoline (hereafter also referred to as “D7719 fuel”) for use as an aviation spark-ignition test fuel. It does not include all fuels 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 D7719 fuel defined by this specification does not exhibit identical performance to those leaded fuels for which the existing aircraft and ground-based fuel handling equipment have been designed to operate on. Therefore, the suitability of this test 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 this fuel. 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 D7719 test fuel at the time and place of delivery.

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

1.7 *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.*

1.8 *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
- D130 Test Method for Corrosiveness to Copper from Petroleum Products by Copper Strip Test
- D323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)
- 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
- 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
- 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
- D2700 Test Method for Motor Octane Number of Spark-Ignition Engine Fuel

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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² Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1721. Contact ASTM Customer Service at service@astm.org.

³ 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

- D3237 Test Method for Lead in Gasoline by Atomic Absorption Spectroscopy
- D3606 Test Method for Determination of Benzene and Toluene in Spark Ignition Fuels by Gas Chromatography
- 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
- D4809 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter (Precision Method)
- D4814 Specification for Automotive Spark-Ignition Engine Fuel
- D4865 Guide for Generation and Dissipation of Static Electricity in Petroleum Fuel Systems
- 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)
- D5580 Test Method for Determination of Benzene, Toluene, Ethylbenzene, *p/m*-Xylene, *o*-Xylene, C₉ and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography
- 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
- D7826 Guide for Evaluation of New Aviation Gasolines and New Aviation Gasoline Additives
- E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. Terminology

3.1 Definitions:

3.1.1 *binary, adj*—characterized by, or consisting of, two components.

3.1.2 *biomass, n*—biological material including any material other than fossil fuels which is or was a living organism or component or product of a living organism.

3.1.3 *non-hydrocarbon, n*—compound or compounds composed of carbon, hydrogen, and other elements such as oxygen, nitrogen, sulfur, and phosphorus.

3.1.4 *unleaded hydrocarbon aviation gasoline, n*—gasoline intended for use in aircraft powered by reciprocating spark-

ignition engines, where lead and lead-containing compounds are not intentionally added for the purpose of enhancing octane performance and which excludes non-hydrocarbons, except for additives approved in this specification.

4. General

4.1 This specification, unless otherwise provided, prescribes the required properties of a high aromatic content unleaded hydrocarbon aviation gasoline test fuel at the time and place of delivery.

5. Classification

5.1 One grade of high aromatic content unleaded hydrocarbon aviation gasoline is provided, known as UL102.

6. Materials and Manufacture

6.1 D7719 fuel, except as otherwise specified in this specification, shall consist of blends of refined hydrocarbons. The sources for these hydrocarbons include biomass, natural gas, or crude petroleum.

6.1.1 See **Appendix X1** for one particular composition that meets the parameters of **Table 1**.

6.2 *Additives*—These can be added to each grade of D7719 fuel in the amount, and of the composition, specified in the following list of approved materials:

6.2.1 *Dyes*—The total maximum concentration of dye in the fuel is 6.0 mg/L. (See **X1.1.1** and **X2.2.7**.)

6.2.1.1 The only blue dye present in the finished fuel shall be essentially 1,4-dialkylaminoanthraquinone.

6.2.1.2 The only yellow dyes in the finished fuel shall be essentially *p*-diethylaminoazobenzene (Color Index No. 11021) or 1,3-benzenediol 2,4-bis [(alkylphenyl)azo-].

6.2.1.3 The only red dye present in the finished fuel shall be essentially alkyl derivatives of azobenzene-4-azo-2-naphthol.

6.2.1.4 The only orange dye present in the finished fuel shall be essentially benzene-azo-2-naphthol (Color Index No. 12055).

6.2.2 *Other Additives*—These may be added in the amount and of the composition specified in the following list of approved materials. The quantities and types shall be declared by the manufacturer. Additives added after the point of manufacture shall also be declared.

6.2.2.1 *Antioxidants*—The following oxidation inhibitors may be added to the fuel separately, or in combination, in total concentration not to exceed 12 mg of inhibitor (not including weight of solvent) per litre of fuel.

(1) 2,6-ditertiary butyl-4-methylphenol.

(2) 2,4-dimethyl-6-tertiary butylphenol.

(3) 2,6-ditertiary butylphenol.

(4) 75 % minimum 2,6-ditertiary butylphenol plus 25 % maximum mixed tertiary and tritertiary butylphenols.

(5) 75 % minimum di- and tri-isopropyl phenols plus 25 % maximum di- and tri-tertiary butylphenols.

(6) 72 % minimum 2,4-dimethyl-6-tertiary butylphenol plus 28 % maximum monomethyl and dimethyl tertiary butylphenols.

(7) N,N'-di-isopropyl-para-phenylenediamine.

(8) N,N'-di-secondary-butyl-para-phenylenediamine.