



Designation: D976 – 06 (Reapproved 2016)

## Standard Test Method for Calculated Cetane Index of Distillate Fuels<sup>1</sup>

This standard is issued under the fixed designation D976; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. Department of Defense.*

### 1. Scope

1.1 This test method covers the Calculated Cetane Index formula, which represents a means for directly *estimating* the ASTM cetane number of distillate fuels from API gravity and mid-boiling point. The index value, as computed from the formula, is termed the Calculated Cetane Index.<sup>2</sup>

1.2 The Calculated Cetane Index is not an optional method for expressing ASTM cetane number. It is a supplementary tool to estimate cetane number when used with due regard for its limitations.

1.3 The Calculated Cetane Index formula is particularly applicable to straight-run fuels, catalytically cracked stocks, and blends of the two.

NOTE 1—This test method is temporarily retained because the proposal to the U.S. EPA to control diesel fuel aromatics concentrations via a 40 Calculated Cetane Index minimum is based on the correlation between Test Method D976 and aromatics concentration. Test Method D4737 is the preferred method as estimator of cetane number.

1.4 *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:<sup>3</sup>

D86 Test Method for Distillation of Petroleum Products and

<sup>1</sup> 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.E0 on Burner, Diesel, Non-Aviation Gas Turbine, and Marine Fuels.

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<sup>2</sup> A method of calculating cetane index was developed by the Diesel Fuels Division, Coordinating Fuel and Equipment Research Committee of the Coordinating Research Council. See Young, H. D., "Methods for Estimating Cetane Number," *Proceedings*, PPIRA, American Petroleum Institute, Vol. 30 M [III], 1950. This method was revised in 1960 by Research Division I of Committee D02 to conform to the revised Test Method D613.

<sup>3</sup> 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.

#### Liquid Fuels at Atmospheric Pressure

D287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)

D613 Test Method for Cetane Number of Diesel Fuel Oil

D1298 Test Method for Density, Relative Density, or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

D2887 Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography

D4052 Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

D4737 Test Method for Calculated Cetane Index by Four Variable Equation

#### 2.2 ASTM Adjuncts:<sup>4</sup>

Nomograph for Calculated Cetane Index

### 3. Significance and Use

3.1 The Calculated Cetane Index is one tool available for estimating ASTM cetane number where a test engine is not available for determining this property. It may be employed for approximating cetane number where the quantity of sample is too small for an engine rating. In cases where the cetane number of a fuel has been initially established, the index is useful as a cetane number check on subsequent samples of that fuel, provided its source and mode of manufacture remain unchanged.

3.2 Test Method D4737 may also be used to approximate the ASTM cetane number of diesel fuels.

3.2.1 Procedure A of Test Method D4737 was developed as a result of a larger degree of offset between Test Method D976 Cetane Index and the results of Test Method D613 over the entire range of the correlation. Generally, it has been found that use of Test Method D4737 results in less offset than use of Test Method D976, but there can be specific cases where this is not true.

3.2.2 Procedure A of Test Method D4737 is recommended to estimate the cetane number of diesel fuels with sulfur contents above 500 ppm or No. 1–D diesel fuels.

<sup>4</sup> Available from ASTM International Headquarters. Order Adjunct No. ADJD0976. Original adjunct produced in 1989.