Designation: D946/D946M – 15

Standard Specification for Penetration-Graded Asphalt Binder for Use in Pavement Construction[1]

This standard is issued under the fixed designation D946/D946M; 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 specification covers asphalt binder for use in the construction of pavements.

NOTE 1—For asphalt binders graded by viscosity at 60°C, see Specification D3381. For performance-graded asphalt binder, see Specification D6373.

1.2 This specification covers the following penetration grades:

40–50,	120–150, and
60–70,	200–300.
85–100,	

1.3 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 non-conformance with the standard.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D5 Test Method for Penetration of Bituminous Materials

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

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

D113 Test Method for Ductility of Bituminous Materials

D140 Practice for Sampling Bituminous Materials

D1754 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

D3381 Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction

D6373 Specification for Performance Graded Asphalt Binder

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

3. Manufacture

3.1 Asphalt binder shall be prepared by the refining of crude petroleum by suitable methods.

4. Properties

4.1 The asphalt binder shall be homogeneous and shall not foam when heated to 175°C [350°F].

4.2 The asphalt binder shall conform to the requirements given in Table 1 or Table 2, as specified by the purchaser. If no table is specified, the default shall be Table 1. Table 2 requirements limit the temperature susceptibility of asphalt over Table 1 requirements. Asphalt binders that meet Table 2 requirements will also meet Table 1 requirements of the same grade.

5. Methods of Sampling and Testing

5.1 The material shall be sampled and the properties enumerated in this specification shall be determined in accordance with the following ASTM methods:

5.1.1 *Sampling*—Practice D140.

5.1.2 *Penetration*—Test Method D5.

5.1.3 *Softening Point*—Test Method D36.

5.1.4 *Flash Point*—Test Method D92.

5.1.5 *Ductility*—Test Method D113.

5.1.6 *Thin Film Oven Test*—Test Method D1754.

5.1.7 *Solubility in Trichloroethylene*—Test Method D2042.

5.1.8 *Solubility in N-Propyl Bromide*—Test Method D7553.

6. Keywords

6.1 asphalt binder; pavement; penetration

[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.

Current edition approved Dec. 1, 2015. Published January 2016. Originally approved in 1947. Last previous edition approved in 2009 as D946/D946M – 09a. DOI: 10.1520/D0946_D0946M-15.

[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 Penetration-Graded Asphalt Binder for Use in Pavement Construction

	Penetration Grade									
	40–50		60–70		85–100		120–150		200–300	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Penetration at 25°C [77°F], 100 g, 5 s	40	50	60	70	85	100	120	150	200	300
Flash point, °C [°F] (Cleveland open cup)	230 [450]	...	230 [450]	...	230 [450]	...	220 [425]	...	175 [350]	...
Ductility at 25°C [77°F], 5 cm/min, cm	100	...	100	...	100	...	100	...	100[A]	...
Solubility, %[B]	99.0	...	99.0	...	99.0	...	99.0	...	99.0	...
Retained penetration after thin-film oven test, %	55 +	...	52 +	...	47 +	...	42 +	...	37 +	...
Ductility at 25°C [77°F], 5 cm/min, cm after thin-film oven test	...	...	50	...	75	...	100	...	100[A]	...

[A]If ductility at 25°C [77°F] is less than 100 cm, material will be accepted if ductility at 15°C [60°F] is 100 cm minimum at the pull rate of 5 cm/min.
[B]Use Test Method D2042 or Test Method D7553.

TABLE 2 Requirements for Penetration-Graded Asphalt Binder for Use in Pavement Construction

	Penetration Grade									
	40–50		60–70		85–100		120–150		200–300	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Penetration at 25°C [77°F], 100 g, 5 s	40	50	60	70	85	100	120	150	200	300
Softening Point, °C [°F]	49 [120]		46 [115]		42 [108]		38 [100]		32 [90]	
Flash point, °C [°F], (Cleveland open cup)	230 [450]	...	230 [450]	...	230 [450]	...	220 [425]	...	175 [350]	...
Ductility at 25°C [77°F], 5 cm/min, cm	100	...	100	...	100	...	100	...	100[A]	...
Solubility, %[B]	99.0	...	99.0	...	99.0	...	99.0	...	99.0	...
Retained penetration after thin-film oven test, %	55 +	...	52 +	...	47 +	...	42 +	...	37 +	...
Ductility at 25°C [77°F], 5 cm/min, cm after thin-film oven test	...	...	50	...	75	...	100	...	100[A]	...

[A]If ductility at 25°C [77°F] is less than 100 cm, material will be accepted if ductility at 15°C [60°F] is 100 cm minimum at the pull rate of 5 cm/min.
[B]Use Test Method D2042 or Test Method D7553.