

Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test

AASHTO Designation: MP 19-10



1. SCOPE

- 1.1. This specification covers asphalt binders graded by performance using the multiple stress creep recovery (MSCR) test. Grading designations are related to the average seven-day maximum pavement design temperature, minimum pavement design temperature, and traffic loading.
- 1.2. This specification incorporates TP 70 for determining non-recoverable creep compliance, J_{nr} . “S,” “H,” “V,” or “E” grades must be specified for standard, high, very high, or extremely high traffic loading, respectively.
- Note 1**—For asphalt cements graded by viscosity at 60°C, see M 226.
- Note 2**—For performance-graded asphalt binder, see M 320.

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 226, Viscosity-Graded Asphalt Cement
 - M 320, Performance-Graded Asphalt Binder
 - M 323, Superpave Volumetric Mix Design
 - R 28, Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)
 - R 29, Grading or Verifying the Performance Grade (PG) of an Asphalt Binder
 - R 35, Superpave Volumetric Design for Hot Mix Asphalt (HMA)
 - T 40, Sampling Bituminous Materials
 - T 44, Solubility of Bituminous Materials
 - T 48, Flash and Fire Points by Cleveland Open Cup
 - T 240, Effect of Heat and Air on a Moving Film of Asphalt Binder (Rolling Thin-Film Oven Test)
 - T 313, Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)
 - T 314, Determining the Fracture Properties of Asphalt Binder in Direct Tension (DT)
 - T 315, Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

- T 316, Viscosity Determination of Asphalt Binder Using Rotational Viscometer
- TP 70, Multiple Stress Creep Recovery (MSCR) Test of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

2.2. *ASTM Standards:*

- D 8, Standard Terminology Relating to Materials for Roads and Pavements
- D 5546, Standard Test Method for Solubility of Asphalt Binders in Toluene by Centrifuge

3. TERMINOLOGY

3.1. *Definitions:*

3.1.1. Definitions for many terms common to asphalt binder are found in ASTM D 8.

3.1.2. *asphalt binder*—an asphalt-based cement that is produced from petroleum residue either with or without the addition of nonparticulate organic modifiers.

4. ORDERING INFORMATION

4.1. When ordering under this specification, include in the purchase order the performance grade (PG) of asphalt binder required and the grade (e.g., MP 19, PG 64-22, Grade S).

4.2. The required environmental asphalt binder grades may be selected by following the procedures described in M 323 and R 35, except do not use the “grade bumping” procedure in M 323. Select the environmentally appropriate high- and low-temperature grades and the appropriate “S,” “H,” “V,” or “E” grade for the expected traffic level and traffic load rate.

4.2.1. Standard Grade “S” in most typical situations will be for traffic levels fewer than 10 million Equivalent Single Axle Loads (ESALs) and less than the standard traffic load rate (>70 km/h).

4.2.2. High Grade “H” in most situations will be for traffic levels of 10 to 30 million ESALs or slow-moving traffic (20 to 70 km/h).

4.2.3. Very High Grade “V” in most situations will be for traffic levels of greater than 30 million ESALs or standing traffic (<20 km/h).

4.2.4. Extremely High Grade “E” in most situations will be for traffic levels of greater than 30 million ESALs and standing traffic (<20 km/h) such as toll plazas or port facilities.

Note 3—“Grade bumping” is accomplished by using “H,” “V,” or “E” grade and not by increasing the PG high-temperature grade as recommended in M 323.

5. MATERIALS AND MANUFACTURE

5.1. Asphalt binder shall be prepared by the refining of crude petroleum by suitable methods, with or without the addition of modifiers.

5.2. Modifiers may be any organic material of suitable manufacture that is used in virgin or recycled condition and that is dissolved, dispersed, or reacted in asphalt binder to enhance its performance.