

## Section 881—Fabrics

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### 881.1 General Description

This section includes the requirements for the following fabrics:

- Plain cotton duck
- Rubber-impregnated cotton duck
- Burlap and cotton bags
- Plastic filter fabric
- Pavement reinforcement fabric
- Silt fence filter fabric

#### 881.1.01 Related References

##### A. Standard Specifications

[Section 106—Materials Certification](#)

##### B. Referenced Documents

Federal Specification CCC-C 419 Type III

ASTM D 36

ASTM D 146

ASTM D 412

ASTM D 1777

ASTM D 3786

ASTM D 4355

ASTM D 4632, GRAB

ASTM D 4751

ASTM D 4833

[GDT 87](#)

[GDT 88](#)

[GDT 95](#)

[QPL 28](#)

[QPL 36](#)

[QPL 40](#)

[QPL 47](#)

### 881.2 Materials

#### 881.2.01 Plain Cotton Duck

##### A. Requirements

1. Use plain cotton duck that meets the requirements of Federal Specification CCC-C 419 Type III.

## Section 881—Fabrics

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2. Ensure that the duck weighs at least 8 oz./yd<sup>2</sup> (270 g/m<sup>2</sup>).

### **B. Fabrication**

General Provisions 101 through 150.

### **C. Acceptance**

General Provisions 101 through 150.

### **D. Materials Warranty**

General Provisions 101 through 150.

## **881.2.02 Rubber-Impregnated Cotton Duck**

### **A. Requirements**

1. Use preformed rubber-impregnated fabric pads made of multiple layers of 8 oz (270 g) cotton duck, impregnated and bound with high quality natural rubber, or made of equivalent materials compressed into resilient pads of uniform thickness.
2. Use enough plies to reach the specified thickness after compression and vulcanizing.
3. Ensure that the finished pad withstands compression loads of not less than 10,000 psi (70 MPa) when applied perpendicular to the plane of the laminations. Ensure that the pad does not extrude or harmfully reduce in thickness.

### **B. Fabrication**

General Provisions 101 through 150.

### **C. Acceptance**

General Provisions 101 through 150.

### **D. Materials Warranty**

General Provisions 101 through 150.

## **881.2.03 Burlap Bags**

### **A. Requirements**

1. Use burlap bags made of at least 95 percent jute and manila fibers.
2. Use burlap that weighs 8 to 18 oz/10 ft<sup>2</sup> (250 to 550 g/m<sup>2</sup>).
3. Use bags with a capacity of 1 to 2 ft<sup>3</sup> (0.03 to 0.06 m<sup>3</sup>).

### **B. Fabrication**

General Provisions 101 through 150.

### **C. Acceptance**

General Provisions 101 through 150.

### **D. Materials Warranty**

General Provisions 101 through 150.

## **881.2.04 Cotton Bags**

### **A. Requirements**

1. Use cotton bags with Osnaburg 40 x 26 thread count and a nominal fabric weight of 6.8 oz/yd<sup>2</sup> (230 g/m<sup>2</sup>).
2. Use bags that have 1/2 in (13 mm) sewn seams with at least 1 stitch per 1/5 in (5 mm).

## Section 881—Fabrics

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3. Use 4 or 5 ply, 12 cotton yarn or equivalent for the stitches.
4. Ensure that seam efficiency is at least 80 percent. Ensure that the inside measurements tolerance is  $\pm 1/2$  in (13 mm).

### B. Fabrication

General Provisions 101 through 150.

### C. Acceptance

General Provisions 101 through 150.

### D. Materials Warranty

General Provisions 101 through 150.

## 881.2.05 Plastic Filter Fabric

### A. Requirements

1. Use pervious sheets of plastic yarn made from a long-chain synthetic polymer. Use polymer composes of at least 85 percent by weight of propylene, ethylene, amide, ester, or vinylidene chloride.

Use a sheet of plastic yarn that contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultra-violet and/or heat exposure.

2. Ensure that the fabric is finished so that the filaments will retain their relative position with respect to each other.
3. Use fabric without defects, rips, holes, or flaws.
4. Use fabric that meets the following physical requirements for woven and non-woven fabric:

<b>Woven Fabrics</b>	
Tensile strength (any direction)	200 lbs (890 N) minimum
Bursting strength	500 psi (3.5 MPa) minimum
Elongation before breaking	10% to 35%
Percent open area	4.0% to 6.5%
<b>Non-woven Fabrics</b>	
Puncture resistance	30 lbs (135 N) minimum
Grab tensile strength	65 lbs (290 N) minimum
Grab elongation	40% minimum
Flow rate [H from 3 to 1 in (75 to 25 mm)]	50 gal/min/ ft <sup>2</sup> (34 liters/second/m <sup>2</sup> ) (minimum) to 350 gal/ min/ft <sup>2</sup> (240 liters/second/m <sup>2</sup> ) (maximum)

5. Seams
  - a. Get approval on the seams from the Engineer before use on a Project.
  - b. Use fabric that is sewn with thread of the same chemical requirements as the fabric, or use fabric bound with cement or heat. Either have the fabric bound or sewn at the point of manufacture or at a location approved by the Engineer.
  - c. Seam Uses: You may use one seam in edge drain and underdrain applications.

## Section 881—Fabrics

You may bond or sew fabric together to form sections at least 6 ft (1.8 m) wide for use under rip rap or behind retaining walls.

### 6. Fabric Use

- a. Use woven fabrics beneath rip rap when dropping stone from 3 ft (1 m) or less.
- b. You may use woven fabrics that meet the flow rate for edge drains.
- c. Use non-woven fabrics to line edge drains, underdrains, or behind retaining walls, where specified.
- d. Do not use non-woven fabrics for filter beneath rip rap.

### B. Fabrication

General Provisions 101 through 150.

### C. Acceptance

Test according to the following:

Test	Method
Puncture resistance	ASTM D 4833
Tensile strength, elongation, grab strength	ASTM D 4632
Bursting strength	ASTM D 3786
Percent open area	<a href="#">GDT 88</a>
Flow rate	<a href="#">GDT 87</a>

1. See [QPL 28](#) for acceptable woven and non-woven fabrics that meet the requirements of this Specification. See [QPL 47](#) for acceptable Geocomposite wall drains.
2. The Department will reject any fabrics that meet this Specification but fail to perform in actual use.

### D. Materials Care and Warranty

Wrap fabric in burlap or similar heavy duty protection during shipment and storage to protect it from mud, dirt, dust, and debris.

## 881.2.06 Pavement Reinforcement Fabric

### A. Requirements

#### Type I and Type II Pavement Reinforcement Fabric

1. Use pavement reinforcement fabric that has the following properties:
  - Is non-woven, heat-resistant material composed of polypropylene or polyester fibers
  - Can be saturated with asphalt cement
  - Can be placed smooth with mechanical devices and be without wrinkles
  - Can withstand the heat of asphaltic concrete mixes during paving operations
  - Can withstand normal field handling and construction operations without damage

For a list of sources, see [QPL 40](#).

- Meets the following physical requirements. The bid item or Plans will indicate which type of fabric is required for a Project.

	Type I	Type II
Tensile strength, minimum	90 lbs (400 N)	125 lbs (555 N)

**Section 881—Fabrics**

Elongation at break	40% min., 100% max.	40% min., 100% max.
Asphalt retention, minimum	0.18 gal/yd <sup>2</sup> (0.8 L/m <sup>2</sup> )	0.28 gal/yd <sup>2</sup> (1.3 L/m <sup>2</sup> )

2. Submit a certificate from the manufacturer that shows the physical properties of the material used and how it meets this Specification. Submit the certificate according to [Subsection 106.05, “Materials Certification.”](#)
3. Demonstrate to the Department that fabric meeting the physical properties requirements of this Specification has been used successfully in installations with similar environmental and Project conditions.

**High Strength Pavement Reinforcement Fabric**

1. Use pavement reinforcement fabric that has the following properties:
  - Is a flexible, water-resistant, high-density asphaltic membrane laminated between two layers of high strength, heat resistant polypropylene or polyester fabric.
  - Can be placed smooth with mechanical devices and be without wrinkles.
  - Can withstand the heat of asphaltic concrete mixes during paving operations.
  - Can withstand normal field handling and construction operations without damage.
  - May have a self-adhesive backing adhered to a film release liner.

For a list of sources, see [OPL 40](#).

- Meets the following physical requirements. The bid item or Plans will indicate which type of fabric is required for a Project.

Width, minimum	18 in (450 mm)
Tensile strength, minimum	1,800 lbs/in <sup>2</sup> (12 MPa)
Elongation	20% to 50%
Softening Point (Asphaltic membrane), minimum	190 °F (87 °C)
Caliper	0.135 inch (3.43 mm) 95% retained after loading
Pliability (Cold Flex) 2" (50 mm) X 5" (125 mm) specimen, condition specimen at 0 °F (-18 °C) for 1 hour, 180° bend on 2" (50 mm) mandrel	No Separation

2. Submit a certificate from the manufacturer that shows the physical properties of the material used and how it meets this Specification. Submit the certificate according to [Subsection 106.05, “Materials Certification.”](#)
3. Demonstrate to the Department that fabric meeting the physical properties requirements of this Specification has been used successfully in installations with similar environmental and Project conditions.

**B. Fabrication**

General Provisions 101 through 150.

**C. Acceptance**

**Type I and Type II Pavement Reinforcement Fabric**

**Section 881—Fabrics**

Test according to the following:

Test	Method
Tensile strength	ASTM D 4632 Grab
Elongation	ASTM D 4632 Grab
Asphalt retention	<a href="#">GDT 95</a>

**High Strength Pavement Reinforcement Fabric**

Test according to the following:

Test	Method
Tensile strength	ASTM D 412
Elongation	ASTM D 412
Softening Point	ASTM D 36
Caliper	ASTM D 1777
Pliability (Cold Flex)	ASTM D 146

**D. Materials Warranty**

General Provisions 101 through 150.

**881.2.07 Silt Fence Filter Fabric**

**A. Requirements**

1. Use approved silt fence from [QPL 36](#).
  - a. Type “A” and “B” Fences: Use either woven or nonwoven filter fabric for Type “A” and “B” fences. If using woven fabric, the fabric may have slit tape yarns in one direction (warp or fill) only.
  - b. Type “C” Fences: Use non-calendered woven fabric constructed with monofilament yarns only.

**NOTE: Approved fabrics must consistently exceed the minimum requirements of this Specification as verified by the Office of Materials and Research. If a fabric is removed from the Qualified Products List, do not use it in the work until the Department has reestablished the product’s acceptability.**

2. Ensure that silt fence filter fabrics have the following characteristics:
  - Has strong rot-proof synthetic fibers formed into either a woven or non-woven fabric
  - Has no treatment or coating that might significantly alter its physical properties after installation
  - Contains stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from exposure to sunlight or heat
  - Makes a pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other under normal handling, installation, and service conditions
  - Has finished fabric edges to prevent the outer yarn from pulling away from the fabric
  - Has no defects or flaws that would significantly affect its physical and/or filtering properties
  - Meets the following physical or dimensional requirements:

Type Fence	A	B	C

**Section 881—Fabrics**

Minimum tensile strength, pounds (newtons) (1)	Warp – 120 (530) Fill – 100 (445)	Warp – 120 (530) Fill – 100 (445)	Warp– 260 (1155) Fill – 180 (800)
Elongation (% Max.)	40	40	40
Apparent opening size (max. sieve size)	No. 30 (600 um)	No. 30 (600 um)	No. 30 (600 um)
Flow rate, gal/ min./ft <sup>2</sup> (L/min./m <sup>2</sup> )	25 (1015)	25 (1015)	70 (2850)
Ultraviolet stability (2)	80	80	80
Bursting strength, psi (kPa)	175 (1200)	175 (1200)	175 (1200)
Minimum fabric width	36 in (900 mm)	22 in (550 mm)	36 in (900 mm)
1. Minimum roll average of five specimens. 2. Percent of required initial minimum tensile strength.			

**B. Fabrication**

The fabric may be manufactured with pockets for posts, hems with cord, or with posts pre-attached using staples or button head nails.

Ensure that the fabric has the manufacturer’s mark, either with an approved color mark yarn in the fabric or the manufacturer’s name and product trade name labeled on the fabric at a minimum of 100 ft (30 m) intervals.

**C. Acceptance**

Test according to the following:

Test	Method
Tensile strength	ASTM D 4632
Elongation	ASTM D 4632
Apparent opening size	ASTM D 4751
Flow Rate	<a href="#">GDT 87</a>
Ultraviolet stability	ASTM D 4632 (after 300 hours weathering according to ASTM D 4355)
Bursting strength	ASTM D 3786, Diaphragm Bursting Strength Tester

**D. Materials Care and Warranty**

Wrap fabric in a heavy-duty protective covering during shipment and storage to protect it from mud, dirt, dust and debris.

Do not expose fabric to temperatures greater than 140 °F (60 °C).

**881.2.08 Filter Fabric for Embankment Stabilization**

See Special Provision.