



Standard Test Method for Hydrogen Content of Middle Distillate Petroleum Products by Low-Resolution Pulsed Nuclear Magnetic Resonance Spectroscopy¹

This standard is issued under the fixed designation D7171; 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 covers the determination of the hydrogen content of middle distillate petroleum products using a low-resolution pulsed nuclear magnetic resonance (NMR) spectrometer. The boiling range of distillates covered by the test method is 150 °C to 390 °C. While this test method may be applicable to middle distillates outside this boiling range, in such cases the precision statements may not apply. The test method is generally based on Test Methods [D3701](#) and [D4808](#), with a major difference being the use of a pulsed NMR spectrometer instead of a continuous wave NMR spectrometer.

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

1.2.1 The preferred units are mass %.

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:²

[D3701 Test Method for Hydrogen Content of Aviation Turbine Fuels by Low Resolution Nuclear Magnetic Resonance Spectrometry](#)

[D4057 Practice for Manual Sampling of Petroleum and Petroleum Products](#)

[D4808 Test Methods for Hydrogen Content of Light Distillates, Middle Distillates, Gas Oils, and Residua by](#)

[Low-Resolution Nuclear Magnetic Resonance Spectroscopy](#)

[D5291 Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants](#)

[D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance](#)

[D6708 Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material](#)

2.2 Other Documents:

[MIL-DTL-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5³](#)

[MIL-DTL-83133 Turbine Fuel, Aviation, Kerosene Type, JP-8 \(NATO F-34\), NATO F-35, and JP-8+100 \(NATO F-37\)](#)

[MIL-DTL-16884 Fuel, Naval Distillate](#)

3. Terminology

3.1 Definitions:

3.1.1 *calibration, n*—the determination of the values of the significant parameters by comparison with values indicated by a set of calibration standards.

3.1.2 *calibration curve (or calibration line), n*—the graphical or mathematical representation of a relationship between the assigned (known) values of calibration standards and the measured responses from the measurement system.

3.1.3 *calibration standard, n*—a standard having an assigned (known) value (reference value) for use in calibrating a measurement instrument or system. This standard is not used to determine the accuracy of the measurement instrument or system (see *check standard*).

3.1.4 *check standard, n*—a material having an assigned (known) value (reference value) used to determine the accuracy of the measurement instrument or system. This standard is

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 D02.03 on Elemental Analysis.

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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 online at the ASSIST Quick Search website <http://quicksearch.dla.mil>.