



Standard Test Method for Softening Point of Pitches (Mettler Softening Point Method)¹

This standard is issued under the fixed designation D3104; 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 softening point of pitches having softening points in the range from 50 to 180°C by this test method, and gives results comparable to those obtained by Test Method D2319 above 176°F (80°C).

1.2 The values 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

A314 Specification for Stainless Steel Billets and Bars for Forging

D2319 Test Method for Softening Point of Pitch (Cube-in-Air Method)

D4296 Practice for Sampling Pitch

3. Summary of Test Method

3.1 In this test method, the softening point is defined as the temperature at which pitch, suspended in a cylindrical cup with a 6.35-mm hole in the bottom, flows downward a distance of 19 mm to interrupt a light beam, as the sample is heated at a linear rate in air.

4. Significance and Use

4.1 Pitch does not go through a solid-liquid phase change when heated, and therefore does not have a true melting point. As the temperature is raised pitch gradually softens or becomes

less viscous. For this reason, the determination of the softening point must be made by an arbitrary, but closely defined, method if the test values are to be reproducible.

4.2 This test method is useful in determining the consistency of pitches as one element in establishing the uniformity of shipments or sources of supply.

5. Apparatus

5.1 A Mettler dropping point cell³ shall be used to determine pitch softening points by this test method. These commercially available instruments consist of a control unit with a digital temperature indicator, matched furnace, sample cartridges, and accessories. The control unit automatically regulates the heating rate of the furnace. The softening point is indicated on the readout, and the heating program stopped, when the sample flow triggers a photocell detector. A general view of the contents of the Mettler is shown in Fig. 1.

5.1.1 *Control Unit*—This unit shall provide a continuous, linear temperature increase from 25 to 250°C at a rate of 2°C/min. A digital readout shall indicate the temperature to 0.1°C throughout.

5.1.2 *Furnace Unit*—This unit shall be capable of heating a sample cup assembly, as described in 5.1.3, at a linear rate of $2 \pm 0.3^\circ\text{C}/\text{min}$. It shall include a sensing system capable of detecting the softening point with a precision of 0.1°C.

5.1.3 *Sample Cup Assembly*—A cup of chromium-plated brass, or of stainless steel conforming to the requirements for Type 303 (UNS S30300) as prescribed in Specification A314, with the dimensions shown in Fig. 2. It shall be placed in the assembly so that the pitch sample will flow downward a distance of 19 mm before interrupting a light beam and stopping the heating program as the softening point is reached.

6. Reagents

6.1 *Xylene*, industrial grade.

6.2 *Benzoic Acid*.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.05 on Properties of Fuels, Petroleum Coke and Carbon Material.

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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 The sole source of supply of the apparatus known to the committee at this time is available from the Mettler Toledo, Inc., Balances and Instruments, 69 Princeton-Hightstown Rd., Hightstown, NJ 08520-0071. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.