



## Standard Test Method for Softening Point of Asphalt and Pitch (Mettler Cup-and-Ball Method)<sup>1</sup>

This standard is issued under the fixed designation D 3461; 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 ( $\epsilon$ ) 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 asphalt and pitch in the range from 50 to 180°C by the cup-and-ball apparatus, and gives results comparable to those obtained by Test Method D 36.

NOTE 1—If the softening point of asphalt by this Mettler cup-and-ball method fails to meet specified requirements, tests may be rerun using the Test Method D 36 (ring-and-ball) softening point apparatus as a referee method.

1.2 *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:

- A 314 Specification for Stainless Steel Billets and Bars for Forgings<sup>2</sup>
- D 36 Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)<sup>3</sup>
- D 140 Practice for Sampling Bituminous Materials<sup>4</sup>
- D 4296 Practice for Sampling Pitch<sup>5</sup>

### 3. Summary of Test Method

3.1 In this test method the softening point is defined as the temperature at which the specimen, suspended in a cylindrical cup with a 6.5-mm hole in the bottom and with a lead ball, 8 mm in diameter, centered on top of the sample in the cup, 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 Asphalt and pitch do not go through a solid-liquid phase change when heated, and therefore do not have true melting points. As the temperature is raised, they gradually soften or become 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 as one element in establishing the uniformity of shipments or sources of supply.

### 5. Apparatus

5.1 A Mettler dropping point cell<sup>6</sup> can be used to determine 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 components of the Mettler apparatus 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 specimen 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 *Specimen Cup Assembly*—A cup of chromium-plated brass, or stainless steel conforming to the requirements for Type 303 (UNS 530300) as prescribed in Specification A 314, with dimensions shown in Fig. 2. It shall be placed in the assembly so that the test specimen will flow down a distance of 19 mm before interrupting a light beam and stopping the heating program as the softening point is reached.

<sup>1</sup> 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.OF on Industrial Pitches.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.03.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.04.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 04.03.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 05.02.

<sup>6</sup> Available from the Mettler Toledo, Inc., Balances and Instruments, 69 Princeton-Hightstown Rd., Hightstown, NJ 08520-0071.

