

MIL-STD-1439  
5 November 1968  
SUPERSEDING  
JAN-I-711  
16 December 1948

MILITARY STANDARD

THICKENED HYDROCARBON FLAME FUELS,  
CONSISTENCY OF; MOBILOMETER TEST

FSC 1365

MIL-STD-1439  
5 November 1968

DEPARTMENT OF DEFENSE  
Washington, D. C. 20301

Thickened Hydrocarbon Flame Fuels, Consistency of; Mobilometer Test

MIL-STD-1439

1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense.
2. Recommended corrections, additions, or deletions should be addressed to Commanding Officer, Edgewood Arsenal, ATTN: SMJEA-QAES-A, Edgewood Arsenal, Maryland 21010.

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## 1. SCOPE

1.1 This standard covers the mobilometer test method for determining the consistency of thickened hydrocarbon flame fuels (see 3.2).

## 2. REFERENCED DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this standard to the extent specified herein.

### MILITARY SPECIFICATIONS

MIL-T-589 - Thickener, Incendiary Oil, M1.  
MIL-T-13025 - Thickener, Incendiary Oil, M2.  
MIL-T-50009 - Thickener, Incendiary Oil, M4.

### MILITARY STANDARDS

MS 602 - Formula for Test Solvent (For Fuel Thickeners).

### US ARMY MUNITIONS COMMAND DRAWINGS

A21-68-1 - Apparatus, Mobilometer, Thickened Fuel, E15, List of Drawings and Specifications.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

## 3. GENERAL STATEMENTS

3.1 Test method numbering. Method number 100.1 indicates that this test method is the first revision of method 100 (JAN-I-711).

3.2 Application. Determinations of consistency by the mobilometer method may be used in evaluation of the following materials:

- (a) Thickener, Incendiary Oil, M1.
- (b) Thickener, Incendiary Oil, M2.
- (c) Thickener, Incendiary Oil, M4.

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100.1

METHOD 100.1  
MOBILOMETER TEST

1. SCOPE

1.1 This method covers a consistency determination of thickened hydrocarbon flame fuels by means of a mobilometer.

2. APPARATUS

2.1 Mobilometer and accessories. The mobilometer shall conform to Drawing D21-68-6. Mobilometer accessories shall conform to Drawing C21-68-40. For the purpose of official testing of the consistency of thickened hydrocarbon fuels, the Director of Quality Assurance, Edgewood Arsenal, Edgewood Arsenal, Maryland will furnish each facility engaged in the manufacture or testing of thickener or thickened hydrocarbon fuels with a mobilometer which has been checked visually, dimensionally, and functionally and determined to be satisfactory.

2.2 Storage containers. Tubes for the storage of thickened fuel shall be made of steel, iron, or anodized aluminum. The inside diameter shall be approximately the same size or slightly larger than the inside of the mobilometer tubes used for testing. The storage tubes shall be approximately 10 inches (in.) long and the tubes shall be filled to give a void of  $10 \pm 2$  percent. The storage tubes shall be capped at both ends with removable caps capable of withstanding a pressure of 35 pounds per square in. Gaskets made of materials which do not affect the thickened fuel shall be used. One-pint mason jars may be used for storage of thickened fuel at  $77^\circ \pm 2^\circ$  F provided they are properly sealed against leakage.

3. STANDARD CONDITIONS

3.1 A brief summary of the conditions standard for all runs made in determining consistency is as follows:

(a) Start the complete stroke with the lower mark on the plunger  $1 \pm 1/4$  in. above the bearing.

(b) Allow the loaded plunger assembly to descend until the upper mark passes the upper surface of the bearing. Within 10 seconds thereafter, remove the weights, push the disc down to the bottom of the tube, and withdraw the disc until the lower mark on the plunger rod is  $1 \pm 1/4$  in. above the bearing, wiping the rod on the upstroke.

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(c) The time between runs shall be  $60 \pm 10$  seconds.

(d) The entire mobilometer test shall be conducted in a room maintained at  $77^\circ \pm 2^\circ$  F.

#### 4. PREPARATION OF SAMPLE

4.1 Transfer of sample. Transfer the sample from the storage tube to the mobilometer tube at the time of test, using one of the following procedures:

(a) If the mobilometer tube will fit into the storage tube, remove one cap of the storage tube and insert the mobilometer tube, without cap or base, into the storage tube, base end first. Push down until the base of the mobilometer tube has reached the lower cap of the storage tube, remove the cap, and screw the base of the mobilometer tube into place. Withdraw the mobilometer tube containing the thickened fuel sample and cap until the consistency determination is made.

(b) If the diameter of the storage tube is approximately the same as that of the mobilometer tube, remove both caps from the storage tube and hold the storage tube tightly over the mobilometer tube and slowly push the sample, by means of a solid disc on a rod, into the mobilometer tube. The base of the mobilometer tube should be loosely fastened until transfer is complete to permit escape of air. Care must be taken not to entrap air in the base of the mobilometer tube.

(c) Any other convenient procedure of transfer may be used, provided the exposure of the sample to evaporation is no greater than that in procedures (a) or (b).

4.2 Removal of sample. The sample may be removed from the mobilometer tube after testing has been completed by removing the base of the mobilometer tube and extruding the sample by means of a solid disc on a rod.

4.3 Filling. The mobilometer tube shall be filled with the thickened fuel sample to the top of the tube.

4.4 Working stroke. For the M1 and M2 thickeners, five strokes shall be made in less than one minute; for the M4 thickener only one stroke shall be made. The following method shall be used: Force the plunger down manually until the disc touches the bottom of the tube, then withdraw until the lower mark on the rod is  $1 \pm 1/4$  in. above the bearing. This procedure should not require more than 10 seconds for a complete stroke. On the upstroke, hold a piece of absorbent cloth or paper around the plunger rod to prevent thickened fuel from

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being carried into the bearing. The presence of dried material on the rod, bearing, disc, or in the holes of the disc will lead to error in measurement. It is therefore essential that these components be kept clean.

## 5. DETERMINATION OF CONSISTENCY

5.1 Procedure. Determine the consistency of the thickened hydrocarbon fuel as follows:

(a) Each type of thickened fuel has a specified consistency range expressed in grams. In the first run determination, use a total weight consisting of the sum of the weight of the disc, plunger, and weight pans, plus added weights so that the sum shall be 100 g in excess of the expected consistency, if over 300 g, or so that the sum shall be 50 g in excess of the expected consistency, if less than 300 g.

(b) After completing the working stroke (with the lower mark on the plunger rod  $1 \pm 1/4$  in. above the bearing), grasp the plunger rod at the bearing and place the required weight on the pan. The interval between the end of working stroke and the start of the first run shall be  $60 \pm 10$  seconds. Start the run by releasing the weighted plunger assembly, thus applying the load to the thickened fuel.

(c) Start the stop watch when the lower mark on the rod passes the upper surface of the bearing. When the upper mark passes the upper surface of the bearing, stop the watch. Remove the weights from the pan, force the plunger down manually until the disc touches the bottom of the tube, then withdraw until the lower mark on the rod is  $1 \pm 1/4$  in. above the bearing, wiping the rod as before on the upstroke. No more than 10 seconds shall elapse between stopping the watch and placing the plunger assembly in the starting position ( $1 \pm 1/4$  in. above the bearing). Record the total weight used in the run in grams and the elapsed time shown on the stop watch to the nearest second.

(d) Continue this process, varying the load on each succeeding run until the times of fall bracket 100 seconds.

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5.2 Report. Three or more successive loads in grams, giving times of fall around 100 seconds shall be noted. The load required to give a time of fall of 100 seconds shall be obtained from the loads so noted by log-log interpolation. This figure shall be reported to the nearest 10 g for material having a consistency greater than 300 g, and to the nearest 5 g for material having a consistency of 100 g to 300 g.

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