
Standard Practice for

Micro Surfacing Design

AASHTO Designation: PP 83



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This standard practice for mix design evaluation uses mixture properties to determine the proportions of polymer-modified emulsified asphalt, mineral aggregate, water, mineral filler, and additives to produce a micro surfacing job-mix formula.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards:*

- M 85, Portland Cement
- M 295, Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- M 303, Lime for Asphalt Mixtures
- M 316, Polymer-Modified Cationic Emulsified Asphalt
- MP 28, Materials for Micro Surfacing

2.2. *ASTM Standard:*

- D 6372, Standard Practice for Design, Testing, and Construction of Micro-Surfacing

2.3. *ANSI Standard:*

- NSF/ANSI 60-2013, Drinking Water Treatment Chemicals-Health Effects

2.4. *ISSA Standards:*

- ISSA A143, Recommended Performance Guideline for Micro Surfacing
- ISSA TB 100, Test Method for Wet Track Abrasion of Slurry Surfacing Systems
- ISSA TB 109, Test Method for Measurement of Excess Asphalt in Bituminous Mixtures by Use of a Loaded Wheel Tester and Sand Adhesion
- ISSA TB 113, Test Method for Determining Mix Time for Slurry Surfacing Systems
- ISSA TB 114, Test Method for Wet Stripping of Cured Slurry Surfacing Mixtures
- ISSA TB 139, Test Method to Determine Set and Cure Development of Slurry Surfacing Systems by Cohesion Tester
- ISSA TB 144, Test Method for Classification of Aggregate Filler-Bitumen Compatibility by Schulze-Breuer and Ruck Procedures
- ISSA TB 147, Test Method for Measurement of Stability and Resistance to Compaction, Vertical and Lateral Displacement of Multilayered Fine Aggregate Cold Mixes

3. SIGNIFICANCE AND USE

- 3.1. The procedure described in this standard practice is used to produce a micro surfacing job- mix formula. The materials used in the design of Micro Surfacing can be found in MP 28.

4. EVALUATION OF MATERIALS

- 4.1. Evaluate the aggregate in accordance with the requirements of MP 28.
- 4.2. Evaluate the emulsified asphalt in accordance with the requirements for CQS-1P or CQS-1hP in M 316.
- 4.3. Evaluate the mineral filler in accordance with M 85 for cement, M 295 for fly ash, M 303 for lime and ANSI 60 for aluminum sulfate.
- 4.4. Water shall be free of harmful salts and contaminants. If the quality of the water is in question, it should be submitted to the mix design laboratory for analysis along with the other raw materials to be used in the mix design.

5. DESIGN PROCESS

- 5.1. Evaluate mix formulations for system performance using the tests, methods and requirements outlined in Table I.

Table 1—Evaluation of Micro Surfacing System Performance

Test	ISSA Technical Bulletin	Requirement
Mix Time @ 77°F (25°C)	TB 113	Controllable to 120 s, min
Wet Cohesion	TB 139	
@ 30 minutes (Set)		12 kg-cm, min
@ 60 minutes (Traffic)		20 kg-cm or Near Spin, min
Wet Stripping	TB 114	Pass (90% min)
Wet-Track Abrasion Loss	TB 100	
1-hr Soak		50 g/ft ² (538 g/m ²), max
6-day Soak		75 g/ft ² (807 g/m ²), max
Lateral Displacement	TB 147	5%, max
Excess Asphalt by LWT Sand Adhesion	TB 109	50 g/ft ² (538 g/m ²), max
Saturated Abrasion Loss	TB 144	1.0 g, max

6. DETERMINING MIX TIME

- 6.1. Determine mix time in accordance with ISSA TB 113 and the requirements of Table 1. Emulsion percentages should result in mixture residual binder contents of 5.5 to 10.5 percent.

7. DETERMINING SET AND CURE CHARACTERISTICS (TRAFFIC READINESS)

- 7.1. Determine initial set and cure development characteristics in accordance with ISSA TB 139 and the requirements of Table 1.

8. DETERMINING BINDER CONTENT

- 8.1. The minimum binder content is determined in accordance with ISSA TB 100 and the requirements of Table 1. In general, select 1 percent more emulsion (at 65 percent residue) from TB 100 with a tolerance of ± 0.5 percent emulsion during placement.
- 8.2. The maximum binder content is determined in accordance with ISSA TB 109 and TB 147 and the requirements of Table 1.

9. DETERMINING ASPHALT-TO-AGGREGATE COMPATIBILITY

- 9.1. Determine the compatibility between the asphalt and the aggregate fines in accordance with the abrasion section of ISSA TB 144 and the requirements of Table 1.
- 9.2. Evaluate the potential of the mixture for stripping in accordance to ISSA TB 114 and the requirements of Table 1.

10. DETERMINING LATERAL DISPLACEMENT

- 10.1. Determine the displacement characteristics of multilayered systems in accordance with ISSA TB 147 and the requirements of Table I.

11. REPORT

- 11.1. Report all test results from Sections 6 through 10.
- 11.2. Report the recommended mix formulation including proportions of all mixture components and appropriate tolerances.

12. KEYWORDS

- 12.1. Aggregate; emulsified asphalt; micro surfacing.