Designation: D6824 – 13ε1

An American National Standard

Standard Test Method for Determining Filterability of Aviation Turbine Fuel[1]

This standard is issued under the fixed designation D6824; 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.

ε[1] NOTE—Editorial changes were made to 6.1.7, 10.1, and the Summary of Changes section in September 2013.

1. Scope*

1.1 This test method covers a procedure for determining the filterability of aviation turbine fuels (for other middle distillate fuels, see Test Method D6426).

NOTE 1—ASTM specification fuels falling within the scope of this test method are Specifications D1655 and D6615 and the military fuels covered in the military specifications listed in 2.2.

1.2 This test method is not applicable to fuels that contain undissolved water.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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]

D1655 Specification for Aviation Turbine Fuels

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4176 Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D4860 Test Method for Free Water and Particulate Contamination in Middle Distillate Fuels (Clear and Bright Numerical Rating)

D5452 Test Method for Particulate Contamination in Aviation Fuels by Laboratory Filtration

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants

D6426 Test Method for Determining Filterability of Middle Distillate Fuel Oils

D6615 Specification for Jet B Wide-Cut Aviation Turbine Fuel

2.2 *Military Standards:*[3]

MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4, JP-5, and JP-5/JP-8 ST

MIL-DTL-25524 Turbine Fuel, Aviation, Thermally Stable

MIL-DTL-38219 Turbine Fuels, Low Volatility, JP-7

MIL-DTL-83133 Turbine Fuels, Aviation, Kerosine Types, NATO F-34 (JP-8), NATO F-35, and JP-8+100

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *filterability, n*—a measure of the rapidity with which a standard filter medium is plugged by insoluble matter in fuel and may be described as a function of pressure or volume:

3.1.1.1 *filterability (by pressure), n*—the pressure drop across a filter medium when 300 mL of fuel is passed at a rate of 20 mL/min.

3.1.1.2 *filterability (by volume), n*—the volume of fuel passed when a pressure of 104 kPa (15 psig) is reached.

3.1.1.3 *Discussion*—Filterability by volume is used when less than 300 mL passes the filter at a pressure up to 104 kPa (15 psig).

3.1.1.4 *filterability quality factor (F-QF), n*—a value that defines the filter plugging tendency of a fuel caused by particulates.

3.1.1.5 *Discussion*—The F-QF value is calculated using the volume and pressure attained at the end of the test cycle, according to one of two equations, depending on the outcome of the test. (See Section 10, Calculations.)

4. Summary of Test Method

4.1 A sample is passed at a constant rate (20 mL/min) through a standard porosity filter medium. The pressure drop

[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.J0.01 on Jet Fuel Specifications.

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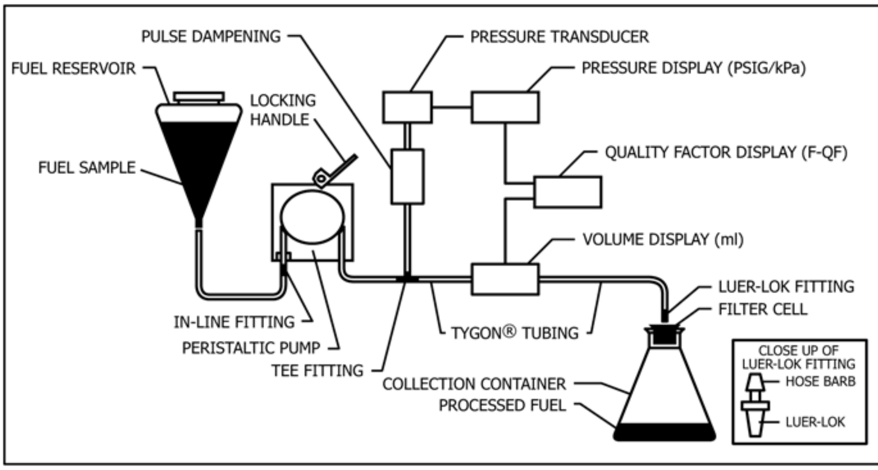
[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098.

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



NOTE 1—Fuel flow from reservoir through pump to container.

FIG. 1 Schematic Diagram of Filterability Apparatus

across the filter and the volume of filtrate are monitored. The test is concluded either when the pressure drop across the filter exceeds 104 kPa (15 psig) or when 300 mL have passed through the filter.

4.2 Results are reported as either the volume that has passed through the filter when a pressure of 104 kPa (15 psig) has been reached or the pressure drop when 300 mL have passed through the filter.

4.3 Verification of the apparatus is required when there is a doubt of a test result, or when the apparatus has not been used for three months or more. It is not necessary to verify apparatus performance prior to each test.

5. Significance and Use

5.1 This test method is intended for use in the laboratory or field in evaluating aviation turbine fuel cleanliness.

5.2 A change in filtration performance after storage, pretreatment, or commingling can be indicative of changes in fuel condition.

5.3 Relative filterability of fuels may vary, depending on filter porosity and structure, and may not always correlate with results from this test method.

5.4 Causes of poor filterability in industrial/refinery filters include fuel degradation products, contaminants picked up during storage or transfer, incompatibility of commingled fuels, or interaction of the fuel with the filter media. Any of these could correlate with orifice or filter system plugging, or both.

6. Apparatus

6.1 *Micro-Filter Analyzer*[4]—The apparatus is shown as a diagram in Fig. 1 and photographically in Fig. 2. It is capable of measuring pressure upstream of the filtering element and the volume of sample passed through the filter at a preset pressure level. The apparatus is comprised of the following parts:

6.1.1 *Peristaltic Pump,* variable speed/flow rate, with feedback speed control, adjusted to provide fuel delivery at a constant rate of 20 ± 1 mL/min, and incorporating a pulse dampening mechanism to produce a smooth flow.

6.1.2 *Pressure Transducer,* capable of measuring gauge pressure in the range from 0 to 104 kPa, in 1.0 kPa increments (0 to 15 psig, in 0.1 psig increments).

6.1.3 *Three Digital Displays,* one for pressure readout capable of interfacing with transducer (see 6.1.2) with display range from 0 to 104 kPa in 1.0 kPa increments (0 to 15 psig in 0.1 psig increments), one for volume readout with display range from 0 to 300 mL in 1 mL increments, and one for filterability quality factor (F-QF).

NOTE 2—The micro-filter analyzer can display the pressure in either kPa or psig units by changing an internal jumper wire.

6.1.4 *Speed Controller,* manual speed adjustment of the peristaltic pump to increase/decrease amount of sample delivered for a given period of time.

6.1.5 *Fuel Reservoir Container,* polytetrafluoroethylene (PTFE), funnel shaped, 500-mL capacity.

6.1.6 *Collection Container,* glass or plastic Erlenmeyer flask, 500-mL capacity.

6.1.7 *Flexible, Inert Tubing,*[5] fuel compatible, nominal 3.1-mm (0.12-in.) inner diameter.

6.1.8 *Plastic In-Line Splice Coupler,* fuel compatible, capable of being inserted into, and making a seal in flexible, inert tubing (see 6.1.7).

6.1.9 *Plastic Tee Coupler,* fuel compatible, capable of being inserted into, and making a seal in flexible, inert tubing (see 6.1.7).

6.1.10 *Plastic Coupler,* fuel compatible, one end capable of being inserted into, and making a seal in flexible, inert tubing

[4] The sole source of supply of the apparatus (Model 1143 Micro-Filter Analyzer) known to the committee at this time is available from EMCEE Electronics, Inc., 520 Cypress Ave., Venice, FL 34285. If you are aware of alternate suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.

[5] Tygon (trademarked) tubing was used in the round robin test program to generate the precision and bias. Tygon is available from most laboratory supply houses. This is not an endorsement of Tygon.