



Designation: D1601 – 18

Standard Test Method for Dilute Solution Viscosity of Ethylene Polymers¹

This standard is issued under the fixed designation D1601; 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 determination of the dilute solution viscosity of ethylene polymers at 135°C. It is applicable to a reasonably wide spectrum of ethylene polymers having densities from 0.910 to 0.970 g/cm³. Directions are given for the determination of relative viscosity (viscosity ratio), inherent viscosity (logarithmic viscosity number), and intrinsic viscosity (limiting viscosity number).

1.2 The values as stated in SI units are to be regarded as the standard.

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

1.3.1 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury and/or mercury containing products into your state or country may be prohibited by law.

NOTE 1—This standard is equivalent to ISO 1628-3.

NOTE 2—Appendix X1 – Appendix X3 contain material from the previous version of Test Method D1601 and are included for information only.

1.4 *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

- 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
 - D883 Terminology Relating to Plastics
 - D1600 Terminology for Abbreviated Terms Relating to Plastics
 - D4020 Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
 - E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids
 - E2935 Practice for Conducting Equivalence Testing in Laboratory Applications
 - IEEE/ASTM SI-10 Standard for Use of the International System of Units (SI): The Modern Metric System
- #### 2.2 ISO Standards:³
- ISO 1628-3 Plastics—Determination of Viscosity Number and Limiting Viscosity Number—Part 3: Polyethylenes and Polypropylenes

3. Terminology

3.1 Units, symbols, and abbreviations used in this test method are those recommended in IEEE/ASTM SI-10 and Terminologies D883 and D1600.

4. Significance and Use

4.1 The knowledge of dilute solution viscosity serves as an additional tool in characterizing ethylene polymers. Viscosity data alone is potentially a limited value in predicting the processing behavior of the polymer. However, when used in conjunction with other flow and physical property values, the solution viscosity of ethylene polymers contributes to characterizing the material.

¹ This test method is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.70 on Analytical Methods (Section D20.70.05).

Current edition approved May 1, 2018. Published June 2018. Originally approved in 1958. Last previous edition approved in 2012 as D1601 - 12. DOI: 10.1520/D1601-18.

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 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