



Designation: D 5006 – 02

An American National Standard

## Standard Test Method for Measurement of Fuel System Icing Inhibitors (Ether Type) in Aviation Fuels<sup>1</sup>

This standard is issued under the fixed designation D 5006; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

*This standard has been approved for use by agencies of the Department of Defense.*

### 1. Scope

1.1 This test method covers a technique for measuring the concentration of Diethylene Glycol Monomethyl Ether (DiEGME) in aviation fuels. The HB and Brix scale refractometers are specified to determine the concentration of this fuel system icing inhibitor (FSII) by measuring the refractive index of a water extract. Precision estimates have been determined for the DiEGME additives using specific extraction ratios with a wide variety of fuel types. The extraction ratios are high enough that portable handheld refractometers can be used, but not so high as to sacrifice accuracy or linearity, or both, in the 0.01 to 0.25 vol % range of interest.

1.2 The values stated in SI units are to be regarded as the standard.

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.*

### 2. Referenced Documents

#### 2.1 ASTM Standards:

E 1 Specification for ASTM Thermometers<sup>2</sup>

E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications<sup>3</sup>

### 3. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 **Brix scale**—a refractometer with a refractive index scale calibrated to weight percent cane sugar (sucrose).

3.1.2 **HB**—a refractometer that can be used in a temperature range from 18 to 35°C without incorporating a temperature correction factor.

#### 3.2 Acronyms:

3.2.1 **DiEGME**—Diethylene Glycol Monomethyl Ether

3.2.2 **FSII**—fuel system icing inhibitor

### 4. Summary of Test Method

4.1 In order to determine the concentration of DiEGME in aviation fuel, a measured volume of fuel is extracted with a fixed ratio of water. The extraction procedure includes sufficient agitation and contacting time to ensure that equilibrium distributions are attained. With the HB refractometer, several drops of the water extract are placed on the prism face and the volume percent DiEGME is read directly from a custom graduated scale printed on the reticule. If the Brix refractometer is used, a temperature correction factor is first applied to the reading, multiplied by 2 and divided by 100 to calculate volume percent DiEGME. (**Warning**—Diethylene glycol monomethyl ether (DiEGME), Slightly toxic material. This material caused slight embryo-fetal toxicity (delayed development) but no increase in birth defects in laboratory animals. Consult the suppliers' material safety data sheet.)

NOTE 1—Methanol is not detected because of the similarity of water/methanol refractive indices, and the presence of methanol in fuel containing other additives results in lower than true measurements.

### 5. Significance and Use

5.1 DiEGME is miscible with water and can be readily extracted from the fuel by contact with water during shipping and in storage. Methods are therefore needed to check the additive content in the fuel to ensure proper additive concentration in the aircraft.

5.2 This test method is applicable to analyses performed in the field or in a laboratory.

### 6. Apparatus

6.1 **Refractometer**—The HB temperature compensated, direct reading refractometer and the 0 to 30 or 0 to 16 Brix have been found satisfactory for use.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.J0 on Aviation Fuels.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 14.03.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 14.02.