



Standard Practice for Basic Calibration of Master Viscometers and Viscosity Oil Standards¹

This standard is issued under the fixed designation D2162; 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 calibration of master viscometers and viscosity oil standards, both of which may be used to calibrate routine viscometers as described in Test Method D445 and Specifications D446 over the temperature range from 15 °C to 100 °C.

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

1.2.1 The SI-based units for calibration constants and kinematic viscosities are mm^2/s^2 and mm^2/s , respectively.

1.3 *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.* For specific warning statements, see Section 7.

2. Referenced Documents

2.1 ASTM Standards:²

- D445 Test Method for Kinematic Viscosity of Transparent and Opaque Liquids (and Calculation of Dynamic Viscosity)
- D446 Specifications and Operating Instructions for Glass Capillary Kinematic Viscometers
- D1193 Specification for Reagent Water
- D1250 Guide for Use of the Petroleum Measurement Tables
- D1480 Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Bingham Pycnometer
- D1590 Test Method for Surface Tension of Water
- E1 Specification for ASTM Liquid-in-Glass Thermometers

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 June 1, 2014. Published July 2014. Originally approved in 1963. Last previous edition approved in 2013 as D2162 – 13. DOI: 10.1520/D2162-14.

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.

- E563 Practice for Preparation and Use of an Ice-Point Bath as a Reference Temperature
- E644 Test Methods for Testing Industrial Resistance Thermometers
- E1137 Specification for Industrial Platinum Resistance Thermometers
- E1750 Guide for Use of Water Triple Point Cells
- E2593 Guide for Accuracy Verification of Industrial Platinum Resistance Thermometers
- E2877 Guide for Digital Contact Thermometers
- 2.2 ISO Standard:³
- ISO 3666 Viscosity of Water

3. Terminology

3.1 Definitions:

3.1.1 *digital contact thermometer (DCT)*, *n*—an electronic device consisting of temperature measuring sensor in contact with the material that provides an output to a digital display of the measured value.

3.1.1.1 *Discussion*—This device consists of a temperature sensor connected to a measuring instrument; this instrument measures the temperature-dependent quantity of the sensor, computes the temperature from the measured quantity, and provides a digital output. This digital output goes to a digital display and/or recording device that may be internal or external to the device. These devices are sometimes referred to as a “digital thermometer”.

NOTE 1—Portable electronic thermometers (PET) is an acronym sometimes used to refer to a subset of the devices covered by this definition.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *basic calibration*, *n*—calibration based on the primary standard, water.

3.2.1.1 *Discussion*—Pure water has a kinematic viscosity of 1.0034 mm^2/s at 20 °C. See ISO 3666.

3.2.2 *master viscometer*, *n*—glass capillary viscometer with a liquid driving head of at least 400 mm.

3.2.2.1 *Discussion*—It is specially designed to minimize errors due to surface tension, kinetic energy, and capillary end effects.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

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