



Designation: D2890 – 23

Standard Test Method for Calculation of Liquid Heat Capacity of Petroleum Distillate Fuels¹

This standard is issued under the fixed designation D2890; 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 calculation of liquid heat capacity, Btu/lb · °F (kJ/kg · K), at atmospheric pressure, of petroleum fuels for which distillation data may be obtained in accordance with Test Method **D86** without reaching a decomposition point prior to obtaining 90 % by volume distilled.

1.2 This test method is not applicable at temperatures less than 0 °F (–18 °C) and greater than 60 °F (16 °C) above the volumetric average boiling point of the fuel.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D86 Test Method for Distillation of Petroleum Products and Liquid Fuels at Atmospheric Pressure

D287 Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer/Method)

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 **D02.04.0K** on Correlative Methods.

Current edition approved Nov. 1, 2023. Published November 2023. Originally approved in 1970. Last previous edition approved in 2018 as D2890 – 92 (2018). DOI: 10.1520/D2890-23.

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.

D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of terms used in this test method, refer to Terminology **D4175**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *mean average boiling point (MeABP), n*—defined internally for this method in Section 7, Procedure 7.3.

3.2.2 *volumetric average boiling point (VABP), n*—defined internally for this method in Section 7, Procedure 7.2.

3.2.3 *Watson characterization factor, K, n*—a systematic way of classifying a crude oil according to its paraffinic, naphthenic, intermediate or aromatic nature.

3.2.3.1 *Discussion*—A K value of 12.5 or higher indicates a crude oil of predominantly paraffinic constituents, while 10 or lower indicates a crude of more aromatic nature.

4. Summary of Test Method

4.1 The Watson characterization factor, K, is obtained from a graphical correlation relating determined Test Method **D86** distillation data and K. The liquid heat capacity is obtained, either graphically or mathematically, from correlations relating calculated heat capacity, temperature at which heat capacity is being calculated, determined API gravity, and K.

NOTE 1—Details of the method have been published.³

5. Significance and Use

5.1 Heat capacities obtained by this method are those at atmospheric pressure. However, because the temperature range is low, the calculated values are similar to saturated liquid heat capacities in the temperature-pressure range required for most engineering design.

6. Data Requirements

6.1 Distillation temperatures at (in °F) 10 %, 30 %, 50 %, 70 %, and 90 % by volume distilled obtained in accordance with Test Method **D86**.

³ *Technical Data Book-Petroleum Refining*, Chapter 7, American Petroleum Institute, Division of Refining, 1220 L St. NW, Washington, DC 20005.

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