

Test Method for Boiling Compatibility of Slurry Seal Mixes

Introduction:

Every slurry seal system must be designed and evaluated as a separate system. Three chemically active additives are generally used to enhance the properties or workability of the mix. These additives are: cement (Type I and III), hydrated lime, and aluminum sulfate [Al₂(SO₄)₃]. At different levels of addition, these additives can vary the mix time, set time and the adhesive/cohesive strength. Mix time extension or set acceleration, however, should not be acquired at the expense of mix cohesion. For example, an additive may be introduced into a system and the desired extended mixing time may be obtained, but if the compatibility of the asphalt/aggregate/additive mix is not determined, a failure of the entire slurry system may occur.

The Cohesion Tester (see ASTM D3910 and ISSA TB #139) can possibly give misleading data with regard to mix compatibility. For example, a granite containing aggregate performed extremely well, according to the Cohesion Tester, with the addition of 1% Type III cement (based on the weight of the aggregate). When the Wet Track Abrasion Test was conducted, the mix deteriorated rapidly. It is for this reason that the proposed Boiling Test is performed as a "quick and dirty" method to confirm mix compatibility. The Wet Track Abrasion Test is a valid test of compatibility and should be used as a final mix design test, but for initial design the time involved with the WTAT is too extensive. Recent data has shown a very high degree of correlation between the WTAT and the proposed test.

The following guidelines explain the procedure for performing the Boiling Compatibility Test:

1. Procedure

- 1.1 Separate job aggregate into the following sieve sizes: #4 (4.75 mm), #8 (2.36 mm), #16 (1.18mm), #30 (600µm), #50 (300µm), #100 (150µm), #200 (75µm).
- 1.2 Reconstitute a 100 gram sample in the correct proportions as obtained from the gradation analysis.
- 1.3 Mix the water, aggregate, emulsion and chemically active additive for one minute (additives: 0.5%, 1% Type I or III cement, 0.5%, 1% lime or 0.03%, 0.05% aluminum sulfate (aluminum sulfate is dissolved into the pre-wet water) - all based on the aggregate weight). Higher concentrations of cement and lime may be used when required.
- 1.4 Place the template (see figure 1) on aluminum foil.
- 1.5 Deposit the mix in the template and level the surface with a squeegee or spatula.
- 1.6 Allow the mix to air cure 70°F to 77°F (21.1°C to 25°C) for 24 hours (minimum 12-15 hours).
- 1.7 Boil approximately 700 ml of water in a 1000 ml beaker. Use a #20 (850 µm) mesh screen in the bottom of the beaker to create a shelf. Bend the edges downward so that the sample is raised ½" (12.7 mm) from the bottom of the beaker, avoiding direct contact of the aggregate

and heat source. Place the sample in the boiling water. If the sample cannot be easily removed from the foil, cut the foil around the outside of the sample. Deposit the same into the boiling water and remove the foil from the water (the boiling water should allow the foil to become detached).

- 1.8 Boil for 10 minutes.
- 1.9 Decant the water and spread the mix on a level surface.
- 1.10 Observe the coating of the mix.
- 1.11 Record the percent retained coating using 2% accuracy.
- 1.12 Determine mix compatibility:
 - 90-100% coated surface—good mix compatibility
 - 75-89% coated surface—fair to good mix compatibility
 - 50-74% coated surface—poor to fair mix compatibility
 - less than 50% coated surface—poor mix compatibility

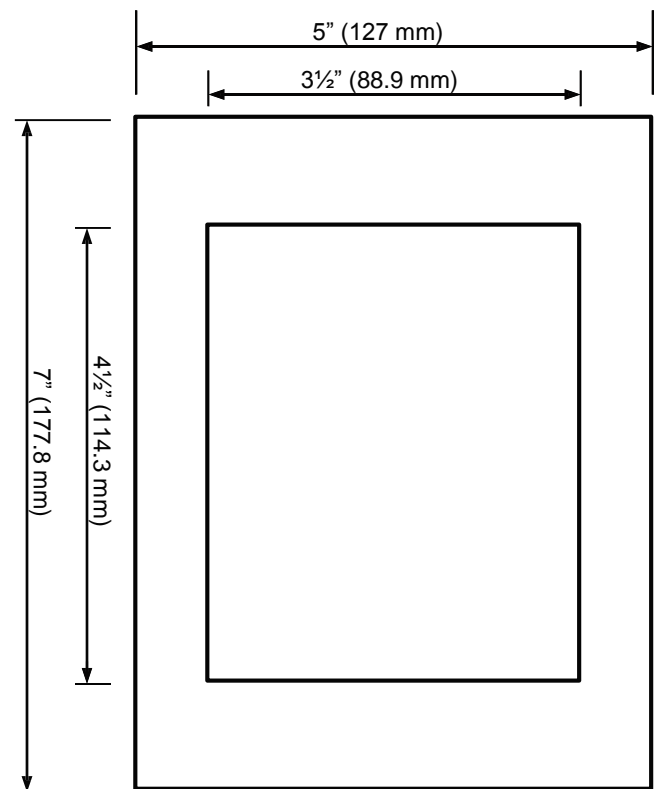


Figure 1
Plastic Template Thickness 1/4" (6.35 mm)

Note: Comments on this procedure should be addressed to the author: Hans G. Schreuders, Retired, MeadWestvaco Corp., P.O. Box 118005, Charleston Heights, SC 29423

See Also: ISSA Technical Bulletins #114, #115 and #144.