

# Storage & Handling of Bituminous Emulsions

pavement work tips – No 2

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## INTRODUCTION

Emulsions are an effective method of applying bitumen in sprayed sealing and maintenance operations. Because of their composition and behaviour, they need to be handled and stored differently to cutback bitumen.

If properly handled and stored, they will perform satisfactorily with few, if any, problems. If badly handled and stored, they can create large-scale cleaning problems.

To obtain the best handling and storage results, the following suggestions are offered.

## GENERAL

- Use the correct type and grade of emulsion
- Transport emulsion in full containers fitted with baffle plates to minimise surging that may cause foaming and breaking.
- Do not mix anionic and cationic bituminous emulsions. This will cause each emulsion to break and separate into water and bitumen, leaving tanks or other equipment partially filled with semi-solid bitumen, and a difficult cleaning job.
- Always use clean containers. Bituminous emulsion must not be loaded into storage tanks, tank cars, tank transports or distributors containing remains of incompatible materials.
- Bituminous emulsions can cause corrosion in non-ferrous metals such as brass, copper and aluminium. The use of such materials in the components of valves, pumps, pipe work and fittings should be avoided.

## STORAGE

- It is preferable to store emulsions in bulk tanks. Vertical tanks that minimise the surface area of liquid are preferred to horizontal tanks.

- All storage containers should be labelled with emulsion grade and date of manufacture.
- Always make a trial blend of the newly-delivered emulsions and the stored emulsion to check for compatibility of the materials before pumping any material into the storage tank. Remember that emulsions with the same grade designation can be very different chemically and in performance.
- Do not allow a bituminous emulsion to either freeze or boil – it will break. Storage temperature should not be allowed to fall below 10°C or exceed 85°C (except for some specialty emulsions that may be heated as high as 90°C under strictly controlled conditions).
- Store at the temperature recommended for the particular grade.
- Some specialty products such as high bitumen content and polymer modified emulsions are designed for use within a short period (commonly less than one week) after manufacture. Manufacturer's storage recommendations must be followed at all times.
- Regularly mix tank contents by gentle agitation or circulation to prevent build-up of sedimented bitumen particles.
- In bulk storage, mix the emulsion every 1–2 weeks (more frequently in cold weather) or as recommended by the supplier. Mixing may be by paddle agitator (slow), loose gear pump, slow centrifugal pump, or other suitable low shear pump.
- Do not bubble air through an emulsion to agitate it, as this will create excessive foam and may cause the emulsion to break.

### Key Summary

*This issue of "pavement work tips" gives some suggested dos and don'ts for safe and proper storage and handling of bituminous emulsions*



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*continued on reverse*

## Storage (cont.)

- A thin layer of kerosene or cutter oil (0.5 L/m<sup>2</sup>) spread on top of emulsion in storage tanks can prevent scum formation on materials that cannot be regularly agitated.
- Where there is doubt on the effectiveness of emulsions that may have been affected by extended storage or poor handling, its condition can be checked using the setting time test (AS/NZS 3241.29).

## CLEANING OF TANKS & EQUIPMENT

- Clean tanks properly at product changeover.
- Thoroughly wash out equipment with kerosene or cutter oil when changing emulsion grade or type, particularly when changing between anionic and cationic emulsion types.
- At the end of each day, flush out the pumping and spraying system on the bitumen distributor with kerosene or cutter oil. This will avoid clogging, binding or seizure from breaking of bituminous emulsion left in the system.
- Clear lines by blowing them out with air and leave drain plugs open when out of service.
- Fill pumps with kerosene or cutter oil to ensure a free start-up when they are to be out of service for even a short period of time.

## DILUTION

- Field dilution of emulsions should be avoided where possible, particularly rapid setting grades, which involve a high risk of breaking when diluted.
- Where medium and slow setting grades are to be diluted, the following procedures must be observed:
  - Use only potable water. Check the compatibility of the water with the emulsion by testing a small quantity before diluting.
  - When diluting bituminous emulsion, always add water to the emulsion, not emulsion to water.
  - Use warm water for diluting (if possible), and always add water slowly to the emulsion.

## PUMPING

- When pumping emulsions, keep the end of the discharge pipe submerged in emulsion (near bottom of tank) to avoid entrainment of air and foaming that can also cause an emulsion to break.

- place inlet pipes and return lines near the bottom of tanks to prevent foaming and minimise contamination from skinning that may have formed on the surface.
- Use pumps that have proper clearances for emulsion use. Tight pump clearances can cause breaking of the emulsion and pump seizure. Particular care should be taken when using new pumps that may have tight clearances.
- Use slow pump settings and limit the amount of recirculation. Excessive pumping can lead to breaking of the emulsion, especially in cold weather, as well as a potential for a reduction in viscosity and instability though entrainment of air bubbles.

## HEATING

- Use gentle heating systems with heating element surface temperatures below 85°C.
- Do not heat above the recommended storage temperature as water may be driven off at elevated temperatures, resulting in a skin of bitumen on the surface.
- When heating bituminous emulsion, agitate it gently to eliminate or reduce skin formation.
- Pumps should be heat-traced to prevent overload at start-up. Warming the pump to about 65°C can facilitate start-up.
- Heat tracing and warming of pipe lines can prevent emulsion breaking in the lines and blockages.
- Use mild heat to unblock lines or valves, or to free a seized pump. Avoid overheating that may cause hardening of deposited bitumen, with particular risk of potential damage to pumping systems. The use of propane torches should be avoided.

## REFERENCES

Austrroads (2002) Guide to the selection and use of bitumen emulsions, AP-G73/02.

Austrroads (2008) Bitumen emulsions, AP-T107/08.

AS 1160 Bituminous emulsions for construction and maintenance of pavements.

AS/NZS 2341.29 Methods of testing bitumen and related roadmaking products, Method 29: determination of breaking behaviour by setting time.

*For more information on any of the construction practices discussed in "pavement work tips", please contact either your local AUSTRROADS representative or AAPA: tel (03) 9853 3595; fax (03) 9853 3484; e-mail: info@aapa.asn.au.*

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