United States
Environmental Protection Agency
Office of Transportation and Air Quality
National Vehicle and Fuel Emissions Laboratory
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Method for Calculating Cetane Index of Diesel Fuels

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NVFEL Reference Number

121

Implementation Approval

Original Procedure Authorized by EPCN # 322 on 05-06-2002

Revision Description

1.0 Scope

The Calculated Cetane Index formula 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 .

2.0 Summary of Method

This is a mathematical calculation method.

3.0 Significance

3.1 The Calculated Cetane Index is a useful tool for estimating ASTM cetane number where a test engine is not available for determining this property. It may be conveniently employed for approximating cetane number where the quantity of sample is too small for an engine rating.

3.2 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.

3.3 Both Calculated Cetane Index and Cetane Number are required official values for Certification Diesel Fuel. Calculated Cetane Index is not a required value for enforcement samples.

4.0 Applicable Documents

4.1 D976, Standard Test Method for Calculating Cetane Index of Distillate Fuels.

4.2 D86, Test Method for Distillation of Petroleum Products

4.3 D4052 Standard Test Method for Density and Relative Density of Liquids by Digital Density Meter.

5.0 Definitions - N/A

6.0 Limitations

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

7.0 Safety - N/A

8.0 Apparatus

8.1 Computer

8.2 Fuel Test Database File

9.0 Reagents and Materials - N/A

10.0 Sampling - N/A

11.0 Calibration - N/A

12.0 Analytical Procedure.

12.1 The Distillation Method (as described in Step 4.1) and the API Gravity Method (as described in Step 4.2) must be completed

12.2 The automatically calculated cetane index is determined from the following equation:

Calculated cetane index =

$$-420.34 + 0.016\ G^{2} + 0.192\ G \log M + 65.01\ (\log M)^{2} - 0.0001809\ M^{2}. \quad (1)$$

G = API Degrees @ 60 ^{0}F

M = D86 Temperature @ 50% volume, in ^{0}F

13.0 Calculation and Reporting

13.1 The FTAG number of the sample is entered into “Fuel Tests Data Base”, the “Cetane Index” Table and then the Cetane Index is automatically calculated using the T50 from “Distillation Table” and the API degrees from the “New Gravity” Table.

13.2 Print out and sign “Cetane Index by Date” form and place in the secured file cabinet .

14.0 Performance Criteria - N/A