



Designation: D1481 – 17

Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Lipkin Bicapillary Pycnometer¹

This standard is issued under the fixed designation D1481; 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 covers the determination of the density of oils more viscous than 15 mm²/s (cSt) at 20 °C, and of viscous oils and melted waxes at elevated temperatures, but not at temperatures at which the sample would have a vapor pressure of 13.3 kPa (100 mmHg) or above.

NOTE 1—To determine the densities of less viscous liquids at 20 °C or 25 °C use Test Method [D1217](#).

1.2 This test method provides a calculation procedure for converting density to relative density (specific gravity).

1.3 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause central nervous system, kidney and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for details and EPA's website—<http://www.epa.gov/mercury/faq.htm>—for additional information. Users should be aware that selling mercury and/or mercury containing products into your state or country may be prohibited by law.

1.4 The values stated in SI units are to be regarded as standard.

1.4.1 *Exception*—Other units of measurement are included in this standard for information only.

1.5 *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.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

[D1217](#) Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer

[D1250](#) Guide for Use of the Petroleum Measurement Tables

[D4052](#) Test Method for Density, Relative Density, and API Gravity of Liquids by Digital Density Meter

3. Terminology

3.1 *Definitions:*

3.1.1 *density, n* —mass per unit volume at a specified temperature. **D4052**

3.1.2 *relative density (specific gravity), n* —the ratio of the density of a material at a stated temperature to the density of water at a stated temperature. **D4052**

4. Summary of Test Method³

4.1 The liquid is drawn into the bicapillary pycnometer through the removable siphon arm and adjusted to volume at the temperature of test, in such a manner that there is practically no drainage in the unfilled tubing. After equilibration at the test temperature, liquid levels are read, and the pycnometer is removed from the thermostated bath, cooled to room temperature, and weighed.

4.2 Density or relative density (specific gravity), as desired, is then calculated from the volume at the test temperature and the weight of the sample. The effect of air buoyancy is included in the calculations.

¹ 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 [D02.04.0D](#) on Physical and Chemical Methods.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ For a more complete discussion of this procedure, see Lipkin, M. R., Mills, I. W., Martin, C. C., and Harvey, W. T., *Analytical Chemistry*, ANCHA, Vol 21, 1949, p. 504.

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