

# INSTALLATION GUIDELINES FOR PETROMAT PAVING FABRICS



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## Installation Checklist For Asphalt Concrete Overlays

### **SURFACE PREPARATION**

- o Clean surface free of dirt, water and debris (page 8).
- o Fill cracks greater than 1/8" (page 9).
- o Correct areas of subgrade failure (pages 8, 9, 11).
- o Most milled surfaces may be directly overlaid with Petromat.
- o Portland cement concrete pavements require special care (page 10).

### **TACK COAT APPLICATION**

- o Uncut paving grade asphalt is preferred (page 5).
- o Verify appropriate application rate between 0.22 gallon/square yard and 0.30 gallon/square yard (page 11).
- o Check function of distributor truck (pages 6, 7, 12).
- o Apply tack coat the width of the PETROMAT plus 3" (page 11).
- o Do not allow traffic on tack coat (page 12).
- o Special care is needed for emulsified asphalt tack coat (pages 5, 20).

### **PETROMAT PLACEMENT**

- o Select the proper PETROMAT style.
- o Protect paving fabric from elements until ready to use (page 4).
- o Install smooth side up, fuzzy side down (pages 13, 14).
- o Verify even roll brake tension (page 14).
- o Avoid sharp turns (pages 14, 17).
- o Joints require an overlap—a minimum of 1"
- o Verify tack coat is placed between all overlaps, except end-of-roll overlaps trimmed to 1" do not need a second tack coat (page 14).
- o When possible, do not place more than can be paved in the same day (page 15).
- o When possible, allow only construction traffic on paving fabric (page 5).

### **OVERLAY PLACEMENT**

- o Apply a minimum of 1.5" of compacted asphalt concrete (page 15).
- o Maximum asphalt concrete temperature 350 °F (page 15).
- o Minimum asphalt concrete temperature of a warm mix 250 °F (page 15).

## Installation Checklist For Chip Seal/Paving Fabric Systems

### **SURFACE PREPARATION**

- o Clean surface free of dirt, water and debris (pages 8, 16).
- o Fill cracks greater than 1/8" (pages 9, 16).
- o Correct areas of subgrade failure (pages 8, 16).

### **TACK COAT APPLICATION**

- o Check function of distributor truck (pages 6, 7, 12).
- o Verify residual asphalt tack coat application rate between 0.22 gallon/square yard and 0.30 gallon/square yard (page 16).
- o Apply tack coat the width of the PETROMAT plus 3" (page 11).

### **PETROMAT PLACEMENT**

- o Select the proper PETROMAT style.
- o Protect paving fabric from elements until ready to use (page 4).
- o Install smooth side up, fuzzy side down (page 17).
- o Verify even roll brake tension (page 17).
- o Avoid sharp turns (pages 14, 15, 17).
- o Overlap all joints a minimum of 1". A minimum joint overlap of 1" is preferred (page 17).
- o Verify tack coat is placed between all overlaps, except end-of-roll overlaps trimmed to 1" do not need a second tack coat (page 17).

### **SANDING AND ROLLING**

- o Broadcast dry sand, 4 to 6 pounds per square yard (page 17).
- o Roll with rubber-tire roller until the fabric is saturated with tack coat (page 17).

### **PLACEMENT OF CHIP SEAL**

- o Remove excess sand (page 17).
- o Visually inspect fabric bond at all overlaps (page 17).
- o Apply chip seal overspray. Increase application rate where paving fabric is dry (page 17).
- o Place chips and roll per local specifications (page 17).

## PART II – MATERIALS AND EQUIPMENT FOR INSTALLATION

### A. PETROMAT

#### Material

The principal component of the PETROMAT System is the nonwoven paving fabric designed specifically for use in pavement rehabilitation projects. One side of the PETROMAT fabric is heat-set, or fused, to create a smooth surface. This heat-set side reduces bleed-through of the asphalt tack coat and helps prevent fabric pick-up by trucks during hot weather installation. Both of these conditions cause paving problems using competing paving fabrics that are “fuzzy” on both sides. PETROMAT has a tight, needle-punched, nonwoven structure that absorbs and holds the asphalt tack coat to provide a durable, stable waterproofing membrane. PETROMAT rolls come in widths to match most roadway requirements. A sample specification for paving fabric is included in the Appendix to this installation guide.

#### Which PETROMAT?

Three styles of PETROMAT are available

**Original PETROMAT** - dark gray paving fabric style is offered in three different weights to comply with industry specifications. This style of PETROMAT is most appropriately used in cooler temperatures, and when tack coat bleed through is desired before surface placement, like beneath a chip seal surface treatment.

**PETROMAT Plus-White** is preferred when temperatures are warm to hot and excessive asphalt cement tack coat bleed through may be expected if the proper amount of tack coat is applied. The the white fabric remains up to 70° F cooler than dark fabrics, to keep the tack coat from becoming too liquid before the overlay is placed.

**PETROMAT Enviro** is a specially engineered paving fabric to be easily milled and recycled.. PETROMAT Enviro is offered in one weight, featuring strength consistent with the AASHTO Type 1 paving fabric.

#### Storage and Handling

Use care in handling and storing PETROMAT rolls to limit potential damage to the fabric. PETROMAT styles come from the factory in a plastic wrapper to protect the fabric from moisture and exposure to sunlight. The wrapper should be left intact around the roll for continued protection until the material is placed. Avoid fabric contact with moisture as this can reduce bonding of the fabric to the pavement. Do not store PETROMAT rolls on the ground where rain or other runoff can get into the fabric. This moisture may also weaken the core, making the roll hard to handle.



Prolonged exposure to sunlight can cause degradation of paving fabric. We recommend protecting the fabric from sunlight and limiting exposure to less than two weeks. PETROMAT styles come wound on a cardboard tube or core. Take care to avoid breaking this core. To protect the core during unloading, a pipe slightly smaller in diameter and length than the core can be inserted inside the roll. Do not drag or push the material off the truck onto the end of the roll. A pipe can also be inserted during installation of the paving fabric to prevent breaking the core of

the roll. If the core breaks accidentally, the pipe will stiffen the core enough to place the fabric.

### Temporary Traffic

Construction vehicle traffic will not damage PETROMAT, however, truck and equipment drivers should maintain slow speeds while driving on the fabric. Care should be taken not to make any sudden starts, stops or turns. Public traffic should be limited to only when necessary and approved by the owner's representative.

**All freshly installed paving fabric styles may have less skid resistance than dry pavement, and moisture can further reduce the skid resistance. Traffic should generally not be permitted on the paving fabric due to safety considerations. If it is necessary to allow traffic on the fabric before the overlay is placed, the surface should be sanded. The paving fabric surface is slippery when wet. All safety precautions, including but not limited to warning signs and speed reductions, should be taken to limit the possibility of a skidding hazard.**

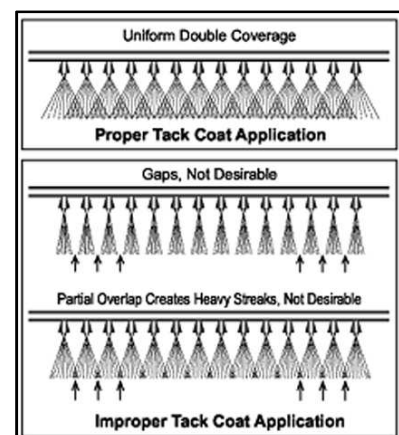
### B. TACK COAT MATERIALS

Each PETROMAT system consists of PETROMAT paving fabric combined with an asphalt cement tack coat. Each element depends on the other for optimum performance. PETROMAT fabrics provide reinforcement and durability to the tack coat, such that it performs its waterproofing function even when deformed.

The tack coat is a hot liquid asphalt cement applied to the pavement surface to saturate the paving fabric and bond it to the pavement layers. The quality and quantity of the asphalt cement tack coat are important factors in the successful installation of the PETROMAT System. Poor placement technique or use of inappropriate asphalt can lead to slipping of the pavement overlay or unsatisfactory waterproofing performance. Uncut paving grade asphalt cements (AC, AR or penetration grades) are preferred for use as the tack coat material. The most commonly used are AC-20, AR-4000 and PG 64-22. The actual grade of asphalt cement will depend on the geographic area and the season.

Asphalt emulsions (RS or CRS grades) are not recommended, but can be used if necessary. If an emulsion must be used, it is important that a sufficient amount be applied such that the residual asphalt will provide the necessary coverage. Also, allow sufficient time for the emulsion to cure before laying the PETROMAT®. More information regarding use of emulsified asphalts is provided in Part V of this installation guide. Emulsions also have low viscosity and therefore are prone to run to low areas quickly, resulting in uneven applications. Uneven milled surfaces will cause thick and thin areas of applied emulsions so a pure asphalt cement should be used over milled surfaces.

Cutback asphalts (RC, MC and SC grades) or emulsions containing oil distillates should not be used for the tack coat. These materials contain solvents that can lead to instability of the overlay and are therefore unsuitable for use with PETROMAT®.



### C. DISTRIBUTOR TRUCK

Uniform application of the tack coat is vital to ensure that the PETROMAT is saturated with asphalt and can provide its full waterproofing benefit. A distributor truck is preferred to obtain the most uniform tack coat application rate possible. The condition of the distributor truck should not be overlooked. Prior to beginning the job, check the spray nozzles on the truck to verify that a uniform spray is delivered.

The tack coat should not be applied with heavy spots, streaks or gaps. The height of the spray bar and spray nozzles can be adjusted to attain the correct spray width and overlap.

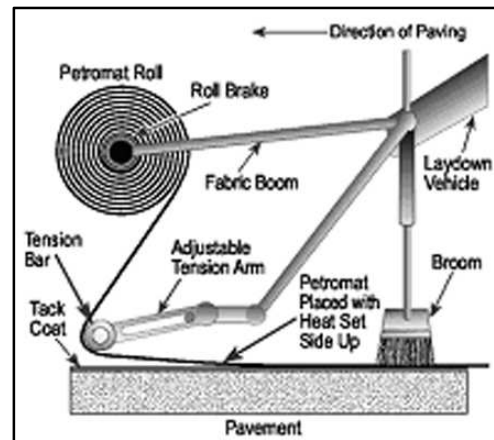
If there is not room on the site to move a distributor truck, hand spray or use a squeegee to place the tack coat. If hand spraying or squeegee placement is used, pay careful attention to maintaining the proper amount and uniform tack coat application.

It is very important that the tack coat application rate be verified. The actual amount of tack coat on the pavement surface should be measured. This can be calculated based on the change in weight of the distributor truck, change in level gauge, on-board computer or other reliable metering system. A heavy cardboard or wood paneling coupon, such as 1 foot x 1foot or 1 yard x 1 yard, may be weighed and placed before tack application. It should then be picked up and weighed again to determine that the proper tack amount was applied.

### D. INSTALLATION EQUIPMENT

Experienced PETROMAT installers have a specially equipped tractor or distributor truck designed to place the paving fabric. This equipment has attachments to lay down and broom in the paving fabric and apply uniform tension as the laydown operation proceeds.

Like any piece of construction equipment, the laydown equipment should be in good condition. The equipment should have a roll brake at each end of the fabric boom to prevent uncontrolled unrolling of the paving fabric. The brake tension should be adjusted evenly to limit wrinkling of the fabric. The laydown equipment will often have brooms attached to smooth out the fabric as it is laid. The brooms should be in good condition. The laydown equipment may also have a tension bar to apply the paving fabric smoothly and keep wind from rolling up the edges of the fabric as it is laid. The tension bar can often be adjusted as needed to smooth out the paving fabric. Best results may be obtained if this bar is bowed out.



If necessary, PETROMAT can be installed by hand. In this case, insert a pipe through the core of the roll and use hand brakes at each end to apply tension to the fabric during the placement procedure. Make sure the inside of the roll, fuzzy side of the fabric is placed down onto the tack coat.

## E. MISCELLANEOUS EQUIPMENT

The following miscellaneous equipment may be useful during the PETROMAT installation:

- Scissors, utility knife, or other fabric-cutting device.
- Stiff bristle push brooms.
- Length of standard pipe, slightly smaller in diameter than the roll core, to insert inside the core when handling the fabric.
- Bucket and squeegee or small hand wand to apply asphalt on fabric joints and in areas not reached with the distributor truck.
- Rubber-tire roller to smooth fabric into the tack coat for chip seals, or to correct blisters or other loss of bond between the fabric and underlying pavement.
- Washed concrete sand (as prescribed).

## PART III - INSTALLATION FOR ASPHALT CONCRETE OVERLAYS

### A. APPLICATIONS

The most common use of the PETROMAT System is as an interlayer for asphalt concrete overlays on existing asphalt pavements and on Portland cement concrete pavements. PETROMAT can be installed with new asphalt concrete pavements following similar procedures. This section presents detailed guidance for installation of the PETROMAT System in these applications.

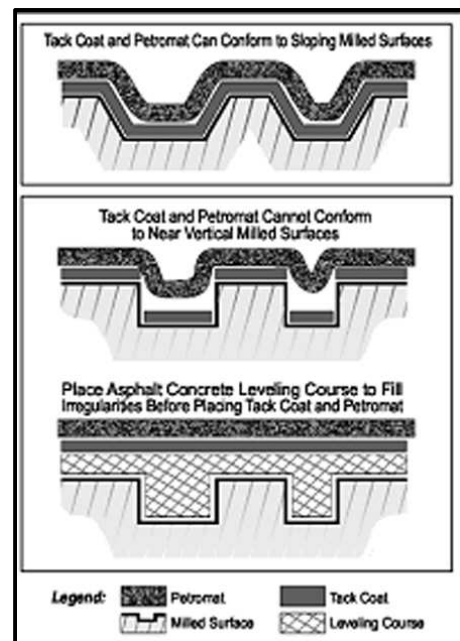
### B. PREPARATION OF ASPHALT CEMENT CONCRETE PAVEMENT SURFACES

#### Surface Preparation

The first step in the installation of the PETROMAT System on existing asphalt concrete pavements is the preparation of the pavement to receive the tack coat. Before beginning the project, determine what pavement surface preparation will be required. Give careful attention to areas that show signs of structural or subgrade distress, such as alligator cracking or pavement deformation. In these areas, the engineer should specify procedures for removing or stabilizing the questionable pavement area.

It is important that the surface on which the PETROMAT System is placed is dry and free of dirt. Sweep off accumulations of dust, debris, water, oil and other foreign matter. Power brooms may be helpful where large areas are to be resurfaced.

Sharp changes in the pavement surface should either be ground down or smoothed out with an asphalt concrete leveling course. The guiding principle is that the tack coat should be able to completely cover the pavement surface





and the PETROMAT conform to the surface.

PETROMAT may be placed on and will conform to typical milled surfaces provided they are completely clean and sound. Where sharp grooves in milled pavements result in vertical surfaces, a leveling course will be required. When paving over a shoulder or other sharp edge, the surface should be ground down or a leveling course of asphalt mix used to smooth it out. Use a fine mix for the leveling course so that the tack coat cannot sink into the pores.

### Crack Treatment

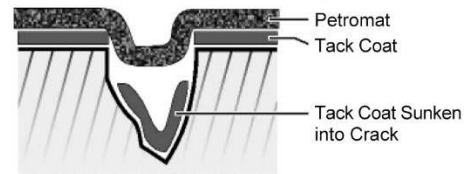
Cracks less than 1/8" wide do not require any special attention before application of the tack coat. Cracks from 1/8" to 3/8" should be filled with a liquid crack sealant so that the tack coat cannot seep down into the crack. Fill cracks larger than 3/8" with a more stable crack filler, such as hot or cold asphalt mix, emulsion slurry, or commercially available crack filler. Highly cracked, but sound pavements may be more economically prepared with a leveling course.

If the crack filler contains an emulsified asphalt or cutback asphalt, allow it to cure completely before placing the tack coat and PETROMAT. Otherwise, the paving fabric will form a membrane that can trap volatiles or moisture, leading to separation of the paving fabric from the pavement surface.

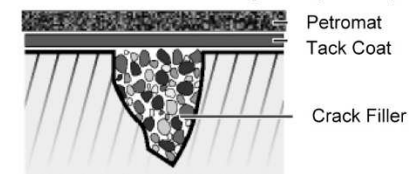
Fill cracks flush with or slightly below the existing pavement surface. If cracks are overfilled, such that the filler mounds up above the surface of the pavement, a noticeable bump in the pavement can result. This can lead to shoving of the overlay or bleeding of excess asphalt.



In Unfilled Crack, the Tack Coat Sinks to the Bottom of the Crack and Leaves a Zone of Unsupported Paving Fabric not saturated with Asphalt. This Compromises the Waterproofing Function of the Petromat System.



Crack Filler, Poured Flush With or Slightly Below the Level of the Pavement, Allows Continuous Layer of Tack Coat to Saturate the Paving Fabric (Petromat).



## C. PREPARATION OF PORTLAND CEMENT CONCRETE PAVEMENT SURFACES

Inadequate pavement stability is one of the leading causes of early cracking of overlays with and without paving fabric. For the best performance of the overlay, there should be no differential movement at joints in the existing concrete pavement. Differential movement will result in early reflective cracking. It may not be possible to stabilize the joints sufficiently to obtain the full benefit from the PETROMAT System. In these cases, we recommend Propex's PETROTAC<sup>®</sup> pavement repair composite membrane, which tolerates slightly more movement.

The following three approaches may be used in applying the PETROMAT System over existing Portland cement concrete pavements. The approach depends on the condition of the existing pavement and the anticipated traffic volume. For best results, an asphalt concrete leveling course is used over the Portland cement concrete pavement.

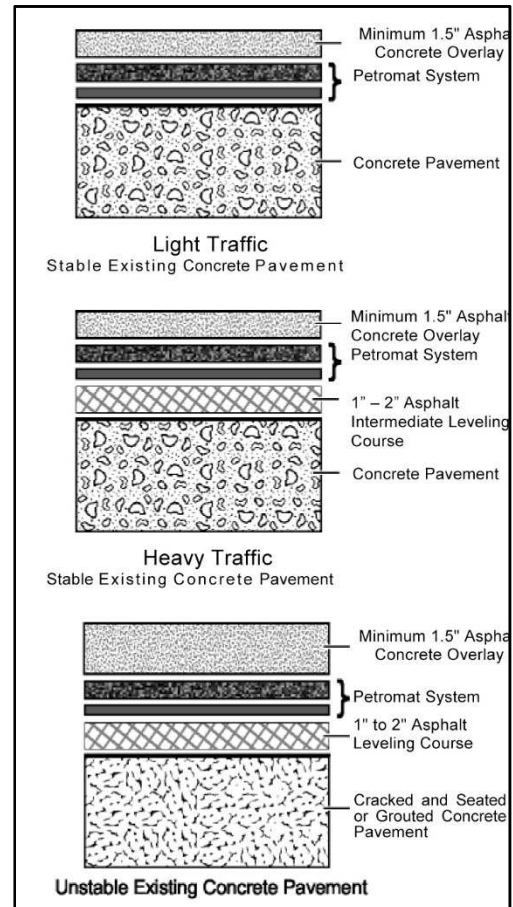
### Light Traffic, Stable Pavement

In low-traffic volume areas, it may be possible to place the PETROMAT System directly over the existing Portland cement concrete pavement. For this approach, the traffic volume should be less than about 5,000 vehicles per day with a low percentage of buses and other heavy vehicles. For good performance of the overlay, there should be no differential movement at cracks and joints. Clean the surface and fill cracks as described for asphalt cement concrete pavements.

Sharp changes in the pavement surface should be given special attention, as they may indicate an unstable concrete slab. Unstable areas must be stabilized before proceeding. Stable areas with sharp changes in grade should either be ground down or smoothed out with a leveling course of asphalt mix.

### Heavy Traffic, Stable Pavement

Where traffic levels are relatively heavy but the concrete pavement is stable, a leveling course of asphalt concrete should be placed before the PETROMAT System is installed. In this approach, there should be no differential movement at joints and cracks in the Portland cement concrete.



This leveling course should be 1" to 2" thick. The asphalt concrete mix should leave a relatively smooth surface after compaction. Do not use an open, coarse mix, because this will allow the tack coat to seep down into the pores, leaving inadequate tack coat to saturate the paving fabric.

### Unstable Pavement

Crack and seat or grouting rehabilitation techniques should be used where the existing Portland cement concrete pavement experiences differential movement. In the crack and seat approach, the existing pavement is typically broken into sections about 3' to 6' square. The broken surface is then rolled in place with a heavy roller to seat the slabs and provide a stable surface.

After stabilizing the concrete, an asphalt hot mix leveling course is placed. The leveling course should be 1" to 2" thick. The leveling course asphalt mix should not be so coarse and open as to allow the tack coat to seep into the pore spaces. The PETROMAT System and overlay may then be installed.

## D. NEW PAVEMENTS

PETROMAT should also be used with new asphalt concrete pavement construction to limit water infiltration and prolong pavement life. The paving fabric should be placed in the pavement section

about one-third to one-half of the way up from the bottom. There should be at least 1.5” of compacted asphalt over the PETROMAT. The asphalt concrete on which the PETROMAT is placed should be relatively densely graded to limit loss of tack coat.

## E. TACK COAT PLACEMENT

### Tack Coat Amount

It is critical that the tack coat be applied correctly. Excessive or insufficient tack coat can lead to shoving or delamination of the overlay. The leading cause of poor performance of overlays with paving fabric is placement of an insufficient amount of tack coat.

o Apply tack coat 3” beyond the area of PETROMAT placement. Tack coat should also be applied between all fabric overlaps. End-of-roll overlaps trimmed to 1” do not need a second tack coat.

A tack coat application rate of 0.25 gallon per square yard is required with PETROMAT under most conditions when using an uncut paving grade asphalt tack coat. A minimum application rate of 0.22 gallon per square yard is required to saturate PETROMAT and bond it to pavement surfaces. It is critical not to apply excess tack coat in locations where vehicles do a lot of hard starting, stopping and turning or on steep grades (greater than 8%). These areas include intersections, bus stops and sharp turns. In these locations, the maximum tack coat application rate should be limited to 0.20 to 0.25 gallon per square yard. Applying less tack coat than the above recommended amounts can result in construction problems or pavement performance problems, such as shoving.

Also, the application rate should not exceed 0.30 gallon per square yard, as this may lead to overlay rutting and shoving. The optimum application rate depends on a number of factors including: the PETROMAT Style, pavement roughness, pavement porosity, and whether or not a leveling course is used. In general, more tack coat is needed for rough and porous pavements. Less tack coat is typically needed when placing PETROMAT over a fine mix asphalt leveling course. Experienced PETROMAT installers are able to adjust the tack coat application rate within the range of 0.22 to 0.30 gallon per square yard to achieve optimum pavement performance and ease of construction. Table 1 gives the tack coat volume for one mile of road of varying widths, assuming the use of uncut paving grade asphalt tack coat.



**NOTE:** The tack coat application rates recommended herein are specifically for the most widely used, AASHTO M 288 recommended paving fabric, PETROMAT 4598. If PETROMAT 4597 is specified, the tack coat application rates shall be increased by 0.03 gallon per square yard and if using PETROMAT 4599, the tack coat shall be reduced by 0.02 gallon per square yard, due to the difference in weight and asphalt absorption of the different paving fabric styles.

**UNACCEPTABLE STREAKS OF ASPHALT TACK COAT (REFER TO PART II C OF THIS BROCHURE)**

**TABLE 1: GALLONS OF UNCUT PAVING GRADE ASPHALT TACK COAT PER MILE OF ROAD**

Width of Application (Feet)	Tack Coat Application Rate		
	0.20 gallon / Square Yard	0.25 gallon / Square Yard	0.30 gallon / Square Yard
8	940	1170	1410
10	1170	1470	1760
12	1410	1770	2110
14	1640	2050	2460
16	1880	2350	2820
20	2350	2930	3520
24	2820	3520	4220
30	3520	4400	5280

The tack coat volume can be monitored using the mechanical or visual gauging system on the distributor equipment. The truck weight tickets can be used to verify the application rate.

Before applying the tack coat, it is important to verify proper operation of the distributor truck. The distributor truck should apply an even and uniform spray of tack. An accumulation of tack may build up where the distributor truck starts and stops. Accumulations of excessive tack coat can lead to overlay rutting and shoving. Consequently, starting and stopping should be kept to a minimum and squeegees should be used to spread any accumulated tack. Sand may also be applied to blot excess asphalt cement. Construction traffic should be kept off the tack coat before the PETROMAT is placed. Traffic can pick up the tack coat, leaving insufficient tack coat to saturate the paving fabric and bond it to the pavement and the new overlay.

**NOTE:** Tack coat amount should never be reduced due to bleed through due to warm to hot temperatures. In installing in warm to hot weather, the use of the solar reflective, white styles of PETROMAT is recommended so that the full specified amount of tack coat is used without the warm weather problems of bleed through and construction traffic tracking and potential fabric damage.

### Tack Coat Temperature

The temperature of the asphalt tack coat should be high enough to allow uniform tack coat application. The allowable temperature range for uncut paving grade asphalt cement tack coat material is 290°F to 325°F.

### Air Temperature

Most state and local agencies have specifications for the minimum temperature for placement of asphalt tack coats and hot mixes, and the applicable specifications should be followed. In the absence of such specifications, the following guidelines are offered. For uncut paving grade asphalt cement tack coat materials, the air temperature should be sufficient to allow adequate “tack” or stickiness to hold the fabric in place. This temperature will vary for different asphalt types. As a rule-of-thumb, the temperature should be 50°F and rising.

## F. PETROMAT PLACEMENT

### Temperature

The surface temperature of the tack coat at the time that PETROMAT is placed should not exceed 325°F. The temperature of the tack coat drops very quickly after it contacts the pavement surface, so this is generally not a consideration. When uncut paving grade asphalt cement tack

coat is used, PETROMAT can usually be placed closely behind the distributor truck. Place the paving fabric while the tack coat is still sticky enough to hold the fabric in place. Paving fabric can be placed after the tack coat has lost its stickiness, but pneumatic rolling may be necessary to keep the material in place. The heat of the overlay will then soften and draw the asphalt tack up into the paving fabric. In very hot weather, (in excess of 100°F, 38°C) it helps to let the asphalt tack coat firm up slightly before placing the fabric, while in cool weather, the fabric should be placed into the tack coat immediately. The solar reflective white styles of PETROMAT remain at ambient temperature once installed, which can be 70° F lower than the dark gray PETROMAT. This lower temperature helps stabilize the asphalt cement to prevent bleed through, tracking, and potential fabric pick up or damage.

### **Paving Fabric Placement – Mechanical**

PETROMAT has a fuzzy side and a relatively smooth, heat-set side. Install the fabric with the fuzzy side down into the tack coat. With the smooth side up, fabric pick-up by construction equipment and bleed-through of the tack coat will be minimized. For ease of installation, PETROMAT is rolled at the factory with the fuzzy side “in” so that it can easily be installed correctly when using lay-down equipment. A pipe slightly smaller in diameter than the roll core can be inserted into the roll. This adds strength and helps the core resist buckling, especially if the core was accidentally broken during handling. Initially, hold the fabric in place at the beginning point and unroll about 20’ to 50’ of fabric into the tack coat. The material should be lined up with the tack coat and installed as smoothly as possible.

During placement, turns of the laydown equipment should be made gradually to limit wrinkling of the fabric. If possible, avoid moving equipment on the paving fabric before the overlay is placed. This can cause wrinkles in the paving fabric and in extreme instances can rip the fabric. The fabric roll brakes should be adjusted evenly. Poorly adjusted brakes result in uneven tension in the paving fabric, which can cause wrinkles during placement. PETROMAT can be placed on slopes of up to about 8%. On steeper slopes, it may be difficult to compact the asphalt concrete overlay without slippage. Take extra precaution when maneuvering installation equipment on slopes.

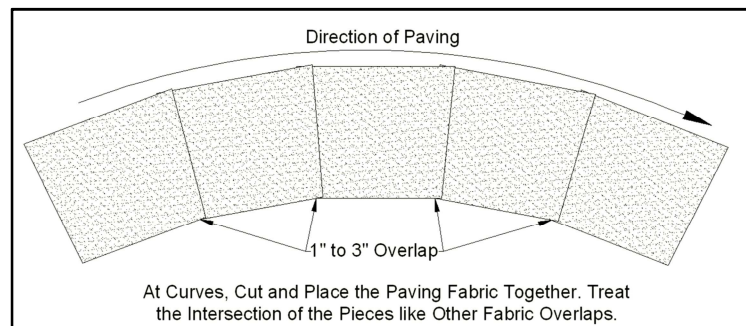
### **Paving Fabric Placement – Manual**

When installing PETROMAT by hand, use hand brakes to maintain tension on the fabric and minimize wrinkling. Do not rest the PETROMAT roll on the pavement and roll it out. This will not provide adequate tension on the fabric and will also incorrectly place the smooth, heat-set side down into the tack coat.

The fabric should be broomed in, working from the center out, to smooth the fabric into the tack coat. When placing PETROMAT by hand, the tack coat may have cooled such that the fabric does not adhere well. Under these circumstances, it may be helpful to roll the installed paving fabric using a rubber-tire roller to promote adhesion to the pavement.

### **Joints and Overlaps**

o A minimum overlap of 1” is required at all longitudinal and end-of-roll joints. All overlaps shall have a second tack coat applied, except end-of-roll overlaps trimmed to 1” do not need a second tack coat. Excessive overlaps (greater than 12”) should be avoided by trimming



the overlapping PETROMAT fabric.

### **Drains, Expansion Joints and Other Penetrations**

At drains, expansion joints or other penetrations, PETROMAT can be placed over the opening. After the fabric is in place, cut out the excess fabric around the structure.

### **Curves**

Sharp curves may be encountered that will not allow mechanical paving fabric placement without wrinkles. In this condition, it may be desirable to cut and piece the paving fabric around the curve. The joints in this procedure should be treated as with other overlaps mentioned previously.

## **G. OVERLAY PLACEMENT**

The asphalt concrete overlay can be placed immediately after the PETROMAT has been installed. No cure time is necessary when using an uncut paving grade asphalt tack coat, and there is no need for additional tack coat application before paving. Installation of the PETROMAT System by an experienced crew will easily stay well ahead of paving operations. Generally, no more paving fabric should be placed than will be covered in the same day by the paving crew. A few days exposure will not harm the PETROMAT System, but if PETROMAT is left exposed, traffic precautions and wet condition installation considerations (see Section V. B.) should be followed.

If paving equipment or public traffic in warm weather creates tracking where the tack coat bleeds to the surface of the PETROMAT, sanding, as described in Section VI.B. should be applied. Sanding will break the tackiness and allow traffic without fear of paving fabric pick up or damage. The use of the white PETROMAT styles in warm to hot weather will keep the installed fabric surface cooler and should minimize the potential for excess tracking or damage.

A maximum temperature for the hot mix will usually be dictated by the governing state or local agency. In the absence of such specification, the maximum temperature allowed should not exceed 350 °F at the time of placement.

Warm mix asphalt concrete may be used over the PETROMAT System. However, warm mix temperature must not be less than 250 °F at the time of placement and, compaction should be accomplished quickly and thoroughly. If warm mix not meeting these temperatures is used, the tack coat underlying the PETROMAT fabric may not remelt and adequately penetrate the fabric, to bond to the overlay. Too low of temperatures and/or insufficient compaction effort may result in pavement problems such as disbonding and pavement shoving and the PETROMAT System may not achieve its full waterproofing potential.

The overlay should be designed based on the condition of the pavement and the anticipated traffic. A minimum compacted thickness of 1.5" is required. Thinner overlays will not generate enough heat to draw the asphalt tack coat up into the paving fabric and produce a waterproof membrane. If the overlay thickness is tapered toward the edges, PETROMAT should not be placed where the thickness tapers to less than 1.5", or the edge should be wedge milled to allow a minimum 1.5" overlay thickness to the edge.

## **PART IV – INSTALLATION OF CHIP SEAL/PAVING FABRIC SYSTEMS**

### **A. APPLICATIONS**

PETROMAT can be used with chip seals as a cost-effective maintenance solution for low volume pavements. A chip seal/paving fabric system consists of aggregate chips embedded in an asphalt binder and placed over an asphalt-saturated paving fabric. The PETROMAT paving fabrics provide an excellent seat for the chips and forms a continuous, long-lasting, waterproofing membrane. The PETROMAT fabric also provides reinforcement to the chip seal to minimize the chip seal cracking open over underlying cracks or joints. The primary difference between this application and PETROMAT use with hot mix asphalt concrete overlays is that the chip seal procedure does not generate enough heat to draw the tack coat up into the paving fabric. Additional measures, such as rolling the fabric and placing a second tack coat, are used to fully saturate the paving fabric before placement of the chip seal surface treatment.

### **B. SURFACE PREPARATION**

Surface preparation for chip seal overlays follows the procedures given in Part III B for hot mix overlays. The surface on which the PETROMAT will be placed should be free of dirt, debris, water, oil and loose stone. A power broom may be helpful in preparing the roadway surface. Areas showing signs of subgrade distress should be repaired. Cracks greater than 1/8" should be sealed with a liquid crack sealant. Where cracks greater than 3/8" are present, a more stable crack filler should be used such as hot or cold asphalt mix or commercial crack filler. Chip seal surface treatments are typically not placed over coarsely milled surfaces, but may be placed over micro-milled surfaces.

### **C. TACK COAT PLACEMENT**

The tack coat for this application can be either an uncut paving grade asphalt cement or an emulsified asphalt. Again, a pure uncut asphalt cement is recommended instead of the emulsion. The tack coat should provide enough asphalt to saturate the paving fabric and bind the PETROMAT to both the existing pavement surface and new chip seal surface treatment.

Use of an uncut paving grade asphalt tack coat will follow the same guidelines given in Part III E. Under normal conditions the tack coat application rate for PETROMAT should be 0.25 gallon per square yard of uncut paving grade asphalt cement. A greater amount of tack coat is needed for rough and porous surfaces. Less tack coat is typically needed when placing PETROMAT over a smooth, tight surface, or a fresh leveling course. An experienced PETROMAT installer can evaluate project requirements and adjust the application rate as necessary. The tack coat application rate should be within the range of 0.22 to 0.30 gallon per square yard of residual asphalt.

When an emulsion is used, the application rate must be increased to allow for complete evaporation of water and additives in the emulsified asphalt. The residual asphalt coverage, after curing, should be 0.25 gallon per square yard. Emulsified asphalt curing time can become critical. The length of time required for all the water and additives to evaporate is highly dependent on the type of emulsion and weather conditions. Emulsions can also cause a problem by running off into lower lying areas, resulting in uneven application rates.

Additional details for use of emulsified asphalts are given in Part V.

Uncut paving grade asphalt tack coats should be placed at temperatures of 290°F to 325°F. Emulsified asphalt tack coats should be applied at temperatures below 160°F.

#### **D. PETROMAT PLACEMENT**

The paving fabric should be placed into the tack coat smoothly and without wrinkles. Place the fuzzy side of the PETROMAT fabric down. With the smooth side up, fabric pick-up by construction equipment is limited. Fabric roll brakes should be adjusted to provide even tension. Poorly adjusted brakes can cause wrinkles in the fabric. Turns of the installation equipment should be made gradually to avoid wrinkling.

o Overlaps of the PETROMAT should be kept to a minimum when used with chip seal pavements. Overlap the fabric by a minimum of 1", typically 2"-3". Care should be taken not to spray excessive tack or emulsion beyond the overlap. Tack coat shall be applied between all overlaps, except end-of-roll overlaps trimmed to 1" do not need a second tack coat.

#### **E. SANDING AND ROLLING**

Chip seal pavements require sanding and rolling once the PETROMAT fabric has been placed. A uniform layer of sand is applied to the fabric at the rate of 4 to 6 pounds per square yard. The sanded fabric is thoroughly rolled using a rubber-tire roller. This step is important to ensure a strong bond between the paving fabric and the pavement and at overlap joints. During the rolling operation, the tack coat should be observed to come up from beneath and saturate the paving fabric, changing the fabric color from gray or white to a dark brown or black.

#### **F. CHIP SEAL PLACEMENT**

The next step is to sweep off any accumulations of sand or debris. Prior to chip seal application, inspect the fabric to verify that it is adhered to the pavement and that overlaps are tightly bonded. Apply additional tack to any loose overlaps and reroll as necessary to saturate overlap and achieve a good bond. The chip seal is then placed following procedures dictated by state or local agencies. This usually involves a tack of emulsified asphalt into which chip stone is immediately set and secured by rolling. In areas where the paving fabric appears to be dry or not fully saturated, the chip seal tack coat application should be increased by about 0.1 gallon per square yard. Finally, roll the surface to stabilize the chips and embed them in the tack coat and seat them in the underlying fabric. A rubber-tire roller is often used to minimize breaking of the chips. A double chip application may be used.

### **Part V – SPECIAL CONSIDERATIONS**

#### **A. EMULSIFIED ASPHALT TACK COATS**

##### **Emulsified Asphalts**

Uncut paving grade asphalt cement is the preferred tack coat for use in the PETROMAT System. Emulsified asphalt tack coats can be used with the PETROMAT System; however, there are several construction-related concerns that make emulsions difficult to use. These include the relatively long curing time required for emulsions and the higher volume of tack coat that must be applied.

Emulsified asphalts are a blend of asphalt and water. The asphalt content may be only 50% to 70% of the total emulsion. Emulsions must be applied at a high rate to ensure the required residual asphalt coverage after the water has evaporated. For example:

1. Emulsion has 60% by volume asphalt content.



2. A tack coat with a residual asphalt coverage of 0.25 gallon per square yard is required.
3. The required emulsion application rate =  $0.25 \div 0.6 = 0.42$  gallon per square yard.

Emulsions are relatively free-flowing at these high application rates. They will tend to run off comparatively gentle slopes or uneven pavements, leaving inadequate asphalt on the high points and an excess of asphalt in low spots.

The curing time for emulsified asphalt tack coats can become critical. Sufficient time must be allowed for all water and any additives to evaporate. The length of time necessary is dependent on the type of emulsion, whether rapid setting (RS, CRS), medium setting (MS, CMS) or slow setting (SS, CSS). Weather conditions also affect the curing time significantly. The medium-and slow-setting emulsions (MS, CMS, SS and CSS) require much longer curing times, which makes them impractical for use with paving fabrics. Table 2 provides cure time guidelines for rapid-setting emulsions.

TABLE 2: CURING TIME FOR RAPID-SETTING EMULSIFIED ASPHALTS (RS & CRS)			
Air Temperature	Humidity		
	Dry	Moderate	Humid
60°F	2 hrs.	3 hrs.	4 hrs.
75°F	1 hrs.	2 hrs.	3 hrs.
90°F	0.5 hr.	1 hr.	2 hrs.

When cured, the surface will be tacky, and the color will have changed from an initial brown hue to glossy black. In windy weather, the surface of an emulsified asphalt tack coat may cure without the full thickness curing. Before installing the fabric, check carefully that the emulsion has cured thoroughly and not just skinned over.

### Temperature

When emulsified asphalt tack coats are used, the air temperature should be 60°F and rising. Cool temperatures lengthen the time that it takes for the tack coat to cure. The temperature of the asphalt emulsion itself should not exceed 160°F.

### B. WET CONDITIONS

There is always a risk of poor bonding within the pavement system if moisture is present during construction. This is also true when paving fabrics are used. Therefore, Propex recommends the existing pavement surface, tack coat, and the PETROMAT be completely dry during construction. If the pavement surface is wet when the tack coat is placed, the tack coat may not properly bond to the existing pavement, leading to an unsatisfactory installation. We do not recommend placing the asphalt tack coat on a wet pavement surface.

If the surface of the tack coat becomes wet before the paving fabric is placed, squeegee standing water off the surface and allow the surface to dry before placing the PETROMAT. Rolling the fabric with a rubber-tire roller may be required to improve adhesion. PETROMAT fabric should not be placed on tack coat that has become wet from precipitation.

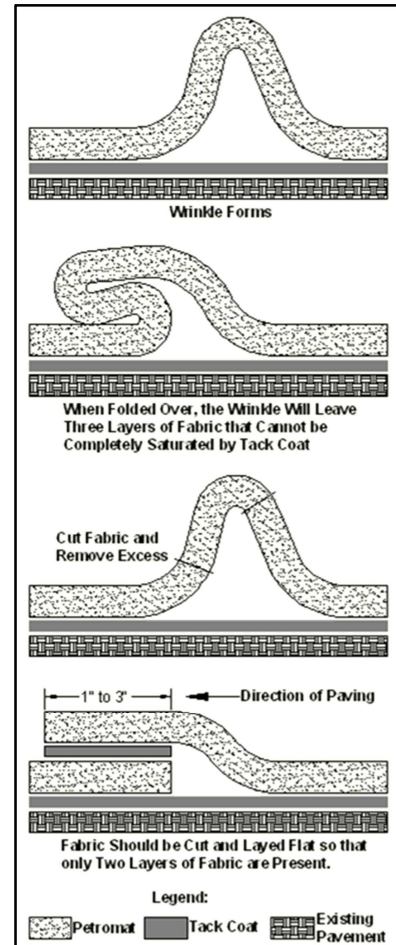
Propex also recommends that the PETROMAT be completely dry prior to placement of the overlay. However, if PETROMAT is slightly damp to the touch, an overlay can be placed. If free water can be forced from the paving fabric or is beaded on the surface, allow the fabric to dry before placing the overlay. A squeegee or broom can be used to force the water out of the paving fabric to help accelerate the drying process. Rain will sometimes cause a blistered appearance in

the PETROMAT surface. If this occurs, the fabric should be rolled down with a rubber-tire compactor before the overlay is placed.

### C. RECYCLING OF PAVEMENTS CONTAINING PETROMAT

If pavements containing PETROMAT are to be recycled, we recommend that the milling machine does not cut deep enough to penetrate the PETROMAT System, so that the waterproof, stress-relieving interlayer remains intact. If a pavement containing PETROMAT must be recycled, field studies have shown that standard cold milling techniques can be used in the recycling operation. This milling should target at least ½ inch below the paving fabric layer to avoid going in and out of the layer and to assure a vertical type cut at the paving fabric level. Satisfactory new recycled asphalt mix performance has been obtained at proportions of up to 70% recycled pavement (containing PETROMAT) to 30% virgin hot mix.

Some practitioners have reported problems milling traditional paving fabric. This may be related to an improperly executed installation or milling operation. PETROMAT ENVIRO has been specially engineered to be more easily milled and processed through the steps leading to its reclamation into a new asphalt concrete mix. PETROMAT ENVIRO is installed the same way as the original PETROMAT and it performs the same. It should be selected for use in pavements that may be reclaimed.



## Part VI – Troubleshooting Guide

### A. WRINKLES

Wrinkles may be formed during placement of the paving fabric. Causes include out-of-adjustment roll brakes on the laydown equipment, sharp turns of the laydown equipment and maneuvering of equipment on the paving fabric. Wrinkles that result in three layers of fabric should be repaired. Generally, these wrinkles will be more than 1” high. They should be slit and laid flat in the direction of paving. Wrinkles less than 1” high are usually not a problem and can be left in place.

### B. TRUCKS PICK UP FABRIC

In hot weather, construction traffic may pick up the paving fabric. PETROMAT is designed with a fuzzy (beard) side and a smooth (heat-set) side. Install the fabric with the smooth (heat-set) side up to limit the potential for trucks to pick up the fabric. If this problem does occur, broadcast sand over the fabric. Be sure to sweep off any excess sand before placing the asphalt concrete overlay. The amount of tack coat should not be reduced to remedy this condition, unless it exceeds the previously prescribed rate of application. The easy solution to this problem is to specify and use one of the solar reflective white styles of PETROMAT, such as PETROMAT PLUS-WHITE or PETROMAT ENVIRO. These white paving fabrics stay much cooler installed and thus

minimize the potential for tack coat bleed through. It is also possible to go to a stiffer grade of asphalt tack coat material, such as from an AR-4000 to an AR-8000, to reduce this problem. This minimizes asphalt seeping through the paving fabric and sticking to the tires of the equipment.

### **C. BLISTERS**

Blisters may form under the paving fabric before overlay construction if the pavement is saturated with water. This must be corrected before the overlay is placed, or they can cause delamination of the overlay. Blisters can be treated by rolling the paving fabric with a rubber-tire roller until the fabric adheres to the pavement surface. If it is suspected that the substrate is thoroughly saturated, it may be necessary to install drainage.

### **D. EXCESS TACK COAT AND BLEED-THROUGH**

Bleed-through occurs when excess tack coat material seeps through the asphalt concrete overlay to the surface. This can happen even when relatively thick overlays are used. Bleed-through can soften the overlay mix and cause rutting and shoving of the overlay.

Bleeding can occur where the distributor truck stops and starts, leaving a thick spot in the tack coat. Improper adjustment of the spray bar can leave heavy streaks of tack coat, also leading to bleed-through. During tack coat application, check adjustment of the equipment and keep the distributor truck moving, limiting starting and stopping. Use a squeegee to spread any excess tack coat before it cools. Alternatively, blot up any heavy spots in the tack coat using dry sand. Broadcast the sand over the heavy spots and then sweep away excess.

### **E. OVERLAY DELAMINATION OR SHOVING**

Historically, overlay delamination or shoving is the leading cause of complaints on the service of pavements containing paving fabric, although complaints are very rare. The main cause of overlay delamination or shoving is insufficient tack coat. If the tack coat is too light to saturate the paving fabric and adhere it to the pavement overlay, there will be a dry layer at the fabric/overlay interface. In extreme cases, the overlay may literally peel off the old pavement. It is critical to check and verify the uniformity and quantity of the tack coat spray from the distributor at the beginning of the job and at intervals throughout the operation. Also, if it gets wet from a rain, be sure the pavement and paving fabric are dry prior to overlay placement.

### **F. DIFFICULTY BONDING FABRIC TO PAVEMENT**

Rolling with a rubber-tire roller can improve adhesion of the paving fabric to the tack coat in a number of situations. Rolling can be particularly helpful when the tack coat has cooled and in locations where the tack coat has been slightly reduced, such as at intersections. In these and other situations, a rubber-tire roller applies a uniform pressure across the fabric to seat it into the tack coat. However, rolling should not be used as a substitute for placing the specified amount of tack coat.