

Chapter 27

Tex-230-F, Laboratory Method of Mixing, Curing and Testing Micro Surfacing (Polymer-Modified Slurry Seal) Mixtures

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Section 1

Overview

Effective Dates: August 1999 to November 2004.

This method covers preparation of polymer-modified slurry seal mixtures for verifying the conformance of mixture designs with applicable specifications.

Units of Measurement

The values given in parentheses (if provided) are not considered to be standard and may not be exact mathematical conversions. Each system of units shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

Section 2

Apparatus

The following apparatus is required:

- ◆ balance readable to 0.1 g, and accurate to 0.5 g
- ◆ mechanical mixer, or other mixer fitted with a wire whip
- ◆ containers for batching aggregates
- ◆ miscellaneous mixing tools
- ◆ wax paper
- ◆ large capacity pans for curing mixtures
- ◆ mechanical sieve shaker
- ◆ forced draft oven capable of maintaining the temperatures specified in the test procedure
- ◆ thermometer capable of measuring the temperatures specified in the test procedure and marked in 1 °C (2 °F) divisions
- ◆ standard U. S. sieves required in the applicable specification, meeting the requirements of "Tex-907-K, Verifying the Accuracy of Wire Cloth Sieves."

Section 3

Materials

The following materials are needed:

- ◆ aggregates
- ◆ emulsified asphalt
- ◆ mineral fillers
- ◆ water
- ◆ additives.

Section 4 Procedure

Follow these steps for laboratory method of mixing, curing, and testing micro surfacing (polymer-modified slurry seal) mixtures.

Laboratory Method of Mixing, Curing, and Testing Micro Surfacing (Polymer-Modified Slurry Seal) Mixtures	
Step	Action
1	Obtain a representative sample of processed aggregates according to Test Method "Tex-221-F, Sampling Aggregate for Bituminous Mixtures, Surface Treatments and Limestone Rock Asphalt."
2	Dry the aggregate in an oven at a temperature between 38 and 150 °C (100 and 302 °F).
3	<ul style="list-style-type: none"> ◆ Prepare dilute solution of liquid additive at 25 ± 3 °C (77 ± 5 °F). ◆ Substitute an appropriate amount for a portion of mix water. ◆ Prepare a fresh solution each day it is used.
4	Weigh and mix the desired amounts of water and diluted liquid additive.
5	<ul style="list-style-type: none"> ◆ Weigh into a mixing bowl an adequate amount of aggregates to prepare approximately 5000 g of mixture. ◆ Maintain all components at 25 ± 3 °C (77 ± 5 °F) during preparation of the mix.
6	Add the mineral fillers and mix dry at a slow speed.
7	Add the mixture of water and liquid additives and mix until the sample displays a homogeneous moisture content.
8	Form a crater in the aggregate mixture and add the required amount of the emulsified asphalt.
9	<ul style="list-style-type: none"> ◆ Mix thoroughly with a mechanical mixer until all aggregates are well coated. ◆ Exercise care to prevent loss of material during mixing and subsequent handling.
10	Line a large metal pan with a piece of waxed paper of adequate size to extend above the sides of the pan.
11	Pour the mixture into the pan and allow the material to flow out evenly across the base of the pan.
12	If necessary, smooth the mix into a uniform thickness of approximately 51 mm (2 in.).
13	Complete mixing and pouring in less than 2 minutes. <ul style="list-style-type: none"> ◆ The design mixture must maintain a free flowing consistency during the mixing and pouring process. ◆ If the mix exhibits a 'break' prior to completion of the pouring, discard and prepare a new mixture with a different concentration of liquid additive.
14	Immediately after placing the mixture in the pan, place the pan in an oven at 60 ± 3 °C (140 ± 5 °F).
15	<ul style="list-style-type: none"> ◆ Cure the mixture for 24 hours or until constant weight is reached. ◆ Constant weight is reached when the mixture shows less than 1 g loss in weight after a 30 minute curing period.
16	Remove the sample pan from the oven.
17	<ul style="list-style-type: none"> ◆ Examine the surface of the mixture for excessively sticky appearance. ◆ A white paper towel may be used to gently blot the surface of the mixture. (Discard mixtures exhibiting excess asphalt on the surface and prepare a new mix design.)
18	When a cured mixture is obtained which does not appear excessively sticky, invert the sample pan on a clean, non-absorptive surface and remove the wax paper.

Laboratory Method of Mixing, Curing, and Testing Micro Surfacing (Polymer-Modified Slurry Seal) Mixtures	
Step	Action
19	<ul style="list-style-type: none"> ◆ Quarter the sample with a trowel or spatula and retain three of the quarters for Hveem stability specimens. (Test Method "Tex-208-F, Test for Stabilometer Value of Bituminous Mixtures") ◆ The fourth quarter will be used for determining theoretical maximum specific gravity. (Test Method "Tex-227-F, Theoretical Maximum Specific Gravity of Bituminous Mixtures")
20	Heat the four samples at 121 ± 3 °C (250 ± 5 °F) for 2 hours.
21	Compact three Hveem specimens according to Test Method "Tex-206-F, Compacting Test Specimens of Bituminous Mixtures."
22	Measure the theoretical maximum specific gravity according to Test Method "Tex-227-F, Theoretical Maximum Specific Gravity of Bituminous Mixtures."
23	Measure the density and stability of the molded specimens according to test methods "Tex-207-F, Determining Density of Compacted Bituminous Mixtures" and "Tex-208-F, Test for Stabilometer Value of Bituminous Mixtures," respectively.

Section 5

Reporting

Report the percent density and Hveem stability of the compacted specimens, or observations regarding the consistency of the slurry or excessive asphalt on the surface of the cured specimen.

Section 6

Calculations for Preparing Sample

Example of Calculations

The following table shows an example of calculations required to determine batch weights of various slurry seal components. The following mixture proportions are identified from mixture design.

Calculations for Preparing Sample	
Aggregate	5000 g sample of dry aggregate
Residual Asphalt	7% by weight of dry aggregate.
Mineral Filler	0.8% Portland cement by weight of dry aggregate.
Water	10% by weight of dry aggregates
Liquid Additive	1.2% by weight of asphalt emulsion
Polymer modified emulsion	65% residual asphalt.

Examples:

$$\text{Emulsion content} = (0.07 \times 5000) / 0.65 = 538.5 \text{ g}$$

$$\text{Mineral Filler} = 0.008 \times 5000 = 40 \text{ g}$$

$$\text{Water} = 0.10 \times 5000 = 500 \text{ g.}$$

Liquid Additive

Liquid additive may be supplied in dilute or concentrated form. When concentrated additive is supplied, determine the required amount by multiplying the additive content by emulsion weight. For this example:

$$\text{Concentrated Additive Weight} = 0.012 \times 538.5 = 6.46 \text{ g}$$

When concentrated additive is supplied, prepare and use a dilute solution.

Take the following steps to determine the amount of diluted solution and water to use:

Determine the required amount of solution:

$$\text{Amount of solution} = \frac{(\text{required additive weight}) \times 100}{\text{solution concentration}}$$

For this example, assuming a 4% solution was supplied:

$$\text{Amount of solution} = \frac{6.46 \text{ g} \times 100}{4} = 161.5 \text{ g}$$

From the previous steps, the required amount of water was calculated to be 500 g.
Therefore, add $500 - 161.5 = 338.5$ g water to the mix in addition to the diluted solution.