



Standard Test Method for Determination of Ignition Delay and Derived Cetane Number (DCN) of Diesel Fuel Oils by Combustion in a Constant Volume Chamber^{1,2}

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1. Scope

1.1 This automated laboratory test method covers the quantitative determination of the ignition characteristics of conventional diesel fuel oil, oil-sands based fuels, blends of fuel containing biodiesel material, diesel fuel oils containing cetane number improver additives, and is applicable to products typical of ASTM Specification D 975 grades No. 1-D and 2-D regular and low-sulfur diesel fuel oils, European standard EN 590, and Canadian standards CAN/CGSB-3.517 and 3.6-2000. The test method may also be applied to the quantitative determination of the ignition characteristics of diesel fuel blending components.

1.2 This test method measures the ignition delay and utilizes a constant volume combustion chamber with direct fuel injection into heated, compressed air. An equation converts an ignition delay determination to a derived cetane number (DCN).

1.3 This test method covers the ignition delay range from 3.3 to 6.4 ms (60 to 33 DCN). The combustion analyzer can measure shorter and longer ignition delays, but precision may be affected.

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

1.5 *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 and Lubricants and is the direct responsibility of Subcommittee D02.01 on Combustion Characteristics.

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2. Referenced Documents

2.1 ASTM Standards:³

- D 613 Test Method for Cetane Number of Diesel Fuel Oil
- D 975 Specification for Diesel Fuel Oils
- D 1193 Specification for Reagent Water
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products
- D 4175 Terminology Relating to Petroleum, Petroleum Products, and Lubricants
- D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products
- D 5854 Practice for Mixing and Handling of Liquid Samples of Petroleum and Petroleum Products
- D 6299 Practice for Applying Statistical Quality Assurance Techniques to Evaluate Analytical Measurement System Performance
- D 6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products and Lubricants
- D 6708 Practice for Statistical Assessment and Improvement of the Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material

E 456 Terminology Relating to Quality and Statistics

2.2 ISO Standards:⁴

- ISO 4010 Diesel Engines—Calibrating Nozzle, Delay Pintle Type
- ISO 4259 Petroleum products—Determination and application of precision data in relation to methods of test

2.3 EN Standard:

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, 25 W. 43rd St., 4th floor, New York, NY 10036.