
Standard Specification for
Materials for Ultrathin
Bonded Wearing Course

AASHTO Designation: MP xxx-yy¹

**Technical Subcommittee: 5b, Bridge and
Pavement Preservation**

Release: Group 1 (April)

AASHTO

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1. SCOPE

- 1.1. This standard covers the requirements for polymer-modified emulsified asphalt, performance-graded asphalt binder, mineral aggregate, mineral filler, and additives used in an ultrathin bonded wearing course. An ultrathin bonded wearing course, usually $\frac{1}{2}$ to 1 in. (12.5 to 25.4 mm) thick is placed on existing pavement surfaces using specially designed paving machines.
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2. REFERENCED STANDARDS

2.1. *AASHTO Standards:*

- M 17, Mineral Filler for Bituminous Paving Mixtures
- M 303, Lime for Asphalt Mixtures
- M 316, Polymer-Modified Emulsified Asphalt
- M 320, Performance-Graded Asphalt Binder
- M 322, Standard Specification for Performance-Graded Asphalt Binder Using Multiple Stress Creep Recovery (MSCR) Test PP xx, Ultrathin Bonded Wearing Course Design
- T 59, Emulsified Asphalts
- T 84, Specific Gravity and Absorption of Fine Aggregate
- T 85, Specific Gravity and Absorption of Coarse Aggregate
- T 96, Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- T 104, Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
- T 112, Clay Lumps and Friable Particles in Aggregate
- T 176, Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test
- T 210, Aggregate Durability Index
- T 304, Uncompacted Void Content of Fine Aggregate
- T 327, Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus
- T 331, Bulk Specific Gravity (G_{mb}) and Density of Compacted Asphalt Mixtures Using Automatic Vacuum Sealing Method
- T 335, Determining the Percentage of Fracture in Coarse Aggregate

2.2. *ASTM Standard:*

- D4791, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

3. TERMINOLOGY

3.1. Definitions:

- 3.1.1. *hot mix asphalt surface layer* The ultrathin bonded wearing course shall be a 1/2 to 1 in. (12.5- to 25.4-mm) thick mix and consist of a polymer- modified asphalt emulsion membrane followed immediately with an ultrathin gap graded hot mix. The ultrathin bonded wearing course shall be placed using an integrated distributor-paver to apply the bonded wearing course.
- 3.1.2. *rapid-setting type anionic polymer-modified emulsified asphalt* Emulsified asphalt RS-1p contained in Section 5.
- 3.1.3. *rapid-setting type cationic polymer-modified emulsified asphalt* Emulsified asphalt CRS-1p contained in Section 6..

4. SIGNIFICANCE AND USE

- 4.1. This standard may be used to select and evaluate materials for the construction of an ultrathin bonded wearing course. The design recommendations for an ultrathin bonded wearing course may be found in PP xx.

5. ANIONIC POLYMER-MODIFIED EMULSIFIED ASPHALT REQUIREMENTS

- 5.1. Anionic polymer-modified emulsified asphalt for ultrathin bonded wearing course shall meet the requirements of Table 1. The emulsified asphalt classification is determined by the owner agency utilizing regional climatic and traffic conditions.

Table 1—Anionic Polymer-Modified Emulsified Asphalt Specification

Tests on Emulsion	Method	Minimum	Maximum
Viscosity, Saybolt Furol @ 122°F (50°C), s	T 59	20	100
Storage Stability 24 h, %	T 59	—	1.0
Demulsibility, 35 mL 0.02 N CaCl ₂ , %	T 59	40	—
Sieve, %	T 59	—	0.05
Evaporation Residue, %	T 59	63	—
Tests on Residue from Evaporation			
Penetration @ 77°F (25°C), dmm	T 49	80	150
Elastic Recovery @ 77°F (25°C), %	T 301	50	—

6. CATIONIC POLYMER-MODIFIED EMULSIFIED ASPHALT REQUIREMENTS

- 6.1. Cationic polymer-modified emulsified asphalt for ultrathin bonded wearing course shall meet the requirements of CRS-1p in M 316 except as modified in Table 2. The emulsified asphalt classification is determined by the owner agency utilizing regional climatic and traffic conditions.

Table 2—Modifications to M 316

Tests on Emulsion	Method	Minimum	Maximum
Sieve Test, Retained on #20 (850- μ m) Sieve, %	T 59	—	0.05

7. AGGREGATE REQUIREMENTS FOR THE HMA

- 7.1. Mineral aggregate shall be 90 percent crushed on two or more faces for the coarse aggregate material retained on the #8(2.36-mm) sieve. Only manufactured fine aggregate, material passing the # 8(2.36-mm) sieve is permitted. T 335 shall be used to determine the percentage of crushed aggregate. The quality requirements for the coarse aggregate shall be in accordance with Table 3. The quality requirements of the fine aggregate shall be in accordance with Table 4 or as specified by the owner agency.

Table 3—Coarse Aggregate Quality Requirements

Test	Method	Limit, %
Flat & Elongated Ratio, 3:1	ASTM D4791	<25
Los Angeles Abrasion	T 96	<40
Aggregate Wear Index	T 210	260 min
Crushed Particles, Two Faced, %	T 335	90
Deleterious Particles	T 112	.0 max
Water Absorption	T 85	3.0 max
Micro-Deval, % Loss	T 327	18 max
Bulk Specific Gravity	T 331	2.50 min
Magnesium Sulfate Soundness, Max Loss, %, 5 cycles	T 104	20
<i>Or</i>		
Sodium Sulfate Soundness, Max Loss, %, 5 cycles	T 104	15

^a The abrasion test is to be run on the parent aggregate, i.e., the limestone, sandstone, etc. from which it was derived.

Table 4—Fine Aggregate Quality Requirements

Test	Method	Requirement
Sand Equivalent	T 176	>45
Uncompacted Void Content, %	T 304	>40
Water Absorption, %	T 84	3.0 max

8. MINERAL FILLER

- 8.1. Lime, fly ash, baghouse fines collected during the mixing process, or other approved filler meeting the requirements of M 17, M 295, or M 303 shall be used if required by the mix design.

9. PERFORMANCE-GRADED BINDER

- 9.1. Evaluate the performance-graded binder in accordance with M 320 and M 332.
- 9.2. Use the binder grade recommended for the climatic and traffic conditions of the project.

10. KEYWORDS

- 10.1. Emulsified asphalt; HMA Aggregate; mineral filler; performance-graded binder; ultrathin bonded wearing course.

¹ This provisional standard was first published in [YYYY].

WORKING DRAFT