MIL-C-43482D
17 April 1987
SUPERSEDING
MIL-C-43482C
30 September 1985

MILITARY SPECIFICATION

CLOTH, POPLIN, COTTON AND POLYESTER (WATER REPELLENT)

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

1. SCOPE

1.1 Scope. This document covers cotton and polyester poplin cloth that is water repellent treated.

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.

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

SPECIFICATIONS

FEDERAL

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

MILITARY

MIL-T-43548 - Thread, Polyester Core: Cotton-, Rayon-, or Polyester-Covered

MIL-T-43624 - Thread, Polyester, Spun

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

(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.)

2.1.2 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

(Application for copies should be addressed to the Federal Trade Commission, Pennsylvania Avenue at Sixth Street, N.W., 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 issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which are 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, North Carolina 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.)

(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, 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 Materials.

3.2.1 Fibers. The fiber shall be polyethylene glycol terephthalate and cotton.

3.2.2 Yarns. The warp and filling yarns shall be a blend of 50 percent (± 5 percent) polyester fiber and the remaining percentage cotton, based on the dry desized weight of the cloth prior to the water repellent treatment. The cotton portion shall be carded and combed, and the blend shall be spun into 2-ply yarn for the warp and a singles yarn for the filling. Tests shall be as specified in 4.2.3.

3.3 Color. The color shall be as specified and shall match the standard sample (see 6.3).

3.3.1 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 not more than a slight trace of labile sulfur as defined in the test method when tested as specified in 4.2.3.

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

* 3.3.3 Colorfastness. The finished cloth shall show fastness to laundering (after 3 cycles), perspiration, wet dry cleaning, dry heat (sublimation), and light (after 80 SFH standard fading hours) equal to or better than the standard sample or equal to or better than a rating of "good" when tested as specified in 4.2.3. The cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating for crocking not lower than 2.5 dry and 2.5 wet, when tested as specified in 4.2.3.

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

TABLE I. Physical requirements

Weight per sq yd (ounces)		Yarns per inch, minimum		Breaking strength (pounds), minimum		Tearing strength (pounds), minimum		Weave
Min	Max	Warp	Filling	Warp	Filling	Warp	Filling	
6.0	6.7	104	64	165	70	4.0	2.0	Plain

3.4.1 Width. The width shall be as specified (see 6.2). The minimum acceptable width shall be inclusive of the woven selvage when flyshuttle looms are used and exclusive of selvages and fringe when shuttleless looms are used.

3.5 Finish. The cloth shall be scoured, heat treated, and finished to meet the requirements of this document. The cloth shall be made water repellent (see 3.7).

3.5.1 Nonfibrous materials. Prior to application of the water repellent treatment, the starch and protein content (including chloroform-soluble and water-soluble material) shall not exceed 2.0 percent, when tested as specified in 4.2.3.

* 3.6 Dimensional stability. The finished cloth shall shrink or elongate no more than 3.0 percent in the direction of the warp nor more than 2.0 percent in the direction of the filling, when tested as specified in 4.2.3.

3.7 Water repellency and air permeability.

3.7.1 Treatment. The cloth shall be given an approved fluorocarbon type of water repellent treatment (see 6.4) and shall conform to the water repellency and air permeability requirements of 3.7.2 through 3.7.5, when tested as specified in 4.2.3.

* 3.7.2 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, initial and 70, 70, 70 after one dry cleaning, when tested as specified in 4.2.3.

* 3.7.3 Hydrostatic pressure. The hydrostatic pressure initially, after 1 dry cleaning, and after 3 launderings shall be not less than 40 centimeters (cm) for the average of the sample units, with no sample unit less than 35 cm.

* 3.7.4 Dynamic absorption. The dynamic absorption initially and after 3 launderings shall be not more than 15 percent for the average of the sample units, with no sample unit greater than 20 percent.

* 3.7.5 Air permeability. The initial air permeability shall be not greater than 4.0 cu ft/min/sq ft.

* 3.8 pH. The pH value of the water extract of the finished cloth shall be not less than 5.0 nor more than 8.5, when tested as specified in 4.2.3.

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

* 3.10 Seam efficiency. The finished cloth shall have a seam efficiency of not less than 70 percent, when tested as specified in 4.2.3.

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

3.12 Fiber identification. Each roll of cloth shall be labeled and ticketed for fiber content in accordance with the Textile Fiber Products Identification Act.

3.12.1 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.

3.13 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 this 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 requirement 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.

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

4.2 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

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 Examination of the end item.

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 I of FED-STD-4 that are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit points as listed in 4.2.2.1.1 except that only those slubs and knots that exceed the maximum limits shown on Sears Fabric Defect Scales (see 6.7) E or 3 for slubs and C for knots shall be scored. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any one roll within the sample shall be penalized more than 4 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 exceed 25.0 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceed 38.0 points. If no individual roll exceeds 38.0 points per 100 square yards, the lot shall be acceptable with respect to this characteristic. 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 examination. 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 calculated as follows:

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

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 5 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

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

Baggy, ridgy or wavy cloth
Width less than specified
Poor dye penetration, mottled, streaky or cloudy
Overall uncleanness
Excessive neppiness

4.2.2.1.2 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 or shade variation from side to side, side to center, or end to end shall be cause for rejection of the entire lot represented by the sample.

4.2.2.2 Examination for shade and finish. Each roll in the lot shall be examined visually for shade match (see 3.3.2) and appearance. A roll shall be unacceptable if it fails to meet the requirements for shade match. The sample unit shall be a 4-inch by 20-inch swatch of the cloth. The sample unit shall be drawn from each roll in the lot.

4.2.2.3 Examination for length. 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.

4.2.2.4 Roll identification. 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 rolls have any of the following defects:

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

4.2.3 End item testing. 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 method. All test

reports shall contain the individual values utilized in expressing the final result. The sample unit shall be 1/2 yard, full width of the cloth prior to application of the water-repellent treatment for determinations of the nonfibrous materials content and fiber content, and 5 continuous yards full width of the finished cloth for all other physical and chemical tests. The lot size shall be expressed in units of one yard each. The lot shall be unacceptable if one or more units fail to meet any test requirements specified. The sample size shall be in accordance with the following:

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

TABLE II. Test methods

Characteristic	Requirement paragraph	Test method
Fiber identification:		
Polyester	3.2.1	1/
Cotton	3.2.1	1200 1/
Yarn content		
Polyester (percent)	3.2.2	2100, 4.3.1 1/
Cotton (percent)	3.2.2	2100, 4.3.1 1/
Yarn		
Warp (2 ply)	3.2.2	Visual 2/
Filling (single)	3.2.2	Visual 2/
Labile sulfur	3.3.1	2020 1/
Colorfastness to:		
Laundering (after 3 cycles)	3.3.3	5610 3/ 4/
Perspiration	3.3.3	5680
Crocking	3.3.3	5651
Wet-dry cleaning	3.3.3	5622
Light	3.3.3	5660
Dry heat (sublimation)	3.4	5642 10/

TABLE II. Test methods - Continued

Characteristic	Requirement paragraph	Test method
Weight	3.4	5041
Yarns per inch	3.4	5050
Breaking strength	3.4	5100
Tearing strength	3.4	ASTM D 1424 5/
Weave	3.4	Visual 2/
Nonfibrous materials	3.5.1	2611 1/
Dimensional stability	3.6	5556 6/
Water repellency	3.7	8/
Spray rating:		
Initial	3.7.2	5526
After 1 dry cleaning	3.7.2	5508 and 5526
Hydrostatic pressure:		
Initial	3.7.3	5514
After 3 launderings (cotton method)	3.7.3	5556 and 5514 7/
After 1 dry cleaning	3.7.3	5508 and 5514
Dynamic absorption:		
Initial	3.7.4	5500
After 3 launderings (cotton method)	3.7.4	5556 and 5500 7/
Air permeability:		
Initial	3.7.5	5450
pH	3.8	2811

TABLE II. Test methods - Continued

Characteristic	Requirement paragraph	Test method
Resistance to organic liquid:		
Initial	3.9	4.3.2
After 3 launderings (cotton method)	3.9	5556 and 4.3.2 7/
Seam efficiency	3.10	5110 9/

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.

2/ One determination shall be made from each sample unit and the results reported as "pass" or "fail."

3/ The specimen must be dried after each complete laundering cycle.

4/ Only the stain on the polyester and cotton fibers of the transfer cloth shall be evaluated.

5/ See 2.2.

6/ Cotton procedures shall be used.

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

8/ The contractor shall report the water repellents used.

9/ Needle size 0.040 inch (± 0.001) across the blade eye. The thread can be either polyester/cotton in accordance with MIL-T-43548, Ticket No. 50, 3-ply for the needle and Ticket No. 70, 2-ply for the looper, or spun polyester in accordance with MIL-T-43624, class 1 or 2, Ticket No. 40, 3-ply for the needle and Ticket No. 70, 2-ply for the looper.

10/ A temperature of 376° ± 6°F shall be used to perform the test.

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

4.3 Methods of inspection.

4.3.1 Fiber content. The general procedure of method 2100 shall be followed and the fiber content percentages shall be calculated as follows:

$$\frac{\text{Weight of dry residual fiber} \times 100}{\text{Weight of dry desized specimen}} = \text{percent polyester.}$$

100 - percent polyester = percent cotton.

4.3.1.1 Report. Two specimens shall be tested from each sample unit, and the average percent of polyester and the average percent of cotton of the two specimens shall be reported to the nearest 1.0 percent.

4.3.2 Test for resistance to organic liquid. 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 be considered cause for rejection of the lot represented by the sample.

5. PACKAGING

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

5.1.1 Levels A and Commercial. The cloth shall be put up and preserved in accordance with the applicable requirements of PPP-P-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 the requirements of PPP-P-1134.

6. NOTES

* 6.1 Intended use. The cloth is intended for military raincoats and utility jackets as follows:

Green 274	- Men's and women's raincoats (Army)
Black 385	- Men's and women's raincoats (Army)
Blue 1600	- Men's and women's, all weather coat and lightweight jacket (AF)
Blue 3329	- Utility jackets, men's and women's (Navy)

6.2 Ordering data. Acquisition documents should specify the following:

a. Title, number and date of this document.
b. Color required (see 3.3).
c. Width required (see 3.4.1).
d. Length required if other than specified (see 3.11).
e. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).

6.3 Standard sample. For access to samples, address the contracting activity issuing the invitation for bids. The standard sample was manufactured from nonoptically brightened polyester fiber.

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 (GL), 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, 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 Dyestuff formulation for Army Green 274. A suggested, but not mandatory, dyestuff formulation for Army Green 274:

Vat Olive 25	CI 69525
Vat Blue 39	
Vat Green 3	CI 69500

Disperse Blue BGL
Disperse Blue 62
Disperse Orange 29

Disperse Yellow 42	CI 10338
Disperse Red 88	
Disperse Brown 2	

* 6.6 Dyestuff formulation for Black 385. A suggested, but not mandatory, dyestuff formulation for Black 385:

Sodyevat Black	4GS
Vat Blue	74
Vat Blue	43
Disperse Blue	79
Disperse Red	179
Disperse Orange	30

6.7 Fabric defect scales. Fabric defect replica kits are available from Sears Roebuck and Co., Department 817 (ATTN: BSC 23-29), Sears Tower, Chicago, IL 60684.

* 6.8 Subject term (key word) listing.

Cloth, poplin
Jackets
Raincoats

6.9 Changes from previous issue. The margins of this document have been 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, as written, irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - GL
Navy - NU
Air Force - 99

Review activities:

Army - MD
Navy - MC, CG
Air Force - 11, 82
DLA - CT

Preparing activity:

Army - GL

Project No. 8305-0134

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge *(DO NOT STAPLE)*, and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

NOTE This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1 DOCUMENT NUMBER	2 DOCUMENT TITLE
MIL-C-43482D	Cloth, Poplin, Cotton and Polyester (Water Repellent)

3a. NAME OF SUBMITTING ORGANIZATION	4 TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ 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)*