Purpose

The purpose of this guide is to provide to the Bituminous Emulsion End User a brief explanation of Bituminous Emulsions and advice on its Safe Storage and Handling, Types, Care and Equipment Design, Operation and Maintenance.

What is a Bituminous Emulsion

A Bituminous emulsion is a mixture of fine Bitumen droplets and Emulsifiers dispersed in Water. The purpose of the emulsifier is to make the emulsion stable to transport/store and break during use.

Disclaimer

Although the information contained in this guide is believed to be fundamentally correct and current at time of printing, the Australian Asphalt Pavement Association does not accept any contractual, tortious or other form of liability for its content or any consequences arising from its use.
A colloid mill is used to refine the bulk bitumen into bitumen droplets (approx. 10 micron), with the mill determining how fine the emulsion is.

The emulsifier adds a charge to the bitumen droplets and this keeps the particles separated and suspended in the water.
In Australia, the more common variety is Cationic due to having a predominately negatively charged aggregate in the field. Most important is that Cationic and Anionic emulsions should never be mixed to avoid coagulation, cleaning cost and/or cross contamination.

Emulsions are inherently unstable and over time, if not circulated and left undisturbed, the particles will flocculate (stick together), eventually coalescing (merging to form larger particles) and then sedimenting (dropping to the bottom). If this happens the bitumen is no longer emulsified and has separated from the water and will not remix.

Because bitumen is denser than water, larger particles settle faster, react more slowly with aggregates, and can have adverse effects on storage life, cohesion and adhesion.

Well designed and maintained colloid mills, in conjunction with good emulsifiers, make fine stable emulsions. Other specialist additives can also be used to adjust for changes in bitumen quality or to adjust the break/storage time.

To reduce settlement and avoid sedimentation (non-redispersible) correct handling and storage are of major importance.

Any activity that forces particles close together or disrupts their surface charge risks coarsening and destabilising the emulsion.

These activities include:

- high shearing due to pumping (e.g. gear pumps)
- overheating (localised or bulk)
- freezing
- excessive circulation
- contamination with other emulsions, cutbacks or chemicals.
Suitable storage tanks and pumps should be used to minimise the risk of degrading the quality of the emulsion.

**What are the benefits of Bituminous Emulsion**

Good cohesion (ability to stick to) with aggregate due to the:

- opposite charge of the bitumen to the aggregate
- greater surface coverage of the aggregate resultant from rise of the binder up the aggregate and the initial water content of the emulsion which then evaporates. This is commonly referred to as Binder Rise, Binder Uppage or Binder Creep.
- Able to be applied in cooler conditions, which extends the sealing season.
- Utilised at lower temperature so no/less chance of sustaining serious burns
- No fuming

**Application’s for Bitumen Emulsion**

There are many different types of Bitumen Emulsion's which can be applied for a variety of uses including:

- Light, medium & heavy traffic
  - maintenance
  - spray sealing - seals
  - spray sealing - primer seals
  - spray sealing - primes
- Asphalt Tack Coat
- Pavement Rejuvenation
- Dust Suppression
- Unsealed Road Binding
- Precoating of aggregate
• Crack Sealing
• Ingredient in the production of cold paving products eg Micro Surfacing & Cold Mix Asphalt

Types

There are 2 Emulsion Types:

• Standard Emulsions
• High Binder Content Emulsion (HBCE) / Polymer Modified Emulsion (PME)

Standard Emulsions are applied at ambient temperatures; it is always advised to avoid direct contact with skin and to have adequate ventilation. Follow the advice in the relevant product Safety Data Sheet.

High Binder Content Emulsions (HBCE) / Polymer Modified Emulsions (PME) are handled at temperatures between 80°C to 95°C, still significantly lower than straight or polymer modified bitumen products, but at these temperatures, serious burns can occur so the same precautions applied to hot binders should be adopted for these emulsions. Refer to the Austroads Bituminous Materials Safety Guide (2014).
STANDARD EMULSIONS

END USER

Storage and Handling Guide
**Safety**

Bituminous Emulsions are the safest form of Bitumen products as they are handled at ambient temperatures which eliminate any chance of burns which can occur with hot applied binders.

Whilst Standard Emulsions are applied at ambient temperatures, it is always advised to avoid direct contact with skin and to have adequate ventilation and follow the advice in the relevant product Safety Data Sheet.

**Storage life**

The length that emulsions can be stored varies according to the emulsion type and components used. For example rapid-set emulsion has a shorter shelf life than a slow-set emulsion.

You should seek advice from your emulsion supplier on the shelf life of their products.

Sedimentation and sieve tests are good indicators of an emulsion’s potential storage life. During long-term storage, sedimentation of the bitumen droplets occurs due to the higher density of the bitumen versus water. Regular circulation will help increase the shelf life of the emulsion but care must be taken not over circulating which can shear the emulsion and cause residue build up.

Emulsions may increase in viscosity (thickness) over time and warming the emulsion prior to use will reduce the viscosity.

**Bulk Storage**

**Tank design**

All regulatory and company engineering standards must be followed when designing and constructing a tank.

Tanks may be made from mild or stainless steel, high density polyethylene, polypropylene co-polymer and many engineering plastics. The selection of materials to be used will depend on the heating system to be employed. It is always recommended that the emulsion supplier be consulted when considering a new tank or repairing tanks.

AAPA recommends the following features be included:

- liquid level measurement (counterweight, pressure or electronic ) to manage stock on hand
- access hatch to enable inspection and cleaning
- ability to bottom fill to avoid breaking up and re-entraining the emulsion skin
- a means of earthing the tank.

Tanks may be raised on a platform to allow gravity feeding or for space considerations. In areas where excessive cold/freezing may occur, consideration should be given to
- Heat tracing and Insulating pipework/pump housing
- Enclosing of the under section of the tank to protect the pump/pipework
- Tank insulation and shrouding. A product, such as mineral wool, may be used for insulation then clad with aluminium or a similar material.
- Tank heating to protect the product from freezing/excessive cooling.

Bunding is required and must conform to local statutory requirements. Basic spill protection may consist of a moat around the tank, usually with some absorbent material such as sand.

**Vertical Tanks**

Vertical tanks are ideal for the storage of standard emulsions. With an angled return pipe, a round shape tank creates a whirlpool, promoting gentle circulation of the emulsion. This tank type also has a reduced surface area resulting in less exposure of emulsion to air and skin formation. They also occupy less space, are easier to heat, insulate and monitor for product level.

**Horizontal Tanks**

Horizontal tanks are generally not recommended because they present a larger surface area to the air that can form a large skin, are more difficult clean and circulate. Their use should be limited to short term field storage. Horizontal tanks may be set with a slight slope to facilitate draining and a directional return pipe to promote circulation.

**Self Bunded Container Tanks**

Emulsion Self Bunded Container Tanks (SBCT) offer an alternative to fixed position tanks and avoids the need for costly civils (ie bunds).

These tanks are specifically developed for the storage and handling of Emulsion, with an appropriate circulation system and all pump and pipework placed behind a bund within the container.

Containerised Tanks where pumps, pipework or hoses, the most common point of leaks, are external to the container bunding (eg Double Skinned Fuel Tanks) do not meet EPA bunding guidance requirements.
Tank safety

It is always advised to consult your Emulsion supplier when considering purchasing, modification, repair or replacement of your Emulsion Tank.

If considering a Used tank, it is always advised to:

- learn the history of the tank eg Age, Previous use, internal design,
- thoroughly clean before use to ensure the best environment for the storage of your Bituminous Emulsion. Cleaning can involve the use of use steam, high pressure water, low pressure water, dry ice and/or kerosene.

Before commencing any work on a tank care should be taken to ensure it is safe to do so and that there is no flammable or harmful liquid, gas or residue present.

Never cut a used tank unless an appropriate hot work permit is obtained.

Care is required when siting storage tanks, for example they should not be located near high tension power lines. Where practicable, they should be located away from waterways.

Tank plumbing

All pipework should be engineered to:

- provide the smoothest/gentlest travel for the emulsion to maintain it homogenous state. It is best to limit the length and number of bends or restrictions in the pipework.
- allow for isolation of the vessel
- have pipe/pump housing heat traced/insulated to protect the emulsion at the point where it is most vulnerable to cold temperatures.
- Have a suction line the same size or larger than the pump outlet which should take product directly from the bottom of the tank.
- Pump outlet should be the same size or no less than one size smaller than the suction line.

The return/recirculation pipe into the tank should be near the bottom of the tank so that it remains below the level of the liquid to prevent foaming.

In vertical tanks, the return/recirculation line into the tank should be located away from the suction line and angled so that it creates a whirlpool effect to assist with circulation.

In horizontal tanks the return line should be at the opposite end of the suction point and angled towards one side in order to create an internal wave effect to assist with circulation.
Do not over or under circulate emulsion. Circulation is generally only required twice a day for a period long enough to circulate the top portion of the emulsion for 20mins. As this time will always differ depending on the volume in the tank at the time, a general rule of thumb of 2 x 1hr sessions per day will provide a level that should circulate product for long enough as to no over or under circulate. Inspections of the tank internal residue build up will allow judgement to be made as to whether the recirculation time and frequency requires adjustment.

The ideal time for circulation is prior to load out.

**Tank inspections**

A build-up of residue inside a tank will occur over time and can reduce the storage life and the effectiveness of an emulsion. However with simple proactive maintenance practices, operators of bituminous emulsion storage tanks will be able to ensure the storage tank is kept free of excessive residue.

An annual inspection of the inside of the tank is highly recommended to determine the volume and viscosity of any residue. This will then dictate the best course of action required in terms of the need for flushing, cleaning or dig out.

Only those with a confined spaces permit and the appropriate PPE should enter a tank.

Prior to changing over emulsion suppliers AAPA recommends that an inspection of the tank is performed by the new supplier to determine what cleaning procedure will be required to ensure the emulsion will not be adversely affected by the previous product.

**Storage of Emulsion in Packaged form**

Packaged Emulsion eg Pails, Drums or IBC’s, are suited to situations where only small amounts are needed or the use of emulsion will be infrequent. As with Bulk Emulsion the same best practices apply to storage and handling of emulsion in packaged form, this includes the following practices:

- Keeping packaged Emulsion undercover in areas where the product won’t be exposed to temperatures below 5°C to avoid freezing and damage from frost
- Store packaged emulsion in an upright position off the ground (e.g. on a pallet)
- Circulating
  - IBC’s
    - Use an agitation tool/pump to stir the emulsion within the IBC
  - Pails/Drums
    - Use an agitation tool to stir the emulsion within the drum
    - Use an engineered pail/drum rotator to help keep emulsion homogenous
    - Ensure vessel is sealed and lay the pail/drums on their side and roll them for several metres along the ground to mix the emulsion and then return them to their upright position
- Ensure good stock rotation practices and use emulsion within 3 months from the date of manufacture
Do not heat emulsion when it is in a sealed packaged format as this can increase the risk of an explosion. Heating of emulsion should only occur once it is transferred to a vessel designed for such a purpose.

Heating systems

With Bituminous Emulsions the objective is to stop the emulsion excessively cooling, ie < 5°C rather than actually heating the product.

Avoid heating without stirring as this can result in localised overheating, particularly if electrical heating is employed, which can lead to breaking of the product inside the tank and a subsequent build-up of residue.

Types of heating systems suitable for emulsion tanks include:

- Internal low wattage electrical heating.
- External low wattage electrical heat trace

All Emulsion pipes and transfer pumps should be heat traced and insulated in order to ensure trouble free start-up and fewer blockages, resultant from cold temperature or settlement. Alternatively, if use is infrequent or in extreme cold weather, lines and pumps may be drained and pumps filled with kerosene.

Rate of heating

Care must be taken to ensure emulsion is not heated rapidly. The heating rate should not exceed 10°C per hour as this implies excessively high heating surface temperatures. Exceeding this rate of heating can cause flocculation of the bitumen droplets especially if it contains polymers around the heating flues or electrical elements.

Recommended storage temperatures

Emulsions are sensitive to extremes of temperature. It is best to keep them within a temperature range as recommended by the manufacturer. The table below gives a guide to the minimum and maximum storage temperatures for Standard Emulsion types.
### Storage and Handling of Bituminous Materials

#### Emulsion

<table>
<thead>
<tr>
<th>Emulsion</th>
<th>Minimum °C</th>
<th>Ideal °C</th>
<th>Maximum °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Emulsion – Anionic and Cationic Slow, Medium or Rapid Set ≤ 69% Bitumen Content</td>
<td>10</td>
<td>20 - 30</td>
<td>60</td>
</tr>
</tbody>
</table>

#### Pumps

**Centrifugal pumps**

For storage tanks, centrifugal pumps are most suited for caring for the emulsion and avoiding shearing of the emulsion.

In a centrifugal pump the material is fed into the centre of the pump under gravity and a high speed impeller pushing it out to the recirculation or despatch outlet.

Another option is to gravity feed when despatching from the tank.

#### Loading emulsion

When loading road tankers or sprayers, or filling drums, the emulsion should be passed through a filter consisting of a mesh sieve with an aperture of 4 – 6 mm. This will prevent lumps of bitumen blocking nozzles in the spray bar.

These sieves should be checked and cleaned regularly to maintain acceptable loading rates.

Loading of emulsion should be done by sucking the product into to bottom of the sprayer or by lowering the filling hose to the bottom of the road tanker. This is to avoid foaming or breaking of the emulsion due to splash filling.

It is not recommended that emulsion be returned into storage as it can compromise the quality of the product.

#### Emulsion dilution

On occasion emulsions are diluted with water before use to reduce their viscosity. Slow-set emulsions, as a rule, can be readily diluted with clean water prior to use, for example as dust palliatives, tack coats etc.

Rapid-set emulsions are not recommended for dilution as this renders them prone to irreversible sedimentation in a very short period of time.

Emulsions, once diluted, should be used immediately and not stored.

Water must be added to the emulsion and not vice versa.

Dilution water must be clean and preferably potable. The water may require additives, for example where hard water is used with some anionic systems. Speak to the supplier for more detailed advice.
AAPA recommends you carry out a simple dilution test in a glass container to ensure that the candidate water is compatible with the emulsion.

If you immediately see the bitumen droplets start to coalesce, this is an indication that the water is incompatible.

**Product changeover**

When changing products in a tank follow the appropriate changeover procedure. These are outlined in section 7 of the Austroads *Bituminous Materials Safety Guide* (2014).

When considering what ‘clean’ means remember that cationic emulsions react with metal or anti-rust coatings on new tank walls. If you clean all residue of bitumen off, the first emulsion will break on the metal and may cause slugs. This is especially true for PME and CRS emulsions but can also occur with CAM170 and CSS 170 emulsions.

For new storage tanks, problems can be avoided if they are first flushed with a weak hydrochloric acid solution or diluted CRS soap solution immediately prior to use.
# Standard Emulsion Storage & Handling

## Do’s and Don’ts

<table>
<thead>
<tr>
<th>Do’s</th>
<th>Don’ts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do transport bulk emulsion in suitable trailers free of contaminants.</td>
<td>Don't pump/agitate excessively or for extended periods; max 2 x 1hr sessions per day is generally adequate.</td>
</tr>
<tr>
<td>Do transport packaged emulsion in full containers.</td>
<td>Don't mix anionic and cationic emulsions.</td>
</tr>
<tr>
<td>Do install processes and equipment to ensure clean transfer of product into/from the emulsion tank</td>
<td>Don't allow product to freeze or cool &lt;5°C.</td>
</tr>
<tr>
<td>Do heat trace emulsion pipework, valves and pump.</td>
<td>Don't use blow torches unless you have no choice as localised overheating will break the emulsion adjacent to the blockage. If required use gently heat and exercise care.</td>
</tr>
<tr>
<td>Do circulate emulsions regularly as per the manufactures instructions and before unloading. Generally 2 x 1hr session per day</td>
<td>Don't heat emulsions vigorously and never more than 85°C.</td>
</tr>
<tr>
<td>Do use gentle agitation when heating or just before load out.</td>
<td>Don't use diesel to clean tanks, pumps or pipeworks. Flush first with water and, if necessary, use a small amount of kerosene.</td>
</tr>
<tr>
<td>Do provide positive drainage to prevent emulsion storage or running back into uncirculated lines.</td>
<td>Don't use incompatible cleaning agents.</td>
</tr>
<tr>
<td>Do check compatibility of emulsions when changing product.</td>
<td>Don't leave emulsion in uncirculated lines/hoses in cold weather or for extended periods.</td>
</tr>
<tr>
<td>Do use different tanks for different emulsion.</td>
<td>Don't heat without agitation.</td>
</tr>
<tr>
<td>Do clean tanks, pipes, hoses and equipment regularly.</td>
<td>Don't aerate emulsion.</td>
</tr>
<tr>
<td>Do inspect internals of emulsion storage tanks annually to assess maintenance and cleaning needs.</td>
<td>Don’t do regular small tank top-ups; run down tank contents to approx 40% then refill.</td>
</tr>
<tr>
<td>Do blow/clean out spray nozzles with compressed air or suitable cleaning agent after spraying.</td>
<td>Don’t suck back solvent into a tank as this will soften bitumen particles over time and can create sludge, or adversely affect the properties of the residual binder.</td>
</tr>
<tr>
<td>Do apply gentle localised heating to clear blockages. Avoid aggressive heating of lines.</td>
<td>Don't return diluted emulsion or any other product into storage tanks.</td>
</tr>
<tr>
<td></td>
<td>Don't ignore Emulsion Tank site housekeeping or maintenance.</td>
</tr>
</tbody>
</table>
High Binder Content Emulsions (HBCE)

or

Polymer Modified Emulsions (PME)

END USER

Storage and Handling Guide
## Safety

Bituminous Emulsions are the safest form of Bitumen products used on our roads as they are handled at ambient/lower temperatures than other hot applied binders.

Hot applied binders are generally sprayed between 165°C - 200°C whereas High Binder Content Emulsions (HBCE) and Polymer Modified Emulsions (PME) are sprayed at temperatures between 80°C to 95°C, significantly lower and safer for the users.

Whilst HBCE & PME are spray between 80°C to 95°C burns can still be suffered so the same precautions applied to hot binders should be adopted for HBCE and PME. Refer to the Austroads *Bituminous Materials Safety Guide* (2014).

## Storage life

The length that HBCE and PME can be stored varies significantly to Standard Emulsion, as these types of Emulsion need to be stored at > 50°C.

It is recommended that HBCE & PME

- can be stored up to 3 weeks provided storage tanks are cleaned prior to use and have adequate heating capability
- once in storage allow the product to cool to ambient temperature and only re-heat just prior to use
- slow circulation is necessary when re-heating provided the temperature is above 70°C
- the tankers must be able to heat the product at a rate not greater than 10°C per hour without localised heating.

Users should seek advice from the emulsion supplier on the shelf life of their products.

Sedimentation and sieve tests are good indicators of an emulsion’s potential storage life. During long-term storage, sedimentation of the bitumen droplets occurs due to the higher density of the bitumen in the water phase. Circulation of the emulsion at regular intervals will help increase the shelf life of the emulsion but users must take care to not over circulate which can shear the emulsion.

Emulsions may increase in viscosity/thickness over time and warming the emulsion prior to use will reduce the viscosity and allow the emulsion to flow more freely.

## Bulk Storage

### Tank design

All regulatory and company engineering standards must be followed when designing and constructing a tank.

The storage of HBCE and PME requires heated tanks ie Bitumen Tanks and therefore require mild or stainless steel construction. It is recommended that the emulsion supplier be consulted when selecting a tank.

AAPA recommends the following features be included:
• liquid level control (pressure, weigh scale or electronic)
• manhole to allow access for inspection and/or cleaning
• ability to bottom fill to avoid breaking up and re-entraining the skin
• a means of earthing the tank.

Tank must be insulated. A product, such as mineral wool, may be used for insulation, then clad with aluminium or a similar material.

Bunding is required and must conform to local statutory requirements. Basic spill protection may consist of a moat around the tank, usually with some absorbent material such as sand.

**Vertical tanks**

Vertical tanks are the most suited style for the storage of Bitumen as they
• have a reduced surface area which minimises evaporative loss & skinning of bitumen
• occupy less space
• are easier to heat, insulate and monitor for product level.

**Horizontal tanks**

Horizontal tanks are commonly used but generally not recommended because they present a larger surface area to the air that can form a skin and it can be more difficult to achieve adequate circulation. Their use should be limited to short term field storage.

Horizontal tanks are often less expensive than vertical tanks. They may be set with a slight slope to facilitate draining and circulation.
**Bitutainers**

Bitutainers are purpose built containers for the storage during transport of Bitumen. Like Horizontal tanks, Bitutainers present a larger surface area to the air that can form a skin and can be difficult to achieve adequate circulation. Their use is ideal for transport and short term field storage.

**Tank safety**

Used tanks must be thoroughly cleaned before use, for example by using steam or high pressure water, and any chemical residues flushed from the tank.

Before cutting a used tank, for example for transportation or modification, ensures there is no flammable product present.

Never cut a used tank unless an appropriate hot work permit is obtained.

Care is required when siting storage tanks, for example they should not be located near high tension power lines. Where practicable, they should be located away from waterways.

**Tank plumbing**

Proper plumbing is very important, including:

- Adequate sampling points e.g. a 25mm diameter sampling line and cock for each tank at around 0.6-1m above the bottom of tank.

- A full sized suction line (same size or larger than the transfer pump inlet). The latter should be as short as practicable with as few bends and restrictions as possible.

- Inside the tank keep the end of the suction inlet about 50mm above the tank bottom. An elbow may be added at the end of the suction inlet to minimise the risk of blockages from falling lumps.

Tank & Pipework should be adequately heated, heat traced and insulated to maintain the temperature of the emulsion.

Circulation should only be undertaken once the product is at >80°C and is required to ensure proper mixing of the HBCE & PME and can be achieved through the use of:

- Pump & Pipework
  - This should be the same size or no less than one size smaller than the suction line.
  - In **vertical tanks**, the return line should re-enter the tank at the top.
In **horizontal tanks**, the return line should re-enter the tank at the top at the opposite end from the suction point.

- **Stirrers**
  - propeller stirrers operated at a low speed
  - larger anchor sweep stirrers.

HBCE can use either Pump **or** Stirrers for circulation and the pipework needs to be an independent system and should not be mixed with other tank farm products.

PME is best cared for with both Pump **and** Stirrers for circulation.

Do not over mix the emulsion. Mixing is generally only required once a week or for a short time just before load out.

**Tank inspections**

Residue build-up inside a tank can reduce the storage life of an emulsion. Operators of sites with bulk bituminous emulsion storage tanks should have a strategy for ensuring the storage tank is kept free of excessive residue.

An annual inspection of the inside of the tank is highly recommended to determine the volume and viscosity any residue in order to determine the best course of action required to clean the tank.

Only those with a confined spaces permit and the appropriate PPE should enter a tank.

Prior to changing over emulsion suppliers AAPA recommends that an inspection of the tank is performed by the new supplier to determine what cleaning procedure will be required to ensure the emulsion will not be adversely affected by the previous product.

**Heating systems**

Types of heating systems suitable for bitumen tanks include:

- low wattage electrical heating (most preferable as it provides a gentler heat)
- oil heater
- steam coils

Pipe and Pumps should be traced and jacketed to assist with trouble free start-up and fewer blockages.

**Rate of heating**

Ensure that emulsion is not heated rapidly. The heating rate should not exceed 10°C per hour as this implies excessively high heating surface temperatures. Exceeding this rate of heating can cause flocculation of the bitumen droplets especially if it contains polymers around the heating flues or electrical elements.
Recommended storage temperatures

Emulsions are sensitive to extremes of temperature. It is necessary to keep them at a constant temperature within a certain range as recommended by the manufacturer. The table below gives a guide to the minimum, ideal and maximum storage temperatures for HBCE & PME.

<table>
<thead>
<tr>
<th>Emulsion</th>
<th>Storage Time</th>
<th>Minimum °C</th>
<th>Ideal °C</th>
<th>Maximum °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Binder Content Emulsion (HBCE) or Polymer Modified Emulsion (PME) ≥ 70% Bitumen Content</td>
<td>&lt; 1 week</td>
<td>10</td>
<td>50 - 60</td>
<td>85</td>
</tr>
<tr>
<td>High Binder Content Emulsion (HBCE) or Polymer Modified Emulsion (PME) ≥ 70% Bitumen Content</td>
<td>&gt; 1 week</td>
<td>10</td>
<td>Let cool to ambient and then reheat (max 10°C per hr) prior to load out</td>
<td>85</td>
</tr>
</tbody>
</table>

Pumps

Pumping/Circulation should only be undertaken once the product is at >80°C with warm/hot binders best served with Positive Displacement Pumps (eg Gear or Vein Pumps)

Positive displacement pumps

Positive displacement pumps, such as rotating gear types, can shear the emulsion if pump tolerance is tight. If purchasing a new pump request extra gear clearance of 0.08 to 0.1mm.

Alternatively, old or worn gear pumps may be suitable. The pump should be jacketed and heated. A relief valve/bypass is essential.

Loading out HBCE or PME

Proactive maintenance of tanks should prevent/detect the build up of residue within the tanks prior to it causing issues with product spraying.

Filtering during loading out should only be implemented if there is a problem present and if required the filter should have apertures of 4 – 6 mm, about the diameter of a pencil.

Filters, if used unnecessarily or of the incorrect size, can actually have a detrimental effect on the product and been the catalyst of lumps forming and blocking nozzles in the spray bar.

Loading of emulsion should be done by sucking the product into to bottom of the sprayer or by lowering the filling hose to the bottom of the road tanker. This is to avoid foaming of the emulsion caused by splash loading.

At no stage should any product be returned into emulsion storage.
### HBCE or PME

#### Do’s and Don’ts

<table>
<thead>
<tr>
<th>Dos</th>
<th>Don’ts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do be proactive with tank inspections and maintenance</td>
<td>Don’t pump excessively.</td>
</tr>
<tr>
<td>Do use periodic gentle agitation during tank storage e.g. weekly,</td>
<td>Don’t allow product to freeze.</td>
</tr>
<tr>
<td>Do warm emulsion to 80°C before circulation.</td>
<td>Don’t use blow torches unless you have no choice as localised overheating will break the emulsion adjacent to the blockage. If necessary, exercise care.</td>
</tr>
<tr>
<td>Do clean tanks, lines and equipment.</td>
<td>Don’t heat emulsions vigorously and never more than 85°C.</td>
</tr>
<tr>
<td>Do use different tanks for different emulsion.</td>
<td>Don’t use diesel to clean lines. Flush first with water and, if necessary, use a small amount of kerosene. A compatible soap solution may be used for more effective flushing of lines provided they are not slugged.</td>
</tr>
<tr>
<td>Do check compatibility of emulsions when changing product.</td>
<td>Don’t aerate emulsion.</td>
</tr>
<tr>
<td>Do apply gentle localised heating to clear blockages. Avoid aggressive heating of lines.</td>
<td>Don’t return diluted emulsion into storage tanks</td>
</tr>
<tr>
<td>Do use gentle agitation when heating or just before load out.</td>
<td></td>
</tr>
<tr>
<td>Do inspect emulsion storage tanks annually to assess maintenance and cleaning needs.</td>
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</tr>
<tr>
<td>Do blow out spray nozzles with compressed air after use.</td>
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</tbody>
</table>

### References


