



Designation: D7152 – 23

Standard Practice for Calculating Viscosity of a Blend of Petroleum Products¹

This standard is issued under the fixed designation D7152; 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 practice covers the procedures for calculating the estimated kinematic viscosity of a blend of two or more petroleum products, such as lubricating oil base stocks, fuel components, residual fuel oil with kerosene, crude oils, and related products, from their kinematic viscosities and blend fractions.

1.2 This practice allows for the estimation of the fraction of each of two petroleum products needed to prepare a blend meeting a specific viscosity.

1.3 This practice may not be applicable to other types of products, or to materials which exhibit strong non-Newtonian properties, such as viscosity index improvers, additive packages, and products containing particulates.

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

1.5 Logarithms may be either common logarithms or natural logarithms, as long as the same are used consistently. This practice uses common logarithms. If natural logarithms are used, the inverse function, $\exp(x)$, must be used in place of the base 10 exponential function, 10^x , used herein.

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, health, and environmental practices and to 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.*

2. Referenced Documents

2.1 ASTM Standards:²

D341 Practice for Viscosity-Temperature Equations and Charts for Liquid Petroleum or Hydrocarbon Products

D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)

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

D7042 Test Method for Dynamic Viscosity and Density of Liquids by Stabinger Viscometer (and the Calculation of Kinematic Viscosity)

2.2 ASTM Adjuncts:

Calculating the Viscosity of a Blend of Petroleum Products Excel Worksheet³

3. Terminology

3.1 Definitions:

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

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *ASTM Blending Method, n*—a blending method at constant temperature, using components in volume percent.

3.2.2 *blend fraction, n*—the ratio of the amount of a component to the total amount of the blend. Blend fraction may be expressed as mass percent or volume percent.

3.2.3 *blending method, n*—an equation for calculating the viscosity of a blend of components from the known viscosities of the components.

3.2.4 *dumbbell blend, n*—a blend made from components of widely differing viscosity.

3.2.4.1 *Example*—a blend of S100N and Bright Stock.

3.2.5 *inverse blending method, n*—an equation for calculating the predicted blending fractions of components to achieve a blend of given viscosity.

¹ This practice is under the jurisdiction of ASTM Committee **D02** on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee **D02.07** on Flow Properties.

Current edition approved Oct. 1, 2023. Published October 2023. Originally approved in 2005. Last previous edition approved in 2016 as D7152 – 11 (2016) ^{ϵ 1}. DOI: 10.1520/D7152-23.

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.

³ Available from ASTM International Headquarters. Order Adjunct No. **ADJD7152-EA**. Original adjunct produced in 2006.

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