



Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)¹

This standard is issued under the fixed designation D 287; 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. This test method has been adopted for use by government agencies to replace Method 401 of Federal Test Method Standard No. 791b.

ε¹ NOTE—Editorial corrections were made throughout in April 2000.

1. Scope

1.1 This test method covers the determination by means of a glass hydrometer of the API gravity of crude petroleum and petroleum products normally handled as liquids and having a Reid vapor pressure (Test Method D 323) of 26 psi (180 kPa) or less. Gravities are determined at 60°F (15.56°C), or converted to values at 60°F, by means of standard tables. These tables are not applicable to nonhydrocarbons or essentially pure hydrocarbons such as the aromatics.

NOTE 1—The international version of this test method is described in Practice D 1298.

1.2 Values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information purposes only.

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.* For specific hazard statements, see 8.3.

2. Referenced Documents

2.1 ASTM Standards:

D 323 Test Method for Vapor Pressure of Petroleum Products (Reid Method)²

D 1250 Guide for Petroleum Measurement Tables²

D 1298 Practice for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method²

E 1 Specification for ASTM Thermometers³

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.02.0A on Temperature, Density, Physical Properties.

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² Annual Book of ASTM Standards, Vol 05.01.

³ Annual Book of ASTM Standards, Vol 14.03.

E 100 Specification for ASTM Hydrometers³

2.2 *IP Standards:*⁴

Specifications for IP Standard Thermometers

IP Specifications for Petroleum Hydrometers

3. Terminology

3.1 Definitions:

3.1.1 *API gravity*—a special function of relative density (specific gravity) 60/60°F (15.56/15.56°C), represented by:

$$\text{API gravity, deg} = (141.5/\text{sp gr } 60/60^\circ\text{F}) - 131.5 \quad (1)$$

No statement of reference temperature is required, since 60°F is included in the definition.

4. Summary of Test Method

4.1 This test method is based on the principle that the gravity of a liquid varies directly with the depth of immersion of a body floating in it. The floating body, which is graduated by API gravity units in this method, is called an API hydrometer.

4.2 The API gravity is read by observing the freely floating API hydrometer and noting the graduation nearest to the apparent intersection of the horizontal plane surface of the liquid with the vertical scale of the hydrometer, after temperature equilibrium has been reached. The temperature of the sample is read from a separate accurate ASTM thermometer in the sample or from the thermometer which is an integral part of the hydrometer (thermohydrometer).

5. Significance and Use

5.1 Accurate determination of the gravity of petroleum and its products is necessary for the conversion of measured volumes to volumes at the standard temperature of 60°F (15.56°C).

5.2 Gravity is a factor governing the quality of crude oils. However, the gravity of a petroleum product is an uncertain

⁴ Available from the Institute of Petroleum, 61 New Cavendish St., London W1M, 8AR, England.