

INCH-POUNDS

MIL-C-24910B  
 27 January 1992  
~~SUPERSEDED~~  
 MIL-C-24910A  
 15 April 1985

## MILITARY SPECIFICATION

## CLOTH, TROPICAL: POLYESTER AND WOOL

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

## 1. SCOPE

1.1 This specification covers the requirements for one type of washable polyester and wool tropical cloth.

## 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 (see 6.2).

## SPECIFICATIONS

## FEDERAL

PPP-P-1132 - Packaging of Woolen, Worsted and Wool Blend  
 (Synthetic Fiber; Cotton) Fabrics

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, P.O. Box 59, Natick, MA 01760-0001 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 PBC 8305

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**MIL-C-24910B**

**MILITARY**

**MIL-C-43665 - Cloth, Wool Mothproofing Treatment of**

**STANDARDS**

**FEDERAL**

**FED-STD-191 - Textile Test Methods**

**MILITARY**

**MIL-STD-655 - Provisions for Evaluating Quality of Cloth, Wool, Worsted and Wool Blends**

**\* MIL-STD-2073-1 - DOD Materials Procedures for Development and Applications of Packaging Requirements**

**\* MIL-STD-2073-2 - Packaging Requirement Codes**

\* (Unless otherwise indicated, copies of federal and military specification, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

\* 2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

**RULES AND REGULATIONS UNDER THE WOOL PRODUCTS LABELING ACT OF 1939**

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

**METHODS OF TEST FOR GRADES OF WOOL TOP**

(Applications for copies should be addressed to the U.S. Department of Agriculture, Agricultural Marketing Service, Washington, DC 20402.)

\* 2.2 Non-Government publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issue of 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 are the issue of the documents cited in the solicitation (see 6.2).

**TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMIST AND COLORIST**

**Method No. 8-1988 - Colorfastness to Crocking: AATCC Crockmeter Method**

**Method No. 135-1978 - Dimensional Changes in Automatic Home Laundering of Woven and Knit Fabrics**

## MIL-C-24910B

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

## AMERICAN SOCIETY FOR TESTING AND MATERIALS

- \* D 1424-83 - Test for Tear Resistance of Woven Fabrics by Falling Pendulum (Elmendorf) Apparatus

(Applications for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187).

(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). The standard sample is identified under piece number 85084.

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.3.3.1 Stock.

3.3.1.1 Wool. The stock shall be fleece or pulled wool or both, not lower in grade than 64's U. S. Standard when tested as specified in 4.4.1.1.

3.3.1.2 Polyester. The stock shall be semi-dull polyester fiber made from polyethylene glycol terephthalate, either homopolymer or modified polymer as appropriate. The fiber shall be 3 denier and the minimum average fiber length shall be 3 inches when tested as specified in 4.4.1.

\* 3.3.2 Polyester/wool yarn. The polyester and wool fibers shall be blended and spun on the worsted system and twisted into a 2-ply yarn for both warp and filling yarns. The finished cloth shall contain 75 + 2 percent polyester and 25 + 2 percent wool, based on the weight obtained from chloroform extraction, when tested as specified in 4.6.

3.4 Color. Unless otherwise specified in the contract, the color of the cloth shall be shade Blue 3346 and shall match the standard sample (see 6.3). The color shall be obtained by top dyeing.

## MIL-C-24910B

\* 3.4.1 Matching. The finished cloth shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated 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.

\* 3.4.2 Colorfastness. The finished cloth shall show colorfastness to laundering (3 cycles), wet drycleaning, perspiration, light (40 Standard Fading Hours) and crocking equal to or better than the standard sample. As a limit of acceptability, or when no standard sample is available, the finished cloth shall show a minimum of "good" colorfastness to laundering (3 cycles), wet drycleaning, perspiration, light (40 Standard Fading Hours) and shall show a crocking rating of not lower than 3.0 for dry and a 2.5 for wet when tested as specified in 4.6.

3.5 Mothproofing. Mothproofing of the wool top shall be in accordance with MIL-C-43555, when tested in accordance with 4.6.

\* 3.6 Physical requirements. The finished cloth shall conform to the requirements specified in Table I when tested as specified in 4.6.

TABLE I. Physical requirements

Yarns per inch (minimum)		Weight (ounces per yd- 56-inch width)	Breaking strength		Tearing strength		Shrinkage		Weave
			(minimum)	(pounds)	(minimum)	(pounds)	percent	(maximum)	
Warp Filling			Warp	Filling	Warp	Filling	Warp	Filling	
50	44	10.0 +0.5	100	80	4.0	4.0	3.0	2.5	Plain

\* 3.6.1 Width. Unless otherwise specified (see 6.2), the finished cloth shall be a minimum of 60 inches exclusive of selvages or exclusive of tuck-in when woven on Sulzer-type looms.

3.7 Finish. The cloth shall be scoured, heat set, sheared and decated so as to provide a finish equal to that of the standard sample.

3.7.1 Pilling. The finished cloth shall show no more pilling than that of the standard sample when tested as specified in 4.6.

3.7.2 pH. The pH value of the water extract of the finished cloth shall be no less than 5.5 nor more than 8.5 when tested as specified in 4.6.

3.8 Selvages. The selvages shall be no thicker than sixty-five percent more than the body of the cloth when tested as specified in 4.6.

## MIL-C-24910B

3.9 Length and put-up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths each not less than 50 yards.

3.10 Wool content label. Cloth manufactured under this specification shall be labeled in accordance with the Wool Products Labeling Act of 1939.

3.11 Marking. The back of the cloth shall be marked "Back" at both ends of each roll with letters not less than 1/2 inch in height (see 4.4.2.3). The marking shall be clearly legible in any indelible marking used commercially.

3.12 Workmanship. The finished cloth shall conform to the quality established by this specification. The demerit points per 100 square yards when calculated as specified in section 4, shall not exceed the established maximum point value. Each defect shall be marked with a 1-to-1 1/2 inch long string. The string shall be sewn into the selvage near the defect. A red string shall represent a three or four point defect and a white string shall represent a one or two point defect (see 4.4.2.5).

#### 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 (examination 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.

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).

## MIL-C-24910B

**4.3 First article inspection.** When required, the first article of finished cloth shall be visually inspected for uniformity of shade, color, finish and appearance and shall be tested for chemical and physical properties in accordance with the applicable methods specified in 4.6.

**4.4 Quality conformance inspection.** Sampling for inspection shall be performed in accordance with MIL-STD-655, 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 purchase document.

TABLE II. Component tests

Characteristics	Requirement paragraph	Test method
Polyester identification	3.3.1.2	1/
Length of fiber	3.3.1.2	Visual 1/
Denier	3.3.1.2	4021 1/

1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirements.

**4.4.1.1 Wool.** The wool shall be visually examined for grade in the undyed top form by comparison with the standard (see 3.3.1.1). In the event of a dispute, the wool grade shall be determined by the width method (wedge). The sample unit shall be 1 yard of undyed top. The sample size (number of sample units) shall be as shown in the table below. The lot size shall be expressed in units of 1 pound. The results from each sample unit shall be reported separately. The lot shall be unacceptable if a single sample unit fails to meet the required grade.

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

**4.4.1.2 In-process inspection.** Inspection shall be made at any point or during any phase of the manufacturing process to assure that supplies and services conform to prescribed requirements. The Government reserves the right to exclude from consideration for acceptance any material for which the in-process inspection has indicated non-conformance.

**4.4.2 Examination of the end item.** Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.4.

## \*MIL-C-24910B

4.4.2.1 Yard-by-yard examination. The yard by yard examination shall be as specified in MIL-STD-655. 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. The fabric quality shall be quality level 15.

4.4.2.1.1 Limit for slubs and knots. Only those knots and slubs which exceed the limits shown on Sears Fabric Defect Scales (see 6.4), 3-1/2 or D for slubs and C for knots, shall be scored.

4.4.2.2 Examination for length. Examination for length shall be as specified in MIL-STD-655.

4.4.2.3 Examination for back marking and compliance with the Wool products Labeling Act. Examination for back marking and compliance with the Wool Products Labeling Act shall be as specified in MIL-STD-655.

4.4.2.4 Examination for shade and finish.

4.4.2.4.1 Individual rolls. Each roll in the lot shall be examined visually for shade match (see 3.4.1) and finish (see 3.7). A roll shall be unacceptable if it fails to meet the requirements for shade match and finish. The sample unit shall be a 4 inch by 20 inch swatch of the cloth. A sample unit shall be drawn from each roll in the lot.

4.4.2.5 Examination for defect marking. Examination for defect marking shall be as specified in MIL-STD-655.

4.5 Examination of packaging requirements. Examination shall be made in accordance with the provisions of PPP-P-1132 to determine that preservation, packing, and marking comply with section 5 requirements.

4.6 Tests. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in Table III shall be followed. The physical and chemical values specified in section 3 apply to the results of the determinations made on a sample unit for test purposes as specified in the applicable test methods. The sample unit shall be 4 continuous yards full width of the finished cloth. The lot size shall be expressed in units of 1 yard. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All test reports shall contain the individual values utilized in expressing the final result. The sample size (number of sample units) shall be in accordance with the following:

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

## MIL-C-24910B

TABLE III. Test methods

Characteristic	Requirement paragraph	Test Method
Yarn ply:		
Warp and Filling	3.3.2	Visual <u>1/</u>
Fiber percentage	3.3.2	2102
Colorfastness:		
Laundering	3.4.2	5614 <u>2/</u> <u>3/</u>
Wet dry cleaning	3.4.2	5622
Crocking	3.4.2	AATCC 8-1988
Perspiration	3.4.2	5680
Light (40 SFH)	3.4.2	5660 <u>4/</u>
Mothproofing	3.5	<u>5/</u>
Yarns per inch:		
Warp and Filling	3.6	5050
Breaking strength:		
Warp and Filling	3.6	5100
Tear Strength:		
Warp and Filling	3.6	ASTM D 1424
Shrinkage:		
Warp and Filling	3.6	<u>6/</u>
Weave	3.6	Visual <u>1/</u>
Weight	3.6	5041
Filling	3.7.1	5320 <u>7/</u>
pH	3.7.2	2811
Selva thickness	3.8	5030

- 1/ One determination per sample unit and the results reported as "pass " or "fail".
- 2/ The specimen shall be dried after each of the 3 laundering cycles.
- 3/ On the color transfer cloth evaluation, only the stain on the polyester and wool fibers of the color transfer cloth shall be evaluated.
- \*4/ The calibration of the fadeometer and the definition of AATCC Fading Units shall be according to AATCC Test Method 16-1982. Using the formula below, 16 to 22 AFU's are acceptable as 20 SFH's.

$$\text{AATCC Fading Units} = \frac{(\Delta E^*)}{1.7} (20)$$

Where  $(\Delta E^*)$  is the color difference in CIELAB<sup>\*</sup> units of color difference.



## MIL-C-24910B

- 5/ A certificate of compliance shall be submitted and shall be acceptable for this requirement.
- 6/ The test for dimensional stability shall be performed in accordance with AATCC TM 135 - 1978, laundered on a Permanent Press Cycle (140 F°) and tumble dried at 140 F° for five (5) complete cycles.
- 7/ The pilling test shall be conducted in accordance with Method 5320, except that five specimens of the test cloth and one specimen of the standard sample shall be used concurrently.

## 5. PACKAGING

5.1 Preservation. Preservation shall be A or C (see 6.2).

5.1.1 Level A and C. The cloth, put up as specified (see 3.9) shall be packaged according to FPP-P-1132.

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

5.2.1 Level A, B and C. The cloth shall be packed according to FPP-P-1132.

5.3 Marking. In addition to any special marking required by the contract, shipments shall be marked in accordance with FPP-P-1132.

\* 5.4 MIL-STD 2073. When specified (see 6.2), Preservation and Packing shall be in accordance with MIL-STD-2073-1 and MIL-STD-2073-2.

## 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 manufacture of apparel for wear by male and female personnel of the U.S. Navy.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this document
- \* b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.2)
- c. When a first article is required (see 3.2). 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.
- d. Width required (see 3.6.1).
- e. Length required if other than specified (see 3.9).
- f. Levels of put-up and preservation, and packing (see 5.1 and 5.2).
- \* g. When all packaging data is to be found in MIL-STD-2073-1 and MIL-STD-2073-2.

MIL-C-24910B

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

\* 6.4 Sears Fabric Defect Scales are available from Sears, Roebuck and Company, Department 817, (Attn: 23-29), Sears Tower, Chicago, IL 60684 (see 4.4.2.1.1).

\* 6.5 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.

\* 6.6 Subject term (key word) listing.

Cloth, dress clothing  
Cloth, washable clothing  
Fabric, washable

Custodian:  
Army - GL  
Navy - NU

Preparing Activity:  
Navy - NU

Project No. 8305-0359

Review Activities:  
Army - MD  
DLA - CT

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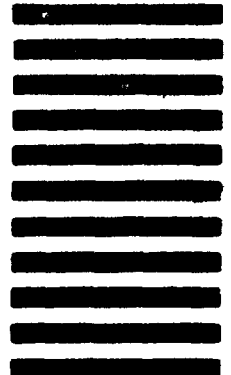
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**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**

MIL-C-24910B

**2. DOCUMENT TITLE**

CLOTH, TROPICAL: POLYESTER AND WOOL

**3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**☐ **VENDOR**☐ **USER**☐ **MANUFACTURER**☐ **OTHER (Specify).** \_\_\_\_\_**b. ADDRESS (Street, City, State, ZIP Code)****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****d. DATE OF SUBMISSION (YYMMDD)**