Arizona AGC Pavement Preservation Series

Micro Surface and Slurry Seal Guide for Application and Construction

Darryn Olson
Micro Surface and Slurry Seal Guide for Application and Construction
The Arizona AGC Pavement Preservation guides are collections of best practices and recommendations for the state of Arizona. Microsurfacing and Slurry Seals are important pavement preservation tools, and when constructed properly they increase the life of a pavement. Following these guidelines and using a reputable AGC member contractor will also contribute to the overall success of the project.

There will be instances where conditions or materials dictate the need to deviate from these guides. It is important that contractors, suppliers, and agencies work together and use common sense to modify these recommendations as needed.

The Arizona Chapter of the Associated General Contractor’s Pavement Preservation committee developed this guideline to identify “best practices” to be used during the application of microsurfacing and slurry seals.

The committee is comprised of contractors, material suppliers, aggregate producers and agency personnel. Special thanks to our partners in the Arizona Department of Transportation: Bill Hurguy, State Materials Engineer and Janet Doerstling Pavement Materials Testing Manager for their contributions...
Micro Surface and Slurry Seal 
Guide for Application and 
Construction

Overview

– Introduction
– Surface Conditions and Preparation
– Materials
– Equipment
– Placement Practices
– Construction Procedures
– Method of Measurement
– Summary
– Checklists
Introduction

This document is provided as a guide for suppliers, contractors, agencies and owners.

Microsurfacing and Slurry seals are cost effective preservation treatments used to maintain and extend the service life of pavements and roadways. These applications extend the life of pavements by preventing moisture intrusion into the base course and sub-grade. Additional benefits include increased skid resistance and improved aesthetics. When properly constructed, microsurfacing and slurry seal applications are cost effective tools that provide improved life cycle benefits.

Although microsurfacing and slurry seals are generally similar, microsurfacing is designed to facilitate a quicker return to traffic, heavier application rate, rut filling, and support higher traffic volumes.

This guide contains best practice information to improve consistency. Many variables affect the successful application of microsurfacing and slurry seals. These variables will be discussed in more detail:

- Existing Surface Conditions
- Surface Preparation
- Materials
- Equipment
- Placement Practices
- Construction Procedures
Surface Conditions and Preparation

Surface Conditions
- Limitations
- When Micro Surface or Slurry Surface

Preparation
Surface Conditions - Limitations
Surface Conditions – Micro or Slurry
Surface Preparation
Materials

- **Aggregate**
  - Type I
  - Type II
  - Type III

- **Aggregate Considerations**

- **Emulsions**

- **Mix Design**
Materials - Aggregate

For high performance microsurfacing and slurry seals, quality aggregate is mandatory. Some of the key indicators of quality aggregate are: proper gradation, particle shape, cleanliness, soundness, and resistance to abrasion.
Type I aggregate has the smallest size gradation. It is primarily used to address minor surface defects such as surface voids and cracks. It is also used when protection from the elements is the main reason for resurfacing. Type I aggregates are commonly used for airfields and parking lots.
Type II aggregate is used to fill surface voids and correct moderate surface defects. It is typically used on pavements with medium-textured surfaces that require correction of weathering and raveling, while producing an adequate wearing surface for medium to heavy traffic.
Materials – Aggregate Type III

Type III aggregate (the largest gradation) is used to improve friction, and skid resistance. Durability is also improved due to increased mat thickness. It is best-suited for higher-traffic pavements such as collectors, arterials and major highways. When Type III aggregates are used in microsurfacing, stability is also increased, making the gradation ideal for rut filling and reestablishing profiles with minor surface irregularities.
Materials – Aggregate Considerations
Materials – Emulsions
# Materials – Mix Design

### Type III Microsealed JMF

<table>
<thead>
<tr>
<th>Material</th>
<th>Grade</th>
<th>Supplier</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral Aggregate</td>
<td>Type III Stony Sand</td>
<td></td>
<td>1332983</td>
</tr>
<tr>
<td>Asphalt Emulsion</td>
<td>Polymer Modified</td>
<td></td>
<td>1332714</td>
</tr>
<tr>
<td>Set Control Additive</td>
<td>Portland Cement (P)</td>
<td></td>
<td>1355271</td>
</tr>
<tr>
<td>Mixing Water</td>
<td></td>
<td></td>
<td>N/A</td>
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</table>

<table>
<thead>
<tr>
<th>(%) Type III Stony Sand Passing 200/270 (5/3) (in) Band</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Trial Mix Identification</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Bitumen Aggregate (by weight of aggregate)</td>
<td>6.50</td>
<td>6.50</td>
<td>6.50</td>
</tr>
<tr>
<td>Set Control Additive (by weight of aggregate)</td>
<td>4.00</td>
<td>4.00</td>
<td>4.00</td>
</tr>
<tr>
<td>Asphalt Emulsion (by weight of aggregate)</td>
<td>10.00</td>
<td>10.00</td>
<td>10.00</td>
</tr>
</tbody>
</table>

### Properties of Freshly Mixed Microseal

<table>
<thead>
<tr>
<th>Trial Mix Number</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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</thead>
<tbody>
<tr>
<td>Mix Time, TB113</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
<td>120</td>
</tr>
<tr>
<td>Consistency, TB106/3910 (2.0 - 3.0)</td>
<td>2.6</td>
<td>2.9</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
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</tbody>
</table>

### Wet Cohesion Test, TB139/3910

<table>
<thead>
<tr>
<th>Wet Cohesion</th>
<th>15 minutes cure</th>
<th>30 minutes cure</th>
<th>60 minutes cure</th>
<th>90 minutes cure</th>
<th>180 minutes cure</th>
<th>240 minutes cure</th>
</tr>
</thead>
<tbody>
<tr>
<td>kg/cm</td>
<td>11 N</td>
<td>13 N</td>
<td>20 NS</td>
<td>22 NS</td>
<td>23 S</td>
<td>24 SS</td>
</tr>
</tbody>
</table>

### Asphalt Classification Summary

<table>
<thead>
<tr>
<th>Grade</th>
<th>Sample ID</th>
<th>Date Received</th>
<th>Sample Date</th>
<th>Sample Type</th>
<th>Concentrate</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTE</td>
<td>042710.1</td>
<td>04-27-2010</td>
<td>04-27-2010</td>
<td>Sample Type</td>
<td>Concentrate</td>
</tr>
</tbody>
</table>

#### Tests on Emulsion

- Asphalt Penetration (77°F), sec: ASTM D5 | 10-100 | 21 |
- Softening Point, °F: ASTM D3 | 50 min. | 0.03 |
- Penetration (77°F), 0.15% | ASTM D5 | 80 | 62.4 |
- Storage Stability, 24 hrs, %: ASTM D11 | Positive | 0.70 |

#### Tests on Residues from Distillation to 50°F

- ASTM D2153 | 100 min. | 144 |
- ASTM D2153 | 500 min. | 93 |

#### Tests on Residues after RTFO

- ASTM D2153 | 1000 min. | 904 |
- Viscosity Ratio, RTFO / Original | ASTM D2153 | 2.5 | 140 |
- Softening Point, °F: ASTM D5 | 140 | 148 |

**Remarks:** Specifications Reference Project Special Provisions, Submission 710.1-00033

Reviewed By:
Equipment

- Mixer
- Spreading Equipment
- Calibration
Equipment – Mixer
Equipment – Spreading Equipment
Equipment – Spreading Equipment
Equipment - Calibration

Each mixing unit shall be calibrated at least once per year for each aggregate source and type, or as required by the agency.

The calibration shall include a metered verification for each material used.

No machine should be allowed to work on the project until the calibration has been completed and/or accepted.
Placement Practices
Construction Procedures

- General Considerations
- Rolling
- Sweeping
- Traffic Control
Construction Procedures - General Considerations

- Prior to Application
  Surface must be cleaned

- Microsurfacing and Slurry seals should be applied when the surface temperature is 45°F and rising.

- Slurry seal should not be performed if wind speeds are greater than 30 mph or rain is imminent.
Construction Procedures - Rolling

- Rollers are not typically needed.
- The rollers should carry a minimum loading of 2,000 pounds on each wheel, with a minimum tire pressure of 90 psi or as recommended by the equipment manufacturer.
Construction Procedures - Sweeping
Construction Procedures - Traffic Control

Before the project starts. You must have a approved Traffic Control Plan (TCP).

Safety is everyone's responsibility. Do your part.
Traffic Control
Method of Measurement

- There are two different types of measurement;

- By the Ton
- By the Square Yard
Summary

- Complete all needed repair work and allow adequate curing time prior to the placement of the application.
- Microsurfacing and slurry seals should be applied when the surface temperature is 50°F or higher and the ambient temperature is 45°F and rising.
- Materials should be tested prior to and during all phases of construction to assure specification compliance.
- Use and follow a current mix design for each project.
## Checklist Construction Techniques/Application

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is traffic control in compliance with approved plan?</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>2. Have pavement markers been considered?</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>3. Is the ambient temperature at 45°F and rising?</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>4. Is the pavement clean and dry?</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>5. Is there a chance of rain during the daily production?</td>
<td>_____</td>
<td>_____</td>
</tr>
<tr>
<td>6. Has the equipment been calibrated?</td>
<td>_____</td>
<td>_____</td>
</tr>
</tbody>
</table>
Checklist Materials & Construction Techniques/Application

1. Is the area clean and dry?  _____  _____
2. Is the ambient asphalt temperature 45 degrees and rising?  _____  _____
3. Is area free of debris, cars, people, or equipment?  _____  _____
4. Is proper traffic control in place prior to starting application?  _____  _____
5. Have you had a Safety/Tail Gate Meeting?  _____  _____
Questions?