



Standard Test Method for Determination of Contamination Level of Fatty Acid Methyl Esters in Middle Distillate and Residual Fuels Using Flow Analysis by Fourier Transform Infrared Spectroscopy— Rapid Screening Method¹

This standard is issued under the fixed designation D7963; 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) processing for the quantitative determination of the fatty acid methyl ester (FAME) contamination of middle distillates, in the range of 20 mg/kg to 1000 mg/kg, and of middle distillates and residual fuels, following dilution, for levels above 0.1 %.

NOTE 1—[Annex A2](#) describes a dilution procedure to significantly expand the measurement range above 1000 mg/kg for distillates and to enable measurement of residual oils

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 [D6751](#) and EN 14214. The accuracy of the test method is based on the molecular mass of C_{16} to C_{18} FAME species; the presence of other FAME species with different molecular masses 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 any potential interference effects of these additives are eliminated by the flow analysis processing.

NOTE 4—Precision for middle distillate and residual fuel is provided in preliminary form at this time, details are given in [Appendix X1](#).

NOTE 5—The scope of this test method does not include aviation turbine fuel which is addressed by Test Method [D7797](#).

1.2 All stated values are in SI units.

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 [D02.14](#) on Stability and Cleanliness of Liquid Fuels.

Current edition approved Oct. 1, 2014. Published October 2014. DOI: 10.1520/D7963-14.

2. Referenced Documents

2.1 ASTM Standards:²

[D1298](#) Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

[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

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

[D7797](#) 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

[E1655](#) Practices for Infrared Multivariate Quantitative Analysis

2.2 CEN Standard:³

[EN 14214](#) Automotive Fuels—Fatty Acid Methyl Esters (FAME) for Diesel Engines—Requirements and Test Methods

2.3 Energy Institute Standards:⁴

[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

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.

³ Available from the American National Standards Institute (ANSI) 25W 43rd St, 4th Floor, New York, NY 10036.

⁴ Available from the Energy Institute, 61 New Cavendish Street, London, W1G7AR, U.K. www.energyinst.org.uk.