

INCH-POUND
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MIL-DTL-43637E  
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SUPERSEDING  
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## MILITARY DETAIL SPECIFICATION

### CLOTH, PLAIN WEAVE, RIPSTOP, NYLON

This document is approved for use by all Departments and Agencies of the Department of Defense (DoD).

#### 1. SCOPE

1.1 Scope. This specification covers nylon, plain weave, ripstop cloth.

1.2 Classification. This specification covers the following classes as specified (see 6.2).

##### 1.2.1 Classes.

Class 1	Dyed
Class 2	Natural
Class 3	(Deleted see 6.6)
Class 4	Woodland Camouflage Pattern
Class 5	Desert Camouflage Pattern
Class 6	Universal Camouflage Pattern (UCP)
Class 7	Operational Camouflage Pattern (OCP)
Class 8	Woodland MARPAT

#### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in Sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification 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 of documents cited in Sections 3 and 4 of this specification whether or not they are listed.

Comments, suggestions, or questions on this document should be addressed: Attn: DLA Troop Support, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Since contact information can change, you may want to verify the currency of the address information using Acquisition Streamlining and Standardization Information System (ASSIST) online database <a href="https://assist.dla.mil">https://assist.dla.mil</a> .
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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 issues of these documents are those cited in the solicitation or contract.

### FEDERAL STANDARDS

FED-STD-4 - Glossary of Fabric Imperfections

(Copies of these documents are available online at <https://assist.dla.mil> or from the Standardization Document Order Desk, 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 or contract.

### DRAWINGS

#### U.S. ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER

- 2-1-1516 - Woodland Camouflage Pattern
- 2-1-2240 - Desert Pattern
- 2-1-2519 - Universal Camouflage Pattern (UCP)
- 2-1-2525 - Woodland MARPAT – 4 color (Coyote 476)
- 2-1-2526 - Woodland MARPAT – 4 color (Green 474 with EGA symbol)
- 2-1-2527 - Woodland MARPAT – 4 color (Black 477)
- 2-1-2528 - Woodland MARPAT – 4 color (Khaki 476)
- 2-1-2592 - Operational Camouflage Pattern (OCP).

(Copies of drawings are available from the U.S. Army Natick Soldier Research Development and Engineering Center, ATTN: RDNS-SEW-EWC, 10 General Greene Avenue Natick, MA 01760-5019.)

### FEDERAL TRADE COMMISSION

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

(Copies are available online at <http://www.ftc.gov> or from the Federal Trade Commission, 600 Pennsylvania Avenue, N.W., Washington, DC 20580-0001.)

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 these documents are those cited in the solicitation or contract.

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## AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- AATCC Test Method 8 - Colorfastness to Crocking: AATCC Crockmeter Method
- AATCC Test Method 15 - Colorfastness to Perspiration
- AATCC Test Method 20 - Fiber Analysis: Qualitative
- AATCC Test Method 61 - Colorfastness to Laundering: Accelerated
- AATCC Test Method 81 - pH of the Water-Extract from Wet Processed Textiles
- AATCC Evaluation Procedure 1, Gray Scale for Color Change
- AATCC Evaluation Procedure 2, Gray Scale for Staining
- AATCC Evaluation Procedure 8, AATCC 9 Step Chromatic Transference Scale Rating
- AATCC Evaluation Procedure 9, Visual Assessment of Color Difference of Textiles

(Copies of are available on line at <http://www.aatcc.org/> or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

## ASTM INTERNATIONAL

- ASTM D1776 - Standard Practice for Conditioning and Testing Textiles
- ASTM D2262 - Standard Test Method for Tearing Strength of Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)
- ASTM D3775 - Standard Test Method for Warp (End) and Filling (Pick) Count of Woven Fabrics
- ASTM D3776 - Standard Test Method for Mass per Unit Area (Weight) of Fabrics
- ASTM D5035 - Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method)
- ASTM F2203 - Standard Test Method for Linear Measurement Using Precision Steel Rule

(Copies of documents are available online at <http://www.astm.org> or from the ASTM INTERNATIONAL, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

## OTHER PUBLICATIONS

Repeat Insult Patch Test - Modified Draize Procedure -  
Principles and Methods of Toxicology, (fourth edition) A Wallace Hayes (editor),  
pp 1057 – 1060, 2001.

(Copies are available online at <http://www.taylorandfrancis.co.uk/> or from Taylor and Francis, 270 Madison Avenue, New York, NY 10016).

Fabric Defect Replica Scales

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Fabric Defect Replica Scales are available online at <http://www.sdlatlas.com> from SDL Atlas 3934 Airway Drive, Rock Hill SC 29732

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 Inspections.

3.1.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.1.2 Conformance inspection. When specified (see 6.2), a sample shall be subjected to conformance inspection 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 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.

3.4 Figures. Figures 1 through 3 are furnished for informational purposes only. To the extent of any inconsistencies between the written document and the figure, the written document shall govern.

#### 3.5 Materials.

3.5.1 Yarn. The yarn used shall be multifilament nylon.

#### 3.6 Color.

3.6.1 Visual shade matching (all Classes). The color and appearance of the cloth shall match the standard sample when tested as specified in Table IX (see 4.4.6).

3.6.2 Colorfastness. The finished cloth shall conform to the colorfastness requirements listed below in Table I unless otherwise specified in the contract or procurement documents when tested as specified in 4.4.6 and 4.5.2.

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TABLE I. Colorfastness requirements (Classes 1, 4, 5, 6, 7, and 8).

Camouflage Pattern	Color Evaluation	Laundering Color Change & Staining (3 cycles) (min.)	Perspiration (Acid & Alkaline) Color Change & Staining (min.)	Crocking Dry/Wet (min.)
Dyed (Class 1)	All colors	3-4	3-4	3.5
Woodland Camouflage (Class 4)	All colors except black 357	3-4	3-4	3.5
	Black 357	3-4	3-4	1.5
Desert Camouflage (Class 5)	All colors	3-4	3-4	3.5
Universal Camouflage (Class 6)	All colors	3-4	3-4	3.5
Operational Camouflage (Class 7)	All colors	3-4	3-4	3.5
Woodland MARPAT (Class 8)	All Colors, except for Black 477	3-4	3-4	3.5
	Black 477	3-4	3-4	1.5

3.6.3 Dyeing/printing of cloth for Class 1. The cloth shall be as specified and shall match the standard sample (see 6.2 and 6.4).

3.6.4 Dyeing/printing of cloth for Class 2. The cloth shall be natural (unbleached).

3.6.5 Dyeing/printing of cloth for Class 4. The cloth shall be dyed to a ground shade to match the Light Green 354 and then it shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Light Green 354, the remaining three (3) colors shall be printed as appropriate, for the Dark Green 355, Brown 356, and Black 357 areas of the pattern. When the ground shade is not dyed to approximate Light Green 354 all four (4) colors of the camouflage pattern shall be printed to match all four (4) colors of the pattern.

3.6.6 Dyeing/printing of cloth for Class 5. The cloth shall be dyed to a ground shade to match the Light Tan 492 and then it shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Light Tan 492, the remaining two (2) colors shall be printed as appropriate, for the Light Brown 493, and Light Khaki 494. When the ground shade is not dyed to approximate Light Tan 492 all three (3) colors of the camouflage pattern shall be printed to match all three (3) colors of the pattern.

3.6.7 Dyeing/printing of cloth for Class 6. The cloth shall be dyed to a ground shade matching or approximating Desert Sand 500 and then it shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Desert Sand 500, the remaining two (2) colors

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shall be printed as appropriate, for the Urban Gray 501 and Foliage Green 502 areas of the pattern. When the ground shade is not dyed to approximate Desert Sand 500 all three (3) colors of the camouflage pattern shall be printed to match all three (3) colors of the pattern.

3.6.8 Dyeing/printing of cloth for Class 7. The cloth shall be dyed to a ground shade matching or approximating Dark Cream 559 and then it shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Dark Cream 559, the remaining six (6) colors shall be printed as appropriate, for the Tan 525, Light Sage 560, Olive 527, Dark Green 528, Brown 529 and Bark Brown 561 areas of the pattern. When the ground shade is not dyed to approximate Dark Cream 559 all seven (7) colors of the camouflage pattern shall be printed to match all seven (7) colors of the pattern.

3.6.9 Dyeing/printing of cloth for Class 8. The cloth shall be dyed to a ground shade matching or approximating Khaki 475 and then overprinted with the camouflage pattern. When the ground shade is dyed to match Khaki 475, the remaining three (3) colors shall be printed as appropriate, for the Green 474, Coyote 476 and Black 477 areas of the pattern. When the ground shade is dyed to approximate Khaki 475, all four (4) colors of the camouflage pattern shall be printed to match all four (4) colors of the pattern.

3.7 Pattern execution, Class 4, 5, 6, 7, and 8. The pattern on the printed finished cloth(s) shall match the standard sample with respect to design, colors, and registration of the respective areas. The various areas of the pattern shall be properly registered in relation to each other and shall present definite sharp demarcations with a minimum of feathering or spew. Each pattern area shall show solid coverage. Skitteriness exceeding that shown by the standard sample in any of the printed areas will not be acceptable. When a standard sample is not available for pattern execution, a pattern drawing will be provided (see 6.4), and the pattern on the finished cloth shall match that of the drawing (see 2.2.2. and 6.2). The pattern repeat for each Class shall be as follows:

Class 4 Woodland Camouflage Pattern	- 27.25 (+1.25, -2.50) inches in the warp direction.
Class 5 Desert Camouflage Pattern	- 16.75 (+1.25, -1.75) inches in the warp direction.
Class 6 Universal Camouflage Pattern	- 36.00 (+1.25, -2.50) inches in the warp direction.
Class 7 Operational Camouflage Pattern	- 25.25 (+1.25, -2.50) inches in the warp direction.
Class 8 Woodland MARPAT	- 27.25 (+1.25, -2.50) inches in the warp direction.

3.7.1 Pattern width (filling direction for OCP, Class 7). The maximum camouflage printed area for OCP, Class 7 shall be 68-inches in the filling direction.

### 3.8. Spectral Reflectance.

3.8.1 Class 4, Woodland Camouflage. The reflectance values shall conform to the requirements listed below, in Table II, when tested as specified in 4.5.5.

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TABLE II. Spectral reflectance requirements, Class 4

Reflectance Values (percent) - Woodland Camouflage						
Wavelength, Nanometers (nm)	Light Green 354		Dark Green 355 and Brown 356		Black 357	
	Min.	Max	Min.	Max	Min.	Max
600	8	20	3	9	N/A	N/A
620	8	20	3	9	N/A	N/A
640	8	20	3	9	N/A	N/A
660	8	20	3	12	N/A	N/A
680	10	30	3	16	N/A	N/A
700	18	50	5	32	N/A	20
720	22	54	7	44	N/A	30
740	30	56	12	52	N/A	33
760	35	58	18	56	N/A	33
780	40	62	26	56	N/A	34
800	55	80	34	56	N/A	34
820	55	80	42	60	N/A	35
840	55	84	44	60	N/A	35
860	60	84	44	60	N/A	35

3.8.2 Class 5, Desert Camouflage. The reflectance values shall conform to the requirements listed below, in Table III, when tested as specified in 4.5.5.

TABLE III. Spectral reflectance requirements, Class 5.

Reflectance Values (percent) - Desert Camouflage Pattern						
Wavelength, nanometers (nm)	Light Tan 492		Light Brown 493		Light Khaki 494	
	Min	Max	Min	Max	Min	Max
700	38	53	19	36	25	48
720	38	58	20	36	25	52
740	39	62	20	36	25	54
760	40	66	21	36	26	56
780	41	72	21	38	27	57
800	43	76	22	43	28	58
820	45	76	23	45	30	58
840	48	78	24	46	33	58
860	50	78	25	46	36	59

3.8.3 Class 6, Universal Camouflage. The reflectance values shall conform to the requirements listed in Table IV, when tested as specified in 4.5.5.

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TABLE IV. Spectral reflectance requirements, Class 6.

Reflectance Values (percent) - Universal Camouflage Pattern						
Wavelength, nanometers (nm)	Desert Sand 500		Urban Gray 501		Foliage Green 502	
	Min	Max	Min	Max	Min	Max
600	28	40	12	26	8	18
620	30	42	14	26	8	18
640	34	48	14	28	8	20
660	38	56	14	30	10	26
680	44	60	18	34	10	26
700	46	66	24	38	12	28
720	48	68	26	42	16	30
740	48	72	30	46	16	30
760	50	74	32	48	18	32
780	54	76	34	48	18	34
800	54	76	34	50	20	36
820	54	76	36	54	22	38
840	55	78	38	54	24	40
860	56	78	40	56	26	42

3.8.4 Class 7, Operational Camouflage. The reflectance values shall conform to the requirements listed in Table V, when tested as specified in 4.5.5.

TABLE V. Spectral reflectance requirements, Class 7.

Reflectance values (percent) - Operational Camouflage Pattern (OCP)						
Wavelength (nm)	Dark Cream 559 & Tan 525		Light Sage 560, Olive 527 & Brown 529		Dark Green 528 & Bark Brown 561	
	Min	Max	Min	Max	Min	Max
600	22	44	12	30	3	11
620	24	45	12	30	3	12
640	24	45	12	32	4	13
660	25	45	12	32	4	14
680	28	45	14	34	4	17
700	28	48	14	36	6	23
720	30	52	16	39	6	23
740	32	55	18	41	10	25
760	36	56	20	43	14	30
780	38	57	22	45	18	35
800	40	57	22	45	21	40
820	44	58	24	46	24	42
840	46	59	26	47	26	43
860	48	60	28	48	28	45



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3.8.5 Class 8, Woodland MARPAT. The reflectance values shall conform to the requirements listed in Table VI, when tested as specified in 4.5.5.

TABLE VI. Spectral reflectance requirements, Class 8.

Reflectance Values (percent) - Marine Pattern (MARPAT) Woodland Camouflage Pattern						
Wavelengths Nanometers (nm)	Coyote 476 and Khaki 475		Green 474		Black 477	
	Min	Max	Min	Max	Min	Max
600	8	20	3	9	N/A	N/A
620	8	20	3	9	N/A	N/A
640	8	20	3	9	N/A	N/A
660	8	20	3	12	N/A	N/A
680	10	30	3	16	N/A	N/A
700	18	50	5	32	N/A	20
720	22	54	7	44	N/A	30
740	30	56	12	52	N/A	33
760	35	58	18	56	N/A	33
780	40	62	26	56	N/A	34
800	55	80	34	56	N/A	34
820	55	80	42	60	N/A	35
840	55	84	44	60	N/A	35
860	60	84	44	60	N/A	35

3.9 Physical requirements. The finished cloth shall conform to the requirements listed below, in Table VII, when tested as specified in 4.4.6.

TABLE VII. Physical requirements

Characteristic	All Classes
Weight, oz./sq.yd., (maximum)	1.0
Yarns per inch, (minimum)	
Warp	120
Filling	120
Breaking strength, pounds (minimum)	
Warp	42
Filling	42
Tearing strength, pounds (minimum)	
Warp	5.0
Filling	5.0

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3.9.1 Weave. The ripstop weave pattern for the cloth shall be one (1) of the weaves as shown in Figures 1, 2, or 3. Reinforcement ribs in both the warp and filling shall form a uniform pattern of squares. There shall be a minimum of 6.5 repeats of the pattern per inch in both directions.

3.9.2 Width. For Government procurements only, the width of the finished cloth shall be as specified (see 6.2) and shall be the minimum acceptable width inclusive of the selvage.

3.10 Finish. The cloth shall be scoured and heat treated prior to printing to meet the requirement in 3.11.

3.11 Dimensional stability. The cloth shall show no appreciable distortion or puckering and the shrinkage or elongation shall not be greater than 2.0 percent in either warp or filling direction, when tested as specified in 4.4.6.

3.12 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 4.4.6.

3.13 Toxicity. The finished cloth shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.4.6. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.14 Length and put-up. For Government procurements only, unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 75 yards. Each length shall be put-up full width on a roll as specified in 5. 1.

3.15 Fiber identification. Each roll of finished cloth shall be labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act.

3.16 Marking. 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.

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

#### 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).

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4.2 First article inspection. A first article, submitted in accordance with 3.1.1, shall be inspected for conformance with physical requirements of Table VII, examined for appearance, color, defects in Table VIII, and overall workmanship. The presence of excessive defects, as defined in the contract (see 6.2) or failure of any testing shall be cause for rejection of the first article.

4.3 Conformance inspection. In accordance with 4.1 above and 3.1.2, the material shall be inspected in accordance with all the requirements of referenced documents, unless otherwise excluded, amended, modified or qualified in this specification or applicable procurement documents. Conformance inspection shall include the examination of 4.4 and 4.4.6 (see 6.2).

4.4 Yard by Yard Examination. Each roll for Class 1, 2, 4, 5, 6, 7, and 8 in the sample shall be examined yard-by-yard on the printed side only. When the 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 III of FED-STD-4 that are clearly noticeable at normal inspection distance (3-feet) shall be scored and assigned demerit points as listed in 4.4.1 except that only those slubs and knots which exceed the limits shown on the Sears Fabric Defect Scale (see 2.3), "D" as applicable for slubs and "C" for knots, shall be scored and coarse yarn shall only be scored as a defect when the coarse yarn is twice the diameter of the normal yarn used in the fabric. No linear yard (increments of 1-yard on the measuring device of the inspection machine) from any one (1) roll shall be penalized more than four (4) points. The sample size shall be selected at random, no less than 10 percent of the rolls per lot. Acceptance criteria for visual examination shall be as specified in the contract or order (see 6.2).

Point computation for lot quality and individual roll quality shall be as follows:

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

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

For defects up to three (3) inches in any dimension	- one (1) point
For defects exceeding three (3) inches, but not exceeding six (6) inches in any dimension	- two (2) points
For defects exceeding six (6) inches, but not exceeding nine (9) inches in any dimension	- three (3) points
For defects exceeding nine (9) inches in any dimension	- four (4) points

4.4.2 Visual examination. The cloth shall be examined for the defects listed in Table VIII.

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TABLE VIII. Visual examination defects

Examine	Defect	Classification	
		Major	Minor
Material defects and damages	Any hole, cut, tear smash, burn, exposed drill hole, thin place, needle chew, visible mends, broken or missing yarn.	101	201
	Knots greater than Sears Scale Level C (see 2.3).	102	
	Slubs greater than Sears Scale Level D (see 2.3).	103	
	Uneven weaving throughout.	104	
	Area of poor dye penetration, dye streak, or shade bar	105	
	Colors not as specified (face and back).	106	
	Design not printed on face side of cloth.	107	
	Marking on face side of cloth omitted.		
	Width not as specified within a tolerance of $\pm 1/2$ -inch.	108	
	<u>Camouflage pattern (face side)</u>		
	Any skitteriness of pattern exceeding that shown by the standard sample.	109	
	Pattern design not equal to standard sample.	110	
	Excessive feathering or spew of pattern.	111	
	Pattern repeat not equal to the standard sample.		
	Warpwise pattern repeat:		
	Woodland Camouflage pattern (Class 4 and 8) less than 24.75-inches or more than 28.50-inches.	112	
	Desert Camouflage pattern (Class 5) less than 14.50-inches or more than 18.00-inches.	113	
Cleanliness	Universal Camouflage pattern (Class 6) less than 33.50-inches or more than 37.25-inches.	114	202
	Operational Camouflage pattern (Class 7) less than 22.75-inches or more than 26.50-inches.	115	
	Excessive grinning (off register, gap where ground shade shows through) of pattern as compared to the standard sample.	116	
	Any color off shade, not uniform, mottled, or spotted (face side only)	117	
	Any spot, streak, or stain of a permanent nature.		
	Removable spot, streak, or stain on outside of garment.		
	Any embedded foreign matter in the cloth. <u>1/</u>		
	Objectionable odor.		203
			204
			205

1/ Clearly visible at normal inspection distance 3-feet.

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4.4.5 Roll identification examination. During the yard-by-yard examination, each roll in the sample shall be examined that each roll is labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act (see 3.15).

4.4.6 End item testing. The cloth shall be tested for the characteristics listed in Table IX. The methods of testing as specified wherever applicable and as listed in Table IX shall be followed. All test reports shall contain the individual values utilized in expressing the final results. The sample unit shall be five (5) continuous yards full width of the finished cloth for all physical and chemical tests. The lot shall be unacceptable if one (1) or more sample units or the lot average for dimensional stability fail to meet any requirement specified. The sample size shall be in accordance with the following:

<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

4.4.6.1 Basic cloth. The basic cloth shall be tested in accordance with Table IX.

TABLE IX. End item tests.

Characteristic	Requirement Reference	Test Method
Fiber identification	3.5.1	AATCC 20
Visual shade matching (all classes)	3.6.1	<u>1</u> /
Colorfastness: Laundering (after 3 cycles) Perspiration (acid & alkaline) Crocking (wet & dry)	3.6.2, Table I 3.6.2, Table I 3.6.2, Table I	AATCC 61 Test 1A and 4.5.2, <u>2</u> /, <u>3</u> / AATCC 15 and 4.5.2, <u>2</u> /, <u>3</u> / AATCC 8 and 4.5.2, <u>4</u> /
Dyeing/printing of cloth	3.6.3 - 3.6.9	Visual
Pattern execution	3.7	4.5.3
Pattern width	3.7.1	ASTM F2203
Spectral reflectance: Class 4 Class 5 Class 6 Class 7 Class 8	3.8.1, Table II 3.8.2, Table III 3.8.3, Table IV 3.8.4, Table V 3.8.5, Table VI	4.5.4 4.5.4 4.5.4 4.5.4 4.5.4
Weight	3.9, Table VII	ASTM D3776
Yarns per inch	3.9, Table VII	ASTM D3775
Breaking strength	3.9, Table VII	ASTM D5035

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TABLE IX. End item tests - Continued

Characteristic	Requirement Reference	Test Method
Tearing strength	3.9, Table VII	ASTM D2262, <u>5/</u>
Weave	3.9.1	Visual
Dimensional stability	3.11	4.5.1
pH	3.12	AATCC 81
Toxicity	3.13	4.5.5

1/ The color and appearance of the cloth shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 (+ 200)K illumination of 100 (+ 20) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 (+ 200)K.

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

3/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change and AATCC Evaluation Procedure 2, Gray Scale for Staining.

4/ Rated using the AATCC Evaluation Procedure 8, AATCC 9-Step Chromatic Transference Scale.

5/ The average of five (5) highest peaks shall be used.

4.5 Methods of inspection. All testing shall be done in a standard condition environment defined by ASTM D1776, if not specifically defined by the individual test procedure.

4.5.1 Dimensional stability test. The test specimen shall be a square of cloth a minimum 20-inches by 20-inches. Before marking and measuring for dimensional change, the specimen shall be in equilibrium with Standard Conditions as specified in ASTM D1776. The specimen shall be laid without tension on a flat surface and shall be inscribed with an 18-inch square approximately equidistant from the edges having sides parallel to the warp and normal filling directions. The marked specimen shall be placed in a preheated oven and maintained at a temperature of 280 ( $\pm 20^\circ\text{F}$ ) for a period of 2-hours. The specimen may be looped over a rod or laid flat on a rack both of which shall be made of low-conductivity (nonmetallic) material and have free air circulation on both sides. Promptly remove the specimen from the oven, allow to cool on a flat surface, and then bring to equilibrium under Standard Conditions. Measure each side of the inscribed square for dimensional change in both the warp and filling directions (two (2) measurements each for the warp and filling per specimen). Each change in dimension shall be reported to the nearest 0.1 percent. The specimen shall also be visually compared with the original unheated cloth for any appreciable distortion or puckering. (Appreciable means a change that is immediately noticeable when comparing the tested specimen with the original. If closer inspection is required to make apparent a slight change, the change is not considered appreciable).

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4.5.2 Colorfastness evaluation testing. When testing for colorfastness properties, each color shall be evaluated, whenever possible, separately and reported as such. In cases where the print pattern does not allow for the evaluation of each color separately, the test results should indicate which colors were evaluated together.

4.5.2.1 Operational Camouflage Pattern (OCP) (Class 7). All Colorfastness testing for Operational Camouflage Pattern (OCP), Class 7, shall be performed on the solid color area and not the tonal area.

4.5.3 Pattern execution. The pattern of the cloth shall be matched to the specified pattern drawing (see 2.2.2).

4.5.4 Spectral reflectance test. Spectral reflectance data shall be obtained from 600 to 860 nanometers (nm) for Classes 4, 6, 7, and 8, and 700 to 860 nanometers (nm) for Class 5 at 20 nm intervals on a spectrophotometer relative to the polytetrafluoroethylene (PTFE) family of compounds, the preferred white 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 shall be less than 20 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer 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. Measurements shall be taken on a minimum of two (2) different areas and the data averaged. The measured areas should be at least 6-inches away from the selvage. The cloth for Class 4, shall be measured as a single layer using three (3) backing layers of the same shade for Light Green 354, Dark Green 355 and Brown 356 colors. The cloth for Class 5 shall be measured as a single layer backed with four (4) layers of the same shade cut from the standard. The cloth for Classes 6, 7, and 8 shall be measured as a single layer backed with four (4) layers of the same shade. The specimen shall be viewed at an angle no greater than 10 degrees from normal, with the specular component included. Measurements shall be taken on a minimum of two (2) different areas. Specimens shall be oriented in different directions during testing. When possible, the specimens tested shall not contain the same warp or filling yarns when presented to the sample port. Photometric accuracy of the spectrophotometer shall be within 1-percent and wavelength accuracy within 2-nanometers. The diameter for standard aperture size used in the color measurement device shall be 1.0 to 1.25-inches for Classes 4 and 5, and 0.3725-inches or larger for the Classes 6, 7, and 8. Any color having spectral reflectance values falling outside the limits at four (4) or more of the wavelengths specified shall be considered a test failure.

4.5.5 Toxicity testing. Unless otherwise specified (see 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the cloth is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see 2.3). If the toxicity requirement (see 3.14) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

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## 5. PACKAGING

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 or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. 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 or contractually binding.)

6.1 Intended use. The cloth is intended for use as the outer covering for batting used in the manufacture of quilted clothing. The cloth is not intended for the manufacture or repair of parachutes.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Class of cloth required (see 1.2)
- c. The specific issue of individual documents referenced (see 2.2)
- d. When first article is required (see 3.1.1, 4.2 and 6.3)
- e. Conformance inspection acceptance quality limits (AQL) (see 3.1.2 and 4.3)
- f. Camouflage pattern drawing, if required (see 3.5)
- g. Inspection conditions (see 4.4)
- h. When toxicity testing is required (see 4.5.4)
- i. Packaging (see 5.1)

6.3 First article. When a first article inspection is required (see 3.1.1), it will be inspected and approved under the appropriate provisions of FAR 52.209-4. 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 include specific instructions in acquisition documents regarding arrangements for selection, inspection and approval of the first article.

6.4 Standard sample. For access to samples and pattern drawings, address the contracting activity issuing the invitation for bids or request for proposal.

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

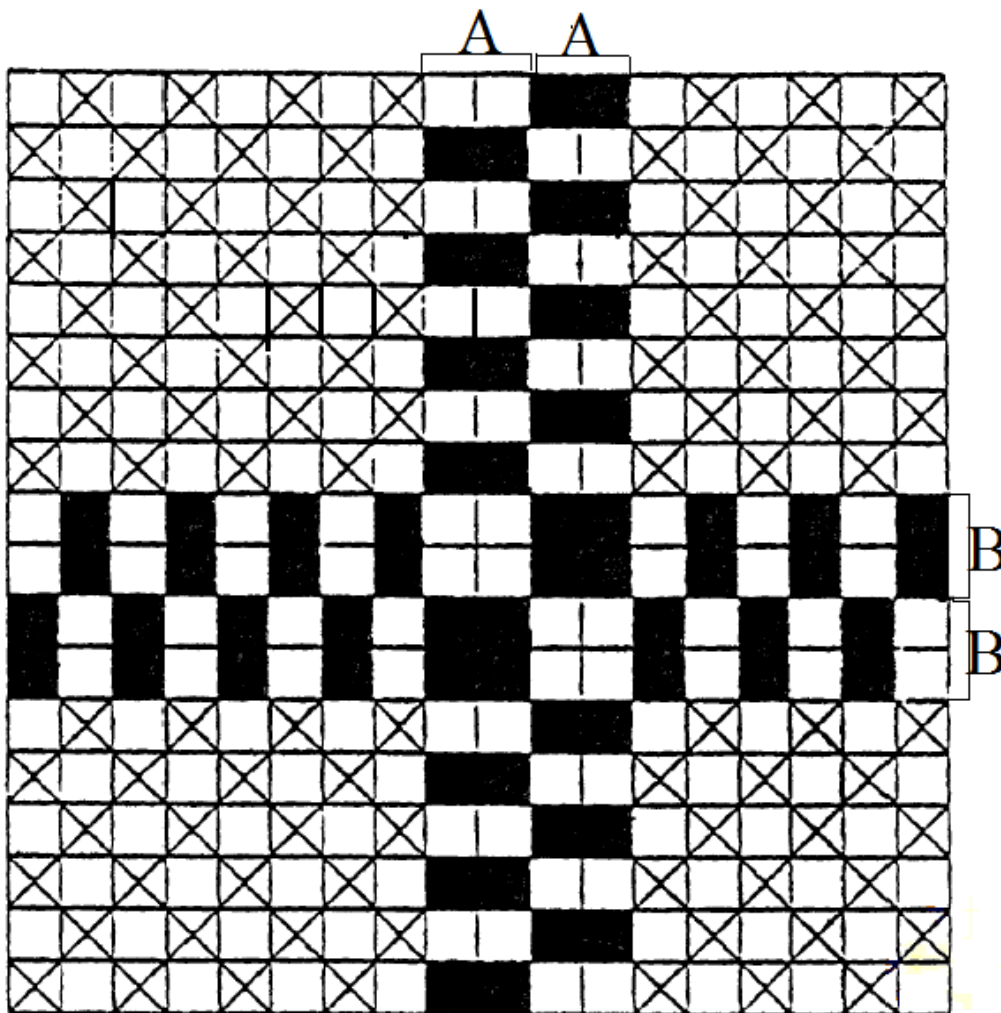


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6.6 Supersession data. The Class 3 U.S Army Camouflage Pattern 1948 cloth has been deleted since it is no longer required.

6.7 Subject term (key word) listing.

Batting  
Desert Camouflage Pattern  
Liner  
Operational Camouflage Pattern (OCP)  
Poncho  
Quilted clothing  
Universal Camouflage Pattern (UCP)  
Woodland Camouflage Pattern  
Woodland, MARPAT

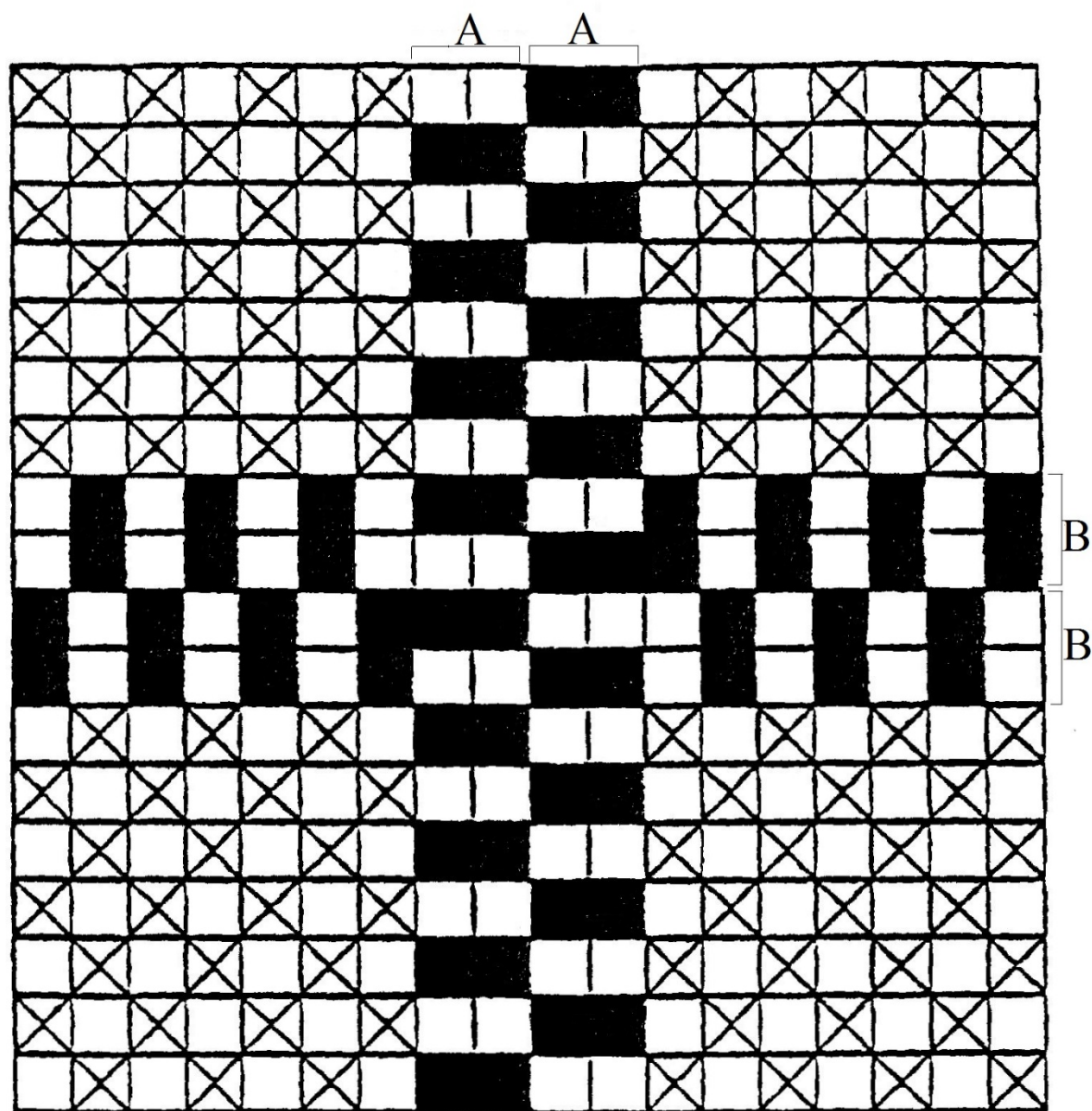


A = Two warp ends woven as one

B = Two filling picks per shed

FIGURE 1. Ripstop weave pattern

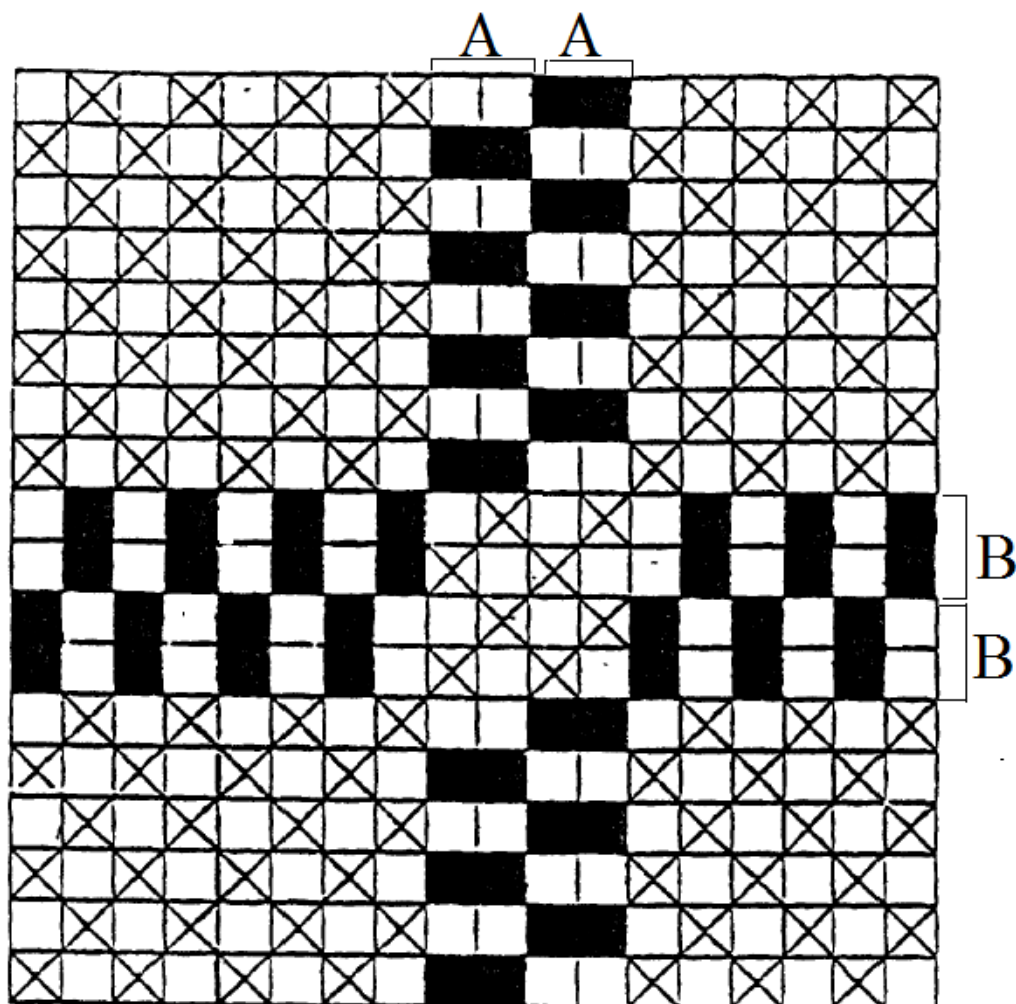
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A = Two warp ends woven as one  
B = Two filling picks per shed

FIGURE 2. Ripstop weave pattern.

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A = Two warp ends woven as one  
 B = Two filling picks per shed

FIGURE 3. Ripstop weave pattern.

Custodian:  
 Army – GL  
 Navy – NU  
 Air Force – 11

Preparing activity:  
 DLA - CT  
 Agent Army - GL

Review activities:  
 Army MD  
 Navy – MC

Project Number: 8305-2016-002

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NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.dla.mil>.