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Designation: D910 - 20 D910 - 20a

An American National Standard

Standard Specification for Leaded Aviation Gasolines¹

This standard is issued under the fixed designation D910; 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.

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

1. Scope*

1.1 This specification covers formulating specifications for purchases of aviation gasoline under contract and is intended primarily for use by purchasing agencies.

1.2 This specification defines specific types of aviation gasolines for civil use. 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 values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 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
- 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
- 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of Test for Knock Characteristics of Motor Fuels Below 100 Octane Number by the Motor Method; Replaced by D 2700 (Withdrawn 1969)³
- 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- D614 Method of Test for Knock Characteristics of Aviation Fuels by the Aviation Method; Replaced by D 2700 (Withdrawn 1970)³ /catalog/standards/astm/60e20b22-5a86-4424-a0d5-e683bbd14f91/astm-d910-20a
- D873 Test Method for Oxidation Stability of Aviation Fuels (Potential Residue Method)
- D909 Test Method for Supercharge Rating of Spark-Ignition Aviation Gasoline
- 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
- D1948 Method of Test for Knock Characteristics of Motor Fuels Above 100 Octane Number by the Motor Method; Replaced by D 2700 (Withdrawn 1968)³
- D2386 Test Method for Freezing Point of Aviation Fuels
- D2392 Test Method for Color of Dyed Aviation Gasolines
- 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

*A Summary of Changes section appears at the end of this 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 Spark and Compression Ignition Aviation Engine Fuels.

Current edition approved May 1, 2020July 1, 2020. Published May 2020August 2020. Originally approved in 1947 (replacing former D615). Last previous edition approved in 20192020 as D910 – 19:20. DOI: 10.1520/D0910-20.10.1520/D0910-20A.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

D3338 Test Method for Estimation of Net Heat of Combustion of Aviation Fuels

D3341 Test Method for Lead in Gasoline—Iodine Monochloride Method

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

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)

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 Spectroscopy

D5191 Test Method for Vapor Pressure of Petroleum Products and Liquid Fuels (Mini Method)

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

D6469 Guide for Microbial Contamination in Fuels and Fuel Systems

D7547 Specification for Hydrocarbon Unleaded Aviation Gasoline

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

3. Terminology

3.1 Definitions:

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

3.1.1.1 Discussion-

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Principal properties include volatility limits, stability, detonation-free performance in the engine for which it is intended, and suitability for low temperature performance.

3.2 *Abbreviations:*

3.2.1 LL—low lead

3.2.2 VLL-very low lead

4. General

<u>ASTM D910-20a</u>

4.1 This specification, unless otherwise provided, prescribes the required properties of aviation gasoline at the time and place of delivery.

5. Classification

5.1 Three grades of leaded aviation gasoline are provided, known as:

Grade 100 Grade 100LL Grade 100VLL

NOTE 1—The above grade names are based on their octane/performance numbers as measured by the now obsolete Test Method D614 (Discontinued 1970). A table for converting octane/performance numbers obtained by Test Method D2700 motor method into aviation ratings was last published in Specification D910–94 in the 1995 Annual Book of ASTM Standards, Vol 05.01.

5.2 Grades 100, 100LL, and 100VLL represent aviation gasolines identical in minimum antiknock quality but differing in maximum lead content and color. The color identifies the difference for engines that have a low tolerance to lead.

NOTE 2—Listing of, and requirements for, Avgas Grades 108/135, and 115/145 appeared in the 1967 version of this specification. U.S. Military Specification MIL-G-5572F, dated January 24, 1978 (withdrawn March 22, 1988), also covers grade 115/145 aviation gasoline, and is available as a research report.⁴ Listing of, and requirements for, Avgas Grades 80 and 91 appeared in the 2016 and 2017 versions of this specification respectively. Provision for unleaded Grade 91, with an optional supercharge D909 test, has been made in Specification D7547.

5.3 Although the grade designations show only a single octane rating for each grade, they shall meet a minimum lean mixture motor rating and a minimum rich mixture supercharge rating (see X1.2.2).

⁴ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D02-1255. <u>Contact ASTM Customer</u> Service at service@astm.org.