

**PURCHASE DESCRIPTION**

**UNIFORM, COMBAT/UTILITY, CAMOUFLAGE PATTERN;  
MARINE CORPS**

**(BLOUSE AND TROUSERS)**

1.1 Scope. This document covers the requirements for the Marine Corps combat utility uniform blouse and trouser, type I and type II fabric, and embroidered Marine Corps insignia.

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

Cloth Type I - Woodland MARPAT Camouflage Printed

Class 1 - Lightweight cloth

Class 2 - Midweight cloth

Class 3 - Midweight cloth for headgear

Class 4 - Midweight cloth for 3 color for name / service tapes

Cloth Type II - Desert MARPAT Camouflage Printed

Class 1 - Lightweight cloth

Class 2 - Midweight cloth

Class 3 - Midweight cloth for headgear and name/service tapes

Cloth Type III - Woodland/Desert Reversible Camouflage Printed

Class 3 - Midweight cloth for helmet covers

Cloth Type IV - Woodland MARPAT Camouflage Printed Alternate Pocketing Material

Cloth Type V - Desert MARPAT Camouflage Printed Alternate Pocketing Material

Comment, suggestions, or questions on this document should be addressed to: DLA Troop Support, Clothing and Textiles Directorate, Attn: DLA TROOP SUPPORT-CRD, 700 Robbins Avenue, Philadelphia, PA 19111-5096 or emailed to [larry.griffin@dla.mil](mailto:larry.griffin@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at [www.dodssp.daps.mil](http://www.dodssp.daps.mil).

**AMSC N/A**

**FSC 8415**

**DISTRIBUTION STATEMENT:**

This notice is to advise you that the Government possesses intellectual property/trademark rights in the following Marine Corps patterns and logos (hereafter collectively referred to as "intellectual property"):

The Eagle, Globe and Anchor (EGA) logo, including the EGA logo as it appears embedded in the fabric pattern. The Government further has title to the invention disclosed and claimed in United States Design Patent No. D491,372 issued on 15 June 2004 for “Camouflage Pattern for Sheet Material and Uniforms” and the invention disclosed and claimed in United States Patent No. 6,805,957 issued on 19 October 2004 for ‘Camouflage U.S. Marine Corps Utility Uniform: Pattern, Fabric, and Design.’ The Government claims exclusive ownership of the above mentioned intellectual property. Therefore, no entity other than the Government, or those contracted by or having obtained proper permission or licenses from the Government to do so, are permitted to produce, sell, or transfer in any manner any items (clothing or non-clothing) containing or copying, in whole or in part, the intellectual property. Doing so will be considered an infringement on the Government’s intellectual property rights and will be subject to legal action.

1.2.1 Garment Classification. The blouse and trouser shall be of the following types and sizes as specified (see 6.2).

- Garment Type 1, Cloth Types I and II            - MCCUU Blouse with Permethrin Treatment
- Garment Type 2, Cloth Types I and II            - MCCUU Trouser with Permethrin Treatment

The Type III cloth is utilized in the reversible helmet cover end item specification. The Type IV and V cloth shall be used as an alternate pocketing material when sufficient printed seconds are not available. The contractor may apply for a waiver to use an alternate fabric for the MCCUU Woodland and Desert Trouser material when MCCUU seconds are not available as long as the Supplier’s fabric meets the physical requirements in the MCCUU Purchase Description.

1.2.2 Schedule of sizes. The blouse and trousers shall be constructed in the following sizes (see 6.2).

**SCHEDULE OF UNISEX SIZES – BLOUSE**

<b>X-Small</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>	<b>X-Large</b>	<b>XX- Large</b>
	XX-Short	XX-Short			
X-Short	X-Short	X-Short	X-Short		
Short	Short	Short	Short	Short	
Regular	Regular	Regular	Regular	Regular	Regular
Long	Long	Long	Long	Long	Long
	X-Long	X-Long	X-Long	X-Long	X-Long
		XX-Long	XX-Long		XX-Long

**SCHEDULE OF FEMALE SIZES – BLOUSE**

<b>32</b>	<b>35</b>	<b>39</b>
X-Short	X-Short	
Short	Short	Short
	Regular	

**SCHEDULE OF UNISEX SIZES - TROUSERS**

<b>X-Small</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>	<b>X-Large</b>	<b>XX-Large</b>
X-Short	X-Short	X-Short			
Short	Short	Short	Short	Short	
Regular	Regular	Regular	Regular	Regular	Regular
Long	Long	Long	Long	Long	Long
	X-Long	X-Long	X-Long	X-Long	X-Long
		XX-Long	XX-Long		XX-Long

**SCHEDULE OF FEMALE SIZES – TROUSERS**

<b>28</b>	<b>24</b>	<b>32</b>
X-Short	X-Short	X-Short
Short	Short	Short
	Regular	

**2. APPLICABLE DOCUMENTS**

2.1 General. The documents listed in this section are specified in sections 3, 4 or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements cited in sections 3, 4 and 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 are those cited in the solicitation or contract.

**FEDERAL STANDARDS**

- FED-STD-4B - Glossary of Fabric Imperfections
- FED-STD-595B - Colors Used in Government Procurement

**COMMERCIAL ITEM DESCRIPTIONS**

A-A-50198 - Thread, Gimp, Cotton, Buttonhole  
 A-A-50199 - Thread, Poly Core Cotton Covered  
 A-A-55126 - Fastener Tape, Hook and Loop, Synthetic  
 A-A-59826 – Thread, Nylon

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-W-5664 - Webbing, Textile, Elastic  
 MIL-DTL-44411- Insect Repellent, Permethrin  
 DPSCM 4155.3 - Quality Systems Requirements.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or [www.dodssp.daps.mil](http://www.dodssp.daps.mil) or from the Standardization Document Order Desk, 700 Robbins Ave. Philadelphia, PA 19111-9054.)

2.2.2 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 specified in the solicitation or contract.

<b><u>Drawing Number</u></b>	<b><u>Drawing Description</u></b>
<b><u>Drawing Date</u></b>	

2-1-2525	Woodland MARPAT- 4 color (Coyote 476)	12-Jul-2004
2-1-2526	Woodland MARPAT- 4 color (Green 474 with EGA symbol)	12-Jul-2004
2-1-2527	Woodland MARPAT- 4 color (Black 477)	12-Jul-2004
2-1-2528	Woodland MARPAT- 4 color (Khaki 476)	12-Jul-2004
2-1-2529	Desert MARPAT- 4 color (Light Tan 479)	12-Jul-2004
2-1-2530	Desert MARPAT- 4 color (Urban Tan 478)	12-Jul-2004
2-1-2531	Desert MARPAT- 4 color (Light Coyote 481 with EGA symbol)	12-Jul-2004
2-1-2532	Desert MARPAT- 4 color (Highland 480)	12-Jul-2004
2-1-2533	Woodland MARPAT- 3 color (Coyote 476)	12-Jul-2004
2-1-2534	Woodland MARPAT- 3 color (Green 474)	12-Jul-2004
2-1-2535	Woodland MARPAT- 3 color (Khaki 476)	12-Jul-2004

(Copies of drawings are available from the U.S. Army Research, Development & Engineering Command, Natick Soldier Center, ATTN: AMSRD-NSC-IP-D, Natick, MA 01760)

CODE OF FEDERAL REGULATIONS

Title 40, part 798.4500 (Primary Eye Irritation)  
 Title 40, part 798.4100 (Dermal Sensitization)  
 Title 40, part 798.4470 (Primary Dermal Irritation)

(Applications for copies should be addressed to U.S. Government Printing Office,

Superintendent of Documents, Mail Stop: SSOP, Washington, DC 20402-9328, or this reference may be found on the Internet at [www.access.gpo.gov/nara/cfr/cfr-table-search.html](http://www.access.gpo.gov/nara/cfr/cfr-table-search.html).)

#### ENVIRONMENTAL PROTECTION AGENCY (EPA):

FEDERAL INSECTICIDE, FUNGICIDE AND RODENTICIDE ACT (FIFRA)  
FIFRA as amended by the Food Quality Protection Act of 1996 and the Pesticide Registration Improvement Act of 2003.

EPA Product Performance Test Guidelines  
OPPTS 810.370 Insect Repellents for Human Skin and Outdoor Premises

(Copies of these documents are available online at <http://www.epa.gov> or from the U.S. Government Printing Office, Washington, DC 20402, telephone (202)-512-0132)

#### EMBROIDERY PROGRAM FILE

Software for embroidery of Eagle Globe and Anchor (EGA).

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those specified in the solicitation or contract. (see para 6.2).

#### AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AATCC-8 - Colorfastness to Crocking: AATCC Crockmeter Method  
AATCC-15 - Colorfastness to Perspiration  
AATCC-16 - Colorfastness to Light  
AATCC-20A - Fiber Analysis: Quantitative  
AATCC-61 - Colorfastness to laundering, Home and Commercial: Accelerated  
AATCC-81 - pH of the Water-Extract from Wet Processed Textiles  
AATCC-96 - Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics Except Wool  
AATCC-135 - Dimensional Change of Fabric After Home Laundering  
AATCC-136 - Bond Strength of Bonded and Laminated Fabrics  
AATCC-143 - Appearance of Apparel and Other Textile End Products after Repeated Home Laundering  
AATCC Evaluation Procedure 6 – Instrumental Color Measurement  
AATCC Evaluation Procedure 9 – Visual Assessment of Color Difference of Textiles

(Copies should be obtained from the American Association of Textile Chemists and Colorists, PO Box 12215, Research Triangle Park, NC 27709-2215.)

#### AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM-D-76 - Standard Specification of Tensile Testing Machines for Textiles  
ASTM-D-1424 - Strength of Cloth, Tearing: Falling Pendulum Method  
ASTM-D-2256 - Tensile Properties of Yarns by the Single-Strand Method  
ASTM-D-3776 - Mass per Unit Area (Weight) of Fabric, Option C

ASTM-D-5034 - Breaking Force and Elongation of Textile Fabrics (Grab Test)  
ASTM-D-6193 - Stitches and Seams

(Copies should be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19426-2959).

## MISCELLANEOUS

ANSI/ASCQ Z1.4- Sampling Procedures and Tables for Inspection of Attributes

(Applications for copies should be addressed to the American National Standards Institute, 1430 Broadway, New York, NY 10018-3308.)

Principle and Methods of Toxicology, A Wallace Hayes (editor), 1989, pp 394-396.

(Applications for copies of referenced documents should be addressed to Raven Press, 1185 Avenue of the Americas, New York, NY 10036)

Marzulli, F. and H. Maibach, "Contact Allergy: Predictive Testing in Humans,"  
Advances in Modern Toxicology, Volume 4, pp 353-372, 1977.

(Applications for copies should be addressed to U.S. Army Center for Health Promotion and Preventative Medicine, Attn: MCHB-DC-TTE, Bldg, E-2100, Aberdeen Proving Grounds, MD 21010-5422.)

Sears Fabric Defect Replica Scales

(Copies are available from Sears Roebuck and Co. "Fabric Defect Replica Kit" at Sears Holdings Global Sourcing (SHGS) Hong Kong Textile Testing Laboratory, 49/F, Office Tower, Langham Place, 8 Argyle Street, Mongkok, Kowloon, Hong Kong.)

2.4 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 First article. When specified, (see 6.2), a sample shall be subjected to first article inspection (see 6.3), in accordance with 4.2.

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.3 Material.

3.3.1 Basic material (all classes except alternate pocketing material). The basic material for the blouse shall be lightweight nylon/cotton twill, cloth printed with the appropriate

camouflage pattern (as specified in the solicitation), and conforming to the requirements specified in paragraph 3.3.1.7. The basic material for the trouser and name/service tapes shall be midweight nylon/cotton twill cloth printed with the appropriate camouflage pattern (as specified in the solicitation), and conforming to the requirements in paragraph 3.3.1.7. Any class of cloth shall show no toxicity when used as intended and when tested as specified in 4.4.5.

3.3.1.1 Alternate Pocketing Material. The alternate pocketing material shall be 77% polyester 23% cotton plain weave cloth printed with the appropriate camouflage pattern (as specified in the solicitation), and conform to the requirements specified in paragraph 3.3.1.7. The contractor may apply for a waiver to use an alternate fabric for the MCCUU Woodland and Desert Trouser material when MCCUU seconds are not available as long as the Supplier's fabric meets the physical requirements as specified in paragraph 3.3.1.7. Testing shall be as specified in paragraph 4.4.6.

3.3.1.2 Nylon. The nylon shall be first quality, high tenacity, semi-dull staple having a nominal cut length of 1-1/2 inches and a round cross-section, with a nominal denier of 1.7 for Type I and II, class 1, and 2.25 to 2.5 for Type I and II, class 2, 3, and 4; and Type III, class 3. The use of any form of nylon waste is prohibited, such as undrawn fiber, mixtures of deniers, lusters or cross sections, and waste from any stage of fiber production: whether drawn, undrawn, or mixed or garneted fiber. The contractor shall submit the fiber producer's certification that each lot of nylon staple used conforms to the requirements specified herein. Testing shall be as specified in paragraph 4.4.6.

3.3.1.3 Cotton. The class 1 cotton shall be carded and combed. The class 2, 3, and 4 cotton shall be carded. Testing shall be as specified in paragraph 4.4.6.

3.3.1.4 Yarn (all classes). The warp and filling yarn shall be singles made from a blend of  $50 \pm 5$  percent nylon with the remaining percentage cotton, based on the dry weight of the desized cloth when tested as specified in paragraph 4.4.6.

3.3.1.5 Weave (all classes). The weave shall be a 2/1 left-hand twill.

3.3.1.6 Fiber and fabric identification (class 1, class 2, class 3, and class 4). Each roll of finished cloth shall be labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act. Each roll shall indicate cloth class and type. Additionally, class 1 cloth shall contain a non-bleeding colored identification yarn woven in the selvage to distinguish rolled goods easily from class 2, class 3, and class 4 cloth. Testing shall be as specified in paragraph 4.4.6.

3.3.1.7 Physical requirements (all classes). The untreated class 1 and 2 cloth (before the permanent press and permethrin finish), and class 3 and class 4 cloth shall conform to the requirements in Table I when tested as specified in paragraph 4.4.6. The permanent press and permethrin treated blouse and trouser fabrics shall conform to the requirements in Table II when tested as specified in paragraph 4.4.6.

**TABLE I - Physical Requirements – Untreated Cloth**

Class	Wt./sq. yd. Ounces	Breaking strength Minimum		Tearing Strength Minimum	
		Warp Pounds	Filling Pounds	Warp Pounds	Filling Pounds
<b>Class 1</b>	6.0 – 6.6 (min - max)	170	115	7.0	6.5
<b>Class 2, 3, &amp; 4</b>	7.0-8.0 (min – max)	200	125	11	8

**Table II. Physical Requirements - Finished Garment**

Class	Wt./sq. yd. Ounces <sup>1/</sup>	Breaking Strength Minimum		Tearing Strength Minimum		Seam Strength Minimum
		Warp Pounds	Filling Pounds	Warp Pounds	Filling Pounds	Pounds
<b>Garment Class 1</b>	6.5 – 7.3 (min - max)	170	115	6.5	5.5	110
<b>Garment Class 2</b>	7.7 – 8.8 (min – max)	190	115	10	6.5	110

<sup>1/</sup>Weights include permanent press and permethrin treatment add-on.

**TABLE IIa. Physical Requirements – Alternate Pocketing Material**

Wt./sq. yd. Ounces	Breaking Strength Minimum		Tearing Strength Minimum		Seam Strength Minimum
	Warp Pounds	Filling Pounds	Warp Pounds	Filling Pounds	Pounds
Min. – Max.					
5.5-6.5	160	115	7.0	6.5	110

3.3.2 Color (all classes).

3.3.2.1 Cloth Type I. The cloth shall be dyed and printed with the warp effect side as the face. The cloth shall be dyed to a ground shade approximating Khaki 475. The Woodland camouflage pattern for classes 1, 2 and 3 shall be obtained by roller or screen-printing using either three or four rollers or screens, as appropriate for the Green 474, Khaki 475, Coyote 476 and Black 477 areas of the pattern. (The Woodland camouflage pattern for Class 4, shall be composed of only three colors; Green 474, Khaki 475, and Coyote 476. Green 474 will replace the Black 477 portion of the woodland camouflage pattern. (This can be accomplished by using the green print color with both the green and black rotary screens or by making a rotary screen combining the black and green pattern.). Resin bonded pigments are not permitted except for a small amount of carbon black pigment may be used to meet the black shade providing all other requirements are met.

3.3.2.2 Cloth Type II. The cloth shall be dyed and printed with the warp effect side as the face. The cloth shall be dyed to a ground shade approximating Light Tan 479. The Desert camouflage pattern shall be obtained by roller or screen-printing using either three or four

rollers or screens, as appropriate for the Urban Tan 478, Light Tan 479, Highland 480 and Light Coyote 481 areas of the pattern. Resin bonded pigments are not permitted.

3.3.2.3 Cloth Type III. The cloth shall be dyed and printed on the face side using the desert colors as specified in paragraph 3.3.2.2 and on the back side using the woodland colors as specified in paragraph 3.3.2.1. The use of pigments may be used on one of the print patterns in Type III cloth.

3.3.2.4 Standard sample. The printed and permanent press/permethrin treated fabric shall match the standard sample for shade and appearance and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced.

3.3.2.5 Length and put-up. Unless otherwise specified, the cloth shall be furnished in continuous lengths, each not less than 40 yards. Each length shall be put up on a roll.

3.3.3 Labile sulfur (all types and classes). The use of dyes and compounds containing sulfur capable of oxidation to sulfuric acid shall be chosen and applied such that the dyed cloth shall contain no more labile sulfur than shown by the standard sample when tested as specified in 4.4.6. When no standard sample is available, the dyed cloth shall show no more than a slight trace of labile sulfur when tested as specified in 4.4.6.

3.3.4. Color matching (all types and classes except alternate pocketing material).

3.3.4.1. Visual matching. The color and appearance of the class 1 and class 2 camouflage printed and permethrin/permanent press finished cloth (post permethrin/permanent press treatment), and type class 3 and class 4 camouflage printed cloth shall match the standard sample when viewed using AATCC Evaluation Procedure 9, Option A, under filtered tungsten lamps that approximate artificial daylight D75 illuminant with a 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 horizon lamplight at  $2300 \pm 200$  K. The permanent press treated garment shall match the standard sample for "hand" or stiffness level and for crease sharpness.

3.3.4.2 Instrumental color matching. Instrumental color matching is used as a tool to quantify shade evaluation if visually shade is rated unacceptable. All the colors in the Woodland MARPAT shall be instrumentally measured except for Khaki and all the colors in the Desert MARPAT shall be measured except for Highland given the areas of these exempted colors are too small for accurate instrumental readings. Each measured color shall match the standard sample. See 4.4.6.2.2 for evaluation procedure and acceptance requirements.

3.3.5. Colorfastness. The finished camouflage printed cloth shall show fastness to: light (after 40 AATCC standard fading hours or 170 Kilojoules); laundering (after 4 cycles); and perspiration (acid and alkaline) and crocking. The colorfastness of the cloth shall be equal to or better than the standard sample, or equal to or better than a rating of "4" using the AATCC Gray Scale for Color Change and a rating of "3-4" using the AATCC Gray Scale for Staining for each of the colors, except the Black 477 which shall have and equal to or better than a rating of "2-3". The finished cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale

Rating not lower than 4.0 for all the colors, except Black 477 which shall have a rating not lower than 1.5 when tested as specified in 4.4.6. The woodland pattern print of the type III cloth shall have a colorfastness to crocking rating when using the AATCC Chromatic Transference Scale equal to or better than 3.0 for all colors except Black 477 which shall have a rating not lower than 1.0 when tested as specified in 4.4.6.

3.3.6. Pattern execution (all types and classes). The pattern shall reproduce the standard sample in respect to design, colors, and registration of the respective areas. The pattern repeat of the camouflage printed finished cloth shall be  $35 \pm 1 \frac{1}{2}$  inches. Each pattern area shall show solid coverage; skitteriness exceeding that shown on the standard sample in any of the printed areas will not be acceptable. When the standard sample is not referenced for pattern execution, a pattern drawing will be provided, and the pattern of the finished cloth shall match that of the drawing.

3.3.7 Spectral reflectance (all classes).

3.3.7.1 Cloth Type I and III. The finished cloth shall meet the spectral reflectance values (in percent) for the visible/near infrared wavelength range, 600 to 860 nanometers (nm) for the colors specified in Table III as applicable, when tested as specified in 4.4.6.1. (For Cloth Class 4, Black 477 spectral reflectance requirements shall not apply; for Cloth Type 1, class 4 Green 474 will replace the black portion of the print.)

**TABLE III. Type I Spectral reflectance requirements**  
Reflectance values (percent)

Wavelengths Nanometers	Black 477		Coyote 476 & Khaki 475		Green 474	
	Min.	Max.	Min.	Max.	Min.	Max.
600	--	10	8	18	3	10
620	--	10	8	18	3	10
640	--	10	8	18	3	9
660	--	10	8	18	3	12
680	--	10	10	22	3	14
700	--	10	18	33	5	18
720	--	10	22	45	7	20
740	--	10	30	55	12	28
760	--	10	35	65	18	36
780	--	10	40	75	26	44
800	--	10	45	80	34	52
820	--	10	50	86	42	60
840	--	10	55	88	53	68
860	--	10	60	90	56	74

3.3.7.2 Cloth Type II and III. The finished cloth shall meet the spectral reflectance values (in percent) for the visible/near infrared wavelength range, 700 to 860 nanometers (nm) for the colors specified in Table IV, when tested as specified in 4.4.6.1.

**TABLE IV. Type II Spectral reflectance requirements**  
Reflectance values (percent)

Wavelengths	Lt. Tan 479		Lt. Coyote 481 & Highland 480		Urban Tan 478	
	Min.	Max.	Min.	Max.	Min.	Max.
700	38	53	19	41	25	44
720	38	54	20	41	25	45
740	39	55	20	42	25	46
760	40	56	21	42	26	47
780	41	57	21	42	27	48
800	43	58	22	43	28	50
820	45	59	23	45	30	52
840	48	62	24	46	33	55
860	50	65	25	48	36	58

3.3.8 Wrinkle Free/Permanent Press finish (Garment Type I and II).

3.3.8.1 Blouse and trouser. The garment shall be given a permanent press/wrinkle free resin treatment and shall meet the standard sample for hand and crease crispness and fabric smoothness. The finished garments shall meet a rating of “5” initially and a rating of equal to or better than “4.5” after 20 laundering cycles for fabric smoothness appearance using AATCC 3-D Smoothness Appearance Replicas. Trouser creases shall exhibit a rating of “5” initially and a rating of equal to or better than a “4.0” after 20 laundering cycles when evaluated using AATCC Crease Retention Replicas. Blouse front and sleeve crease shall exhibit a rating of “4.5” initially and a rating of equal to or better than a “3.0” after 20 laundering cycles when evaluated using AATCC Crease Retention Replicas. Creases shall be uniform and continuous as specified in 3.3.8.1.2 and 3.3.8.1.3 without unwanted creases, folds or impressions in the garment. The finished garment shall meet a rating after 20 laundering cycles for seam smoothness appearance using AATCC Seam Smoothness Replicas of “3.0” or better for seams with 4 plies of fabric or greater and a “4.0” or better for seams with 3 plies of fabric or less. The manufacturer can submit either the 4 ply results or the 3 ply results depending upon which seams the manufacturer uses. If the manufacturer uses a seam construction that contains 3 plies of fabric 3 ply results would be provided. If the manufacturer uses a seam construction that contains 4 plies of fabric 4 ply results would be provided. The testing shall be as specified in 4.4.6.

3.3.8.1.1 Blouse Crease. The left front blouse crease (as worn) shall start from immediately above of the blouse fly at 1/16” (without exposing the blouse fly) to maximum ¼ inch above the fly. The right front blouse crease shall start at the front edge at a point parallel to the top of the second button to ¼” (maximum) above the second button. Both front creases shall follow a natural fold to the collar seam without exposing the blouse facing edge, be even and lie flat against the blouse body. The sleeve crease shall start at the 1/16 to ½ inch below the bottom of the sleeve pocket and end at the bottom cuff edge. All creases shall be uniform and continuous.

3.3.8.1.2 Trouser Crease. The front trouser creases shall start at the pleat and end at the bottom edge of the trouser. The back trouser creases shall start from 1/16 to 1 inch below the seat patch and end at the bottom edge of the trouser. All creases shall be uniform and continuous which follow the grain of the fabric.

3.3.9 Dimensional stability (all types and classes). The shrinkage in warp and filling direction of the untreated finished cloth shall be not greater than 3.5 percent for individual sample unit and not greater than 3.0 percent for the lot average when tested as specified in 4.4.6. The fabric shall not elongate. Manufacturers must compensate for actual fabric shrinkage in order to deliver finished Permanent Press and Permethrin treated garments that comply with the dimension requirements specified in 4.4.9.

3.3.10 Insect Bite Protection (Garment Type I and II). The finished garments with bite protection treatment shall be strictly limited to the level specified in 3.3.10.1 and provide the minimum insect bite protection specified in 3.3.10.2.

3.3.10.1 Permethrin Treatment. Permethrin treatment process and garments will comply with Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended (see 2.2.2). Permethrin concentration in Class 3 and Class 4 garments shall comply with EPA Toxicological Category IV. The class 3 and 4 garments shall have an EPA registered (See 6.10) permethrin insect protection treatment which shall use permethrin in accordance with Type II specified in MIL-DTL-44411 except that the application for Type II specified in paragraph 3.6 of MIL-DTL-44411 shall also be applicable to finished garment. The garments shall be labeled in accordance with 3.4.3.1. (blouse) and 3.4.3.2 (trouser) and 3.4.3.4.2. The permethrin finish shall be uniformly applied across the fabric or garments at a target level of 0.52% wt/wt and **strictly** controlled to fall within the minimum to maximum permethrin levels specified below. The treatment level shall provide the percent (%) bite protection specified in 3.3.10.2. The permethrin treatment shall be durable to repeated laundering to provide the minimum permethrin level after 20 launderings specified below. The permethrin level will be measured as specified in paragraph 4.4.6. The finished permethrin treatment shall not degrade any performance characteristics or present any latent defects to the cloth or garment.

	<u>Min: mg/cm<sup>2</sup></u>	to	<u>Max: mg/cm<sup>2</sup></u>
INITIAL			
Blouse	0.104	to	0.141
Trouser	0.123	to	0.170
AFTER 20 Launderings			
Blouse	0.075		
Trouser	0.075		

3.3.10.2 Percent (%) Bite Protection. Finished permethrin treated garments shall provide bite protection specified below when assessed by the biting protection testing specified in 4.4.6.6. Government approval is required initially, and any time there is a change in the permethrin treatment formulation or processing conditions (see 4.4.6.3.1).

<u>Condition</u>	<u>% Bite Protection</u>
Initial	>= 96%
After 20 launderings	>= 96%
After 50 launderings	>= 90%

3.3.11 pH (all types and classes). The pH value of the water extract of all the finished

cloth and garments shall be no lower than 5.0 or higher than 8.5 when tested as specified in 4.4.6.

3.3.12 Toxicity (all types and classes). All the finished cloth and garments shall not present a dermal health hazard when used as intended when tested as specified in 4.4.5.

3.3.13 Ground shade/printed seconds/mill seconds. Ground shade cloth shall be dyed in conformance with the specified basic material and shall meet the physical, mechanical, and dimensional requirements of the respective finished fabric. Printed seconds shall be defined as cloth that has been rejected only for defects pertaining to color, infrared reflectance, or camouflage print patterns, which are cited in the specified basic material requirements. Mill seconds shall be cloth that has been rejected for visual defects only, and dyed to match ground shade (see 3.5.3). Mill seconds finished firsts may contain slubs and knots (see 4.4.7 and FED-STD-4B for all other fabric defects which constitute seconds).

3.3.14 Disposal of ground shade/printed seconds/mill seconds/rejected garments. All scraps, irregulars, extra material, and garments containing the aforementioned intellectual property/trademarks which are not utilized for Government contracts or a purpose authorized in writing by the Government, shall be destroyed and not sold or transferred in any manner. This restriction applies to the prime contractor, as well as all subcontractors. Contractor shall be prepared to certify as to the method and execution of the destruction of all scraps, seconds, irregulars, extra material, and garments containing the aforementioned intellectual property/trademarks.

### 3.4 Design and construction.

#### 3.4.1 Design.

3.4.1.1 Blouse. The blouse is a single-breasted design with a band collar, curved collar ends, concealed button front closure, a tapered waist, and a straight cut bottom. The blouse has two 65° angled patch chest pockets with rectangular flaps that close with two one by one inch squares of hook and loop tape. The left chest pocket (as worn) has a 2 ¼ x 2 ½ inches embroidered eagle, globe & anchor (EGA) centered on it and pen opening centered in flap. This pen opening appears only on the pocket flap and does NOT lead onto a pen pocket inside the chest pocket (see figure 3). There are two upper sleeve pockets with side and bottom bellows, a drainage hole is located in the bottom bellow of each pocket (positioned near the front of the pocket) and the tapered flaps have a concealed two-button closure. Chest and sleeve pocket flaps shall finish ½ + 1/8 inch above top pocket when measured from top of finished pocket to pocket flaps setting seam. (Note: Positioning mark on pattern indicates required finished location of pocket flap.) The long sleeves have one-piece, single layer external elbow reinforcement patches. There are adjustable tabs at wrists with a single button located on the underside of the sleeve tab and three buttonholes in the sleeve hem (see Figure 5 for required placement and spacing) for wrist closure adjustment. The blouse collar and all pocket flaps have fusible interlining. The collar ends shall finish curved as specified by the patterns and shown in figure 14.

3.4.1.2 Trousers. The trousers have a concealed button and buttonhole fly, front panels with a centered single stitched pleat (the fold of the pleat faces the outseam), hemmed legs, seven (7) evenly spaced 3/8 +/- 1/8 inch wide belt loops with a 2 ¼ inches belt loop

opening and side waist elastic adjustments. The elasticized portion of the waist starts at the front of the pocket bearer and extends past the outseam into the back of the trousers to achieve the finished four inches of waist circumference for each size. The trousers have two side hanging pockets and two welt opening hip pockets. There are two pleated cargo type pockets (the pleats face the back of the trousers) with the flap bartacked at forward lower corner and one rear button closure, a bottom bellow and elasticized pocket upper edge creating an adjustable opening to secure the contents when the flap is not buttoned. Cargo pocket flaps shall finish  $\frac{1}{2} \pm \frac{1}{8}$  inch above top of pocket when measured from top of finished pocket to pocket flap setting seam. (Note: Positioning mark on pattern indicates required finished location of pocket flap). The elasticized cargo pocket edge requires elongation/extension when the hand is inserted into the pocket yet does not distort the trouser leg when lying in the gathered/relaxed closed position. Drainage holes are positioned in the cargo pocket bellow (positioned near the back of the pocket.). All pockets, except for the side hanging ones have a flap with fusible interlining and closure with concealed buttons. The trousers have single layer external reinforcement patches at the seat and knees. See Figures 8 through 13.

#### 3.4.2 Components.

3.4.2.1 Interlining. To improve the abrasion resistance and appearance, the blouse collar and all pocket flaps shall be interlined. The fusible interlining shall have the same life expectancy as the blouse, and after attaching to the basic cloth, shall meet an initial directional bond strength of 32 ounces minimum per inch and 24 ounces minimum per inch after 3 launderings when tested as specified in 4.4.1. There shall be no delamination, bubbling or strike-through after a blouse is laundered three times.

3.4.2.2 Thread. Thread for needle and bobbin (looper) shall be commercial size Ticket No. 50 (Tex size 36 to 50) with a minimum breaking strength of 3.2 lb. when tested as specified in 4.4.2. As an alternate, Ticket No. 70 (Tex size 31 to 35) with a minimum breaking strength of 2.6 pounds may be used as the bobbin (looper) thread. Thread shall conform to A-A-50199.

3.4.2.2.1 Alternate Seam Thread. Alternate seams shall be stitched using the alternate seam thread combination. The needle thread for the alternate seams shall be 100% nylon thread, Class B conforming to A-A-59826. The bobbin (looper) thread for the alternate seams shall be commercial size Ticket No. 50 (Tex size 36 to 50) with a minimum break strength of 3.2 lbs conforming to A-A-50199.

3.4.2.2.2 Button Attachment Thread. All buttons shall be attached using A-A-59826, Thread, Nylon, Bonded, Type II, Class A, Size B.

3.4.2.3 Gimp. Thread for reinforcement of buttonholes shall be commercial size Ticket No. 8 (Tex size 210) with a minimum breaking strength of 6.5 lbs. when tested as specified in 4.4.2. This size and type of gimp provides durability and shape retention to the eyelet and buttonhole. Thread shall conform to A-A-50198.

3.4.2.4 Thread colorfastness and color. All thread shall be non-staining and show good colorfastness to laundering when tested as specified in 4.4.3. The thread color shall be Camouflage Green 483 (approximating color chip 34094 of FED-STD-595) for Type I and Khaki P-1 (C.A.66019 or approximating color chip 30277 of FED-STD-595) for Type II.

3.4.2.5 Fastener Tape, Hook and Loop. The hook and loop fastener tapes for the chest pocket closure shall be 1 inch wide, CG 483 (approximating color chip 34094 FED-STD-595) for Type I and Khaki P-1 C.A.66019 (or approximating color chip 30277 of FED STD-595) for Type II and shall conform to type II, class 1 of A-A-55126. The hook tape shall be  $1 \pm 1/16$  inches in length and the loop tape shall be  $1 \pm 1/16$  inches in length. Cut edges shall be finished so that they do not ravel for the life of the garment.

3.4.2.6 Elastic Webbing. The elastic webbing for the trouser waistband and cargo pocket shall be 1 inch wide and conform to equal to or better performance of Type II, class 1 of MIL-W-5664 or QST style 150-43171RA,  $1 \frac{1}{2} \pm 1/16$  inches or equal ( see Table XIII footnote 1) . Elastic ends shall be heat cut to prevent raveling. When 1- $\frac{1}{2}$  inch elastic is used, the manufacturer will adjust patterns to accommodate the wider elastic without altering finished dimensions created by GFM patterns and stitching. The color shall be natural for either type, or Camouflage Green 483 or black for Type I, or tan for type II. The elastic for the waistband shall be cut to the length needed to achieve both the trouser  $\frac{1}{2}$  waist finished relaxed and finished stretched measurements (for each size) as specified in paragraph 4.4.9, Tables XIc and XI d and the elongation force specified below. The elastic in the cargo pocket opening shall extend the full width to achieve a  $6 \frac{3}{4}$  to  $7 \frac{1}{2}$  inches relaxed opening. The elastic will retreat to its relaxed opening position when the hand is removed. The encased elastic webbing for the cargo pocket shall lie flat in the relaxed state and not distort the trouser leg. The cargo pocket opening shall retain its elongation/recovery characteristic for the life of the garment. The finished elasticized waistband and cargo pocket features shall conform to the following requirements:

<b>Feature</b>	<b>Elongation (in.) +/- 1/16"</b>	<b>Force (lbs.) Minimum to Maximum</b>	<b>Test Method</b>
Cargo Pocket	$1 \frac{1}{2}$	2.5 to 3.5	See 4.4.6.4
Waistband	$\frac{3}{4}$	0.5 to 1.5	See 4.4.6.4
Waistband	$1 \frac{1}{2}$	1.5 to 4.0	See 4.4.6.4

### 3.4.3 Labels.

3.4.3.1 Blouse labels. The blouse shall contain two permanent labels as specified below. All permanent label inscription, legibility, label material, and label attachment method shall last the expected life of the uniform.

1. Marine Corps Exclusive Label (all classes). Each blouse shall have a woven exclusive label, cut single, fused edge, Minnewawa style number LR5398 (A-C) or equal. The information on the label includes the abbreviated size – length designation (see paragraph 6.6 for standardized abbreviation) on the top, followed by “Made Expressly for” with the USMC emblem woven in the center of the label. Below the emblem, the contractor’s name shall appear in gold letters. The exclusive label shall be placed at center back of the collar

and sewn in collar setting seam and stitched on all four sides. As an alternative, the size-length designation can be on a separate label.

The separate size-length designation label shall be 1 inch in width by 1 inch in height. It shall be sewn centered to the bottom of USMC exclusive label with a 1/4 inch seam allowance as shown in Figure 18. The lettering shall be 18 point Arial Font and the label color shall be according to fabric class with black numbers and letters. Both methods shall include the words "Made Expressly for" with the USMC emblem woven in the center of the label. Below the emblem, the contractor's name shall appear in gold letters. The exclusive label shall be placed at the center back of collar and sewn in collar setting seam and stitched on all four sides.

2. Blouse Combination Label (all classes). A separate combination label (see 6.7 for example) shall contain size, body measurements, identification, and care information as specified below.

The size and body measurement in the top portion of the combination label shall contain following information:

**X-Small-X-Short** (example of Size-Length)  
**Chest: Up to 33 in.** (example)  
**Height: 59-63 in.** (example)  
**8415-00-000-0000** (example of NSN)

Information for each size is specified in the "Size and Body Measurements" table shown in paragraph 3.4.3.2.2. The label colors shall be Medium Green, Cable No. 70034, 70130, or 70131 for Type I and Khaki, Cable No. 70188 for Type II. The inscription shall have a minimum font size of 10 points. The inscription legibility, label, and label attachment method shall last the expected life of the uniform. The combination label shall be located on the backside of the right chest pocket (as worn) (see Figure 3). Label shall be of a size that is no larger than the pocket behind which it is attached. The label shall be attached by stitching on all four sides with no indication of label application showing on the outside of the blouse.

**Size:** The size – length designation (without abbreviation), body measurements, and stock number shall be included on the combination label. Information for each size is specified in the "Size and Body Measurements" Table, paragraph 3.4.3.2.2, and shall be centered at the top of the label.

**Identification:** List one corresponding to blouse type ordered and delivered:  
Blouse, Woodland MARPAT TM (typed as trademark symbol) Camouflage,  
MCCUU  
50% Cotton/50% Nylon  
OR  
Blouse, Desert MARPAT TM (typed as trademark symbol) Camouflage,  
MCCUU  
50% Cotton/50% Nylon

**Contract Information:**

Contract Number:

Contractor Name:

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**Care Information:**

1. Washing: Machine wash using Permanent Press Cycle or hand wash using mild detergent that does NOT contain optical brighteners. Rinse completely.  
DO NOT USE CHLORINE BLEACH
2. Drying: Tumble dry and remove immediately from dryer. To drip dry, remove from water and place on hanger.
3. Ironing: Light ironing **if needed**.  
DO NOT STARCH or COMMERCIALY HOT PRESS.

3. Blouse Combination Insect Protection and Brand Identification Label (Garment Type I). The blouse insect protection label and the blouse insect protection brand label shall be combined into a single label. The combination label shall include both permanent insect protection and brand labeling information; and shall comply with the approved EPA registration (See 6.12). The combination label shall be stitched on all four sides and attached to the underside of the left chest pocket as worn with the writing facing out as worn, parallel to the combination label. Labeling information, characteristics and location of labels are subject to Government approval prior to production. See paragraph 3.4.3.4 for additional EPA hang tag information requirement.

4. Insect Protection Brand Label (Garment Type I). Each blouse shall contain brand identification in accordance with the treatment's EPA registration. Brand identification may be included in an expanded permanent insect protection label (item 3 above) or as a separate brand label stitched directly above the insect protection label which shall not be visible on the outside of the garment. The contractors labeling is subject to Government approval prior to production.

3.4.3.2 Trouser Labels. The trousers shall contain two permanent labels as specified below. All permanent label inscription, legibility, label material, and label attachment method shall last the expected life of the uniform.

1. Trouser Size label (all classes): The size label shall contain the following information:

<b><u>X-Small-X-Short</u></b>	<b>(example of Size-Length)</b>
<b>Waist: Up to 27 in</b>	<b>(example)</b>
<b>Inseam: Up to 26 1/2 in</b>	<b>(example)</b>
<b>8415-00-000-0000</b>	<b>(example of NSN)</b>

Refer to "Size and Body Measurements", 3.4.3.2.2, for the correlation between size and Body measurements (Waist and inseam). Size label shall be positioned on inside center back, left of the seat seam and catch in the waistband stitching. Only one stock number associated with Type I or Type II trouser as ordered on the contract will be provided on the label.

2. Trouser Combination identification/care label (all classes): This label is positioned on right hip pocket (as worn – see figure 11) so that on the finished trousers the label shall face the wearer. The combination label shall be no larger than the pocket to which it is attached. The label shall be sewn on all four sides. The label colors shall be Medium Green, Cable No. 70034, 70130, or 70131 for Type I and Khaki, Cable No. 70188 for Type

II. The inscription shall have a minimum font size of 10 points.

3. Trouser Combination Insect Protection and Brand Identification Label (Garment Type II). The trouser insect protection label and the trouser insect protection brand label shall be combined into a single label. The class 4 combination label shall include both permanent insect protection and brand labeling information and shall comply with the approved EPA registration (See 6.12). The combination label shall be stitched on all four sides and attached to the underside of the left hip pocket with the writing facing out as worn, parallel to the combination label. Labeling information, characteristics and location of labels are subject to Government approval prior to production. See paragraph 3.4.3.4 for additional EPA hang tag information requirement.

4. Insect Protection Brand Label (Garment Type II). Finished trousers shall contain brand identification in accordance with the treatment's EPA registration. Brand identification may be include in an expanded permanent insect protection label (item 3 above) or as a separate label stitched directly above the insect protection label which shall not be visible on the outside of the garment. The contractors labeling is subject to Government approval prior to production.

3.4.3.2.1 Trouser Identification/Care Label. The trouser combination identification/care label shall be the same as the blouse size/identification/care label specified in 3.4.3.1 EXCEPT that the size and size prediction measurements are not provided (duplicates the trouser size label) and the identification shall correspond to the trouser type ordered and delivered as outlined below (see 6.8).

Trouser, Woodland MARPAT TM (typed as trademark symbol) Camouflage,  
MCCUU  
50% Cotton/50% Nylon

OR

Trouser, Desert MARPAT TM (typed as trademark symbol) Camouflage,  
MCCUU 50% Cotton/50% Nylon.

3.4.3.4.2 Insect Protection Hang Tag Label (Garment Type I and II): Each class 3 and class 4 garment shall have an individual paper tag attached to the garment. The tag shall provide additional insect protection information as required by EPA registration and is subject to Government approval (See 6.12).

3.4.3.2.2. Size and Body Measurements Table.

**Size and Body Measurements Table**

Unisex		
<b>Chest (Size of Blouse)</b>	X-Small	Up to 33 in.
	Small	33 to 37 in.
	Medium	37 to 41 in.
	Large	41 to 45 in.
	X-Large	45 to 49 in.
	XX-Large	49 to 53 in.

<b>Height (Length of Blouse)</b>	XX-Short	55 to 59 in.
	X-Short	59 to 63 in.
	Short	63 to 67 in.
	Regular	67 to 71 in.
	Long	71 to 75 in.
	X-Long	75 to 79 in.
	XX-Long	Above 79 in.
<b>Waist (Size of Trousers)</b>	X-Small	Up to 27 in.
	Small	27 to 31 in.
	Medium	31 to 35 in.
	Large	35 to 39 in.
	X-Large	39 to 43 in.
	XX-Large	Over 43 in.
<b>Inseam (Length of Trousers)</b>	X-Short	Up to 26-1/2 in.
	Short	26-1/2 to 29-1/2 in.
	Regular	29-1/2 to 32-1/2 in.
	Long	32-1/2 to 35-1/2 in.
	X-Long	35-1/2 to 38-1/2 in.
	XX-Long	Over 38-1/2 in.
<b>Female</b>		
<b>Chest (Size of Blouse)</b>	32	Up to 33 in.
	35	33 to 37 in.
	39	37 to 41 in.
<b>Height (Length of Blouse)</b>	X-Short	59 to 63 in.
	Short	63 to 67 in.
	Regular	67 to 71 in.
<b>Waist (Size of Trouser)</b>	24	22 to 26 in.
	28	26 to 30 in.
	32	30 to 34 in.
<b>Inseam (Length of Trouser)</b>	X-Short	23-1/2 to 26-1/2 in.
	Short	26-1/2 to 29-1/2 in.
	Regular	29-1/2 to 32-1/2 in.

3.4.3.3 Garment Lot Designation. For garment manufacturing traceability, each blouse and trouser garment shall have a lot designation in accordance with lot Numbering procedure as specified in DPSCM 4155.3, Quality Systems Requirements. The lot number shall be placed next to or above the combination identification / care label on the pocket interiors of the blouse and trouser garments. Batch designation is not acceptable.

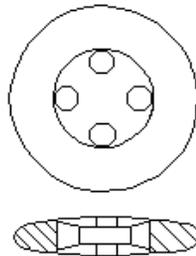
#### 3.4.3.4 Hang Tag Labels.

3.4.3.4.1 Bar Code Label (all classes): Each blouse and trouser shall have an individual bar code placed on a paper tag for personal clothing items. The paper tag shall be standard bleached sulfate having a basis weight of 100 pounds. The paper used for the tags shall have a smooth finish to accept thermal transfer and direct printing. The tags shall have a hole and shall be attached to each item by a fastener. The tags shall be clearly legible and readable by a scanner. The bar-coding element shall be a 13 digit national stock number (NSN). There shall be a 12 digit UPC number assigned for each NSN by the contracting

activity. UPC will be provided as Government Furnished Information. The initials "UPC" must appear beneath the code. The bar-code for NSN and UPC printing shall be a medium to high code density and shall be located so that it is completely visible on the item when it is folded and/or packaged as specified and shall cause no damage to the item. The UPC code must also be placed on all shipping cartons on which the NSN appears.

3.4.3.5 Insect Protection Label (class 3 and 4): Each class 3 and class 4 garment shall have an individual paper tag attached that provides additional insect protection information required by EPA registration and subject to Government approval.

3.4.4 Buttons. The buttons shall be dull finish, 4-hole, 30 ligne, and shall be in accordance with the following button style:



The color of the buttons shall be a good match to Olive Green 106,C.A. 62016 for Type I and Tan AJ (Desert Tan 380) C.A.62028. The buttons shall not exhibit chalking when tested as specified in 4.4.4.1. The buttons shall show a minimum compressive strength of 1800 lb. when tested as specified in 4.4.4.2. The buttons shall be attached with a "C" stitch pattern. When attached to the blouse and the trouser, the button and thread shall withstand a pull test of 40 lb. (min.), when tested as specified in 4.4.4.3.

3.4.5 Embroidery. Each blouse pocket (left as worn) shall be embroidered with a 2-1/4 x 2-1/2 inches eagle, globe, and anchor (EGA) according to the EGA Embroidery Program File (see paragraph 3.5.5). Embroidery for Type I Woodland and Type II Desert shall be polyester (with abundant luster), bright, continuous filament embroidery yarn. All yarns shall show colorfastness to light, laundering, and wet-dry cleaning of not less than grade "4" when tested as specified in Table VIII. They Type I Woodland shall approximate Federal Standard 595c chip No. 37038. Type II Desert shall approximate Federal Standard 595c chip No. 20070. Strict compliance to color is required to ensure that ancillary embroidered items from other manufacturers; headgear, name and service tapes, match the MCCUU blouse. The EGA for the blouse shall be centered on the left chest pocket (as worn) in accordance with the marks on patters. See Figure 4.

3.5 List of pattern parts. The Government shall furnish a complete set of patterns which show directional line markings for proper assembly. The Government patterns are to be used as a guide for cutting contractor's working patterns. Minor modifications are permitted to accommodate manufacturing procedures however, the design and finished measurements must be maintained.

3.5.1 List of blouse pattern parts. Standard patterns provide a seam allowance of 3/8 inch for single needle seams and 1/2 inch for double needle seams. Buttonholes, pockets and pocket flaps shall be located in accordance with marks on patterns and figures. The pattern

parts list in Table V is provided for first quality fabrics and to ensure that the pattern set is complete.

**TABLE V. List of blouse pattern parts- First Quality**

Nomenclature	Pattern Abbreviation <sup>2/</sup>	Cut parts
<b>BASIC MATERIAL</b>		
FRONT	MCCUUB-FRONT	2
BACK	MCCUUB-BACK	2
LEFT FRONT FLY	MCCUUB-LFT FRNT FLY	1
TOP SLEEVE	MCCUUB-TOP SLEEVE	2
UNDER SLEEVE	MCCUUB-UNDER SLEEVE	2
COLLAR	MCCUUB-COLLAR	2
SLEEVE POCKET	MCCUUB-SLEEVE POCKET	2
SLEEVE POCKET FLAP TAB	MCCUUB-SLV PKT FL TB	2
SLEEVE POCKET FLAP	MCCUUB-SLV PCKT FLAP <sup>1/</sup>	2
SLEEVE POCKET TAB	MCCUUB-SLV PCKT TAB <sup>1/</sup>	2
BREAST POCKET	MCCUUB-BREAST POCKET	2
BREAST POCKET FLAP	MCCUUB-BRST PCKT FLP	2
CUFF	MCCUUB-CUFF	2
CUFF TAB	MCCUUB-CUFF TAB	2
ELBOW PATCH	MCCUUB-ELBOW PATCH	2
<b>FUSIBLE</b>		
TOP COLLAR FUSIBLE	MCCUUB-TOP COLLR FUS	1
SLEEVE POCKET FLAP FUSIBLE	MCCUUB-SLV PK FL FS	2
BREAST POCKET FLAP FUSIBLE	MCCUUB-BRS PKT FL FS	2
<b>TEMPLATE</b>		
COLLAR TEMPLATE	MCCUUB-COLLAR TEMPLT	0

<sup>1/</sup> Alternate patterns for two piece construction.

<sup>2/</sup> There are two sets of blouse patterns; alpha sizing and numeric sizing. Alpha size pattern parts are indicated by the prefix "MCCUUB". Numeric size patterns are indicated by the prefix "MCCUUBF".

3.5.2 List of trouser pattern parts. Standard patterns provide a seam allowance of 3/8 inch for single needle seams and 1/2 inch for double needle seams. Buttonholes, pockets and pocket flaps shall be located in accordance with marks on patterns. The pattern list in Table VI is provided for first quality fabrics and to insure that the pattern set is complete.

**TABLE VI. List of trouser pattern parts- First Quality**

Nomenclature	Pattern Abbreviation <sup>2/</sup>	Cut parts
<b>BASIC MATERIAL</b>		
BACK	MCCUUT-BACK	2
FRONT	MCCUUT-FRONT	2
LEFT FLY	MCCUUT-LEFT FLY	3
RIGHT FLY LINING	MCCUUT-RGHT FLY LIN	1

KNEE PATCH	MCCUUT-KNEE PATCH	2
SEAT PATCH	MCCUUT-SEAT PATCH	2
HIP POCKET	MCCUUT-HIP POCKET	2
HIP POCKET FACING	MCCUUT-HIP POCKET FAC	2
HIP POCKET BEARER	MCCUUT-HIP PKT BEAR	2
HIP POCKET FLAP TAB	MCCUUT-HIP PKT FL TB	2
HIP POCKET FLAP	MCCUUT-HIP PKT FLAP 1/	2
HIP POCKET TAB	MCCUUT-HIP POCKET TAB 1/	2
SIDE HANGING POCKET	MCCUUT-SID HANG PCKT	2
SIDE HANGING POCKET BEARER	MCCUUT-SD HNG PKT BR	2
SIDE HANGING POCKET FACING	MCCUUT-SID HNG PK FC	2
CARGO POCKET	MCCUUT-CARGO POCKET	2
CARGO POCKET FACING	MCCUUT-CARG PCKT FAC	2
CARGO POCKET FLAP TAB	MCCUUT-CARG PKT FLT B	2
CARGO POCKET FLAP	MCCUUT-CARG PCKT FLP 1/	2
CARGO POCKET TAB	MCCUUT-CARG PCKT TAB 1/	2
<b>FUSIBLE</b>		
HIP POCKET FLAP FUSIBLE	MCCUUT-HIP PKT FL FS	1
CARGO POCKET FLAP TAB FUSIBLE	MCCUUT-CG PK FLT B FS	2

**TABLE VIa. List of trouser alternate sewn-on waistband construction pattern parts.**

FRONT ALTERNATE	MCCUUT-FRONT ALT	2
BACK ALTERNATE	MCCUUT-BACK ALT	2
LEFT FLY LINING ALTERNATE LT	MCCUUT-LFT FLY LN AL	1
RIGHT FLY LINING ALTERNATE	MCCUUT-RGT FLY LN AL 4/	1
BUTTONHOLE FLY ALTERNATE	MCCUUT-BTNHL FLY ALT 4/	1
SIDE HANGING POCKET ALTERNATE	MCCUUT-SD HG PKT ALT	2
SIDE HANGING POCKET BEARER ALTERNATE	MCCUUT-SD HG PK BR A	2
SIDE HANGING POCKET FACING ALTERNATE	MCCUUT-SD HG PK FC A	2
HIP POCKET ALTERNATE	MCCUUT-HIP POCKET ALT	2
WAISTBAND ALTERNATE	MCCUUT-WAISTBAND 3/	2

1/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

2/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

3/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

4/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

3.5.3 Parts cut from ends and from printed seconds (see 3.3.12). Table VIIa and VIIb list the pattern parts, which are not visible on the finished garment, and may be cut from ends.

Table VIIa parts shall utilize class 1 cloth seconds. Note the listed parts include both blouse and trouser pieces to maximize utilization of class 1 cloth seconds.

**TABLE VIIa. List of pattern parts cut from ends, printed seconds or mill seconds from class 1 cloth**

Nomenclature	Pattern Abbreviation <u>2/</u>
<b>BASIC MATERIAL</b>	
LEFT FRONT FLY	MCCUUB-LFT FRNT FLY
SLEEVE POCKET TAB	MCCUUB-SLV PCKT TAB <u>1/</u>
LEFT FLY	MCCUUT-LEFT FLY
RIGHT FLY LINING	MCCUUT-RGHT FLY LIN
HIP POCKET	MCCUUT-HIP POCKET
HIP POCKET FACING	MCCUUT-HIP POCKT FAC
HIP POCKET TAB	MCCUUT-HIP POCKT TAB <u>1/</u>
HIP POCKET BEARER	MCCUUT-HIP PCKT BEAR
SIDE HANGING POCKET	MCCUUT-SID HANG PCKT
SIDE HANGING POCKET FACING	MCCUUT-SID HNG PK FC
CARGO POCKET FACING	MCCUUT-CARG PCKT FAC
CARGO POCKET TAB	MCCUUT-CARG PCKT TAB <u>1/</u>
LEFT FLY LINING ALTERNATE LT	MCCUUT-LFT FLY LN AL
RIGHT FLY LINING ALTERNATE	MCCUUT-RGT FLY LN AL <u>4/</u>
SIDE HANGING POCKET ALTERNATE	MCCUUT-SD HG PKT ALT
SIDE HANGING POCKET FACING ALTERNATE	MCCUUT-SD HG PK FC A
HIP POCKET ALTERNATE	MCCUUT-HIP POCKT ALT
WAISTBAND ALTERNATE	MCCUUT-WAISTBAND <u>3/</u>

1/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

2/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

3/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

4/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

**TABLE VIIIb. List of pattern parts cut from ends, printed seconds or mill seconds from class 2 cloth or from alternate pocketing material.**

Nomenclature	Pattern Abbreviation <u>2/</u>
<b>BASIC MATERIAL</b>	
SLEEVE POCKET TAB	MCCUUB-SLV PCKT TAB <u>1/</u>
LEFT FLY	MCCUUT-LEFT FLY
RIGHT FLY LINING	MCCUUT-RGHT FLY LIN
HIP POCKET	MCCUUT-HIP POCKET
HIP POCKET FACING	MCCUUT-HIP POCKT FAC
HIP POCKET TAB	MCCUUT-HIP POCKT TAB

	1/
HIP POCKET BEARER	MCCUUT-HIP PCKT BEAR
SIDE HANGING POCKET	MCCUUT-SID HANG PCKT
SIDE HANGING POCKET FACING	MCCUUT-SID HNG PK FC
CARGO POCKET FACING	MCCUUT-CARG PCKT FAC
CARGO POCKET TAB	MCCUUT-CARG PCKT TAB
	1/
LEFT FLY LINING ALTERNATE LT	MCCUUT-LFT FLY LN AL
RIGHT FLY LINING ALTERNATE	MCCUUT-RGT FLY LN AL
	4/
SIDE HANGING POCKET ALTERNATE	MCCUUT-SD HG PKT ALT
SIDE HANGING POCKET FACING ALTERNATE	MCCUUT-SD HG PK FC A
HIP POCKET ALTERNATE	MCCUUT-HIP POCKT ALT
WAISTBAND ALTERNATE	MCCUUT-WAISTBAND 3/

1/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

2/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

3/ Waistband and lining are cut from same pattern. If waistband and lining are strip cut and put on rolls, disregard these pattern parts.

4/ A hybrid fly construction using the standard left fly pattern and alternate RIGHT FLY LINING and BUTTONHOLE FLY ALTERNATE pattern is allowed.

3.5.4 Parts cut from ends and from ground shade. Use of ground shade for class 1 or 2 is restricted to: hip pocket, side hanging pocket, cargo pocket facing pattern parts and waistband lining.

3.5.5 Embroidery Program File. The Government shall furnish Embroidery Program File to manufacture the Eagle Globe and Anchor (EGA) embroidery design as specified in section 3.4.5. Proper placement of EGA on the Blouse pocket as described in the purchase description package and Figure 4 is the responsibility of the contractors.

3.6 Configuration. The following specifications are needed to provide uniform appearance, comfort and durability in garrison use, combat, and operations other than war. End item blouse and trouser construction and appearance shall conform to the requirements of this document and the finished dimension tables (see 4.4.9) and figures 1 – 14 to maintain item configuration and compliance to component and end item tests (see 4.4).

3.6.1 Seaming and Stitching. Seaming shall be consistent, exhibit a uniform appearance and shall conform to the ASTM D-6193 stitch types listed in Table XIII below. The backside of all seams (inside garment) shall be flat with no protruding seam allowance or raw edges to create irritation, discomfort or poor appearance. To maintain durability and functionality, the seams shall be sewn with 10-14 stitches per inch for all outside visible stitching. Thread ends shall be secured by a minimum of ¼” backstitched or ½” overlap when broken stitches are repaired. Overedge or pre-hemming shall be 6 – 10 stitches per inch. All bartacks (except for waistband, fly, crotch intersection, and cargo pocket elastic) shall be positioned and sized in accordance with Table XIIIa, all bartacks shall have a ± 1/16 inch size tolerance. (Also, See figures for location of bartacks).” The crotch intersection shall be reinforced with a parallel 5/8” bartack with approximately 42 to 46 stitches with the B-50 thread combination. The fly opening bartack shall be stitched with the B/50 thread combination as specified in paragraph 3.4.2.2.1. Bartacks are required at

the specified reinforcement points (see figures 1-14) and centered on belt loop for attachment. The buttonholes shall be eyelet end, tapered bar, with 7/8 inch cut opening and 52 – 56 stitches per inch. The buttonhole purling shall be between tab and flap plies, front facing and front plies, fly and front waist, and on the outside of the blouse and trousers. The front cut edge of buttonholes shall be positioned  $\frac{3}{4} \pm \frac{1}{8}$  inch from front folded edge for the blouse and  $\frac{1}{2} \pm \frac{1}{16}$  inch from front folded edge for the trouser. The pocket drainage eyelets shall have a minimum of 19 stitches each, with the purling on the outside. Material edges must not ravel. Pocket flaps shall be bartacked at top right and left corners with 3/8” in length and 20 to 27 stitches per bartack. The following seams shall be sewn with the alternate B/50 thread combination as specified in paragraph 3.4.2.2.1: Trouser Inseams, Seat Seams, Armholes, Blouse Side Seams, Blouse Hem, Seat patch, Knee Patch, and Blouse Hem. Raw edges may be turned-in, turned-under or serged to prevent raveling. No raw edges are allowed. No raw edges on outside, or on inside along double needle seams, or greater than 1/8 inch on inside of garment are allowed. All thread ends shall be trimmed to 1/4 inch or less. All loose threads shall be removed

**TABLE XIII. Seam types.**

<b>Seam Placement</b>	<b>Seam Type</b>	<b>Gage</b>	<b>Stitch Type</b>
Sleeve seams, shoulder seams, side seams, outseams, seat seam and inseams	LS <sub>c</sub> -2	3/16 to 9/32 inch gage	301 or 401
Waistband	LS <sub>k</sub> -2	1 ½ inch	301 or 401
Alternate Waistband- metered elastic	LS <sub>bc</sub> -4	1/	1/
Top stitching for pocket flaps, collar, cuff tab, flies, tabs, and front edges.	OS <sub>f</sub> -1	1/8 to 1/4 inch from the edge (uniform throughout the garment) (pocket flaps shall be backstitched ½” stitched back and forth 3 times. Positioned at top right and left corners.)	301
Closing of side hanging and hip pockets leaving ½” chain	SS <sub>e</sub> -2 and OS <sub>f</sub> -1 Or SS <sub>a</sub> -2	3/16 to 1/4 inch from edges	301 or 515,516, or 519
Hip pocket opening construction	S <sub>sa</sub> or SS <sub>be</sub> -2	Hip pocket welt width ¼ - 3/8 inch: Pad opening welt width: 1 +/- 1/8 in.	301
Attachment of patch pockets and attachment of side and hip pocket bearers and facings	LS <sub>d</sub> -1	one row 1/16 to 1/8 inch apart	301
Double needle flap stitching 2/	LS <sub>d</sub> -2	two rows 3/16 to 1/4 inch apart	301
Belt loop construction	E <sub>fh</sub> -1	1/16 to 1/8 inch from edges	301
Attachment of elbow, seat and knee patches	LS <sub>d</sub> -2	two rows 3/16 to 1/4 inch apart	301
Label attachment	LS <sub>bj</sub> -1	1/8 to 3/16 inch	301

		from edges	
All hems: Blouse & trouser legs Sleeves	EFb-1	1/16 to 1/8 inch from edge	301

1/ An alternate waistband construction shall use 1-1/2 + 1/16 inch elastic metered its entire length using seam type LSbc-4 with the elastic inserted within the seam construction along opposite sides of the waistband per pattern placement. A total of 4 stitch lines shall be correctly tensioned or balanced such that the stitch lines do not impede stretch whereby stitches could break open. The alternate waistband shall meet elastic webbing, elongation, and force specified in 3.4.2.6 and finished dimensions specified in 4.4.9 (Tables XIc and D).

2/ An alternate for all pocket flaps, except the blouse chest pockets, shall be a single needle stitch attachment in accordance with the pattern then turned and topstitched 3/16" to 1/4" with backtacking at each end. The top flap edge, raw or overedged, shall not be visible when the flap is raised.

**Table XIIIa. Bartacks.**

Size (Inches)	Stitches/ bartack	Location
<b>BLOUSE</b>		
3/8	20-27	End of each sleeve inseam at cuff edge
3/8	20-27	Left front edge of front fly in accordance with marks on pattern
3/8	20-27	Top corners of chest and sleeve pockets
3/8	20-27	Left chest pocket flap, each side of pen opening
3/8	20-27	Top corners of sleeve pocket and chest pocket flaps
3/8	20-27	Vertically at each end of cuff tab along vertical stitching <u>1/</u>
<b>TROUSER</b>		
3/8	20-27	Centered across top and bottom of belt loops
3/8	20-27	Top and bottom of side pocket openings
3/8	20-27	Each end of hip pocket welt openings
3/8	20-27	Top and bottom corners of cargo pockets
3/8	20-27	Top corners of cargo pocket flaps
3/8	20-27	Lower front corner of cargo pocket flap through pocket and trouser
5/8	35-40	Bottom of fly, Superimposed on "J" stitching
3/4	35-40	Vertically positioned $\frac{3}{4} + \frac{1}{16}$ inch above top end of front crotch seam and 1/8 inch from outside edge of right fly, bartack shall not be visible on outside of trouser
5/8	35-40	Parallel at crotch intersection
1 to 1-1/8	52-56	Each end of waistband elastic and cargo pocket elastic when elastic floats within the casing" <u>2/</u>
5/8	35-40	Across pleat placements below lower edge of elastic on top of cargo pockets.

1/ As an alternate: Back stitch tacking, with 20-27 stitches, may be used in lieu of a bartack.

2/ The following alternate method may be used for construction of the elasticized top edge of the pockets:

a. As an alternate method to construct elasticized top edge cargo pocket use seam type SSt-4, stitch type 301: two rows of double needle stitch 1/4 inch gauge at either edge of the elastic. Each row of stitching shall be 1/16 to 1/8 of an inch from either edge of elastic.

b. The 1 1/2 inch (+ or - 1/16 inch) elastic per 3.4.2.6 shall be placed inside the top edge with the top end aligned with the upper edge of the cargo pocket and will be sewn and be caught within the interior of seam via all four top stitching. No part of the elastic shall be visible from outside of the pocket.

c. The elasticized cargo pocket edge requires elongation/extension when the hand is inserted into the pocket yet does not distort the trouser leg when lying in the gathered (relaxed) closed position. The elastic shall extend the full width of the pocket to achieve a 6 3/4 to 7 1/2 inches relaxed opening. The elastic will retreat to its relaxed opening position when hand is removed. The cargo pocket opening shall retain its elongation/recovery characteristics for the life of the garment.

3.7 Toxicity Statement. The blouse and trousers shall show no toxicity (see 4.4.5).

#### **4. VERIFICATION**

4.1 Classification of inspection. The inspection requirements specified herein are classified as follows:

1. First article inspection (see 4.2)
2. Quality conformance inspection (see 4.3)

4.2 First article inspection. The first article, submitted in accordance with 3.1, shall be inspected for appearance, color, finish, design, configuration, workmanship and dimensional requirements. The presence of excessive defects, as defined by contract, (see 4.1) or failure to pass any test shall be cause for rejection of the first article.

4.3 Quality conformance inspection. Sampling for inspection shall be performed in accordance with ANZI/ASQC Z1.4, as defined by contract, except where otherwise indicated.

4.4. Component and end item inspections: In accordance with 4.1, fabric, components and end items shall be tested in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable procurement documents. The government reserves the right to inspect all components and end items to determine conformance to requirements. When certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification. A certification of compliance may be acceptable as evidence that the permethrin treatment meets the requirements of Paragraph 3.3.10. When Certificate of Compliance are submitted, the QAR will conduct in-process inspections and review records to audit compliance to the treatment process approved by the government in production verification and EPA registration. The Government reserves the right to periodically inspect such items to determine the validity of the certification in accordance with MIL-DTL-44411B and the performance requirements of this specification.

4.4.1 Bond strength test. The interlining shall meet the requirements stated in 3.4.2.1 when tested according to AATCC-136, paragraph 11.

4.4.2 Breaking strength and elongation test. The thread and gimp shall meet the requirements stated in 3.4.2.2 and 3.4.2.3 when tested according to ASTM-D-2256, except testing speed shall be  $12 \pm 0.5$  in/min and a 10 inch gauge shall be used.

4.4.3 Thread colorfastness test. The thread and gimp shall meet the requirements stated in 3.4.2.4 when tested according to AATCC-61, Test 3A (4 cycles).

4.4.4. Button Tests.

4.4.4.1 Chalking test. The buttons shall meet the requirements stated in 3.4.4 when tested for chalking by immersion in a boiling solution of 0.8 percent by weight sulfuric acid for 10 minutes, immediately thereafter dried and examined by holding the button at arm's length under a strong white light.

4.4.4.2 Compressive strength test. The buttons shall meet the requirements stated in 3.4.4 when tested for compressive strength using an apparatus that permits gradual application of the load either by a manual or automatic hydraulic mechanism. Buttons shall be placed face down one at a time between flat blocks of steel, and tested to failure. Failure is defined as the first sign of a crack in the button visible to the naked eye (a visible crack in the button will usually be found at the first audible sound of cracking).

4.4.4.3 Button pull test. The buttons attached to the blouse and trouser shall meet the requirements stated in 3.4.4 when tested according to ASTM D-5034, except slide button on top of 1 inch wide grips separated at least 3/8 inch so that button loosely rests evenly on top of grips. Use manually adjusted grips only, not pneumatic. Place button attachment stitching in middle of bottom grips and adjust an additional 3/8-inch down so that the grips grab fabric just below stitching, not on the stitching. Run tensile machine per test method and record force required to pull button from sewn garment.

4.4.5 Toxicity test. The finished blouse and trouser shall be tested for dermal toxicity as follows:

- a. Title 40, Code of Federal Regulations, 1994 Edition;  
Part 798.4100 - Dermal Sensitization  
Part 798.4470 - Primary Dermal Irritation  
Part 798.4500 - Primary Eye Irritation  
Marzulli, F and H. Maibach, "Contact Allergy: Predictive Testing in Humans,"  
Advances in Modern Toxicology, Volume 4, pp353-372, 1977.

b. As an alternative to animal and human testing, the contractor may provide information, which certifies that the treated cloth is composed of chemicals and/or materials, which have been safely used commercially where prolonged, repeated skin contact has occurred.

4.4.6 Material and Garment Testing. The cloth and/or garment shall be tested for the characteristics listed in Table VIII. The testing shall be performed using the test methods as specified in table VIII. All test reports shall contain the individual values utilized in

expressing the final results. For material testing, the sample unit shall be 5 continuous yards full width of the finished cloth, for all physical and chemical tests. For garment testing, the sample unit shall be one blouse and one trouser per Permanent Press treatment lot. The lot shall be considered unacceptable if one or more sample units fail to meet any requirements specified.

**TABLE VIII. Material and Garment Testing Requirements**

Characteristic	Requirement Paragraph	Test Method
Material		
Nylon :	3.3.1.2	<u>1</u> /
Identification		<u>1</u> /
Luster		<u>1</u> /
Denier		<u>1</u> /
Absence of Nylon Waste		<u>1</u> /
Cotton :	3.3.1.3	
Identification		
Combed cotton (class 1 only)		<u>1</u> /
Fiber content:	3.3.1.4	<u>1</u> /
Cotton content		
Nylon content		AATCC-20A <u>1</u> / <u>2</u> /
Fabric Identification (Class 1 only)	3.3.1.7	AATCC- 20A <u>1</u> /
Weave	3.3.1.5	Visual <u>1</u> /
Physical Requirements:		Visual <u>1</u> /
Untreated and permethrin/permanent press treated:		
Weight	3.3.1.7	ASTM D 3776 <u>3</u> /
Breaking Strength	3.3.1.7	ASTM D 5034 <u>3</u> /
Tearing Strength	3.3.1.7	ASTM D 1424 <u>3</u> /
Seam Strength	3.3.1.7	ASTM D 1683 <u>3</u> /
Presence of labile sulfur	3.3.3	<u>1</u> /
Visual color matching	3.3.4.1	AATCC Evaluation Procedure 9, Option A, 4.4.6.2.1
Instrumental color matching	3.3.4.2	AATCC Evaluation Procedure 6, 4.4.6.2.2
Colorfastness:		
Light (after 40 hrs or 170 kilojoules)	3.3.5	AATCC-16 A or E
Laundering (after 4 cycles)	3.3.5	AATCC-61 test 1A <u>4</u> /
Croaking	3.3.5	AATCC-8
Perspiration (acid and alkaline)	3.3.5	AATCC-15
Spectral reflectance	3.3.7	4.4.6.1 and <u>1</u> /
Garment Testing:		
Smoothness Appearance (class 1 & 2)		
Initial	3.3.8.1	AATCC-143
After 20 launderings	3.3.8.1	AATCC-143 <u>5</u> /
Crease Retention;		

Characteristic	Requirement Paragraph	Test Method
Initial	3.3.8.1	AATCC-143
After 20 launderings	3.3.8.1	AATCC-143 <u>5/</u>
Seam Smoothness		
Initial	3.3.8.1	AATCC 143
After 20 launderings	3.3.8.1	AATCC- 143, <u>5/</u>
Embroidery Yarn Testing		
Colorfastness:		
Light (40 AATCC Fading Units or 170 kilojoules):	3.4.5	AATCC-16 Opt 1 or 3
Dimensional stability	3.3.9	AATCC-96. Test Vic, A <u>6/</u>
pH	3.3.11	AATCC-81
Toxicity	3.3.12	4.4.6.3, 4.4.6.3.1, <u>1/</u>
Elastic Force vs. Elongation	3.4.2.6	4.4.6.4
Cargo Pocket	3.4.2.6	4.4.6.4.1, <u>7/</u>
Waistband	3.4.2.6	4.4.6.4.2, <u>7/</u>
Permethrin Content (Garment Type I &II)	3.3.10.1	4.4.6.5 <u>8/</u>
% Bite Protection (Garment )Type I & II	3.3.10.2	4.4.6.5 <u>8/</u>

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

2/ The cotton content shall be calculated as follows:

$$\text{Cotton content, percent} = R/S \times 100$$

R = Weight of residual fibers  
S = Weight of dry desized specimen

3/ Five determinations are required for untreated material testing, except three determinations will be performed on garments.

4/ Except that 1993 AATCC Standard Reference Detergent (non-phosphate) without optical brightener shall be used.

5/ The water temperature shall be 140° F ±5° F and the drying cycle shall be permanent press or durable press. Ten (10) launderings are acceptable verification test provided the garment/cloth meets the performance requirement for 20 launderings. The government reserves the right to perform or request that 20 launderings be performed anytime.

6/ Except no pressing is performed after drying.

7/ The seams shall be parallel to the jaw grips at 3 inch setting.

8/ After 20 launderings as per AATCC 135, 3, V,iii. Except laundering cycle 5,10,15,19 & 20 shall be performed without adding any detergent to minimize detergent accumulation in specimens. After 50 launderings as per AATCC 135, 3, V, iii, except laundering cycles 5, 10, 15, 19, 20, 25, 30, 35, 40, 45, 49, and 50 shall be performed without any detergent.

4.4.6.1 Spectral Reflectance. Initial and Permanent Press finished cloth shall be meet requirements specified in 3.3.7. Spectral reflectance shall be measured and reported on the initial cloth. Certificate of compliance will be accepted on finished uniforms and subject to Government verification. If finished garments are rejected for shade, spectral reflectance will be measured on cloth in the finished garments. Spectral reflectance data shall be determined on the face side and shall be obtained from 600 to 860 nanometers (nm) at 20 nm intervals on a spectrophotometer relative to the barium sulfate standard, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white, e.g. magnesium oxide or vitrolite tiles. The spectral bandwidth shall be less than 26 nm at 860 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a source that simulates either CIE source A or CIE source D65. The specimen shall be measured as a single layer, backed with six layers of the same fabric and shade. Measurements shall be taken on a minimum of two different areas and the data averaged. The measured areas should be taken at least 6 inches away from the selvage. The specimen shall be viewed at an angle no greater than 10 degrees from the normal, with the specular component included. Photometric accuracy of the spectrophotometer shall be within 1 percent and the wavelength accuracy within 2 nm. The standard aperture size used in the color measurement device shall be 0.3725 inches in diameter. Any color having spectral reflectance values outside the limits at four or more of the wavelengths specified shall be considered a test failure.

#### 4.4.6.2 Color Matching.

4.4.6.2.1 Visual color matching (all types and classes). The color and appearance of the class 3 and class 4 camouflage printed cloth, and classes 1 and 2 camouflage printed and permanent press finished cloth shall match the standard sample when viewed using AATCC Evaluation Procedure 9, Option A, under filtered tungsten lamps that approximate artificial daylight D75 illuminant with a 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 horizon lamplight at  $2300 \pm 200$  K.

4.4.6.2.2 Instrumental color matching (all types and classes). Instrumental color matching is used as a tool to quantify shade evaluation if visually shade is rated unacceptable. All the colors in the Woodland MARPAT shall be instrumentally measured except for Khaki and all the colors in the Desert MARPAT shall be measured except for Highland given the areas of these exempted colors are too small for accurate instrumental readings. Each measured color shall match the standard sample using AATCC Evaluation Procedure 6. A color difference greater than a  $\Delta E_{CMC} = 1.5$ , when using a  $\Delta E_{CMC} (2:1)$  ratio ( $D_{65} / 10^\circ$ )

units as compared to the standard sample, shall be basis for rejection.

4.4.6.3 Toxicity assessment. The contractor must furnish information (see 4.4.6.3.1) certifying that the finished product is composed of materials which have been safely used commercially OR which provide sufficient toxicity data to show compatibility with prolonged, direct skin contact. At a minimum, toxicity data should include results from a primary dermal irritation study in laboratory animals and a repeated insult human patch test (Modified Draize Procedure). The latter must be conducted under the supervision of a qualified dermatologist using at least 100 free-living individuals.

4.4.6.3.1 Toxicity Documents. All finishes/chemicals used to process the garment shall be identified and accompanied by the appropriate Material Safety data Sheet (MSDS) information. The use of chemical recognized by the Environmental Protection Agency (EPA) as known human carcinogens is prohibited.

4.4.6.4 Force versus elongation of elasticized features. Cargo pocket and waistband samples shall be samples from garments are constructed to duplicate the configuration on the finished garment where the elastic webbing is set on or within the trouser fabric and permanent press treated. The cargo pocket length (relaxed) is the finished opening length of six inches in length. The waistband shall consist of one side of the elasticized waistband which is approximately four inches in length (relaxed). Both cargo pocket and waistband samples are laundered 5 times as per AATCC 135,3,V,iii and stitching which sets the elastic must stay secured through the washings. Tensile properties are evaluated by conducting tensile tests utilizing equipment, which conform to ASTM D-76, Standard Specification of Tensile Testing Machines for Textiles. Samples are conditioned in a 70 degree F, 65% RH laboratory for a minimum of 24 hours. The specimens are clamped in pneumatic jaws in a relaxed state (no force on read out) where the jaws are spaced 4.0 inches apart.

4.4.6.4.1 Cargo Pocket. The cargo pocket sample shall be centered between the jaws so that the set elastic webbing is clamped into each jaw. A Constant Rate of Extension (CRE) with a loading rate of 20.0 inches per minute is used. The crosshead is moved 1.5" for a total of 5.5". The resulting force is recorded at a rate of 10 points per second. One cycle consists of this elongation as well as the return to the initial 4.0" separation position. The cycle is repeated 100 times for each sample. The graph shall be evaluated and the sample will meet the requirement when no peak is greater than 3.5 lbs. nor less than 2.5 lbs.

4.4.6.4.2 Waistband. A Constant Rate of Extension (CRE) with a loading rate of 2.0 inches per minute is used. The crosshead is moved 1.5" for a total of 5.5". The resulting force is recorded at a rate of 10 points per second. The graph shall be evaluated to record the force separately at ¾ inch and 1 ½ inch extension. The sample meets requirements when the ¾ inch extension does not exceed 1.5 lbs nor is less than 0.5 lbs, and the 1 ½ inch extension does not exceed 4.0 lbs nor less than 1.5 lbs. The sample must demonstrate acceptable performance at both extensions to pass the requirement.

4.4.6.5 Permethrin content analysis. The permethrin content of treated fabric shall be determined by gas chromatographic procedure and directly compared to an external standard containing a known permethrin content (see 4.4.6.5.2.1). Alternate method(s) of extraction and analysis, and specimen size are subject to government approval and



a. Performance Turbo Pump MSD (EI Mode), or equal

4.4.6.5.1.8 Ultrasonic Cleaner. Branson, or equal

4.4.6.5.1.9 High Temperature Convection Oven. 500°C Max

4.4.6.5.1.10 Refrigerator Storage. 4°C

4.4.6.5.2 Reagents.

4.4.6.5.2.1 Permethrin Analytical Standard. Permethrin standard shall be  $\geq 97\%$ , mixture of Cis/Trans Isomers. Permethrin standards are available from FMC Agricultural Products; Princeton, New Jersey 08543; FMC reference #33297; 97% purity/specified technical, or equal

4.4.6.5.2.2 Solvent Mixture. Solvent mixture shall be 80% Acetonitrile/Analytical Grade and 20% Methanol/Analytical Grade

4.4.6.5.2.3 High Purity Helium Carrier Gas. Carrier gas shall be  $\geq 99.999\%$

4.4.6.5.2.4 Cleaning Solutions. Cleaning solutions shall be as follows:

- a. Micro-90 Ultra Cleaning Solution, or equal
- b. Reversed Osmosis Water, 98% Rejection Rate

4.4.6.5.3 Calibration of Apparatus.

4.4.6.5.3.1 Analytical Balance.

4.4.6.5.3.1.1 Pre-Weighing Procedures. Prior to weighing, initiate the internal weight calibration function or use an external certified weight set to verify that the balance is operating properly.

4.4.6.5.3.1.2 Manufacturer Calibrations. Obtain manufacturer certifications within 12 months prior to taking measurement.

4.4.6.5.3.2 Gas Chromatography equipped with Mass Selective Detector (See A.6, A.7)

a. Perform the manufacturer's recommended calibration procedures prior to analyses.

b. Before samples or required blanks can be analyzed, the instrument must meet the initial calibration acceptance criteria (see G).

4.4.6.5.3 Cleaning Techniques. Establish cleaning techniques to ensure that no permethrin carries over from experiment to experiment. The techniques listed below have been determined to be suitable:

- a. Evaporate excess solvent from extraction glassware and wash using conventional

methods. (See B.4)

b. Bake off residual organic substances from glassware in high temperature convection oven, 500°C, for three to six hours. (See A.9)

c. Sonicate A.S.E. Cells in the solvent that was used for the extraction. (see A.8)

#### 4.4.6.5.4. Sampling and Test Specimens.

4.4.6.5.4.1 Sample size. The sample size (garment class 3 and garment class 4) to be tested shall be selected in accordance with ANSI/ASQ Z1.4, Special Inspection Levels S-1 and AQL of 1.5, OR a minimum of three (3) samples per lot to be evaluated.

#### 4.4.6.5.4.2 Test specimens.

a. From each sample garment being evaluated (unlaundered, after 20 and after 50 launderings), select three 3 inch diameter specimens (use a 3 inch circular cutting die having surface area of 45.6037cm<sup>2</sup>) for each test condition. Cut specimens from single ply areas so that no two specimens shall contain the same warp and filling yarns (for example, for the blouse areas-front left, front right, back, right sleeve, left sleeve; and for the trouser areas-front left leg, back left leg, right front leg, back front leg, and front left or right fly). Specimens for the measurement of permethrin content after laundering shall be cut after the finished garment has been laundered according to AATCC 135, 3, V, III to the specified number of cycles. Laundered specimens shall be cut from different ply areas across the garment.

b. Weigh each specimen to the nearest milligram (see A.1).

#### 4.4.6.5.5 Standard Preparation.

a. Prepare six concentrations of permethrin standards which are 20, 50, 75, 100, 150, and 200ng/μL, [1ng/μL is equal to 1 part-per-million (ppm)]

b. Using the balance specified in A.2, weigh 10mg ± 1mg of permethrin crystals and place into a 50mL volumetric flask and fill with 80% acetonitrile/20% methanol solvent to obtain the standard of 200ng/μL. Make all appropriate dilutions from this flask to obtain the additional standards.

c. Calculate the actual concentrations of the standards based on the weight of the permethrin.

#### 4.4.6.5.6 Extraction Procedure (see A.5)

##### 4.4.6.5.6.1 ASE

4.4.6.5.6.1.1 Preparing Specimens. Roll each specimen and place into an ASE cell fitted with a cellulose filter. Fill the void with glass beads to conserve solvent. Place all cells onto ASE cell tray.

4.4.6.5.6.1.2 Quality Control. Extract a specimen blank for every run to detect if any carry

over of permethrin is significant.

#### 4.4.6.5.6.1.3 Accelerated Solvent Extraction Procedures.

##### 4.4.6.5.6.1.3.1 Parameters.

Cell Size	22mL
Collection vials	60mL, light blocking/amber
Solvent	80% Acetonitrile, 20% Methanol

Approximate Gas Pressures:

System	50 psi
System Solvent	10 psi
Oven Compression	130 psi

##### Parameters:

Preheat	0 min
Heat	5 min @ 100°C
Static w/Solvent	10 min @ 1500 psi
Flush Volume	90%
Purge	90 sec
Cycles	2

4.4.6.5.6.1.3.2 Preparation for analyses. Dilute or concentrate each vial to 40mL and prepare a 1mL aliquot from every specimen extraction for GC analysis. Permethrin recovery must be 95% or greater (see F.4).

4.4.6.5.6.2 Soxhlet. Place each specimen into cellulose Soxhlet extraction thimble. Add 160mL of the acetonitrile/methanol mixture and boiling chips into a 250mL flask. Assemble the Soxhlet apparatus and extract the permethrin treated specimens for 6 hours or until an extraction recovery of 95% or greater has been achieved (see F.4). Concentrate the extract by rotoevaporation, or equal, at 35°C to a final volume of 40mL.

4.4.6.5.6.3 Storage. After the specimens are extracted, store in light blocking amber vials in refrigerator until ready to inject (see A.10). Specimen extractions shall be stored in a refrigerator for no longer than three months. When ready to analyze, allow the temperature of the GC vials to equilibrate in the area of evaluation before injection into GC.

##### 4.4.6.5.6.4 Extraction Efficiency.

a. Select three random specimens from any permethrin treated fabric sample and perform three consecutive extractions.

b. Quantify the level of permethrin recovered from each specimen for each consecutive extraction, through GC/MS analysis.

c. Verify that the percent recovery of permethrin for any specimen size and composition, is 95% or greater by comparing the recovery level from the first extraction, to that of subsequent extractions. Combine the permethrin levels obtained from each of the

three extractions, if the initial extraction yields permethrin levels 95% or greater than the total percent of permethrin extracted three sequential times, then the extraction efficiency is 95% or greater. Note - To ensure that the extraction efficiency is being accurately calculated, the permethrin levels in the second and third extraction should be minimal, and the permethrin level by the third extraction should be trace or zero.

Note: Initial verification of extraction efficiency of this test method must be performed. Once an extraction efficiency of 95% or greater is established, no further demonstration of the extraction efficiency is needed.

#### 4.4.6.5.7. Analytical Procedure.

4.4.6.5.7.1 Quality Control. Laboratory blanks that contain no analyte are used to ensure specimens are free of contaminants or to ensure there is no cross contamination during a run. Inject a blank containing 80% acetonitrile/20% methanol before every set of standards and before and after every ten specimens. If any blank, after multiplying concentration by five, is greater than any specimen result, the specimen data points are invalid and a system check must be run to identify the source of the carry over. After system maintenance has been performed, repeat injections of the standards for the calibration curve, new blanks, and new aliquots of the specimens affected by the previous carryover.

#### 4.4.6.5.7.2 Standard Injection.

a. All six permethrin standards will be injected at the beginning and at the end of each series of specimens to "bracket" the specimen injections. Check linearity of the standards for each set of injections by plotting the responses (area counts) on the x-axis vs. the calculated standard concentrations on the y-axis. A 3<sup>rd</sup> order polynomial regression line with R-squared value of 0.99 or greater is acceptable. Derive the equation of the 3<sup>rd</sup> order polynomial for sample calculations.

4.4.6.5.7.3 Specimen Injection. Run specimen injections in duplicate. Sample extracts, standards, and blanks must be analyzed within an analytical sequence such as listed below:

- a. Initial calibration (Standards)
- b. Instrument blank at the end of the initial calibration
- c. Specimen Series 1 (extracts 1-10, 1st quantitation)
- d. Instrument blank
- e. Standard Series 1
- f. Instrument blank
- g. Specimens Series 2 (extracts 1-10, 2nd quantitation)
- h. Instrument blank
- i. Standard Series 2
- j. Instrument blank
- k.-r. Subsequent specimen series,( ex. 11-20, including blanks, and standard series)
- s. Final calibration (Standards)

Note: After the initial calibration, the analytical sequence may continue as long as acceptable instrument blanks and the standards are analyzed at the required frequency. If any specimen count does not fall on the standard calibration curve, the evaluator may dilute that specimen by 1:10 and re-run; calculations of the permethrin level must be

adjusted using the factor of 10.

#### 4.4.6.5.7.4 Gas Chromatograph/Mass Spectrometer Parameters. (see A.6)

##### 4.4.6.5.7.4.1 Injection procedures.

a. Place all GC vials into auto sampler tray. To avoid vapor pressure differences, all vials must be at room temperature and containing identical volumes.

b. Inject 1 $\mu$ L into the Gas Chromatograph equipped with Mass Spectrometer. Use high purity helium carrier gas (see B.3) and appropriate column.

c. Ensure that rinse vials in the injector port contain 80% acetonitrile/20% methanol above the minimum solvent line.

##### 4.4.6.5.7.4.2 Instrument Settings. The following parameters will be used in the analysis:

Oven Temperature	250 °C
Injector Temperature	275 °C
Detector Temperature	280 °C
Injection volume	1 $\mu$ L
Carrier Gas Flow Rate	1.3 mL/min
GC Run Time	10 min
Split Ratio	3:1
MS Single Ion Monitoring	
Scan Parameters	EM Voltage Gain Factor of 1
Real Time Plot	10 min
Resolution	Low
Solvent Delay	4 min
Start Time	4 min, 4.26 Cycles/sec
Ions Monitored	183 (quantitation), Dwell 100 163 (confirmatory), Dwell 100

##### 4.4.6.5.7.4.3 Evaluation Procedures.

a. Quantify the permethrin content detected by the mass spectrometer by extracting ion chromatograms 183 (quantitation ion) and 163 (confirmatory ion).

b. Integrate permethrin peaks manually from baseline to baseline using the software, or generation of report.

##### 4.4.6.5.8. Calculations.

4.4.6.5.8.1 Permethrin Concentration. The permethrin concentration will be calculated from the area counts of the chromatographic curve and expressed in terms of mass permethrin per surface area (mg/cm<sup>2</sup>), with the option of expressing in terms of weight permethrin per weight of specimen (W/W%):

4.4.6.5.8.1.1 Concentration. The concentration of permethrin in milligrams per square

centimeter shall be calculated as follows:

$$\text{Concentration (mg/cm}^2\text{)} =$$

$$40\text{mL} \times (ax^3 + bx^2 + cx + d) \times (1,000 \mu\text{L}/1\text{mL}) \times 1\text{mg}/1,000,000\text{ng} \times (1/45.6037\text{cm}^2)$$

Where:

40mL = Final Volume

a, b, c, and d = numbers derived from 3<sup>rd</sup> degree polynomial equation from standard series

following specimen series

x = area count of the specimen curve

45.6037cm<sup>2</sup> = area of specimen

#### 4.4.6.5.8.1.2 Conversion to Permethrin Weight Percent Content (W/W%).

Concentration (W/W%) = [Concentration (mg/cm<sup>2</sup>) multiplied by (surface area) cm<sup>2</sup> divided by (weight of specimen) mg] multiplied by 100.

#### 4.4.6.5.9 Report.

Report the permethrin concentrations in milligrams per square centimeter squared to the nearest 0.001 mg of the three (3) individual specimens per sample unit (garment) for all sample units tested. A single individual specimen within a sample unit (garment) shall be allowed to fall outside of the minimum to maximum range of the permethrin levels as specified in paragraph 3.3.10.1 as long as the averages of the three specimens meet the specified levels. If a sample unit (garment) fails, three (3) specimens from an additional sample unit (garment) shall be tested. The additional test shall then be used to rate pass or fail of the lot. The lot shall be rated "pass" when a minimum of three (3) sample units meet the minimum to maximum concentration level range specified in 3.3.10.1."

4.4.6.6. Percent (%) Biting Protection Assay. Percent (%) bite protection shall be measured on finished permethrin treated garments, class 3 and class 4, under three test conditions and using a control specimen (non-permethrin treated, garment classes 1 and 2) against the two selected insect species specified in 4.4.6.6.3. the three test conditions shall be one unlaundered, two: after 20 launderings and three: after 50 launderings from garments produced in the same lot. Corresponding permethrin content for each of these conditions will be measured as specified in 4.4.6.5.9 to correlate biological toxicity with the particular garment treatment used to meet requirements specified in 3.3.10.

4.4.6.6.1 Number of determinations. Three determinations will be run for each of the 2 insect species (see 4.4.6.6.3.3). Each determination for each insect is conducted with 4 volunteers using 3 different fabric conditions; unlaundered, 20 launderings and 50 launderings and compared to non-permethrin treated control. One set of controls will be used for the 3 determinations for each volunteer (see 4.4.6.6.3.6). The total number of specimens for the 3 determinations is outlined below. It is estimated that one blouse yields 6 specimens and one trouser yields 4 specimens consisting of largely a single ply fabric area (see 4.4.6.6.2).

	Number of	Number of	Number of	Number of	Total
Specimens					
	<u>Insect tests</u>	X	<u>Determinations</u>	X	<u>Volunteers</u>
			X	<u>Fabric conditions</u>	= per

<u>garment type</u>					
36 2/	Mosquitos 1/	3 x	4 x	3 x	=
12 2/	Control 2/	1 x	4 x	3 x	=

1/ one set of treated specimens will be used twice to test each mosquito species  
 2/ Total garments estimated, required to conduct 3 determinations are; 6 treated blouses, 9 treated trousers, 2untreated blouse, 3 untreated trousers

4.4.6.6.2 Specimen size. Specimens will be cut to the shape and dimensions illustrated in Figure 17. The cut specimen shall be folded in half lengthwise (right sides together) and seamed 1/8” from the raw edge. The seam shall finish 2-1/4” from the narrower end of the sample, with the completed seam measuring 9-3/4”. Specimens shall be cut from single fabric ply areas. To minimize the number of garments needed for each determination, multiple ply areas such as seam areas or hems may occur limitedly in the perimeter areas provided multiple plies of fabric in these areas shall not create a gap between subject’s arm and fabric (see 4.4.6.6.3.5). Specimens will be cut with gloved hand and placed in a plastic bag and the glove disposed of to avoid residual contamination of controls. When failure point is being quantified, the laundered samples may be used to accomplish the additional launderings needed.

4.4.6.6.3 Procedure. The procedure to conduct biting protection assay shall follow the “EPA Product Performance Test Guidelines, OPPTS 810.3700, Insect Repellents For Human Skin and Outdoor Premises (see 2.2.2), and is described in part below, noting any exceptions to this procedure.

4.4.6.6.3.1 Applicable Protocol. Within OPPTS 810.3700, Section 3 addresses treated fabric material and section (3)(iii) specifies that laboratory studies are conducted as described in (d)(1) of the OPPTS 810.3700 guideline.

4.4.6.6.3.2 Fastening Test Specimen. Section (3)(iii) recommends “fastening a strip of the impregnated material to the test subject’s forearm.” This will be accomplished by utilizing specimen size specified in 4.4.6.6.2 (see Figure 15) and ensure it covers the entire forearm of the test subject without gaps for insect access. With the arm in the pronated position, the fastening seam that closes the specimen on the volunteer’s arm shall be located on the top of the forearm. Attachment of the treated specimen will be done with gloved hand, which will be disposed of prior to attaching the control to alternate arm.

4.4.6.6.3.3 Test Insects. OPPTS 810.3700 section (d) (1) addresses laboratory tests conducted with mosquitoes and stable except this test shall utilize two species of mosquito. The results of this evaluation for the mosquitos is a contractual requirement. Insect genus, species and subspecies, colony origin and approximate age shall be used as specified below and in 4.4.6.6.3.3.

Mosquitos:  
 Aedes (Stegomyia) aegypti  
 Anopheles albimanus,

4.4.6.6.3.3.1 Insect Characteristics. Mosquito ages employed for these studies shall be 5-11

days old after emergence from the pupal stage. Methods should be used to preselect females for the studies. Use either a hand draw box or cold table to collect mosquitos for the required cage density (see 4.4.6.6.3.3.3).

4.4.6.6.3.3.2 Insect Rearing. Insects for these studies shall be reared under optimal conditions for larvae, as described in OPPTS 810.3700, section (d)(1)(iii).

4.4.6.6.3.3.3 Cage Conditions. A cage density of  $225 \pm 25$  female insects per cage is required to meet the biting pressure density of at least one female mosquito per 100 cm<sup>3</sup> cage volume. (Cages shall be 20,000 cm<sup>3</sup>, with a sleeved opening for the arm of the volunteer to be inserted.) Cages shall be constructed of a lightweight clear plastic on 4 sides, with the side opposite the cloth sleeve containing a screen covered by a plastic flap. Tests shall be conducted with fluorescent lights on and under room conditions (22-27°C, and 40-80% RH). The temperature and RH during the test shall be recorded and reported.

4.4.6.6.3.3.4 Subjects. A minimum of 4 test volunteers shall be used in each study for each insect species at each test facility. The same 4 subjects can be used to evaluate different insect species done at the same facility. Each replicated assay with a volunteer and garment specimen shall be run on different days such that a specimen is not simply replicated under the same environment conditions and using essentially the same insect population. Due to the replication, the number of volunteers is now decreased from the 5 or more recommended in OPPTS 810.3700, section (c)(3)(i). Equivalent numbers of females and males are preferred for the study, and if not possible, at least one male and female volunteer shall be included for each insect species. Cosmetics and alcohol shall be avoided 12 hrs. prior and during the test. Volunteers shall read and sign the appropriate Institutional Review Board (IRB)-Human Use protocol forms, required for their consent, prior to being used in the test. IRB protocols shall be approved through the appropriate agencies' IRB mechanisms.

4.4.6.6.3.3.5 Volunteer's Test Area. The test area shall consist of the region from the wrist to approximately ½ inch before the elbow. Fabric material shall be secured around the forearm to eliminate gaps between the arm and material and with the fastened seam positioned on the top of the forearm as specified in 4.4.6.6.3.2. The ends of the garment, near the wrist and elbow shall be sealed with protective tape of adequate thickness to prevent insects from biting through the tape. The hand shall be gloved with a glove of appropriate thickness to prevent biting through to the hand.

4.4.6.6.3.3.6 Controls. For each test condition a control shall be conducted. The control shall consist of the same fabric without the insect protection treatment and be identical size to the test swatch (see 4.4.6.6.2). Controls will be cut in clean area and stored in separate plastic bags to avoid residual permethrin contamination. Laundered controls shall be laundered separately and to the identical number of times as the treated fabric. Controls shall be worn on the arm opposite the treated specimens.

4.4.6.6.3.3.7 Biting Exposure. Arms containing the treated specimens shall be exposed to a cage of insects for 15 min. Since both arms shall contain fabric (one as the control, one as the treatment), the order of the exposure periods shall be randomized; however, effort should be made to run each period consecutively, with as little elapsed time as possible in between testing of a volunteer's arms.

4.4.6.6.3.8. Raw Data. Raw data shall consist of the insect information as described in 4.4.6.6.3.3, the number of insects used per cage, and method of selection of these insects. The number of male and female insects shall be counted and only the number of females used for purposes of identifying insects that bite compared to non-biting mosquitoes. The number of bites received for each sample (treatment or control) shall be counted and recorded.

4.4.6.6.4 Report. Calculation of the reduction in bites for the treatment, compared to the control, shall be expressed as a percentage that represents the percentage bite protection as shown below. Individual subject results for each trial (3 for each treatment type or control), shall be averaged with all trials for the other volunteer subjects in the study. An overall average % bite protection shall be calculated by Abbott's equation below and reported in this manner for each insect and for all volunteer tested. For initial and 20 wash conditions, a single average within each species trial may fall below the 96% minimum provide it is greater than or equal to 90% and the overall average of all 4 (or more) volunteer's samples results in bite protection which is greater than or equal to 96%. For the 50 wash condition, single average within each species trial may fall below the 90% minimum provide it is greater than or equal to 85% and the overall average of all 4 (or more) volunteer's samples results in bite protection which is greater than or equal to 90%.

$$\% \text{ Bite Protection} = \frac{(B_{NC}/F_C) - (B_T/F_C)}{(B_{NC}/F_C)}$$

where:

$B_{NC}$  = bites recorded on the arm covered by the negative control fabric

$F_C$  = female insects in the cage that are capable of biting at the start of the 15-min period

$B_T$  = bites recorded on the arm that was covered by the treated fabric.

4.4.7 End item visual examination. Finished end item blouse and trousers shall be subjected to visual examination after permanent press treatment. All fabric and garment defects shall be scored in accordance with examination descriptions as specified in Table IX.

4.4.7.1 Fabric yard by yard examination. The maximum lot size shall be 150,000 linear yards. Each roll in the sample shall be examined on the face side only (printed side) When the total yardage in the roll does not exceed 100 yards, the entire yardage in the roll shall be examined. All defects, as defined in section I of FED-STD-4, which are clearly noticeable at normal inspection distance (3 feet) shall be scored and assigned demerit point as listed in below, except that only those slubs and knots which exceed the maximum limits shown on Sears Fabric Defect Scales, E or 3 as applicable for slubs and D for knots shall be scored. No linear yard (increments of 1 yard on the measuring device of the inspection machine) from any roll within the sample shall be penalized more than four points. The lot shall be unacceptable if the point per 100 square yards of the total yardage examined exceeds 30 points. Point computation for lot quality and individual roll quality shall be as follows:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Width of cloth (inches)} \times \text{Total yards inspected}} = \text{Points per 100 square yards}$$

4.4.7.2 Demerit points. Demerit point shall be assigned as follows:

Defects up to and including 3 inches in any direction	one point
Defects exceeding 3 inches but not exceeding 6 inches in any direction	two points
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:

Objectionable odor

Baggy, ridgy, or wavy cloth

Width less than specified

Edge ravels when pulled outward

Overall uncleanness

Pattern design not equal to standard sample

Incorrect color in any part of the pattern

Pattern repeat not equal to the standard sample

Skitteriness (mottles, uneven color) of pattern exceeds that shown by standard sample

Excessive grinning (off register, gap where ground shade shows through) of pattern as compared to the standard sample

Excessive halving or trapping (overlapping of colors) of pattern as compared to the standard sample

4.4.7.2 Verification of Shade.

a. Printed/dyed fabric will be 100% sampled for shade. Any shade sample submitted shall be permanent press/permethrin treated prior to submittal for shade approval. A 12 inch by full width swatch (header) will be cut by the contractor from rolls within the lot. The header will be cut in half to form Set A and Set B. The Government representative will select samples in accordance with the following:

<u>Lot size (Rolls)</u>	<u>Pieces to be sampled:</u>
1 to 8	1 swatch from each roll
9 to 25	8 swatches from roll lot (only one piece shall be cut from an individual roll)
26 to 90	20 swatches from roll lot (only one piece shall be cut from an individual roll)
91 to 160	32 swatches roll lot (only one piece shall be cut from each individual roll)
> 160	1 swatch from each 5 rolls

b. The swatches shall be identified and submitted for shade evaluation. If one or more of the shade swatches are found unacceptable, the entire lot shall be rejected. Any end items made from the component lot shall also be rejected. A lot that was rejected for shade shall, without cost to the Government, be screened and all defective pieces in the lot shall be removed before such a lot is resubmitted. Resubmitted lots shall again be subjected to the sampling and shade evaluation prescribed herein. This requirement does not negate the contractor's responsibility to perform shade evaluation prior to the submittal of a lot to the

Government.

c. The swatches submitted in accordance with (a) above shall also be evaluated for uniformity of shade.

d. If the contractor reworks and resubmits pieces originally rejected for shade or finish, the contractor shall not combine the rejected pieces with normal production or with lots rejected for other causes. Such pieces shall be combined to form one resubmitted lot. Each piece shall retain its original piece number, suffixed with an "x".

The shade submittal shall indicate "for government shade approval" and contain the following information:

- (1) Name of prime contractor.
- (2) Contract number.
- (3) Nomenclature.
- (4) Government inspection lot number.
- (5) Number of swatches being submitted.
- (6) QAR's name.
- (7) Name and address of the QAR's base plant.
- (8) Piece number of standard sample cited.
- (9) Tally list with piece numbers.

e.) If any swatches are rejected, those pieces from which the rejected swatches were cut will be removed from the lot. Each piece acceptable for shade from which a shade swatch has been removed shall be cut by the contractor from selvage to selvage so that there will be no evidence of the shade swatch cut-out. The portion removed shall not be included in the yardage indicated on the piece ticket.

**Table IX. End Item Visual Examination**

Examination	Defect Description
Component Part	Component part of blouse or trouser omitted, distorted, full, tight, or twisted; any part of blouse or trouser caught in any unrelated stitching, the edge of any component part required to be forced out having folds of more than 1/8 inch. Fullness creating unwanted permanent fold, pleat, or crease in fabric or garments, shade variations within or between parts. <u>3/</u>
Material	Hole, slub, cut, tear, smash, burn, exposed drill hole, run, thin place, color/dye streak, spots and/or stains, Slubs, knots, color not as specified, misweave <u>1/</u> Fabric used for each blouse and trouser not as specified.
Stitching	Blouse or trouser seam: open stitching, puckered, distorted, pleated, repaired, wavy, twisted, irregular, loose or tight stitch tension, broken or missing thread or stitch, fullness, needle chew, visible mend, edge or raised stitching sewn too close to edge resulting in damage to cloth, seam allowance not as specified, visible raw edge, raw edge on outside, raw edge on inside along double needle seams, raw edge greater than 1/8 inch on inside of garment.

Examination	Defect Description
	<p>Stitching not as specified.</p> <p>Double needle intersecting seams staggered by more than ¼” except the crotch seam which is staggered by more than ½.”</p> <p>Run off of more than ½” for edge and raised stitching except chest pockets which will have not more than 1 stitch run off.</p> <p>Thread color not as specified</p> <p>Embroidery not as specified, loose threads, skipped stitches, more than 2 free ends</p> <p>Three or more occurrences of untrimmed threads of ½ inch or longer.</p>
Evenness <u>2</u> /	<p>Blouse:</p> <p>Length of blouse fronts uneven by more than 1/4 inch at top or bottom when buttoned.</p> <p>Blouse collar rounded ends vary by more than 1/8 inch, collar curls, puckers, pleats, or twists. End of collar and edge of front facing out of alignment by more than 1/8 inch</p> <p>Sleeve lengths vary by more than ½ inch. Cuff and cuff tab out of alignment with bottom folded edge of sleeve hem by more than 1/8 inch</p> <p>Blouse fly lining exposed more than 1/16”</p>
Evenness	<p>Trouser:</p> <p>Waistband uneven more than ¼ inch when buttoned</p> <p>Inseam and/or outseam lengths vary by more than ½ inch from leg to leg</p> <p>Bottom openings vary by more than ½ inch in half width</p> <p>Evenness of length between inseam and outseam varies by more than ½”</p>
Buttons & Buttonholes	<p>Blouse front, trouser fly and pocket flap buttons and buttonholes out of alignment causing bulge, twist or distortion when buttoned.</p> <p>Buttonholes and eyelets omitted, added, not clean cut or securely caught in fabric, not specified type, not specified location.</p> <p>Sleeve buttonhole placement not as specified (see Figure 5) - first buttonhole not aligned with cuff tab button, second buttonhole less than 4 1/8 or more than 4 –3/8 inches from first, third buttonhole less than 1-7/8 or more than 2 -1/8 inches from second. Eyelet end of sleeve buttonholes less than 1-1/8" or more than 1-3/8" from bottom edge of sleeve hem. Cuff buttonhole opening greater than 7/8 in.</p>
Hook & Loop	<p>Hook and loop out of alignment by more than 1/8”</p> <p>Button and/or hook and loop color not as specified</p>
Hems	<p>Hems at blouse bottom, sleeves, and/or trouser legs twisted, wavy, omitted, or not as specified.</p> <p>Hem width of blouse bottom and trousers less than 1/2” or more than 3/4". Sleeve hem width less than 2-3/8" or more than 2-5/8". Hem measurement taken from top fold to bottom fold.</p>

Examination	Defect Description
Pocket & Flaps	<p>Pocket companions not uniform in size or shape</p> <p>Pockets twisted, curled or puckered, not stitched or located as specified</p> <p>Pocket flap not completely covering pocket opening, not positioned as specified.</p> <p>Pocket flaps not centered over pocket opening. Flap width extends past finished pocket edge by more than 1/8" on each side.</p> <p>Sleeve and cargo pocket bellows exposed beyond edge of pockets by more than 1/8 inch</p> <p>Sleeve, cargo, and hip pocket out of horizontal alignment by more than 1/2"</p> <p>Sleeve pocket flap length at center from setting seam greater than 2 3/4"</p> <p>Chest pocket out of horizontal alignment by more than 1/4", (see 3/), front edge of chest pockets not at 65° angle to front edge of blouse by 1/4 inch or more, not matching the grain of the camouflage material</p> <p>Chest pocket hem stitching exposed below pocket flap</p>
Pockets and Flaps	<p>Cargo pocket elasticized opening less than 6-3/4 or more than 7- 1/2 inches in width, forward bottom corner of flap not bartacked down. Bartack not positioned and stitched through both flap and pocket.</p> <p>Side Hanging pocket opening less than 6 inches.</p>
Pleats	<p>Trouser pleats omitted, reversed, i.e. not facing outseam, front panel pleats stitched down less than 2-3/4 or more that 3-1/4 inches from top of trousers.</p>
Elastic	<p>Trouser waist elastic omitted, not positioned as specified, not attached as specified, width not as specified, not caught in bartack, bartack not required length or positioned as specified,</p> <p>Trouser cargo pocket elastic does not expand/retract to relaxed condition as specified, , omitted, twisted, width not as specified, not caught in bartack, bartack not length or position specified, setting distorts trouser leg.</p>
Belt Loops	<p>Belt loops omitted, insecure, not specified size and opening out of tolerance. (3/8 inches +/- 1/8" wide x 2 1/4 +/- 1/4 inches length opening)</p>
Eyelets	<p>Omitted, misplaced, improper size or caught in stitching</p>
Bartacks	<p>Bartacks or backtacks missing, insecure, misplaced, not specified size, stitches loose or broken, bartack/backtack not serving intended purpose.</p>
Patches	<p>Elbow, seat and knee patches omitted, not attached as specified, not positioned as specified in pattern</p>
Pressing Defects	<p>Unwanted permanent fold, pleat or crease in garments affecting appearance or serviceability.</p> <p>Blouse or Trouser creases not as specified; location, continuity, uniformity, sharpness</p> <p>Shiny impressions visible from 3 feet distance, scorched, burnt, odor, discoloration</p> <p>Damaged or lost component; buttons, seams, elastic.</p> <p>Fabric smoothness appearance and hand rating not as specified.</p>
Labels	<p>Omitted, incorrect, illegible, not attached where specified; bar-codes omitted, not readable by scanner; human-readable interpretation (HRI) omitted or illegible; bar code not visible on folded, packaged item; bar code attachment causes damage to the item.</p>
Packaging	<p>Any blouse or trouser not packaged in accordance with the contract or purchase order</p>

1/As defined in FED STD 4B Glossary of Fabric Imperfections.

2/ Evenness can be determined by comparing measurements of companion part OR by aligning parts and measuring difference in lengths as described below. Except for the collar, comparisons shall be inspected by extending the portions of the garments in parallel between two hands without stretching and inspecting for evenness. Where evenness defects are found, the garments shall be laid flat on a measuring surface and the difference in lengths recorded.

- Collar: Evenness shall be assessed by folding the collar at center back and align the collar halves at the setting seam to the front collar ends. Rounded front collar edges shall be compared for height, shape and curve.

- Sleeves shall be aligned from top of shoulder seam, smoothed down along sleeve crease to sleeve hem edge. The aligned sleeve lengths shall be visually inspected for evenness of sleeve lengths.

- Inseam shall be aligned with inseam along the top edge, starting from the center of the crotch seam along the inseam down to the trouser hem edge. The aligned trouser legs shall be inspected for evenness of the trouser legs.

- Outseam alignment shall be aligned by folding trousers in half width wise following the permanent press crease of the legs and aligning the top of the waistband. The aligned trouser legs shall be inspected for evenness of trouser length, and placement of companion knee patches and cargo pockets. The folded trouser shall be turned vertically to enable alignment of the bottom opening widths for comparison.

- Inseam/Outseam Length: While measuring inseam, the uniformity in length between inseam and outseam shall be inspected for evenness.

- Chest Pocket Alignment: With the blouse lying flat, a measuring device shall be extended between the inner pocket flap corners in a straight line following the grain of the fabric. When unevenness is found, measurements shall be taken in a vertical line from the shoulder seam to the upper pocket flap corner on both pockets and recorded.

3/ Parts suspected of being off shade shall be examined at a distance of 3 feet against a background of the other parts and colors of the garment. When the shade difference is discernable under these examination conditions, it shall be scored as a shade part.

4.4.8 Finished Garment Visual examination. The garment shall be inspected after it is gently smoothed by hand and lying flat. Defects are defined in paragraph 4.4.7 Table IX.

4.4.9 Finished dimensions (all types and classes). The finished and treated blouse and trouser shall conform to the dimensions listed in Table XIa through XIId.

**Table XIa. Unisex Blouse - Finished Measurement (inches)**

SIZE	XX-SHORT	X-SHORT	SHORT	REGULAR	LONG	X-LONG	XX-LONG	TOL.
<u>Half Chest 1/</u>								
X-Small	--	20-1/4	20-1/4	20-1/4	20-1/4	--	--	
Small	22-1/4	22-1/4	22-1/4	22-1/4	22-1/4	22-1/4	--	
Medium	24-1/4	24-1/4	24-1/4	24-1/4	24-1/4	24-1/4	24-1/4	± 3/4
Large	--	26-1/4	26-1/4	26-1/4	26-1/4	26-1/4	26-1/4	
X-Large	--	--	28-1/4	28-1/4	28-1/4	28 1/4	28 1/4	
XX-Large				--	30-1/4	--	30-1/4	
<u>Back Length 2/</u>								
X-Small	--	27	28	29-1/2	30-7/8	--	--	
Small	26-1/2	27-1/2	28-1/2	30	31-3/8	32-3/4	--	
Medium	27	28	29	30-1/2	31-7/8	33-1/4	34-5/8	± 3/4
Large	--	28-1/2	29-1/2	31	32-3/8	33-3/4	35-1/8	
X-Large		--	30	31-1/2	32-7/8	34 -1/4	35-5/8	
XX-Large			--	--	33-3/8	--	36-1/8	
<u>Sleeve Length 3/</u>								
X-Small	--	22-1/4	23-1/4	24-1/4	25-1/4	--	--	
Small	21-3/4	22-3/4	23-3/4	24-3/4	25-3/4	26-3/4	--	
Medium	22-1/4	23-1/4	24-1/4	25-1/4	26-1/4	27-1/4	28-1/4	± 3/4
Large	--	23-3/4	24-3/4	25-3/4	26-3/4	27-3/4	28-3/4	
X-Large		--	25-1/4	26-1/4	27-1/4	28 1/4	29 1/4	
XX-Large			--	--	27-3/4	--	29-3/4	
<u>Collar Width 4/</u> (all sizes)	2-3/8	2-3/8	2-3/8	2-3/8	2-3/8	2-3/8	2-3/8	± 1/8

The garment shall be buttoned and placed flat upon a table and measured as follows:

1/ Half Chest With blouse buttoned, measure from side seam folded edge to folded edge across blouse chest in line with pit of armhole (bottom of seam).

2/ Back Length Along center back measure from undercollar seam to bottom edge of blouse (in line with grain of fabric for straight line).

3/ Sleeve Length Fold sleeve along underarm seam, measure along folded edge of the top sleeve from the edge of the armhole sleeve to the bottom of the sleeve cuff.

4/ Collar Measure along center back of collar from setting seam to top of collar.

**Table XIb. Female Blouse- Finished Measurements (inches)**

SIZE	X-SHORT	SHORT	REGULAR	TOL.
<u>Half Chest 1/</u>				
32	21	21	-	
35	22-1/2	22-1/2	22-1/2	± 3/4

39	-	24	-	
<u>Back length 2/</u>				
32	25-7/8	26-7/8	-	± 3/4
35	26-1/4	27-1/4	28-3/4	
39	-	27-5/8	-	
<u>Sleeve length 3/</u>				
32	23-1/4	24-1/4	-	± 3/4
35	23-3/4	24-3/4	25-3/4	
39	-	25-1/4	-	
<u>Half Sweep 4/</u>				
32	22-1/2	22-1/2	-	± 3/4
35	24	24	24	
39	-	25-1/2	-	
<u>Shoulder 5/</u>				
32	16	16	-	± 1/2
35	16-3/4	16-3/4	16-3/4	
39	-	17-1/2	-	
<u>Collar Width 6/</u>	2-3/8	2-3/8	2-3/8	± 1/8

The garment shall be buttoned and placed flat upon a table and measured as follows:

- 1/ Half Chest With blouse buttoned, measure from side seam folded edge to folded edge across blouse chest in line with pit of armhole (bottom of seam).
- 2/ Back Length Measure along center back from undercollar seam to bottom edge of blouse (in line with grain of fabric for straight line).
- 3/ Sleeve Length Fold sleeve along underarm seam, measure along folded edge of the top sleeve from the edge of the armhole seam to the bottom of the sleeve cuff.
- 4/ Half Sweep measurement shall be taken with the blouse laid flat and measured straight across the bottom edge. Care must be taken to ensure the blouse is placed down flat and the facing is closed along the center front.
- 5/ Shoulder Measurement shall be taken straight across the shoulder seam, from armhole seam to armhole seam.
- 6/ Collar Measure along center back of collar from setting seam to top of collar.

**Table XIc. Unisex Trouser – Finished Measurement (inches) – Make sure table correlates to what Michael has (updated)**

SIZE	X-SHORT	SHORT	REGULAR	LONG	X-LONG	TOL.
<u>1/2 Waist - Relaxed 1/</u>						
X-Small; min – max	12	12	12	12	12	-1/4 +1/2
Small; min –max	14	14	14	14	14	
Medium; min – max	16	16	16	16	16	
Large; min – max	18	18	18	18	18	
X-Large; min – max	20	20	20	20	20	
XX-Large; min – max	---	22	22	22	22	
<u>1/2 Waist – Stretched 2/</u>						
X-Small; min	14	14	14	14	--	N/A
Small; min	16	16	16	16	16	
Medium; min	18	18	18	18	18	
Large; min	--	20	20	20	20	
X-Large; min	--	22	22	22	22	
XX-Large; min	--	--	24	24	24	
<u>Inseam: 3/</u>						
X-Small	28-3/4	30-3/4	32-3/4	34-3/4	--	± 3/4
Small	28-3/4	30-3/4	32-3/4	34-3/4	36-3/4	
Medium	28-3/4	30-3/4	32-3/4	34-3/4	36-3/4	
Large	--	30-3/4	32-3/4	34-3/4	36-3/4	
X-Large	--	30-3/4	32-3/4	34-3/4	36 3/4	
XX-Large	--	--	32 3/4	34-3/4	36 3/4	

<b>Outseam: 4/</b>						
X-Small						
Small	37-3/4	40-1/4	42-3/4	45-1/4	--	± 3/4
Medium	38-1/4	40-3/4	43-1/4	45-3/4	48-1/4	
Large	38-3/4	41-1/4	43-3/4	46-1/4	48-3/4	
X-Large	--	41-3/4	44-1/4	46-3/4	49-1/4	
XX-Large	--	42-1/4	44-3/4	47-1/4	49 3/4	
	--	--	45 1/4	47-3/4	50 1/4	
<b>Bottom: 5/</b>						
X-Small						
Small	17	17	17	17	--	± 1/2
Medium	17	17	17	17	17	
Large	17-3/4	17-3/4	17-3/4	17-3/4	17-3/4	
X-Large	--	17-3/4	17-3/4	17-3/4	17-3/4	
XX-Large	--	18-1/2	18-1/2	18-1/2	18 1/2	
	--	--	18 1/2	18-1/2	18 1/2	

The trouser shall be buttoned and placed flat upon a table and measured as follows:

1/ Half Waist Relaxed - With elastic inserts relaxed, measure along center of waistband from outside folded edge to folded edge.

2/ Half Waist Stretched. - Rotate ½ waist so that elastic is in the approximate center to prevent the hands or stretching device from restricting the elastic from fully elongating. Stretch waist until fully extended without excessive force, measure along center of waistband from outside folded edge to folded edge.

3/ Inseam - Measure inseam of trousers from center of crotch seam to bottom edge of trouser leg.

4/ Outseam - Measure from top edge of waist to bottom of leg along outseam.

5/ Bottom - Measure across bottom of leg, multiply by two.

**Table XIId. Female Trouser- Finished Measurements (inches)**

SIZE	X-SHORT	SHORT	REGULAR	TOL.
<u>1/2 Waist – Relaxed 1/</u>				
24	12	12	-	- ¼
28	13 1/2	13 1/2	13 1/2	+ ½
32	15	15	-	
<u>1/2 Waist – Stretched 2/</u> (minimum)				
24	14	14	-	N/A
28	15-1/2	15-1/2	15-1/2	
32	17	17	-	
<u>½ Seat: 3/</u>				
24	19-3/4	19-3/4	-	± 3/4

28	21-3/4	21-3/4	21-3/4	
32	22-3/4	22-3/4	-	
<u>Inseam: 4/</u>				
24	30	32	-	± 3/4
28	30	32	34	
32	30	32	-	
<b>SIZE</b>	<b>X-SHORT</b>	<b>SHORT</b>	<b>REGULAR</b>	<b>TOL.</b>
<u>Outseam: 5/</u>				
24	39-1/8	41-5/8	-	± 3/4
28	39-1/2	42	44-1/2	
32	39- 7/8	42-3/8	-	
<u>Bottom: 6/</u>				
24	16-1/4	16-1/4	-	± 1/2
28	16-1/4	16-1/4	16-1/4	
32	17	17	-	

The garment shall be buttoned and placed flat upon a table and measured as follows:

1/ Half Waist Relaxed - With elastic inserts relaxed, measure along center of waistband from outside folded edge to folded edge.

2/ Half Waist Stretched - Rotate ½ waist so that elastic is in the approximate center to prevent the hands or stretching device from restricting the elastic from fully elongating. Stretch waist until fully extended without excessive force, measure along center of waistband from outside folded edge to folded edge.

3/ Seat - With trousers laid flat on table, measure from folded edge to folded edge 1” above cargo pocket flap.

4/ Inseam - Measure inseam of trousers from center of crotch seam to bottom edge of trouser leg.

5/ Outseam - Measure from top edge of waist to bottom of leg along outseam.

6/ Bottom - Measure across bottom of leg. Multiply by two.

4.4.10 End Item Acceptance Testing. Both the blouse and trouser shall be tested for the physical characteristics as outlined in Table II, and fabric and seam appearance smoothness and crease retention specified in 3.3.1.8. Garments shall be randomly sampled. The garments shall be cut in half where ½ of the garment shall be tested for fabric and seam appearance smoothness and crease retention after laundering while the other ½ of the garment shall be utilized to obtain specimens for destructive physical property characterization specified in Table II. Seconds can be utilized for destructive end item testing. Testing shall be performed as specified in 4.4.6.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or purchase order (see 6.2). When actual packaging of material is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are

maintained by the Inventory Control Point's packaging activity within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Permethrin Packaging. Every box containing permethrin treated uniforms must be labeled according to EPA requirements as stated in Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). (See paragraph 2.2.2)

## 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 blouse and trouser are for wear by military personnel of the United States Marine Corps as a combat utility uniform in garrison and combat missions: Type I in woodland environments, Type II in desert environments for Garment Types I and II. Type III fabric is reversible woodland/desert print fabric for use in helmet covers. Type IV and V fabrics are used for as alternate pocketing material.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this document.
- b. Types, classes and sizes required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- d. When first article sample is required (see 3.1, 4.2 and 6.3).
- e. Packaging requirements (see 5.1).
- f. Inspection level (see 4.1 and 4.3)

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209-4. 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 include specific instructions in all acquisitions documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Subject term (key word) listing.

Uniform  
Clothing  
Desert  
Insect Protection  
Permanent press  
Permethrin  
Utility  
Woodland  
Wrinkle Free

6.5 Figures. See attached Figures 1 – 18. Update with new figures

- Figure 1. Blouse, Front View
- Figure 2. Blouse, Back View
- Figure 3. Blouse, Inside View
- Figure 4. Blouse, Breast Pocket Finished Dimensions and Eagle, Globe, and Anchor Positioning
- Figure 5. Blouse, Sleeve Buttonhole Placement
- Figure 6. DELETED
- Figure 7. Blouse Sleeve Pocket Construction
- Figure 8. Trousers, Front View
- Figure 9. Trousers, Back View
- Figure 10. Trouser Standard Waistband and Fly Construction, Bartack Positions
- Figure 11. Alternate Waistband and Fly Construction Bartack Positions
- Figure 12. Trouser Cargo Pocket Construction
- Figure 13. Trouser Hip Pocket Flap Construction Cargo Pocket Flap Construction
- Figure 14. Collar Shape
- Figure 15. Blouse, Class 3 (only), Permethrin Label placement
- Figure 16. Trouser, Class 4, Label placement Alternate Waistband
- Figure 17. Test Specimen, % Bite Protection Test
- Figure 18. Alternate Construction, Marine Corps Exclusive Label

6.6 Size Abbreviation. The size abbreviation on the blouse's USMC woven label shall show the combination of one of each of the following size and length abbreviations shown below. The combination of the two elements shall be designated as Size –(hyphen) Length; for example Small Regular abbreviated designation is Sm-Reg, Xsmall Xshort abbreviated designation is XS- XS etc.

<u>Size</u>	<u>Size Abbreviation</u>	<u>Length</u>	<u>Length Abbreviation</u>
X-Small	as XSm	XX-Short	as XXSht
Small	as Sm	X-Short	as XSht
Medium	as Med	Short	as Sht
Large	as Lg	Regular	as Reg
X-Large	as XLg	Long	as Lng
XX-Large	as XXLg	X-Long	as XLng
		XX-Long	as XXLng

6.7 Blouse Size/Identification/Care Label Example:

**Medium - X-Short**

Height: 59 to 63 in.

Chest: 37 to 41 in.

Stock No: 8415 01 484 5933

Blouse, Woodland MARPAT TM (typed as trademark) Camouflage, MCCUU

50% Cotton/50% Nylon

U. S. Patent Nos. D464.790 & D491.372

CONTRACT #: DAAD16-01-D-9999

Apparel USA

---

1. **Washing:** Machine wash using Permanent Press Cycle or Hand wash using mild detergent that does NOT contain optical brighteners. Rinse completely.

DO NOT USE CHLORINE BLEACH

2. **Drying:** Tumble dry and remove immediately from dryer. To drip dry, remove from water and place on hanger.

3. **Ironing:** Light ironing if needed.

DO NOT STARCH or COMMERCIALY HOT PRESS.

6.8 Trouser Identification/Care Label Example:

Trouser, Woodland MARPAT TM (typed as trademark) Camouflage, MCCUU

50% Cotton/50% Nylon

U. S. Patent Nos.

CONTRACT #: DAAD16-01-D-9999

---

1. **Washing.** Machine wash using Permanent Press Cycle or Hand wash using mild detergent that does NOT contain optical brighteners. Rinse completely.

DO NOT USE CHLORINE BLEACH

2. **Drying:** Tumble dry and remove immediately from dryer. To drip dry, remove from water and place on hanger.

3. **Ironing:** Light ironing if needed.

DO NOT STARCH or COMMERCIALY HOT PRESS.

6.9 Insect Protection Label. Example of a labels approved by EPA for Type I and II garments is included in EPA web site at: <http://oaspub.epa.gov/pestlabl/ppls.home> and as shown

below:

**PRODUCT BRAND NAME  
INSECT REPELLENT APPAREL**

**Refer to tag for more information.**

**BLOUSE, DESERT, MARPAT TM  
CAMOUFLAGE, MCCUU**

**PERMETHRIN CONTRACT No. :  
COMPANY NAME (APPLIER):  
PRODUCT NAME:  
EPA REG. NO. :  
EPA EST. NO. :**

- 
- **Do Not Dry Clean,  
Dry Cleaning removes active ingredient.**
  - **Wash separately from other clothing.**
  - **Do Not Re-treat with a permethrin product.**
  - **Dispose of garment in trash.**

Repels mosquitoes, ticks, ants, flies, chiggers, and midges.

Repellency remains effective for 25 washings

ACTIVE INGREDIENT:	%W/W
Permethrin.....	0.52%
OTHER INGREDIENTS: (GARMENT).....	99.48%
TOTAL.....	100.00%

It is a violation of Federal Law to use this product  
in a manner inconsistent with its labeling.

Retain hangtag for future reference on proper handling  
of this garment.

6.10 Approved EPA Permethrin Registrations. Permethrin treatment operation for the subject uniforms shall be EPA registered (Such as EPA Registrations shown at EPA web site at: <http://oaspub.epa.gov/pestlabl/ppls.home>)

NOTE: EPA registration does not certify that the permethrin treatment meets the MCCUU specification requirements.

6.11 Percent Bite Protection. The following facilities are known to perform percent bite protection testing in conformance with 4.4.6.6:

Aedes aegypti and Anopheles albimanus:

United States Department of Agriculture  
Center for Medical, Agricultural and Veterinary Entomology  
Agricultural Research Service  
1600 SW 23<sup>rd</sup> Dr  
Gainesville, FL 32608  
POC: Dr. Ulrich R. Bernier/Research Chemist Mosquito and Fly Research

Ph: 352-374-5917

6.12 Insect Protection Label. Example of a labels approved by EPA for garment Type I and II is included in EPA web site at: <http://oaspub.epa.gov/pestlabl/ppls.home> and as shown below:

**PRODUCT BRAND NAME  
INSECT REPELLENT APPAREL**

**Refer to tag for more information.**

**BLOUSE, DESERT, MARPAT™  
CAMOUFLAGE, MCCUU**

**PERMETHRIN CONTRACT No. :  
COMPANY NAME (APPLIER):  
PRODUCT NAME:  
EPA REG. NO. :  
EPA EST. NO. :**

- 
- **Do Not Dry Clean,  
Dry Cleaning removes active ingredient.**
  - **Wash separately from other clothing.**
  - **Do Not Re-treat with a permethrin product.**
  - **Dispose of garment in trash.**

**Repels mosquitoes.  
Repellency remains effective for 25 washings**

<b>ACTIVE INGREDIENT:</b>	<b>%W/W</b>
Permethrin.....	0.52%
<b>OTHER INGREDIENTS: (GARMENT)...</b>	<b>99.48%</b>
<b>TOTAL.....</b>	<b>100.00%</b>

**It is a violation of Federal Law to use this product  
in a manner inconsistent with its label**

**Retain hangtag for future reference on proper handling  
of this garment.**

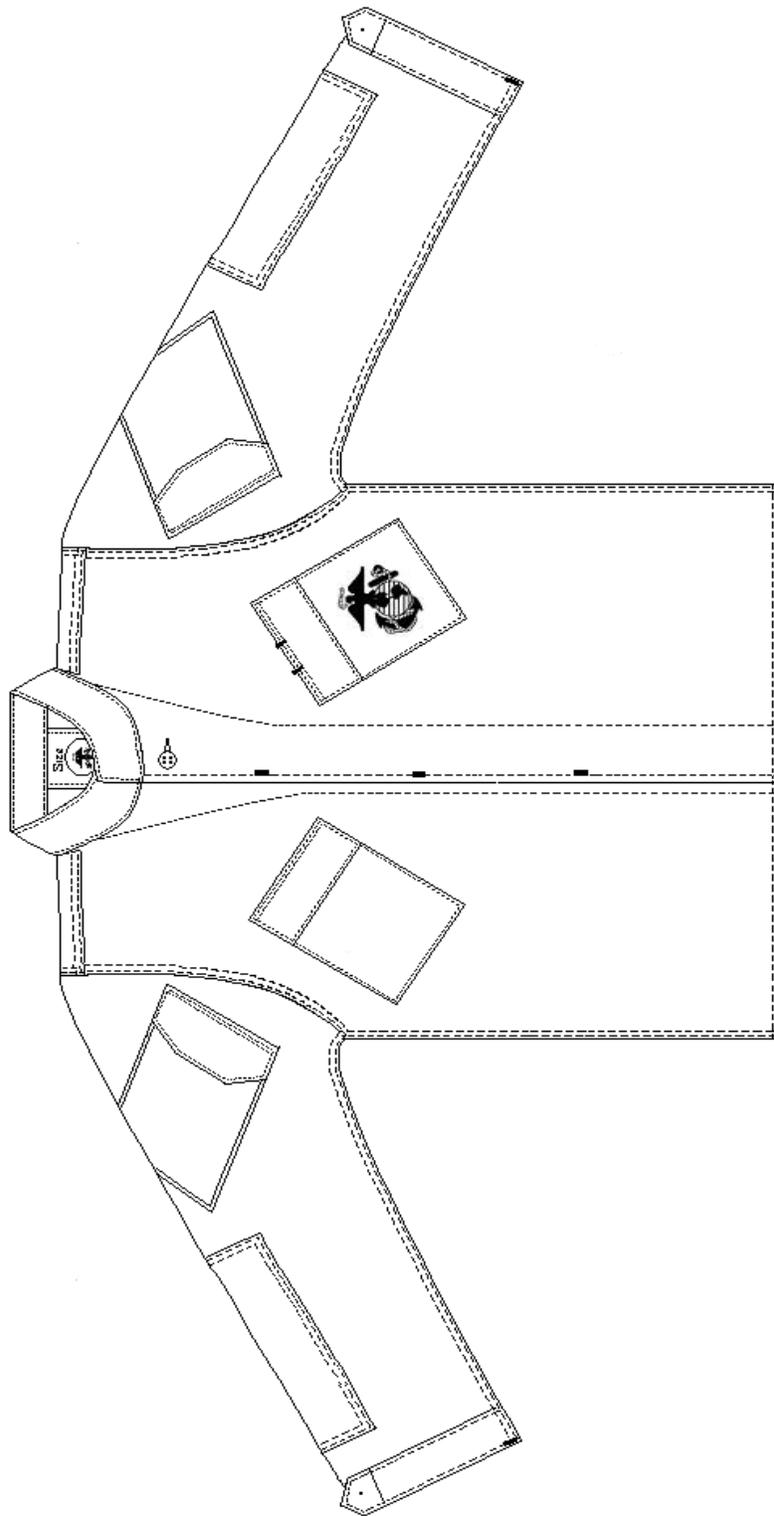
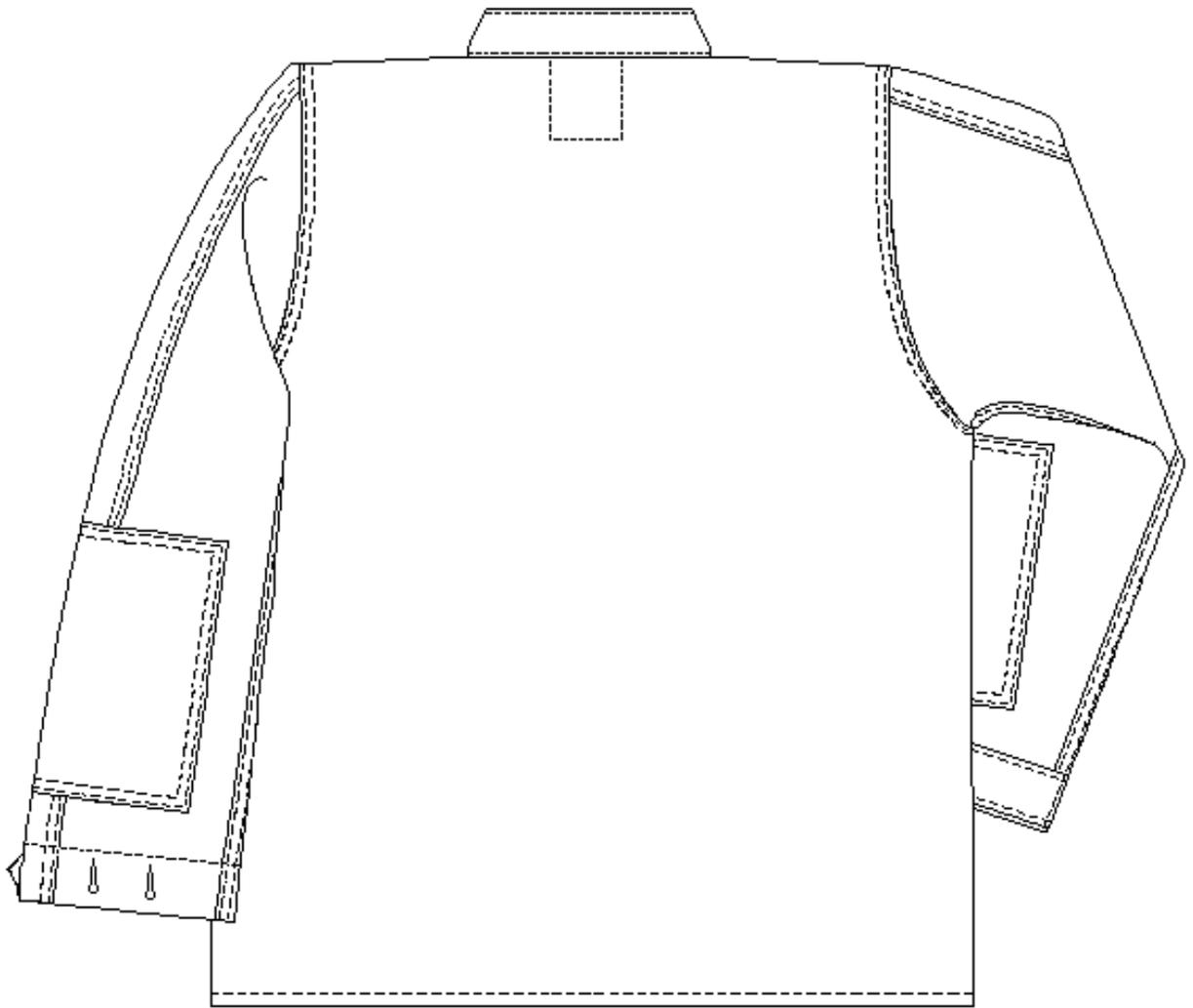
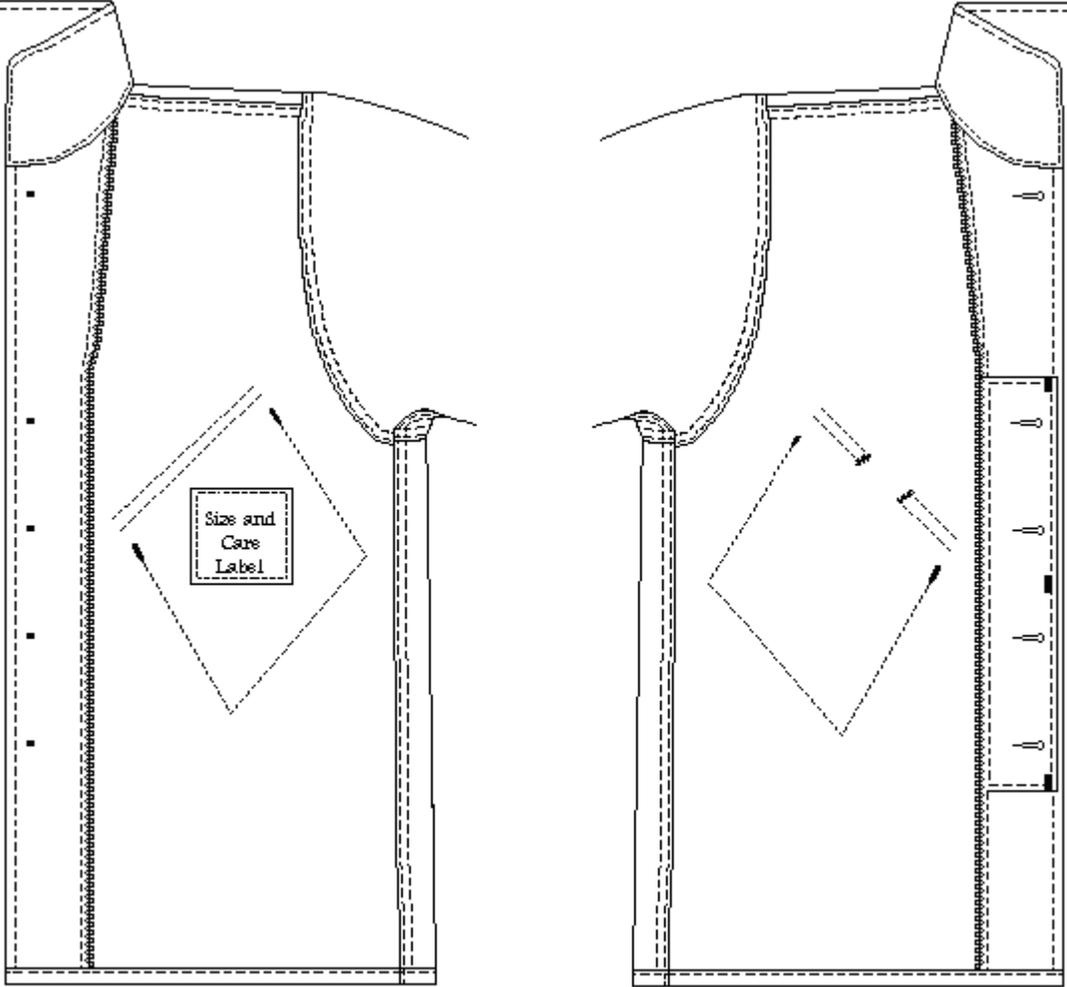


FIGURE 1.  
Blouse, Front View



**FIGURE 2.**  
Blouse, Back View

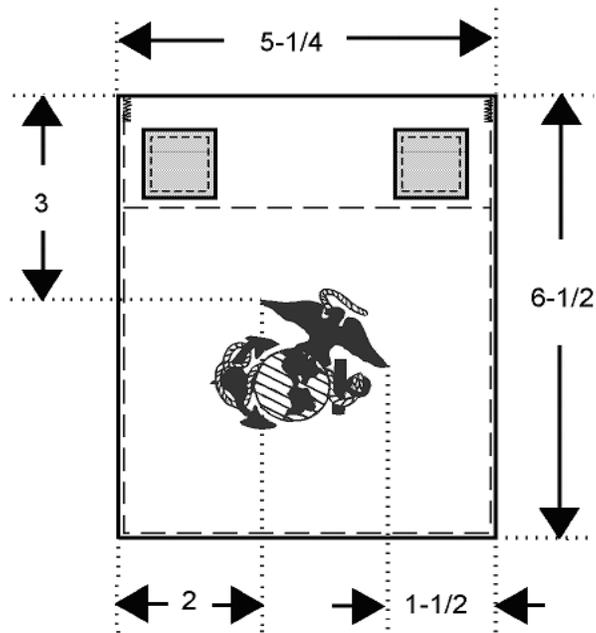


Right

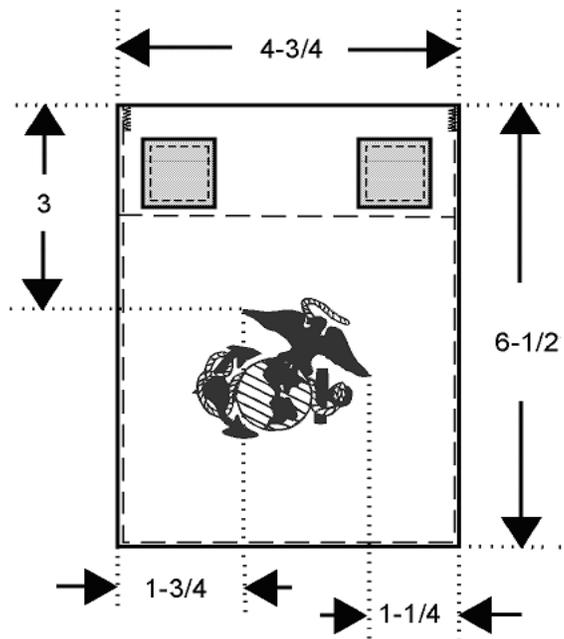
Left

**FIGURE 3**  
Blouse, Inside View

ALL MEASUREMENTS ARE IN INCHES  $\pm 1/8$  INCHES

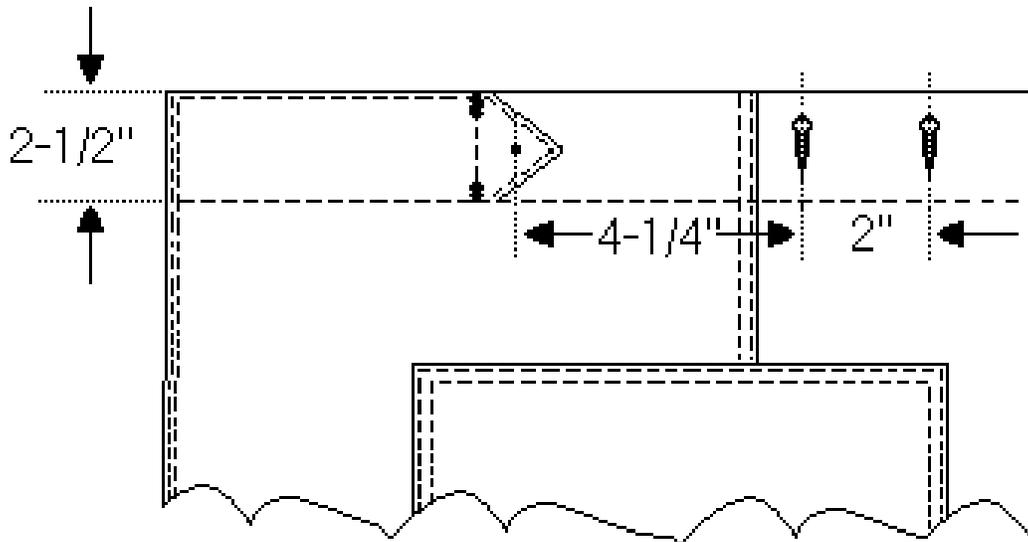


**Breast pocket Sizes**  
Unisex: Small to X-X-Large  
Female: 35 and 39



**Breast pocket Sizes**  
Unisex: X-Small  
Female: 32

**FIGURE 4.**  
Blouse  
Breast Pocket Finished Dimensions and  
Eagle, Globe, and Anchor Positioning

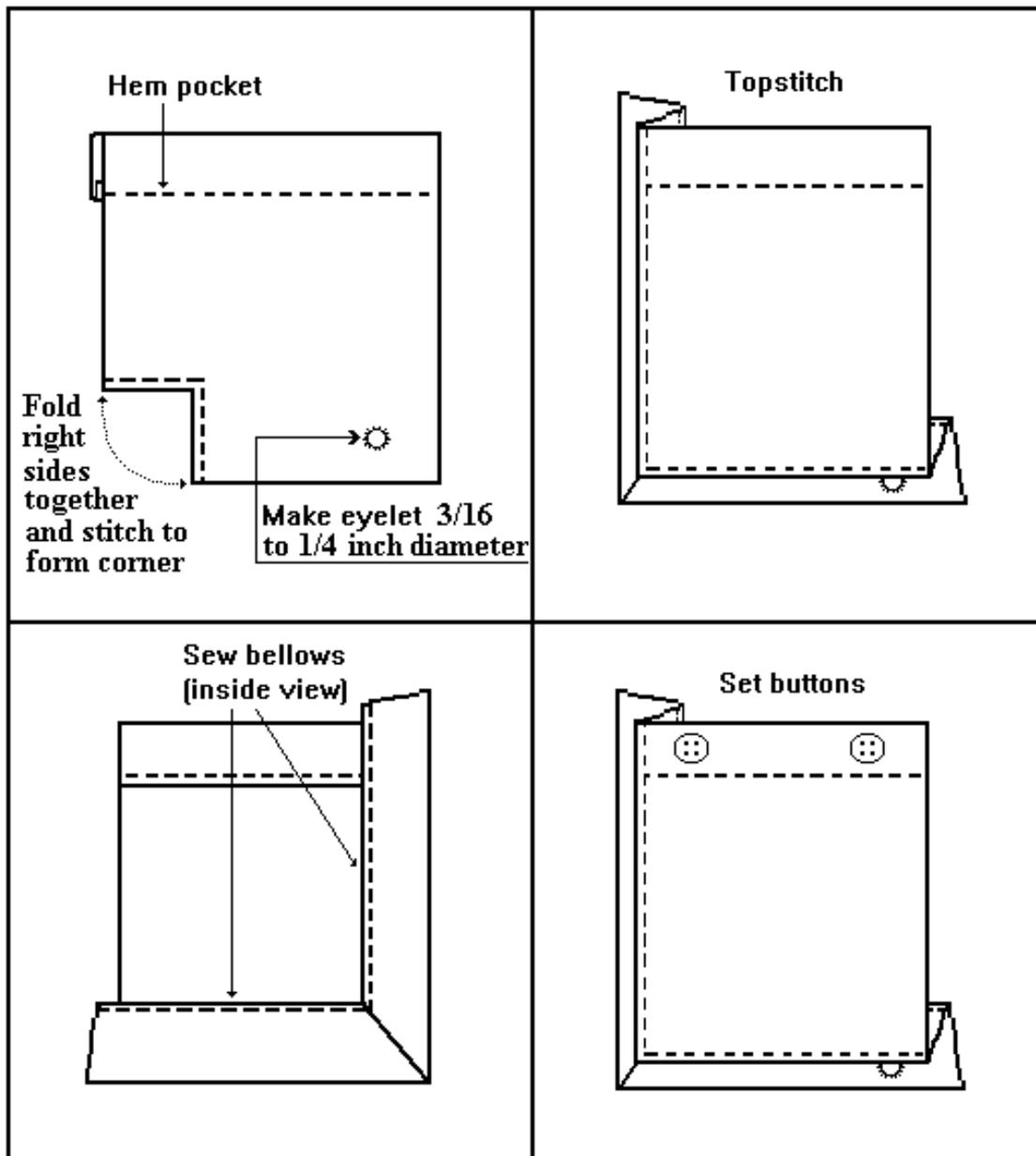


1. One buttonhole shall be aligned with button positioned on underside of sleeve tab.  
(Note: Buttonhole is hidden under tab in this figure)
2. Second Buttonhole shall be positioned  $4\text{-}1/4 \pm 1/8$  inches from the center of first buttonhole.
3. Third Buttonhole shall be  $2 \pm 1/8$  inches from the center of the second buttonhole.
4. All Buttonholes shall be positioned with cut opening  $1\text{-}1/8 \pm 1/8$  inches from bottom edge of sleeve.

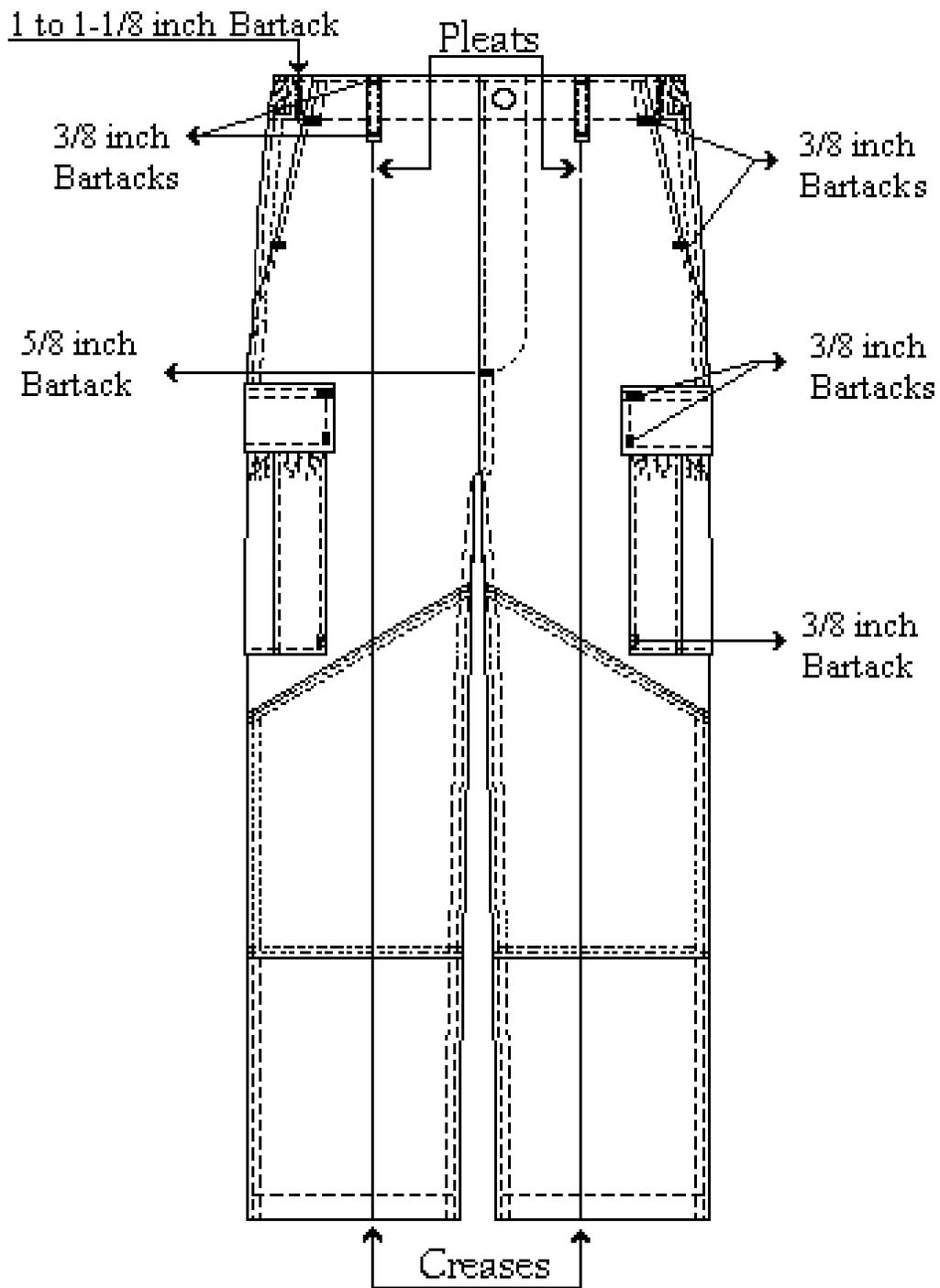
NOTE: All measurements in figure are in inches with a  $\pm 1/8$  inch tolerance.

**FIGURE 5.**  
Blouse, Sleeve Buttonhole Placement

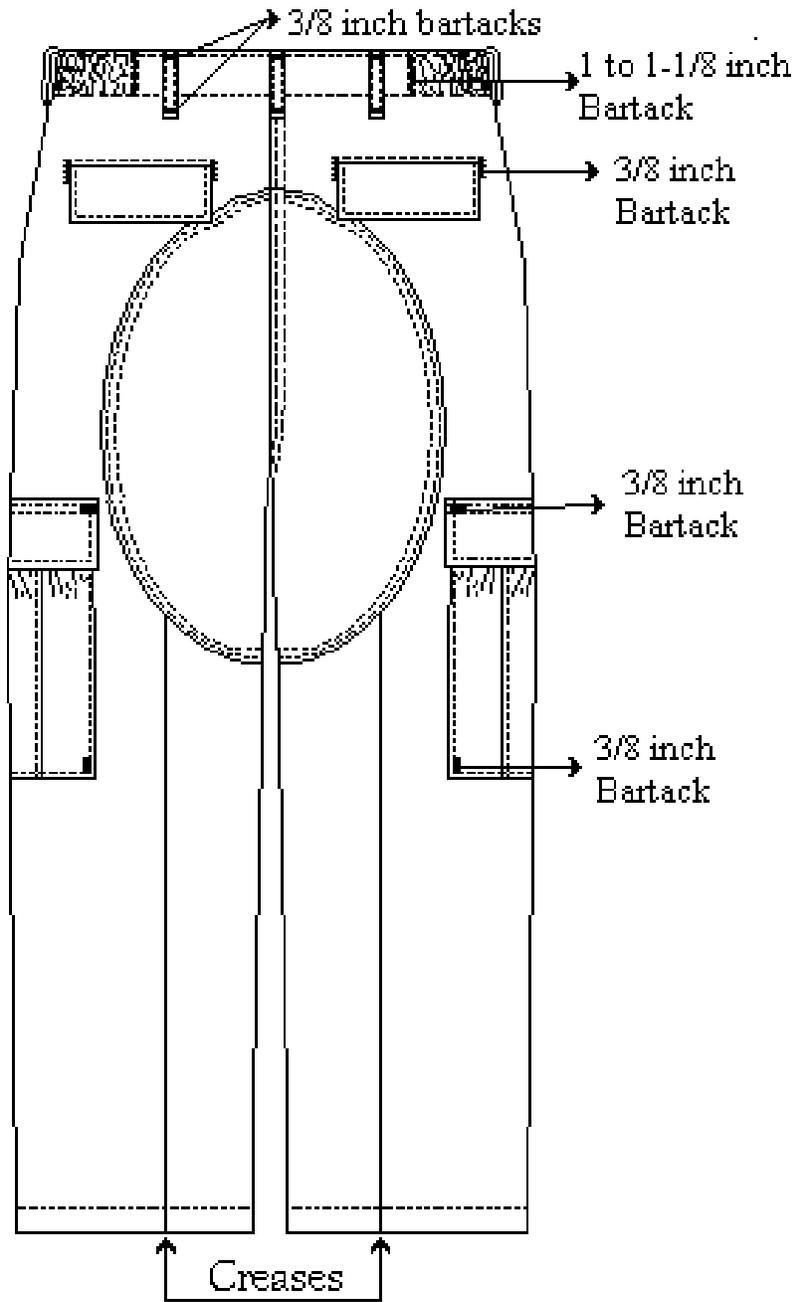
Figure 6 Deleted Without Replacement



**FIGURE 7**  
Blouse  
Sleeve Pocket Construction

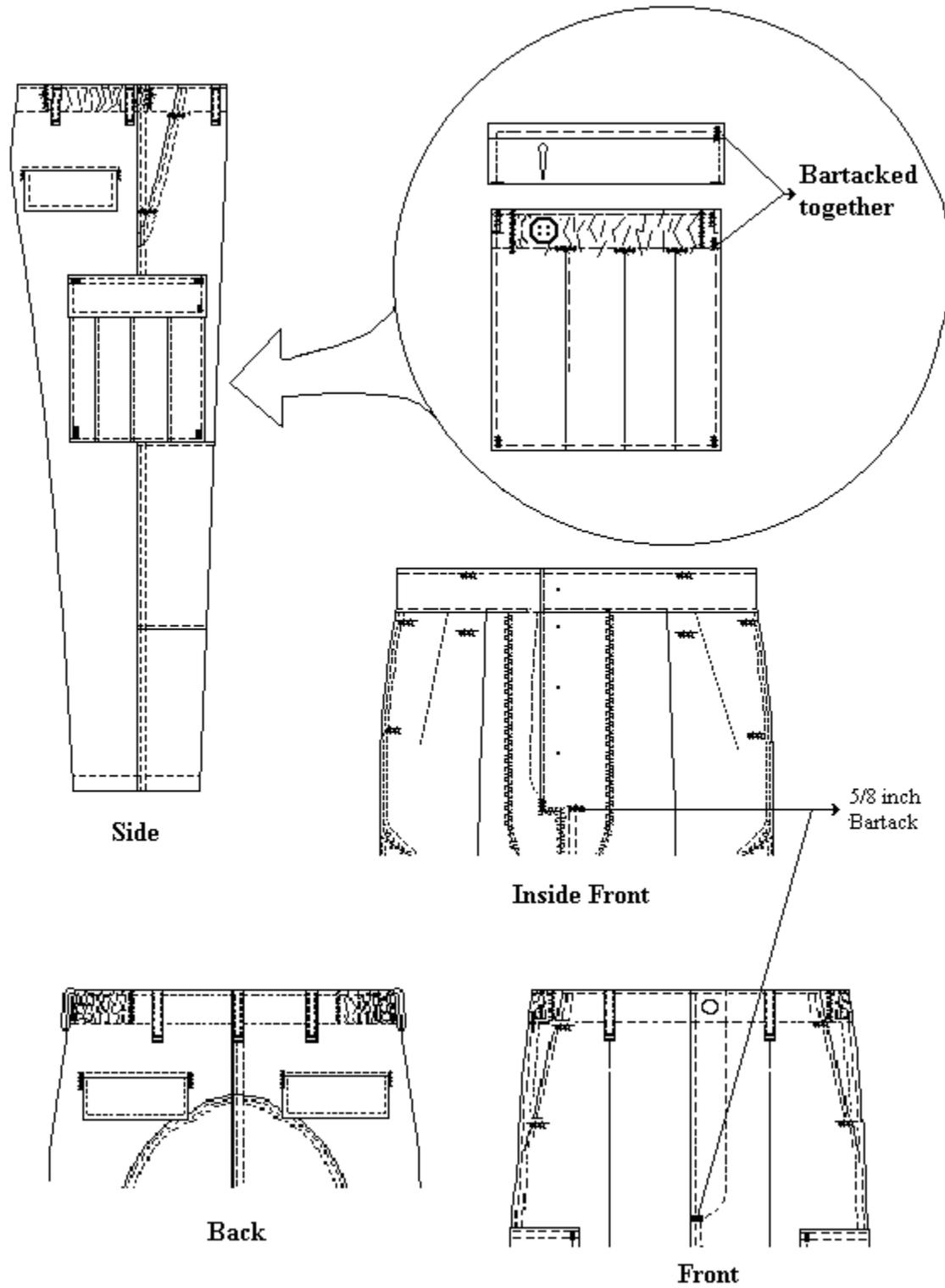


**FIGURE 8.**  
Trousers, Front View



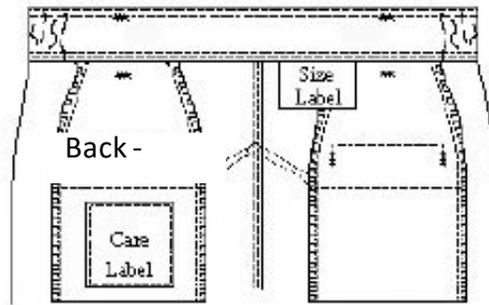
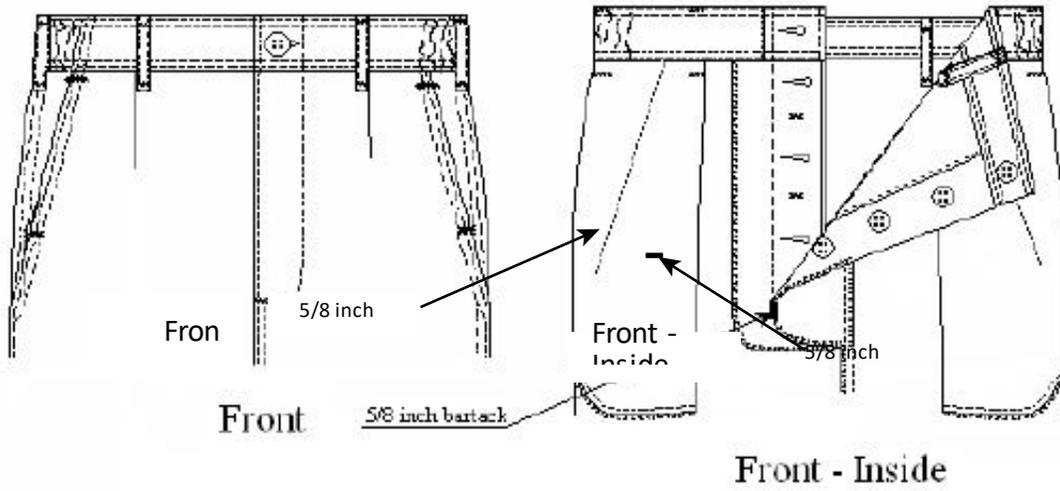
**FIGURE 9.**  
Trousers, Back View

FIGURE 10  
Trousers, Standard Waistband and Fly Construction and Bartack Locations



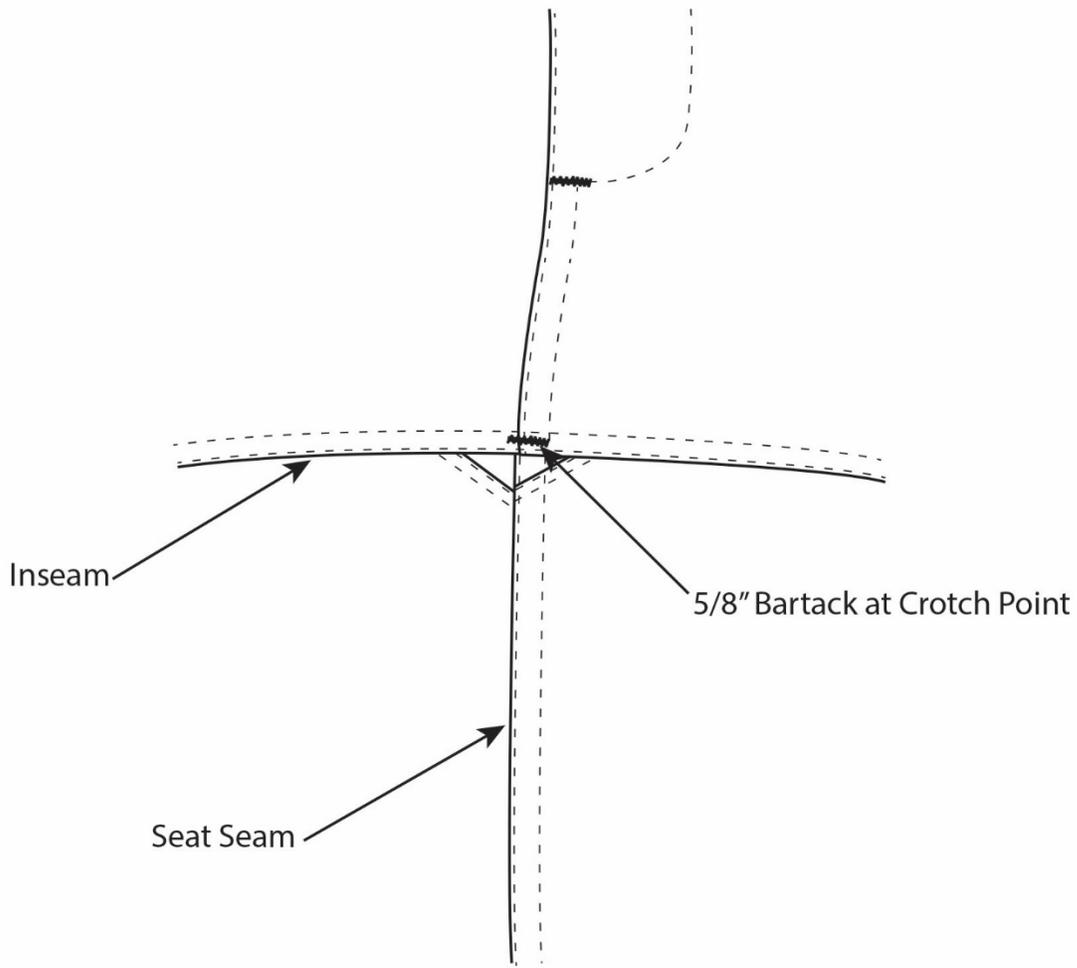
**FIGURE 10a.**

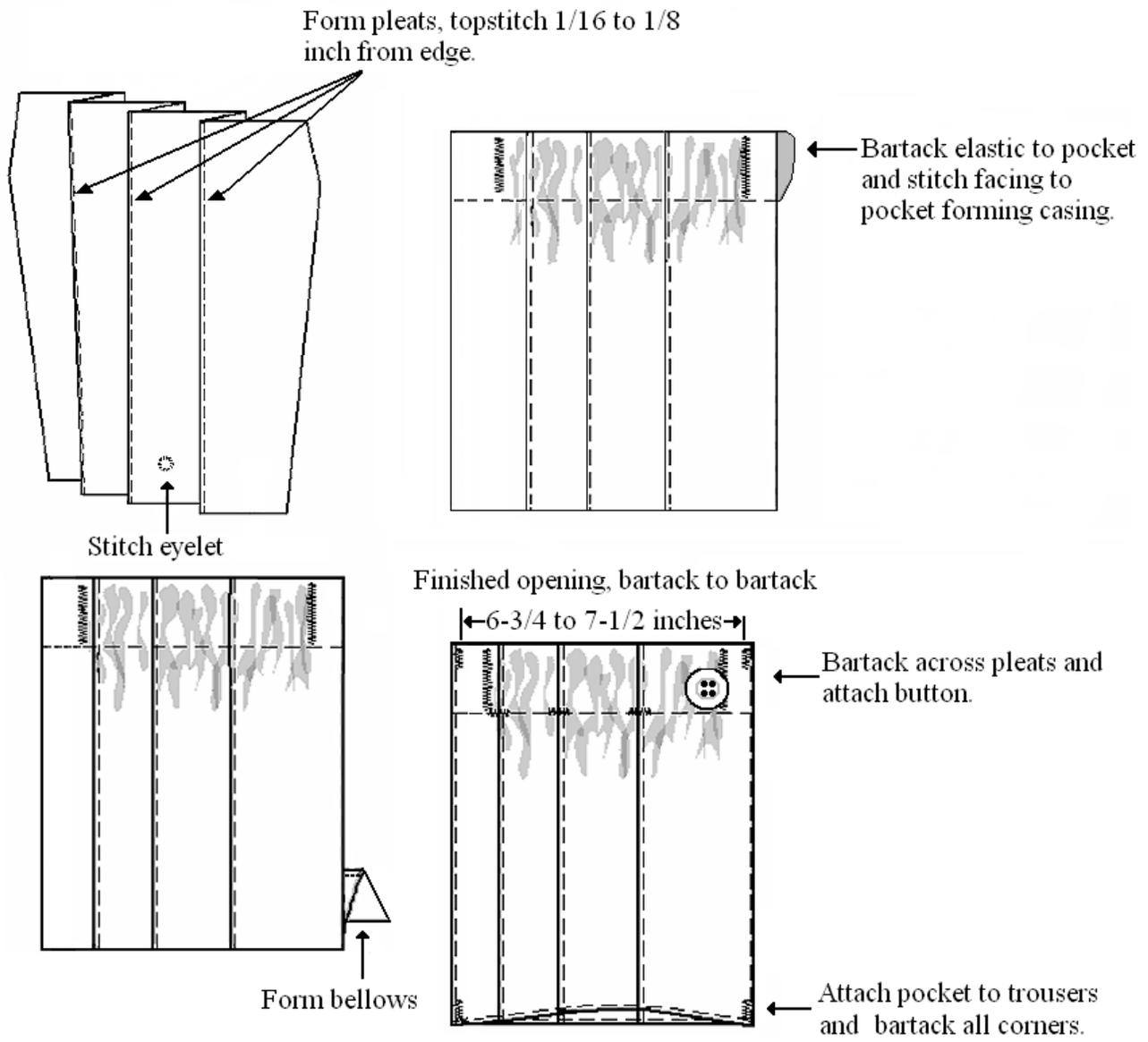
Trouser, Standard Waistband and Fly Construction and Bartack Locations



**Back- Inside**

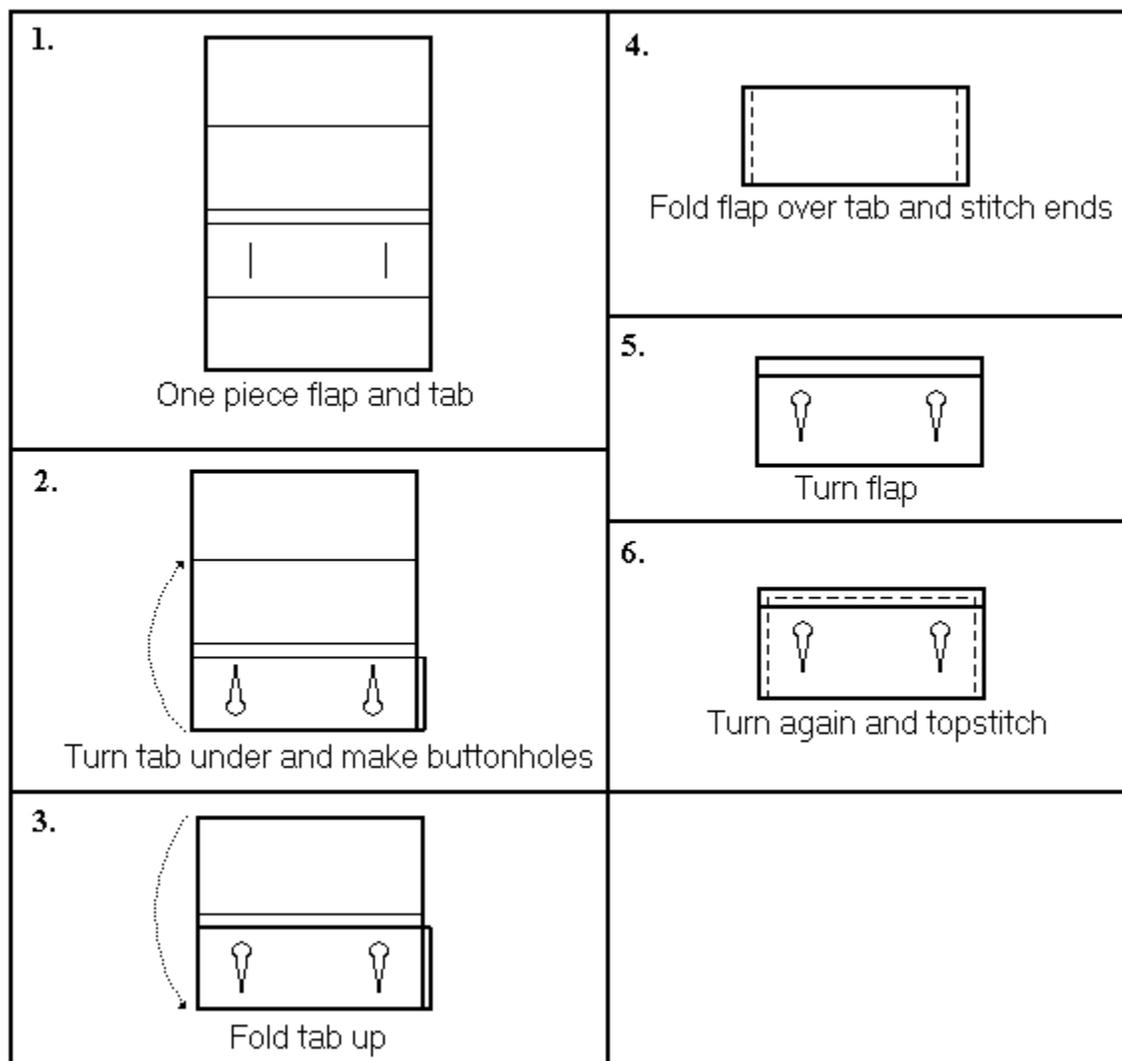
FIGURE 11.  
Trousers  
Alternate Waistband and Fly Construction  
Bartack Positions





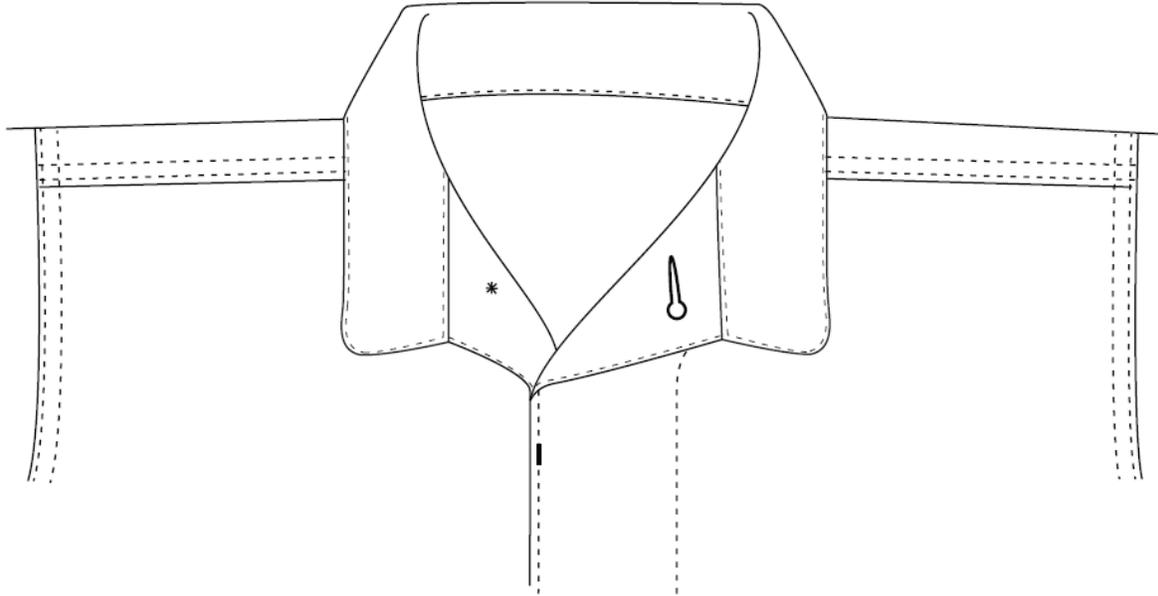
**FIGURE 12.**  
Trousers, Cargo Pocket Construction

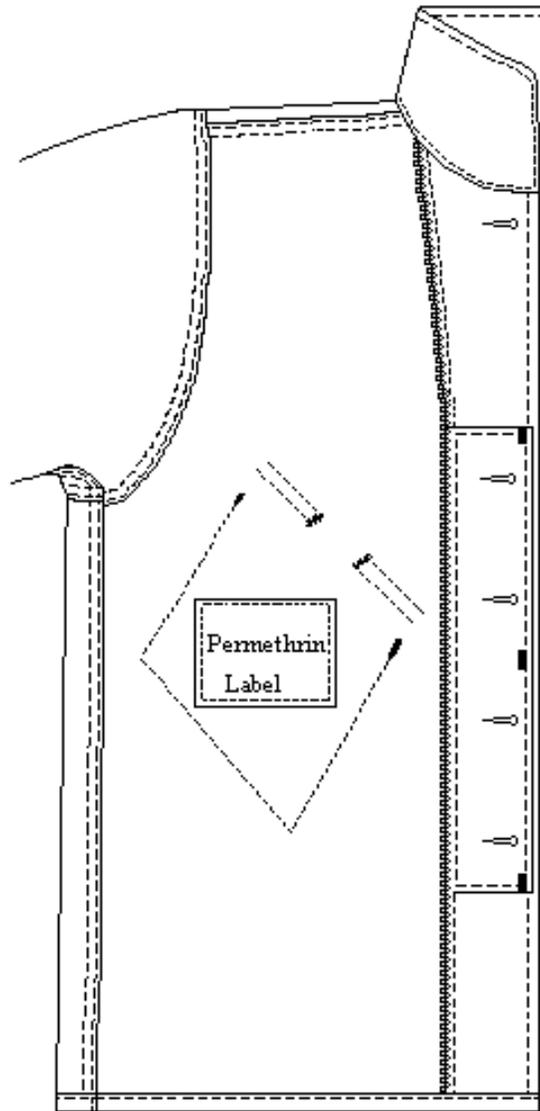




**FIGURE 13.**  
 Trousers  
 Hip Pocket Flap Construction  
 Cargo Pocket Flap Construction (except only one buttonhole)

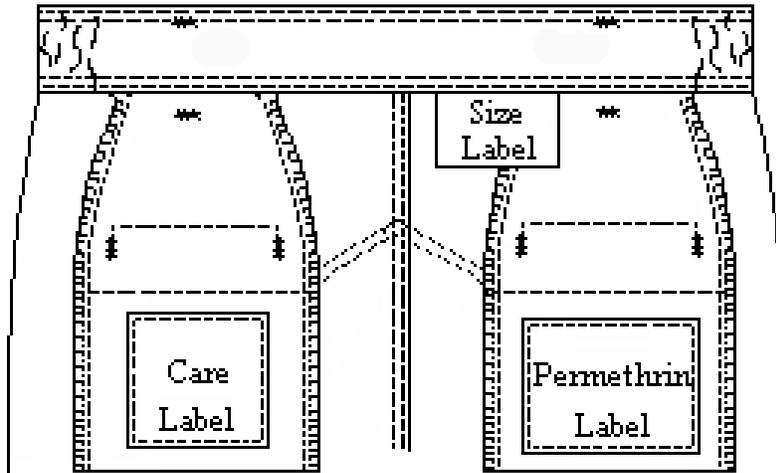
**Figure 14. Collar Shape**





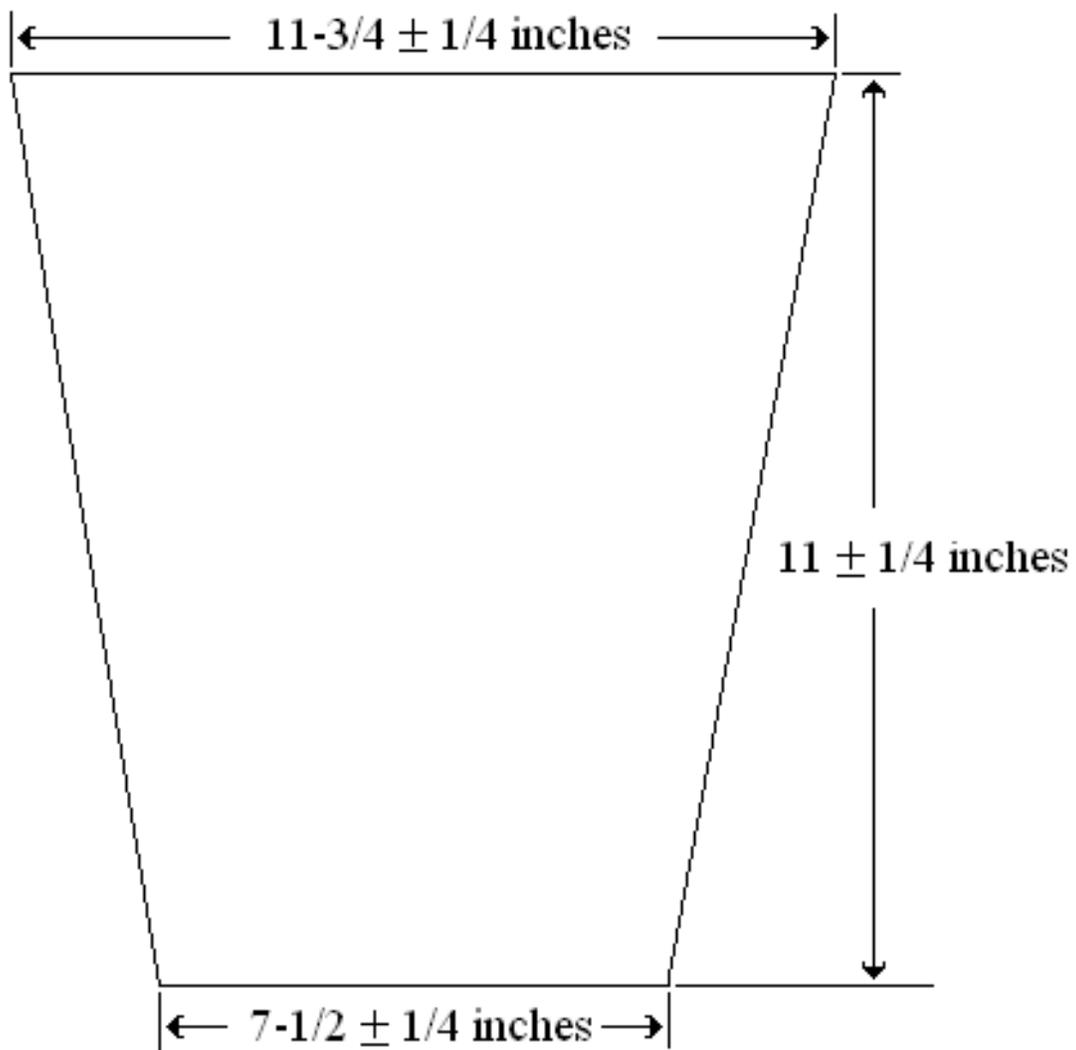
Inside Blouse – Left side

**FIGURE 15**  
Blouse, Garment Type I  
Permethrin Label placement

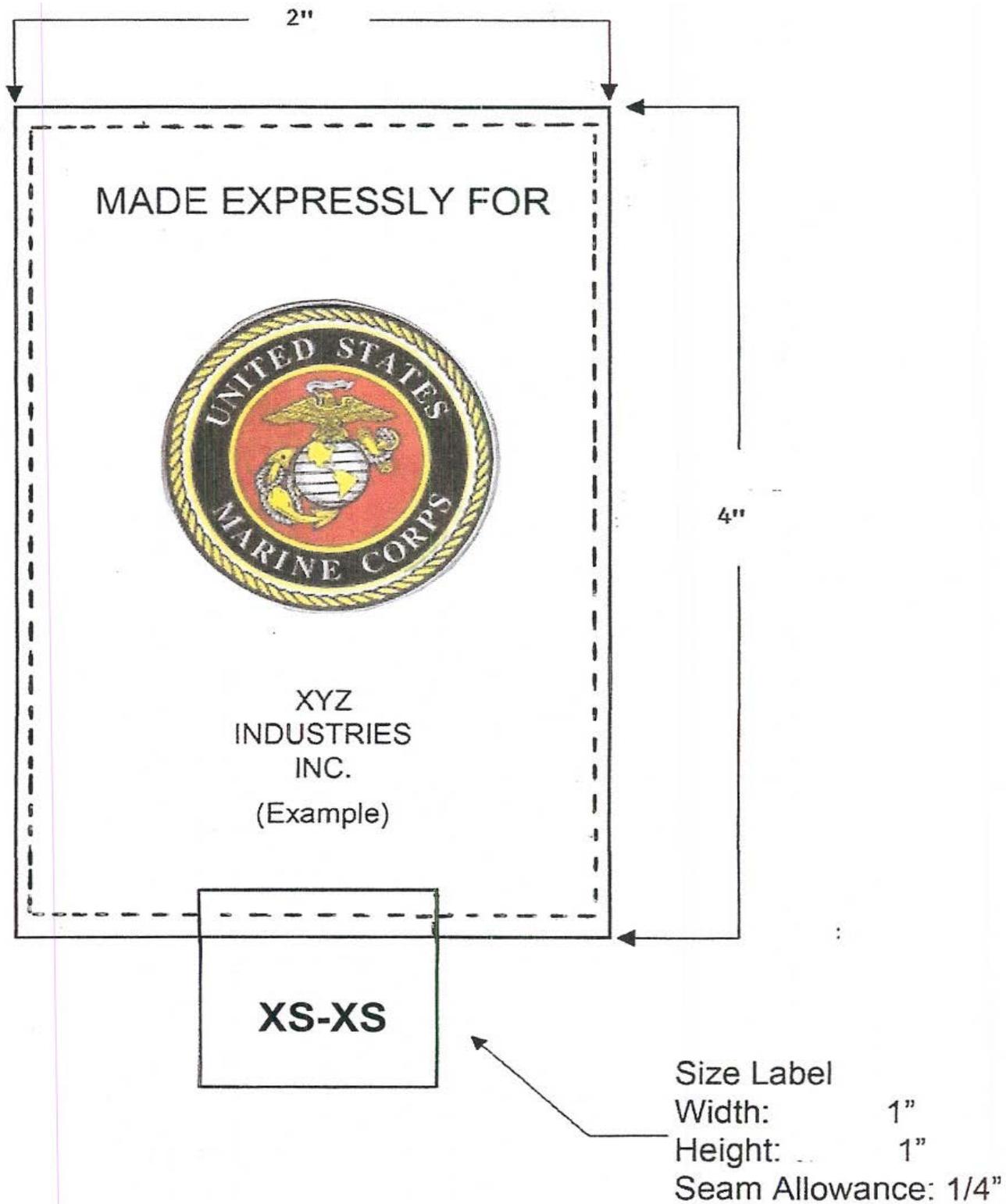


## Back- Inside

**FIGURE 16.**  
Trousers, Garment Type II, Label placement  
Alternate Waistband



**FIGURE 17.**  
Test Specimen,  
% Bite Protection Test



**Figure 18**  
Alternate Construction,  
Marine Corps Exclusive Label