

VERMONT CONSTRUCTION SPECIFICATION

54 – GEOTEXTILE

1. Scope

This work consists of furnishing all material, equipment, and labor necessary for the installation of geotextiles.

2. Quality

A. General requirements

Fibers (threads and yarns) used in the manufacture of geotextile shall consist of synthetic polymers composed of a minimum of 85 percent by weight polypropylenes, polyesters, polyamides, polyethylene, polyolefins, or polyvinylidene-chlorides. They shall be formed into a stable network of filaments or yarns retaining dimensional stability relative to each other. The geo-textile shall be free of defects and conform to the physical requirements in tables 1 and 2. The geotextile shall be free of any chemical treatment or coating that significantly reduces its porosity. Fibers shall contain stabilizers and/or inhibitors to enhance resistance to ultraviolet light.

Thread used for factory or field sewing shall be of contrasting color to the fabric and made of high strength polypropylene, polyester, or polyamide thread. Thread shall be as resistant to ultraviolet light as the geotextile being sewn.

B. Classification

Geotextiles shall be classified based on the method used to place the threads or yarns forming the fabric. The geotextiles will be grouped into woven and nonwoven types.

Woven—Fabrics formed by the uniform and regular interweaving of the threads or yarns in two directions. Woven fabrics shall be manufactured from monofilament yarn formed into a uniform pattern with distinct and measurable openings, retaining their position relative to each other. The edges of fabric shall be selvaged or otherwise finished to prevent the outer yarn from unraveling.

Nonwoven—Fabrics formed by a random placement of threads in a mat and bonded by heat-bonding, resin-bonding, or needle punching. Nonwoven fabrics shall be manufactured from individual fibers formed into a random pattern with distinct, but variable small openings, retaining their position relative to each other when bonded by needle punching, heat, or resin bonding. The use of nonwovens other than the needle punched geotextiles is somewhat restricted (see note 3 of table 2).

VERMONT CONSTRUCTION SPECIFICATION

C. Sampling and testing

The geotextile shall meet the specified requirements (table 1 or 2) for the product style shown on the label. Product properties as listed in the latest edition of the "Specifiers Guide," Geotechnical Fabrics Report, (Industrial Fabrics Association International, 1801 County Road BW, Roseville, MN 55113-4061) and that represent minimum average roll values, are acceptable documentation that the product style meets the requirements of these specifications.

D. Shipping

The geotextile shall be shipped/transported in rolls wrapped with a cover for protection from moisture, dust, dirt, debris, and ultraviolet light. The cover shall be maintained undisturbed to the maximum extent possible before placement.

Each roll of geotextile shall be labeled or tagged to clearly identify the brand, class, and the individual production run in accordance with ASTM D4873.

Table 1 – Requirements for Woven Geotextiles

<u>Property</u>	<u>Test Method</u>	<u>Class I</u>	<u>Class II & III</u>	<u>Class IV</u>
Tensile Strength (Pounds) <u>1/</u>	ASTM D4632 Grab Test	200 Min. in any principal direction	120 Min. in any principal direction	180 Min. in any principal direction
Elongation at Failure (Percent) <u>1/</u>	ASTM D4632 Grab Test	< 50	< 50	< 50
Puncture (Pounds) <u>1/</u>	ASTM D4833	90 Min.	60 Min.	60 Min.
Ultraviolet Light (% Residue Tensile Strength)	ASTM D4355 (150 Hour Exposure)	70 Min.	70 Min.	70 Min.
Apparent Opening Size (AOS)	ASTM D4751	As specified, but no smaller than 0.212 mm (#70) <u>2/</u>	As specified, but no smaller than 0.212 mm (#70) <u>2/</u>	As specified, but no smaller than 0.212 mm (#70) <u>2/</u>
Percent Open Area (Percent)	CWO-02215-86	4.0 Min.	4.0 Min.	1.0 Min.
Permittivity (Sec ⁻¹)	ASTM D4491	0.10 Min.	0.10 Min.	0.10 Min.

1/ Minimum Average Roll Value (Weakest Principal Direction)

2/ U.S. Standard Sieve Size

Note: CW) is a USACE Reference

VERMONT CONSTRUCTION SPECIFICATION

Table 2 – Requirements for Nonwoven Geotextile

<u>Property</u>	<u>Test Method</u>	<u>Class I</u>	<u>Class II</u>	<u>Class III</u>	<u>Class IV 3/</u>
Tensile Strength (Pounds) <u>1/</u>	ASTM D4632 Grab Test	180 Min.	120 Min.	120 Min.	115 Min.
Elongation at Failure (Percent) <u>1/</u>	ASTM D4632	=> 50	=> 50	=> 50	=> 50
Puncture (Pounds)	ASTM D4833	80 Min.	60 Min.	40 Min.	40 Min.
Ultraviolet Light (% Residual Tensile Strength)	ASTM D4355 (150 Hour Exposure)	70 Min.	70 Min.	70 Min.	70 Min.
Apparent Opening Size (AOS)	ASTM D4751	As Specified, Max. #40 <u>2/</u>			
Permittivity (Sec ⁻¹)	ASTM D4491	0.70 Min.	0.70 Min.	0.70 Min.	0.10 Min.

1/ Minimum Average Roll Value (Weakest Principal Direction)

2/ U.S. Standard Sieve Size

3/ Heat Bonded or Resin-Bonded Geotextile may be used for Class III and IV. They are particularly well suited to Class IV. Needle-Punched Geotextile are required for all other classes.

3. Storage

Before use, the geotextile shall be stored in a clean, dry location out of direct sunlight, not subject to extremes of either hot or cold temperatures, and with the manufacturer's protective cover undisturbed. Receiving, storage, and handling at the job site shall be in accordance with the requirements listed in ASTM D4873.

4. Surface preparation

The surface on which the geotextile is to be placed shall be graded to the neat lines and grades as shown on the drawings. It shall be reasonably smooth and free of loose rock and clods, holes, depressions, projections, muddy conditions, and standing or flowing water.

5. Placement

Before the geotextile is placed, the soil surface will be reviewed for quality assurance of the design and construction. The geotextile shall be placed on the approved prepared surface at the locations and in accordance with the details shown on the drawings. It shall be unrolled along the placement area and loosely laid, without stretching, in such a manner that it conforms to the surface irregularities when material or gabions are placed on or against it. The geotextile may be folded and overlapped to permit proper placement in designated area(s).

VERMONT CONSTRUCTION SPECIFICATION

The geotextile shall be joined by overlapping a minimum of 18 inches (unless otherwise specified on the drawings) and secured against the underlying foundation material. Securing pins, approved and provided by the geotextile manufacturer, shall be placed along the edge of the panel or roll material to adequately hold it in place during installation. Pins shall be steel or fiberglass formed as a **U**, **L**, or **T** shape or contain "ears" to prevent total penetration through the geotextile. Steel washers shall be provided on all but the **U**-shaped pins. The upstream or upslope geotextile shall overlap the abutting downslope geotextile. At vertical laps, securing pins shall be inserted through the bottom layers along a line through approximately the mid-point of the overlap. At horizontal laps and across slope laps, securing shall be inserted through the bottom layer only. Securing pins shall be placed along a line about 2 inches in from the edge of the placed geotextile at intervals not to exceed 12 feet unless otherwise specified. Additional pins shall be installed as necessary and where appropriate to prevent any undue slippage or movement of the geotextile. The use of securing pins will be held to the minimum necessary. Pins are to remain in place unless otherwise specified.

Should the geotextile be torn or punctured, or the overlaps or sewn joint disturbed, as evidenced by visible geotextile damage, subgrade pumping, intrusion, or grade distortion, the backfill around the damaged or displaced area shall be restored to the original approved condition. The repair shall consist of a patch of the same type of geotextile being used and overlaying the existing geotextile. Geotextile panels joined by overlap shall have the patch extend a minimum of 2 feet from the edge of any damaged area.

Slope protection—The geotextile shall not be placed until it can be anchored and protected with the specified covering within 48 hours or protected from exposure to ultraviolet light. In no case shall material be dropped on uncovered geotextile from a height of more than 3 feet.

Subsurface drains—The geotextile shall not be placed until drainfill or other material can be used to provide cover within the same working day. Drainfill material shall be placed in a manner that prevents damage to the geotextile. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet.

Road stabilization—The geotextile shall be unrolled in a direction parallel to the roadway centerline in a loose manner permitting conformation to the surface irregularities when the roadway fill material is placed on its surface. In no case shall material be dropped on uncovered geotextile from a height of more than 5 feet. Unless otherwise specified on the drawings, the minimum overlap of geotextile panels joined without sewing shall be 24 inches. The geotextile may be temporarily secured with pins recommended or provided by the manufacturer, but they shall be removed before the permanent covering material is placed.