Designation: D6154 – 15 (Reapproved 2021)ε1

Standard Specification for Chemically Modified Asphalt Cement for Use in Pavement Construction[1]

This standard is issued under the fixed designation D6154; 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.

ε[1] NOTE—Section 1 was updated editorially in December 2021.

1. Scope

1.1 This specification covers asphalt cements that have been modified by the addition of a chemical gellant. It was developed to provide a reference for specifying chemically modified asphalt cement and reflects the properties of currently available commercial products. The tests are intended to measure degree of modification, not performance characteristics. This is not intended to be a performance-based specification.

1.2 Chemically modified asphalt cements are normally produced by addition of a chemical stabilizer. However, any asphalt modifier may be used that will give the required test results when blended with the desired asphalt.

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

1.4 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.

1.5 The following precautionary statement pertains to the test method portion only, Section 5, of this specification: *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.*

1.6 *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]

D5/D5M Test Method for Penetration of Bituminous Materials

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

D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester

D140/D140M Practice for Sampling Asphalt Materials

D1754/D1754M Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)

D2042 Test Method for Solubility of Asphalt Materials in Trichloroethylene

D4957 Test Method for Apparent Viscosity of Asphalt Emulsion Residues and Non-Newtonian Asphalts by Vacuum Capillary Viscometer

D7553 Test Method for Solubility of Asphalt Materials in N-Propyl Bromide

3. Materials and Manufacture

3.1 The asphalt cement used to prepare the chemically modified asphalt cement shall be prepared by the refining of crude petroleum by suitable methods.

4. Physical Properties

4.1 The chemically modified asphalt cement shall be homogeneous, free from water, and shall not foam when heated to 180 °C.

4.2 The chemically modified asphalt cement shall conform to the requirements of Table 1.

5. Methods of Sampling and Testing

5.1 Sample and test the chemically modified asphalt cement in accordance with the following methods:

5.1.1 *Sampling*—See Practice D140/D140M.

[1] This specification is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.40 on Asphalt Specifications.

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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.

TABLE 1 Requirements for Chemically Modified Asphalt Cement

Test[A]	Grade			
	CM 5-10	CM 10-20	CM 20-30	CM 30-40
Viscosity,[B,C] 60 °C, min, Pa·s, 1 s^{-1}	50.0	100.0	200	300
Viscosity,[C,D] 135 °C, Pa·s, 10 s^{-1}	0.2 to 2.0	0.4 to 4.0	0.7 to 6.0	1.0 to 8.0
Penetration, 4 °C, 200 g, 60 s, dmm	40 to 100	30 to 65	20 to 45	12 to 35
Penetration, 25 °C, 100 g, 5 s, dmm	140 to 185	100 to 140	65 to 100	35 to 65
Flash Point, Cleveland open cup, min,° C	246	246	246	246
Softening Point, min, °C	50	55	60	65
Solubility, min, %[E]	99.0	99.0	99.0	99.0
Tests on residue from thin-film oven test:				
Aging Index, max Vis. ATFOT/BTFOT	2.5	2.5	2.5	2.5

[A] Handling of all samples for testing shall be in accordance with 7.2 of Test Method D4957, which requires heating the sample in an oven maintained at 195 ± 2 °C. Stir the sample occasionally until homogenous and pour in a suitable container for testing. Pouring temperatures should be 180 ± 5 °C on all tests.
[B] Normally run using a No. 200 Modified Koppers Viscometer tube at 300 mm of vacuum.
[C] Normally run using a No. 50 Modified Koppers Viscometer tube at 100 mm of vacuum.
[D] The selection of tube size and vacuum should be varied to achieve measurement near the specified shear rate to avoid extrapolation of data.
[E] Use Test Method D2042 or Test Method D7553.

5.1.2 *Penetration*—See Test Method D5/D5M.

5.1.3 *Viscosity at 60 °C*—See Test Method D4957.

5.1.4 *Viscosity at 135 °C*—See Test Method D4957.

5.1.5 *Flash Point, Cleveland Open Cup*—See Test Method D92.

5.1.6 *Solubility*—See Test Method D2042 or Test Method D7553.

5.1.7 *Softening Point*—See Test Method D36/D36M.

5.1.8 *Thin-Film Oven Test*—See Test Method D1754/D1754M.

6. Keywords

6.1 chemical gellant; chemical stabilizer; chemically modified asphalt cement; viscosity