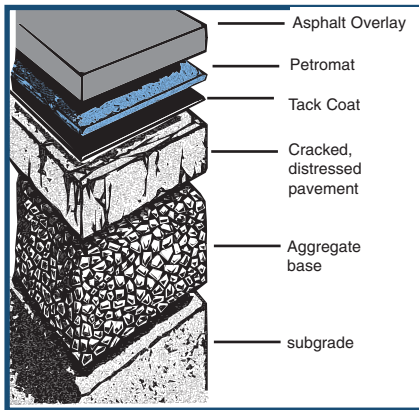


Introduction



The Petromat[®] System extends the life of new asphalt concrete (AC) pavements and AC overlays. The Petromat System consists of Propex's Petromat non-woven polypropylene fabric which is field saturated with an asphalt cement tack coat. When placed between pavement layers, the Petromat system becomes an integral part of the roadway section, forming a barrier to water infiltration and absorbing stresses to reduce reflective and fatigue cracking of the new AC surface layer. Since 1965, the economical Petromat System has had an outstanding record of improving pavement performance while reducing maintenance and roadway life-cycle costs. Paving fabric systems are currently being used at a rate of over 15,000 equivalent lane miles per year in North America alone.



Benefits

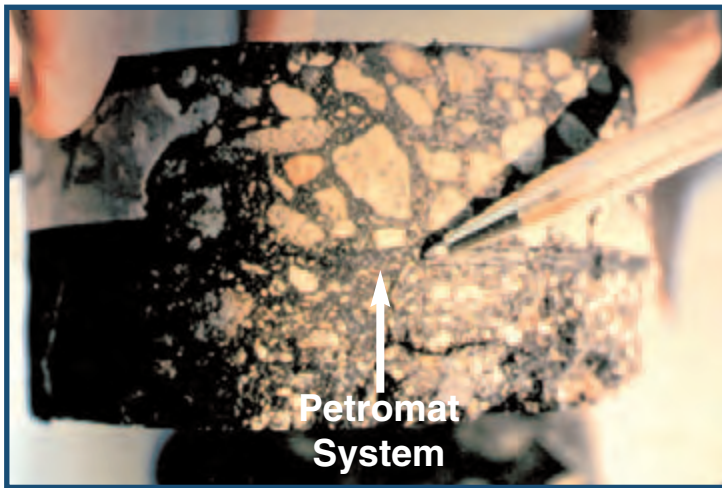
Moisture Barrier

Function: The greatest source of damaging water in road structural sections is precipitation infiltration through pavements. Most pavements do not have adequate drainage systems to quickly remove infiltrated water. If a pavement base is saturated as little as 10% of the time, the useful life of that pavement will be reduced by 50%. The Petromat fabric, when saturated with the asphalt cement tack coat, becomes a moisture barrier in the pavement, minimizing surface water infiltration. The American Association of Highway and Transportation Officials (AASHTO) 1993 flexible pavement design methodology gives a substantial structural credit to unbound roadbase materials when they are well drained and not allowed to become saturated. By minimizing water infiltration, the Petromat System moisture barrier will keep the road base more well drained and will therefore maximize the structural strength of unbound roadbase materials.

In rehabilitation of an existing pavement, capping the surface with the Petromat System can be a much more efficient and cost effective way to control moisture problems than retrofitting edge drain systems to typically poor draining road bases.



Performance: Both laboratory and field testing have shown pavements to be 10 to 1000 times less permeable when the Petromat System is incorporated as an interlayer. A complete treatise on the need for pavement moisture control and the effectiveness of paving fabric systems as moisture barriers may be found as a Transportation Research Board (TRB) Circular and is summarized as Tech Note 4, by Propex Fabrics Inc.. The electronic circular, EC006, may be found on the TRB web site as an online publication at [“http://gulliver.trb.org/publications/circulars/ec006.html”](http://gulliver.trb.org/publications/circulars/ec006.html). Also shown in the referenced paper is the need for a uniform application of the proper amount of asphalt cement tack coat for the Petromat System to achieve the desired very low permeabilities.



Stress Absorbing Interlayer

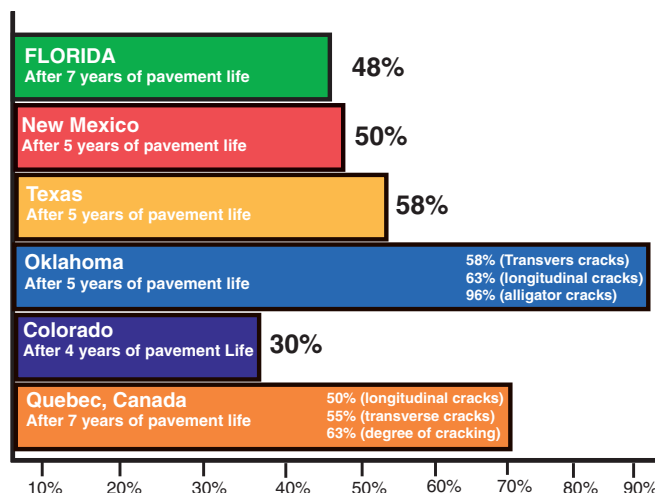
Function: Petromat paving fabric, saturated with asphalt cement, forms a substantial interlayer media within which stresses can be absorbed. Stresses associated with limited movement along cracks and joints in existing AC or Portland cement concrete (PCC) pavements are absorbed within the paving fabric system and therefore, are not translated, or reflected, up into the asphalt concrete layer over the system. If there is excessive movement of existing cracks or joints, there are more robust membrane interlayer

er products available, such as, Petrotac[®], Pro-Guard[®], or PetroGrid[®], for pavement treatment. Also, asphalt concrete flexible pavement will eventually develop fatigue cracking due to tensile stresses while flexing. The inclusion of the Petromat System interlayer results in a layered pavement with greatly reduced tensile stresses compared to monolithic pavements with no interlayer. The result is a dramatic increase in the fatigue life of new pavements or overlays.

Performance: Laboratory simulation of comparable pavements both with and without the Petromat System indicated a 100 to 1000% increase in the number of pavement loadings before fatigue or reflective cracking appeared over the Petromat System. Field performance indicates a 50 to 150% increase in overlay life before fatigue or reflective cracking occurs in overlays over the Petromat System versus the same thickness control sections with no fabric. A comprehensive study, Maxim Technologies (1997), examined available paving fabric research and empirical evidence to find that properly applied paving fabric systems, such as the Petromat System, equate to an additional 0.1 to 0.15 foot (3 to 4.4 cm) thickness of AC overlay for the retardation of reflective

cracking. The study, which may be viewed at “<http://www.gmanow.com>”, cited both the moisture barrier environmental benefits and the stress absorbing interlayer functions as the reasons for success of paving fabric systems. The study is also summarized in Case Histories 10 and 11 as found on our website at “www.geotextile.com”. Widespread field evaluations have verified the effectiveness of the Petromat System as shown below:

Reduction In Overlay Reflective Cracking With The Petromat System Compared To Control Sections With No Fabric



Petromat, Number One In The Business

Petromat, the original paving fabric, is the most widely used paving fabric in the world for the following reasons:

Petromat is Designed Specifically For Pavement Application:

- a heat set side on top to minimize asphalt cement tack coat bleed-through and to protect against damage from construction traffic,
- a special blend of fiber sizes to promote rapid, uniform tack coat saturation and to give the interlayer stability while holding the asphalt cement in place indefinitely, and
- an engineered amount of stretch to ease installation while maintaining stability.

Choice of Styles: Petromat styles 4598 and 4599 are the most widely recommended and used paving fabrics. Style 4598 meets the requirements of AASHTO guideline specification M 288.

Cost-effective: The installed cost of the Petromat System (fabric and asphalt cement tack coat) is typically less than half the cost of 0.1 foot of AC. For extending pavement life, the Petromat System is therefore much less expensive than placing additional asphalt concrete to get the same performance or increasing roadway maintenance. Use of paving fabrics generally yields a savings in pavement rehabilitation system costs of more than \$7,000 per lane mile.

Versatile: The Petromat System is effective within new AC pavements, below AC overlays over rigid and flexible pavements, and below surface treatment(chip-seal) pavements. It can improve the performance of highways, city streets, parking areas, airport pavements, bridge decks and other pavement surfaces.

Installation

Detailed information on the installation of Petromat paving fabrics may be found in the Petromat Installation Guide, also located on our website at "www.geotextile.com".

Project Planning Help

We have software available called "**Roadways And Civil Engineering (R.A.C.E.)** with Geotextiles". The software presents easy-to-use- unpaved road and flexible pavement design methodologies. The third module of the software, Pavement Rehabilitation, allows the user to identify the type of pavement distress and then using a decision tree format, helps the user identify whether or not a geosynthetic interlayer will provide a longer lasting rehabilitation project. The recommendations help the user decide which geosynthetic interlayer would be most applicable and is based on many years of experience with the products such as Petromat. A copy of the **R.A.C.E.** software may be obtained from any of our distributors. You may locate your local distributor of our products on our website at www.geotextile.com or by calling (800) 445-7732.

Published Reports

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State of California, *Evaluation of Paving Fabric Test Installations in California*, Report No. FHWA/CA-90/02, CALTRANS, Department of Transportation, Feb. 1990.

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State of Oklahoma, *The Evolution of Non-Woven Fabrics*, Oklahoma Department of Transportation, Research & Development Division, Report No. FHWA/OK 82(6), May 1982.

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State of Texas, *Overlay Construction and Performance Using Geotextiles*, Texas Transportation Institute, Texas A&M University System, Paper No. 880424, Jan. 1989.

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Maxim Technologies, Inc., *"Nonwoven Paving Fabrics Study"* for Industrial Fabrics Association International, Oct. 1997.

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Marienfeld, M.L. and Baker, T.L., *Paving Fabric Interlayer System as a Pavement Moisture Barrier*, Transportation Research Board Paper # 9881112, 1998,
<http://www.nas.edu/trb/publications/ec006.html>

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PAVING FABRIC GUIDE SPECIFICATION

DESCRIPTION This work shall consist of furnishing and placing an asphalt overlay geotextile (paving fabric) beneath a pavement overlay or between pavement layers to provide a moisture barrier membrane and a stress absorbing interlayer.

MATERIAL REQUIREMENTS

Paving Fabric: will be a staple fiber, needle-punched, nonwoven material consisting of at least 85 percent by weight polyolefins, polyesters or polyamides. The paving fabric shall be resistant to chemical attack, rot and mildew and shall have no tears or defects that will adversely alter its physical properties. The fabric shall be specifically designed for pavement applications and be heat-set on one side to reduce tack coat bleed-through and to minimize fabric pick-up by construction equipment during installation. The fabric shall meet the physical requirements specified in Table 1.

Tack Coat: The tack coat used to impregnate the fabric and bond the fabric to the pavement is typically the same grade asphalt cement as used in the hot mix asphalt concrete. A cationic or anionic emulsion may be used as approved by the Engineer. The Contractor shall follow the special recommendations of the paving fabric manufacturer when an asphalt emulsion is used. The use of cutbacks or emulsions that contain solvents shall not be permitted.

CONSTRUCTION AND INSTALLATION REQUIREMENTS*

Shipping and Storage: The paving fabric shall be kept dry and wrapped such that it is protected from the elements during shipping and storage. If stored outdoors, the fabric shall be elevated and protected with a waterproof cover. The paving fabric shall be labeled in accordance with ASTM D 4873-88, "Standard Guide for Identification, Storage, and Handling of Geotextiles."

Weather Limitations: The air and pavement temperatures shall be at least 50°F(10 °C) and rising for placement of asphalt cement and shall be at least 60°F(16 °C) and rising for placement of asphalt emulsion. Neither asphalt tack coat nor paving fabric shall be placed when weather conditions are not suitable, in the opinion of the Engineer.

Surface Preparation: The pavement surface shall be dry and thoroughly cleaned of all dirt and oil to the satisfaction of the Engineer. Cracks 1/8inch (3mm) wide or greater shall be cleaned and filled with suitable bituminous material or by a method approved by the Engineer. Crack-filling material shall be allowed to cure prior to placement of the paving fabric. Potholes and other pavement distress shall be repaired. Repairs shall be performed as directed by the Engineer. The paving fabric must be placed on a drainable grade with no depressions which may hold water in the overlying asphalt concrete.

Tack Coat Application: The tack coat shall be applied using a calibrated distributor truck spray bar. Hand spraying, squeegee and brush application may be used in locations where the distributor truck cannot reach. Every effort shall be made to keep hand application to a minimum. The tack coat shall be applied uniformly to the prepared, clean, dry pavement surface. The tack coat application rate must be sufficient to saturate the fabric and to bond the fabric to the existing pavement surface. The tack coat application rate shall be 0.22 to 0.28 (1.0 to 1.3 liters per square meter) gallons per square yard as required by the roadway surface and environmental conditions. When using emulsions, the application rate must be increased as directed by the Engineer to offset the water content of the emulsion. Within street intersections, on steep grades or in other zones where vehicle braking is common, the normal application rate shall be reduced by about 20 percent as directed by the Engineer, but to not less than 0.20 gallons per square yard (0.9 liters per square meter).

The temperature of the tack coat shall be sufficiently high to permit a uniform spray pattern. For asphalt cements, the minimum temperature shall be 290°F(143 °C). To avoid damage to fabric, distributor tank temperatures shall not exceed 325 °F(163 °C). For asphalt emulsions, the distributor tank temperatures shall be maintained between 130°F(55°C) and 160°F(71°C).

The target width of the tack coat application shall be equal to the paving fabric width plus 6 inches(152mm). Tack coat application shall be wide enough to cover the entire width of fabric overlaps. The tack coat shall be applied only as far in advance of paving fabric installation as is appropriate to ensure a tacky surface at the time of paving fabric placement. Traffic shall not be allowed on the tack coat. Excess tack coat shall be cleaned from the pavement.

Paving Fabric Placement: The paving fabric shall be placed onto the tack coat using mechanical or manual laydown equipment capable of providing a smooth installation with a minimum amount of wrinkling or folding. The paving fabric shall be placed before the asphalt cement tack coat cools and loses its tackiness. Paving fabric shall not be installed in areas where the overlay asphalt tapers to a minimum compacted thickness of less than 1.5 inches(38mm).

When asphalt emulsions are used, the emulsion shall be allowed to cure properly such that essentially no

*Note:

Additional instructions on paving fabric installation are available from Propex Fabrics Inc. in their Petromat® Installation Manual, which may be found at <http://www.geotextile.com>.

water moisture remains prior to placing the paving fabric. Wrinkles severe enough to cause folds shall be slit and laid flat. Brooming and/or rubber-tire rolling will be required to maximize paving fabric contact with the pavement surface. Additional hand-placed tack coat may be required at overlaps and repairs as required by the Engineer.

Turning of the paver and other vehicles shall be done gradually and kept to a minimum to avoid movement and damage to the paving fabric. Abrupt starts and stops shall also be avoided. Damaged fabric shall be removed and replaced with same type of fabric and a tack coat.

Joints and Overlaps: At joints, fabric rolls shall overlap by 1 to 6 inches(25 to 152mm). End joints and joints from repair of wrinkles should be made to overlap or “shingle” in the direction that the pavement overlay will be placed. Overlaps of adjacent rolls may be as great as 6 inches to accommodate variations between the width of the roadway and paving fabric. Excess fabric shall be cut and removed to ensure that overlaps of adjacent rolls do not exceed 6 inches(152mm). Additional tack coat shall be applied between all fabric overlaps. Any locations that do not have additional tack for the overlaps shall be corrected by manual placement of tack coat prior to overlay construction. **Unless otherwise approved by the Engineer, no traffic except necessary construction traffic will be allowed to drive on the paving fabric.**

Overlay Placement: Asphalt overlay construction shall closely follow fabric placement. All areas in which paving fabric has been placed should be paved during the same day. Excess tack coat that bleeds through the paving fabric shall be removed by broadcasting sand on the paving fabric. Excess sand should be removed before beginning the paving operation. In the event of rainfall on the paving fabric prior to the placement of the asphalt overlay, the paving fabric must be allowed to dry before asphalt concrete is placed. Overlay asphalt thickness shall meet the requirements for the contract drawings and documents. The minimum compacted thickness of the first lift of overlay asphalt shall not be less than 1.5 inches(38mm) in areas of paving fabric installation.

METHOD OF MEASUREMENT

Paving Fabric: The paving fabric will be measured by the square yard (square meters).

Tack Coat: Tack coat will be measured by the gallon (liter).

BASIS OF PAYMENT

Paving Fabric: The accepted quantities of paving fabric will be paid for at the contract unit price per square yard (square meter) in place.

Tack Coat: The accepted quantities of tack coat for the paving fabric will be paid for at the contract unit price per gallon (liter) complete in place.

Table 1 Physical Requirements of Paving Fabrics^{1,2,3}
(Note to Specifier: Choose one fabric specification, delete the other)

Properties	Test Method	(Petromat Style 4599)		or	(Petromat Style 4598)	
		American Standard	Metric Units	American Standard	Metric Units	
Mass per unit Area	ASTM D 3776	na	na		4.1 oz/yd ²	140 g/m ²
Tensile Strength	ASTM D-4632	90 lbs	0.400 kN		101 lb	0.450 kN
Tensile Elongation	ASTM D-4632	50%	50%		50%	50%
Asphalt Retention	ASTM D 6140	0.20 gal/yd ²	0.90 l/m ²		0.20 gal/yd ²	0.90 l/m ²
Melting Point	ASTM D 276-87	300 °F	149 °C		300 °F	149 °C
Surface Texture	VISUAL INSPECTION	Heat-Set On One Side			Heat-Set On One Side	

NOTES

¹ Certification of conformance from paving fabric manufacturer may be required

² All numerical values represent minimum average roll values (average of test results from any sampled roll in a lot shall meet or exceed the minimum values) in the weaker principal direction. Lot shall be sampled according to ASTM D 4354-89, “Practice for Sampling of Geosynthetics for Testing.”

³ Conformance of paving fabrics to specification property requirements shall be determined in accordance with ASTM D 4759-88, “Practice for Determining the Specification Conformance of Geosynthetics.”

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