



## **SECTION 3**

### **SAFETY & HANDLING OF ASPHALT EMULSIONS**

There are several characteristics that distinguish asphalt emulsions from other forms of bituminous paving materials, asphalt cements and cutbacks. The biggest single difference is the presence of water in asphalt emulsions. Most asphalt emulsions contain between 30 to 40% water, depending on the grade. The asphalt cements and cutbacks on the other hand cannot tolerate the presence of water or moisture.

The water constituent of emulsions is basic to many of the properties of these materials, both advantageous and otherwise. One of the prime advantages is safety. Emulsions are liquid at ambient temperatures and therefore require much less heat than asphalt cements when being handled and worked. Depending on the grade of product and the type of job, asphalt emulsions are typically used at temperatures between ambient and 85° C (185° F), while asphalt cements require much higher temperatures. Asphalt cutbacks, like emulsions are liquids at ambient temperature, but have the disadvantage of being flammable because of the petroleum solvents present.

From a safety standpoint, the emulsions have the best of two worlds. They may be used at comparatively low temperatures thus reducing the danger of people being badly burned when inadvertently splattered or drenched. Because the medium used in emulsions is mostly water, they are nonflammable and therefore are more difficult to flash or burn when overheated.

Emulsions, although inherently safer than most other forms of asphalt, like all construction products must be handled with reasonable care. The use of protective clothing (long sleeves, rubber gloves, goggles, etc.) will protect the skin from accidental contact. In the event that the skin is splashed with emulsion, the area should be flushed well with water to remove most of the unbroken emulsion. Any remaining residue can be removed by the use of a suitable hand cleaner or baby oil. If the eyes are part of the affected area, flush well with water and consult a physician.

In case of a spill, the best method is to contain the spill with an absorbent solid, such as sand or dirt. The resulting mix may then be picked up and disposed of in accordance with local regulations.

AEMA recommends the following additional precautions in the handling of asphalt emulsion:

1. Do not heat emulsion to temperatures in excess of 85° C (185° F).
2. Do not subject the asphalt emulsion or the air above it to an open flame, heat or strong oxidants. Adequate ventilation is required.
3. Avoid breathing hot fumes, vapors, and mist.
4. Obtain a copy of supplier's Material Safety Data Sheet (MSDS). Read the MSDS carefully and follow it.

5. Read and understand the operation manual for any equipment used with asphalt emulsions.
6. Instruct all personnel working with asphalt emulsions in proper operational and material safety procedures.



### 3.1 Handling

Because emulsions contain water, they tend to behave like water. They will freeze at 0° C (32° F), and will boil at 100° C (212° F). When ambient temperatures are around the freezing point or below 4° C (39.2° F), care must be taken to protect the material. If the temperature of the emulsion is allowed to reach the freezing point, it will usually be damaged enough to render it useless as a workable material. Even after warming to a high temperature, the thawed material will in most cases be broken, the asphalt phase being separated from the water-phase.

One way of handling this problem, is not to use asphalt emulsion during the cold months. However, with proper handling, a certain amount of winter work is possible with emulsions. Keeping the material warm and not allowing it to freeze is the key.

Asphalt emulsions can be damaged by overheating. If the material is heated to the boiling point of water, 100° C (212° F), the emulsion will start to break, just as with freezing.

Emulsions are limited then, to temperatures between 4° C (39.2° F) and 100° C (212° F). In practice, it should seldom, if ever be necessary to heat the emulsion above 85° C (185° F) for any type of a field job. Should heating be necessary, the use of mild heat while gently agitating the material is recommended.

Another important factor in the handling of asphalt emulsion is to recognize the incompatibility of the two different types, anionic and cationic. The two types cannot be mixed. Any storage tanks, transport vessels, or lines handling the one type must be completely cleaned before introducing the other type.

Refer to AEMA's [A Basic Asphalt Emulsion Manual](#) for further information regarding the storage and transportation of incompatible emulsion types.

Mild heating of lines, pumps, and valves may be necessary at times when the emulsion has set up or hardened in these small restricted areas. This is especially true at lower temperatures, but sometimes is necessary even in warm weather.

While transporting emulsion in bulk, the transport tank should be as full as possible. This will avoid slushing the emulsion around within the tank while moving. Transport tanks with baffle plates should be used if available.

Do not pump emulsions excessively. The high viscosity types may tend to lose viscosity if pumped too often or continually.

Pumps used for asphalt emulsion should have extra clearance tolerance between the gears 0.38 to 0.51 mm (0.015 to 0.020 in.), and may be of the positive displacement or centrifugal type. A frozen pump may be broken loose by gently heating from the out-

side. Refer to **SECTION 21 ASPHALT EMULSION EQUIPMENT PUMPS** for further information.



Some grades of emulsions are designed to be mixed or diluted with water. In those grades that are dilutable, the water should be added to emulsion, never emulsion to water. For the best field performance, the temperature of the water added should be as near the temperature of the emulsion as possible. Also, the water should be potable and free of rust and other contaminants. The emulsion should not be handled in a manner which will cause foaming and incorporate air bubbles. This can cause the emulsion to break. Special care should be taken while loading or unloading. Bottom loading facilities are recommended.

The various grades and types of asphalt emulsion are designed for different jobs, aggregates, methods, etc. Emulsions can vary widely and some require handling techniques that may differ from others. Always check with your asphalt emulsion supplier to find the best way to handle the particular grade or type being used.

In recent years, there has appeared in the market a variety of asphalt emulsions that have been modified with polymer, rubber, elastomers or other modifiers. These materials may or may not require different or special handling techniques. No really general recommendations can be made since there is such a wide variety of materials. Each supplier of the particular product is in the best position to recommend how to handle its own emulsion. Check with your AEMA supplier.

### 3.2 Sample Conditioning for Testing

Both ASTM and MSHTO recognize the importance of proper sample handling to achieve valid test results. They recognize that all asphalt emulsions are made hot (typically 180° to 200° F), some grades are stored hot (typically 150° to 180° F), and that some of these hot stored grades are subsequently transported and applied at temperatures above 140° F. Hot samples collected in the field usually arrive at the laboratory at ambient temperature. How should these samples be handled? The language in ASTM D224 and MSHTO T-59 is significant and similar, with MSHTO stating:

All emulsions with viscosity requirements of 50° C (122° F) should be heated to 50 ± 3° C (122 ± 5° F) in a 68° C (160° F) water bath or oven. The container should be vented to relieve pressure. After the sample reaches 50 ± 3° C (122 ± 5° F), stir the sample to achieve homogeneity.

The above statement recognizes that the viscous grades of emulsion, those tested for viscosity at 50° C (122° F), generally give low, false viscosity values if manipulated or handled in the laboratory at ambient temperatures. The key to this sample-conditioning step is that if the sample is NOT stirred or agitated prior to heating to 50° C (122° F), it will give a more realistic laboratory viscosity like that experienced at the jobsite. This recovery of the jobsite viscosity is quite independent of the duration of ambient temperature storage of the sample.

