

INCH-POUNDS

MIL-C-21852F  
 6 February 1989  
SUPERSEDING  
 MIL-C-21852E  
 25 August 1981

## MILITARY SPECIFICATION

## CLOTH, TAFFETA, NYLON

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

## 1. SCOPE

1.1 Scope. This specification covers the requirements for a nylon taffeta cloth suitable both as a base fabric without coating or for coating with chloroprene rubber or other type coatings.

\* 1.2 Classification. The cloth shall be of the following types as specified (see 6.2):

Type I	- 1.2 oz/yd <sup>2</sup> (41g/m <sup>2</sup> )
Type II	- 1.5 oz/yd <sup>2</sup> (51g/m <sup>2</sup> )
Type III	- 2.0 oz/yd <sup>2</sup> (68g/m <sup>2</sup> )
Class 1	- Plain finish
Class 2	- Water repellent treated
Type IV	- 1.9 oz/yd <sup>2</sup> (64g/m <sup>2</sup> )

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Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760-2490 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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AMSC N/A

FSC 8305

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## \* 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 issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

## FEDERAL

V-T-295 - Thread, Nylon  
 PPP-P-1133 - Packaging of Synthetic Fiber Fabrics

## STANDARDS

## FEDERAL

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

## MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

(Unless otherwise indicated, copies of federal and military specifications, standards and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-9099.)

\* 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.

## Rules and Regulations Under the Textile Fiber Product Identification Act

(Application for copies should be addressed to the Federal Trade Commission, Washington, DC 20580-0001.)

\* 2.2 Non-Government publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the documents cited in the solicitation.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS

D1424 Test for 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 19103-1187.)

TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

Method No. 8 - Colorfastness to Crocking: AATCC Crockmeter Method

(Application for copies should be addressed to the AATCC National Headquarters, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

(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 Standard sample. The finished cloth shall match the standard sample for shade, and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 First article. When specified, the contractor shall furnish sample unit(s) for first article inspection and approval (see 4.3 and 6.2).

3.3 Material. (see 6.6)

3.3.1 Fiber.

\* 3.3.1.1 Type I and II. The fiber shall be a polyamide prepared from hexamethylene diamine and adipic acid or its derivatives and shall have a minimum melting point of 472°F (244°C) when tested as specified in 4.5.

\* 3.3.1.2 Type III and IV. The fiber shall be first quality semi-dull regular tenacity nylon when tested as specified in 4.5.

3.3.2 Yarn.

3.3.2.1 Type I. The yarn shall be multifilament, nominal 50 denier (5.6 Tex) for the warp and filling, when tested as specified in 4.5.

3.3.2.2 Type II. The yarn shall be multifilament nominal 50 denier (5.6 Tex) for the warp and nominal 70 denier (7.6 Tex) for the filling when tested as specified in 4.5.

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3.3.2.3 Type III and Type IV. The yarn shall be continuous filament, nominal 70 denier (7.6 Tex) for both the warp and filling, when tested as specified in 4.5.

\* 3.4 Physical requirements. The finished cloth shall conform to the requirements in Table I when tested as specified in 4.5.

Table I - Physical requirements

Characteristic	Type I	Type II	Type III	Type IV
Weight oz/yd <sup>2</sup> (g/m <sup>2</sup> )	1.2 (41) (max)	1.5 (51) (max)	2.0 (68) (min) 2.3 (78) (max)	1.75 (59) (min) 2.05 (69) (max)
Yarns per inch (2.54cm) (min)				
Warp	100	95	106	100
Filling	66	65	92	68
Breaking Strength lbs (N) (min)				
Warp	80 (356)	75 (334)	110 (498)	110 (498)
Filling	55 (245)	75 (334)	95 (423)	85 (378)
Tearing Strength lbs (N) min.				
Warp	4.0 (18)	4.0 (18)	3.64 (16)	5.0 (22)
Filling	4.0 (18)	6.0 (27)	2.97 (13)	3.5 (16)
Air permeability, ft <sup>3</sup> /min/ft <sup>2</sup> (cm <sup>3</sup> /sec/cm <sup>2</sup> )	120 ± 20 (61.0 ± 10.2)	70 ± 15 (35.6 ± 7.6)	-	-
Flex stiffness, in-lbs X 10 <sup>-4</sup> (max) (N.m) <u>1/</u>				
Warp	-	-	1.5 (0.17)	-
Filling	-	-	0.5 (0.06)	-

1/ When specified (see 6.2).

\* 3.4.1 Weave. The weave shall be a taffeta (plain weave), when tested as specified in 4.5.

\* 3.4.2 Width. The width of the finished cloth shall be as specified (see 6.2) and shall be the minimum acceptable width inclusive of selvages when fly shuttle or shuttleless looms with tuck-in selvages are used. For all other shuttleless looms the width measurement shall be made between the last warp yarn on each side with the protruding fringe excluded.

\* 3.5 Color. The color shall be Camouflage Green 483 (see 6.7) or as specified (see 6.2) and shall match the standard sample.

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

\* 3.5.2 Colorfastness.

3.5.2.1 Type I and II. The finished cloth shall show fastness to light, water, and crocking equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available the finished cloth shall show a minimum of "good" fastness to light and water, and shall show a wet and dry crocking rating not lower than 3.0.

3.5.2.2 Type III, class 1 only and type IV. The finished cloth shall show fastness to light, laundering, perspiration, dry cleaning, and crocking equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available, the finished cloth shall show a minimum of "good" fastness to light, laundering, perspiration, and dry cleaning, and shall show a wet and dry crocking rating not lower than 3.0.

\* 3.5.2.3 Type III, class 2 only. The finished cloth shall show fastness to light, dry cleaning, laundering, perspiration, and crocking equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available, the finished cloth shall show a minimum of "good" fastness to light, dry cleaning, laundering, and perspiration and shall show a wet and dry crocking rating not lower than 3.0.

\* 3.5.3 Spectral reflectance. Cloth dyed Camouflage Green 483 shall conform to the reflectance values specified below when tested as specified in 4.5.4.

Spectral Reflectance Requirements

<u>Wavelength</u> Nanometers (nm)	<u>Reflectance (%)</u>	
	Max.	Min.
600	10	3
620	10	3
640	10	3
660	11	3
680	13	3
700	28	4
720	40	5
740	52	7
760	60	11
780	64	17
800	67	24
820	70	32
840	71	37
860	73	40

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3.6 Length and put-up. Unless otherwise specified (see 6.2), the finished cloth shall be furnished in continuous lengths, each not less than 40 yards (36.4m) for type III and IV cloth and 75 yards (68.2m) for type I and II cloth. Each length shall be put up on full width rolls as specified in 5.1.

3.7 Finish. The cloth shall be scoured and heat set. The types I, II, and IV cloths may be calendered. Type III cloth shall not be calendered.

\* 3.7.1 Permanence of finish (type I and II). The finished cloth shall have the following requirements when tested as specified in 4.5:

a. The air permeability readings taken after testing shall be within 15 percent of the readings taken before testing.

b. The cloth thickness after testing shall not exceed 10 percent more than before testing.

c. The shrinkage after testing shall not exceed 2 percent in either the warp or filling direction. The preshrinking process used shall not be identified by name or by trademark either on cloth, ticket, or package.

3.7.2 Heat setting (type III and IV). The cloth shall be fully heat set at a minimum temperature of 400°F (204°C). The cloth shall show no appreciable change in color, distortion, or puckering and not more than 2.0 percent dimensional change in either the warp or the filling direction when tested as specified in 4.5.

3.7.3 Nonfibrous materials. The finished cloth shall not exceed 1.0 percent (type III class 1 only, and type IV) and 2.0 percent (types I and II) starch and protein content including chloroform-soluble and water-soluble material when tested as specified in 4.5.

3.7.4 pH. The pH of the water extract of the finished cloth shall be no less than 5.0 nor more than 8.5 when tested as specified in 4.5.

\* 3.7.5 Water repellent treatment (type III, class 2 only). The cloth shall be given an approved fluorocarbon water repellent treatment (see 6.5) and shall conform to the requirements of 3.7.5.1 and 3.7.5.2 when tested as specified in 4.5.

\* 3.7.5.1 Dynamic absorption. The dynamic absorption initially and after 3 launderings shall be not more than 8 percent for the average of the sample units with no sample unit greater than 10 percent when tested as specified in 4.5.

\* 3.7.5.2 Spray rating. The results of the three individual determinations on the sample unit for spray rating shall be equal to or better than ratings 100, 100, 90 initially and 80, 80, 70 after 3 launderings when tested as specified in 4.5.

\* 3.7.6 Resistance to organic liquids (type III, class 2 only). The finished cloth shall show no wetting by n-tetradecane initially and after 3 launderings when tested as specified in 4.5.

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\* 3.7.7 Silicone oil. Type I and II finished cloth shall contain a silicone oil so applied that it is evenly distributed throughout the cloth. The amount of oil added shall be from 0.3 percent to 0.5 percent based on the weight of the dry cloth. The finisher shall submit a certification for each shippers' roll, indicating that the silicone oil was used (see 6.2 and 6.10).

3.8 Seam slippage (types I and II). The load required to separate the seam 1/2 inch (1.3cm) shall be as stated below in either the warp or filling direction when tested as specified in 4.5:

Type I - 10 pounds (44N) (min)  
 Type II - 20 pounds (89N) (min)

3.9 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.

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

3.10 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards (83.6m<sup>2</sup>), when calculated as specified in Section 4, shall not exceed the established maximum point value.

#### 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 order, the contractor may use his own or any other facilities suitable for 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 the 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 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 acceptance of defective material.

4.1.2 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

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

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. When required (see 3.2 and 6.2), the first article shall be visually examined for appearance, color, finish, and visual defects (see 4.4.2.1) and shall be tested for physical and chemical properties in accordance with the methods specified in 4.5.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

\* 4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable procurement documents.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.5.

\* 4.4.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side only. When the total yardage in the roll does not exceed 100 yards (91.4m) the entire yardage on the roll shall be examined. When the total yardage in the roll exceeds 100 yards (91.4m), only 100 yards (91.4m) shall be examined. All defects as defined in Section III of FED-STD-4 which are clearly noticeable at normal inspection distance (3 feet) (.91m) shall be scored and assigned demerit points as listed in 4.4.2.2 except that only those slubs and knots which exceed the limit shown on Sears Fabric Defect Scale (see 6.4), "C" or "4" (as applicable) for slubs and "B" for knots, shall be scored. No liner yard (increments of 1 yard (0.91m) 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 in accordance with the following:

<u>Lot size (yards)</u>	<u>Sample size (rolls) 1/</u>
3200 or less	8
3201 up to and including 10,000	13
10,001 and over	20

1/ No more than one roll shall be taken from any shipping container unless the number of shipping containers in the lot is less than the required number of rolls in which case all shipping containers shall be present in the sample.

The lot shall be unacceptable if the points per 100 square yards (83.6m<sup>2</sup>) of the total yardage examined exceeds the following:

- 30 points for type I, II, and IV cloth
- 16 points for type III cloth



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The lot shall be unacceptable if the points per 100 square yards (83.6m<sup>2</sup>) of two or more individual rolls exceeds the following:

- 45 points for type I, II, and IV cloth
- 24 points for type III cloth

If one roll exceeds the point level, a second sample of the same number of rolls as in the first sample shall be examined only for individual roll quality. The lot shall be unacceptable if one or more rolls in the second sample exceeds the point level. Point computation for lot quality and individual roll quality shall be as follows:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Contracted width of cloth (inches)} \times \text{total yards inspected}} = \text{Points per 100 square yards (83.6m}^2\text{)}$$

\* 4.4.2.2 Demerit points. Demerit points shall be assigned as follows:

- For defects up to and including 3 inches (7.6cm) in any dimension - one point
- For defect exceeding 3 inches (7.6cm) but not exceeding 6 inches (15.2cm) in any dimension - two points
- For defects exceeding 6 inches (15.2cm), but not exceeding 9 inches (22.9cm) in any dimension - three points
- For defects exceeding 9 inches (22.9cm) in any dimension - four points

The following defects when present, shall be scored four points for each yard (.9m) in which they occur:

- Baggy, ridgy, or wavy cloth
- Poor dye penetration, mottled, streaky, or cloudy
- Width less than specified
- Holes, cuts, tears, open places
- Objectionable odor
- Characteristics of finish, hand, and shade not equal to the standard sample

4.4.2.3 Examination for length.

4.4.2.3.1 Individual rolls. 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 two yards (1.8m) less than the length marked on the ticket shall be considered a defect with respect to length. The lot shall be unacceptable if two or more rolls in the sample are defective in respect to length.

4.4.2.3.2 Total yardage in sample. The lot shall be unacceptable if the total of the actual lengths of rolls in the sample is less than the total of lengths marked on the ticket. The rolls examined shall be those selected for the examination of individual rolls.

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4.4.2.4 Examination for shade variation. During the yard-by-yard examination, each roll in the sample shall be examined for shade variation. Any roll in the sample exhibiting uneven shade, shade variation side to side, side to center, or end to end, shall be cause for rejection of the entire lot represented by the sample.

\* 4.4.2.5 Examination for face identification, non-identification of preshrinking process, and compliance with Textile Fiber Products Identification Act. 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 identification missing from either or both ends  
 Face identification on wrong side  
 Preshrinkage process identified by name or trademark on cloth or ticket  
 Not labeled or ticketed in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act

4.4.3 Examination of packaging requirements. An examination shall be made in accordance with the provisions of PPP-P-1133 to determine that packaging, packing, and marking comply with Section 5 requirements.

\* 4.5 Tests. The methods of testing specified in FED-STD-191 wherever applicable, and as listed in Table II shall be followed. The physical and chemical values specified in Section 3, except where otherwise specified, apply to the results of the determinations made on the sample unit for test purposes as specified in the applicable test methods. All test reports shall contain the individual values utilized in expressing the final result. The sample unit for the test purposes shall be 2 continuous yards (1.8m) for type I, II, and IV cloth and 3-1/2 continuous yards (3.2m) for type III cloth full width of the finished cloth. The lot size shall be expressed in units of one yard (.91m). The lot shall be unacceptable if one or more sample units fail to meet any of the test requirements specified. The sample size shall be in accordance with the following:

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

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TABLE II - Test methods

Characteristic	Requirement paragraph	Test method
Fiber identification	3.3.1	1/
Yarn denier	3.3.2	1/
Weight	3.4	5041
Yarns per inch	3.4	5050
Breaking strength	3.4	5100
Tear strength	3.4	ASTM-D1424-63 <u>2/</u>
Air permeability	3.4	5450
Flex stiffness	3.4	5206
Weave	3.4.1	Visual <u>3/</u>
Colorfastness to:		
Laundering	3.5.2	5614 <u>4/</u>
Crocking	3.5.2	AATCC <u>TM</u> 8-1985
Perspiration	3.5.2	5680
Dry cleaning	3.5.2	5620
Light	3.5.2	5660 <u>5/</u>
Water	3.5.2	5630
Spectral reflectance	3.5.3	4.5.4
Permanence of finish		
Air permeability	3.7.1	4.5.2
Thickness	3.7.1	4.5.2
Shrinkage	3.7.1	4.5.2
Heat setting	3.7.2	4.5.1
Nonfibrous materials	3.7.3	2611
pH	3.7.4	2811
Water repellency (Type III, Class 2 only)	3.7.5	<u>6/</u>
Dynamic absorption		
Initial	3.7.5.1	5500
After 3 launderings	3.7.5.1	5552, 5500 <u>7/</u>
Spray rating		
Initial	3.7.5.2	5526
After 3 launderings	3.7.5.2	5552, 5526 <u>7/</u>
Resistance to organic liquid		
Initial	3.7.6	4.5.3
After 3 launderings	3.7.6	5552, 4.5.3 <u>7/</u>
Seam slippage	3.8	5420 <u>8/</u>

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

2/ Standard instrument with one augmenting weight.

3/ One determination per sample unit and the result reported as "pass" or "fail".

4/ Only the stain on the nylon fibers of the color transfer cloth shall be evaluated.

5/ Total exposure time shall be 20 hours for type III cloth only.

6/ The contractor shall report the water repellents used.

7/ Specimens shall be subjected to 3 complete cycles (wash and dry) prior to determination of dynamic absorption, spray rating, and resistance to organic liquid after laundering.

8/ The following exception to method 5420 shall be made:

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- a. Test machine shall have a maximum capacity of 75 pounds (34.1Kg)
- b. The use of 2 inch (5.08cm) front jaws is permissible
- c. Type I, Class 1, size E nylon thread conforming to V-T-295
- d. Eight stitches per inch shall be used

4.5.1 Heat resistance. The test specimen shall consist of a square cloth at least 12 by 12 inches (30.5 by 30.5cm). It shall be laid flat without tension, and marked off with a square 10 by 10 inches (25.4 by 25.4cm), having sides parallel to the warp and filling directions of the cloth. The test specimen shall be arranged on a tray and placed in an oven maintained at  $280 \pm 2^{\circ}\text{F}$  ( $138 \pm 1^{\circ}\text{C}$ ), for a period of two hours. At the end of this period, the specimen shall be removed from the oven, and conditioned under standard atmospheric conditions. The specimen shall then be measured for dimensional changes at three points of the 10 inch (25.4cm) square. The measurements shall be made at least one inch (2.5cm) from the edge of the square and at the center of the square in the warp and filling direction. The specimen shall then be visually compared with the original unheated fabric for distortion, puckering, or change in color. The change in color shall be evaluated in accordance with the evaluation specified in Method 5662 of FED-STD-191. One specimen shall be tested from each sample unit. The dimensional change of the sample unit in the warp and filling direction shall be the average of the specimens tested from each direction, respectively, and shall be reported separately to the nearest 0.1 percent. Distortion and puckering shall be reported as "pass" or "fail".

4.5.2 Permanence of finish. Two 20-inch (50.8cm) square specimens of the cloth shall be prepared. Using a template and indelible ink, an 18 inch (45.7cm) square shall be marked on each specimen. The specimens shall be subjected to the air permeability and thickness tests in accordance with Methods 5450 and 5030 of FED-STD-191. A container of adequate size to accommodate both specimens, prepared as described below, shall be filled to within 3 inches (7.6cm) of the top with water which shall be heated to a rapid boil. Both specimens shall be placed in the boiling water in a "skein" form prepared by stapling the two opposite sides of a specimen together to form a loop or skein. One specimen shall have the warp yarns vertical in the "skein" and the other specimen shall have the filling yarns vertical. Each specimen shall then be placed over a glass rod 1/4 inch (.6cm) in diameter and 21 inches (53.3cm) in length. A glass tube, 1/4 inch (.6cm) in diameter and 21 inches (53.3cm) in length, and approximately 100 grams in weight, shall be placed inside each loop at the bottom. Both loops shall then be suspended freely in the boiling water bath by attaching each with twine or wire to glass rods which are 1/4 inch (.6cm) in diameter and of sufficient length to rest on the top of the container. The specimen shall be subjected to the action of the boiling water bath for a period of 15 minutes, after which they shall be removed from the bath and allowed to drain for a few minutes, the staples shall be removed from the specimens and the specimens shall be placed flat on a horizontal screen to air dry. After the specimens are thoroughly dry they shall be exposed for at least 4 hours to a standard atmospheric condition of  $65 \pm 2$  percent relative humidity and a temperature of  $70^{\circ} \pm 2^{\circ}\text{F}$  ( $21.7 \pm 1^{\circ}\text{C}$ ). The 18-inch square (46.7cm) shall be measured to the nearest 0.01 inch (0.25mm) in 6 places, 3 in the warp direction and 3 in the filling direction. The results of the warp skein and filling skein tests for thickness, air permeability, and shrinkage shall be averaged, and acceptance based on the average results. The percentage of shrinkage in either the warp or filling direction shall be computed as follows:

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$\frac{18 - \text{distance between marks after boiling} \times 100}{18} = \text{percent shrinkage}$

The specimen shall again be subjected to the air permeability and thickness test to determine conformance to 3.7.1.

\* 4.5.3 Resistance to organic liquid test. Place a small specimen of the cloth face up on a smooth horizontal surface. Using a pipette or eye dropper, gently deposit one drop of n-tetradecane on the surface of the specimen. After one minute, examine the specimen under light at an angle. Absence of light reflectance at the fabric-drop interface shall be taken as evidence of wetting. Three specimens (or areas) taken at various locations across the sample shall be tested. Evidence of wetting on one or more specimens shall constitute a test failure.

\* 4.5.4 Spectral reflectance test. Spectral reflectance data shall be obtained from 600-860 nm relative to a barium sulfate standard, the preferred white reference standard (see 6.8). Other reference white standards may be used provided they are calibrated to an absolute white; i.e., Halon, magnesium oxide, or vitrolite tile. The spectral band width at 860 nm shall be less than 26 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer (see 6.9) shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65 in the visible spectrum. The specular component of reflection shall be included in the measurement. Specimens shall be measured as a single layer of fabric backed by seven layers of the same fabric. Reading 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 degrees from normal. Photometric accuracy of the spectrophotometer shall be within 1 percent; and the wavelength accuracy shall be within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. Failure of the near-infrared spectral reflectance requirements will occur when spectral reflectance limits are exceeded at four or more specified wavelengths.

## 5. PACKAGING

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

\* 5.1.1 Levels A or C. The cloth shall be put-up and packaged in accordance with the applicable requirements of PPP-P-1133.

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

5.2.1 Levels A, B, and C. The cloth shall be packed in accordance with the applicable requirements of PPP-P-1133.

5.3 Marking. In addition to any special marking required by the contract or order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1133.

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## 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 cloth covered by this specification is intended for use in the following:

- Type I and II - For use in fabrication of Army cargo parachutes
- Type III - For use in fabrication of special clothing (Navy) Linings in uniform clothing (Army and MC), Sleeping bags (Army)
- Type IV - For use in linings of uniform clothing (AF, Navy, CG and Army)

\* 6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type and class of cloth required (see 1.2).
- c. Color of cloth required (see 3.5).
- d. When silicone oil is used (see 3.7.7).
- e. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).
- f. When first article sample is required (see 3.2 and 4.3). The item will be tested and should be a first article sample. The contracting officer should include specific instruction in acquisition documents regarding arrangements for examinations, quantity, testing, and approval of the first article.
- g. When special test required for Type III cloth.
- h. Width required (see 3.4.2).
- i. Length required, if other than specified (see 3.6).
- j. Levels of put-up and preservation, and packing (see 5.1 and 5.2)

6.3 Standard sample. For access to the standard sample, address the procuring activity issuing the invitation for bids (see 3.1).

\* 6.4 Sears Fabric Defect Scales. Sears Fabric Defect Scales are available from Sears, Roebuck and Company, Department 817, (Attn: BSC 23-29), Sears Tower, Chicago, IL 60684. (see 4.4.2.1)

\* 6.5 Approval of fluorocarbon water repellent. Approval of the fluorocarbon water repellent treatment 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 necessary to conduct full evaluation (approximately 6 months), only those chemical treatments already approved and so listed in the invitation for bids or request for proposal shall be considered acceptable for the related procurement.

\* 6.6 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

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\* 6.7 Dye formulation for Camouflage Green 483. A suggested but not mandatory dye formulation for Camouflage Green 483 is as follows:

Acid Orange 162  
Acid Blue 171

\* 6.8 White standards. Barium sulfate of suitable quality for use as a white standard is available from Eastman Kodak Company. Tiles are available from the instrument manufacturer (see 4.5.4).

\* 6.9 Spectrophotometers. Suitable spectrophotometers for measuring spectral reflectance in the visible/near-infrared as the Diano Hardy, Diano Match Scan, Hunter D54P-IR, Hunter VIS/NIR Spectrocolorimeter, and Macbeth 1500 with IR option.

6.10 Silicone oil. Dow Chemical Company's silicone emulsion ET 112A has proved satisfactory for use in the finishing of type I and II cloth (see 3.7.7), and is available from Dow Corning Corp., Box 0994, Midland, MI 48686-0994.

\* 6.11 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

6.12 Subject term (key word) listing.

Lining  
Parachutes, cargo  
Taffeta  
Water repellent treated  
Weave, plain

## Custodian:

Army - GL  
Navy - NU  
AF - 11

## Preparing Activity:

Navy - NU

## Review Activity:

Army - MD  
Navy - CG, MC  
AF - 99, 82  
DLA - CT

Project No. 8305-0132

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER MIL-C-21852F	2. DOCUMENT TITLE Cloth, Taffeta, Nylon
3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION <i>(Mark one)</i> <input type="checkbox"/> VENDOR  <input type="checkbox"/> USER  <input type="checkbox"/> MANUFACTURER  <input type="checkbox"/> OTHER <i>(Specify)</i> _____
b. ADDRESS <i>(Street, City, State, ZIP Code)</i>	
5. PROBLEM AREAS	
a. Paragraph Number and Wording	
b. Recommended Wording	
c. Reason/Rationale for Recommendation	
6. REMARKS	
7a. NAME OF SUBMITTER <i>(Last, First, MI) - Optional</i>	b. WORK TELEPHONE NUMBER <i>(Include Area Code) - Optional</i>
c. MAILING ADDRESS <i>(Street, City, State, ZIP Code) - Optional</i>	8. DATE OF SUBMISSION <i>(YYMMDD)</i>



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