

MIL-C-29404(MC)
11 May 1983

MILITARY SPECIFICATION

CLOTH, TROPICAL: POLYESTER AND WOOL

This specification is approved for use by U. S. Marine Corps, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1. Scope. This specification covers polyester and wool tropical washable cloth in top dye and piece dye fabrics.

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

Type I	Top Dye	75/25 Polyester/Wool
Type II	Piece Dye	80/20 Polyester/Wool

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

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

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Commandant of the Marine Corps (LMA-1), Headquarters, U. S. Marine Corps, Washington, D.C. 20380, by using the self-addressed Standardization Document Improve Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 8305

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MIL-STD-129 - Marking for shipment and storage
 MIL-STD-655 - Provisions for Evaluating Quality of Cloth, Wool, Worsted and Wool blends

(Copies of specifications, standards, drawings and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer).

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein.

U. S. DEPARTMENT OF AGRICULTURE
 Methods of Test for Grades of Wool Top

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

Rules and Regulations Under the Wool Products Labeling Act of 1939

(Application for copies should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.)

3. REQUIREMENTS

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

3.2 First article. When specified (see 6.2), the contractor shall furnish sample cloth for first article inspection and approval. The first article shall consist of 5 yards, full width. The approval of the first article authorizes the commencement of production, but does not relieve the contractor of the responsibility for compliance with all provisions of the specification. The first article shall be manufactured by the contractor in the same facilities to be used for the manufacture of the production cloth.

3.3 Material

3.3.1 Fiber

3.3.1.1 Wool. The stock shall be fleece or pulled wool or both, not lower in grade than 62's U. S. Standard for the piece dye and not lower than 64's U. S. Standard for the top dye when tested as specified in 4.4.1.1.

3.3.1.2 Polyester. The stock shall be semidull 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 for both warp and filling yarns. The yarns shall be

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singles in both warp and filling. The finished cloth shall contain the following fiber percentages, based on the oven-dry weight, when tested as specified in 4.3:

- a. Top dyed cloth - 75 percent polyester, 25 \pm 3 percent wool
- b. Piece dyed cloth - 80 percent polyester, 20 \pm 3 percent wool or

3.3.3 Color. The color of the cloth shall be khaki 2122 for type I and 2130 for type II and shall match the standard sample (see 6.3). The type I color shall be obtained by top dyeing and the type II color shall be obtained by piece dyeing.

3.3.3.1 Matching. The color of the finished cloth shall match the standard sample for type I or type II under artificial daylight having a color temperature of 7500° Kelvin and shall be a good approximation to the standard sample for type I or type II under incandescent lamplight at 2800° Kelvin.

3.3.3.2 Colorfastness. The finished cloth shall show colorfastness to wet dry-cleaning, perspiration, light and crocking equal to or better than the standard sample. When no standard sample is available, the finished cloth shall show "good" colorfastness to wet drycleaning, perspiration, crocking and light. Testing shall be as specified in 4.6.

3.4 Design and construction.

3.4.1 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)		Breaking strength minimum (pounds)		Shrinkage percent (maximum) 1/		Weave
Warp	Filling	Warp	Filling	Warp	Filling	
65	59	100	80	2.5	2.5	Plain (1X1)

1/ The maximum shrinkage shall be determined after three complete launderings (after three complete wash and dry cycles).

3.5 Length and put up. Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 50 yards, and shall be put up on full width rolls as specified in PPP-P-1132.

3.6 Width. Unless otherwise specified (see 6.2), the width of the finished cloth shall be a minimum of 60 inches exclusive of selvages.

3.7 Weight of cloth. The weight per linear yard of the finished cloth, on a 56 inch width basis, shall be as follows:

<u>Piece dyed cloth</u>		<u>Top dyed cloth</u>	
Ounces		Ounces	
Minimum	Maximum	Minimum	Maximum
6.5	7.0	6.3	6.8

3.8 Finish. The cloth shall be scoured, heat set, sheared and decated so as to

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provide a finish equal to that of the standard sample for the applicable type being procured.

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

3.8.2 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.

3.8.3 Selvages. The selvages shall be no thicker than 65 percent more than the body of the cloth when tested as specified in 4.6, and shall lie flat when the material is laid out for cutting.

3.9 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.

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

3.10 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 4.4.2.1.1 and 4.4.2.5).

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 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:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Packaging inspection (see 4.5).

4.3 First article inspection. When required, the first article shall be visually examined for color, finish, and appearance and shall be tested for chemical, and physical properties in accordance with the applicable methods specified in 4.4.2.

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4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-655 except where otherwise indicated herein.

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be inspected 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. The polyester fiber shall be tested and identified as specified in Table II.

TABLE II. Component tests

Characteristic	Requirement paragraph	Test method
Polyester identification	3.2.1.2	1/
Length of fiber	3.2.1.2	Visual 1/
Denier	3.2.1.2	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 (see 3.3.1.1) in the undyed top form by comparison with Methods of Test for Grades of Top Wool. 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 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 nonconformance.

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

4.4.2.1 Yard-by-yard examination. Each roll in the sample shall be examined on the face side only. When the total yardage in the roll does not exceed 100 yards, 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 sample size shall be in accordance with the following.

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

All defects as specified in MIL-STD-655, which are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit points as listed in 4.4.2.1.1 except that only those knots and slubs which exceed the limits shown on Sears Fabric Defect Scales (see 6.5), D for slubs and C for knots, shall be scored. The same yardage shall be given a through-lighting inspection from the back of the cloth towards a light source for holes and thin areas not previously scored on the face side of the cloth. Slight open places resulting from removal of burrs, shives, sisal or broken picks not previously scored on the face side shall not be scored in through-lighting inspection. Defects on the selvage shall not be scored unless the body of the cloth is affected. 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 lot shall be unacceptable if the points per 100 square yards of the total yardage examined exceeds 20.0 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 33.0 points. If one roll exceeds 33.0 points for 100 square yards, a second sample shall be examined only for individual roll quality examination. The lot shall be unacceptable if one or more rolls in the second sample exceeds 33.0 points per square yards. Point computation for lot quality and individual roll quality shall be as follows:

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

4.4.2.1.1 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

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

Width less than specified
Edges of roll build-up or softness of roll in body of cloth
Shading defects: Shaded side to side, side to center, or end to end

4.4.2.2 Examination for length. The 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. The examination for back marking and compliance with the Wool Products Labeling Act shall be as specified in MIL-STD-655.

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

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4.4.2.4 Examination for shade and finish, individual rolls. Each roll in the lot shall be examined visually for shade match (see 3.3.3) and finish (see 3.8). 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 (stringing of defects). The 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 packaging, packing and marking complies with the 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
22,0001 and over	5

TABLE III. Test methods

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Yarn ply:		
Warp	3.3.2	Visual <u>1/</u>
Filling	3.3.2	Visual <u>1/</u>
Fiber percentage	3.3.2	2102
Colorfastness:		
Wet dry cleaning	3.3.3.2	5622
Crocking	3.3.3.2	5651
Perspiration	3.3.3.2	5680
Light	3.3.3.2	5660
Yarns per inch:		
Warp	3.4.1	5050
Filling	3.4.1	5050
Breaking strength:		
Warp	3.4.1	5100

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Characteristic	Requirement paragraph	Test method
Filling	3.4.1	5100
Shrinkage:		
Warp	3.4.1	4.3.1
Filling	3.4.1	4.3.1
Weave	3.4.1	Visual <u>1/</u>
Weight	3.7.1	5041
Pilling	3.8.1	5320 <u>2/</u>
pH	3.8.2	2811
Selvage thickness	3.8.3	5030

1/ One determination per sample unit and the results reported as "pass" or "fail".

2/ 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.

4.6.1 Test for shrinkage after laundering.

4.6.1.1 Apparatus and materials.

(a) Kenmore Automatic Washing Machine Model 600 or equivalent machine (in case of disputes, the Kenmore Model 600 shall be used).

(b) Kenmore Automatic Dryer Model 600 or equivalent (in case of disputes, the Kenmore Model 600 shall be used).

(c) AATCC Standard Detergent 124 or equivalent.

(d) Dummy pieces for ballast - 36 X 36 inches hemmed pieces of similar cloth which when added to test specimens will make an approximately 4 pound load.

4.6.1.2 Preparation of specimens. Three specimens 22 X 22 inches measured parallel to the warp and filling shall be cut from a portion of the cloth sample. One specimen shall be cut from each side of the sample unit to within 3 inches of the salvages and the third specimen shall be taken from the center. No two specimens shall contain the same filling yarns. The specimen shall be conditioned to equilibrium under standard conditions in accordance with FED-STD-191. The conditioned specimens shall be laid without tension on a flat surface, care being taken that the cloth is free from wrinkles or creases. Three distances, each a minimum of 18 inches, shall be measured and marked off parallel to each of the warp and filling directions of the specimen. Each pair of markings shall be a minimum

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of 6 inches from each other and not closer than 1 inch to the edges of the specimen. The distance may be marked with indelible ink and a fine pointed pen, or by sewing fine threads into the cloth or by stamping. The samples shall then be laundered in accordance with 4.6.1.3.

4.6.1.3 Laundering. Place the three 22 X 22 inch specimens in the washer. The washing load shall be $4 + 1/4$ pounds. Dummy pieces shall be added to the machine, along with the specimens to make up the $4 + 1/4$ pounds. Fill to the full water level of the washer with water of a hardness not to exceed 50 parts per million and at a temperature of $115^{\circ} + 5^{\circ}\text{F}$. The rinse temperature shall be $80^{\circ} + 5^{\circ}\text{F}$. Add 140 + 1 grams of detergent. Set the washer for a 12 minute cycle on the "Permanent Press" setting. Allow the washing to proceed automatically through the final cycle. Remove the specimens immediately at the completion of the final spin and separate from the dummy pieces, and each other if tangled. Place the complete washed load (4 pounds) in the dryer and dry at a permanent press setting with a 10 minute cool down cycle. Operate the dryer until the load is dry and continue tumbling 5 minutes with the heat turned off (cool down cycle.). Remove the load immediately after the machine stops. Repeat the wash and dry cycles for five complete cycles. All the specimens shall be removed and conditioned to equilibrium in accordance with FED-STD-191.

4.6.1.4 Determination of shrinkage. The three 22 X 22 inch specimens shall be laid out without tension on a flat surface in a standard atmosphere. Care shall be taken that the specimens are free from wrinkles and creases. The previously measured distance marked on the specimens shall be measured in both the warp and filling directions. The shrinkage of the specimens (after three complete wash and dry cycles) shall be calculated as follows:

$$\text{Shrinkage percent} = \frac{A-B}{A} \times 100$$

Where A = Average of initial measurements (three specimens)

B = Average of measurements after laundering (three specimens)

The shrinkage of the sample unit in the warp and filling directions shall be the average of the specimens tested in each direction respectively and shall be reported separately to the nearest 0.1 percent. The individual values used to calculate the average shall also be reported.

5. PACKAGING

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

5.1.1 Level A and commercial. The cloth shall be put up and packaged in accordance with the applicable requirements of PPP-P-1132 except the moth repellent requirements shall not apply.

5.2 Packing. Packing shall be level A or commercial as specified (see 6.2).

5.2.1 Level A and commercial. The cloth shall be packed in accordance with the applicable requirements of PPP-P-1132.

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5.3 Marking. In addition to any special marking required by the contract, shipments shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The cloth covered by this specification is intended for use in the manufacture of shirts and neck ties for male personnel and shirts for female personnel of the U. S. Marine Corps.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2).
- (c) When first article is required (see 3.2).
- (d) Length and put up if other than specified (see 3.5).
- (e) Width if other than specified (see 3.6).
- (f) Selection of applicable levels of put up, packaging and packing (see

5.1 and 5.2).

6.2.1 Data requirements. Data conforming to Data Item Descriptions DI-R-4803, DI-R-4805, DI-T-4901, DI-T-4902, DI-T-4903, and DI-T-4904 will usually be required for delivery in connection with this specification. When so required, such data will be specified for delivery on a DD Form 1423 included in the contract.

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

6.4 First article. Examinations, tests, and approval shall be as specified by the contracting officer (see 3.2).

6.5 Scales. Sears Fabric Defect Scales are available from Sears Roebuck and Company, Department 817 (Attn: BSC 23-29) "Fabric Defect Replica Kit", Sears Tower, Chicago, IL 60684.

Preparing Activity:

Navy - MC

Project No. 8305-0852

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<p>INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. 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. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.</p>		
DOCUMENT IDENTIFIER AND TITLE MIL-C-29404(MC) Cloth, Tropical: Polyester and Wool		
NAME OF ORGANIZATION AND ADDRESS	CONTRACT NUMBER	
	MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT	
<p>1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A. GIVE PARAGRAPHS NUMBER AND WORDING.</p> <p>B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</p>		
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