

September 1, 2004

Rev: February 2, 2012

Rev: July 1, 2016

REV: March 6, 2017

Rev: August 18, 2018

Tennessee Department of Transportation Division of Materials and Tests

Emulsified Asphalt Certified Supplier Requirements (SOP 3-2)

Purpose- The purpose of this document is to establish the minimum requirements for an emulsified asphalt supplier to become certified in Tennessee, and therefore provide emulsified asphalt on TDOT projects.

Policy- All Emulsified Asphalt supplied to a TDOT project must come from a certified emulsified asphalt supplier and be in compliance with TDOT Specifications (Section 904). To become certified, the supplier or manufacturer must submit a quality control plan (QCP) in resemblance with AASHTO R-26, and as modified or required in this procedure, to TDOT for approval. The supplier must also demonstrate a history of quality control data and proof of full QCP implementation. New emulsified asphalt suppliers must submit three (3) consecutive split samples for each emulsion being shipped for TDOT verification testing.

Procedure-

Definitions-

The *manufacturer*, as further referenced in this procedure will be the last source to produce or modify the final product.

The *supplier* will be the last source to handle the product before being shipped, and the supplier will provide the emulsion certification report with each shipment. In many instances, the manufacturer and the supplier will be one in the same.

A *lot* will be the quantity of a single product produced during a 30 day period; if the product is stored in multiple tanks each tank will be considered a separate lot.

Laboratory-Each manufacturer and supplier must have a designated laboratory to either certify the emulsion or to conduct quality control testing. Laboratories used to certify emulsified asphalts must participate in annual AASHTO Materials Reference Laboratory (AMRL) proficiency testing for the tests listed below and submit proficiency results to the Department once available. Any laboratory that demonstrates excessive consecutive poor proficiency testing results may be asked to conduct additional extra proficiency sample testing until non-conformities are corrected.

1. AASHTO T-59, Residue by Evaporation
2. AASHTO T-59, Residue by Distillation
3. AASHTO T-59, Sieve Test
4. AASHTO T-59, 24 Hour Storage Stability Test
5. AASHTO T-59, Saybolt Viscosity
6. AASHTO T-51, Ductility Test
7. AASHTO T-49, Penetration Test

Supplier laboratories that conduct quality control testing must have equipment to perform a Saybolt-Furol viscosity test, a Sieve test, and Percent Residue by evaporation or Percent Distillate. Quality Control testing may be defined by the supplier for rapid testing. However, all Specification Compliance testing shall follow AASHTO current test methods. Personnel conducting quality control testing must be qualified; either by training from the equipment manufacturer, trained under the direct supervision of an individual who routinely completes AMRL demonstrations and

proficiency testing, or trained by other highly proficient and competent individuals with emulsified asphalt testing experience.

Quality Control Plan (QCP) - Each manufacturer and supplier must submit a QCP for approval. Once approved each manufacturer and supplier shall, at the beginning of each calendar year, send either a new QCP or written notification to the department that no changes will be made to the current QCP on file. The QCP shall contain the information required in resemblance with Section 9.1 and 9.2 (or as revised below) of AASHTO R-26. In addition the plan shall include the following:

- A plan view of the facility and description of storage tanks,
- A narrative description detailing how each emulsified asphalt will be blended and handled to assure a consistent product.

Testing for Tanks

As a minimum quality control testing shall be completed on every batch added to a tank. Quality Control shall be completed before the material is shipped. *Quality Control* shall consist of either the rapid viscosity, residue and sieve tests in Appendix A or AASHTO T-59 equivalent.

Minimum Sample Size

The minimum sample size for terminal samples shall be: 1 Gallon.

The minimum sample size for project samples shall be: 2 Quarts.

As a minimum, TDOT will require specification compliance testing on every lot.

Testing shall include all tests in TDOT Standard and Supplemental Specifications 904.03 for each emulsified asphalt. **Email certification for each lot to:**

tdot.emulsionmtr@tn.gov

If a tank remains idle for more than 2 weeks, it shall be tested for quality control before shipment and every 2 weeks thereafter until another batch is added to it.

Asphalt Emulsions that are used for Micro-Surfacing, Slurry Seals, Bituminous Seal Coats (chip seals) and other Specialty Applications shall meet specification compliance testing before they may be shipped. Monthly verification samples are not required for these emulsions.

Each manufacturer and supplier shall keep a record of all specification compliance and quality control test results on file for immediate review by the TDOT. All records shall be retained for a minimum of 5 years.

If test results indicate a lot is not in compliance with TDOT Specifications, in addition to the resemblance of Section 9.2 of AASHTO R 26, the supplier must provide a list of all shipments (date, quantity, contract number) to which the questionable material was shipped.

Quality Assurance (Split samples, random sampling and Round Robin testing) - The manufacturer shall split samples for specification compliance testing and for quality control testing. Half of each sample shall be retained at the supplier's facility for a minimum of 30 days to act as a referee sample. The producer shall obtain samples for TDOT verification testing when requested and in the presence of a TDOT inspector (every 30 days).

The TDOT, at any time, may request additional quality control samples to be taken and tested by the supplier or by TDOT, for assurance purposes.

The TDOT, at any time, may request the manufacture or supplier to participate in round robin proficiency testing. TDOT will provide a reasonable time period for the test results to be submitted.

The TDOT will have the right to visit each approved supplier to review quality control activities and records, to obtain random check samples, or to inspect production.

Contract Sampling

TDOT will sample and conduct weekly verification testing of contract samples.

Verification testing for emulsions that are more than a week old (as measured from the date of departure from the terminal) will be tested at the contractor's laboratory by the TDOT plant technician, except if the material is stored in a storage tank by the contractor. Verification testing at the contractor's plant will only consist of the AASHTO T-59 Sieve Test and the AASHTO T-59 Residue by Evaporation. The test procedures listed in the appendix may be used for quality control only.

Emulsions that are less than a week old or that have been stored by the contractor in a storage tank will be sent to the Headquarters Laboratory for testing. Samples at the headquarters laboratory may be tested for any of the specified requirement listed in the Specification 904.03 or the product specification for QPL items at the Department's discretion.

If a contract sample is found to be out of compliance, the certification for the load will be deemed no longer valid and the rejected from further use.

Shipment- All shipments from the supplier must be accompanied with a completed Form DT-0293Emulsion.

One tanker load may be split between multiple small projects; the projects and estimates shall be declared on the DT-0293Emulsion -Multiple Project form. Quantities used on each project shall be verified by weight tickets prior to and after use on each project.

Appendix A: Rapid Testing Protocol for Quality Control Testing

Method for Rapid Sieve Test

Purpose: A rapid method for sieve test of emulsified asphalt for quality control purposes.

Scope: This method identifies asphalt particles or other discrete solids larger than #20 mesh.

Safety: Utilize safety precautions and personal protective equipment according to facility procedures. Dispose of materials according to facility procedures.

Equipment:

- Sieve with #20 mesh on a 76.2-mm frame.
 - Alternatively, a piece of #20 mesh wire cloth approximately 3" by 3".
- Sieve pan or container to retain residue during drying period.
- Balance capable of weighing 1,000 +/- 1.0 gram.
- Balance capable of weighing 500 +/- 0.1 grams.

Procedure:

1. Obtain sample using proper sampling procedure.
2. The temperature of the emulsion sample is related to the emulsion viscosity.
 - A. For emulsions less than 100 SSF @ 25°C perform test at room temperature. Condition sample to room temperature in a closed container using an oven, water bath, or allow the sample to cool on the counter followed by stirring to achieve homogeneity.
 - B. For all other emulsions perform test at 50 ± 3°C. Condition sample to room temperature in a closed container using an oven, water bath, or allow the sample to cool on the counter followed by stirring to achieve homogeneity.
3. Once the sample is conditioned skim the top of the sample to remove any film that may have formed during the conditioning period.
4. Weigh sieve or screen assembly to nearest 0.1 grams.
5. Pour 1,000g +/- 1.0 gram of emulsion through sieve or screen.
6. Gently rinse sieve or screen with distilled water.
7. If no material is retained on the sieve or screen the test is considered passing.
8. If material is retained, remove free water from the bottom and sides of sieve. Care should be used to not disturb particles. Weigh wet assembly. Determine the difference between the wet and dry assembly weights (wet weight). If the difference is less than 1.0 gram (failure threshold) the test is considered passing.
9. If the wet weight exceeds 1.0 gram the sieve assembly will be placed in an oven to dry. During the drying period the assembly can be periodically weighed. At anytime, if the weight gain is less than 1.0 gram (failure threshold) the test will be considered passing.

Method for Rapid Residue by Evaporation Test

Purpose: A rapid residue content test method for emulsified asphalt quality control purposes.

Scope: This method determines residue content of an asphalt emulsion.

Safety: Utilize safety precautions and personal protective equipment according to facility procedures. Dispose of materials according to facility procedures.

Equipment:

- Metal container suitable for evaporation with a capacity large enough to retain material splatter.
- Balance capable of 1,000 +/- 0.1 grams.

Procedure:

1. Obtain sample using proper sampling procedure.
2. Tare a metal container and weigh into it 50 +/- 0.1 grams of emulsion.
3. Heat container using a direct flame or hot plate. Splattering can be controlled by adjusting the heat source to prevent localized overheating and by constantly moving container.
4. Continue heating until sample is smooth or has reached a constant weight. Record weight of container and residue.
5. Determine residue. Divide remaining net residue by the original sample weight and multiply by 100.
 - A. For CAE-P, AE-P or AE-3 emulsions reported as distillate percentage.
 - $\text{Distillate (\%)} = 100 - \text{Residue (\%)}$
 - B. For TST-1P
 - Residue (%) Range, 56 % - 59 %
6. If results fail to meet material specifications the standard distillation or evaporation will be performed.

Method for Rapid Saybolt-Furol Viscosity Test

Purpose: A rapid viscosity test method for emulsified asphalt quality control purposes.

Scope: This method determines Saybolt-Furol viscosity of an asphalt emulsion.

Safety: Utilize safety precautions and personal protective equipment according to facility procedures. Dispose of materials according to facility procedures.

Equipment:

- Saybolt-Furol Viscometer.
- Sieve with #20 mesh on a 76.2-mm frame.
 - Alternatively, a piece of #20 mesh wire cloth approximately 3" by 3".
- Containers suitable for material transfer.
- Timing device capable of counting seconds.

Procedure:

1. Obtain sample using proper sampling procedure
2. Inspect viscometer, making sure it is clean, at the proper test temperature, and outlet stopper is in place. Place an approved receiving flask under viscometer outlet.
3. The temperature of the emulsion sample is related to the emulsion viscosity.
 - A. For emulsions tested at 77°F - condition approximately 300 grams of emulsion to 78°F – 80°F in a closed container using an oven, water bath or allow to cool on counter followed by stirring to achieve homogeneity.
 - B. For emulsions tested at 122°F - condition approximately 300 grams of emulsion to 125°F in a closed container using an oven, water bath or allow to cool on counter followed by stirring to achieve homogeneity.
4. Once the sample is conditioned transfer emulsion through a #20 mesh sieve into the viscometer until a portion begins to overflow into the outer rim.
5. Without further conditioning time, simultaneously remove stopper and start the timer. Emulsion should flow into the receiving flask. Stop timing when flask is filled to fill line.
6. Determine viscosity by multiplying fill time by tube correction factor.
7. If the following limits are exceeded the standard method will be performed:
 - 77°F Viscosity 10 % of Lower Spec. Limit < Vis. < 10 % of Upper Spec. Limit
 - 122°F Viscosity 5 % of Lower Spec. Limit < Vis. < 5 % of Upper Spec. Limit