



Designation: D4868 – 00 (Reapproved 2010)

Standard Test Method for Estimation of Net and Gross Heat of Combustion of 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 petroleum fuels from the fuel density, sulfur, water, and ash content.

NOTE 1—The equation for estimation of net and gross heat of combustion used in this method were originally published by the NIST 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 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 is applicable only to liquid hydrocarbon fuels derived 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 to 1000 kg/m³ and those that do not contain an unusually high aromatic content. High aromatic content fuels will not normally meet 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 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 may be in error by large amounts 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:

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.05 on Properties of Fuels, Petroleum Coke and Carbon Material.

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Fuel	Specification
Fuel Oils	
Grades 1, 2, 4 (light), 4, 5 (light), 5 (heavy), and 6	D396
Diesel	
Grades 1-D, 2-D, and 4-d	D975
Aviation Turbine	
Jet A, Jet A-1, and Jet B	D1655
Gas Turbine	
Grades 0-GT, 1-GT, 2-GT, 3-GT and 4-GT	D2880
Kerosine	
Grades 1-K and 2-K	D3699

1.4 This test method is not applicable to pure hydrocarbons. It is not intended as a substitute for 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.*

2. Referenced Documents

2.1 ASTM Standards:²

- D95 Test Method for Water in Petroleum Products and Bituminous Materials by Distillation
- D129 Test Method for Sulfur in Petroleum Products (General High Pressure Decomposition Device Method)
- D240 Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter
- D396 Specification for Fuel Oils
- D482 Test Method for Ash from Petroleum Products
- D975 Specification for Diesel Fuel Oils
- D1266 Test Method for Sulfur in Petroleum Products (Lamp Method)

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.