Designation: D 4539 – 98

An American National Standard

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

Standard Test Method for Filterability of Diesel Fuels by Low-Temperature Flow Test (LTFT)[1]

This standard is issued under the fixed designation D 4539; 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 estimates the filterability of diesel fuels in some automotive equipment at low temperatures.

1.2 The values stated in SI units are to be regarded as the standard. The values 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.* For specific precautionary statements, see 7.1, 7.2.1, 7.3, 7.5, 7.9.3, 7.11, and A1.1.7.

2. Referenced Documents

2.1 *ASTM Standards:*

D 97 Test Method for Pour Point of Petroleum Oils[2]
D 975 Specification for Diesel Fuel Oils[2]
D 1655 Specification for Aviation Turbine Fuels[2]
D 2500 Test Method for Cloud Point of Petroleum Oils[2]
D 3117 Test Method for Wax Appearance Point of Distillate Fuels[3]
D 3699 Specification for Kerosine[3]
E 1 Specification for ASTM Thermometers[4]

2.2 *Coordinating Research Council, Inc.*

CRC Report No. 528 Diesel Fuel Low-Temperature Operability Field Test[5]

2.3 *Canadian General Standards Board:*

CAN/CGSB-3.0, No. 14.01-M86, Low Temperature Flow Test (LTFT) for Diesel Fuels

NOTE 1—CAN/CGSB-3.0, No. 140.1-M86 is essentially equivalent to Test Method D 4539 but the differences in apparatus and procedures may or may not yield different results.

3. Summary of Test Method

3.1 The temperature of a series of test specimens of fuel is lowered at a prescribed cooling rate. Commencing at a desired test temperature and at each 1°C interval thereafter, a separate specimen from the series is filtered through a 17-µm screen until a minimum LTFT pass temperature is obtained. The minimum LTFT pass temperature is the lowest temperature, expressed as a multiple of 1°C, at which a test specimen can be filtered in 60 s or less.

3.2 Alternatively, a single specimen may be cooled as described under 3.1 and tested at a specified temperature to determine whether it passes or fails at that temperature.

4. Significance and Use

4.1 The Low Temperature Flow Test results are indicative of the low temperature flow performance of the test fuel in some diesel vehicles (per CRC Report No. 528). The test method is especially useful for the evaluation of fuels containing flow improver additives.

4.2 The test method can be used to supplement other measurements of diesel fuel low temperature behavior (in accordance with Test Methods D 97, D 2500, and D 3117).

5. Apparatus

5.1 *Glass Specimen Vessels*,[6] several 300-mL, clear, heat resistant, wide-mouthed glass bottles having markings indicating 200 mL ± 10 mL and 50–60 mm ID or clear, heat resistant, tall form beakers with no pour spouts and equivalent dimensions.

5.2 *Glass Receiver Vessels*, clear, heat resistant, glass containers graduated through 180 mL in 10 mL ± 2 mL increments.

5.3 *Filtering Assembly* (see Fig. 1), including a storage lid or some other form of cover, glass tubing, flexible fuel resistant tubing, pinch clamp and rubber stopper, or other means to provide a vacuum seal.

5.4 *Filter*, as shown in detail in Fig. 2, for each sample container (300-mL beaker). 304SS sintered screen[7] is a twill Dutch weave mesh with a nominal filtration rating of 17 µm. The mesh is 65 wires/cm (165 wires/in.) X 303/315 wires/cm (770/800 wires/in.). The wire strands have diameters of 0.0071 cm (0.0028 in.) and 0.0046 cm (0.0018 in.), respectively. The

[1] This test method is under the jurisdiction of Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.07 on Flow Properties.

Current edition approved June 10, 1998. Published August 1998. Originally published as D 4539 – 85. Last previous edition D 4539 – 94.

[2] *Annual Book of ASTM Standards*, Vol 05.01.

[3] *Annual Book of ASTM Standards*, Vol 05.02.

[4] *Annual Book of ASTM Standards*, Vol 14.03.

[5] Available from Coordinating Research Council, Inc., 219 Perimeter Center Parkway, Atlanta, GA 30346.

[6] Borosilicate heat resistant glass or equivalent beakers are suitable for this purpose.

[7] Suitable filter cloth is available from Pall Aerospace Co., Pall Aeropower Corp., 6301 49th St. N, Pinellas Park, FL 33781.

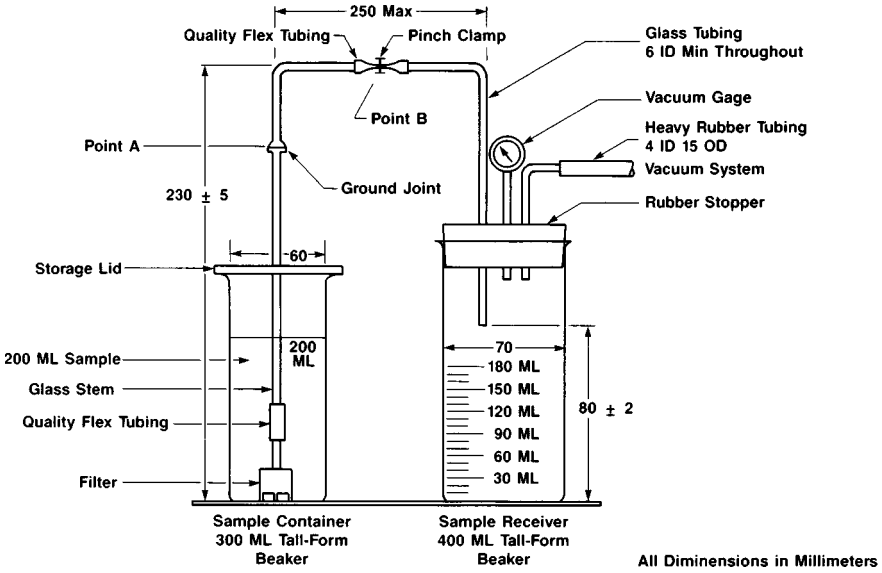
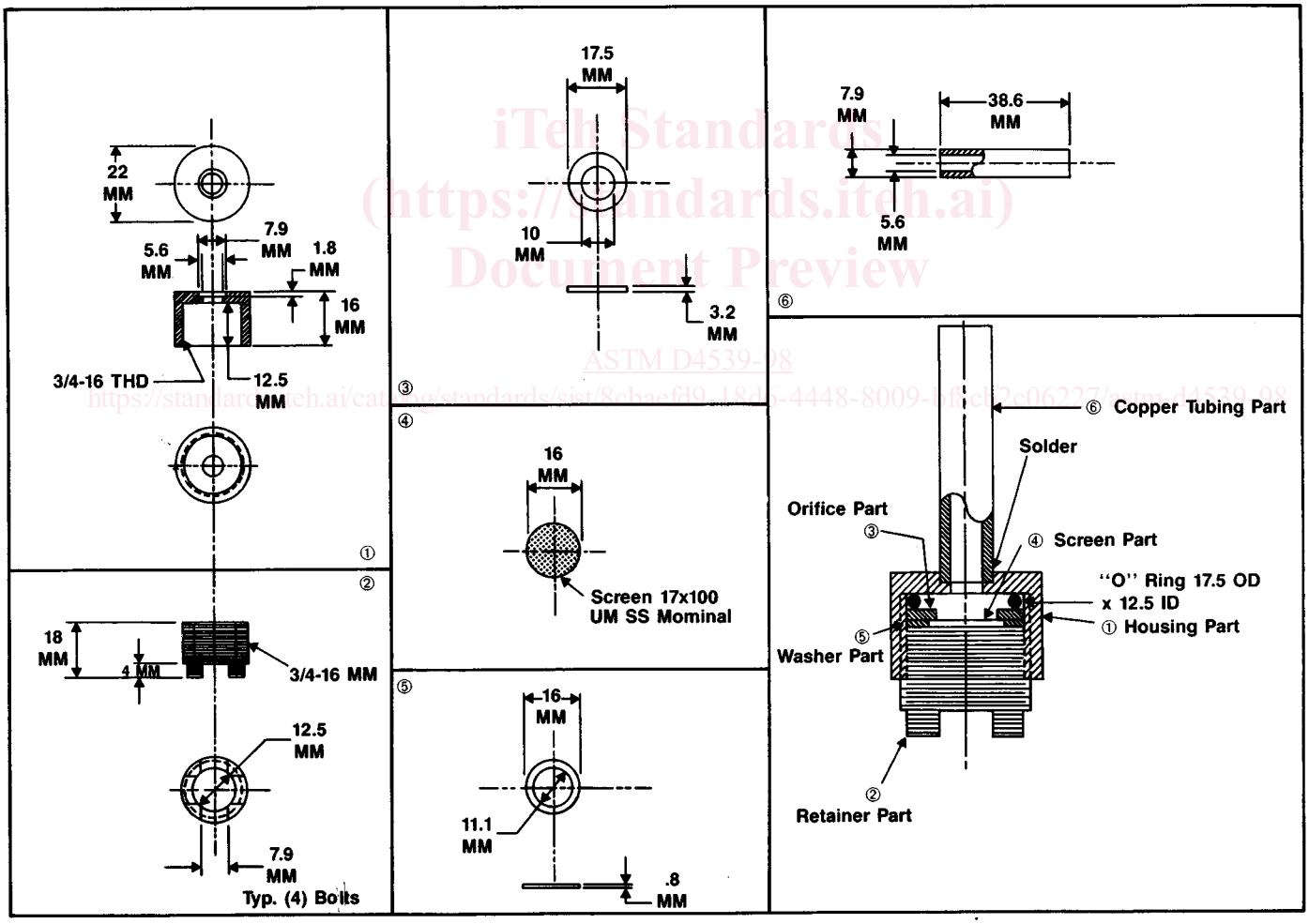


FIG. 1 LTFT Sample Filtration Assembly



Note: Material for ① ② ③ is brass; material for ⑤ is corrosion resisant polymer; for ⑥ is copper tubing.

FIG. 2 LTFT Filter Assembly

nominal filtration rating indicates a 98 % removal by mass weight of all particles equal to or greater than 17 µm.

5.5 *Programmable Cooling System*, capable of cooling multiple specimens to the desired temperature at a mean rate of 1.0°C per hour between + 10°C and − 30°C. Absolute deviation of any single temperature point along the prescribed ramp