



Designation: D2709 – 16

Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge¹

This standard is issued under the fixed designation D2709; 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 test method covers the determination of the volume of free water and sediment (as a percentage of the sample) that is suspended in the bulk fuel in middle distillate fuels with viscosities in the range of 1.0 mm²/s to 4.1 mm²/s at 40 °C (1.0 cSt to 4.1 cSt at 104 °F) and densities in the range of 770 kg/m³ to 900 kg/m³ at 15 °C.

NOTE 1—Fuels corresponding to Specification D396 Grades No. 1 and 2, D975 Grades No. 1-D and 2-D, Specification D2880 Grades No. 0-GT, 1-GT and 2-GT, and Specification D3699 Grades No. 1-K and 2-K and similar middle distillate fuels and blendstocks will usually fall in this viscosity and density range. Test Method D1796 is intended for higher viscosity fuel oils.

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

1.2.1 *Exception*—The non-SI values are for information only.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D396 Specification for Fuel Oils

D975 Specification for Diesel Fuel Oils

D1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)

D2880 Specification for Gas Turbine Fuel Oils

D3699 Specification for Kerosine

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.14 on Stability and Cleanliness of Liquid Fuels.

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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.

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

3. Terminology

3.1 For definitions of terms used in this test method, refer to Terminology D4175.

3.2 *Definitions:*

3.2.1 *free water, n*—water in excess of that soluble in the fuel at the temperature of the test and appearing in the fuel as a haze, cloudiness, droplets, or water layer.

3.2.1.1 *Discussion*—Note that when there is a water layer in a biodiesel fuel blend, there can be water-soluble components present in the free water.

3.3 *Abbreviations:*

3.3.1 *rcf*—relative centrifugal force.

4. Summary of Test Method

4.1 A 100 mL sample of the undiluted fuel is centrifuged at a relative centrifugal force (see 6.2) of 800 for 10 min at 21 °C to 32 °C (70 °F to 90 °F) in a specified centrifuge tube. After centrifugation, the volume of free water and sediment that has settled into the tip of the centrifuge tube is read to the nearest 0.005 mL and reported as the volumetric percent water and sediment by centrifuge.

5. Significance and Use

5.1 This test method is used as an indication of free water and sediment suspended as haze, cloudiness, or droplets in middle distillate fuels such as Grades No. 1 and 2 fuel oil (Specification D396), Grades No. 1-D and 2-D diesel fuel (Specification D975), and Grades No. 0-GT, 1-GT, and 2-GT gas turbine fuels (Specification D2880), similar fuels and blendstocks used to make these fuels.

5.2 Appreciable amounts of free water and sediment in a fuel oil tend to cause fouling of fuel-handling facilities and to give trouble in the fuel system of a burner or engine. An accumulation of sediment in storage tanks and on filter screens can obstruct the flow of oil from the tank to the combustor. Free water in middle distillate fuels can cause corrosion of

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