



Designation: D4868 – 17

Standard Test Method for Estimation of Net and Gross Heat of Combustion of Hydrocarbon Burner and Diesel Fuels¹

This standard is issued under the fixed designation D4868; 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 estimation of the gross and net heat of combustion in SI units, megajoules per kilogram, of hydrocarbon fuels and blendstocks from the fuel density and sulfur, water, and ash contents.

1.1.1 This test method is not applicable to fuels containing non-hydrocarbons such as alcohols (for example, ethanol, methanol), ethers (for example, MTBE), or esters (for example, biodiesel).

NOTE 1—The equation for estimation of net and gross heat of combustion used in this method was originally published as NBS Miscellaneous Publication No. 97.

1.2 This test method is especially useful for estimating, using a minimum number of tests, the heat of combustion of burner and diesel fuels (which do not contain non-hydrocarbon components) for which it is not usually critical to obtain very precise heat determinations.

NOTE 2—More accurate estimation methods are available for aviation fuels (Test Methods D1405, D4529, and D3338). However, those estimation methods require additional tests to those required in this test method.

1.3 This test method is purely empirical (Note 1). It was derived using liquid hydrocarbon fuels produced by normal refining processes from conventional crude oil that conform to the requirements of specifications for petroleum fuels as described in Note 3. This test method is valid for those fuels in the density range from 750 kg/m³ to 1000 kg/m³ and those that do not contain an unusually high aromatic content. High aromatic content fuels will not normally meet some fuel specification criteria.

NOTE 3—The estimation of the heat of combustion of a hydrocarbon fuel from its density and sulfur, water, and ash content is justifiable only when the fuel belongs to well-defined classes for which a relationship

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 D02.05 on Properties of Fuels, Petroleum Coke and Carbon Material. Current edition approved Jan. 1, 2017. Published February 2017. Originally approved in 1988. Last previous edition approved in 2010 as D4868 – 00 (2010). DOI: 10.1520/D4868-17.

between these quantities have been derived from accurate experimental measurements on representative samples of these classes. Even in these classes, the possibility that the estimate can be in error for individual fuels should be recognized. This test method has been tested for a limited number of fuels from oil sand bitumen and shale oil origin and has been found to be valid. The classes of fuels used to establish the correlation presented in this test method are represented by the following applications:

Fuel (not applicable to any fuels containing non-hydrocarbon components)	Specification
Fuel Oils Grades No. 1, 2, 4 (light), 4, 5 (light), 5 (heavy), and 6	D396
Diesel Grades No. 1-D, 2-D, and 4-D	D975
Aviation Turbine Jet A and Jet A-1	D1655 D6615
Jet B Gas Turbine Grades No. 0-GT, 1-GT, 2-GT, 3-GT, and 4-GT	D2880
Kerosene Grades No. 1-K and 2-K	D3699

1.4 This test method is not applicable to pure hydrocarbon compounds. It is not intended as a substitute for highly accurate experimental measurements of heat of combustion (Note 4).

NOTE 4—The procedures for the experimental determination of the gross and net heats of combustion are described in Test Methods D240 and D4809.

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

1.6 *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.*

1.7 *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.*

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