KAYTECH
ENGINEERED FABRICS

Sealmac® and Sealgrid®

Road Paving Fabrics

Installation Guidelines

CONTENTS

1. INTRODUCTION

Paving fabrics were first used in the 1930s when cotton sheets were installed as reinforcement to asphalt layers in roads in North Carolina, USA. Since the early 1980s the concept of geotextile reinforcement of surfacing seals has been used successfully worldwide, with some 60 million m^2 installed in the USA alone in 1987.

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 - **Sealmac®**
- Those requiring substantial strengthening - **Sealgrid®**

These categories may overlap with a single procedure able to both seal and strengthen the pavement. This can be achieved by incorporating a paving geotextile into the rehabilitation design (See Figure 1). The geotextile waterproofs the surfacing which can then be constructed on a base susceptible to rutting and shrinkage cracking. Where funds are limited and a rehabilitation measure is required, the inclusion of a paving fabric will enhance the performance of such a holding action.

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 non-woven compressible product which is temperature stable and unaffected by hydrocarbons.

To add a strength component to the paving fabric a high strength glass fibre woven roving stitched to **Sealmac®** to form a reinforced composite paving fabric, **Sealgrid®**. The reinforcing effect of the low strain glass filaments in combination with the waterproofing, stress relieving and bonding properties of **Sealmac®** leads to a dramatic reduction of reflective cracking under asphalt overlays.

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:

1	Client		The desired end product.
2	Consultant		most appropriate design suppliers and contractor to inspect road with consultant visual assessment (TMH 9, Table A1) to include: texture voids Elevation (cross or steep grades).
3	Suppliers	Bitumen	Most suitable binder for the particular project. Design input
		Stone	most suitable to design taking into account existing surface, binder type, **Sealmac®** saturation and rolling, seal type and rolling, dust content, ALD, pre-coating, etc.
		Paving Fabric	**Sealmac®** 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).
4	Contractors		Guidance on installation to ensure appropriate design is applied. flexibility to variations on site co-ordination of effort Follow-up on completion and for a period thereafter.

2. BENEFITS

2.1 SEALMAC®

- **Sealmac®** saturated with bitumen effectively seals the existing pavement and waterproofs the surface treatment by enhancing the performance of the seal. Paving fabrics provide one or more of the following benefits:
- Prolongs surfacing lifetime by a factor of approximately 3 (Asphalt Reinforcement using Glass Grid F.P. Jaecklin & J. Scherer, Switzerland
- Revents the Ingress of Water by providing a more flexible, homogeneous waterproof layer.
- Stabilises Pavement Moisture Content by preventing further ingress of surface water.
- Bridges Shrinkage Cracks retarding their propagation up through the surfacing.
- Allows Larger Deflections of the order of 2-3mm to take place in comparison with 1.25mm for single seals.
- Prevents Cracking as a result of rutting caused by weak underlying structural layers.
- Prolongs Fatigue Life when the structural layers are weak and susceptible to rutting or shrinkage cracking.
- Cost Effective alternative to an expensive structural upgrade.
- Reduces Required Overlay Thickness by retarding the passage of cracks through an asphalt layer.
- Lower Maintenance Costs by extending the life of the existing surface, reducing future maintenance costs.
- Lower Installation Costs particularly regarding simplicity, ease of placement and speed of installation.
- Employment of Unskilled Labour for cracksealing and patching systems making it ideal for use by SMME's.
- No Expensive Plant Required for cracksealing and patching systems i.e.: compactors and milling machines.
- Can be re-milled in the cold recycling process, (hot recycling not recommended).
- Excellent heat resistance. **Sealmac®** is manufactured from polyester which has a melting point of 260ºc, where as polypropylene is sensitive to temperatures in excess of 145ºc.

2.2 SEALGRID®

- Prolongs surfacing lifetime by a factor of approximately 7. (Asphalt Reinforcement using Glass Grid F.P. Jaecklin & J. Scherer, Switzerland).
- The glass fibre woven roving provides a high strength interlayer at very low strain, which effectively stitches cracks together.

- No levelling layer is required over milled surfaces as **Sealgrid®** is flexible and conforms around milled irregularities, while **Sealmac®** acts as padding between the milled surface and glass grid.

3. SPECIFICATION:

Properties		units	Sealmac®	Test Method
Thickness	under 2 kPa	mm	1.4	SANS 10221
Tensile Strength	machine direction	kN/m	9	SANS 10221
	elongation	%	40 – 60	
	cross direction	kN/m	8	
	elongation	%	40 – 60	
Tear Strength	minimum	N	215	ASTM D4533
Grab Strength	minimum	N	390	ASTM D4632
Penetration Load	CBR	kN	1.5	SANS 10221
Puncture Resistance	diameter of hole	mm	28	ISO 13433
G Value (robustness) Geotextile Strength Rating			1 500	AustRoads
Melting Point		ºC	260	ASTM D276
Bitumen Retention (*see explanation below)		ℓ/m²	1.2	ASTM D6140

The Geotextile Strength Rating G is a means of classifying the robustness of geotextiles. This index is derived from values obtained from the Penetration Load (CBR Plunger Test) and the Puncture Resistance (Drop Cone

$$G = \sqrt{L \times h50}$$

Test). The Geotextile Strength Rating G takes the geometric mean of the two values.

Where:

- L = Load (Newtons) on the CBR plunger at failure using SANS 10221 Test Method. Should the strain at failure exceed 80 %, then the CBR Load (L80) at 80 % strain should be used in the calculation of G. In such cases, if actual failure is used, unacceptable deformation may occur in service as the required strength of the geotextile is mobilised.
- h50 = Drop Height (mm) required to make a hole 50 mm in diameter using AS 3706.5 Test Method.

Classification	G Value
Weak	< 600
Slightly Robust	600 – 900
Moderately Robust	900 – 1 350

Classification	G Value
Robust	1 350 – 2 000
Very Robust	2 000 – 3 000
Extremely Robust	> 3 000

Standard Grades		Units	Sealgrid® 50	Sealgrid® 100	Test Method
Fibre Glass Reinforcement					
Grid Dimensions		mm	25 x 13	12 x 6.5	
Tensile Strength	Tensile Strength	kN/m	50 x 50	100 x 100	SANS 10221
	Elongation at Break	%	3		
	Strength at 2 % Strain	kN/m	30 x 30	60 x 60	
Sealmac®	Nonwoven Continuous Filament Polyester Geotextile				
Sealmac® Melting Point		º C	> 265		ASTM D276
Bitumen Retention ** See explanation below		ℓ/m^2	≥0.85		ASTM D6140
Roll Size	length	m	50		
	width	m	2.45		

4. TYPES OF APPLICATIONS

Where Sealmac® and Sealgrid® are used

Type of Distress	Cracksealing Strips	Patches (>1m^2)	Full Width	Remarks
SEALMAC®				
Surface Cracking		x	x	Cracks > 7mm wide to be pre-filled.
Block/Stabilization cracks	x	x	x	Cracks > 7mm wide to be pre-filled.
Longitudinal or Transverse cracks	x		x	Cracks > 7mm wide to be pre-filled.
Crocodile cracks		x	x	Cracks > 7mm wide to be pre-filled. Depends on the failure mechanism
Pumping		x	x	Cracks > 7mm wide to be pre-filled. If pumping occurs due to water in the base. Subsoil drains to be installed first
Rutting	x	x	x	Only if cracking is evident. Pre-treatment to levelling layer
Potholes		x	x	Potholes to be repaired or pre-filled
Patches		x	x	Distressed ,broken, conventional patches to be pre filled
Edge Breaking	x	x	x	Severe edge breaks to be pre-filled, repaired or built up
Re-Instatement	x	x		Sealing cracks between existing pavement and new fill

Type of Distress	Cracksealing Strips	Patches (>1m^2)	Full Width	Remarks
SEALGRID®				
Surfacing cracks			x	Cracks > 7mm wide to be pre-filled.
Block/Stabilization cracks			x	Cracks > 7mm wide to be pre-filled.
Longitudinal or Transverse cracks			x	Cracks > 7mm wide to be pre-filled.
Crocodile cracks			x	Cracks > 7mm wide to be pre-filled. Depends on the failure mechanism
Pumping			x	Cracks > 7mm wide to be pre-filled. If pumping occurs due to water in the base. Subsoil drains to be installed first
Rutting			x	Only if cracking is evident. Pre-treatment to levelling layer
Potholes		x	x	Potholes to be repaired or pre-filled
Patches		x	x	Distressed ,broken, conventional patches to be pre filled
Edge Breaking	x	x	x	Severe edge breaks to be pre-filled, repaired or built up

TABLE 1

5. BITUMEN BINDERS

5.1 Bituminous Binder Performance with Sealmac®

Type of Binder	Advantages in Conventional Use	Saturation Characteristics (Tack Coat)	Adhesion of Sealmac® Surface	Adhesion of Aggregate surfacing to Saturated Sealmac® (Penetration Coat)	User Friendly	Weather Versatility (Road Surface Temp)
65% SBR latex (3% net) modified bitumen emulsion	Reseals over lightly cracked pavements. Tolerates higher deflections. Better for colder, wetter climates. Easier handling	XXXX	XXXX	XXXX	XXXX (sprayed@ 60 °C)	10°C+ rising
Spray grade 60% cationic bitumen emulsion	Reliable and easy to handle. Wide range of suitable stone. More tolerant of inclement weather	XXX	XXX	XXX	XXX (sprayed@ 60 °C OR higher)	10°C+ rising
Spray grade 65% cationic bitumen emulsion	Reliable and easy to handle. Wide range of suitable stone. More tolerant of inclement weather	XXX	XXX	XXX	XXX (sprayed@ 60 °C	10°C + rising (Rapid curing)
Stable grade 60% anionic bitumen emulsion	Reliable, easy to handle	XX (may take too long to break)	XXX (especially the modified)	XXX (slow curing)	XXX	10°C+ rising
80/100 penetration grade hot bitumen	Readily available. Good base bitumen for emulsions. Can be applied to	XX	XXXX	XX	XX (sprayed @ 170°C)	25°C+ rising

	steep gradients					
MC3000 cut back bitumen	Good wettability, good adhesion in cold weather	XXX	XXX	XXX	XX (sprayed @ 135°C)	10°C+ rising
Bitumen rubber	Better option to reseal rapidly deteriorating pavements. Good engineering qualities	X	XXXX	XXXX	XX (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.	XX	XXXX	XXXX	XX (sprayed @ 200°C)	Road: 25°C + rising Air :20°C + rising

TABLE 2

XXXX = Excellent

XXX = Good

XX = Average

X = Poor

Note: Stable grade 60% anionic bitumen emulsion can be used to tack down **Sealmac®/Sealgrid®**, but must not be used for the armouring aggregate seal. Should it be required for this application, additional 2.5% latex must be added.

5.2 *SBR Polymer Modified Cationic Emulsion*

- The Perfect Partner for **Sealmac®** Applications
- All the advantages of a Bitumen Emulsion plus the improved Polymer
- Modified rheological properties of the binder residue.

- High level of consistency obtained due to the low temperature blending process. No risk of Polymer degradation with storage or handling.
- Greater binder cohesion; aggregate is gripped tenaciously on the road in cold and hot climates.
- No pre-coating of aggregate required.
- Maximum chip retention with optimised binder application rates due to the improved wetting action of the modified binder.
- Reduced risk of flushing or bleeding.
- Modified binder has elastic properties to compliment **Sealmac®** for sealing cracks in roads.
- No degradation of the modified binder during handling and storage.
- User-friendly, can be returned to storage if surfacing operations are delayed.
- Applied at normal Emulsion application temperatures.
- Compatible with **Sealmac®.**

	PROPERTIES	**TEST METHOD**
Binder Content % m/m	65 min	ASTM D244
Viscosity @ 50 °C sSF	70 min	ASTM D244
Residue of Sieving g/100 ml max.	0,25	SABS 548
Particle charge	Positive	SABS 548
Sedimentation after 60 rotations	Nil	SABS 548
pH	<6	
Break test	Pass	VIALIT
SBR content, % m/m on bitumen	5	

	VALUE	**TEST METHOD**
Softening Point (R&B) typical, °C	55 min	ASTM D36
Dynamic viscosity at 135 °C (Pa.S) – min	1.3	ASTM D4402
Ductility at 10 °C (mm) – min	1000	DIN 52013
Elastic recovery at 10 °C min STM D113 (mod	55	STM D113 (mod)
% Adhesion at 5 °C min	90	VIALIT
at 50 °C min VIALIT	100	VIALIT

HANDLING AND STORAGE:

Can be stored at ambient temperature or at 60 °C spraying temperature. Slight agitation may be required at weekly intervals during the storage period. No degradation of the Polymer occurs during storage periods. Can be diluted with potable water up to ratios of 1:1 for fogspray applications. Diluted product should not be stored.

6. TYPICAL SPRAY RATES

Cracksealing Strips 200- 100mm		
Pre-treatment type	Tack Coat	Saturation Coat* * *
Conventional Slurry / Micro-surfacing	1.20 l/m²	0.50 l/m²
Sand / Crusher Dust Seal	1.20 l/m²	0.50 l/m²
Cape Seal Aggregate: 13.2 / 19mm	1.20 / 1.20 l/m²	0.50 / 0.50 l/m²
Single Seal Aggregate: 9.5 / 13.2mm	1.20 / 1.20 l/m²	0.50 / 0.50 /lm²
Double Seal Aggregate 13.2 + 6.7mm	1.20 /lm²	0.50 /lm²
Premix or Ultra thin friction coarse (UTFC)	1.20 l/m²	0.50 l/m²

Patches >1.0m²		
Pre-treatment type	Tack Coat	Saturation Coat* * *
Conventional Slurry / Micro-surfacing	1.20 l/m²	0.50 l/m²
Sand / Crusher Dust Seal	1.20 l/m²	0.50 l/m²
Cape Seal Aggregate: 13.2 / 19mm	1.20 / 1.20 l/m²	0.50 / 0.50 l/m²
Single Seal Aggregate: 9.5 / 13.2mm	1.20 / 1.20 l/m²	0.50 / 0.50 l/m²
Double Seal Aggregate 13.2 + 6.7mm	1.20 l/m²	0.50 l/m²
Premix or Ultra thin friction coarse (UTFC)	1.20 l/m²	1.0 l/m² @ 50:50 dil*

Full Width Sealmac®		
Pre-treatment type	Tack Coat	Saturation Coat
Conventional Slurry / Micro-surfacing	1.40 l/m²	1.0 l/m²
Sand / Crusher Dust Seal	1.40 l/m²	1.0 l/m²
Cape Seal Aggregate: 13.2 / 19mm	1.40 / 1.40 l/m²	1.0 / 1.0 l/m²
Single Seal Aggregate: 9.5 / 13.2mm	1.40 / 1.40 l/m²	1.0 / 1.0 l/m²
Double Seal Aggregate 13.2 + 6.7mm	1.40 l/m²	1.0 l/m²
Premix or Ultra thin friction coarse (UTFC)	1.40 l/m² **	1.0 l/m² @ 50:50 dil*

TABLE 3

Binder: Modified Cationic Spray Grade 65% Emulsion with 5% net SBR latex. The actual spray rates of bitumen given in Table 3 are a guide only and must be considered after a visual inspection of the road has taken place. 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 4).

*Saturation coat is optional for surface blinding if the premix / 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 4).

***For best saturation of the geotextile in cracksealing 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 2x that shown in the table.

Existing Surface Texture – Tack Coat Variances

Existing Surface Condition	**Additional Application (l/m²) for tack coat**
Tight – Non-Porous	As per above table
Cracked – Weathered	0.1 - 0.3
Cracked – Open Texture	0.3 - 0.5

TABLE 4

7. SEALMAC® INSTALLATION PROCEDURE:

7.1 Cracksealing 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 the Equipment and Pre-check lists. *Ref: TABLE 1, TABLE 2 and TABLE 6.*
- 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 ideal.
- Prefill larger cracks (wider than 7mm) with a hot sealant or similar.
- 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 *TABLE 3*. The bitumen emulsion is spray applied or poured on by bucket and spread by broom or squeegee.
- Place or roll out a suitable width of **Sealmac®**, by hand, which will cover the affected area or crack. This is 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. *(Note 1)*
- Saturate the **Sealmac®** with bitumen emulsion according to recommended spray rates in TABLE 3. The saturation coat is 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 on the bitumen impregnated **Sealmac®**. 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. (*Note 2)*
- Roll the wearing course with a hand operated drum roller or drive over the sealed area with a truck (3-4 Passes). Rolling is less critical where traffic volumes are lower.
- 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 200mm, 500mm 1,0m and 1.5m widths.
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 6,7mm aggregate or a fine aggregate wearing course with a recommended grading according to Table 5 below. A 4mm stone aggregate as per the COLTO Blinding specification is ideal, if available.

Recommended Aggregate Grading

Sieve size (mm)	Percentage Passing by Mass		
4,75	100	Aggregate Crushing Value (ACV)	>30
2,36	0—100	Polished Stone Value (PSV)	>55
1,18	0—50	10% FACT (Fine Aggregate Crushing Test)	>210
0,600	0—20	Wet/Dry	>75%
0,300	0—10		
0,150	0—5		
0,075	0—2		

TABLE 5

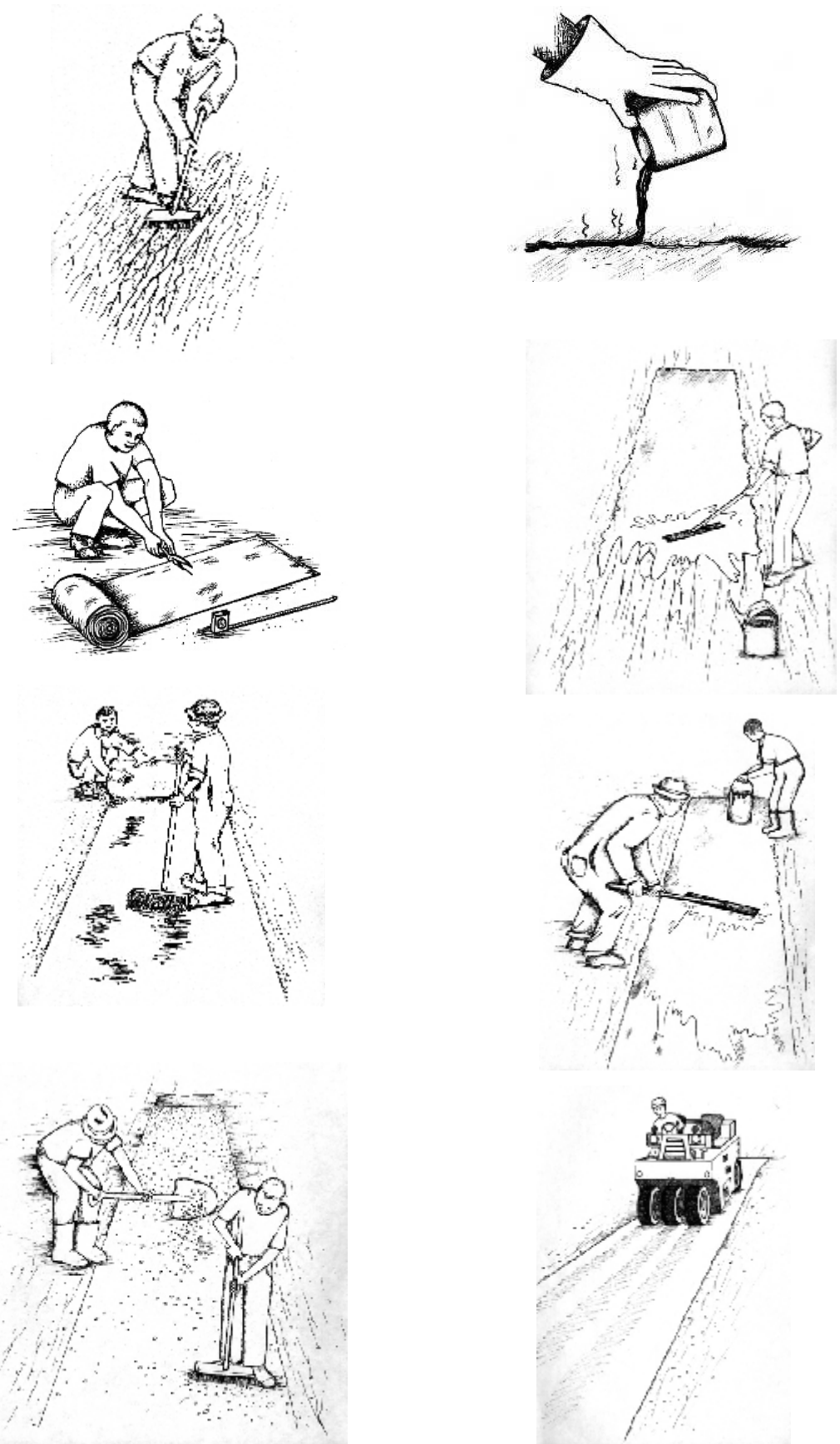

Figure 2: Schematic, **Sealmac®** Cracksealing and Patching

7.2 Cracksealing using Anionic Bitumens and a Slurry Seal

- **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 the Equipment and Pre-check lists. Ref: TABLE 1, TABLE 2 and TABLE 6.
- 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 ideal.
- Prefill larger cracks (wider than 7mm) with a hot sealant or similar. Preferably allow 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 a 60% stable grade anionic bitumen emulsion tack coat at 1.4 l/m² *(Note 2).* This may vary on site according the texture of the existing surface *(TABLE 4).* The bitumen emulsion is spray applied or poured on by bucket and spread by broom or squeegee. A 70% stable grade anionic bitumen emulsion may be preferential on steeper grades. Ideal is to add 2.5% latex to the 60% stable grade anionic bitumen emulsion.
- Place or roll out a suitable width of **Sealmac®**, by hand, which will cover the affected area or crack. This is 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. *(Note 1)*
- Allow minimum one hour to break.
- Apply a 60% stable grade anionic bitumen emulsion saturation coat at 0.4 l/m²
- Blind **Sealmac®** with crusher dust
- Roll the edges of the patch using a bakkie or truck. For strips, roll complete. (Preferably do not 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 200mm, 500mm 1,0m and 1.5m widths.
2) For an improved performance use 60% stable with a 2.5% minimum latex added. Anionic bitumen SS60 emulsions without latex are not recommended as they tend to be extremely slow curing.

7.3 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 the equipment and pre-check list Ref: TABLE 1, TABLE 2 and TABLE 6. Also select desired width as per **Sealmac®** standard widths *(Note 1)*
- 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 7mm should be patched or filled with conventional materials. (eg. slurry seal or premix)
- Spray bitumen tack coat using a calibrated bitumen distributor truck according to the recommended spray rates in TABLE 3. The distributor should be set to apply the bitumen tack coat 100mm wider than the width of **Sealmac®** to be used. The bitumen tack coat can be sprayed by hand but the application rate must be carefully monitored. Refer to Bitumen Binder Performance with **Sealmac®** *(TABLE 2).*
- 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). This is done before the bitumen has cooled or lost its tackiness *(Note 2*). Large wrinkles should be cut, opened out, extra bitumen applied to the one side (±0,6 l/m² residual bitumen) and overlapped. All **Sealmac®** overlaps and joins should be 150mm wide.
- Roll the **Sealmac®** with a pneumatic tyred roller (3-4 passes) 3 hours 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. While rolling of the first width of **Sealmac®** is still in progress the bitumen distributor can make a second pass, spraying bitumen 150m over the edge of the first width of **Sealmac®**. When the second width of **Sealmac®** is then rolled out to overlap the first by 150mm there is sufficient bitumen to saturate the double layer of **Sealmac®** along the overlap. This process is 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 3.* Allow 3 hours for saturation coat to break prior to opening to traffic. If adverse weather conditions prevail which prolongs the drying 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 4mm stone aggregate as per the COLTO Blinding Specification or *TABLE 3* is also ideal, if available.
- Construct conventional surfacing according to normal design procedure. *(Note 3).*
- As with conventional surfacings, if necessary, temporary speed restrictions should be applied for several hours after the road has been opened to traffic.

Notes:

1) Available in standard widths of 200mm, 500mm 1.0m, 1.5m, 2.0m and 2.5m. However, roll width can be adapted to most road widths for large quantities.

2) Where a premix overlay is to be installed, the tack coat should be allowed to break prior to placement of **Sealmac®**.

3) The choice of surfacing is based on which type will perform best 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 a conventional surfacing or remedial measure.

7.4 Full Width under asphalt

- **Sealmac®/Sealgrid®** 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 the equipment and pre-check list Ref: TABLE 1, TABLE 2 and TABLE 6. Also select desired width as per **Sealmac®/Sealgrid®** standard widths (Note 1)
- 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 7mm should be patched or filled with conventional materials. (eg. slurry seal or premix). Allow a week for crack sealing and pothole repair cold emulsion-based fillers to cure. Not required for hot mix patching systems.
- Spray on a uniform application of bituminous tack coat, either a quick setting SBR modified cationic emulsion or hot applied bitumen. The necessary amount of tack coat is 1.0–1.2 ℓ/m² of residual bitumen. When using latex modified cationic emulsion, a minimum of 65 % residual bitumen content is preferable. (Total quantity of a 65 % modified emulsion to be applied is 1.7 ℓ/m².) Avoid cutters or solvents. (Note 2)
- Quick setting SBR modified cationic emulsion – allow breaking before installing **Sealgrid®**.
- Hot bitumen – install immediately using a mechanical lay down machine1
- Roll out the first width of **Sealmac®/Sealgrid®**, preferably using a mechanical lay down device to reduce wrinkles and creases (it can be done by hand, but advisable when using hot bitumens). Use a squeegy or the reverse of a hard broom to smooth out any wrinkles. Stubborn folds are to be cut and smoothed. This is done before the bitumen has cooled or lost its tackiness. Large wrinkles should be cut, opened out, extra bitumen applied to the one side (±0,6 l/m² residual bitumen) and overlapped. All **Sealmac®/Sealgrid®** overlaps and joins should be 100 - 150mm wide. **Sealgrid®** is usually installed with the glass grid portion facing up (see Note 3).
- Roll the **Sealmac®/Sealgrid®** with a pneumatic tyred roller (3-4 passes) 3 hours 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. While rolling of the first width of **Sealmac®/Sealgrid®** is still in progress, the bitumen distributor can make a second pass, spraying bitumen 150m over the edge of the first width of **Sealmac®/Sealgrid®**. When the second width of **Sealmac®/Sealgrid®** is then rolled out to overlap the first by 150mm

there is sufficient bitumen to saturate the double layer of **Sealmac®/Sealgrid®** along the overlap. This process is repeated until the full road width is covered in **Sealmac®/Sealgrid®**. Where resealing takes place under traffic half width construction is possible.

- Install conventional asphalt surfacing according to normal design procedures.

Notes:

1) **Sealmac®** is available in standard widths of 200mm, 500mm 1.0m, 1.5m, 2.0m and 2.5m. **Sealgrid®** is available in 2.45m widths. However, roll width can be adapted to most road widths for large quantities.
2) Emulsions that are not properly broken may lead to pickup during rolling or the paving operation. Should pickup occur during the paving operation, avoid pushing of the delivery truck with the paver or wait until emulsion has set. Also, a light sprinkling of loose asphalt in front of the paver's wheels can be applied by hand.
3) Installed **Sealmac®** and **Sealgrid®**, placed with the glass grid portion facing down, and may be temporarily opened to traffic. **Sealgrid®** should only be placed with the glass grid portion facing down where a scratch coat has been placed over the existing surface or the existing surface has a relatively smooth finish. **Sealgrid®** should always be installed with the glass grid facing up when placed onto a milled surface

8. TYPICAL PROBLEMS:

Aggregate loss - ravelling

- Common to conventional re-sealing so why any different?
- wrong binder selection
- poor binder
- cold weather
- stripping
- wet weather
- 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 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 (addition of paraffin)
- 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 – no sub-soil drainage
- insufficient tack coat and saturation of **Sealmac®** allowing water ingress
- laying in rain/wet conditions
- fuel leakage/contamination between applications of **Sealmac®** and seal

Mechanical failures

- vertical crack movement is excessive – tears fabric
- insufficient/lack of overlap in full width applications
- laid at intersections where braking is excessive
- Potholes and cracks larger than 7mm not being repaired pre-filled or textured prior to **Sealmac®** placement.
- *Shoving / Heaving*
- at intersections or sharp bends
- Unreinforced surfacing e.g. Cape Seal may be better.
- slippage on old rich surface
- Bleeding
- too much binder
- use of cutback bitumen's
- use of stable grade emulsions
- winter grade bitumen emulsion (addition of paraffin)

General

It at all possible, avoid cutback bitumen. If the climate conditions require a cutter to be added to the bitumen for the seal, it is preferable 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 locked in the fabric and the volatiles try to escape/evaporate during hot weather, softening the bitumen. This results in bleeding, slippage of the seal on the Sealmac® and loss of aggregate. Avoid slow curing emulsions under asphalt operations. Latex modified emulsions give superior performance with all paving fabric installations.

9. SEALMAC® INSTALLATION:

Tools and Equipment for the Installation of Sealmac®

	Cracksealing Strips (200, 500mm, 1m)	Patches(> 1m²)	Full width Sealmac®
Brooms (Hard Bristle)	X	X	X
Spades	X	X	X
Squeegees	X	X	X
20 l Empty Containers	X	X	X
Large Scissors or Sharp Knife	X	X	X
Spanner to open 200 l drum	X	X	
Roller (1 ton steel drum)	X	X	
Pneumatic Roller (6-8t)			X
Kaytech Laydown machine			X
Bitumen Distributor			X
Tipper Truck (5m³)			X
Chip Spreader			X
Rotary Broom			X
Cleaning material paraffin, diesel, rags, water	X	X	X

TABLE 6