



Designation: D446 – 24



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Standard Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers^{1,2}

This standard is issued under the fixed designation D446; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These specifications cover operating instructions for glass capillary kinematic viscometers of all the types described in detail in [Annex A1](#), [Annex A2](#), and [Annex A3](#) as follows:

Modified Ostwald viscometers, [Annex A1](#)
Suspended-level viscometers, [Annex A2](#)
Reverse-flow viscometers, [Annex A3](#)

1.2 The calibration of the viscometers is described in Section 7.

1.3 This standard covers some widely used viscometers suitable for use in accordance with Test Method [D445](#). Other viscometers of the glass capillary type which are capable of measuring kinematic viscosity within the limits of precision given in Test Method [D445](#) may be used.

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 *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.*

¹ These specifications and operating instructions are under the jurisdiction of ASTM International Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and are the direct responsibility of ASTM Subcommittee [D02.07](#) on Flow Properties. The technically equivalent standard as referenced is under the jurisdiction of the Energy Institute Subcommittee SC-C-3.

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² This standard has been developed through the cooperative effort between ASTM and the Energy Institute, London. ASTM and IP standards were approved by ASTM and EI technical committees as being technically equivalent but that does not imply both standards are identical.

2. Referenced Documents

2.1 ASTM Standards:³

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

[D2162](#) Practice for Basic Calibration of Master Viscometers and Viscosity Oil Standards

[D4175](#) Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants

2.2 ISO Documents:⁴

[ISO 3104](#) Petroleum Products—Transparent and Opaque Liquids—Determination of Kinematic Viscosity and Calculation of Dynamic Viscosity

[ISO 3105](#) Glass Capillary Kinematic Viscometers—Specifications and Operating Instructions

[ISO 5725](#) Basic Methods for the Determination of Repeatability and Reproducibility of a Standard Measurement Method

[ISO 17025](#) General Requirements for the Competence of Testing and Calibration Laboratories

2.3 NIST Standards:⁵

[NIST 1297](#) Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminology [D4175](#).

4. Materials and Manufacture

4.1 Fully annealed, low-expansion borosilicate glass shall be used for the construction of all viscometers. The size

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁵ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

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