



Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)¹

This standard is issued under the fixed designation D 323; 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.

1. Scope

1.1 This test method covers procedures for the determination of vapor pressure (see Note 1) of gasoline, volatile crude oil, and other volatile petroleum products. Procedure A is applicable to gasoline and other petroleum products with a vapor pressure of less than 180 kPa (26 psi). Procedure B may also be applicable to these other materials, but only gasoline was included in the interlaboratory test program to determine the precision of this test method. Neither procedure is applicable to liquefied petroleum gases or fuels containing oxygenated compounds other than methyl *t*-butyl ether (MTBE) (see Note 2). Procedure C is for materials with a vapor pressure of greater than 180 kPa (26 psi) and Procedure D for aviation gasoline with a vapor pressure of approximately 50 kPa (7 psi).

NOTE 1—Because the external atmospheric pressure is counteracted by the atmospheric pressure initially present in the vapor chamber, the Reid vapor pressure is an absolute pressure at 37.8°C (100°F) in kilopascals (pounds-force per square inch). The Reid vapor pressure differs from the true vapor pressure of the sample due to some small sample vaporization and the presence of water vapor and air in the confined space.

NOTE 2—For determination of the vapor pressure of liquefied petroleum gases refer to Test Method D 1267. For determination of the vapor pressure of gasoline-oxygenate blends refer to Test Method D 4953.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are provided for information 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.* Specific precautionary statements are given in Sections 6 and 17, and Note 6, Note 9, Note 12, Note 13, Note A1.1 and Note A1.2.

2. Referenced Documents

2.1 ASTM Standards:

D 1267 Test Method for Vapor Pressure of Liquefied Petro-

leum (LP) Gases (LP-Gas Method)²

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³

D 4953 Test Method for Vapor Pressure of Gasoline and Gasoline-Oxygenate Blends (Dry Method)³

E 1 Specification for ASTM Thermometers⁴

3. Summary of Test Method

3.1 The liquid chamber of the vapor pressure apparatus is filled with the chilled sample and connected to the vapor chamber that has been heated to 37.8°C (100°F) in a bath. The assembled apparatus is immersed in a bath at 37.8°C (100°F) until a constant pressure is observed. The reading, suitably corrected, is reported as the Reid vapor pressure.

3.2 All four procedures utilize liquid and vapor chambers of the same internal volume. Procedure B utilizes a semi-automatic apparatus immersed in a horizontal bath and rotated while attaining equilibrium. Either a Bourdon gage or pressure transducer may be used with this procedure. Procedure C utilizes a liquid chamber with two valved openings. Procedure D requires more stringent limits on the ratio of the liquid and vapor chambers.

4. Significance and Use

4.1 Vapor pressure is an important physical property of volatile liquids. This test method is used to determine the vapor pressure at 37.8°C (100°F) of petroleum products and crude oils with initial boiling point above 0°C (32°F).

4.2 Vapor pressure is critically important for both automotive and aviation gasolines, affecting starting, warmup, and tendency to vapor lock with high operating temperatures or high altitudes. Maximum vapor pressure limits for gasoline are legally mandated in some areas as a measure of air pollution control.

4.3 Vapor pressure of crude oils is of importance to the crude producer and the refiner for general handling and initial refinery treatment.

4.4 Vapor pressure is also used as an indirect measure of the evaporation rate of volatile petroleum solvents.

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 D02.08 on Volatility.

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

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

⁴ *Annual Book of ASTM Standards*, Vol 14.03.