



Standard Test Method for Determination of the Red Dye Concentration and Estimation of the ASTM Color of Diesel Fuel and Heating Oil Using a Portable Visible Spectrophotometer¹

This standard is issued under the fixed designation D 6756; 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 describes the determination of the red dye concentration of diesel fuel and heating oil and the estimation of the ASTM color of undyed and red-dyed diesel fuel and heating oil. The test method is appropriate for use with diesel fuel and heating oil of Grades 1 and 2 described in Specifications D 396, D 975, D 2880 and D 3699. Red dye concentrations are determined at levels equivalent to 0.1 to 20 mg/L of Solvent Red 26 in samples with ASTM colors ranging from 0.5 to 5. The ASTM color of the base fuel of red-dyed samples with concentration levels equivalent to 0.1 to 20 mg/L of Solvent Red 26 is estimated for the ASTM color range from 0.5 to 5. The ASTM color of undyed samples is estimated over the ASTM color range of 0.5 to 5.

1.2 The values stated in SI units are to be regarded as the 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 396 Specification for Fuel Oils²
- D 975 Specification for Diesel Fuel Oils²
- D 1500 Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)²
- D 2880 Specification for Gas Turbine Fuel Oils³
- D 3699 Specification for Kerosine³
- D 4052 Test Method for Density and Relative Density of Liquids by Digital Density Meter³
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³
- D 4177 Practice for Automatic Sampling of Petroleum and

Petroleum Products³

- D 6045 Test Method for Color of Petroleum Products by the Automatic Tristimulus Method⁴
- E 203 Test Method for Water Using Volumetric Karl Fischer Titration⁵
- E 1655 Practices for Infrared, Multivariate, Quantitative Analysis⁶
- E 2056 Practice for Qualifying Spectrometers and Spectrophotometers for Use in Multivariate Analysis, Calibrated Using Surrogate Mixtures⁶

3. Terminology

3.1 Definitions:

3.1.1 *ASTM color, n*—an empirical definition of the color of a petroleum liquid based on a scale of 0.5 to 8 as determined by Test Method D 1500.

3.1.2 *surrogate calibration, n*—a multivariate calibration that is developed using a calibration set which consists of mixtures with pre-specified and reproducible compositions that contain substantially fewer chemical components than the samples which will ultimately be analyzed. **E 2056**

3.1.3 *surrogate method, n*—a standard test method that is based on a surrogate calibration. **E 2056**

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *red dye, n*—substance that, when added to fuel, absorbs green light and imparts a red color to the product. For this test method, red dyes are:

3.2.1.1 *product dyes, n*—alkyl derivatives of azobenzene-4-azo-2-naphthol (methyl derivatives of Color Index No. 26105) which are more soluble in diesel fuel.

3.2.1.2 *solvent red 26, n*—an azobenzene-4-azo-2-naphthol dye of a specific chemical structure that is used to gage the amount of red dye present in a given sample.

4. Summary of Test Method

4.1 A sample is introduced into the liquid specimen cell. The cell is placed into the light path of the apparatus. A beam of visible light is imaged through the sample onto a detector,

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.05 on Properties of Fuels, Petroleum Coke and Carbon Materials.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.

⁴ *Annual Book of ASTM Standards*, Vol 05.04.

⁵ *Annual Book of ASTM Standards*, Vol 15.05.

⁶ *Annual Book of ASTM Standards*, Vol 03.06.