Designation: D6426 – 22

Standard Test Method for Determining Filterability of Middle Distillate Fuel Oils[1]

This standard is issued under the fixed designation D6426; 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 test method covers a procedure for determining the filterability of distillate fuel oils within the viscosity range from 1.70 mm^2/s to 6.20 mm^2/s (cSt) at 40 °C.

NOTE 1—ASTM specification fuels falling within the scope of this test method are Specification D396 Grade No. 2, Specification D975 Grade No. 2-D, and Specification D2880 Grade No. 2-GT.

NOTE 2—The test method has been used with lower viscosity middle distillate fuels such as Specification D396 Grade No. 1, Specification D975 Grade No. 1-D, and Specification D2880 Grade No. 1-GT, but the precision has not been studied and therefore the stated precision has not been validated for these grades.

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 standard.

1.3.1 Non-SI units, specifically U.S. customary units such as temperature in degrees Fahrenheit and pressure in pounds per square inch gauge (psig), are included for information.

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

1.5 *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]

D396 Specification for Fuel Oils

D975 Specification for Diesel Fuel

D2880 Specification for Gas Turbine Fuel Oils

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

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

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)

3. Terminology

3.1 *Definitions:*

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *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:

3.2.2 *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.

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

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

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

3.2.4.1 *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 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.

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

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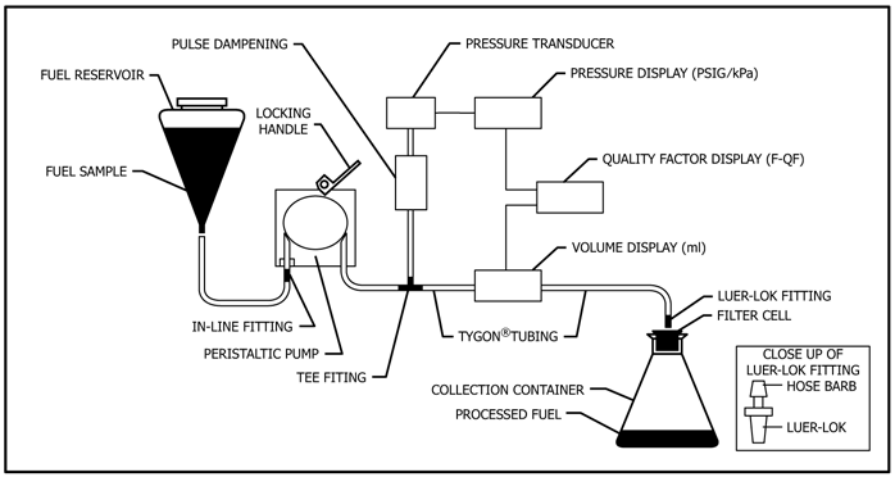
[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*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

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 distillate 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:*[3]

NOTE 3—The Micro-Filter can display the pressure in either kPa or psig units by changing an internal jumper wire.

6.1.1 The apparatus is shown diagrammatically 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:

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

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

6.1.1.3 *Three Digital Displays*—One for pressure readout capable of interfacing with transducer (see 6.1.1.2) with display range from 0 kPa to 104 kPa in 1.0 kPa increments (0 psig to 15 psig in 0.1 psig increments), one for volume readout with display range from 0 mL to 300 mL in 1 mL increments, and one for F-QF.

6.1.1.4 *Fuel Reservoir Container*—PTFE-fluorocarbon, funnel shaped, 500 mL capacity.

6.1.1.5 *Collection Container*—Glass or plastic Erlenmeyer flask, 500 mL capacity.

6.1.1.6 *Tygon Tubing,*[4]fuel compatible, 3.1 mm (0.12 in.) inner diameter.

6.1.1.7 *Plastic In-line Splice Coupler,* fuel compatible, capable of being inserted into, and making a seal in Tygon tubing (see 6.1.1.6).

6.1.1.8 *Plastic Tee Coupler,* fuel compatible, capable of being inserted into, and making a seal in Tygon tubing (see 6.1.1.6).

6.1.1.9 *Plastic Luer-Loc Coupler,* fuel compatible, one end capable of being inserted into, and making a seal in Tygon tubing (see 6.1.1.6) and the other end into filter unit (see 6.2).

[3] 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 34292. If you are aware of alternate suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

[4] Tygon tubing was used in the round robin test program to generate the precision and bias. Tygon is available from most laboratory supply houses.