



Designation: D7173 – 20

Standard Practice for Determining the Separation Tendency of Polymer from Polymer-Modified Asphalt¹

This standard is issued under the fixed designation D7173; 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 practice describes a laboratory procedure for determining the tendency of polymer to separate from polymer-modified asphalt under static heated storage conditions. The results of testing on material prepared according to this practice may be used as a guideline when formulating products or to establish field handling procedures. Large differences in test results between top and bottom specimens indicate that there is a degree of incompatibility between the polymer and the base asphalt.

1.2 The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

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.*

2. Referenced Documents

2.1 ASTM Standards:²

¹ This practice is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.47 on Miscellaneous Asphalt Tests.

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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.

D36/D36M Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)

D3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials

D7175 Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer

D7405 Test Method for Multiple Stress Creep and Recovery (MSCR) of Asphalt Binder Using a Dynamic Shear Rheometer

3. Summary of Practice

3.1 A measured quantity of polymer-modified asphalt in a sealed aluminum tube is conditioned in a vertical position for 48 h at a temperature of 163 ± 5 °C. At the end of the conditioning period, top and bottom portions are separated and subjected to further testing to determine the degree of separation. Tests chosen for this purpose depend on the polymer modification system being evaluated and the type of information desired by the user. Softening point (Test Method D36/D36M) and DSR (Test Method D7175) are the most common tests used for this purpose. MSCR (Test Method D7405) is an alternate test.

4. Significance and Use

4.1 Purchasers of polymer-modified asphalt need guidelines on proper storage and handling procedures to maintain the integrity of material they have purchased. This practice provides a significant tool for understanding the characteristics of these materials as well as comparing various sources of supply.

NOTE 1—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 Specification D3666 are generally considered capable of competent and objective testing, sampling, inspection, etc. Users of this standard are cautioned that compliance with Specification D3666 alone does not completely ensure reliable results. Reliable results depend on many factors; following the suggestions of Specification D3666 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.

5. Apparatus

5.1 *Aluminum Tubes*—25 mm diameter by 125 mm to 140 mm length aluminum separation tubes, used to hold the test sample during conditioning.³

5.2 *Balance*—Capable of being read to the nearest 0.1 g.

5.3 *Oven*—Capable of maintaining a temperature of 163 ± 5 °C.

5.4 *Freezer*—Capable of maintaining a temperature of -10 ± 10 °C.

5.5 *Rack*—Capable of supporting the aluminum tubes in a vertical position in the oven and freezer.

5.6 *Containers*—Metal or glass, 100 ± 20 mL capacity.

5.7 *Hammer and Cutting Tool*—The cutting tool must be rigid and sharp to allow cutting of the tube containing the sample when at a low temperature.

NOTE 2—A tool known as a 6-in-1 painter's tool has been found ideal for this purpose.

6. Procedure

6.1 Place the empty aluminum tube in the rack, with sealed end down, or support it some other way in a vertical position.

³ Aluminum tubes suitable for this purpose may be obtained from R/H Specialty & Machine, Inc., P.O. Box 10187, Terre Haute, IN 47801, (812) 232-0781, as Part No. 100-550; from HMA Lab Supply, 3407 W. Leigh St., Richmond VA 23230, (888) 569-0499, as Part No. SC-4200; or from Freund Container, 11535 S. Central Ave., Alsip, IL, (800) 363-9822 as Part No. 6219T11. 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.

6.2 If the sample is not already hot, heat it in the oven at 163 ± 5 °C until sufficiently fluid to pour. Stir the sample thoroughly and pour 50 ± 0.5 g into the vertically held tube. Depending on the type of tube used, either fold the excess tube over two times and crimp tightly, screw on the cap, insert a cork stopper wrapped in aluminum foil, or seal it in some other way to prevent the introduction of air.

6.3 Place the sealed tube assembly in the 163 ± 5 °C oven (other temperatures may be used if deemed more appropriate by all parties). Allow the tube to stand undisturbed in the oven for a period of 48 ± 1 h. At the end of the conditioning period, remove the tube from the oven and place it immediately in the freezer at -10 ± 10 °C, taking care to keep the tube in a vertical position at all times. Leave the tube in the freezer for a minimum of 4 h to solidify the sample completely.

6.4 Remove the tube from the freezer and place it on a hard, flat surface. Cut the section of the tube containing the specimen into three portions of approximately equal length. A hammer and cutting tool are normally used, but other means are appropriate if they can make a clean separation. Discard the center asphalt section, and place the top and bottom portions of the tube into separate covered 100 ± 20 -mL containers. Place the covered containers in the 163 ± 5 °C oven until the asphalt is sufficiently fluid to remove the pieces of the aluminum tube, but not longer than 30 min.

6.5 Stir the samples thoroughly before pouring them up for comparative testing of the top and bottom portions.

7. Keywords

7.1 modified asphalt; polymer; separation; storage

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