



## Installation Guidelines

### CONTENTS

<b>1.</b>	<b>INTRODUCTION.....</b>	<b>1</b>
<b>2.</b>	<b>TYPES OF APPLICATIONS.....</b>	<b>2</b>
<b>3.</b>	<b>BITUMEN BINDERS .....</b>	<b>3</b>
3.1	<i>SBR polymer modified cationic emulsion (SC-E1).....</i>	<i>3</i>
3.1.1.	Handling and storage .....	3
<b>4.</b>	<b>TYPICAL SPRAY RATES .....</b>	<b>5</b>
<b>5.</b>	<b>SEALMAC<sup>®</sup> INSTALLATION PROCEDURE (Refer to schematic, Figure 1).....</b>	<b>7</b>
5.1	<i>Crack sealing and patching .....</i>	<i>7</i>
5.2	<i>Crack sealing using anionic bitumen and a slurry seal surfacing .....</i>	<i>10</i>
5.3	<i>Full width under seals.....</i>	<i>11</i>
5.4	<i>Full width under asphalt .....</i>	<i>12</i>
<b>6.</b>	<b>TYPICAL PROBLEMS .....</b>	<b>13</b>
<b>7.</b>	<b>INSTALLATION EQUIPMENT .....</b>	<b>14</b>

## 1. INTRODUCTION

Without adequate maintenance paved roads rapidly deteriorate. The escalating cost of paved road rehabilitation highlights the need for cost effective solutions to this problem. In general, rehabilitation of paved roads can be divided into:

- Those requiring minor strengthening or surface improvements and,
- Those requiring substantial strengthening

Kaytech has developed **Sealmac**® geosynthetic paving fabric especially for use in road repairs and rehabilitation. **Sealmac**® is produced from continuous filament polyester and mechanically interlocked by double needle punching. This results in a nonwoven compressible product which is temperature stable and unaffected by hydrocarbons.

Pavement surface treatment applications using **Sealmac**® can be divided into two distinctive installation procedures, namely, chip seal or re-seal surfacings and asphalt overlays. For all chip seal work, whether crack sealing, patching, or full width sealing projects, **Sealmac**® is installed by first applying a rich tack coat of bitumen emulsion to the surface immediately followed by the laying down of **Sealmac**®. Chip seals do not generate sufficient heat to draw the tack coat up into the **Sealmac**® therefore rolling of the laid **Sealmac**® is required before saturating the **Sealmac**® with enough bitumen to provide sufficient binder for the overlaying chip seal aggregate. Where **Sealmac**® is installed beneath an asphalt overlay, the full quantity of bitumen is applied as a tack coat. Where emulsions are used, they must be allowed to break before applying the **Sealmac**® except for the hot bitumens where the **Sealmac**® is immediately applied to the tack coat.

These are guidelines for typical situations facing the engineer in road maintenance, but each project should be considered in isolation and the design adapted accordingly.

The success of the system lies in good communication amongst all the players involved:

Client		The desired end result
Consultant		<ul style="list-style-type: none"> <li>• Most appropriate design</li> <li>• Suppliers and contractor to inspect road with consultant visual assessment (TMH 9, Table A1) to include:               <ul style="list-style-type: none"> <li>○ Condition of surfacing</li> <li>○ Texture</li> <li>○ Crack type, severity and frequency</li> <li>○ Voids</li> <li>○ Elevation (cross or steep grades)</li> </ul> </li> </ul>
Suppliers	Bitumen	<ul style="list-style-type: none"> <li>• Most suitable binder for the particular project</li> <li>• Design input</li> </ul>
	Stone	Most suitable to the design taking into account existing surface, binder type, <b>Sealmac</b> ® saturation and rolling, seal type and rolling, dust content, ALD, pre-coating, etc.
	Paving Fabric	<b>Sealmac</b> ® not to be considered in isolation but as an integral part of the design including spray rates, existing pavement assessment, binder type, installation procedure and seal design (TRH 3)

Contractors	<ul style="list-style-type: none"> <li>• Guidance on installation to ensure appropriate design is applied</li> <li>• A trial section is recommended</li> <li>• Adherence to installation guidelines and recommendations</li> <li>• Flexibility to variations on site</li> <li>• Co-ordination of effort</li> <li>• Follow-up on completion and for a period thereafter</li> </ul>
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## 2. TYPES OF APPLICATIONS

Type of Distress	Crack Sealing Strips	Patches (>1 m <sup>2</sup> )	Full Width	Remarks
Surface cracking		✓	✓	Cracks > 7 mm wide to be pre-filled
Block / Stabilisation cracks	✓	✓	✓	Cracks > 7 mm wide to be pre-filled
Longitudinal or Transverse cracks	✓		✓	Cracks > 7 mm wide to be pre-filled
Crocodile cracks		✓	✓	Cracks > 7 mm wide to be pre-filled. Depends on the failure mechanism.
Pumping		✓	✓	Cracks > 7 mm wide to be pre-filled. If pumping occurs due to water in the base, subsoil drains to be installed first.
Rutting	✓	✓	✓	Only if cracking is evident, pre-treatment to levelling layer
Potholes	✓	✓	✓	Potholes to be repaired or pre-filled. Strips for perimeter of larger pothole repair.
Patches	✓	✓	✓	Distressed, broken, conventional patches to be pre-filled. Strips for perimeter of larger pothole repair.
Edge breaking	✓	✓	✓	Severe edge breaks to be pre-filled, repaired or built up
Re-instatement	✓	✓		Seal cracks between existing pavement and apply new fill

**Table 1 – Pavement Conditions where Sealmac® is Used**

### 3. BITUMEN BINDERS

#### 3.1 SBR polymer modified cationic emulsion (SC-E1)



This is the ideal partner for **Sealmac**® applications. It contains all the advantages of a bitumen emulsion as well as the improved polymer. The binder residue has modified rheological properties. A high level of consistency can be obtained due to the low temperature blending process and there is no risk of polymer degradation with storage or handling.

SBR polymer modified cationic emulsion achieves greater binder cohesion as the aggregate is held fast to the road in cold and hot climates without the need for pre-coating the aggregate. It can be used with slightly damp / dusty stone. If aggregate is too dusty, pre-coating may be required. Maximum chip retention is achieved with optimised binder application rates due to the improved wetting action of the modified binder. Thus there is a reduced risk of flushing or bleeding.

This modified binder has elastic properties to complement **Sealmac**® for sealing cracks in roads. It is user-friendly, can be returned to storage if surfacing operations are delayed, and can be applied at standard emulsion application temperatures.




Some useful values:

		PROPERTIES	TEST METHOD
Binder content % m/m		65 min	MB-22
Viscosity @ 50 °C sSF		51 - 200	
Residue on sieving g/100 ml max	710µm	0.1	MB-23
	150 µm	0.5	
Particle charge		Positive	MB-24
Sedimentation after 60 rotations		Nil	SANS 4001-BT3
pH		<6	
SBR content, % m/m on bitumen		3	
Softening point °C		≥ 48	MB-17
Elastic recovery at 15 °C		≥ 50	MB-4

**Table 2 – SBR Polymer Modified Cationic Emulsion (SC-E1)**

##### 3.1.1. Handling and storage

The product may be stored at ambient temperature or at 65 °C spraying temperature. Slight agitation may be required at weekly intervals during the storage period. No degradation of the Polymer occurs during storage periods. It may be diluted with potable water up to ratios of 1:1 for fog spray or saturation coat applications. Diluted product should not be stored.

Type of binder	Advantages in conventional use	Saturation characteristics (Tack coat)	Adhesion of Sealmac® to surface	Adhesion of aggregate surfacing to saturated Sealmac® (Penetration coat)	User-friendly	Weather versatility (Road surface temp)	Sealmac® friendly rating
65% SBR latex (3% net) modified bitumen emulsion 	Reseals over lightly cracked pavements. Tolerates higher deflections. Better for colder, wetter climates. Easier handling. Long storage.	★★★★	★★★★	★★★★	★★★★ (sprayed @ 65 °C)	10°C+ rising	★★★★
Spray grade 60 / 65% cationic bitumen emulsion	Reliable and easy to handle. Wide range of suitable stone. More tolerant of inclement weather	★★★★	★★★★	★★★★	★★★★ (sprayed @ 60 °C or higher)	10°C+ rising	★★★★
Stable grade 60% anionic bitumen emulsion 	Reliable, easy to handle. Time till break problems.	★★★ (need time to allow to break)	★★★★ (especially the modified)	★★★ (slow curing)	★★★★	10°C+ rising	★
Penetration grade hot bitumen	Readily available. Good base bitumen for emulsions. Can be applied to steep gradients	★★★★	★★★★	★★★★	★★★★ (sprayed @ 170°C)	25°C+ rising	★★★★
Bitumen rubber 	Better option to reseal rapidly deteriorating pavements. Good engineering qualities	★	★★★★	★★★★	★★★★ (sprayed @ 210°C)	20°C+ rising	★
SBR latex modified hot bitumen	Reseals over medium cracked pavements. Increased flexibility. Good storage stability. Early opening to traffic.	★★★★	★★★★	★★★★	★★★★ (sprayed @ 200°C)	Road: 25°C+ rising Air: 20°C+ rising	★★★★

**Table 3 – Bitumen Binder Performance with Sealmac®**

★★★★ = Excellent

★★★ = Good

★★ = Average

★ = Poor



= Highly Recommended



= Caution: consult Kaytech

Cautionary note: Stable grade 60% anionic bitumen emulsion can be used to tack down **Sealmac®** if modified with 3% latex. It must not be used for the armouring aggregate seal.

**4. TYPICAL SPRAY RATES**

<b>Crack Sealing Strips 200 - 100mm</b>		
<b>Pre-treatment Type</b>	<b>Tack Coat</b>	<b>Saturation Coat* * *</b>
Conventional slurry / micro-surfacing	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Sand / crusher dust seal	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Cape seal aggregate: 13.2 / 19mm	1.20 / 1.20 ℓ/m <sup>2</sup>	0.50 / 0.50 ℓ/m <sup>2</sup>
Single seal aggregate: 6.7 / 9.5 / 13.2mm	1.20 / 1.20 / 1.20 ℓ/m <sup>2</sup>	0.50 / 0.50 / 0.50 ℓ/m <sup>2</sup>
Double seal aggregate 13.2 + 6.7mm	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Premix or Ultra-thin friction coarse (UTFC)	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>

**Table 4**

<b>Patches &gt;1.0m<sup>2</sup></b>		
<b>Pre-treatment Type</b>	<b>Tack Coat</b>	<b>Saturation Coat***</b>
Conventional slurry / micro-surfacing	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Sand / crusher dust seal	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Cape seal aggregate: 13.2 / 19mm	1.20 / 1.20 ℓ/m <sup>2</sup>	0.50 / 0.50 ℓ/m <sup>2</sup>
Single seal aggregate: 6.7 / 9.5 / 13.2mm	1.20 / 1.20 / 1.20 ℓ/m <sup>2</sup>	0.50 / 0.50 / 0.50 ℓ/m <sup>2</sup>
Double seal aggregate 13.2 + 6.7mm	1.20 ℓ/m <sup>2</sup>	0.50 ℓ/m <sup>2</sup>
Premix or Ultra-thin friction coarse (UTFC)	1.20 ℓ/m <sup>2</sup>	1.0 ℓ/m <sup>2</sup> @ 50:50 dil*

**Table 5**

<b>Full Width Sealmac®</b>		
<b>Pre-treatment Type</b>	<b>Tack Coat</b>	<b>Saturation Coat</b>
Conventional slurry / micro-surfacing	1.40 ℓ/m <sup>2</sup>	1.0 ℓ/m <sup>2</sup>
Sand / crusher dust seal	1.40 ℓ/m <sup>2</sup>	1.0 ℓ/m <sup>2</sup>
Cape seal aggregate: 13.2 / 19mm	1.40 / 1.40 ℓ/m <sup>2</sup>	1.0 / 1.0 ℓ/m <sup>2</sup>
Single seal aggregate: 9.5 / 13.2mm	1.40 / 1.40 ℓ/m <sup>2</sup>	1.0 / 1.0 ℓ/m <sup>2</sup>
Double seal aggregate 13.2 + 6.7mm	1.40 ℓ/m <sup>2</sup>	1.0 ℓ/m <sup>2</sup>
Premix or Ultra-thin friction coarse (UTFC)	1.40 ℓ/m <sup>2</sup> **	1.0 ℓ/m <sup>2</sup> @ 50:50 dil*

**Table 6**

**Notes:**

**Binder:** Modified Cationic Spray Grade 65% Emulsion with 3% net SBR latex. The actual spray rates of bitumen given in Tables 4, 5 & 6 are a guide only and must be considered after a visual inspection of the road has taken place and a trial section has been done. Application rates exclude the bitumen required for the surfacing. The condition of the pavement should be evaluated to establish what total bitumen must be applied in the saturation coat (in addition to the above) to ensure adhesion of the stone. (Refer to “Pavement Conditions where Sealmac® is Used” - Table 1 and the “Existing Surface Texture - Tack Coat Variances” -Table 7).



\* *Saturation coat is optional for surface blinding if the asphalt / UTFC is to be applied at a later date.*

\*\* *A smooth surface will require less application whereas a coarse surface will require more application (Table 7). The ideal application rate should be established with a trial section before commencing with full scale application.*

\*\*\* *For best saturation of the geotextile in crack sealing and patching, the emulsion may be diluted at a ratio of 50:50. In this case the amount of diluted bitumen for the saturation coat is double that shown in the table.*



*For reseal preparation work, a tack coat and the **Sealmac®** is applied then blinded with a dusting of grit to contain any tackiness. The section is then opened to traffic for a week or so to allow time for the bitumen to cure. Before commencing the re-seal, the **Sealmac®** treatment is assessed as to whether a saturation coat is required.*



*A saturation coat is essential for holding action maintenance where a wearing course is being applied.*

**Existing Surface Texture – Tack Coat Variances**

Existing Surface Condition	Additional Application (ℓ/m <sup>2</sup> ) for tack coat
Tight – non-porous	As per Tables 4, 5, 6
Cracked – weathered	0.1 - 0.3
Cracked – open texture	0.3 - 0.5

**Table 7 (for tender purpose only – to be established on site)**

## 5. SEALMAC® INSTALLATION PROCEDURE (Refer to schematic, Figure 1)

### 5.1 Crack sealing and patching

- **Sealmac®** strips or patches applied to cracks in a road surface as a pre-treatment can buy time prior to full scale resealing.
- Good preparation and planning produces best results. Refer to “Pavement Conditions where **Sealmac®** is Used” (Table 1), “Bitumen Binder Performance with **Sealmac®**” (Table 3), and “Tools and Equipment for Installation” (Table 9).
- Remove water, grass, weeds, grease, or any other material which may prevent bonding of the geotextile and sweep the affected area or crack to remove all loose material. Blowing out cracks with compressed air is recommended.
- Prefill larger cracks (wider than 7 mm) with a hot sealant or similar suitable bituminous filler preferably allowing one week to cure.
- Ensure that a suitable width of **Sealmac®** to cover cracked area is on site. **Sealmac®** can be either cut to the correct length prior to placement or simply rolled out over the cracked area and trimmed afterwards (*Note 1*).
- Apply the prescribed bitumen emulsion tack coat according to recommended spray rates in Tables 4 & 5. A trial section is recommended to confirm ideal spray rates. The bitumen emulsion should be spray applied or poured on by bucket and spread by broom or squeegee.
- Place or roll out a suitable width of **Sealmac®**, by hand, to cover the affected area or crack. This should be carried out immediately after the emulsion has been applied, before the bitumen emulsion has broken. Ensure that all creases are ironed out by using either a squeegee or the reverse section of a hard broom (*Note 1*).
- Saturate the **Sealmac®** with bitumen emulsion according to recommended spray rates in Tables 4 & 5. The saturation coat should be applied in the same manner as the tack coat, immediately after the **Sealmac®** strip/patch has been applied.
- Spread a suitable amount of coarse river sand, grit or 6.7 mm stone on the bitumen impregnated **Sealmac®** (*see Note 2 & Table 8*). This is best done by hand using spades and brooms. The quantity of material used should be sufficient to form a reasonable wearing course, taking into account loss due to traffic. Blind 6.7 mm stone with crusher dust where there is concern regarding stone pick-up by early opening to traffic to stop rolling of stone.
- Roll the wearing course with a hand-operated drum roller or drive over the sealed area with a truck (1-2 passes). Rolling is less critical where traffic volumes are lower. Where **Sealmac®** is applied to rutted surfacings, apply a thicker layer of aggregate and roll transverse to the direction of rut. This will ensure thorough compaction and prevent damage at high points.
- Open to traffic. Normal traffic speed restrictions should apply particularly where traffic volumes are high.

#### Notes:

- 1) For crack sealing and patching, **Sealmac®** is available in widths of 200 mm, 500 mm 1.0 m and 1.5 m. Choose the correct width to minimise overlaps.
- 2) When crusher dust is used, chip loss can be a problem due to the presence of excessive dust. This can be alleviated by using a 6.7 mm aggregate or a fine aggregate wearing course with a recommended grading according to Table 8 below. A 2.4 mm washed grit or aggregate is recommended, if available.



<b>Recommended Aggregate Grading</b>	
<b>Sieve size (mm)</b>	<b>Percentage Passing by Mass</b>
4.75	100
2.36	0 - 100
1.18	0 - 50
0.600	0 - 20
0.300	0 - 10
0.150	0 - 5
0.075	0 - 2
Sand equivalent (%) min	35

**Table 8** (Recommended for use as a holding action.)

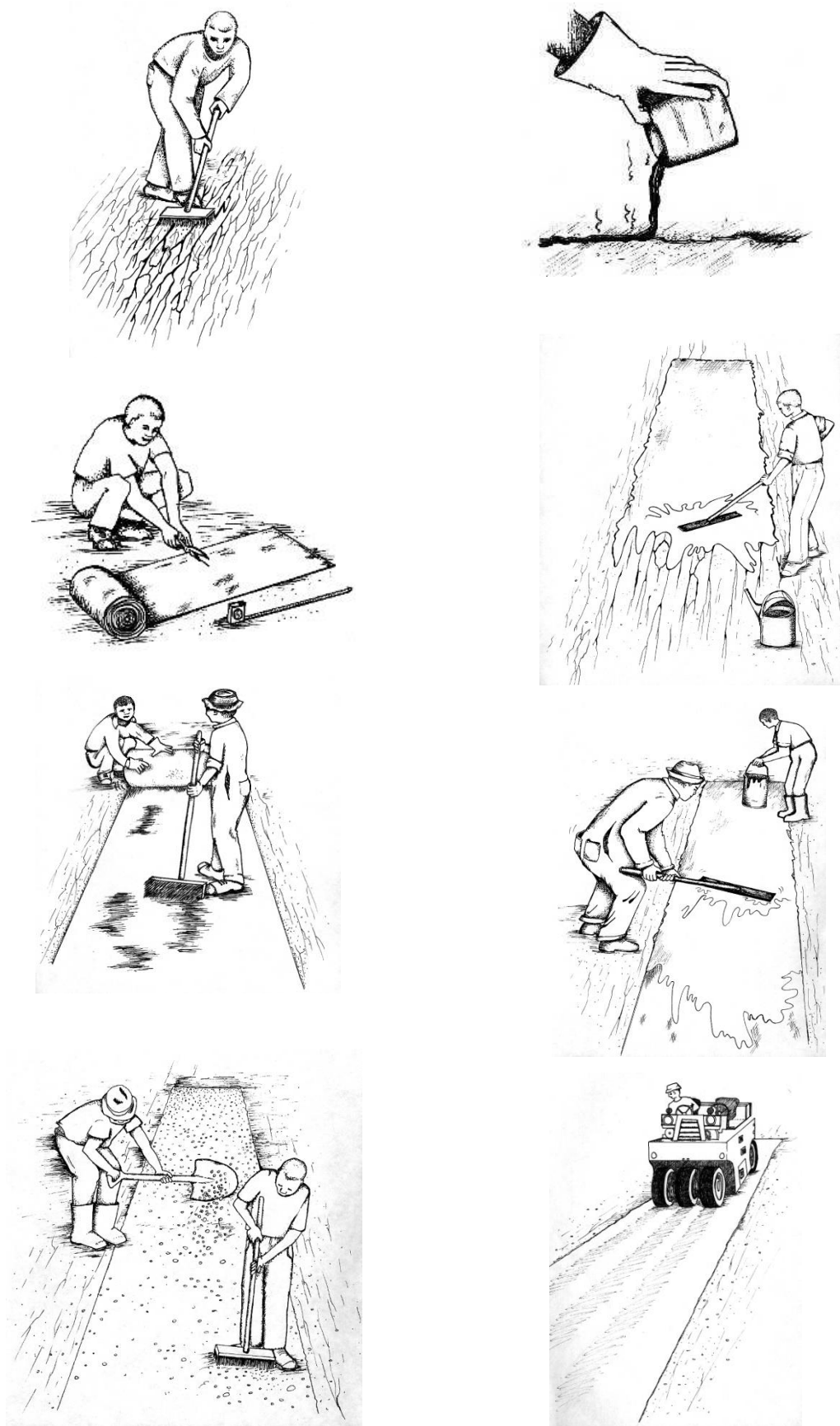


Figure 1: Schematic, **Sealmac**® Crack sealing and patching



## 5.2 Crack sealing using anionic bitumen and a slurry seal surfacing

(Avoid this method or proceed with extreme caution)

- **Sealmac**® used under the right conditions and installed correctly can retard reflective cracking and provides a moisture barrier.
- Good preparation and planning produces best results. Refer to “Pavement Conditions where **Sealmac**® is used” (Table 1), “Bitumen Binder Performance with **Sealmac**®” (Table 3), and “Tools and Equipment for Installation” (Table 9).
- Remove water, grass, weeds, grease, or any other material which may prevent bonding of the geotextile and sweep the affected area or crack to remove all loose material. Blowing out cracks with compressed air is recommended.
- Prefill larger cracks (wider than 7 mm) with a hot sealant or similar suitable bituminous filler preferably allowing one week to cure.
- Ensure that the width of **Sealmac**® suitable to cover cracked area is available on site. **Sealmac**® can be either cut to the correct length prior to placement or simply rolled out over the cracked area and trimmed afterwards (*Note 1*).
- Apply a 60% stable grade anionic bitumen emulsion tack coat at 1.4 l/m<sup>2</sup> (*Note 2*). This may vary on site according to the texture of the existing surface (*Table 7*). A trial section is recommended to confirm ideal spray rates. The bitumen emulsion should be spray applied or poured on by bucket and spread by broom or squeegee. A 70% stable grade anionic bitumen emulsion is suggested on steeper grades.
- Place or roll out a suitable width of **Sealmac**®, by hand, to cover the affected area or crack (*Note 1*). This should be carried out immediately after the emulsion has been applied. Ensure that all creases are ironed out by using either a squeegee, or the reverse section of a hard broom.
- Allow minimum one hour to break, depending on weather conditions.
- Apply a 60% stable grade anionic bitumen emulsion saturation coat at 0.4 l/m<sup>2</sup>
- Blind **Sealmac**® with crusher dust or coarse river sand (*Table 8*).
- Roll the edges of the patch using a bakkie or truck. For strips, roll the entire strip. (It is preferable not to use a steel-wheeled roller for this operation).
- Open to traffic for 1 to 2 weeks.
- Broom off any loose crusher dust.
- Apply a conventional slurry seal.

### Notes:

- 1) For crack sealing and patching, **Sealmac**® is available in widths of 200 mm, 500 mm, 1.0 m and 1.5 m. Choose the correct width to minimise overlaps.
- 2) For improved performance and adhesion, use 60% stable with 3% minimum latex added. Anionic bitumen SS60 emulsions without latex are not recommended as they tend to be extremely slow curing and thereby compromise the adhesion of the **Sealmac**®.

### 5.3 Full width under seals

- **Sealmac®** used under the right conditions and installed correctly, can retard reflective cracking and provides a moisture barrier.
- Good preparation and planning produces best results. Refer to “Pavement Conditions where **Sealmac®** is Used” (Table 1), “Bitumen Binder Performance with **Sealmac®**” (Table 3), and “Tools and Equipment for Installation” (Table 9). **Sealmac®** standard width is 2.5 m.
- Remove water, grass, weeds, grease, or any other material which may prevent bonding of the geotextile and sweep the road surface to remove all loose material. Larger holes or depressions and cracks wider than 7 mm should be patched or filled with conventional materials, e.g. slurry seal or premix.
- Spray bitumen tack coat using a calibrated bitumen distributor truck according to the recommended spray rates in Table 6. It’s recommended that a trial section be done before full scale work commences to finalise spray rates. Where possible, this should be done in the presence of a Kaytech representative unless the contractor is very experienced in **Sealmac®** installation. The distributor should be set to apply the bitumen tack coat 100 mm wider than the width of **Sealmac®** to be used. The bitumen tack coat can also be sprayed by hand but the application rate must be carefully monitored. Refer to “Bitumen Binder Performance with **Sealmac®**” (Table 3).
- Roll out the first width of **Sealmac®**, preferably using a mechanical lay-down device to reduce wrinkles and creases (although it can be done by hand). This must be carried out before the bitumen has cooled or lost its tackiness. Large wrinkles should be cut, opened out, extra bitumen applied to the one side ( $\pm 0,6 \text{ l/m}^2$  residual bitumen) and overlapped. All **Sealmac®** overlaps and joins should be 50-150 mm wide.
- Roll the **Sealmac®** with a pneumatic tyre roller (3-4 passes) once set sufficiently to prevent bleeding and pick-up after tack coat has been applied to ensure good adhesion to the road surface. If pick-up still occurs, delay rolling. The roller tyres must be clean and free of bitumen binder. When rolling out the first width of **Sealmac®**, the bitumen distributor can make a second pass, spraying bitumen 100 mm over the edge of the first width of **Sealmac®**. When the second width of **Sealmac®** is rolled out, it must overlap the first by 100 mm so there is sufficient bitumen to saturate the double layer of **Sealmac®** along the overlap. This process must be repeated until the full road width is covered in **Sealmac®**. Where resealing takes place under traffic, half width construction is possible.
- Apply saturation coat as recommended in Table 6. Allow 3 hours for saturation coat to break prior to opening to traffic. If adverse weather conditions prevail which prolong the curing time of the binder and it is necessary to open the road to traffic, then the area laid should be blinded with washed coarse river sand to prevent pick-up. A 6.7 mm aggregate or washed grit as per Table 8 is also recommended, if available. Limit traffic speed as temporary smooth surface has very little traction. Mechanically broom off excess loose grit prior to application of seal.
- Construct conventional surfacing according to normal design procedure (Note 1).
- As with conventional surfacing, if necessary, temporary speed restrictions should be imposed for several hours after the road has been opened to traffic.

#### Notes:

- 1) *The choice of surfacing is based on best performance type in a specific situation. Standard engineering procedures are used to make this decision. The **Sealmac®** must not be considered in isolation. It is intended to enhance the performance of conventional surfacing or as a remedial measure.*

#### 5.4 Full width under asphalt

- **Sealmac®** used under the right conditions and installed correctly, can retard reflective cracking and provides a moisture barrier.
- Good preparation and planning produces best results. Refer to “Pavement Conditions where **Sealmac®** is Used” (Table 1), “Bitumen Binder Performance with **Sealmac®**” (Table 3), and “Tools and Equipment for Installation” (Table 9). **Sealmac®** standard width is 2.5 m.
- Remove water, grass, weeds, grease, or any other material which may prevent bonding of the geotextile. Sweep the road surface to remove all loose material. Larger holes or depressions and cracks wider than 7 mm should be patched or filled with conventional materials, e.g. slurry seal or premix. Allow a week for crack sealing and pothole repair cold emulsion-based fillers to cure. This last step is not required for hot mix patching systems.
- Spray on a uniform application of bituminous tack coat – either a quick-setting SBR modified cationic emulsion (Table 2) or a hot applied bitumen. The necessary amount of tack coat is 1.0–1.2 l/m<sup>2</sup> of residual bitumen. It’s recommended that a trial section be done before full scale work commences to finalise spray rates. Where possible, this should be done in the presence of a Kaytech representative unless the contractor is very experienced in **Sealmac®** installation. When using latex modified cationic emulsion, a minimum of 65% residual bitumen content is recommended (Table 2). (Total quantity of a 65% modified emulsion to be applied is 1.7 l/m<sup>2</sup>.) (Note 1) Avoid cutters or solvents.
- Hot bitumen – install close behind the spray tanker using a mechanical lay down machine especially when hot modified binders are being used.
- Roll out the first width of **Sealmac®**, preferably using a mechanical lay down device to reduce wrinkles and creases. (It can be done by hand, but this is not advisable when using hot bitumen. Where **Sealmac®** is placed by hand, it is preferable to unroll from a steel bar, applying the outside of the roll to the tacked surface rather than placing the roll on the ground and rolling it out. Employing this method ensures that **Sealmac®** is tensioned sufficiently and wrinkles are limited. Use a squeegee or the reverse of a hard broom to smooth out any wrinkles. Stubborn folds are to be cut and smoothed. This should be done before the bitumen has cooled or lost its tackiness. Large wrinkles should be cut, opened out, extra bitumen applied to the one side ( $\pm 0.6$  l/m<sup>2</sup> residual bitumen) and overlapped. All **Sealmac®** overlaps and joins should be 50 - 150mm wide.
- Roll the **Sealmac®** with a pneumatic tyre roller (3-4 passes) 3 hours after bitumen emulsion tack coat has been applied, to ensure good adhesion to the road surface. For hot bitumens, rolling can commence almost immediately. In some cases, as determined by the trial section, the tack coat application rate may be reduced to enable immediate rolling. If pick-up still occurs, delay rolling. The roller tyres must be clean and free of bitumen binder. While rolling the first width of **Sealmac®**, the bitumen distributor can make a second pass, spraying bitumen 100-150 mm over the edge of the first width of **Sealmac®**. When the second width of **Sealmac®** is rolled out to overlap the first by 50-150 mm, ensure there is sufficient bitumen to saturate the double layer of **Sealmac®** along the overlap. This process should be repeated until the full road width is covered in **Sealmac®**. Where resealing takes place under traffic, half width construction is possible.
- Install conventional asphalt surfacing according to normal design procedures.

#### Notes:

- 1) *Emulsions should be allowed to break sufficiently to avoid pick-up during rolling or during paving operation. Should pick-up occur during the paving operation, avoid pushing the delivery truck with the paver or wait until emulsion has cured. Also, a light sprinkling of loose asphalt in front of the paver’s wheels can be applied by hand.*

## 6. TYPICAL PROBLEMS

### ***Aggregate loss - ravelling***

- common to both conventional re-sealing and **Sealmac**® installations
- wrong binder selection or poor binder quality
- cold or wet weather
- stripping
- insufficient stone application / coverage
- incorrect rolling – type of roller, number of passes, etc.
- open to traffic too soon
- blocked nozzles on distributor
- transverse overlap spray
- inadequate pre-coating of stone for modified hot bitumen
- using stone with a high dust content
- using fresh / wet pre-coat stone, i.e. too soon after treatment
- permanent shade areas in forests and East-West bridges / overpasses
- winter grade bitumen emulsion and cutback bitumens (addition of cutters or solvents)
- rolling over of individual stones in single seals



Single seals may require an addition of a smaller size aggregate / grit to fill voids between the nominal sized aggregate and provide an interlock to pin down the single seal

### ***De-lamination***

- water in base – inadequate sub-soil drainage
- insufficient tack coat and saturation of **Sealmac**® allowing water ingress
- insufficient curing of tack coat before opening to traffic
- use of cutters in the bitumen delays curing
- laying in rain / wet conditions
- bleeding – too much binder
- winter grade bitumen emulsions and cutback bitumens (addition of cutters and solvents)
- use of stable grade emulsions

### ***Mechanical failures***

- vertical crack movement is excessive – tears **Sealmac**® paving fabric
- lack of overlap in full width applications
- laid at intersections or sharp bends where braking forces are excessive
- cracks larger than 7 mm and potholes not being repaired, pre-filled, or textured prior to **Sealmac**® placement
- shoving / heaving
- slippage on old rich surface

**Caution**

If at all possible, avoid winter grade bitumen emulsions and cutback bitumen. If the climate conditions require a cutter or solvent to be added to the bitumen for the seal, it is recommended that the tack coat placed prior to placement of the **Sealmac**®, is not cut back. The reason for minimizing the use of the cutter is that it gets trapped in the paving fabric. This results in bleeding, slippage of the seal on the **Sealmac**® and loss of aggregate. Avoid slow-curing stable grade emulsions under asphalt overlay operations.



Latex modified emulsions give superior performance with all **Sealmac**® paving fabric installations.

**7. INSTALLATION EQUIPMENT**

	<b>Crack Sealing Strips (200 mm, 500 mm, 1 m)</b>	<b>Patches &gt; 1.0m<sup>2</sup></b>	<b>Full width Sealmac®</b>
Brooms (hard bristle)	✓	✓	✓
Spades	✓	✓	✓
Squeegees	✓	✓	✓
20 l empty containers	✓	✓	✓
Large scissors or sharp knife	✓	✓	✓
Spanner to open 200 l drum	✓	✓	
Roller (1 ton steel drum)	✓	✓	
Pneumatic roller (6-8 ton)			✓
Kaytech lay down machine			✓
Bitumen distributor			✓
Tipper truck (5m <sup>3</sup> )			✓
Chip spreader			✓
Rotary broom			✓
Cleaning material: paraffin, diesel, rags, water	✓	✓	✓

**Table 9 - Tools and Equipment for the Installation of Sealmac®**

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