



Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter¹

This standard is issued under the fixed designation D 1826; 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 with the continuous recording calorimeter (Note 1) of the total calorific (heating) value of fuel gas produced or sold in the natural gas range from 900 to 1200 Btu/standard ft³.

NOTE 1—An extensive investigation of the accuracy of the Cutler-Hammer recording gas calorimeter, when used with gases of high heating value, was made by the National Bureau of Standards in 1957 under a research project sponsored by the American Gas Association.

1.2 The subjects covered in this test method appear in the following sections:

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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.*

2. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 The most important terms used in connection with the determination of the calorific value of gaseous fuels in recording calorimetry are as follows:

2.1.2 *British Thermal Unit, or Btu*—is the defined International Tables British thermal unit (symbol Btu).

NOTE 2—The defining relationships are:

(a) $1 \text{ Btu} \cdot \text{lb}^{-1} = 2.326 \text{ J} \cdot \text{g}^{-1}$ (exact)

(b) $1 \text{ lb} = 453.592 \text{ 37 g}$ (exact).

By these relationships, $1 \text{ Btu} = 1 \text{ 055.055 852 62 J}$ (exact). For most purposes, the value rounded to $1 \text{ Btu} = 1 \text{ 055.056 J}$ is adequate.

2.1.3 *combustion air*—air used for combustion, a total of the portion mixed with the gas as primary air and the air supplied around the burner tube as secondary air (theoretical air plus excess air).

2.1.4 *flue gases*—the products, of combustion remaining in the gaseous state, together with any excess air.

2.1.5 *heat-absorbing air*—the heat exchange medium used to absorb the heat of combustion derived from the burning of gaseous fuel.

2.1.6 *saturated basis*—the expressed total calorific value of a gas when it is saturated with water vapor at standard temperature and pressure; 1 ft^3 of this gas is equivalent in dry gas content to 0.9826 ft^3 of dry gas at the standard temperature of 60°F and standard pressure of 14.73 psia .

NOTE 3—The definitions given in 2.1.6 and 2.1.10 are for total calorific (heating) values per standard cubic foot of gas. The definitions corresponding to any other unit quantity of gas are obtained by substituting the name of the desired unit in place of the term “standard cubic foot” in the definitions. Methods of calculating calorific (heating) values per cubic foot of gas under any desired conditions of pressure, temperature, and water vapor content are specified in Section 14.

2.1.7 *standard cubic foot of gas*—the quantity of any gas that at standard temperature and under standard pressure will fill a space of 1 ft^3 when in equilibrium with liquid water.

2.1.8 *standard pressure*—is 14.73 psia .

NOTE 4—This is the pressure base adopted by the American National Standards Institute in 1969 (Z132.1). According to Dalton’s law, this is equivalent to stating that the partial pressure of the gas is:

$$14.73 - 0.256 \text{ 36} = 14.473 \text{ 64 psia}$$

where 0.256 36 is the vapor pressure of water in psia at 60°F .

2.1.9 *standard temperature*— 60°F , based on the international practical temperature scale of 1968.

2.1.10 *total calorific value (gross heating value, higher heating value)*—of a gas is the number of British thermal units evolved by the complete combustion at constant pressure of

¹ This test method is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.03 on Determination of Heating Value and Relative Density of Gaseous Fuels.

Current edition approved May 10, 2003. Published May 2003. Originally approved in 1961. Last previous edition approved in 1998 as D 1826 – 94 (1998).