



Designation: D7963 – 19^{ε1}

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.

^{ε1} NOTE—Footnote 8 was corrected editorially in July 2019.

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 C₈ to C₂₂ molecules, as specified in standards such as D6751 and EN 14214. The accuracy of the test method is based on the molecular mass of C₁₆ to C₁₈ 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—The scope of this test method does not include aviation turbine fuel which is addressed by Test Method D7797.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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

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

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

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, Cleanliness and Compatibility of Liquid Fuels.

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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.

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