



Standard Test Method for Trace Sediment in Lubricating Oils¹

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This standard has been approved for use by agencies of the Department of Defense. This test method has been adopted for use by government agencies to replace Method 3004 of Federal Test Method Standard No. 791b.

1. Scope

1.1 This test method covers the determination of trace amounts (less than 0.05 volume %) of sediment in lubricating oils. Since oil-soluble material precipitated by the specified solvent is not intended as part of the measured sediment, the test method is not applicable in cases where precipitated oil-soluble components will appreciably contribute to the sediment readings.

1.2 The values stated in acceptable 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 86 Test Method for Distillation of Petroleum Products²
- D 611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents²
- D 1298 Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²
- D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³
- D 4177 Practice for Automatic Sampling of Petroleum and Petroleum Products³

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *trace sediment, n*—the number of millilitres of sediment precipitated from 100 mL of oil sample (volume percent) when equal parts of the oil sample and the specified solvent are mixed and centrifuged under the prescribed conditions.

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 D02.06 on Analysis of Lubricants.

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

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

4. Significance and Use

4.1 This test measures the trace level amount of sediment that is naphtha-insoluble and can be separated by centrifuging. Excessive amounts of sediment in oil could lead to system malfunction in critical applications.

5. Apparatus

5.1 *Centrifuge*, meeting all the safety requirements for normal use and capable of whirling two or more filled centrifuge tubes at a speed which can be controlled to give a relative centrifugal force (rcf) between 600 and 700 at the tip of the tubes. The revolving head, trunnion rings, and trunnion cups, including the rubber cushion, shall be soundly constructed to withstand the maximum centrifugal force capable of being delivered by the power source. The trunnion cups and cushions shall firmly support the tubes when the centrifuge is in motion. The centrifuge shall be enclosed by a metal shield or case strong enough to eliminate danger if any breakage occurs. Calculate the speed of the rotating head as follows:

$$\text{rpm} = 1337 \sqrt{\text{rcf}/d} \quad (1)$$

where:

rcf = relative centrifugal force, and

d = diameter of swing, in millimetres, measured between tips of opposite tubes when in rotating position.

The relationship between the diameter swing, relative centrifugal force, and revolutions per minute is given in Table 1.

5.2 *Centrifuge Tube*, cone-shaped, conforming to the dimensions given in Fig. 1, and made of thoroughly annealed glass. The graduations, numbered as shown in Fig. 1, shall be clear and distinct, and the mouth shall be constructed in a shape suitable for closure with a cork. Scale-error tolerances and smallest graduations between various calibration marks are given in Table 2 and apply to calibrations made with redistilled mercury up to the 0.30-mL mark and distilled water for all remaining marks at 20°C.

6. Reagent

6.1 *ASTM Precipitation Naphtha* (**Warning**—see Note 1,