

# IMPORTANT PHYSICAL PROPERTIES FOR PAVING FABRICS

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**Nonwoven**

Nonwoven paving fabrics are textile fabrics made of fibrous layers carded and randomly layered through mechanical interlacing of the fibers. Products are manufactured with staple fiber needle into a three-dimensional configuration using carding and a series of needle boards. This process also includes a heat setting and hot calendaring which produces a textile that will act as a carrier for liquid asphalt necessary for the system to perform. The liquid residual asphalt provides the waterproof benefit and aids in providing an interlayer that retards or blunts reflective crack stresses.

**Polypropylene Fiber**

Polypropylene has an affinity for liquid asphalt that bonds the asphalt tack coat to the fabric. This compatibility is due to the similarity in the polymer composition of polypropylene and liquid asphalt because of their relationship in the petroleum chemical chain. This bond between the asphalt and fiber is important to the product performance as a moisture barrier. The liquid asphalt and fabric composition repels water infiltrated from pavement sources.

**Heat-set and/or Calendered Surface**

Nonwoven paving fabrics are required to be heat set and calendared to preserve the dimensional stability of the finished product. This property is important for construction and also assists in retaining the proper amount of asphalt in the interlayer. The improved dimensional stability of the fabric will allow limited construction vehicles and traffic to drive on the installed fabric without damage to the membrane interlayer. Heat Setting and calendaring also assists in retaining the liquid asphalt in the structure of paving fabric (asphalt retention).

**AASHTO M288 Specification for Paving Fabric**

The AASHTO M288 committee responsible for developing the specification was composed of State Highway Materials Engineers and The Industrial Fabric Association Geotextile Group. The committee developed the specification to establish minimum property requirements for paving fabrics to function as a water barrier and reflective crack control. This development allows for an accepted product specification that permits a healthy, competitive market.

**AASHTO M288 Paving Fabric Requirements 9.0**

9.1 Description- This specification is applicable to the use of paving fabrics, saturated with asphalt cement, between pavement layers. The function of the paving fabric is to act as a waterproofing and stress relieving membrane within the pavement structure. This specification is not intended to describe fabric membrane system specifically designed for pavement joints and localized (spot) repairs.

9.2 Paving Fabric Requirements-The paving fabric shall meet the requirements of Table 7. All numerical values in Table 7 represent MARV in the weaker principal direction.

**Table 7 –Paving Fabric Property Requirement (Note - 1)**

Property	Test Method	Units	Typical MARV (min)
Grab Strength	ASTM D4632	N (lbs)	450 (101)
Ultimate Elongations	ASTM D4632	%	> 50%
Mass per unit area	ASTM D5261	gm/m <sup>2</sup> (oz/yd <sup>2</sup> )	140 (4.01)
Asphalt Retention	ASTM D 6140	l/m <sup>2</sup> (gal/yd <sup>2</sup> )	(see notes 2&3)
Melting Point	ASTM D276	°C (°F)	150 (325)

Note 1: All numeric values represent MARV in the principal directions (refer to Section 9.2)

Note 2: Asphalt require saturating paving fabric only. Asphalt retention must be provided in manufacturer certification. Values does not indicate the asphalt application rate require for construction. Refer to appendix for discussion of asphalt application rate\*.

Note 3: Product asphalt retention property must meet MARV value provided by the manufacture certification\*.

\* See Mirafi Installation Guide for Asphalt application and retention rates.

### Discussion of Physical Properties

#### Grab Strength

Value for grab strength ± 100 lbs is based on constructability and performance for water barrier and reflective crack control. Initial and historical installations provided a benchmark for this value for the purpose of constructability for a wide range of applications and climatic conditions. Weaker fabrics (80 – 90) lbs have been found suitable for light traffic areas such as parking areas and trailer parks. Stronger fabrics (100- 160) lbs tend to perform better in high traffic areas and colder climates with thicker overlays, \_ 2”.

#### Ultimate Elongations

The value of ≥ 50% was established by the committee to describe those products that demonstrated performance in field and laboratory studies. Elongation becomes important as the asphalt overlay and existing pavement expands and contracts during changes in temperature. It is also important as an overlay ages and exhibits micro-cracking to allow for the paving fabric interlayer to span cracks and continue performing the water proofing function. This continuing performance will extend pavement life by reducing cracking growth.

#### Mass per unit area

Using 4.0 oz per square yard as the standard fabric weight supports the ability of a paving fabric to retain sufficient quantities of asphalt for good performance. It also gives the user a simple method of testing for product identification. Fabric weight also depicts the standard that preformed in field and laboratory testing.

### Asphalt Retention

The original test was developed by the Texas Department of Transportation for paving fabric interlayers and later modified and adopted as ASTM D6140 for asphalt retention. The amount of asphalt (liquid neat or uncut asphalt) that a fabric will hold is directly related to its field performance and is the most important value for extending pavement life.

AASHTO recommends a retention value of  $> 0.21$  gal/yd. This value is the minimum rate of asphalt tack coat that would satisfy the requirements for waterproofing and relief of stress cracking. Although the spread rate has a relationship to asphalt retention, there is not a direct correlation because the asphalt retention test is a benchmark test that gives an indication of the amount of asphalt retained in the fabric. The generally accepted asphalt spread rate is 0.25 gal/yd.

### Melting Point

The melting point of 325°F is used in standard AASHTO specification because the liquid asphalt spread rate to saturated paving fabrics is a reasonable temperature that is used in paving operations. Paving fabric interlayers have been installed with overlays hot rubberized asphalt mixes and super pave mixes. The value is well below most asphalt flash points of 440°F. Liquid asphalt for fabric installation is normally spread at temperatures between 270°F and 320°F.

### Installation

Installation of paving fabric interlayer should follow the guidelines as set forth by manufacturers and guidelines set by AASHTO. Installation guidelines include recommended asphalt binders.

References: Manual of Nonwoven, Dilling & Krcma The Textile Trade Press AASHTO Standard Specification for Geotextiles Specifications for Highway Applications AASHTO designation M288-96 "The Proper Installation of Paving Fabrics with Special Emphasis on Asphalt Tack, J. Miner, and D. Guram, 1993 Coat Requirement", 4R Conference & Road Show, Philadelphia, Pennsylvania "Pavement Restoration with MiraPave® Installation Guide Lines", TenCate,, Pendergrass, GA. "Hot Mix Asphalt Materials Mixture Design and Construction", Roberts, Kandhal, Brown, Lee & Kennedy, 1996

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