



Standard Test Method for Trace Sediment in Lubricating Oils¹

This standard is issued under the fixed designation D 2273; 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.

^{e1} NOTE—Warning notes were editorially moved into the standard text in March 2003.

^{ε2} NOTE—Restored correct reproducibility information in 10.1.2 editorially in November 2004.

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 Products at Atmospheric Pressure²

D 611 Test Methods for Aniline Point and Mixed Aniline Point of Petroleum Products and Hydrocarbon Solvents²

D 1298 Test Method 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:

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.06 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.

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.

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