



Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers asphalt cements graded by viscosity at 140°F (60°C) for use in pavement construction. Three sets of limits are offered in this specification. The purchaser shall specify the applicable table of limits. In the event the purchaser does not specify limits, **Table 1** shall apply. For asphalt cements graded by penetration at 77°F (25°C) (see Specification **D 946**). If needed, volume corrections for asphalt cements should be made according to Practice **D 4311**.

2. Referenced Documents

2.1 ASTM Standards:²

- D 5** Test Method for Penetration of Bituminous Materials
- D 92** Test Method for Flash and Fire Points by Cleveland Open Cup Tester
- D 95** Test Method for Water in Petroleum Products and Bituminous Materials by Distillation
- D 113** Test Method for Ductility of Bituminous Materials
- D 140** Practice for Sampling Bituminous Materials
- D 946** Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
- D 1754** Test Method for Effects of Heat and Air on Asphaltic Materials (Thin-Film Oven Test)
- D 2042** Test Method for Solubility of Asphalt Materials in Trichloroethylene
- D 2170** Test Method for Kinematic Viscosity of Asphalts (Bitumens)

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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.

- D 2171** Test Method for Viscosity of Asphalts by Vacuum Capillary Viscometer
- D 2872** Test Method for Effect of Heat and Air on a Moving Film of Asphalt (Rolling Thin-Film Oven Test)
- D 4311** Practice for Determining Asphalt Volume Correction to a Base Temperature

3. Manufacture

3.1 The asphalt cement shall be prepared from crude petroleum by suitable methods.

4. Physical Requirements

4.1 The asphalt cement shall be homogeneous, free from water, and shall not foam when heated to 347°F (175°C).

4.2 The asphalt cements shall conform to the requirements given in **Table 1**, **Table 2**, or **Table 3**, as specified by the purchaser.

5. Methods of Sampling and Testing

5.1 Sample and test asphalt cements in accordance with the following methods:

- 5.1.1 *Sampling*—Practice **D 140**.
- 5.1.2 *Water*—Test Method **D 95**.
- 5.1.3 *Viscosity at 140°F (60°C)*—Test Method **D 2171**.
- 5.1.4 *Viscosity at 275°F (135°C)*—Test Method **D 2170**.
- 5.1.5 *Penetration*— Test Method **D 5**.
- 5.1.6 *Flash Point, Cleveland Open Cup*—Test Method **D 92** (see **Table 1** and **Table 2**).
- 5.1.7 *Solubility in Trichloroethylene*—Test Method **D 2042**.
- 5.1.8 *Thin-Film Oven Test*—Test Method **D 1754** (see **Table 1** and **Table 2**).
- 5.1.9 *Rolling Thin-Film Oven Test*—Test Method **D 2872** (see **Table 3**).
- 5.1.10 *Ductility*—Test Method **D 113**.

TABLE 1 Requirements for Asphalt Cement, Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on original asphalt.

| Test | Viscosity Grade | | | | | |
|--|------------------|-----------|------------|------------|------------|------------|
| | AC-2.5 | AC-5 | AC-10 | AC-20 | AC-30 | AC-40 |
| Viscosity, 140°F (60°C), P | 250 ± 50 | 500 ± 100 | 1000 ± 200 | 2000 ± 400 | 3000 ± 600 | 4000 ± 800 |
| Viscosity, 275°F (135°C), min, cSt | 80 | 110 | 150 | 210 | 250 | 300 |
| Penetration, 77°F (25°C), 100 g, 5 s, min | 200 | 120 | 70 | 40 | 30 | 20 |
| Flash point, Cleveland open cup, min, ° F (°C) | 325 (163) | 350 (177) | 425 (219) | 450 (232) | 450 (232) | 450 (232) |
| Solubility in trichloroethylene, min, % | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| Tests on residue from thin-film oven test: | | | | | | |
| Viscosity, 140°F (60°C), max, P | 1250 | 2500 | 5000 | 10 000 | 15 000 | 20 000 |
| Ductility, 77°F (25°C), 5 cm/min, min, cm | 100 ^A | 100 | 50 | 20 | 15 | 10 |

^A If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

TABLE 2 Requirements for Asphalt Cement Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on original asphalt.

NOTE 2—Table 2 specifies asphalts that are less temperature susceptible than those specified by Table 1. Asphalts that meet Table 2 requirements will also meet Table 1 requirements of the same grade.

| Test | Viscosity Grade | | | | | |
|--|------------------|-----------|------------|------------|------------|------------|
| | AC-2.5 | AC-5 | AC-10 | AC-20 | AC-30 | AC-40 |
| Viscosity, 140°F (60°C), P | 250 ± 50 | 500 ± 100 | 1000 ± 200 | 2000 ± 400 | 3000 ± 600 | 4000 ± 800 |
| Viscosity, 275°F (135°C), min, cSt | 125 | 175 | 250 | 300 | 350 | 400 |
| Penetration, 77°F (25°C), 100 g, 5 s, min | 220 | 140 | 80 | 60 | 50 | 40 |
| Flash point, Cleveland open cup, min, ° F (°C) | 325 (163) | 350 (177) | 425 (219) | 450 (232) | 450 (232) | 450 (232) |
| Solubility in trichloroethylene, min, % | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |
| Tests on residue from thin-film oven test: | | | | | | |
| Viscosity, 140°F (60°C), max, P | 1250 | 2500 | 5000 | 10 000 | 15 000 | 20 000 |
| Ductility, 77°F (25°C), 5 cm/min, min, cm | 100 ^A | 100 | 75 | 50 | 40 | 25 |

^A If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

TABLE 3 Requirements for Asphalt Cement Viscosity Graded at 140°F (60°C)

NOTE 1—Grading based on residue from rolling thin-film oven test.

| Tests on Residue from Rolling Thin-Film Oven Test: ^A | Viscosity Grade | | | | |
|---|------------------|------------------|-------------|-------------|--------------|
| | AR-1000 | AR-2000 | AR-4000 | AR-8000 | AR-16000 |
| Viscosity, 140°F (60°C), P | 1000 ± 250 | 2000 ± 500 | 4000 ± 1000 | 8000 ± 2000 | 16000 ± 4000 |
| Viscosity, 275°F (135°C), min, cSt | 140 | 200 | 275 | 400 | 550 |
| Penetration, 77°F (25°C), 100 g, 5 s, min | 65 | 40 | 25 | 20 | 20 |
| % of original penetration, 77°F (25°C), min | ... | 40 | 45 | 50 | 52 |
| Ductility, 77°F (25°C), 5 cm/min, min, cm | 100 ^B | 100 ^B | 75 | 75 | 75 |
| Tests on original asphalt: | | | | | |
| Flash point, Cleveland open cup, min, °F (°C) | 400 (205) | 425 (219) | 440 (227) | 450 (232) | 460 (238) |
| Solubility in trichloroethylene, min, % | 99.0 | 99.0 | 99.0 | 99.0 | 99.0 |

^A Thin-film oven test may be used but the rolling thin-film oven test shall be the referee method.

^B If ductility is less than 100, material will be accepted if ductility at 60°F (15.5°C) is 100 minimum at a pull rate of 5 cm/min.

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