

**Project Name:**  
**Project Number:**

## **Section 02 66 00.04**

### **Specification for Geotextile Used in Geomembrane Cushioning**

#### **1. GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Geotextile placed directly above and below geomembrane liner/cover for protection from damage due to construction and service loading.

##### **1.2 RELATED SECTIONS**

- A. Section 02 50 00 - Site Remediation
- B. Section 01 89 13 - Site Preparation Performance Requirements
- C. Section 31 00 00 - Earthwork
- D. Section 32 10 00 - Bases, Ballasts, Pavements, and Appurtenances

##### **1.3 UNIT PRICES**

- A. Method of Measurement: By the square yard (or square meter - as indicated in contract documents) including seams, overlaps, and wastage.
- B. Basis of Payment: By the square yard (or square meter - as indicated in contract documents) installed.

##### **1.4 REFERENCES**

- A. AASHTO Standards
  - 1. T088-10-UL - Particle Size Analysis of Soils
  - 2. T090-00-UL - Determining the Plastic Limit and Plasticity Index of Soils
  - 3. T099-10-UL - The Moisture-Density Relations of Soils Using a 5.5lb (2.5 kg) Rammer and a 12in (305 mm) Drop.
- B. American Society for Testing and Materials (ASTM):
  - 1. D123 - Standard Terminology Relating to Textiles
  - 2. D276 - Test Method for Identification of Fibers in Textiles
  - 3. D4354 - Practice for Sampling of Geosynthetics for Testing
  - 4. D4355 - Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus)
  - 5. D4439 - Terminology for Geotextiles
  - 6. D4491 - Test Methods for Water Permeability of Geotextiles by Permittivity
  - 7. D4533 - Test Method for Index Trapezoid Tearing Strength of Geotextiles
  - 8. D4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles
  - 9. D4751 - Test Method for Determining Apparent Opening Size of a Geotextile

10. D4759 - Practice for Determining the Specification Conformance of Geosynthetics
  11. D4873 - Guide for Identification, Storage, and Handling of Geotextiles
  12. D6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
- C. Environmental Protection Agency (EPA) – Technical Guidance Document Quality Assurance and Quality Control for Waste Containment Facilities.
- D. Geosynthetic Accreditation Institute (GAI) - Laboratory Accreditation Program (LAP).
- E. International Standards Organization (ISO) – 9001:2015

## **1.5 DEFINITIONS**

- A. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

## **1.6 SUBMITTALS**

- A. Submit the following:
1. Certification: The contractor shall provide to the Engineer a certificate stating the name of the manufacturer, product name, style number, chemical composition of the filaments or yarns and other pertinent information to fully describe the geotextile. The Certification shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the Manufacturer's quality control program. The Certification shall be attested to by a person having legal authority to bind the Manufacturer.
  2. Quality Standards: The contractor shall provide to the Engineer the Manufacturer's Quality Control Plan along with their current GAI-LAP and ISO 9001:2015 certificates.

## **1.7 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
1. The geotextile Manufacturer shall have all the following credentials:
    - a. Geosynthetic Accreditation Institute (GAI)- Laboratory Accreditation Program (LAP)
    - b. ISO 9001:2015 Quality management System
- B. The geotextile Manufacturer shall have a GAI-LAP accredited laboratory at the location of production capable of performing the ASTM tests as outlined in the specification.

## **1.8 DELIVERY, STORAGE, AND HANDLING**

- A. Geotextiles labeling, shipment, and storage shall follow ASTM D4873. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.
- B. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.
- C. During storage, geotextile 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, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

## **2. PRODUCTS**

### **2.1 MANUFACTURERS**

- A. TenCate™ Geosynthetics Americas  
365 South Holland Drive  
Pendergrass, GA, USA 30567  
1-800-685-9990  
1-706-693-2226  
1-706-693-4400, fax  
[www.tencategeo.us](http://www.tencategeo.us)

### **2.2 MATERIALS**

- A. Geotextile:
  - 1. The geotextile shall be manufactured with fibers consisting of long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyesters. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages.
  - 2. The geotextile shall meet the requirements of Table 1. All numeric values in Table 1 except AOS represent MARV in the weakest principal direction. Values for AOS represent maximum average roll values.

**TABLE 1 – Cushioning Geotextile**

<b>Mechanical Properties</b>	<b>Test Method</b>	<b>Unit</b>	<b>Minimum Average Roll Value</b>
Weight	ASTM D5261	oz/yd <sup>2</sup> (g/m <sup>2</sup> )	16.0 (542)
Thickness	ASTM D5199	mils (mm)	175 (4.4)
Grab Tensile Strength	ASTM D4632	lbs (N)	425 (1891)
Grab Tensile Elongation	ASTM D4632	%	50
Trapezoid Tear Strength	ASTM D4533	lbs (N)	155 (690)
CBR Puncture Strength	ASTM D6241	lbs (N)	1200 (5340)
			<b>Maximum Opening Size</b>
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	100 (0.15)
			<b>Minimum Roll Value</b>
Permittivity	ASTM D4491	sec <sup>-1</sup>	0.7
Permeability	ASTM D4491	cm/sec	0.31
Flow Rate	ASTM D4491	gal/min/ft <sup>2</sup> (l/min/m <sup>2</sup> )	50 (2037)
			<b>Minimum Test Value</b>
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	80

3. Approved geotextiles are as follows:

**Elongation  $\geq$  50 %: Mirafi® S1600**

## 2.3 QUALITY CONTROL

- A. Manufacturing Quality Control: Testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the geotextile.
- B. Manufacturer's certifications and testing of quality assurance samples obtained using Procedure B of ASTM D4354. A lot size for conformance or quality assurance sampling shall be the shipment quantity of the given product or a truckload of the given product, whichever is smaller.

## 3. EXECUTION

### 3.1 PREPARATION

- A. The installation site shall be prepared by clearing, grubbing, and excavation or filling the area to the design grade. This includes removal of stones or excessive moisture.

### 3.2 INSTALLATION

- A. Install geotextile at elevation and alignment as indicated or as directed by the Engineer and in accordance with EPA Technical Guidance Document: Quality Assurance and Quality Control for Waste Containment Facilities by United States Environmental Protection Agency (Ref. EPA/600/R-93/182).
- B. The geotextile should be installed to the grade and location specified in the project specifications.

- C. Recommended minimum geotextile overlap should be 12 inches to 24 inches in both machine and transverse directions unless otherwise specified.
- D. Prior to covering, the geotextile shall be inspected by a certified inspector of the Engineer to ensure that the geotextile has not been damaged during installation. Damaged geotextiles, as identified by the Engineer, shall be repaired immediately. Cover the damaged area with a geotextile patch which extends an amount equal to the required overlap beyond the damaged area.

**END OF SECTION**