

VIRGINIA DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION FOR
SECTION 245—GEOSYNTHETICS

April 6, 2004c

SECTION 245—GEOSYNTHETICS of the Specifications is completely replaced by the following:

245.01—Description.

These specifications cover artificial fiber textile products to be used in transportation construction work.

245.02—Detail Requirements.

Geosynthetics shall include a label that clearly shows the manufacturer or supplier name, style name, and roll number. The shipping document shall include documentation to meet the requirements of Section 245.03.

Each geosynthetic roll shall be wrapped or otherwise packaged in such a manner as to protect the geosynthetic, including the ends of the roll, from damage due to shipment, water, sunlight, and contaminants. The protective wrapping shall be maintained during periods of shipment and storage.

During storage, geosynthetics rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, temperatures in excess of 160⁰ F, and other environmental condition that may damage the physical property values of the geosynthetic. Geosynthetics that are not properly protected may be subject to rejection.

245.03—Testing and Documentation.

Each geosynthetic material provided to the project shall be tested by the Contractor for the material properties specified herein within 24 months of submission. Test results reported from AASHTO's National Transportation Product Evaluation Program – Laboratory Results of Evaluations on Geotextile and Geosynthetics may be used. The Contractor shall provide certification of the material in accordance with the requirements of AASHTO M 288 Section 4, Certification, and copies of the test results. The Contractor's testing, however, will not be the sole basis for acceptance.

The Department shall sample and test the geosynthetics for acceptance to verify conformance with this specification. Sampling shall be in accordance with ASTM D 4354, using the section titled, "Procedure C - Sampling for Purchaser's Specification Conformance Testing." In the absence of the Department's testing, acceptance may be based on manufacturer's certifications as a result of testing by the manufacturer of quality assurance samples obtained using the procedure for Sampling for Manufacturer's Quality Assurance (MQA) Testing. A lot size shall be considered to be the shipment quantity of the given product, or a truckload of the given product, whichever is smaller.

All property values, with the exception of apparent opening size (AOS) and Panel Vertical Strain, in these specifications represent minimum average roll values (MARV) in the weakest principal direction (i.e., average test results of any roll in a lot sampled for conformance or quality assurance testing shall meet or exceed the minimum values provided herein). Values for AOS and Panel Vertical Strain represent maximum average roll values.

Perform tests in accordance with the methods referenced in this specification for the indicated application. The number of specimens to test per sample is specified by each test method. Geotextile product acceptance shall be based on ASTM D 4759. Product acceptance is determined by comparing the average test results of all specimens within a given sample to the specification MARV.

(a) **Geotextile Fabric for Use in Silt Fences, Silt Barriers or Filter Barriers**

Geotextile shall function as a vertical; permeable interceptor designed to remove suspended soil from overland water flow. Fabric shall filter and retain soil particles from sediment-laden water to prevent eroding soil from being transported off the construction site by water runoff. Fabric shall contain ultraviolet inhibitors and stabilizers to provide at least 6 months of expected, usable construction life at a temperature of 0 degrees F to 125 degrees F. The tensile strength of the material after 6 months of installation shall be at least 50 percent of the initial strength.

| Physical Property | Test Method | Requirements |
|--------------------------|--------------------|-----------------------------|
| Filtering Efficiency | VTM-51 | 75% (min) |
| Flow Rate | VTM-51 | 0.2 gal/sq. ft/minute (min) |

In addition to these requirements the geotextile shall meet the requirements of AASHTO M 288 for Temporary Silt Fence Property Requirements, Table 6 for Grab Strength and Ultraviolet Stability.

(b) **Geotextile for Use as Riprap Bedding Material**

Geotextile shall meet the requirements of AASHTO M 288 for Separation Geotextile Properties Table 3 for Apparent Opening Size and Ultraviolet Stability and Geotextile Strength Property Requirements, Table 1, Class 2 for grab strength and puncture strength.

(c) **Geotextile Fabric for Use in Drainage Systems (Drainage Fabric)**

Drainage fabric shall be nonwoven, clog resistant, suitable for subsurface application, and stable both thermally and biologically.

The geotextile shall retain at least 75 percent of its ultimate strength when subjected to substances having a pH of a minimum of 3 and a maximum of 12 for a period of 24 hours.

| Physical Property | Test Method | Requirements |
|-----------------------------|--------------------|-----------------------------|
| Permittivity | ASTM D 4491 | 0.5 sec ⁻¹ (min) |
| Apparent Opening Size (AOS) | ASTM D 4751 | No. 50 sieve (max) |

In addition to these requirements, the geotextile shall meet the requirements of AASHTO M 288 Strength Requirements, Table 1, Class 3 for grab strength.

(d) **Geotextile for Use in Stabilization**

Geotextiles used in saturated and or unstable conditions to provide the functions of separation and reinforcement.

1. **Subgrade Stabilization Fabric**

| Physical Property | Test Method | Requirements |
|-----------------------------|--------------------|---------------------|
| Apparent Opening Size (AOS) | ASTM D 4751 | No. 20 sieve (max) |

In addition to this requirement, the geotextile shall meet the requirements of AASHTO M 288 for Strength Property Requirements, Table 1, Class 3 for Grab Strength, Tear Strength and Puncture Strength.

2. **Embankment Stabilization Fabric – up to 6 feet high**

| Physical Property | Test Method | Requirements |
|-----------------------|-------------|-----------------------------|
| Apparent Opening Size | ASTM D 4751 | No. 20 sieve (max) |
| Seam Strength | ASTM D 4632 | 90% Specified Grab Strength |

In addition to this requirement, the geotextile shall meet the requirements of AASHTO M 288 for Strength Property Requirements, Table 1, Class 1 for Grab Strength, Tear Strength and Puncture Strength.

(e) **Prefabricated Geocomposite Pavement Underdrain**

Prefabricated geocomposite pavement underdrain shall consist of a polymeric drainage core encased in a non-woven filter fabric envelope having sufficient flexibility to withstand bending and handling without damage. Prefabricated geocomposite pavement underdrain shall conform to the following:

- (1) **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the pavement environment, and shall have a thickness of not less than 3/4 inch.

| Physical Properties | Test Method | Requirements |
|---|--------------------|--|
| Compressive Strength Panel Vertical Strain & Core Area Change | ASTM D 1621/D 2412 | 40 psi(min) @ 20% deflection |
| Panel Vertical Strain & Core Area Change @ 22.7 psi | ASTM D 6244 | 10% for core area & panel height (max) |
| Water flow rate (after 100 hours @ 10 psi normal confining pressure gradient of no more than 0.1) | ASTM D 4716 | 15 gal/min/ft width for 12" specimen length) (min) |

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0° and 125°F respectively for a period of 24 hours.

- (2) **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag nor block the flow channels, have equivalent life of the core material and conform to the requirements of Section 245.03(c).

(f) **Geocomposite Wall Drains**

Geocomposite wall drains may be used as an alternative to porous backfill when permitted by the Engineer. Geocomposite wall drains will not be permitted for use with walls considered critical by the Engineer. Critical walls shall include walls over 15 feet in height and walls supporting bridge abutments or other structures on spread footings.

Prefabricated geocomposite wall drain shall consist of a polymeric drainage core encased in a non-woven filter fabric envelope having sufficient flexibility to withstand

bending and handling without damage. Geocomposite wall drains shall conform to the following:

- (1) **Core:** The drainage core shall be made from an inert, polymeric material resistant to commonly encountered chemicals and substances in the roadway.

| Physical Property | Test Method | Requirements |
|---|---------------------|---|
| Compressive Strength @ 20 % deflection | ASTM D 1621/ D 2412 | 40 psi (min) |
| Water flow rate (after 100 hours at 10 psi normal confining pressure and gradient of no more than 0. 1) | ASTM D 4716 | 15 gal/min/ft width (for 12" specimen length) (min) |

The core shall retain at least 75 percent of its ultimate strength when subjected to temperatures of 0° and 125° F for a period of 24 hours.

- (2) **Filter Fabric:** Geotextile shall be bonded to and tightly stretched over the core. Geotextile shall not sag nor block the flow channels, have equivalent life of the core material and conform to the requirements of section 245.03(c).

(g) **Geomembrane Moisture Barrier**

Geomembrane moisture barrier shall be resistant to biological attack. Geomembrane shall be constructed out of PVC, have a thickness of 30 mils and shall meet the requirements of the PVC Geomembrane Institute 1197 material specification for PVC Geomembrane or shall conform to the following requirements:

| Physical Property | Test Method | Requirements |
|------------------------|-------------|------------------|
| Thickness | ASTM D 5199 | 30 mils (min) |
| Tensile (1 inch strip) | ASTM D 882 | 130 kip/ft (min) |
| Tear (Die C) | ASTM D 1004 | 200 lbf (min) |
| Puncture | ASTM D 4833 | 620 lbf (min) |

(h) **Dewatering Bag:**

A non-woven geotextile sewn together to form a bag that can be used in lieu of a dewatering basin for the purpose of filtering out suspended soil particles. The bag shall be capable of accommodating the water flow from the pump without leaking at the spout and seams.

| Physical Property | Test Method | Requirements |
|---|-------------|-------------------------------------|
| Grab Strength @ Elongation < 50%(CRE/Dry) | ASTM D 4632 | 250 lbs (min) |
| Seam Strength | ASTM D 4632 | 90% Specified Grab Strength |
| Puncture | ASTM D 4833 | 150 lbs (min) |
| Mullen Burst | ASTM D 3786 | 450 psi (min) |
| Flow Rate | ASTM D 4491 | .189 ft ³ /sec/ft. (min) |
| Permittivity | ASTM D 4491 | 1.2 sec ⁻¹ (min) |
| UV Resistance | ASTM D 4355 | 70% at 500 hrs (min) |
| AOS | ASTM D 4751 | 100 sieve (max) |

(i) **Paving Fabric**

The geotextile shall meet the requirements of AASHTO M 288 Paving Fabric Property Requirements, Section 9.