



Standard Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)¹

This standard is issued under the fixed designation D 1754; 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 effects 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 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:

D 5 Test Method for Penetration of Bituminous Materials²

D 113 Test Method for Ductility of Bituminous Materials²

D 2170 Test Method for Kinematic Viscosity of Asphalts (Bitumens)²

D 2171 Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer²

E 1 Specification for ASTM Thermometers³

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens⁴

3. Summary of Test Method

3.1 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 incurred in physical properties measured before and after the oven treatment. An optional procedure is provided for determining the change in sample mass.

3.2 Precision values for the method have been developed for viscosity, viscosity change, penetration change, mass change, and ductility.

4. Significance and Use

4.1 This method indicates approximate change in properties of asphalt during conventional hot-mixing at about 150°C (302°F) as indicated by viscosity, penetration, or ductility measurements. It yields a residue which approximates the asphalt condition as incorporated in the pavement. If the mixing temperature differs appreciably from the 150°C (302°F) level, more or less effect on properties will occur.

5. Apparatus

5.1 *Oven*—The oven shall be electrically heated and shall conform to the performance requirements of Specification E 145, Type IB (Gravity-Convection), for operating temperatures up to 180°C (356°F). During the tests for compliance to Specification E 145 requirements, the oven shelf, properly centered as described in 5.1.2 shall be in place and rotating.

5.1.1 *Construction*—The oven shall be rectangular, and each interior dimension (exclusive of space occupied by the heating element) shall be a minimum of 330 mm (13 in.) and a maximum of 535 mm (21 in.). The oven shall have, in front, a tightly fitted hinged door, which shall provide a clear opening substantially the same as the interior height and width of the oven. The door may contain a window with dimensions of at least 100 by 100 mm (4 by 4 in.) and with two sheets of glass separated by an air space, through which a vertical thermometer, located as specified in 5.2, may be read without opening the door; or the oven may be provided with an inner glass door, through which the thermometer may be observed on opening the outer door momentarily. The oven shall be adequately ventilated by convection currents of air and for this purpose shall be provided with openings for the entrance of air and for the exit of heated air and vapors. Openings may be of any size and arrangement provided the requirements of Specification E 145, Type IB, are met.

5.1.2 *Rotating Shelf*—The oven shall be provided with a single metal circular shelf having a minimum diameter of 250 mm (9.8 in.) and a maximum diameter of 450 mm (18 in.). The shelf construction shall be such that it provides a flat surface for support of the containers without blocking all air circulation through the shelf when the containers are in place. The shelf shall be suspended by a vertical shaft and centered with respect to the horizontal interior dimensions of the oven and shall be

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.46 on Durability and Distillation Test.

Current edition approved Aug. 10, 1997. Published February 1998. Originally published as D 1754 – 60 T. Last previous edition D 1754 – 94.

² Annual Book of ASTM Standards, Vol 04.03.

³ Annual Book of ASTM Standards, Vol 14.03.

⁴ Annual Book of ASTM Standards, Vol 14.04.