



Standard Test Method for Gum Content in Fuels by Jet Evaporation¹

This standard is issued under the fixed designation D381; 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 the determination of the existent gum content of aviation fuels, and the gum content of motor gasolines or other volatile distillates in their finished form, (including those containing alcohol and ether type oxygenates and deposit control additives—see **Note 7** for additional information) at the time of test.

1.2 Provisions are made for the determination of the heptane insoluble portion of the residue of non-aviation fuels.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3.1 The accepted SI unit of pressure is the Pascal (Pa); the accepted SI unit for temperature is degrees Celsius.

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.* For specific warning statements, see **6.4**, **7.4**, and **9.1**.

2. Referenced Documents

2.1 ASTM Standards:²

D1655 Specification for Aviation Turbine Fuels

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

E1 Specification for ASTM Liquid-in-Glass Thermometers

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 Energy Institute Standard:³

¹ This test method is under the jurisdiction of ASTM Committee **D02** on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee **D02.14** on Stability and Cleanliness of Liquid Fuels.

Current edition approved April 15, 2009. Published April 2009. Originally approved in 1934. Last previous edition approved in 2004 as D381– 04^{ε1}. DOI: 10.1520/D0381-09.

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 Available from Energy Institute, 61 New Cavendish St., London, WIG 7AR, U.K.

IP Standard Methods for Analysis and Testing of Petroleum Products

IP 540 Determination of the existent gum content of aviation turbine fuel – jet evaporation method

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *existent gum*—the evaporation residue of aviation fuels, without any further treatment.

3.2 For non-aviation fuels, the following definitions apply.

3.3 *solvent washed gum content*—the residue remaining when the evaporation residue (see **3.4**) has been washed with heptane and the washings discarded.

3.3.1 *Discussion*—For motor gasoline or non-aviation gasoline, solvent washed gum content was previously referred to as existent gum.

3.4 *unwashed gum content*—the evaporation residue of the product or component under test, without any further treatment.

4. Summary of Test Method

4.1 When testing either aviation or motor gasoline, a 50 ± 0.5 mL quantity of fuel is evaporated under controlled conditions of temperature and flow of air (see **Table 1**). When testing aviation turbine fuel, a 50 ± 0.5 mL quantity of fuel is evaporated under controlled conditions of temperature and flow of steam (see **Table 1**). For aviation gasoline and aviation turbine fuel, the resulting residue is weighed and reported as milligrams per 100 mL. For motor gasoline, the residue is weighed before and after extracting with heptane and the results reported as milligrams per 100 mL.

NOTE 1—Specification **D1655** allows the existent gum of aviation turbine fuels to be determined by either Test Method D381 or **IP 540**, with Test Method D381 identified as the referee test method. Test Method D381 specifically requires the use of steam as the evaporating medium for aviation turbine fuels, whereas **IP 540** allows either air or steam as the evaporating medium for aviation turbine fuels.

5. Significance and Use

5.1 The true significance of this test method for determining gum in motor gasoline is not firmly established. It has been proved that high gum can cause induction-system deposits and

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