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An American National Standard

Standard Test Method for Evaluating Water Sensitivity of Multi-Purpose Power Transmission Fluids¹

This standard is issued under the fixed designation D 4997; 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 evaluates the effect of water contamination on additive-containing fluids.

1.2 The values stated in SI (metric) units are to be regarded as the standard.

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 96 Test Methods for Water and Sediment in Crude Oils²

D 1193 Specification for Reagent Water³

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products⁴

D 4628 Test Method for Analysis of Barium, Calcium, Magnesium, and Zinc in Unused Lubricating Oils by Atomic Absorption Spectroscopy⁴

3. Terminology

3.1 Description of Terms Specific to This Standard:

3.1.1 *emulsion*—the layers of opaque substance between clear fluid and free water observed in the test tube at the completion of the test.

3.1.2 *free water*—the clear fluid located between the emulsion layer, if any, and the solid layer, if any, that has separated from the fluid in the test tube observed at the completion of the test.

3.1.3 *light-tight chamber*—an enclosure that, when sealed, excludes all light (total darkness).

3.1.4 *solids*—the substance, if any, located below the free water layer, if any, in the test tube observed at the completion of the test.

4. Summary of Test Method

4.1 Water is added to a volume of fluid to be tested. The mixture is agitated to produce an emulsion. A portion of the emulsion is placed in a totally dark chamber for one week. When removed from the light-tight chamber, the sample is

centrifuged. The sample is then rated.

5. Significance and Use

5.1 This test method measures the water sensitivity of multi-purpose power transmission fluids used in on-off highway equipment.

5.2 This test method was developed for this purpose on referring to John Deere Standard JDQ19.⁵

6. Apparatus

6.1 *Blender*, capable of 12 000 to 14 000 r/min.⁶

6.2 *Centrifuge*, capable of whirling two or more filled centrifuge tubes at a speed that can be controlled to give a relative centrifugal force (rcf) of between 900 and 1 000 at the tip of the tubes.

6.2.1 Calculate the speed of the rotating head as follows:

$$r/\text{min} = 1335.6 (rcf/d)^{1/2}$$

where:

r/min = revolutions per minute,

rcf = relative centrifugal force, and

d = diameter of swing in millimetres as defined in Test Method D 96.

6.2.2 *Example*—If rcf = 950, and d = 457 mm, then r/min = 1926.

6.3 *Centrifuge Tube*, 152 mm long, ASTM 100 mL cone-shaped centrifuge tube, as specified in Test Methods D 96.

6.4 *Light-Tight Chamber*, of suitable size to contain centrifuge tubes upright, in an environment completely void of light.

7. Reagents and Materials

7.1 The fluid sample shall be thoroughly representative of the fluid in question, and the portion used shall be thoroughly representative of the sample itself. Sample in accordance with Practice D 4057.

7.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water as defined by Type III of Specification D 1193.

8. Procedure

8.1 Preparation:

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.B on Automotive Lubricants.

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² Annual Book of ASTM Standards, Vol 05.01.

³ Annual Book of ASTM Standards, Vol 11.01.

⁴ Annual Book of ASTM Standards, Vol 05.03.

⁵ Available from John Deere and Company, Corporate Standards, John Deere Road, Moline, IL 61265.

⁶ Commercial Sargent Welch blender, Part No. 5-61642B, or equivalent, is available from Sargent Welch, 7400 N. Linder Ave., P.O. Box 1026, Skokie, IL 60077-1026.