

**INCH-POUND****MIL-PRF-44103D****19 November 1996****SUPERSEDING****MIL-C-44103C(GL)****19 July 1988****PERFORMANCE SPECIFICATION****CLOTH, FIRE, WATER AND WEATHER RESISTANT**

This specification is approved for use by all Departments and Agencies of the Department of Defense.

**1. SCOPE**

1.1 Scope. This specification covers four classes and two grades of fire, water and weather resistance cloth.

1.2 Classification. The cloth shall be furnished in the following classes and grades as specified (see 6.2).

Class 1 - Camouflage Green 483

Class 2 - Desert Tan 459

Class 3 - Pale Green (color # 34554) face/Black back

Class 4 - Gray (color # 36231) face/Black back

Grade A - With visual and image intensification blackout

Grade B - With visual blackout

**2. APPLICABLE DOCUMENTS**

2.1 General. The documents listed in this section are specified in sections 4 and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 4 and 5 of this standard, whether or not they are listed.

**Beneficial comments (recommendations, additions, deletions, clarifications) and any pertinent data which may be of use in improving this document should be addressed to: Defense Personnel Support Center, Clothing and Textiles Directorate, Attn: DPSC-FNS, 2800 South 20th Street, Philadelphia, PA 19145-5099 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter..**

**AMSC N/A****FSC 8305**

**DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.**

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### **2.2 Government documents.**

**2.2.1 Specifications, standards, and handbooks.** The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issue of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

### **SPECIFICATIONS**

#### **MILITARY**

MIL-B-44152 - Boots, Combat, Mildew and Water Resistant DMS

### **STANDARDS**

#### **FEDERAL**

FED-STD-4 - Glossary of Fabric Imperfections  
FED-STD-191 - Textile Test Methods  
FED-STD-595 - Colors Used in Government Procurement

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

**2.2.2 Other Government documents, drawings, and publications.** The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

#### **FEDERAL TRADE COMMISSION**

Rules and Regulations Under-the Textile Fiber Products Identification Act

(Copies are available from the Federal Trade Commission, Pennsylvania Avenue at Sixth Street, N.W., Washington, DC 20580-0001.)

#### **CODE OF FEDERAL REGULATIONS**

(Applications for copies of referenced documents should be addressed to U. S. Government Printing Office, Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328.)

**2.3 Non-Government publications.** The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

#### **AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

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(Applications for copies of referenced documents should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19426-2959.)

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

(Applications for copies of referenced documents should be addressed to the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY (TAPPI)

(Applications for copies of referenced documents should be addressed to TAPPI Press, Technology Park/Atlanta, P.O. Box 105113, Atlanta, GA 30348-5113.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection.

3.2 Standard sample. The finished cloth shall match the standard sample for shade and appearance and shall be equal to or better than the standard sample for colorfastness (see 6.3).

3.3 Performance requirements. The cloth shall conform to the requirements specified in Table I and 3.4 through 3.8.

TABLE I. Requirements

Characteristic	Requirements			
	Classes 1 & 2		Classes 3 & 4	
	Min	Max	Min	Max
Weight Oz/yd <sup>2</sup> (max)	--	13.5	--	15
Breaking Strength, lbs.				
Warp	320	--	320	--
Filling	250	--	250	--
Tearing Strength, lbs.				
Warp	11	--	11	--
Filling	7	--	7	--
Gloss (face side only) %				
60° specular gloss	--	2.0	--	--
85° specular gloss	--	2.0	--	--
Adhesion of coating, lbs/2 inch width <u>1</u> /: Face and back sides	6.0	--	10.0	--
Colorfastness to:				
Accelerated Weathering	Fair <u>2</u> /	--	Fair <u>2</u> /	--
Crocking, scale rating	1.5 <u>2</u> /	--	1.5 <u>2</u> /	--

**MIL-PRF-44103D**TABLE I. Requirements (continued)

Characteristic	Requirements			
	Classes 1 & 2		Classes 3 & 4	
	Min	Max	Min	Max
Hydrostatic Resistance (low pressure), cm				
Initial	80	--	--	--
After weathering	65 <u>3/</u>	--	--	--
After cold crack (-20°F)	65 <u>3/</u>	--	--	--
Hydrostatic Resistance (high pressure), psi				
Initial	--	--	300	--
After cold crack (-20°F)	--	--	250	--
After abrasion	--	--	250	--
Flame Resistance (5905) After flame, seconds:				
Initial:				
Warp	--	2	--	2
Filling	--	2	--	2
After weathering:				
Warp	--	2	--	2
Filling	--	2	--	2
Consumption, percent:				
Initial:				
Warp	--	50	--	50
Filling	--	50	--	50
After weathering:				
Warp	--	50	--	50
Filling	--	50	--	50
Melt-Drip:				
Initial	<u>4/</u>	--	--	<u>4/</u>
After Weathering	<u>4/</u>	--	--	<u>4/</u>
Stiffness inch-pounds Initial:				
Warp	--	0.020	--	--
Filling	--	0.020	--	--
At -20°F:				
Warp	--	0.040	--	--
Filling	--	0.040	--	--
After heat aging:				
Warp	--	0.040	--	--
Filling	--	0.040	--	--
Stiffness, cm, Warp only				
At 70°F:	--	--	--	15
At 70°F after accelerated weathering:	--	--	--	15
At -20°F:	--	--	--	16
At -20°F after oven aging	--	--	--	16
Blocking at 200°F	--	--	--	No.2
Abrasion resistance:	2.5 <u>5/</u>	--	<u>6/</u>	--
Static slip resistance index units				
At 73° F dry	--	--	7.0	--
At 73° F wet	--	--	7.0	--

1/ Requirement applies if a film or coating is applied to the surface of the cloth.

2/ Or equal to or better than the standard sample.

3/ The cloth shall not crack or flake.

4/ No specimen shall drop melted or flaming pieces.

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5/ Scale rating.

6/ There shall be no visible loose fibers in the abraded area of test specimen for the abrasion test and prior to hydrostatic resistance testing.

3.4. Opacity, (grades A and B). When grade A cloth is specified, the cloth shall transmit not more than 0.030 watts per square cm per steradian of combined visible and nonvisible light and not more than 0.020 foot-lamberts of visible light. When grade B cloth is specified, the cloth shall not transmit more than 0.020 foot-lamberts of visible light.

3.5 Color. The color of the face side of the cloth shall be Camouflage Green 483 for class 1 and Desert Tan 459 for class 2. For both classes, the color of the back side of the finished cloth shall be off-white, gray, or black or any other suitable color which will allow the face side of the cloth to be easily distinguished from the back. If color of the face and back sides of the cloth is the same, the face side shall be identified by applying a stamping on that side of the cloth with the word "Face" on each end of each individual piece. The color of the face side of the cloth shall be Pale Green shade no. 34554 of FED-STD-595 for class 3 and Gray shade no. 36231 of FED-STD-595 for class 4. For class 3 and 4 cloth, the back side of the cloth shall be black.

3.6. Spectral reflectance. The spectral reflectance of the face side of the cloth shall meet the requirements specified in Table II for classes 1 and 2.

TABLE II. Spectral reflectance requirements

Wavelengths Nanometers	Reflectance, %			
	Class 1		Class 2	
	Min	Max	Min	Max
600	5	12	--	--
620	5	12	--	--
640	5	12	--	--
660	5	13	--	--
680	6	15	45	65
700	9	21	45	65
720	15	30	45	65
760	32	50	45	65
780	38	56	45	65
800	41	60	45	65
820	43	63	45	65
840	45	65	45	65
860	46	66	45	65

3.7 Toxicity assessment. The cloth shall not be toxic to the skin, eyes or epidermis when used as intended (see 4.4.17).

3.8 Mildew resistance. The cloth shall be mildew resistant. If plastizers are used they should be restricted to phosphate or pthalate esters for the purpose of providing mildew resistance (see 4.4.18).

3.9 Fiber identification. Each roll shall be labeled and ticketed for fiber content in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

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3.10 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

**4. VERIFICATION**

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. When a first article is required (see 3.1 and 6.2) it shall be examined as specified in 4.3.1 and tested as specified in 4.3.2.

4.3 Conformance inspection. Sampling for inspection shall be as specified in the contract or purchase order.

4.3.1 End item Examination.

4.3.1.1 Visual examination. The cloth shall be examined for the defects listed below:

Defect

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Hole, cut, or tear  
 Objectionable odor 1/  
 Baggy, ridgy, or wavy cloth  
 Edge ravel when pulled outward  
 Slack or tight edges or selvages 2/  
 Not clean  
 Any piece not uniformly finished (if finished)  
 Tackiness (Cloth shall not block so as to cause surfaces to adhere or cause difficulty in unrolling.)  
 Color not uniform  
 Color mottled, blotchy, spotted, or streaky  
 Color not as specified

- 1/ Odors of chemicals commonly used in finishes (i.e., coatings and films) shall not be regarded as objectionable.
- 2/ To determine the presence of unacceptable edge or selva conditions, the following procedure shall be observed: During the visual examination, the perch shall be stopped a minimum of three times for each roll in the sample, the tension removed, and the finished cloth examined for the selva conditions. A waviness in the selva causing significant waviness or ripples within the body of the cloth is an indication of slack or tight edges or selvages.

4.3.1.2 Roll identification examination. During the yard-by-yard examination, each roll in the sample shall be examined for proper identification. Any roll in the sample that is not labeled or ticketed in accordance with the Textile Fiber Products Identification Act or any piece not marked with the word "Face", when required, shall be considered a roll identification defect.

4.3.1.3 Shade and appearance examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade and appearance. If any roll in the sample is off

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shade or shaded side to side, side to center, or end to end, or if any roll does not have the same appearance as the standard sample, it shall be considered a shade and appearance defect.

4.3.2 End item testing. The cloth shall be tested for the characteristics listed in Table III. The methods of testing specified, wherever applicable and as listed in Table III shall be followed. The sample unit shall be 5 continuous yards full width. The sample size shall be as shown below. The test reports shall contain the individual values utilized in expressing the final results.

Lot size (yards)	Sample size (sample units)
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

TABLE III. End item tests

Characteristic	Test method
Weight	ASTM D 3776 Method C (small swatch of fabric method)
Breaking strength	ASTM D 5034 (G-E or G-T)
Tearing strength	ASTM D 1424
Gloss (face side only)	ASTM D 523
Adhesion of coating	4.4.1
Colorfastness to: Weathering Croaking	5671 <u>1</u> / or 4.4.2.2 AATCC-8
Hydrostatic Resistance (low pressure) (Classes 1 & 2) Initial After weathering After cold crack	4.4.3 4.4.2 <u>2</u> / & 4.4.3 5874 <u>3</u> / & 4.4.3
Hydrostatic Resistance (high pressure) (Classes 3 & 4) Initial After cold crack After abrasion	4.4.4 5874 <u>3</u> / & 4.4.4 4.4.5 & 4.4.4
Flame Resistance Initial: After weathering:	5905 4.4.2 & 5905
Stiffness (Classes 1 and 2) Initial: At -20°F: After heat aging:	4.4.6 4.4.7 4.4.8
Stiffness (Classes 3 and 4) At 70°F: At 70°F after weathering At -20°F: At -20°F after oven aging:	4.4.9 4.4.10 4.4.11 4.4.12
Abrasion resistance:	4.4.5
Opacity: Combined visible & non visible light (grade A only) Visible light (grade A & B)	5780 <u>4</u> / 5781
Color	4.4.13
Spectral reflectance	4.4.14

**MIL-PRF-44103D**TABLE III. End item tests (continued)

Characteristic	Test method
Blocking at 200°F	4.4.15
Static Slip Resistance	4.4.16
Toxicity	4.4.17
Mildew resistance	4.4.18

- 1/ Except that filters shall be removed and exposure time shall be 100 hours.
- 2/ Except that the specimen shall be a minimum of 6 inches in any dimension.
- 3/ Except that the exposure temperature shall be  $-20^{\circ} \pm 5^{\circ}\text{F}$  and the exposure time shall be a minimum of 4 hours. The face side of the specimen shall be toward the outside of the fold.
- 4/ Except that the photometer shall be capable of measuring light energy over the wavelength range of 360 to 930 nanometers.

#### 4.4 Methods of inspection.

4.4.1 Adhesion of coating. ASTM-D-751, Adhesion of Coating with 2 inch wide reinforced coating adhesion specimens, cyanoacrylate (solventless) adhesive, and pulling clamp speed of 5 mm/s. Three specimens shall be tested by adhering face-to-face and three specimens shall be tested by adhering back-to-back.

4.4.2 Accelerated weathering procedure. The accelerated weathering procedure shall be as specified in either 4.4.2.1 or 4.4.2.2. The method used shall be reported.

4.4.2.1 Accelerated weathering procedure (carbon arc). Method 5804 of FED-STD-191 except that the filters shall be removed and the weathering procedure shall be as follows. Two swatches, each 13 by 22 inches, shall be cut from the sample unit. One swatch shall be cut with the long dimension in the direction of the warp; the other with the long dimension in the direction of the filling. The face side of the cloth shall be exposed to the light source. The swatches shall be exposed one above the other, in the quadrant of the accelerated weathering apparatus for 100 hours. The swatches shall be changed from the top to bottom racks and visa versa each time the carbons are changed (approximately 17 to 20 hours) during a 100-hour exposure period. At the conclusion of the 100-hour exposure period, the swatches shall be removed from the apparatus and allowed to dry and condition at Standard Conditions. Then five specimens for the fire resistance test shall be cut from each exposed swatch such that the direction being tested shall have been exposed to accelerated weathering in the vertical position. In conducting fire resistance tests on these specimens, three specimens shall be subjected to the flame at the end which was at the top of the exposed material, and two shall be subjected to the flame at the end which was at the bottom of the specimen. The lower edges of the fire resistance test specimens shall be trimmed, if necessary, so that a freshly cut end is exposed to the test flame.

4.4.2.2 Accelerated weathering procedure (xenon exposure). AATCC Method 169 except that the following deviations shall apply:

- a. The test apparatus shall be either test chamber type 1A or 1B. Type 1B shall be equipped with a three-tiered inclined specimen rack. The apparatus shall be equipped with an automatic light monitor and shall be capable of automatically controlling irradiance, temperature, and humidity. The apparatus shall be maintained in accordance with the manufacturer's recommendations.



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b. The weathering test cycle shall be 40 minutes of light, 20 minutes of light with water spray on the fabric face, 60 minutes of light, 60 minutes of darkness. The test cycle shall be repeated until the total energy exposure is equal to 100 kilojoules per square meter.

c. The irradiance level shall be  $0.55 \pm 0.01$  watt/square meter/nanometer (w/m<sup>2</sup>/nm) bandpass at 340 nanometers.

d. The glass filter combination shall be a quartz inner filter and a borosilicate type "S" outer filter.

e. The relative humidity shall be  $50 \pm 5$  percent during the light cycle and not lower than 95 percent during the dark cycle.

f. The control set points shall be as follows:

	<u>Dark cycle</u>	<u>Light cycle</u>
Black panel	38°C	77°C
Conditioning water	40°C	53°C
Wet bulb depression <u>1/</u>	0°C	10°C

1/ As a guide only; adjust to achieve required relative humidity (see e. above).

g. The test specimens shall fit the specimen rack of the apparatus with no wrinkles or gaps. The test specimen shall be mounted on the outside of the rack with the use of appropriate stainless steel spring clips. After the required exposure period, the specimens shall be removed from the apparatus and allowed to dry and condition at Standard Conditions. Then test specimens for each required test shall be cut and tested appropriately.

NOTE: Monitoring of dry bulb temperature, wet bulb depression, irradiance, and black panel temperature is recommended through the use of chart recorders.

4.4.3 Hydrostatic resistance (low pressure). ASTM D-751, Hydrostatic Resistance Procedure B (Pressure Application by a Rising Column of Water, Procedure 1 with water pressure applied to the face side of the cloth.

4.4.4 Hydrostatic resistance (high pressure). ASTM D-751, Hydrostatic Resistance Procedure A (Pressure Application by Mullen Type Hydrostatic Tester Procedure 1 with water pressure applied to the face side of the cloth.

4.4.5 Abrasion resistance test. ASTM-D-3886. The abradant shall be the face side of the cloth. Each specimen shall be abraded for 1,000 multidirectional cycles. After abrading, the specimens shall be evaluated for color change in accordance with AATCC Method 119, using the Gray Scale for Color Change. The class rating shall be averaged and then rounded to the nearest 0.5.

4.4.6 Initial stiffness test (classes 1 and 2). ASTM-D-747 except that eight specimens, four with the long dimension in the warp direction and four in the filling direction shall be cut from the sample unit and pressed between two glass plates having dimensions of approximately 8 inches by 8 inches by 1/8 inch. A 20-pound weight shall be placed on the top plate for 4 hours at Standard Conditions prior to determining the stiffness. The load scale reading shall be taken only at a 20-degree angular deflection for each specimen.

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4.4.7 Stiffness at low temperature test (classes 1 and 2). Stiffness test specimens shall be cut and conditioned as specified in 4.4.6. The weight shall then be removed. The plate/specimen assembly and the test instrument shall then be subjected to a temperature of minus  $20^{\circ} \pm 5^{\circ}\text{F}$  for not less than 1 hour and then tested at that temperature as specified in ASTM-D-747. The load scale reading shall be taken only at a 20-degree angular deflection for each specimen.

4.4.8 Stiffness after heat aging test (classes 1 & 2). A sample of the cloth to be tested shall be cut to measure 8 inches by 8 inches. The sample shall be hung vertically in a well ventilated oven at a temperature of  $200^{\circ} \pm 5^{\circ}\text{F}$  for 120 hours. The sample shall not be laid flat in the oven. The sample shall be removed from the oven and placed between glass plates with the dimensions stipulated in 4.4.6. A 20-pound weight shall be placed on the top plate for 4 hours at Standard Conditions. The sample shall then be removed from the glass plates and specimens shall be cut as specified in 4.4.6. Stiffness shall then be determined as specified in ASTM-D-747. The load scale reading shall be taken only at a 20-degree angular deflection for each specimen.

4.4.9 Stiffness at 70°F test (classes 3 and 4). TAPPI Method T-451, Preferred Procedure (1), warp direction only.

4.4.10 Stiffness at 70°F test after accelerated weathering (classes 3 and 4). Test specimens shall be exposed to the accelerated weathering test specified in 4.4.2 and tested for stiffness as specified in 4.4.9.

4.4.11 Stiffness at -20°F (classes 3 and 4). TAPPI Method T-451, Preferred Procedure (1), warp direction only, except that the test shall be performed at  $-20^{\circ}\text{F} \pm 5^{\circ}\text{F}$  after specimens and equipment have been conditioned at this temperature for a minimum of 4 hours before testing. Test shall be conducted in still air.

4.4.12 Stiffness at -20°F after oven aging (classes 3 and 4). Test specimens shall be exposed in a circulating air oven at  $180^{\circ}\text{F} \pm 2^{\circ}\text{F}$  for 100 hours, withdrawn from the oven and brought to equilibrium under standard conditions prior to testing. The conditioned sample shall then be tested for stiffness at  $-20^{\circ}\text{F}$  as specified in 4.4.11.

4.4.13 Matching. The color and appearance of the face side and the back side of the cloth shall match the standard sample or color number of FED-STD-595 when viewed under filtered tungsten lamps that approximate artificial daylight and that have a correlated color temperature of  $7500 \pm 200^{\circ}\text{K}$ , with illumination of  $100 \pm 20$  foot candles, and shall be a good match to the standard sample or color number of FED-STD-595 under incandescent lamplight at  $2300 \pm 200^{\circ}\text{K}$ .

4.4.14 Spectral reflectance measurements in the visible/near infrared. Spectral reflectance data for class 1 Camouflage Green 483 and class 2 Desert Tan 459 shall be obtained from 600 to 860 nanometers (nm) and 700 to 860 nm respectively, at 20 nm intervals on a spectrophotometer relative to a barium sulfate standard, the preferred white reference standard. Other white reference materials may be used, provided they are calibrated to absolute white; e.g., magnesium oxide, or vitrolite tiles. The spectral band width at 860 nm shall be less than 26 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates in the visible spectrum either CIE Source A or CIE Source D65. The specimen shall be measured as a single layer backed with two layers of the same fabric and shade. Readings shall be taken on a minimum of two different areas, and

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the data averaged. The specimen shall be viewed at an angle no greater than 10° from normal, with the specular component included. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nm. The standard aperture size used in the color measuring instrument shall be 1.0 to 1.25 inches in diameter. When the measured reflectance values for any color at four or more wavelengths do not meet the requirements specified in Table II or III, it shall be a test failure.

4.4.15 Blocking. ASTM D-751, Determination of Blocking Resistance of Fabrics Coated With Rubber or Plastics at Elevated Temperatures, except that test specimens shall be exposed at 200°F for 30 minutes.

4.4.16 Static slip resistance (Classes 3 and 4). Testing shall be performed in accordance with ASTM-F-609 with the following exceptions. Testing shall be conducted at a temperature of 73°F  $\pm$  3°F for dry and wet testing of the cloth and at -20°F  $\pm$  5°F for low temperature dry testing of the cloth; conditioning under controlled humidity is not required. The Horizontal Pull Slipmeter apparatus shall be modified such that the three "test samples" or feet of the apparatus shall be cut from rubber soles or sheet conforming to 3.3.7 of MIL-B-44152. The test samples or feet shall have dimensions of 1/2 inch diameter and 5/16 inch thickness and shall be positioned such that the smooth, flat and treadless surface is oriented toward the floor material. The coated cloth test specimens, 9 inches (min.) by 9 inches (min.) with edges aligned parallel to the warp and filling directions, shall be cleaned by washing with a solution of mild detergent and water, then thoroughly rinsed and then air dried; the coated cloth test specimen shall not be abraded as specified in paragraph 9.6. The specimen shall be laid flat, face side up, to form the floor material or test surface. The Horizontal Pull Slipmeter shall be placed on the test surface with pull direction parallel to the warp direction of the test surface and the test performed. The test shall be performed three more times on the test surface with the test surface rotated 90° after each test. The slip resistance of each test surface specimen shall be the average of the four maximum readings. Three test surface specimens shall be tested for static slip resistance and the result for each of the conditions (i.e., dry, wet and low temperature) shall be the average of the three specimens. For low temperature testing, the coated cloth test specimens shall be laid flat and conditioned, along with the Horizontal Pull Slipmeter, at -20°F for a minimum of 18 hours prior to testing; testing shall then be conducted at that temperature. Paragraphs 9.2, 9.19 and 10.2 through 10.5 of the test method are not required.

4.4.17 Toxicity. The cloth shall be tested for toxicity as follows:

- a) Title 40, Code of Federal Regulations, 1994 Edition;  
     Section 798.4100- Dermal Sensitization  
     Section 798.4470- Primary Dermal Irritation  
     Section 798.4500- Primary Eye Irritation  
     Marzulli, F. & H. Maibach, "Contact Allergy: Predictive Testing in Humans",  
     Advances in Modern Toxicology, Volume 4, pp 353-372, 1977.

b) As an alternative to animal and human testing, the contractor may provide information which certifies that the finished product was composed of chemicals or materials which have been safely used commercially where prolonged skin contact has occurred.

4.4.18 Mildew resistance. ASTM G-21.

**5. PACKAGING**

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5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

**6. NOTES**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The fabric is intended for use in manufacture of tents and tentage related items.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Class and grade of cloth required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. When first article is required (see 3.1 and 4.2).
- e. Width of cloth required.
- f. Length required.
- g. Levels of preservation and packing (see 5.1).

6.3 Sample. For access to standard sample, address the contracting activity issuing the invitation for bids.

6.4 Opacity testing. When equipment for opacity testing is not available to the contractor, a 1/4 yard full width sample should be cut from each sample unit and forwarded to U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 (ATTN: SSCNC-ITA), for opacity testing.

6.5 Subject term (key word) listing.

Blackout

Tents

Tent flies

Custodians:

Army - GL

Navy - NU

Air Force - 99

Preparing activity

DLA-CT

(Project 8305-0635)

Review activities:

Navy - MC

Air Force 45, 82

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

**INSTRUCTIONS**

1. The preparing activity must complete blocks 1, 2, 3, and 8, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
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MIL-PRF-44103D

**2. DOCUMENT DATE (YYMMDD)**

96-11-19

**3. DOCUMENT TITLE**

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**4. NATURE OF CHANGE** *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)***5. REASON FOR RECOMMENDATION****6. SUBMITTER**a. NAME *(Last, First, Middle Initial)*

b. ORGANIZATION

c. ADDRESS *(Include Zip Code)*d. TELEPHONE *(Include Area Code)*

(1) Commercial

7. DATE SUBMITTED

(YYMMDD)

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a. NAME

DLA-CT

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