

Seven best practices for storing and handling asphalt emulsions

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Good storage and handling of asphalt emulsions are essential to ensure that customers will get what they ordered. Improper storage and handling can compromise the quality and performance of the emulsion.

“Asphalt emulsions have become increasingly sophisticated,” says Mark McCollough of Asphalt Materials and current president of the Asphalt Emulsion Manufacturers Association (AEMA).

“They have moved from being simple to sophisticated. And as their complexity increases, so has their vulnerability to mishandling.”

There are a number of basic good handling practices that suppliers can do to ensure good performance of asphalt emulsions on the road.

1. USE STORAGE TANKS THAT KEEP THE EMULSION FROM FREEZING OR OVERHEATING.

“You can’t let your emulsions get too hot or too cold because they will either separate or become too thick to pump,” says McCollough.

Freezing breaks the emulsion and separates the asphalt from the water and results in two layers in the tank, neither of which will be suited for the intended use.

You shouldn’t overheat an emulsion because elevated temperatures evaporate the water and change the characteristics of the emulsion. AEMA recommends that emulsions are stored between 50°F and 180°F.

“Storing emulsions at too high temperatures will drive off water and cause the emulsion to become increasingly thicker so it won’t flow when pumped or circulated. Overheated emulsion won’t flow freely from a distributor,” says Mark Smith, Vice President of Operations for Vance Brothers.

2. USE VERTICAL TANKS RATHER THAN HORIZONTAL TANKS.

Horizontal tanks are too big and expose the emulsion to air at its surface, causing a skin on the surface of the emulsion. Vertical tanks are better because they minimize the surface area exposed to air.

“The problem with horizontal tanks is they have a larger surface area at the top, which builds a crust on the emulsion. The crust won’t liquefy and won’t pump or spray. If the storage facility has to use horizontal tanks, keep them full to limit the exposure to air,” says Smith.

“If we use vertical tanks, the surface film floats up and down, but doesn’t break. Vertical tank emulsion is the best product to send to the customer,” says McCollough.

3. USE GENTLE AGITATION.

AEMA suggests that today’s emulsions don’t need heavy agitation in the tank. Side paddles or blenders with a little bit of movement are best. Light and gentle agitation is recommended. Propellers should be large and turned slowly to gently circulate material. They should only be used when there is enough emulsion for proper mixing.

“Without periodic agitation or circulation, emulsions can freeze in cold weather,” adds Smith.

4. AVOID REPEATED PUMPING AND RECIRCULATION.

“Be aware that asphalt emulsions are sensitive to pumping. The more the emulsion is pumped, the more opportunity there is for contamination,” says McCollough.

Avoid repeated pumping and recirculating because the emulsion viscosity may drop and air become entrained, causing the emulsion to become unstable. He adds that it is important to pump from the bottom of the tank to minimize contamination from possible skin formation on the surface.

AEMA advises placing inlet pipes and lines at the bottom of the tank to prevent foaming. It’s also important to protect pumps, valves and lines from freezing in winter. Drain pumps and service lines according to the manufacturer’s recommendation.

5. FOLLOW ALL SAFETY PROCEDURES.

Safety procedures are important when handling asphalt emulsions. Handlers should provide adequate ventilation to avoid exposure to fumes, vapors and mist. Obtain a copy of the supplier’s Material Safety Data Sheet (MSDS) and give a copy to every emulsion handler.

6. GATHER GOOD SAMPLES.

Sampling is a critical aspect of handling asphalt emulsions. Good sampling promotes good testing. The best place to sample emulsion is from the original tank where it was stored when it came from the manufacturer.

“If we sample from another source, we risk contamination.

It’s important to take day-to-day samples for certification from the original tank. Don’t take them from a secondary source, such as a tanker or a distributor, because you don’t know what was in that tank or distributor before. Take the sample from the virgin tank. Don’t give yourself an opportunity for contamination,” says McCollough.

Good sampling practices will contribute to reliable test results. AEMA recommends sampling asphalt emulsion close to the manufacturer’s source and then testing it within two days after the sample is taken. Take three or four samples from the original tank and send them off to the testing lab immediately. If you wait to test an RS (Rapid Set) emulsion, it may not result in a true test. Jostling the sample, or exposing it to excessive heat, may also result in an inaccurate test.

“It’s important that DOTs get the samples as soon as possible. The properties of an emulsion may change if it is stored too long — its viscosity may change. Ideally, samples should be stored in an oven between 110°F and 140°F,” says Joe Brandenburg, Emulsion Research and Technical Specialist for Asphalt Materials.

7. TRAIN TECHNICIANS ON PROPER PROCEDURES.

Training asphalt emulsion technicians to sample properly and to test properly is a key factor in emulsion handling.

“Proper training is necessary for proper sampling, and training is necessary for proper testing. It’s important that a testing technician look at the potential performance of an emulsion on the road. The goal should be to establish the potential performance of the emulsion on the road,” says Brandenburg.

If a DOT waits twenty days to test a sample, the viscosity may be different. Storage under a too low temperature may change emulsion properties. McCollough says samples may not always be tested in a timely manner. Because asphalt emulsions are more sophisticated, and care and handling is sometimes declining, there is a serious disconnect developing. Tests may not represent the product as produced by the manufacturer, according to McCullough.

“We need to teach and promote good testing practices. Now, the standard of care is wildly diverse. In some tests, we have to ask, ‘Are we really measuring the sample properly? Or, are we introducing error in handling the sample, or in the testing’,” says McCollough.

“The state DOTs want to get the true test results and so do the project owner and the manufacturer. We need trained people that understand proper testing, and we need test results that correlate with actual performance — tests that ensure that the product performs on the road.”

CHECK LISTS FOR EMULSION STORAGE AND HANDLING

STORAGE

- Store emulsion in vertical tanks. for long-term storage.
- Store at a temperature between 50°F and 180°F.
- Don't let the emulsion freeze.
- Don't allow emulsion temperatures to exceed 212°F or water boiling point.
- Don't allow emulsion to free-fall into vessel from loading line or recirculation line.
- Do bottom load.
- Circulate material every two weeks.
- Protect pump, valves and lines from freezing.

HANDLING

- Don't mix anionic and cationic emulsions.
- Don't load elevated temperature material above 212°F on top of asphalt emulsion.
- Circulate vessel while heating with direct fire tubes. (Low fire on heating tubes).
- Dilute emulsion by adding warm water to the emulsion.
- Check with the emulsion manufacturer for guidance on dilution of emulsion.
- Wear proper personal protective equipment (PPE) to safely handle the emulsion.
- Asphalt emulsions are nonhazardous materials.
- Asphalt emulsions do not require placards.

TESTING TIPS FOR ASPHALT EMULSIONS

- Ensure that the tester understands when emulsion breaks.
- Understand why emulsions demulsify.
- Understand how the product performs (polymers increase strength).
- Ensure that owner gets what is requested.
- Derive results that show how the emulsion will perform on the road over time.

- Ensure you are playing by the same standard (standardized specifications).
- Ensure that you are getting consistent results.

(Joe Brandenburg of Asphalt Materials and Mark Smith of Vance Brothers contributed to these lists.)