



# Standard Test Method for Free Water and Particulate Contamination in Middle Distillate Fuels (Clear and Bright Numerical Rating)<sup>1</sup>

This standard is issued under the fixed designation D4860; 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.

## 1. Scope\*

1.1 This test method covers a rapid, portable means for field and laboratory use to inspect visually for particulate matter and numerically rate free water in aviation turbine and distillate fuels.

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

1.3 *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.* For specific warning statements, see 11.2.3 and Annex A1.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

**D1500** Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)

**D1744** Test Method for Determination of Water in Liquid Petroleum Products by Karl Fischer Reagent

**D2276** Test Method for Particulate Contaminant in Aviation Fuel by Line Sampling

**D2709** Test Method for Water and Sediment in Middle Distillate Fuels by Centrifuge

**D4057** Practice for Manual Sampling of Petroleum and Petroleum Products

**D4176** Test Method for Free Water and Particulate Contamination in Distillate Fuels (Visual Inspection Procedures)

## 3. Terminology

### 3.1 Definitions:

<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 D02.14 on Stability and Cleanliness of Liquid Fuels. Stability and Cleanliness of Liquid Fuels.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3.1.1 *clear-and-bright* (also termed *clean-and-bright*), *n*—a condition in which the fuel contains no visible water drops or particulates and is free of haze or cloudiness.

3.1.2 *free water*, *n*—water in excess of that soluble in the fuel at the temperature of the test and appearing in the fuel as a haze, cloudiness, droplets, or water layer.

3.1.3 *solid particulate*, *n*—*in liquid fuels*, small solid or semi-solid particles, sometimes referred to as silt or sediment, present in fuel.

3.1.3.1 *Discussion*—Some examples of solid particulates are air-blown dust, corrosion by-products, internal protective-coating deterioration, and products of fuel degradation and microbial growth.

### 3.2 Definitions of Terms Specific to This Standard:

3.2.1 *Micro-Separometer*<sup>3</sup> *clear-and-bright* (MSEP-C&B<sup>3</sup>), *n*— a numerical rating indicating the presence and ease of removal of free water and particulate contamination by filtration.

## 4. Summary of Test Method

4.1 Visual inspection of the fuel sample for free water and particulate matter is performed immediately when the sample is taken. A glass container is used to view for water haze, and the fuel sample is swirled to create a vortex to detect the presence of particulate matter.

4.2 A numerical rating for free water is obtained by filtering a portion of the fuel sample at a programmed rate (50 mL/45 s) through a standard fiberglass coalescer/filter. A portion of the effluent is used to establish a reference (100) level by a light transmittance measurement. Another portion of the unprocessed (unfiltered) fuel sample is then compared to the 100 reference level. The results are reported on a 50 to 100 scale to the nearest whole number. A test can be performed in 5 min to 10 min.

NOTE 1—The standard fiberglass coalescer/filter consists of a precision-machined aluminum housing containing fiber-glass material that has been selected to specific air flow characteristics. These criteria have a direct bearing on the test results.

<sup>3</sup> 'MSEP' and 'Micro-Separometer' are trademarks of EMCEE Electronics, Inc., 520 Cypress Ave., Venice, FL 34285.

\*A Summary of Changes section appears at the end of this standard