

SECTION 31 32 19.16 GEOTEXTILE

PART 1 GENERAL

1.01 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. ASTM International (ASTM):
 - a. D737, Standard Test Method for Air Permeability of Textile Fabrics.
 - b. D4355, Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
 - c. D4491, Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
 - d. D4533, Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
 - e. D4595, Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method.
 - f. D4632, Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - g. D4716, Test Method for Determining the (In-Plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head.
 - h. D4751, Standard Test Method for Determining Apparent Opening Size of a Geotextile.
 - i. D4833, Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
 - j. D4884, Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Geotextiles.
 - k. D4886, Standard Test Method for Abrasion Resistance of Geotextiles (Sand Paper/Sliding Block Method).
 - l. D5199, Standard Test Method for Measuring the Nominal Thickness of Geosynthetics.
 - m. D5261, Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
 - n. D6193, Standard Practice for Stitches and Seams.

1.02 DEFINITIONS

- A. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.
- B. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile furnished.

- C. Minimum Average Roll Value (MinARV): Minimum of series of average roll values representative of geotextile furnished.
- D. Nondestructive Sample: Sample representative of finished Work, prepared for testing without destruction of Work.
- E. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.
- F. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D4884.

1.03 SUBMITTALS

- A. Action Submittals:
 - 1. Shop Drawings: Manufacturer material specifications and product literature.
- B. Informational Submittals: Certifications from each geotextile manufacturer that furnished products have specified property values. Certified property values shall be either minimum or maximum average roll values, as appropriate, for geotextiles furnished.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Deliver each roll with sufficient information attached to identify it for inventory and quality control.
- B. Handle products in manner that maintains undamaged condition.
- C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

1.05 SCHEDULING AND SEQUENCING

- A. Where geotextile is to be laid directly upon ground surface, prepare subgrade as specified in Section 31 23 13, Subgrade Preparation, first.
- B. Notify Contracting Officer whenever geotextiles are to be placed. Do not place geotextile without Contracting Officer's approval of underlying materials.

PART 2 PRODUCTS

2.01 NONWOVEN GEOTEXTILE

A. Physical Characteristics:

1. Nonwoven geotextile shall be composed of continuous, or discontinuous (staple) fibers held together through needle-punching, spun-bonding, thermal-bonding, or resin-bonding.
2. Unseamed Sheet Width: Minimum 12 feet.
3. Nominal Weight per Square Yard: 8 ounces per ASTM D5261.
4. Conform to requirements in Table No. 1.

Table No. 1 Physical Property Requirements for Nonwoven Geotextile		
Property	Requirement	Test Method
Water Permittivity	0.05 sec.-1, MinARV	ASTM D4491 (Falling Head)
Apparent Opening Size (AOS)	30 U.S. Standard Sieve Size	ASTM D4751
Grab Tensile Strength, Machine Direction	113 lb/in, MinARV	ASTM D4632
Grab Elongation, Machine Direction	50 percent, MaxARV	ASTM D4632
Puncture Strength	223 lb, MinARV	ASTM D4833
Trapezoid Tear Strength	41 lb, MinARV	ASTM D4533
Ultraviolet Radiation Resistance	50 percent strength retention, MinARV after 500 hours	ASTM D4355

- #### B. Functional Characteristics: Pervious sheet of polyester, polypropylene, or polyethylene fabricated into stable network of fibers that retain their relative position with respect to each other.

C. Performance Characteristics:

1. Geotextile Edges: Selvaged or otherwise finished to prevent outer material from pulling away from geotextile.

2.02 SECURING PINS

A. Steel Rods or Bars:

1. Physical Characteristics:
 - a. 3/16-inch diameter.
 - b. Pointed at one end.
 - c. Minimum Length: 12 inches.
2. Functional Characteristics: With head on other end sufficiently large to retain washer.
3. Performance Characteristics: None.

B. Steel Washers for Securing Pins:

1. Physical Characteristics:
 - a. Outside Diameter: Not less than 1-1/2 inches.
 - b. Inside Diameter: 1/4 inch.
 - c. Thickness: 1/8 inch.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

C. Steel Wire Staples:

1. Physical Characteristics:
 - a. U-shaped.
 - b. 10 gauge.
 - c. Minimum Length: 6 inches.
2. Functional Characteristics: None.
3. Performance Characteristics: None.

PART 3 EXECUTION

3.01 LAYING GEOTEXTILE

- A. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.02 SHEET ORIENTATION ON SLOPES

- A. Orient geotextile with long dimension of each sheet parallel to direction of slope.
- B. Geotextile may be oriented with long dimension of sheet transverse to direction of slope only if sheet width, without unsewn seams, is sufficient to cover entire slope and anchor trench and to extend at least 18 inches beyond toe of slope.

3.03 JOINTS

A. Unseamed Joints:

1. Overlapped.
2. Overlap, unless otherwise shown:
 - a. Foundation/Subgrade Stabilization: Minimum 18 inches.
 - b. Riprap: Minimum 18 inches.
 - c. Drain Trenches: Minimum 18 inches, except overlap shall equal trench width if trench width is less than 18 inches.
 - d. Other Applications: Minimum 12 inches.

3.04 SECURING GEOTEXTILE

A. Secure geotextile during installation as necessary with sandbags or other means approved by Contracting Officer.

B. Secure Geotextile with Securing Pins or Staples:

1. Insert securing pins with washers through geotextile.
2. Securing Pin Alignment:
 - a. Midway between edges of overlaps.
 - b. 6 inches from free edges.
3. Spacing of Securing Pins:

<u>Slope</u>	<u>Maximum Pin Spacing</u>
Steeper than 3:1	2 feet
3:1 to 4:1	3 feet
Flatter than 4:1	5 feet

4. Install additional pins across each geotextile sheet as necessary to prevent slippage of geotextile or to prevent wind from blowing geotextile out of position.
5. Push each securing pin through geotextile until washer bears against geotextile and secures it firmly to subgrade.
6. Where staples are used instead of securing pins, install in accordance with alignment and spacing above. Push in to secure geotextile firmly to subgrade.

3.05 PLACING PRODUCTS OVER GEOTEXTILE

A. Before placing material over geotextile, notify Contracting Officer. Do not cover installed geotextile until after Contracting Officer provides authorization to proceed.

- B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as specified in Article Repairing Geotextile.

3.06 INSTALLING GEOTEXTILE IN TRENCHES

- A. Place geotextile in a way to completely envelope granular drain material to be placed in trench and with specified overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.
- B. After granular drain material is placed to required grade, fold geotextile over top of granular drain material, unless otherwise shown. Maintain overlap until overlying fill or backfill is placed.

3.07 REPAIRING GEOTEXTILE

- A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile.
- B. Repair Procedure:
 - 1. Place patch of undamaged geotextile over damaged area and at least 18 inches in all directions beyond damaged area.
 - 2. Remove interfering material as necessary to expose damaged geotextile for repair.
 - 3. Sew patches or secure them with heat fusion tacking or with pins and washers, as specified above in Article Securing Geotextile, or by other means approved by Contracting Officer.

3.08 REPLACING CONTAMINATED GEOTEXTILE

- A. Protect geotextile from contamination that would interfere, in Contracting Officer's opinion, with its intended function. Remove and replace contaminated geotextile with clean geotextile.

END OF SECTION