Designation: D7501 – 22

Standard Test Method for Determination of Fuel Filter Blocking Potential of Biodiesel Fuel Blendstock (B100) by Cold Soak Filtration Test (CSFT)[1]

This standard is issued under the fixed designation D7501; 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 the determination by filtration time after cold soak for the suitability of biodiesel fuel blendstock (B100) that meets all other requirements of Specification D6751 and has a cloud point below 20 °C (68 °F) to provide adequate low temperature operability performance to at least the cloud point of the finished blend.

1.2 The values stated in SI units are to be regarded as standard. Non-SI units are given 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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]

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

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

D6217 Test Method for Particulate Contamination in Middle Distillate Fuels by Laboratory Filtration

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

D6751 Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels

3. Terminology

3.1 *Definitions:*

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

3.1.2 *biodiesel, n*—fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated as B100.

3.1.3 *biodiesel blend (BXX), n*—a homogeneous mixture of hydrocarbon oils and mono-alkyl esters of long chain fatty acids.

3.1.3.1 *Discussion*—In the abbreviation, BXX, the XX represents the volume percentage of biodiesel fuel in the blend.

3.1.4 *bond, v*—to connect two parts of a system electrically by means of a conductive wire to eliminate voltage differences.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *air chamber, n*—unit to control temperature of sample for cooling with maximum 0.5 °C variation from set point. The unit shall use a microprocessor temperature controller with digital set point and readout. A food-grade refrigerator does not provide adequate temperature stability for this test method.

3.2.2 *minor component, n*—material present in B100, typically at concentrations well below 1 % by mass.

3.2.3 *thermal history, n*—range of temperatures that a batch or sample of B100 has experienced which can result in separation or precipitation of minor components.

3.2.3.1 *Discussion*—Cooling some biodiesel fuels can result in precipitation or separation of minor components that have limited solubility in B100. Heating these biodiesel fuels above 40 °C is believed to redissolve most of these minor components and thus erase the thermal history of the sample.

3.3 *Abbreviations:*

3.3.1 *CSFT*—Cold Soak Filtration Test

4. Summary of Test Method

4.1 In this test method, 300 mL of biodiesel (B100) is stored at 4.5 °C ± 0.5 °C (40 °F ± 1 °F) for 16 h, allowed to warm to 25 °C ± 1 °C (77 °F ± 2 °F), and vacuum filtered through a

[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, Cleanliness and Compatibility of Liquid Fuels.

Current edition approved April 1, 2022. Published April 2022. Originally approved in 2009. Last previous edition approved in 2021 as D7501 – 21. DOI: 10.1520/D7501-22.

[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

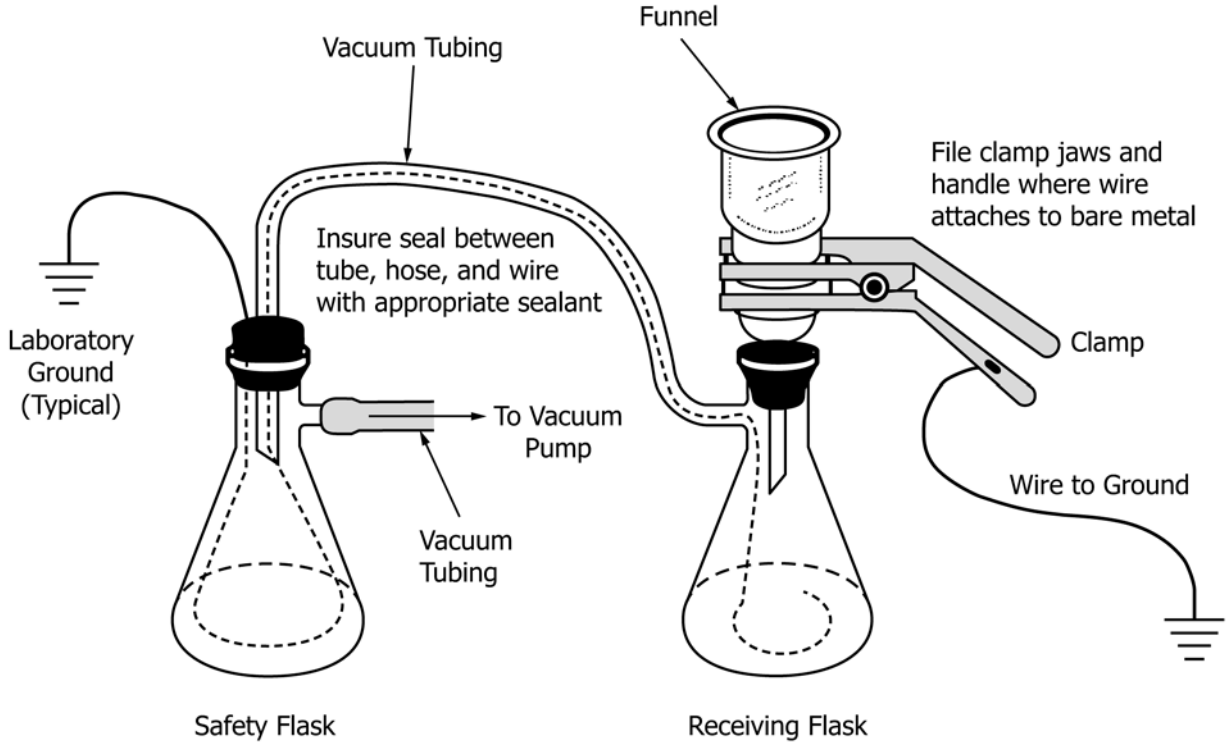

FIG. 1 Schematic of Filtration System

single 0.7 µm glass fiber filter at controlled vacuum levels of ~70 kPa to 85 kPa (21 in. of Hg to 25 in. of Hg).

4.2 The filtration time is reported in seconds.

5. Significance and Use

5.1 Some substances that are soluble or appear to be soluble in biodiesel fuel blendstock (B100) at room temperature will, upon cooling to temperatures above the cloud point or standing at room temperature for extended periods, come out of solution. This phenomenon has been observed in both B100 and biodiesel blends. These substances can cause filter plugging. This method provides an accelerated means of assessing the presence of these substances in B100 and their propensity to plug filters.

5.1.1 Biodiesel fuel blendstocks that yield short filtration times are expected to give satisfactory operation of biodiesel blends at least down to the cloud point of the biodiesel blends.

5.2 The test method can be used in specifications as a means of controlling levels of minor filter plugging components in biodiesel and biodiesel blends.

6. Apparatus

6.1 *Filtration System*—Arrange the following components as shown in Fig. 1.

6.1.1 *Funnel and Funnel Base,* with a stainless steel filter support for a 47 mm diameter glass fiber filter, and locking ring or spring action clip, capable of receiving 300 mL.

NOTE 1—Sintered glass supports were found to give much higher filtration times during initial studies and are not recommended to be used.

6.1.2 *Ground/Bond Wire,* 0.912 mm to 2.59 mm (No. 10 through No. 19) bare stranded flexible, stainless steel or copper installed in the flasks and grounded as shown in Fig. 1.

6.1.3 *Electrical Bonding Apparatus,* as described in Test Method D6217 or by using other suitable means of electrical grounding that ensure safe operation of the filtration apparatus and flask. This may not be necessary in filtering biodiesel B100 because of the higher electrical conductivity.

6.1.4 *Receiving Flask,* 1 L borosilicate glass vacuum filter flask, into which the filtration apparatus fits, and equipped with a sidearm to connect to the safety flask.

6.1.5 *Safety Flask,* 1 L borosilicate glass vacuum filter flask equipped with a sidearm to connect the vacuum system. A fuel and solvent resistant rubber hose, through which the grounding wire is connected to the sidearm of the receiving flask to the tube, passes through the rubber stopper in the top of the safety flask.

6.1.6 *Vacuum System,* capable of producing a vacuum of ~70 kPa to 85 kPa (21 in. of Hg to 25 in. of Hg) when measured at the safety flask. A mechanical vacuum pump may be used if it has this capability. A vacuum pump with free air displacement capacity of 25 L/min to 30 L/min at 60 Hz has been found to be suitable to pull the vacuum down to the required level within 30 s to 40 s when guard and filtration flasks are present in the assembly.

NOTE 2—Water aspirated vacuum will not provide relative vacuum within the prescribed range.

6.1.7 *Chilling Apparatus,* either 6.1.7.1 or 6.1.7.2 may be used.