



Standard Test Method for Volatility of Liquefied Petroleum (LP) Gases¹

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1. Scope

1.1 This test method is a measure of the relative purity of the various types of liquefied petroleum (LP) gases and helps to ensure suitable volatility performance. The test results, when properly related to vapor pressure and density of the product, can be used to indicate the presence of butane and heavier components in propane type LP-gas, and pentane and heavier components in propane-butane and butane type fuels. The presence of hydrocarbon compounds less volatile than those of which the LP-gas is primarily composed is indicated by an increase in the 95 % evaporated temperature.

1.2 Chromatographic analysis should be used when the concentration and type of higher boiling compounds must be identified.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 96 Test Methods for Water and Sediment in Crude Oil by Centrifuge Method (Field Procedure)²
- D 1796 Test Method for Water and Sediment in Fuel Oils by the Centrifuge Method (Laboratory Procedure)²
- E 1 Specification for ASTM Thermometers³

3. Summary of Test Method

3.1 The product is refrigerated by means of a cooling coil, and 100 mL of the liquid is collected in a weathering tube. The liquid is allowed to weather under specified conditions and the temperature is observed when 95 % has evaporated. Correction for variation of barometric pressure is made.

4. Significance and Use

4.1 Volatility, expressed in terms of the 95 % evaporated

temperature of the product, is a measure of the amount of least volatile fuel components present in the product. Coupled with a vapor pressure limit, it serves to ensure essentially single-component products in the cases of commercial propane and commercial butane fuel types. When volatility is coupled with a vapor pressure limit which has been related to gravity, as in the case of the commercial PB-mixture type of fuels, the combination serves to assure essentially two component mixtures for such fuels. When coupled with a proper vapor pressure limit, this measurement serves to assure that specialty propane products will be composed chiefly of propane and propylene and that propane will be the major constituent.

5. Apparatus

5.1 *Weathering Tube*—A centrifuge tube, cone-shaped, conforming to the dimensions given in Fig. 1 and made of thoroughly annealed heat-resistant glass.⁴ The shape of the lower tip of the tube is especially important. The taper shall be uniform and the bottom shall be rounded as shown in Fig. 1. The tubes shall comply in wall thickness to ASTM centrifuge tube requirements (Note 1). The graduation tolerances are given in Table 1.

NOTE 1—Requirements for centrifuge tubes appear in Test Methods D 96 and D 1796.

5.2 *Tube Support*—Means shall be provided for supporting the weathering tube by its neck in a vertical position.

5.3 *Water Bath* (for use in tests on butane and propane-butane mixture types of liquefied petroleum gas only). A shallow container filled with clean water having a maintained temperature ranging from 15 to 21°C (60 to 70°F) and a depth of 38 mm (1½ in.).

5.4 *Thermometer*—ASTM Armored Weathering Test Thermometer having a range from -50 to 5°C (-58 to 41°F) and conforming to the requirements for Thermometer 99C-92 (99F-86) as prescribed in Specification E 1.

5.5 Sampling Precooling Equipment:

5.5.1 *Cooling Vessel*—Any suitable wide-mouthed metal container or Dewar flask at least 64 mm (2½ in.) in inside diameter by 292 mm (11½ in.) deep.

5.5.2 *Cooling Coil*—Approximately 6 m (20 ft) of 4.8-mm (3/16-in.) outside diameter soft copper tubing, wound around a hollow mandrel at least 54 mm (2 1/8 in.) in outside diameter,

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

³ *Annual Book of ASTM Standards*, Vol 14.03.

⁴ Borosilicate glass has been found satisfactory for this purpose.