



TECHNICAL BULLETIN #36

SAMIflex 'E'

A High Binder Content Polymer Modified Emulsion for Spray Sealing Applications

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Description

SAMIflex 'E' is an SBS Polymer Modified Cationic Bitumen Emulsion for spray sealing applications used as an alternative to hot modified binders or conventional bitumen. Polymer modification can be up to 7%, and the solids content is normally in the range of 75% to 78%. Specific site requirements will determine the degree of polymer modification required.

Features and Benefits

Offers all the advantages of plant blended hot SBS Modified Binders with additional benefits.

- No heat degradation during transport or storage of the binder
- Improved aggregate embedment and adhesion
- Can be applied all year round, even in cool, damp conditions
- Lower spray temperatures (85 - 95°C)
- Doesn't require adhesion agents or diluents
- Elimination of fuming

Applications

- New seals over properly prepared surfaces
- Reseals over pavements exhibiting surface cracking
- Pavements with high deflections
- Where waterproofing of the surface is necessary
- As a SAMI membrane interlayer or SAM surface membrane.

The SAMIflex 'E' range consists of:

	<u>AustRoads /RTA</u>	<u>QLD MRD</u>
SAMIflex CRS HR – unmodified high residue CRS emulsion		
SAMIflex E30 HR – modified with 3% SBS polymer	S10E spec.	S0.25S
SAMIflex E40 HR – modified with 4% SBS polymer	S15E spec.	S1S
SAMIflex E50 HR – modified with 5% SBS polymer	S20E spec.	S2S
SAMIflex E60 HR – modified with 6% SBS polymer	S25E spec.	S4.5S
SAMIflex E70 HR – modified with 7% SBS polymer	S30E spec.	S9S

The residue of the emulsion can be specified in terms of the National or State specification for the appropriate SBS Modified Spray Sealing Grade. Customers should specify the appropriate AustRoads or QLD MRD specification for the polymer modified bitumen residue, e.g. SAMIflex E50 HR meeting the AustRoads/NSW RTA specification for S20E, or QLD's MRD S2S specification.

Alternatively, SAMIflex 'E' can be ordered by SBS polymer content 3 – 7%, or as an un-modified CRS high residue emulsion.

Where SAMIflex 'E' is chosen due to cold or poor weather conditions and polymer modification is not a part of the seal design criteria, it is recommended to use SAMIflex E30HR as the binder offers better protection against possible traffic damage in the early stages of curing and overnight trafficking. The presence of a small amount of polymer (3%) greatly assists with aggregate adhesion and retention in these early critical stages of the curing process and aggregate embedment.

Seal Design

The following information is provided to assist with seal design, and to determine the amount of SAMIflex 'E' required.

Design the seal as a HSS, SAM or SAMI using accepted design practice and incorporate a PMB factor (**PF**) of 1.2 - 1.4 into the calculation when determining the residual application rate at 15°C (**R**). (Note: Where there are low traffic volumes, add 0.1ltr /m² to the residual design application rate). Then multiply the application rate per sq.m (**R**) by 1.34 to convert the residual rate to the hot application rate of the emulsion (@ 90°C), which also takes into account the water content of the product.

When designing using the AustRoads practitioners seal design guide AP-T17 or the NSW RTA's "Sprayed Sealing Guide", a PMB factor (**PF**) of 1.2 should be used for 7mm seals, and a factor of 1.3 - 1.4 for 10mm and 14mm seals. SAMIflex 'E' high residue emulsions contain a residual binder content of between 75% - 78%. (generally 76.5% – 77%).

SAMIflex 'E' can be applied as either a Single/Single (7mm seal), Single/Double "racked-in" seal (10/5mm or 14/7mm), or as Double/Double seal.

The "Racked-In" process is recommended when a 10mm or 14mm seal is constructed. The application rates required for 10 and 14mm seals take longer to cure (especially in cooler weather conditions) and if the new seal is opened to trafficking in the initial or early stages of the SAMIflex 'E' breaking and curing, the larger aggregate tends to move about under tyres. The presence of the smaller sized aggregate reduces aggregate movement and roll-over of the larger stone, and it also assists with breaking and curing, thus reducing possible damage from early trafficking. The larger aggregate must have an initial roll to lay on its ALD prior to the smaller aggregate being applied. (for information on Rolling, see page 4).

Double/Double (two coat)

After determining the total application rate of the SAMIflex 'E'

- Spray 50-60% of the SAMIflex 'E' in the first coat, spread the larger size aggregate, and roll.
- Spray the balance of the SAMIflex 'E' (40-50%), spread the smaller sized aggregate, and complete the rolling process.

Binder Calculations

Figures used in these calculations are based on 77% residual binder content emulsion and should be used for all SAMIflex 'E' calculations.

To Find:

1. Total Residual Binder

Multiply the residual application rate **R** (litres @ 15°C), by the total area to be sealed (m²).

2. Application Rate at 90°C:

Multiply the residual application rate **R** (litres @ 15°C) by 1.34.

3. Total Litres of SAMIflex 'E' at 90°C:

Multiply the Total Residual Binder quantity (above 1.), by 1.34. This figure is required for ordering purposes.

4. Total Litres of SAMIflex 'E' at 15°C (V)

Divide the Total Residual Binder quantity (above 1.), by 0.77. This figure is required to calculate Tonnes.

5. Tonnes of SAMIflex 'E' (T)

The density of SAMIflex @ 15°C is 1.02 – 1.03 kgs/litre. Use this figure to determine the amount of SAMIflex in tonnes (**T**) as SAMIflex is invoiced by weight. **T = V x density**.

Manufacture

SAMIflex 'E' is available ex plant (Sydney, Brisbane and Perth) in minimum 8000 litre bulk quantities. All SAMIflex 'E' is manufactured to order, and each batch can be tailor made to suit individual requirements.

Ordering SAMIflex 'E'

SAMIflex must be ordered in litres @ 90°C (see binder calculations above).

Delivery and Transportation

The proper handling of SAMIflex 'E' post manufacture is very important. The following should be used as a guide.

Tankering

- Tankers should be properly cleaned and flushed prior to loading SAMIflex 'E' (to avoid contamination or the possible breaking of the emulsion during transit). The heat from the emulsion at 95°C is not sufficient to free blocked valves or lines.
- No heat should be applied to the product until the nominated delivery site has been reached. Ensure sufficient time is allowed for at the destination, to heat the product up to a temperature of 90°-95°C prior to discharging into the sprayer. (Heating and circulation must be kept to a minimum and should be done just prior to the time requested on site).
- Do not heat at a rate greater than 10°C per hour, or above 95°C.
- During heating, commence slow circulation once the product temperature is above 70°C.
- Do not circulate, pump or transfer product until at least 70°-80°C.
- Discharge into the sprayer by pumping in conjunction with the sprayer. This action will also assist with the re-blending of any "skin" that may have formed during transportation. If transfer is done by the sprayer only then ensure the tanker is circulating the product during the transfer.
- During transportation there will be some evaporation of water from the product depending on the amount of ullage in the tank. This will cause a "skin" to form on the surface of the product within the tank, which is normal. After pumping out the tank there will be some binder residue (skin) left in the bottom of the tank, which is easily removed by flushing the tank in the usual manner.

Sprayer

- Ensure that the sprayer and spray bar have been thoroughly flushed prior to loading the SAMIflex 'E' and ensure that the manifold and valves are free and clear.
- Use the sprayer's pump, assisted by the tankers pump, to transfer the SAMIflex 'E' from the tanker into the sprayer. This combination will also assist any "skin" that may have formed in the tanker to be fully blended back into the binder.
- Once loaded, commence heating to spraying temperature (85°-95°C). Circulate slowly during heating.
- Do not circulate, pump or transfer product unless temperature exceeds 70°C.
- Do not heat at a rate greater than 10°C per hour.
- Spray temperature is recommended at 85°-95°C.
- In marginal weather conditions or where a damp pavement is to be sealed, the spray temperature of the product should be around 95°C to assist with the "breaking" process.
- SAMIflex 'E' is sprayed using standard spray jets (Copley A4).

Spraying

Due to the superior properties of SAMIflex 'E' it is possible to apply it to steeper gradients and cross falls than with conventional bitumen emulsions without "run off".

SAMIflex 'E' can be sprayed over a wide variety of weather conditions. The following can be taken as a guide.

- Minimum pavement temperatures to be 5°C rising to 10°C.
- May be applied in damp conditions, but not wet or raining.
- During hot conditions the SAMIflex 'E' will form a "skin" after spraying. Rolling of the aggregate will help ensure uniform breaking.
- Spray runs should be designed to have minimal stoppages. After spraying, the spray bars and jets should be flushed with kerosene in the normal manner (usually done at the end of the day).
- At the completion of spraying, the sprayer must be thoroughly flushed to avoid leaving any material which may break and contaminate future loads.

Storage

SAMIflex 'E' can be stored for up to 3 weeks provided storage tanks are cleaned prior to use, have adequate heating capability, and are filled to maximum capacity whenever possible. Once SAMIflex 'E' is 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.

- Only transport in tankers that have been properly cleaned and flushed to avoid contamination or the possible breaking of the emulsion during transit.
- The tankers must be able to heat the product at a rate not greater than 10°C per hour without localised heating.
- Due to the thixotropic nature of the product slow circulation through an internal pump prior to transfer or spraying is preferable, however do not commence circulation unless product temperature is greater than 70°C. (This assumes that a "gear" pump is used, other pumps may have different temperature requirements). Temperature gauges should be in proper working order.
- Delivery can be arranged to suit specific job requirements with suitable emulsion tankers.

Aggregate

The aggregate may be damp, preferably pre-coated (for rolling purposes only) and must be free of any dirt or foreign matter. After spraying, the application of the aggregate is best left until the SAMIflex 'E' has started to break (turn black) or "skin". Timing for this to occur is very much dependent on both ground and ambient air temperature. If the application rate or gradient/cross fall is such that the product starts to run or move, apply the aggregate as soon as possible then wait for the break/curing process to begin before commencing rolling.

For best results, if possible allow the binder to partially break or "skin" prior to spreading the aggregate, as this will reduce the chance of "pick-up" on the spreaders tyres.

Rolling

The main function of the rollers is to orientate the aggregate and to assist with the breaking and set-up of the SAMIflex 'E'. If the "Racked In" aggregate process is not used then pick-up may occur in the early stages of rolling, however this is dependant on application rates, aggregate size, and the amount or freshness of aggregate pre-coat.

For best results, if possible allow the binder to partially break or "skin" prior to spreading the aggregate this will reduce the chance of "pick-up" on the roller's tyres.

If un-precoated aggregate is used then rubber tyred rollers may experience "pick-up". To reduce this risk, lightly spray the tyres with diesel or water. SAMIflex 'E' has a very strong affinity to the rubber on rubber tyred rollers and if any contact is made, there may be a build up of SAMIflex 'E' and aggregate on the tyres. This can cause further pick up of the aggregate from the fresh seal causing "Pock Marks".

Brooming

Brooming may commence once rolling has been completed and the binder has fully cured. When it is necessary to sweep before the binder has fully cured, such as late in the day prior to darkness, light brooming is recommended however some aggregate may be dislodged.

Traffic Control

Traffic exceeding site speed restrictions within 24 hours of application (particularly at night), may cause stripping in cool or damp weather.

NOTE: Whilst every care is taken in the preparation of this data sheet, no responsibility is accepted for the interpretation of information contained herein, nor is any warranty expressed or implied for the suitability of the material for a particular application.