Designation: D2709 – 96(Reapproved 2011)ε1

Standard Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge[1]

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 Department of Defense.

ε[1] NOTE—Added part of speech to term in 3.1.1 editorially in May 2011.

1. Scope

1.1 This test method covers the determination of the volume of free water and sediment in middle distillate fuels having viscosities at 40°C (104°F) in the range of 1.0 to 4.1 mm^2/s (1.0 to 4.1 cSt) and densities in the range of 770 to 900 kg/m^3.

NOTE 1—Fuels corresponding to Specification D975 Grades 1D and 2D, Specification D2880 Grades 0-GT, 1-GT and 2-GT, and Specification D3699 Grades 1-K and 2-K 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. The values given in parentheses 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

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *distillate fuel, n*—a virgin or cracked or blend of virgin and cracked distillate having a flash point greater than 38°C.

4. Summary of Test Method

4.1 A 100-mL sample of the undiluted fuel is centrifuged at a relative centrifugal force of 800 for 10 min at 21 to 32°C (70 to 90°F) in a centrifuge tube readable to 0.005 mL and measurable to 0.01 mL. After centrifugation, the volume of water and sediment which 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 water and sediment in middle distillate fuels such as Grade Nos. 1 and 2 fuel oil (Specification D396), Nos. 1-D and 2-D diesel fuel (Specification D975), and Nos. 0-GT, 1-GT, and 2-GT gas turbine fuels (Specification D2880).

5.2 Appreciable amounts of water and sediment in a fuel oil tend to cause fouling of the 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. Water in middle distillate fuels can cause corrosion of tanks and equipment, and if detergent is present, the water can cause emulsions or a hazy appearance. Water is necessary to support microbiological growth at fuel water-interfaces in fuel systems.

6. Apparatus

6.1 *Centrifuge,* capable of whirling two or more filled centrifuge tubes at a speed which can be controlled to give a relative centrifugal force (rcf) of 800 ± 60 at the tip of the tubes. The revolving head, trunnion rings, and trunnion cups, including the cushions, are to be soundly constructed to withstand the maximum centrifugal force capable of being delivered by the power source. The trunnion cups and cushions shall support the tubes when the centrifuge is in motion. The centrifuge shall be enclosed by a metal shield or case strong enough to eliminate danger if any breakage occurs.

6.2 The data in Table 1 can be used to determine the centrifuge speed setting required for the centrifuge to meet

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products 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.