

INCH POUND

MIL-C-29404B  
10 JUNE 1992  
 SUPERSEDING  
 MIL-C-29404A(MC)  
 31 OCTOBER 1990

## MILITARY SPECIFICATION

## CLOTH, TROPICAL: POLYESTER AND WOOL

This specification is approved for use by the US 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 the requirements for a polyester and wool tropical cloth, washable, 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, Khaki Shade 2122
Type II	Piece Dye	80/20 Polyester Wool, Khaki Shade 2130

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Personnel Support Center, Clothing and Textiles Directorate, Attn: DPSC-FSSD, 2800 South 20th Street, Philadelphia, PA 19101-8419, by using the 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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 distribution is unlimited.

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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 and packing of Woolen, Worsted and Wool Blend (Synthetic Fiber; Cotton) Fabrics

MILITARY

MIL-L-35078 - Loads, Unit; Preparation of Semipermanent Subsistence Items; Clothing, Personal Equipment and Equipage; General Specification for

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

MIL-STD-129 - Marking for Shipment and Storage  
MIL-STD-147 - Palletized Unit Load  
MIL-STD-655 - Provisions for Evaluating Quality of Cloth, Wool, Worsted and Wool Blends

(Unless otherwise indicated, copies of federal and military specifications, 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.

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US DEPARTMENT OF AGRICULTURE  
Methods of Test for Grades of Wool Top

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

Rules and Regulations Under the Wool Products Labeling Act 1939 US Postal Manual

(Application for copies should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 29402.)

2.2 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).

\* 3.2 First article. When specified, (see 6.2 and 6.4), a sample shall be subjected to first article inspection, in accordance with 4.3.

3.3 Material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3.1 Basic Material

3.3.1.1 Fiber.

\* 3.3.1.1.1 Wool. The stock shall be fleece or pulled wool or both, not lower in grade than 62's US. Standard for the piece dye and not lower than 64's US standard for the top dye when tested as specified in 4.4.1.1. The wool fiber shall be 3 to 3 1/2 inches in length and when blended with the appropriate polyester (3 denier) shall be spun on the worsted spinning system.

3.3.1.1.2 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 three denier and the minimum average fiber length shall be three inches when tested as specified in 4.4.1.

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3.3.2 Yarn.

3.3.2.1 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 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 4.5.

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

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

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 degrees Kelvin and shall be a good approximation to the standard sample for type I or type II under incandescent lamplight at 2800 degrees Kelvin.

3.3.3.2 Colorfastness. The finished cloth shall show colorfastness to laundering, wet drycleaning, 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 laundering, wet drycleaning, perspiration, crocking and light. Testing shall be as specified in 4.5.

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 4.5.

TABLE I. Physical Requirements.

Yarns Per Inch minimum		Breaking Strength minimum (Pounds)		Shrinkage percent minimum		Weave (1x1)
Warp	Filling	Warp	Filling	Warp	Filling	
65	59	100	80	2.5	2.5	Plain

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3.5 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> (ounces)		<u>Top dyed cloth</u> (ounces)	
Minimum	Maximum	Minimum	Maximum
6.5	7.0	6.3	6.8

3.6 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.

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

3.8 Finish. The cloth shall be scoured, heat set, sheared and decatized so as to 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 4.5.

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 4.5.

3.8.3 Selvages. The selvages shall be no thicker than 65 percent more than the body cloth when tested as specified in 4.5. The cloth 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 selvaqe 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.

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## 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 (examinations and tests) 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 specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall 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 an 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 accept 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)

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.

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

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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 procurement documents. The polyester fiber shall be tested and identified as specified in Table II.

TABLE II. Component Tests

Characteristic	Requirement paragraph	Test methods
Polyester identification	3.3.1.1.2	<u>1/</u>
Length of fiber	3.3.1.1.2	Visual <u>1/</u>
Denier	3.3.1.1.2	4021 <u>1/</u>

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 3.3.1.1.1) 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 (yards)</u>	<u>Sample size rolls</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

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.

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.

4.4.2.4 Examination for shade and finish for individual rolls. Each roll in the lot shall be examined visually for shade match (see 3.3.3.1) 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 24 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 (string of defects). The examination for defect marking shall be as specified in MIL-STD-655.

4.5 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 for test purposes as specified in the applicable test methods. The sample unit shall be four continuous yards full width of the finished cloth. The lot size shall be expressed in units of one 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



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TABLE III. Test Methods

Characteristic	Requirement Paragraph	Test Method
Yarn Identification		
Warp	3.3.2	Visual <u>1/</u>
Filling	3.3.2	Visual <u>1/</u>
Fiber content		
Type I	3.3.2	2102
Type II	3.3.2	2102
Yarn Ply		
Warp	3.3.2	Visual <u>2/</u>
Filling	3.3.2	Visual <u>2/</u>
Weight (Option C - Small Swatch of Fabric)		
Type I	3.5	ASTM-D 3776 <u>3/</u>
Type II	3.5	ASTM-D 3776 <u>3/</u>
Yarns per inch		
Warp	3.4.1	5050
Filling	3.4.1	5050
Breaking Strength (Grab Method)		
Warp	3.4.1	ASTM-D 5034 <u>3/</u>
Filling	3.4.1	ASTM-D 5034 <u>3/</u>
Shrinkage		
Warp	3.4.1	4.6 <u>4/</u>
Filling	3.4.1	4.6 <u>4/</u>
Weave	3.4.1	Visual
Colorfastness:		
Wet-dry cleaning	3.3.3.2	5622
Laundering	3.3.3.2	5614
Crocking	3.3.3.2	5651
Perspiration	3.3.3.2	5680
Light	3.3.3.2	5660
Pilling	3.8.1	5320 <u>5/</u>
pH	3.8.2	2811
Selvage thickness	3.8.3	5030

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- 1/ The test methods indicated have been found acceptable to determine if the cloth meets the stated requirements. If the Government requires proof that the cloth meets the stated requirements, the test method indicated shall be used.
- 2/ One determination per sample unit and the results reported as "pass" or "fail".
- 3/ Refers to American Society for Testing Materials (ASTM).
- 4/ The maximum shrinkage shall be determined after three complete launderings (three complete wash and dry cycles).
- 5/ The pilling test shall be conducted in accordance with Method 5320, except that five specimens of test cloth and one specimen of the standard sample shall be used concurrently.

\* 4.6 Test for Shrinkage after Laundering.4.6.1 Apparatus and Materials.

(a) Kenmore Automatic Washing Machine Model 600 or equivalent, (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 - hemmed pieces of similar cloth, 36 X 36 inches, which when added to test specimens will make approximately a 4 pound load.

4.6.1.1 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 selvages and the third specimen shall be taken from the center. No two specimens shall contain the same filling yarns. The specimens 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 (3) 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 of 6 inches from each other and not closer than one (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 4.6.1.2.

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4.6.1.2 Laundering. Place the three (3) 22 X 22 inch specimens in the washer. The washing load shall be  $4 \pm 1/4$  pounds. Dummy pieces shall be added to the machine, along with the specimens to make up the  $4 \pm 1/4$  pounds. Fill to the full water level of the washer of a hardness not to exceed 50 parts per million and at a temperature of  $115 \pm 5$  F. The rinse temperature shall be  $80 \pm 5$  F. Add  $140 \pm 1$  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 three complete cycles. All the specimens shall be removed and conditioned to equilibrium in accordance with FED-STD-191.

4.6.1.3 Determination of shrinkage. The three (3) 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 (3) 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.

4.7 Examination of packaging requirements. Examination shall be made in accordance with the provisions PPP-P-1132, to determine that packaging, packing and marking complies with section five requirements.

## 5. PACKAGING

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

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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.

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

## 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 shirts and neck ties for male personnel and shirts for female personnel of the US Marine Corps.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of the individual documents referenced (see 2.1.1).
- c. Type and weight of cloth required. If the cloth is type I, specify number and texture (see 1.2 and 3.5).
- d. When first article is required (see 3.2).
- e. Length and put up if other than specified (see 3.6).
- f. Width if other than specified (see 3.7).
- g. Applicable levels of put-up, packaging, and packing (see 5.1 and 5.2).

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

6.4 First Article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a pre-production sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

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6.5 Acceptance criteria. The quality level of this cloth is 20 when inspected in accordance with MIL-STD-655. The lot shall be unacceptable if the points per 100 yards of the total yardage examined exceeds 20 points. The lot shall be unacceptable if the points per 100 square yards of two or more individual rolls exceeds 33 points.

6.6 Recycled materials. It is encouraged that recycled materials be used when practical as long as the materials meet the requirements of this specification

6.7 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.

6.8 Subject term (key word) listing.

Textile  
Blended fiber  
Fabric

Custodian:  
Navy-MC

Preparing activity:  
DLA-CT

Project No.  
8305-0457

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

- 1 The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
- 2 The submitter of this form must complete blocks 4, 5, 6, and 7.
- 3 The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

<b>I RECOMMEND A CHANGE:</b>	1 DOCUMENT NUMBER MIL-C-29404B	2 DOCUMENT DATE (YYMMDD) 10 JUNE 1992
3 DOCUMENT TITLE CLOTH, TROPICAL: POLYESTER AND WOOL		
4 NATURE OF CHANGE (Identify paragraph number and include proposed rewrite if possible. Attach extra sheets as needed.)		
5 REASON FOR RECOMMENDATION		
<b>E. SUBMITTER</b>		
a. NAME (Last, First, Middle Initial)	b. ORGANIZATION	
c. ADDRESS (include Zip Code)	d. TELEPHONE (include Area Code) (1) Commercial (2) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)
<b>B. PREPARING ACTIVITY</b>		
a. NAME  DLA-CT	b. TELEPHONE (include Area Code) (1) Commercial  (2) AUTOVON DSN  444-8105	
c. ADDRESS (include Zip Code) 2800 South 20th Street ATTN: DPSC-FSSD; Bldg. 12-3-D Philadelphia, PA 19101-8419	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS CONTACT Defense Quality and Standardization Office 5203 Leesburg Pike Suite 1403 Falls Church VA 22041 3466 Telephone (703) 756 2340 AUTOVON 289-2340	