



## Standard Test Methods for Volumetric Measurement of Gaseous Fuel Samples<sup>1</sup>

This standard is issued under the fixed designation D 1071; 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 These test methods cover the volumetric measuring of gaseous fuel samples, including liquefied petroleum gases, in the gaseous state at normal temperatures and pressures. The apparatus selected covers a sufficient variety of types so that one or more of the methods prescribed may be used for laboratory, control, reference, or in fact any purpose where it is desired to know the quantity of gaseous fuel or fuel samples under consideration. The various types of apparatus are listed in Table 1.

1.2 *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. Terminology Terminology and Units of Measurement

2.1 *Units of Measurement*—All measurements shall be expressed in inch-pound units (that is: foot, pound (mass), second, and degrees Fahrenheit); or metric units (that is: metre, kilogram, second, and degrees Celsius).

2.2 *Standard Conditions*, at which gaseous fuel samples shall be measured, or to which such measurements shall be referred, are as follows:

#### 2.2.1 Inch-pound Units:

- (1) A temperature of 60.0°F,
- (2) A pressure of 14.73 psia.
- (3) Free of water vapor or a condition of complete water-vapor saturation as specified per individual contract between interested parties.

#### 2.2.2 SI Units:

- (1) A temperature of 288.15K (15°C).
- (2) A pressure of 101.325 kPa (absolute).
- (3) Free of water vapor or a condition of complete water-vapor saturation as specified per individual contract between interested parties.

#### 2.3 Standard Volume:

2.3.1 *Standard Cubic Foot of Gas* is that quantity of gas which will fill a space of 1.000 ft<sup>3</sup> when under the standard conditions (2.2.1).

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D-3 on Gaseous Fuels and are the direct responsibility of Subcommittee D03.01 on Collection and Measurement of Gaseous Samples.

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TABLE 1 Apparatus for Measuring Gaseous Fuel Samples

| Apparatus                                                          | Capacity and Range of Operating Conditions Covered in Section No. | Calibration Procedure Covered in Section No. |
|--------------------------------------------------------------------|-------------------------------------------------------------------|----------------------------------------------|
| Containers                                                         |                                                                   |                                              |
| Cubic-foot bottle, immersion type of moving-tank type              | 5                                                                 | 12                                           |
| Portable cubic-foot standard (Stillman-type)                       | 5                                                                 | 12                                           |
| Fractional cubic-foot bottle                                       | 5                                                                 | 12                                           |
| Burets, flasks, and so forth, for chemical and physical analysis   | 6                                                                 | 12                                           |
| Calibrated gasometers (gas meter provers)                          | 7                                                                 | 13-16                                        |
| Gas meters, displacement type:                                     |                                                                   |                                              |
| Liquid-sealed relating-drum meters                                 | 8                                                                 | 17-22                                        |
| Diaphragm- or bellows-type meters, equipped with observation index | 9                                                                 | 23                                           |
| Rotary displacement meters                                         | 10                                                                | 24                                           |
| Gas meters, rate-of-flow type:                                     |                                                                   |                                              |
| Porous plug and capillary flowmeters                               | 11                                                                | 25                                           |
| Float (variable-area, constant-head) flowmeters                    | 11                                                                | 25                                           |
| Orifice, flow nozzle, and venturi-type flowmeters                  | 11                                                                | 25                                           |

2.3.2 *Standard Cubic Metre of Gas* is that quantity of gas which will fill a space of 1.000 m<sup>3</sup> when under the standard conditions (2.2.2).

2.4 *Temperature Term for Volume Reductions*—For the purpose of referring a volume of gaseous fuel from one temperature to another temperature (that is, in applying Charles' law), the temperature terms shall be obtained by adding 459.67 to each temperature in degrees Fahrenheit for the inch-pound units or 273.15 to each temperature in degrees Celsius for the SI units.

2.5 At the present state of the art, metric gas provers and meters are not routinely available in the United States. Throughout the remainder of this procedure, the inch-pound units are used. Those having access to metric metering equipment are encouraged to apply the standard conditions expressed in 2.2.2.

NOTE 1—The SI conditions given here represent a “hard” metrication, in that the reference temperature and the reference pressure have been changed. Thus, amounts of gas given in metric units should always be referred to the SI standard conditions and the amounts given in inch-pound units should always be referred to the inch-pound standard conditions.

### 3. Significance and Use

3.1 The knowledge of the volume of samples used in a test

