

# TENCATE MIRAFI<sup>®</sup> MPV500 FOR CHIP SEAL WITH SURFACE TREATMENT

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## GENERAL

Mirafi® MPV500 is a heat-set, polypropylene, non-woven paving fabric for use with surface treatments. The MPV paving fabric is placed below the surface treatment and is installed using a paving grade asphalt binder, such as PG64-XX, PG70-XX, or PG76-XX. The MPV paving fabric and asphalt cement creates a stress-absorbing membrane interlayer (SAMI). The advantages of the SAMI are the following:

- ▶ Prevents surface water from entering into the pavement section, which helps retain the strength of the pavement section by regulating the moisture content of the base,
- ▶ Assists in retaining chips,
- ▶ mitigates the effects of the cracks in the underlying surface on the chip seal during installation and during trafficking,
- ▶ Reduces the likelihood for future crack filling.

The results are a longer chip seal life providing a life cycle cost advantage.

It is important that users of this system follow best practice for surface treatments including proper site selection, material selection and installation of all materials. This guideline is prepared to assist in the proper installation of Mirafi® MPV500 paving fabric with single chip seals, double chip seals and cape seals. The objective is to be consistent with generally accepted construction practices of the many chip seal processes.

For assistance with the paving fabric SAMI system, contact TenCate Geosynthetics. A material and construction specification for Mirafi® MPV500 under chip seal can be found at [www.tencategeo.us](http://www.tencategeo.us)

## **PAVING FABRIC**

### **MATERIALS**

The paving fabric should be Mirafi® MPV500 or equivalent. Mirafi® MPV500 is a polypropylene, needle-punched non-woven paving fabric that is heat treated on one side.

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Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	450 (101)	450 (101)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Grab Tensile Asphalt Saturated	ASTM D 4632	N (lbs)	979 (220)	
Grab Tensile Elongation Asphalt Saturated	ASTM D 4632	%	40 – 70	
Trapezoid Tear Strength	ASTM D 4533	N (lbs)	0.18 (40)	0.18 (40)
Asphalt Retention	ASTM D 6140	l/m <sup>2</sup> (gal/yd <sup>2</sup> ) (oz/ft <sup>2</sup> )	1.2 (0.27) (3.8)	
Melting Point	ASTM D276	°C (°F)	163 (325)	
Mass per Unit Area	ASTM D 5261	g/m <sup>2</sup> (oz/yd <sup>2</sup> )	140 (4.1)	
UV Resistance after 500 hours	ASTM D 4355	% Strength Retained	70	

### **ASPHALT CEMENT FOR USE AS A PAVING FABRIC TACK COAT**

The asphalt cement shall be paving grade (PG) liquid asphalt (i.e. PG64-XX, and PG 70-XX) appropriate for the local climate. The asphalt cement is used to saturate the paving fabric to form a SAMI and also bonds the paving fabric to the existing pavement.

Modified asphalt cements (e.g. PG76-XX or Rubber modified binders) can be used in a paving fabric SAMI under chip seal to improve the performance of the SAMI. If modified asphalt cements are used they should be climate specific. The Asphalt Institute ([www.asphaltinstitute.org](http://www.asphaltinstitute.org)) provides a list of recommended climate-specific binders for each state.

Asphalt emulsions are generally not recommended for use with paving fabrics. However, emulsions can be used under certain ideal conditions, and only after consulting with the manufacturer. Modified asphalt emulsions are preferred and must be compatible with the surface treatment and the recommendation of the engineer. The application rate will need to be modified to obtain the recommended equivalent residual asphalt rate.

## INSTALLATION GUIDELINES

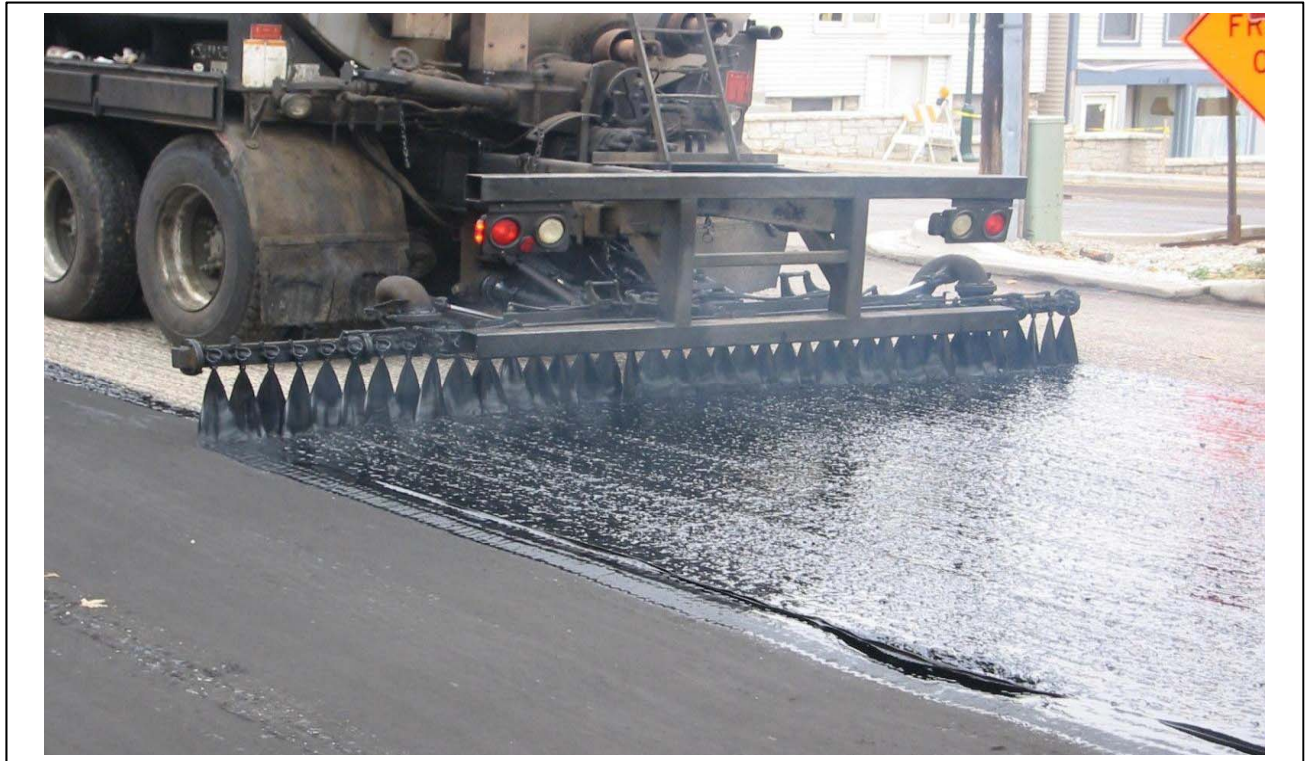
### SURFACE PREPARATION

The pavement surface on which the asphalt cement and paving fabric is to be placed shall be relatively smooth and free of all dirt, water, debris, oil and vegetation at the time of installation. The pavement shall not be damp or moist.

### Repairs

The following pavement distresses should be repaired in accordance with acceptable standard construction practices.

- ✓ Fill all potholes
- ✓ Level or remove and replace ruts
- ✓ Level sharp edges
- ✓ Repair broken edges
  - Seal all cracks larger than 3/8" (10 mm) wide as directed by the specifying engineer.  
Cracks less than 3/8" (10 mm) wide can be filled with an increase in liquid asphalt tack coat by increasing the tack coat by 10% over the recommended rate.
  - Crack sealer should be flush with or slightly lower than the pavement surface.
  - A leveling course may be placed over areas where crack sealing would be inefficient. The leveling course should be placed with a paver and have a maximum aggregate size that is less than one-third the layer thickness.
- ✓ Remove and replace shoving asphalt



**Figure 1: Tack coat being applied.**

The curing requirements for a new leveling course or repairs prior to application of a paving fabric SAMI are consistent with curing requirements for chip seals. Sufficient curing is normally accomplished by leaving the leveling course or repaired area open to vehicle traffic for several days. This applies to crack fillers and hot and cold mix asphalt. Installation and curing guidelines of asphalt or repair product manufacturer should be followed.

#### Manhole Covers

Temporary covers can be placed to protect items located within the pavement surface such as survey monument covers, utility access covers and valve covers as well as on the portland cement concrete pads surrounding these items.

#### Pavement Markers

All raised pavement markers and delineators should be removed in order to provide a flat, uniform pavement surface.

## **WEATHER & CLIMATE CONSIDERATIONS**

The minimum ambient air temperature for the asphalt tack coat and paving fabric is generally preferred to be 60° F (15° C) and rising (110° F (45° C) maximum daily high) The acceptable minimum ambient air temperature specified for chip placement will suffice for fabric installation.

Experience has shown that fabric/surface treatments are less effective in areas where extreme freeze thaw conditions are present. Information collected on cold climate areas suggest that geographic areas where a three month low average temperature is less than 15°F (-10° C) in winter months combined with a three month average high temperature of greater than 78°F (25° C) in summer months are not the best candidates for this process

Fabric should not be installed when the pavement surface is damp or wet. If the installed paving fabric becomes wet prior to installation of the surface treatment, paving fabric should be completely dried before the chip seal is placed. The paving fabric can be dried using mechanical methods, including sweeping or blow drying. Care should be taken to insure that the paving fabric is not damaged during this process.

## **PAVING FABRIC TACK COAT APPLICATION**

Asphalt cement should be applied to the existing pavement surface prior to installation of the paving fabric.

### **Equipment – Asphalt Distributor**

An asphalt distributor truck used to apply the asphalt cement should conform to the specifications below.

- equipped with computer rate controlled technology
- external truck mounted gauge indicating gallons present in tank
- suitably calibrated and all current records kept with the truck
- equipped with a heated, re-circulating spray bar that is:
- capable of spraying the asphalt cement uniformly and at the prescribed rate with no drilling or skipping
- clean and adjusted to the manufacturer recommended angle and height
- capable of spraying in a triple coverage pattern
- In general, the asphalt cement should:
  - provide a good bond of the paving fabric to the existing surface
  - fully saturate the paving fabric
  - be a minimum of 0.25 gallons per square yard (gal/yd<sup>2</sup>) [1.13 l/m<sup>2</sup>]
  - be a maximum of 0.36 gal/yd<sup>2</sup> [1.63 l/m<sup>2</sup>]
  - be bid as a separate bid item, tack coat, in the contract documents



The asphalt tack coat must be uniformly sprayed (see Figure 1). Determining the correct asphalt cement application rate is critical to successful performance of the paving fabric under chip seal system. The specified application rate is determined by the condition of the existing pavement

- degree of porosity
- degree of oxidation
- surface texture

The asphalt cement application rate required to bond the paving fabric to the existing surface and saturate the paving fabric may vary throughout the installation with wind conditions, air and pavement temperatures and with the surface condition of the existing pavement (e.g. degree of porosity, oxidation). All adjustments to the application rate shall be approved by the specifying engineer. It is recommended that the asphalt cement application rate NOT be adjusted below 0.25 gal/yd<sup>2</sup> (1.13 l/m<sup>2</sup>).

**Examples of pavement surfaces and recommended tack coat rates:**



Figure 2: Recommended Application rate - 0.25 gal/yd<sup>2</sup>



Figure 3: Recommended Application rate - .33 gal/yd<sup>2</sup>

The tack coat application rate should be checked at the beginning of, and during the installation process. This is accomplished by placing the asphalt cement and paving fabric, then sanding and rolling a short section and inspecting the surface for saturation. The surface texture after fabric installation should reflect the texture of the underlying pavement and the paving fabric should be visibly saturated with the asphalt cement.

### Temperature

The temperature of the asphalt cement must be sufficiently high to permit a uniform spray pattern.

The recommended temperature range for applying unmodified asphalt cement is 290° F (145° C) to 325° F (165° C) as measured in the asphalt distributor tank. Modified liquid asphalts should be stored and sprayed according to manufacturer or producer recommendations. Higher temperatures required by modified asphalt require that fabric installation be placed no greater than 5 ft (1.5 m) behind the distributor spray applicator.

### Spray Width

The asphalt tack coat should be applied:

- ✓ A minimum of 1 to 3 inches (25 to 75 mm) beyond all edges of the paving fabric (Figure 4)
- ✓ A minimum of 6 inches (150 mm) from curbs or pavement edges



Figure 4: Tack coat spray width beyond fabric

## **PAVING FABRIC INSTALLATION**

The paving fabric shall be placed so that the non-heat treated (bearded or fuzzy) side is placed downward into the tack coat.

### Equipment

The paving fabric shall be placed onto the asphalt cement with a tractor or similar mechanical device with paving fabric lay down equipment capable of handling the specified fabric roll widths. (Figures 5& 6).

The equipment shall be capable of laying the paving fabric smoothly (without wrinkles). Brooming the fabric with stiff-bristled brooms attached to the lay down equipment will aid in smoothing the fabric and creating intimate contact with the asphalt cement.





Figure 5: Distributor mounted equipment

Figure 6: Tractor mounted equipment



### Transverse Butt Joints

Transverse joints shall be butt joints with no overlap. Butt joints shall not have excess tack coat at the joint. Butt joints can be created by:

- Placing paving fabric with equipment to create a butt joint (Figure 8).
- overlapping paving fabric and trimming to create a butt joint

### Longitudinal Overlaps

Longitudinal joints shall be overlapped 1 to 3 inches (25 to 75 mm) with the asphalt cement tack coat extending another 1 to 3 inches (25 to 75 mm) beyond the fabric overlap (Figure 7).

Longitudinal overlaps that aren't saturated with asphalt cement after rolling shall be saturated prior to chip seal placement. This can be done turning on 2 or 3 nozzles on the asphalt distributor truck and applying asphalt cement along the edge of the fabric or over the overlap. Application rates should be specified by the engineer and should be enough to saturate the overlap without excess tack coat.

Transverse joints and longitudinal overlaps that are not installed as described above shall be trimmed to meet the correct dimensions.



Figure 7: Longitudinal overlap



Figure 8: Transverse joint

### Wrinkles

The paving fabric shall be installed with minimal wrinkles. Wrinkles that are present must be pushed into the tack by brooming so that the fabric lays flat or they must be slit and lapped to produce a flat surface. If they are slit, the fabric should be trimmed to create a butt joint.

### Sanding

After the paving fabric has been installed, sand can be spread over the entire fabric surface at a uniform rate of 2 to 6 lbs/yd<sup>2</sup> (1 to 3 kg/m<sup>2</sup>) by a mechanical sand spreader to prevent the fabric from being picked up or damaged by the roller or construction traffic (Figure 9).

### Rolling

To ensure that the paving fabric is saturated and well bonded to the existing pavement, the fabric should be rolled with a pneumatic-tired roller as outlined below:

- Rolling should begin immediately after fabric placement, or sand application (where the temperatures are above 80° F (25° C), on steep grades, or where high volumes of construction traffic are anticipated)
- Rolling should be completed while the asphalt cement is still liquid. Two or more rollers may be used especially in cooler weather conditions (Figure 10).
- Minimum of 5 passes
- Maximum speed of 10 miles per hour (16 km/hour)
- Rolling is complete when the texture of the underlying pavement surface is visible and felt on the surface of the fabric with no change in texture or appearance.

**CAUTION:** Completion of 5 rolling passes does not necessarily indicate that the paving fabric is saturated. However, if the no further improvement is seen by additional rolling, then the overlying chip seal binder application rate should be increased, as directed by the engineer.



Figure 9: Spreading sand



Figure 10: Rolling

## **PAVING FABRIC SATURATION AND BONDING TO THE SURFACE**

Asphalt saturation of a paving fabric installed prior to a chip seal is best determined by visual inspection and touch.

### Saturation Indicators (Figure 11)

- ✓ Liquid asphalt is visible on the surface
- ✓ Liquid asphalt can be felt on the surface
- ✓ Individual paving fabric fibers are not visible
- ✓ Sand can be easily removed from surface with light brooming

### Non-saturation Indicators

- ✓ Paving fabric still feels fuzzy or dry
- ✓ Liquid asphalt is not visible on the surface
- ✓ Paving fabric fibers are visible
- ✓ Loose sand is embedded in the paving fabric

If the paving fabric is not uniformly saturated with the asphalt cement after rolling, the chip seal binder application rate should be increased, as directed by the specifying engineer, to provide enough residual asphalt to saturate the remaining unsaturated paving fabric without reducing the amount of binder available for the chip seal.

The binder application rate should be monitored continuously by visually inspecting the chip seal for full embedment and normal appearance after rolling.





Figure 11: Saturated fabric with broadcast sand

### **TRAFFIC ON THE INSTALLED PAVING FABRIC**

Construction traffic on the installed paving fabric, especially turning, should be slow and kept to a minimum. If it is necessary for motorist traffic to be on the paving fabric prior to chip sealing, the fabric should remain sanded until immediately prior to application of the chip seal binder. Speeds should be reduced and signs should be placed to warn motorists that the driving surface has less resistance than normal and may be slippery, especially when wet.

### **CHIP SEAL PLACEMENT ON THE INSTALLED PAVING FABRIC**

Prior to beginning chip seal installation, the blinding sand should be swept from the saturated fabric surface with a mechanical sweeper, or a vacuum should be used.

Materials for and placement of the chip seal should be in conformance with the specifying agency's requirements. It is important to note that tack rate for application of chip seal should not be reduced from recommended application rates.

The chip seal can be placed (Figure 12) as soon as:

- ✓ the sand has been swept or vacuumed from the surface,
- ✓ the paving fabric has been checked for saturation, and
- ✓ the chip seal binder rate has been adjusted by the engineer if necessary.



Figure 12: Chip seal installation over installed paving fabric

The NCHRP Synthesis 342, “Chip Seal Best Practices”, provides an overview of successful chip seal practices in the United States, Canada and Overseas. It contains a list of references of available chip seal site selection and design methods, including chip seals with paving fabric interlayers. The NCHRP Chip Seal Best Practices document and all of the references at the end of this document can be obtained from your regional TenCate representative.

### **MATERIAL IDENTIFICATION, STORAGE AND HANDLING**

Identification – Before unrolling the paving fabric, verify the roll identification, length and installation location with the contract drawings and/or documents.

Handling - Care must be taken while unloading or transferring the Mirafi<sup>®</sup> MPV from one location to another. This prevents damage to the wrapping, core, label and the paving fabric itself. While unrolling the paving fabric, inspect it for damage or defects. Repair or remove, and replace if necessary, any portions of the paving fabric that are damaged during storage, handling or installation.

Storage - If the paving fabric is to be stored for an extended period of time, the paving fabric shall be stored in a manner that ensures the integrity of the wrapping, core and label as well the physical properties of the fabric. This can be accomplished by elevating the product off the ground and adequately covering and protecting it from ultraviolet radiation sunlight, acidic or alkaline chemicals, fire or flames including welding sparks, and rodents.



**This document does not contain guidelines for the design, specification or installation of chip seals.**

The inclusion of a paving fabric SAMI below a chip seal does not change the need or methods for a properly designed and installed chip seal. It is assumed throughout this guideline that the slurry, single chip seal or double chip seal being placed over the Mirafi® MPV500CS SAMI has been properly designed for all appropriate environmental, material, road and service conditions.

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