

MIL-C-44157A
6 August 1986
SUPERSEDING
MIL-C-44157
8 February 1985

MILITARY SPECIFICATION

CLOTH, PLAIN WEAVE, POLYESTER/COTTON FOR POCKETS (WATER REPELLENT)

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

1. SCOPE

1.1 Scope. This document covers a plain weave polyester/cotton cloth.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Documents. The following documents 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

PPP-P-1134 - Packaging of Cotton and Cotton-Synthetic Fiber Blend Fabrics (Excluding Duck Fabrics)

MILITARY

MIL-T-43548 - Thread, Polyester, Cotton-Covered and Rayon Covered

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development and Engineering Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8305

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STANDARDS

FEDERAL

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

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

2.1.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies may be obtained without charge from the Federal Trade Commission, Washington, DC 20580.)

2.2 Other 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 shall be those listed in the issues of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

Chromatic Transference Scale

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

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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(Technical society and technical association documents are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this document shall take precedence. Nothing in this document, however, shall supersede 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 appearance and shall, unless otherwise indicated (see 3.3.3), 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 Material.

3.2.1 Yarn. The warp yarns shall be 100 percent textured continuous multifilament polyester and the filling yarns shall be spun singles made from a blend of 30 to 60 percent carded or combed cotton and the remaining percentage polyester.

3.3 Color. Unless otherwise specified, the cloth shall be dyed Olive Green 107.

3.3.1 Matching. The color of the finished cloth shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7000 ± 500 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 100 K.

3.3.2 Labile sulfur. The use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is prohibited. The dyestuff shall be chosen and applied so that the dyed and finished cloth shall contain no more labile sulfur than shown by the standard sample when tested as specified in 4.2.3. When a standard sample is not available, the dyed and finished cloth shall show no more than a slight trace of labile sulfur when tested as specified in 4.2.3.

3.3.3 Colorfastness. The dyed and finished cloth shall show fastness to laundering (after 3 cycles) and perspiration equal to or better than the standard sample or equal to or better than the rating of "good" when tested as specified in 4.2.3. Fastness to crocking shall be equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating not lower than 3.5 when tested as specified in 4.2.3.

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3.4 Physical requirements. The finished cloth shall conform to the requirements specified in table I when tested as specified in 4.2.3.

TABLE I. Physical requirements

Characteristic	Requirement
Weight, oz/yd ² (min)	5.0
Yarns per inch (min):	
Warp	105
Filling	68
Breaking strength, lbs. (min):	
Warp	250
Filling	100
Tearing strength, lbs. (min):	
Warp	7.5
Filling	2.5
Air permeability, cu ft/minute/sq ft (max)	10.0

3.4.1 Weave. The weave shall be plain weave.

3.4.2 Width. The width of the cloth shall be as specified (see 6.2) and shall be the minimum acceptable width inclusive of selvages 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 wasp yarn on each side excluding the protruding fringe(s).

3.5 Finish. The cloth shall be dyed and finished with a softener to assist sewability.

3.5.1 Water repellency. The cloth shall be given an approved fluorocarbon type water repellent treatment (see 6.4) and shall conform to the requirements of 3.5.1.1 through 3.5.1.3 when tested as specified in 4.2.3.

3.5.1.1 Hydrostatic pressure. The hydrostatic pressure initially and after 3 launderings shall be not less than 25 cm for the average of the sample units with no sample unit less 20 cm.

3.5.1.2 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.

3.5.1.3 Spray rating. The results of the three individual determination 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.

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3.5.2 Resistance to organic liquids. The finished cloth shall show no wetting by n-tetradecane either initially or after 3 launderings when tested as specified in 4.2.3.

3.6 Dimensional stability. The finished cloth shall not shrink or elongate more than 3.0 percent in the warp and 2.0 percent in the filling when tested as specified in 4.2.3. The preshrinkage process used shall not be identified by name or trademark either on the cloth, ticket, or package.

3.7 Seam efficiency. The finished cloth shall have a seam efficiency of no less than 80 percent when tested as specified in 4.2.3.

3.8 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 40 yards. Each length shall be put-up on full width rolls as specified in 5.1.

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

3.10 Workmanship. The finished cloth shall conform to the quality established by this document. The demerit points per 100 square yards 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 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 the document where such inspections are deemed necessary to assure 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 document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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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.

4.2 Quality conformance inspection.

4.2.1 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 document or applicable purchase document.

4.2.2 End item examination.

4.2.2.1 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, 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, which are clearly noticeable at normal inspection distance (3 feet), shall be scored and assigned demerit points as listed in 4.2.2.1.1. 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 selected from 20 containers. The lot shall be unacceptable if the points per 100 square yards of the total yardage examined exceeds 25.0 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 38.0 points. If one roll exceeds 38.0 points per 100 square yards, a second sample of 20 rolls shall be examined only for individual roll quality. The lot shall be unacceptable if one or more rolls in the second sample exceeds 38.0 points per 100 square yards. Point computation for lot quality and individual roll quality shall be as follows:

Total points scored in sample x 3600	=	Points per 100
Contracted width of cloth (inches) x Total yards inspected		square yards

4.2.2.1.1 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
 Width less than specified
 Poor dye penetration, mottled, streaky, or cloudy
 Bias or bowed filling - distortion at any point, 2 inches or more from normal alignment
 Turned selvage which cannot be flattened by manual pressure

4.2.2.2 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 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 or if the total of the actual lengths of rolls in the sample is less than the total of the lengths marked on the tickets.

4.2.2.3 Shade and appearance examination. During the yard-by-yard examination, each roll in the sample shall be examined for shade and appearance. Any roll in the sample off shade; shaded side to side, side to center, or end to end; or not having the same appearance as the standard sample shall be cause for rejection of the entire lot represented by the sample.

4.2.2.4 Roll identification examination. During the yard-by-yard examination, each roll in the sample shall be examined for identification of fiber content. The lot shall be unacceptable if two or more rolls in the sample are not labeled or ticketed in accordance with the Rules and Regulations Under the Textile Fiber Products Identification Act.

4.2.3 End item testing. The cloth shall be tested for the characteristics listed in table II. 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 apply to the results of the determinations made on the sample unit for test purposes as specified in the applicable test method. All test reports shall contain the individual values used in expressing the final results. The sample unit shall be 1-1/2 yards full width of the cloth. The lot shall be unacceptable if one or more sample units fail to meet any test 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
22,000 and over	5

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TABLE II. End item tests

Characteristic	Requirement paragraph	Test method
Polyester identification	3.2.1	1600 <u>1/</u>
Cotton identification	3.2.1	1200 <u>1/</u>
Filling yarn fiber content	3.2.1	2635 <u>1/</u>
Labile sulfur	3.3.2	2020 <u>1/</u>
Colorfastness:		
Laundering after 3 cycles	3.3.3	5610 <u>2/</u>
Perspiration	3.3.3	5680
Crocking	3.3.3	5651
Weight	3.4	5041
Yarns per inch	3.4	5050
Breaking strength	3.4	5100
Tearing strength	3.4	ASTM D-1424
Air permeability	3.4	5450
Weave	3.4.1	Visual <u>3/</u>
Water repellency:	3.5.1	<u>4/</u>
Hydrostatic pressure:		
Initial	3.5.1.1	5514
After 3 launderings	3.5.1.1	5552, 5514 <u>5/</u>
Dynamic absorption:		
Initial	3.5.1.2	5500
After 3 launderings	3.5.1.2	5552, 5500 <u>5/</u>
Spray rating:		
Initial	3.5.1.3	5526
After 3 launderings	3.5.1.3	5552, 5526 <u>5/</u>
Resistance to organic liquid:		
Initial	3.5.2	4.3.1
After 3 launderings	3.5.2	5552, 4.3.1 <u>5/</u>
Dimensional stability	3.6	5552
Seam efficiency	3.7	5110 <u>6/</u>

- 1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirements.
- 2/ The specimens must be dried after each of the three laundering cycles.
- 3/ One determination per sample unit and the results reported as "pass" or "fail".
- 4/ The contractor shall report the water repellents used.
- 5/ Specimens shall be subjected to 3 complete cycles (wash and dry) prior to determination of hydrostatic pressure, dynamic absorption, spray rating, and resistance to organic liquid after laundering.

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- 6/ The needle shall measure 0.040 ± 0.001 inch across the blade at the eye. The threads shall be polyester, cotton-covered or rayon covered in accordance with MIL-T-43548, ticket no. 50, 2 ply for the needle and ticket no. 70, 2 or 3 ply for the looper.

4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1134.

4.3 Methods of inspection.

4.3.1 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 1 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.

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 fabric shall be put-up and preserved in accordance with the applicable requirements of PPP-P-1134.

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-1134.

5.3 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with PPP-P-1134.

6. NOTES

6.1 Intended use. The cloth is intended for use as pocket material for the Extended Cold Weather Clothing System.

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number and date of this document.
- b. Color if other than specified (see 3.3)
- c. Width of cloth required (see 3.4.2).
- d. Length if other than specified (see 3.8).
- e. Selection of applicable levels of put-up, preservation, and packing (see 5.1 and 5.2).

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

6.4 Approval of fluorocarbon water repellent. Approval of the fluorocarbon type 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.

6.5 Subject term (key word) listing.

Cloth
Extended cold weather clothing system
Plain weave
Pockets
Polyester/cotton
Water repellent

6.6 Changes from previous issue. Asterisks 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 No. 8305-0128

Review activities:

Army - MD
Navy - MC
Air Force - 82
DLA - CT

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-C-44157A		2. DOCUMENT TITLE CLOTH, PLAIN WEAVE, POLYESTER/COTTON FOR POCKETS (WATER REPELLENT)	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	