



Designation: D1321 – 24

Standard Test Method for Needle Penetration of Petroleum Waxes¹

This standard is issued under the fixed designation D1321; 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 This test method covers the empirical estimation of the consistency of waxes derived from petroleum by measurement of the extent of penetration of a standard needle. This test method is applicable to waxes having a penetration of not greater than 250.

NOTE 1—This test method is similar to the needle method for determining the penetration of bituminous material, Test Method D5. Cone methods applicable to greases and to petrolatum are described in Test Methods D217 and Test Method D937, respectively.

1.2 **WARNING**—Mercury has been designated by many regulatory agencies as a hazardous substance that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Use caution when handling mercury and mercury-containing products. See the applicable product Safety Data Sheet (SDS) for additional information. The potential exists that selling mercury or mercury-containing products, or both, is prohibited by local or national law. Users must determine legality of sales in their location.

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

1.3.1 *Exception*—The values given in parentheses are for information only.

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.*

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 D02.10 on Properties of Petroleum Waxes and Alternative Wax-like Materials.

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2. Referenced Documents

2.1 ASTM Standards:²

- D5 Test Method for Penetration of Bituminous Materials
- D87 Test Method for Melting Point of Petroleum Wax (Cooling Curve)
- D217 Test Methods for Cone Penetration of Lubricating Grease
- D937 Test Method for Cone Penetration of Petrolatum
- D938 Test Method for Congealing Point of Petroleum Waxes, Including Petrolatum
- D4175 Terminology Relating to Petroleum Products, Liquid Fuels, and Lubricants
- E1 Specification for ASTM Liquid-in-Glass Thermometers
- E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

3. Terminology

3.1 Definitions:

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

3.1.2 *penetration, n*—of petroleum wax, the depth in tenths of a millimetre to which a standard needle penetrates into the wax under defined conditions.

3.1.2.1 *Discussion*—As an example, a penetration reading of 85 from the indicator scale corresponds to a penetration depth of 8.5 mm.

3.1.3 *penetrometer, n*—an instrument that measures the consistency or hardness of semiliquid to semisolid materials by measuring the depth to which a specified cone or needle under a given force falls into the material.

3.1.3.1 *Discussion*—In this test method, a standard penetrometer needle (6.3) is used to determine the hardness of petroleum wax. The penetration force is determined by the total mass (100 g) of the needle, plunger, and 50 g weight.

4. Summary of Test Method

4.1 The sample is heated to at least 17 °C (30 °F) above its expected congealing point or melting point, poured into a

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.

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