

Mirafi[®] MPV500CS with Surface Treatment

Prepared by:

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GENERAL

Mirafi® MPV500CS is a heat-set, polypropylene, non-woven paving fabric for use with a chip seal surface treatment. The paving fabric is placed below a new chip seal treatment into paving grade liquid asphalt (asphalt cement), such as PG64-22, PG70-10, AR 4000 or AC-20. The paving fabric and asphalt cement create a stress-absorbing membrane interlayer (SAMI). This interlayer prevents surface water infiltration from entering into the pavement section below the chip seal surface. The interlayer strengthens the section by reducing the moisture content of the base. The system assists in retaining chips and reducing cracking of the chip seal surface. An additional advantage is the elimination of future crack filling, a significant pavement preservation expense savings. The results are a longer chip seal life providing a life cycle cost advantage.

Proper installation is important. It is important that users of this system follow the proper practices for the use of surface treatment including proper site selection, material selection and installation of all materials. This guideline is prepared to assist in the proper installation of Mirafi® MPV500CS 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™, (800) 685-9990. A material and construction specification for Mirafi® MPV500CS under chip seals can be found at www.tencate.com

MATERIALS

PAVING FABRIC

The paving fabric should be Mirafi® MPV500CS or equivalent. Mirafi® MPV500CS is a polypropylene, needle-punched non-woven paving fabric that is heat treated on one side.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	N (lbs)	449 (101)	449 (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)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	1378 (200)	
Puncture Strength	ASTM D 4833	kN (lbs)	0.27 (60)	
Asphalt Retention	ASTM D 6140	l/m ² (gal/yd ²) (oz/ft ²)	1.2 (0.27) (3.8)	
Melting Point	ASTM D276	°C (°F)	163 (325)	
Mass per Unit Area	ASTM D 5261	g/m ² (oz/yd ²)	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 liquid asphalt (i.e. AC-20, PG64-22, AR-8000, and PG 70-10) appropriate for the local climate. The asphalt cement is used to saturate the paving fabric to form the SAMI and bond the paving fabric to the existing pavement.

Modified asphalt cements can be used in a paving fabric SAMI under chip seal to improve the performance of the SAMI. If a modified asphalt cement is used it should be climate specific. The Asphalt Institute (www.asphaltinstitute.org) provides a list of recommended climate-specific PG binders for each state.

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

INSTALLATION

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" wide as directed by the specifying engineer. Cracks less than 3/8" 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 one-third the size of pavement thickness
- Remove and replace shoving asphalt



Figure 1: Tack coat being applied

The curing requirements for a 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 CONSIDERATION

The minimum ambient air temperature for the asphalt tack coat and paving fabric is generally preferred to be 60° F and rising (110° F 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 in winter months combined with a three month average high temperature of greater than 78°F summer month are not the best candidates for this process

Fabric should not be placed when the pavement 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.

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

Application Rate

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/sy)
- be a maximum of 0.36 gal/sy
- 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/sy.

Examples of pavement surfaces and tack coat rates



Figure 2: Application rate - 0.25 gal/sy



Figure 3: Application rate - .33 gal/sy

The tack coat application rate can be checked during at the beginning of 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 to 325° F 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 greater than 5 ft behind the distributor spray application

Location

The asphalt tack coat should be applied

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



Figure 4: Tack coat 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 full rolls of fabric (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 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 with the asphalt cement tack coat extending another 1 to 3 inches 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 rate 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 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 facilitate 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 pounds per square yard by a mechanical sand spreader to prevent the fabric from being picked up or damaged by the roller (Figure 9).

ROLLING

To insure 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
- Rolling should be completed while the asphalt cement is still liquid. Two or more rollers may be used (Figure 10).
- Minimum of 5 passes
- Maximum speed of 10 miles per 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 rolling does not necessarily indicate that the paving fabric is saturated.



Figure 9: Spreading sand



Figure 10: Rolling

SATURATION AND BONDING

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 feels fuzzy or dry
- Liquid asphalt is not visible on the surface
- Paving fabric fibers are visible
- 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 paving fabric without reducing the amount of binder available for the chip seal.

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



Figure 11: Saturated fabric with sand

TRAFFIC

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

Prior to beginning chip seal operations, the sand should be completely swept from the saturated fabric surface with a mechanical sweeper.

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 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 sealing over 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® 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 located and laced 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 including sunlight, chemicals that are strong acids or bases, fire or flames including welding sparks, and human or animal destruction.

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 single 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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