



Standard Test Method for Undissolved Water In Aviation Turbine Fuels¹

This standard is issued under the fixed designation D 3240; 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.

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

1. Scope

1.1 This test method covers the measurement of undissolved water in aviation turbine fuels in flowing fuel streams without exposing the fuel sample to the atmosphere or to a sample container. The usual range of test readings covers from 1 to 60 ppm of free water. This test method does not detect water dissolved in the fuel, and thus test results for comparable fuel streams can vary with fuel temperature and the degree of water solubility in the fuel.

1.2 *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. Terminology

2.1 *Definition of a Term Specific to This Standard:*

2.1.1 *free water*—water not dissolved in the fuel.

3. Summary of Test Method

3.1 A measured sample of fuel is passed through as uranine dye-treated filter pad. Undissolved (free) water in the fuel will react with the uranine dye. When the pad is subsequently illuminated by ultra violet (UV) light, the dye previously contacted by free water will fluoresce a bright yellow with the brightness increasing for increasing amounts of free water in the fuel. The UV light-illuminated pad is compared to a known standard using a photocell comparator, and the free water in the fuel sample is read out in parts per million by volume. By varying the fuel sample size, the range of the test method can be increased.

4. Significance and Use

4.1 Undissolved (free) water in aviation fuel can encourage the growth of microorganisms and subsequent corrosion in the tanks of aircraft and can also lead to icing of filters in the fuel system. Control of free water is exercised in ground fueling equipment by use of filter-coalescers and water separators.

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.01 on Aviation Fuels.

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5. Apparatus

5.1 *Test Pad Rater*—A device² for comparing the fluorescence of the test pad to a known standard, while both are illuminated by the same source of UV light, shall be used. The amount of UV light striking the standard shall be modulated until the total fluorescence of the test pad and the standard are equal; this shall be determined using a photocell bridge circuit null indicator. The light modulating device for controlling the UV light striking the standard shall provide a direct reading in parts per million by volume of free water.

5.2 *Test Pads*—Absorbent filter disks of 25-mm diameter shall be coated on one side with uranine (sodium fluorescein) dye at a concentration of 0.23 to 0.29 mg per 25 mm pad. The test pads³ shall be individually packaged in hermetically sealed envelopes or other suitable containers. Fresh, unused test pads shall have an orange color over the dyed surface. Any discoloration, unevenness in dye content, or faded (to a yellow color) appearance shall be cause for rejection.

5.3 *Test Pad Holder⁴ and Sampling Line*—A test pad holder and sampling line shall be used to draw the fuel sample through the test pad at a rate of 600 to 800 mL/min. Means shall be provided to flush the test pad sampling line and holder immediately prior to use. The test pad holder shall include an orifice of 1-mm (0.040-in.) diameter upstream of the pad to disperse water droplets in the fuel.

5.4 *Tweezers*—Suitable clean, dry tweezers shall be used at all times when handling the test pad.

5.5 *Blotting Paper*—Clean, dry, absorbent paper towels, blotters, etc., shall be provided for blotting the test pad prior to rating to remove excess fuel. The blotter paper shall neither impart color or stain nor leave any residue on the test pads.

5.6 *Sampling Valve Connection*, designed to meet the following requirements: (1) It shall be mounted in the sampling point and must incorporate a self-sealing quick action coupling

² The Aqua-Glo Series II instrument manufactured by Gammon Technical Products, Inc., P.O. Box 400, Manasquan, NJ 08736-0400 was used in the precision test program. The unit is currently available in a Series III configuration which is changed only in the power supply. All water content measuring components remain of the same configuration as the Series II instrument. Manufacturers who wish to offer similar products are referred to Committee D02 Equipment Replacement Guidelines.

³ Aqua-Glo test pads used in the Precision Test Program are available from Gammon Technical Products Inc., P.O. Box 400, Manasquan, NJ 08736-0400.

⁴ A test pad holder used in the Precision Test Program is available from Gammon Technical Products Inc., P.O. Box 400, Manasquan, NJ 08736-0400.