

Standard Test Method for Determination of the Fatty Acid Methyl Esters Content of Aviation Turbine Fuel Using Flow Analysis by Fourier Transform Infrared Spectroscopy—Rapid Screening Method^{1,2}

This standard is issued under the fixed designation D7797; 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 specifies a rapid screening method using flow analysis by Fourier transform infrared (FA-FTIR) spectroscopy with partial least squares (PLS-1) processing for the determination of the fatty acid methyl ester (FAME) content of aviation turbine fuel (AVTUR), in the range of 10 mg/kg to 150 mg/kg.

NOTE 1—Specifications falling within the scope of this test method are: Specification **D1655** and Defence Standard 91-91.

NOTE 2—This test method detects all FAME components, with peak IR absorbance at approximately 1749 cm^{-1} and C_8 to C_{22} molecules, as specified in standards such as Specification **D6751** and EN 14214. The accuracy of the method is based on the molecular weight of C_{16} to C_{18} FAME species; the presence of other FAME species with different molecular weights could affect the accuracy.

NOTE 3—Additives such as antistatic agents, antioxidants and corrosion inhibitors are measured with the FAME by the FTIR spectrometer. However the effects of these additives are removed by the flow analysis processing.

NOTE 4—FAME concentrations from 150 mg/kg to 500 mg/kg, and below 10 mg/kg can be measured but the precision could be affected.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*

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.J0.05** on Fuel Cleanliness.

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² This standard has been developed through the cooperative effort between ASTM International and the Energy Institute, London. The IP and ASTM logos imply that the ASTM and IP standards are technically equivalent, but their use does not imply that both standards are editorially identical.

2. Referenced Documents

2.1 ASTM Standards:³

- D1298** Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method
- D1655** Specification for Aviation Turbine Fuels
- D4052** Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter
- D4057** Practice for Manual Sampling of Petroleum and Petroleum Products
- D4177** Practice for Automatic Sampling of Petroleum and Petroleum Products
- D6300** Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants
- D6751** Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels
- E1655** Practices for Infrared Multivariate Quantitative Analysis

2.2 CEN Standards:⁴

- EN 14214** Specification Automotive Fuels—Fatty Acid Methyl Esters (FAME) for Diesel Engines—Requirements and Test Methods

2.3 Energy Institute Standards:⁵

- IP 583** Test Method for Determination of the Fatty Acid Methyl Esters Content of Aviation Turbine Fuel Using Flow Analysis by Fourier Transform Infrared Spectroscopy—Rapid Screening Method

³ 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.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁵ Available from the Energy Institute, 61 New Cavendish St., London, W1G 7AR, U.K., <http://www.energyinst.org.uk>.

*A Summary of Changes section appears at the end of this standard