



Designation: D5188 – 23

Standard Test Method for Vapor-Liquid Ratio Temperature Determination of Fuels (Evacuated Chamber and Piston Based Method)¹

This standard is issued under the fixed designation D5188; 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 temperature at which the vapor formed from a selected volume of volatile petroleum product saturated with air at 0 °C to 1 °C (32 °F to 34 °F) produces a pressure of 101.3 kPa (one atmosphere) against vacuum. This test method is applicable to samples for which the determined temperature is between 36 °C and 80 °C (97 °F and 176 °F) and the vapor-liquid ratio is between 8 to 1 and 75 to 1.

NOTE 1—When the vapor-liquid ratio is 20:1, the result is intended to be comparable to the results determined by Test Method D2533.

NOTE 2—This test method may also be applicable at pressures other than one atmosphere, but the stated precision may not apply.

1.2 This test method is applicable to both gasoline and gasoline-oxygenate blends.

1.2.1 Some gasoline-oxygenate blends may show a haze when cooled to 0 °C to 1 °C. If a haze is observed in 12.5, it shall be indicated in the reporting of results. The precision and bias statements for hazy samples have not been determined (see Note 12).

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

1.3.1 *Exception*—The values given in parentheses are provided for information only.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use. For specific warnings, see Section 7 and subsection 8.1.1.*

1.5 *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 Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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 D02.08 on Volatility.

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2. Referenced Documents

2.1 ASTM Standards:²

D2533 Test Method for Vapor-Liquid Ratio of Spark-Ignition Engine Fuels (Withdrawn 2008)³

D2892 Test Method for Distillation of Crude Petroleum (15-Theoretical Plate Column)

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

D6708 Practice for Statistical Assessment and Improvement of Expected Agreement Between Two Test Methods that Purport to Measure the Same Property of a Material

3. Terminology

3.1 Definitions:

3.1.1 For definitions of general terms used in D02 standards, refer to Terminology D4175.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 $T_{(V/L = 20)}$, n —the equilibrium temperature at which the partial pressure of a sample under test conditions is equal to 101.3 kPa (14.69 psia) and the vapor-liquid ratio is 20.

3.2.2 *vapor-liquid ratio of a fuel*, n —the ratio at a specified temperature and pressure of the volume of vapor in equilibrium with liquid to the volume of sample charged, as a liquid, at 0 °C (32 °F).

4. Summary of Test Method

4.1 A known volume of chilled, air-saturated sample is introduced into an evacuated, thermostatically controlled test chamber of known volume or a test chamber with moveable piston that expands the volume after sample introduction, the

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 The last approved version of this historical standard is referenced on www.astm.org.

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