
Standard Method of Test for

Effect of Heat and Air on Asphalt Materials (Thin-Film Oven Test)

AASHTO Designation: T 179M/T 179-23¹

Technically Revised: 2023

Technical Subcommittee: 2b, Liquid Asphalt

ASTM Designation: D1754/D1754M-20



American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This method covers the determination of the effect of heat and air on a film of semisolid asphaltic materials. The effects of this treatment are determined from measurements of selected asphalt properties before and after the test.
- 1.2. The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents, therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.
- 1.3. **Warning**—Mercury has been designated by the United States Environmental Protection Agency and many state agencies as a hazardous material that can cause central nervous system, kidney, and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury-containing products. See the applicable material safety data sheet (MSDS) for details and EPA's website for additional information. Users should be aware that selling mercury and/or mercury-containing products into your state may be prohibited by state law. (Also see Fed. Std. No 29, CFR 1910.1200.)
- 1.4. *This standard does not purport to address all of the safety concerns 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.*
- 1.5. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
 - M 231, Weighing Devices Used in the Testing of Materials
 - M 339M/M 339, Thermometers Used in the Testing of Construction Materials

- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
- T 49, Penetration of Bituminous Materials
- T 201, Kinematic Viscosity of Asphalts (Bitumens)
- T 202, Viscosity of Asphalts by Vacuum Capillary Visometer

2.2. *ASTM Standards:*

- D8, Standard Terminology Relating to Materials for Roads and Pavements
- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers
- E145, Standard Specification for Gravity-Convection and Forced-Ventilation Ovens
- E1137/E1137M, Standard Specification for Industrial Platinum Resistance Thermometers

2.3. *International Electrotechnical Commission Standard:*

- IEC 60751: 2008 Industrial Platinum Resistance Thermometers and Platinum Temperature Sensors

2.4. *Federal Standard:*

- Fed. Std. No. 29, CFR-1919.1200 OSHA Hazard Communication Standard; see also Permissible Exposure Limits—Annotated Tables, available at <https://www.osha.gov/dsg/annotated-pels/>

3. TERMINOLOGY

- 3.1. Definitions of terms used in this test method may be found in ASTM D8, determined from common English usage, or a combination of both.

4. SUMMARY OF METHOD

- 4.1. A film of asphaltic material is heated in an oven for 5 h at 163°C (325°F). The effects of heat and air are determined from changes occurring in physical properties measured before and after the oven treatment. An optional procedure is provided for determining the change in sample mass.
- 4.2. Precision values for the method have been developed for viscosity, viscosity change, penetration change, and mass change; precision for other properties is undefined.

5. SIGNIFICANCE

- 5.1. This method indicates approximate change in properties of asphalt during conventional hot-mixing at about 150°C (300°F) as indicated by viscosity, penetration, or ductility measurements. It yields a residue that approximates the asphalt condition as incorporated in the pavement. If the mixing temperature differs appreciably from the 150°C (300°F) level, more or less effect on properties will occur.

6. APPARATUS

- 6.1. *Oven*—The oven shall be electrically heated and shall conform to the performance requirements of ASTM E145, for Gravity-Convection and Forced-Ventilation Ovens Type IB (Gravity-Convection), for operating temperatures up to 180°C (356°F). During the tests for compliance to ASTM E145 requirements, the oven shelf, properly centered as described in Section 6.1.2, shall be in place and rotating.