

INCH-POUND

MIL-C-43627D

7 November 1990

SUPERSEDING

MIL-C-43627C

20 February 1986

MILITARY SPECIFICATION

CLOTH, DUCK, COTTON, PLIED YARNS, FIRE, WATER, WEATHER

AND MILDEW RESISTANT TREATED, LIGHT DRY FINISH

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

1. SCOPE

1.1 Scope. This specification covers one type of finished duck, treated for fire, water, weather and mildew resistance, using a light dry finish.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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).

SPECIFICATION

FEDERAL

CCC-D-950	- Dyeing and Aftertreating Processes for Cotton Cloths
PPP-P-1135	- Packaging of Duck Fabrics (Cotton; Synthetic Fiber; Cotton-Synthetic Fiber Blends)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014, 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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STANDARDS

FEDERAL

FED-STD-4 - Glossary of Fabric Imperfections
FED-STD-191 - Textile Test Methods

(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)

2.1.2 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.)

2.2 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 ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

Chromatic Transference Scale

AATCC Method 169 - Weather Resistance of Textile: Xenon Lamp Exposure

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 1424 - Tear Resistance of Woven Fabrics by Falling Pendulum
(Elmendorf) Apparatus

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

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(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 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 (see 6.3), in accordance with 4.3.

3.2 Standard sample. The finished cloth shall match the standard sample for shade and appearance and shall unless otherwise indicated be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

3.3 Material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3.1 Yarn. The yarn shall be made from cotton which has been carded, drawn, spun, and twisted into 2-ply yarns for both warp and filling.

3.4 Physical requirements. The greige and finished cloth shall conform to the requirements specified in table I when tested as specified in 4.4.3.

TABLE I. Physical requirements

	Weight oz/sq.yd.	Breaking strength pounds (minimum)		Tearing strength pounds (minimum)		Air permeability cu.ft./min/sq.ft. (maximum)
		Warp	Filling	Warp	Filling	
Greige	10 (min.)	170	150	6.0	6.0	4.0
Finished	17 (max.)	185	165	-	-	-

3.4.1 Weave. The weave shall be plain. The cloth shall be woven on either a fly-shuttle or a shuttleless loom. When the cloth is woven on shuttleless looms, the fringed selvages shall be secured by a leno-lock stitch and the protruding fringe shall not exceed 3/16 inch.

3.4.2 Width. The cloth shall be furnished in widths indicated below as specified (see 6.2) and shall be the minimum acceptable width inclusive of the selvage when fly shuttle looms or shuttleless with tuck-in selvage looms are used. For all other shuttleless looms the width measurement shall be made between the last warp yarn on each side excluding the protruding fringe(s).

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<u>Specified width of finished cloth</u> <u>Inches</u>	<u>Tolerance</u> <u>Inch</u>
36	+1/4 -1/2
46	+3/8 -1/2
59	+3/8 -5/8

3.5 Color. The color of the finished cloth shall be as specified (see 6.2) and shall match the standard sample. The color shall be obtained with carbon black or lamp black, inorganic or phthalocyanine pigments, or such other coloring materials to meet the requirements specified herein.

3.5.1 Matching. The color of the finished cloth shall match the standard sample when viewed under filtered tungsten lamps that approximate artificial daylight and that have a correlated color temperature of 7500 ± 200 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 200 K.

3.5.2 Colorfastness. The dyed and finished cloth shall show fastness to accelerated weathering equal to or better than the standard sample or equal to or better than a rating of "fair". The dyed and finished cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating of not lower than 1.5. Testing shall be as specified in 4.4.3.

3.5.3 Spectral reflectance. The spectral reflectance values (in percent) for the visible/near infrared wavelength range of 600 to 860 nanometers (nm) for shades Olive Green and Forest Green 433, and 700 to 860 nm for Desert Tan 459 and Tan 380 finished cloth shall meet the requirements specified in table II, when tested as specified in 4.4.3.

TABLE II. Spectral reflectance requirements

<u>Wavelength, Nanometers (nm)</u>	<u>Reflectance values (percent)</u>			
	<u>Olive Green shades and Forest Green 433</u>		<u>Desert Tan 459 and Tan 380</u>	
	<u>Min.</u>	<u>Max.</u>	<u>Min.</u>	<u>Max.</u>
600	4	10	-	-
620	4	10	-	-
640	5	10	-	-
660	5	10	-	-
680	6	12	-	-
700	9	25	45	65
720	17	36	45	65
740	29	46	45	65

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TABLE II. Spectral reflectance requirements (cont'd)

Wavelength, Nanometers (nm)	Reflectance values (percent)			
	Olive Green shades and Forest Green 433		Desert Tan 459 and Tan 380	
	Min.	Max	Min.	Max.
760	38	55	45	65
780	43	60	45	65
800	46	64	45	65
820	48	67	45	65
840	49	69	45	65
860	49	70	45	65

3.6 Nonfibrous material. The cloth, prior to finishing, shall contain not more than 2.5 percent starch and protein excluding chloroform-soluble and water-soluble material and not more than 5.0 percent starch and protein including chloroform-soluble and water-soluble material. Testing shall be as specified in 4.4.3.

3.7 Finish. The cloth shall be given an approved fire, water, weather and mildew resistant treatment (see 6.5).

3.7.1 Water resistance. Unless otherwise specified (see 6.2), the finished cloth initially and after accelerated weathering shall not show leakage greater than 50 mL when tested as specified in 4.4.3.

3.7.2 Flame resistance. The finished cloth initially, after accelerated weathering, and after water leaching shall have an after flame time of not greater than 2.0 seconds and an average char length of not greater than 4.5 inches when tested as specified in 4.4.3.

3.7.3 Mildew resistance. The cloth shall be mildew resistant treated in accordance with the methods specified in CCC-D-950. Unless otherwise specified, the Green Shades shall be treated with inhibitor (d) or (e) (copper-8-quinolinolate) and the Tan Shades shall be treated with inhibitor (a) (2,2' methylene-bis-(4-chlorophenol)) or (h) (a mixture of Zinc salts of dimethyl dithiocarbamic acid and 2 mercaptobenzothiazole).

3.8 Flexibility. The finished cloth shall show a bending moment of not more than 0.013 inch-pound initially and not more than 0.032 inch-pound after exposure at $0^{\circ} \pm 5^{\circ}\text{F}$ when tested as specified in 4.4.3.

3.9 Dimensional stability. The dimensional change of the finished cloth shall not exceed 2.0 percent when tested as specified in 4.4.3.

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3.10 Face identification. The face side of the cloth shall be identified by applying a stamping on that side of the cloth with the word "face" at each end of the roll.

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

3.12 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be in continuous pieces, each not less than 40 yards in length and shall be put-up in rolls as specified in 5.1.

3.13 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards when calculated as specified in section 4 shall not exceed the established maximum point values.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

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4 3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined as specified in 4.4.2 and tested as specified in 4 4 3

4 4 Quality conformance inspection.

4 4 1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4 4.2 End item examination.

4 4.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side only. When total yardage in the roll does not exceed 100 yards, the entire yardage in the roll shall be examined. When the total yardage in the roll exceeds 100 yards, only 100 yards shall be examined. All defects, as defined in section I of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit points as listed in 4 4 2.1.1 with the following exceptions: Glossary numbers 1, 2, 3, 5, 14, 26, 27, and 29 shall not be scored unless they exceed three times the thickness of the yarn. Misdraws and reed marks shall be scored if they result in a clearly noticeable separation of warp yarns. Only those slubs and knots which exceed three times the normal yarn size shall be scored. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any one roll within the sample shall be penalized more than four points. The sample size shall be 20 rolls. The lot shall be unacceptable if the points per 100 square yards of the total yardage examined exceeds 40.0 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 60.0 points. If one roll exceeds 60.0 points per 100 square yards, a second sample of 20 rolls shall be examined for individual roll quality only. The lot shall be unacceptable if one or more rolls in the second sample exceeds 60.0 points per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

<u>Total points scored in sample X 3600</u>	= Points per 100
Contracted width of cloth (inches) X Total yards inspected	square yards

4.4.2.1.1 Demerit points. Demerit points shall be assigned as follows:

For defects 3 inches or less in any dimension	- one point
For defects exceeding 3 inches but not exceeding 6 inches in any dimension	- two points
For defects exceeding 6 inches but not exceeding 9 inches in any dimension	- three points
For defects exceeding 9 inches in any dimension	- four points

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The following defects, when present, shall be scored four points for each yard in which they occur

- Objectionable odor
- Baggy, ridgy, or wavy cloth
- Width less than specified or fringed selvage(s) of shuttleless loom cloth not secured by leno-lock stitch or fringe protruding in excess of 3/16 inch
- Color not uniform; off shade (not within established tolerances); or shaded end to end, side to side, or side to center
- Poor dye penetration, mottled or cloudy streaks, or areas of color other than the designated shade
- Poorly constructed - not firmly or tightly woven
- Overall application of compound not uniform
- Edge ravels when pulled outward
- Slack or tight selvages 1/
- Overall uncleanness
- Clearly noticeable crystallization of mildew inhibitor
- Tackiness

1/ To determine the presence of unacceptable selvage 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 selvage conditions. A waviness in the selvage causing significant waviness or ripples within the body of the cloth is an indication of slack or tight selvages.

4.4.2.2 Length examination. During the yard-by-yard examination, each roll in the sample shall be examined for length. Any length found to be less than the minimum specified or more than 2 yards less than the length marked on the roll ticket shall be considered a length defect. The lot shall be rejected if two or more rolls in the sample are defective with respect to length or if the total of the actual lengths of rolls in the sample is less than the total of the lengths marked on the roll tickets.

4.4.2.3 Roll marking examination. During the yard-by-yard examination, each roll in the sample shall be examined for defects listed below. The lot shall be unacceptable if two or more of the following defects are present in the sample:

- Face stamping missing from either or both ends
- Face stamping on wrong side
- Not labeled, or ticketed in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

4.4.3 End item testing. The cloth shall be tested for the characteristics listed in table III. The methods of testing specified in FED-STD-191 wherever applicable and as listed in table III shall be followed. The physical and chemical values specified in section 3, (except where otherwise indicated)

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apply to the results of the determinations made on the sample unit for test purposes as specified in the applicable test methods, except that for the finished cloth weight, the lot average shall apply. The sample unit shall be as follows:

<u>Width of finished cloth</u>	<u>Sample unit of cloth prior to finishing</u>	<u>Sample unit of finished cloth</u>
Up to 50 inches	1-1/3 yards full width	3-1/4 yards full width
51 inches and over	1 yard full width	2-1/2 yards full width

The sample size shall be as shown below except for the inhibitor content. The sample unit for testing the inhibitor content shall be 1/4 yard of the finished cloth and the sample size shall be 5 for lots up to and including 22,000 yards in size, and 8 for all lots over 22,000 yards in size. For all requirements except weight, the lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. For the weight requirement, the lot shall be unacceptable if the average of the results of all determinations fails to meet any test requirement specified. Unless otherwise specified herein, all physical tests shall be performed under Standard Conditions as specified in FED-STD-191. Test reports shall contain the individual values utilized in expressing the final result.

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

TABLE III. End item tests

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Material identification	3.3.1	1200 <u>1</u> /
Yarn ply	3.3.1	Visual
Weight:		
Greige cloth	3.4	5041
Finished cloth	3.4	5041
Breaking strength:		
Greige cloth	3.4	5100
Finished cloth	3.4	5100
Tearing strength:		
Greige cloth	3.4	ASTM D 1424

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TABLE III. End item tests (cont'd)

Characteristic	Requirement paragraph	Test method
Air permeability Greige cloth	3.4	5450
Weave	3.4.1	Visual
Colorfastness to: Accelerated weathering	3.5.2	5671 <u>2/</u>
Crocking	3.5.2	5651
Spectral reflectance	3.5.3	4.5.1
Nonfibrous material	3.6	2611
Water resistance: Initial	3.7.1	5516 <u>3/</u>
After accelerated weathering	3.7.1	4.5.2 or 4.5.2.1 <u>2/</u>
Flame resistance: Initial:		
Char length	3.7.2	5903 <u>5/</u>
After flame time	3.7.2	5903 <u>5/</u>
After accelerated weathering:		
Char length	3.7.2	5903 <u>4/</u> <u>5/</u>
After flame time	3.7.2	5903 <u>4/</u> <u>5/</u>
After water leaching:		
Char length	3.7.2	5903 <u>5/</u> <u>6/</u>
After flame time	3.7.2	5903 <u>5/</u> <u>6/</u>
Fungicide	3.7.3	<u>7/</u>
Flexibility:		
Initial	3.8	4.5.3
At low temperature	3.8	4.5.3.1
Dimensional stability	3.9	4.5.4

1/ A certificate of compliance is required and will be acceptable for the requirement stated.

2/ The exposure time shall be 100 standard fading hours for TM 5671, Carbon Arc, or 100 kilojoules for Xenon.

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- 3/ The exposure time shall be 10 minutes and the hydrostatic head shall be 10 inches. If the test result fails to comply with 3.7.1, the test specimens shall be immersed in water at a temperature of 75° to 85°F to a depth of 2 inches for 2 hours and then retested while still wet. If the retested specimens meet requirements of 3.7.1, the cloth shall be considered as having passed the water resistance test. For Xenon accelerated weathering procedure the specimen size shall be 6 inches by 6 inches.
- 4/ The specimens shall be selected from samples subjected to the accelerated weathering procedure specified in 4.5.2. The exposure time shall be 100 standard fading hours for Method 5671, Carbon Arc, or 100 kilojoules for Xenon.
- 5/ Four specimens in each direction on (warp and filling) shall be tested.
- 6/ The specimens shall be leached for 24 hours in accordance with Method 5832 of FED-STD-191 before being tested for flame resistance after water leaching.
- 7/ The contractor shall indicate on his test report which fungicides were used.

4.4.4 Packaging inspection. The inspection of the preservation, packing, and container marking shall be in accordance with the quality assurance provisions of PPP-P-1135.

4.5 Methods of inspection.

4.5.1 Spectral reflectance test. Spectral reflectance data shall be obtained from 600 to 860 nanometers (nm) for Olive Green and Forest Green 433 and 700 to 860 nm for Desert Tan 459 and Tan 380, at 20 nm intervals on a spectrophotometer relative to barium sulfate standard, the preferred white reference standard. Other white reference materials may be used, provided they are calibrated to absolute white; e.g. Halon, magnesium oxide, or vitrolite tiles (see 6.6). The spectral band width shall be less than 26 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer (see 6.7) 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 will be taken on a minimum of two different areas and the data averaged. The specimen shall be viewed at an angle no greater than 10° from normal. Photometric accuracy of the spectrophotometer shall be within 1 percent and the wavelength accuracy within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. When the measured reflectance values at four or more wavelengths do not meet the limits specified in 3.5.3, it shall be a test failure.

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4.5.2 Accelerated weathering procedure (carbon arc). The apparatus and procedure shall be in accordance with Method 5804 except that the filters shall be removed and the weathering procedure shall be as follows. Two swatches, each 13 by 28 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. When the width of the sample unit does not permit a full 28-inch swatch to be taken in the filling direction, two 13 by 14-inch swatches shall be cut. 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 swatch 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. Then four specimens for the fire resistance test shall be cut from each exposed swatch. All specimens shall be conditioned at Standard Conditions prior to testing. The four specimens shall be cut 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.

4.5.2.1 Accelerated weathering procedure (xenon lamp exposure). The test procedure shall be in accordance with 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.

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 ± 0.01 watt/square meter/nanometer ($\text{W/m}^2/\text{nm}$) 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 ± 5 percent during the light cycle and not lower than 95 percent during the dark cycle.

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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 (see 6.8).

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

4.5.3 Flexibility test. The test shall be conducted in accordance with Method 5202 of FED-STD-191 with the following modifications:

Load scale reading - The load scale reading shall be taken at a 20 degree angular deflection of the specimen.

Specimens - Eight specimens, 1 inch by 2 inches, shall be cut, four with the long dimension in the warp direction and four in the filling direction, and pressed between two 6 by 6-inch glass plates weighted with a 20-pound weight for 4 hours at Standard Conditions, prior to testing.

Determinations - Average of four determinations to the nearest 0.001 inch-pound in each direction.

4.5.3.1 Flexibility at low temperature. Flexibility test specimens shall be prepared as specified in 4.5.3. The weight shall then be removed. The plate/specimen assembly and the test instrument shall then be subjected to a temperature of $0^{\circ} \pm 5^{\circ}\text{F}$ for not less than 1 hour and then tested at that temperature. Four specimens shall be tested in each direction (warp and filling) and their results averaged respectively and reported to the nearest 0.001 inch-pound.

4.5.4 Dimensional stability. A length of cloth approximately 40 inches long shall be drawn from the finished roll (the cloth may be left intact), and immediately marked by two lines 3 feet apart and perpendicular to the selvage. This sample length shall then lay on a flat horizontal surface under standard conditions for at least 24 hours. The distance between the lines marking the 3-foot distance shall be remeasured at three locations and the average percent change in length for the three locations recorded.

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5 PACKAGING

5.1 Put-up and preservation Put-up and preservation shall be level A or Commercial as specified (see 6.2).

5.1.1 Levels A and Commercial. The cloth shall be put-up and preserved in accordance with the applicable requirements of PPP-P-1135.

5.2 Packing. Packing shall be level A, B, or Commercial as specified (see 6.2).

5.2.1 Levels A, B, and Commercial. The cloth shall be packed in accordance with the applicable requirements of PPP-P-1135.

5.3 Marking In addition to any special marking required in the contract or purchase order, shipments shall be marked in accordance with the requirements of PPP-P-1135.

6. NOTES

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

6.1 Intended use. Cotton duck cloth treated for fire, water, weather and mildew resistance is intended for use in manufacture of tents and tent flies.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1).
- c. When first article is required (see 3.1, 4.3, and 6.3).
- d. Width of cloth required (see 3.4.2).
- e. Color required (see 3.5).
- f. Water resistance requirement, if other than specified (see 3.7.1)
- g. Mildew inhibitor, if other than required (see 3.7.3).
- h. Length of roll, if other than specified (see 3.12).
- i. Levels of put-up, preservation and packing (see 5.1 and 5.2).

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instruction in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

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6.4 Sample For access to samples, address the contracting activity issuing the invitation for bids or request for proposal.

6.5 Formula approval Approval of formulations is the responsibility of the U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 and is based on extensive tests including those for toxicity which are not set forth in this document. Because of the time required to evaluate and approve new treatments (approximately 6 months), only those chemical treatments already approved will be considered acceptable for the related procurement. Information pertaining to approval of new treatments should be obtained from the U.S. Army Natick Research, Development, and Engineering Center. The list of approved treatments may be obtained from the contracting activity.

6.6 White standard. Barium sulfate of suitable quality for use as a white reference standard is available from the Eastman Kodak Company. The same source has available, magnesium reagent (ribbon) and Halon. Suitable tiles can be obtained from the National Bureau of Standards or the instrument manufactureres.

6.7 Spectrophotometers. Suitable spectrophotometers for measuring spectral reflectance in the visible/near infrared are the Diano Hardy, Diano Match Scan, Hunter D54P-IR and Macbeth 1500 with IR options.

6.8 Clips. Style 2235-4E stainless steel spring clips have been found appropriate for securing the fabric to the rack and are available from John F. Maguire Company, Inc., 121 Bacon Street, Pawtucket, RI 02860.

6.9 Subject term (key word) listing.

Tent

Tent flys

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - GL

Navy - NU

Air Force - 99

Preparing activity:

Army - GL

(Project 8305-0361)

Review activities:

Army - MD

Navy - MC

Air Force - 82

DLA - CT

User activity:

Air Force - 45

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

- 1 The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
- 2 The submitter of this form must complete blocks 4, 5, 6, and 7.
- 3 The preparing activity must provide a reply within 30 days from receipt of the form.

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I RECOMMEND A CHANGE:		1 DOCUMENT NUMBER MIL-C-43627D	2 DOCUMENT DATE (YYMMDD) 1990 November 7
3 DOCUMENT TITLE CLOTH, DUCK, COTTON, PLIED YARNS, FIRE, WATER, WEATHER AND MILDEW RESISTANT TREATED, LIGHTDRY FINISH			
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 (2) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
NAME U.S. Army Natick RD&E Center		b. TELEPHONE (Include Area Code) (1) Commercial 508-651-4532 (2) AUTOVON 256-4532	
c. ADDRESS (Include Zip Code) Commander, U.S. Army Natick RD&E Center ATTN: STRNC-IRT Natick, MA 01760-5014		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	