

**SECTION 796**  
**GEOSYNTHETICS**

**796.1 GENERAL:**

Geosynthetic fabrics, grids and membranes used for construction purposes, including woven and non-woven materials, shall be in conformance with this Section.

Identification, packaging, delivery, storage and handling of geosynthetic materials shall be in accordance with manufacturer's recommendations and ASTM D4873. Each roll shall be labeled or tagged to provide product identification sufficient to determine the product type, manufacturer, quantity, lot number, roll number date of manufacture, and shipping date.

Geosynthetic materials shall be packaged in a manner that will protect the materials from harmful environmental conditions as referred to in the manufacturer's specifications. Fabric rolls shall be stored and protected from the weather. If stored outdoors, the rolls shall be elevated and protected with a waterproof cover, and in no case shall geosynthetics be exposed to mud, dirt, dust and debris.

**796.2 MATERIALS AND REQUIREMENTS;**

Geosynthetic materials shall be inert to commonly encountered chemicals, resistant to rot and mildew, and shall have no tears or defects which adversely affect or alter its physical properties.

Materials required for complete and proper installation of geosynthetic materials that are not specifically described herein (such as pins, nails, washers, etc.) shall conform to the manufacturer's recommendations and be as selected and supplied by Contractor subject to final approval by the Engineer.

Requirements represent minimum average roll values in the weaker principal direction. Average of test results from any sampled roll in a lot shall meet or exceed the minimum values noted herein. Lot shall be sampled according to ASTM D 4354.

**796.2.1 Pavement:** Pavement fabric geosynthetics are non-woven polyester or polypropylene fabrics that are field saturated with an asphalt binder and placed as an interlayer beneath a pavement overlay or between pavement layers. When placed, the fabric becomes an integral part of the roadway section, forming a barrier to water infiltration and absorbing stresses to reduce reflective and fatigue cracking of the new pavement surface layer.

Pavement fabric shall be constructed of at least 95 percent (by weight) nonwoven synthetic fibers of polyester or polypropylene, thermally bonded on one side. The fabric material shall additionally conform to the physical properties shown in Table 796-1.

<b>TABLE 796-1</b>			
<b>PAVEMENT GEOSYNTHETIC PROPERTIES</b>			
<b>Property</b>	<b>Class A</b>	<b>Class B</b>	<b>ASTM Test Method</b>
Weight: oz/yd <sup>2</sup>	4.1 min.	4.0 min	D3776
Grab tensile strength: lbs.	100 min.	90 min	D4632
Elongation at break: %	50 min.	50 min	D4632
Melting point: degree F	300 min.	300 min	D276
Asphalt retention: gal/yd <sup>2</sup>	0.25 min. <sup>(1)</sup>	0.20 min	D6140

(1) May be reduced within street intersections, on steep grades or in other zones where vehicle braking is common, but not less than 0.20 gal/yd<sup>2</sup>.

**796.2.2 Filtration (Drainage) and Separation:** Filtration and separation fabrics are nonwoven or woven polypropylene or polyester fabrics with specified strength characteristics used as permeable separators to restrain soil or other particles subjected to hydrodynamic forces while allowing the passage of fluids into or across a geotextile and to prevent inter-migration of adjacent soil layers of vastly different particle sizes and particle distributions.

Filtration and separation fabrics shall be nonwoven or woven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed or woven into a stable network such that the filaments retain their relative position to each other. The fabric material shall additionally conform to the physical properties shown in Table 796-2.

<b>TABLE 796-2</b>			
<b>FILTRATION &amp; DRAINAGE GEOSYNTHETIC PROPERTIES</b>			
<b>Property</b>	<b>Class A <sup>(1)</sup></b>	<b>Class B <sup>(2)</sup></b>	<b>ASTM Test Method</b>
Grab tensile strength: lbs.	180 min	80 min.	D4632
Seam strength: lbs.	160 min	70 min.	D4632
Puncture strength: lbs.	80 min	25 min.	D4833
Trapezoidal tear: lbs	50 min	25 min.	D4533
Apparent opening size: US Standard sieve size	> 50	>50	D4751
Ultraviolet Stability: %	50 min.	50 min	D4355

- (1) Class A - Use where installation stresses are more severe than for Class B application (i.e. very coarse sharp angular aggregate, heave degree of compaction).
- (2) Class B – Use with smooth graded surface having no sharp angular projections and sharp angular aggregate.

**796.2.3 Erosion Control:** Erosion control fabrics are woven monofilament fabrics or nonwoven fabrics similar to filtration and separation fabrics, but are thicker and stronger (higher survivability) to absorb stress and resist abrasion. These fabrics are used below all areas to receive aggregate or rip-rap rock slope protection and act as filter/separators to provide sustained permeability while maintaining structural stability.

Erosion control fabrics shall be a woven monofilament fabric or a nonwoven fabric consisting only of long chain polymeric filaments such as polypropylene or polyester formed into a stable network that the filaments retain their relative position to each other. The fabric material shall additionally conform to the physical properties shown in Table 796-3.

<b>TABLE 796-3</b>			
<b>EROSION CONTROL GEOSYNTHETIC PROPERTIES</b>			
<b>Property</b>	<b>Class A <sup>(1)</sup></b>	<b>Class B <sup>(2)</sup></b>	<b>ASTM Test Method</b>
Weight: oz/yd <sup>2</sup>	8.0 min	6.0 min	D3776
Grab tensile strength: lbs.	270 min	200 min.	D4632
Elongation at break: %	45min, 115 max	15 min., 115 max.	D4632
Puncture strength: lbs.	110 min	75 min.	D4833
Burst strength: psi	430 min	320 min.	D3786
Trapezoidal tear: lbs	75 min	50 min.	D4533
Apparent opening size: US Standard sieve size	30 – 140	30 - 140	D4751
Ultraviolet Stability: %	70 min.	70 min	D4355

- (1) Class A - Use where installation stresses are more severe than for Class B applications.
- (2) Class B – Use with structures or under conditions where the fabric is protected by sand cushion or by "zero drop height" placement of stone (stone placement depth < 3 ft; stone wt < 250 lbs).

**796.2.4 Soil or Base Reinforcement:** Geogrid geosynthetic materials are used for improving the stability of weak soils or reinforcing aggregate bases. Geogrids are defined as biaxial or triaxial polymeric grids

formed by a regular network of integrally connected polymer tensile elements with apertures of sufficient size to permit significant mechanical interlock with the surrounding soil, aggregate, or other fill materials to function primarily as reinforcement.

The geogrid structure shall be dimensionally stable and able to retain its geometry under manufacture, transport and installation. Geogrids shall be comprised of 100 percent punched and drawn or extruded virgin resin polypropylene or high-density polyethylene, with a maximum of 5 percent in-plant regrind material. Geogrids shall additionally conform to the physical properties shown in Table 796-4.

<b>TABLE 796-4</b>			
<b>REINFORCEMENT GEOGRID PROPERTIES</b>			
<b>Property</b>	<b>Requirement</b>		<b>Test Method</b>
	Type 1	Type 2	
Aperture size: in	1 min.	1-3/8 min.	ID callipered
Rib Thickness: mil	30 min.	50 min.	ASTM D1777
Rib Shape	Rectangular or Square	Rectangular or Square	Observation
Junction Thickness: mil	60 min.	60 min.	ASTM D1777
Ultimate Tensile Strength: lb/ft	850	1300	ASTM D4945
Flexural Rigidity: Mg-cm	250,000	750,000	ASTM D1388
Min Tensile Strength @ 2% Strain: lb/ft MD	280	410	ASTM D6637
Min Tensile Strength @ 2% Strain: lb/ft CMD	450	620	ASTM D6637
Min Tensile Strength @ 5% Strain: lb/ft MD	580	810	ASTM D6637
Min Tensile Strength @ 5% Strain: lb/ft CMD	920	1340	ASTM D6637
Junction Strength: %	80 min.		ASTM 638
Ultraviolet Stability: %	70 min		D4355

(1) (MD) Machine Direction (2) (CMD) Cross-Machine (transverse) Direction

### **796.3 TEST & CERTIFICATION REQUIREMENTS:**

Certificates of compliance shall be submitted to the engineer upon delivery of material for use of a specified project. Samples of materials shall be submitted for testing. No samples shall be taken within five feet from either end of roll. Dimension and determination of the amount of samples needed shall be determined by the Engineer. Each geosynthetic material lot or shipment must be approved by the Engineer before the materials may be incorporated in the work.

Testing methods and results shown in the certificate of compliance shall conform to the listed specifications for the proposed geosynthetic use. Supporting documentation including, but not limited to, product information sheets, installation procedures and recommendations, recommended use, and project references shall also be submitted by the supplier or manufacturer as part of product evaluation and pre-approval.