

INCH-POUND

GL-PD-14-04A  
27 February 2015  
SUPERSEDING  
GL-PD-14-04  
14 October 2014

## PURCHASE DESCRIPTION

### COAT, ARMY COMBAT UNIFORM

This purchase description is approved for use by DLA Troop Support and is available for use by all Departments and Agencies of the Department of Defense (DoD).

#### 1. SCOPE

1.1 Scope. This Purchase Description covers the requirements for unisex and female combat coats to be worn by Army personnel.

1.2 Classification. The coat will be of the following types, styles, classes and sizes as specified.

##### 1.2.1 Types.

Type I - 50/50 Nylon/Cotton Ripstop  
Type II - 65/25/10 Rayon/Para-Aramid/Nylon Ripstop Flame Resistant  
Type III - Flame Resistant Cloth Ripstop

##### 1.2.2 Styles.

Style A - Unisex  
Style B - Female

##### 1.2.3 Classes.

Class 1 - Untreated  
Class 2 - Permethrin Treated

Comments, suggestions, or questions on this document should be addressed to: US Army Natick Soldier Research, Development and Engineering Center, Attn: RDNS-SEW-EWC, 15 Kansas Street, Natick, MA 01760-5019.

1.2.4 Sizes. The coat sizes will be as follows:

STYLE A. UNISEX SCHEDULE OF SIZES					
X-Small	Small	Medium	Large	X-Large	XX-Large
XX-Short	XX-Short	XX-Short	XX-Short	XX-Short	----
X-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	X-Long
----	----	XX-Long	XX-Long	XX-Long	XX-Long

STYLE B. FEMALE SCHEDULE OF SIZES			
30	33	36	39
X Short	X Short	X Short	----
Short	Short	Short	Short
Regular	Regular	Regular	Regular
----	Long	Long	Long
----	----	X Long	X Long

## 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 of documents cited in sections 3, 4, or 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 SPECIFICATIONS

V-B-871 - Button, Sewing, Hole and Button Staple (plastic)

#### FEDERAL STANDARDS

FED-STD-4 - Glossary of Fabric Imperfections

## COMMERCIAL ITEM DESCRIPTIONS

- A-A-50198 - Thread, Gimp, Cotton, Buttonhole
- A-A-50199 - Thread, Polyester Core, Cotton or Polyester-Covered
- A-A-55126 - Fastener Tape, Hook and Loop, Synthetic
- A-A-55195 - Thread, Para-Aramid, Spun, Intermediate Modulus
- A-A-55217 - Thread, Aramid, Spun Staple
- A-A-55634 - Zippers (Fasteners, Slide Interlocking)

## DEPARTMENT OF DEFENSE SPECIFICATIONS

- MIL-C-44296 - Cloth, Fusible
- MIL-DTL-32075 - Label: For Clothing, Equipment, and Tentage (General Use)
- MIL-DTL-44411 - Insect Repellent, Permethrin
- MIL-DTL-44436 - Cloth, Camouflage Pattern, Wind Resistant Poplin, Nylon/Cotton Blend
- MIL-PRF-5038 - Tape, Textile and Webbing, Textile, Reinforcing Nylon

(Copies of these documents are available online at <https://assist.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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.

## ENVIRONMENTAL PROTECTION AGENCY (EPA)

Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)  
(40 CFR Part 162) State Registration of Pesticide Products

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 are available online at <http://www.epa.gov/pesticides> or from the Environmental Protection Agency, 1200 Pennsylvania Avenue, N.W., Washington, DC 20460)

## FEDERAL ACQUISITION REGULATIONS (FAR)

52.209-4 – First Article Approval – Government Testing

(Copies are available online at <http://acquisition.gov/far/index.html> or by contacting the Superintendent of Documents at 202-512-1800.)

#### PURCHASE DESCRIPTIONS

CO-PD 06-05	Patch and Brassard, Identification, Infrared Retroflective
GL-PD 07-12	Cloth, Flame Resistant
GL-PD 10-08	Patch Kit, Integrated, Flame Resistant (IPK)

(Copies of documents are available through the contracting activity.)

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.

#### AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Test Method 81	- pH of the Water-Extract from Wet Processed Textiles
AATCC Test Method 135	- Dimensional Changes of Fabrics After Home Laundering

(Copies of documents are available online at <http://www.aatcc.org> or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

#### AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4	- Sampling Procedures and Tables for Inspection of Attributes
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(Copies are available online at <http://www.asq.org> or from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

#### ASTM INTERNATIONAL

ASTM D 5034	- Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D 6193	- Standard Practice for Stitches and Seams

(Copies of documents are available online at <http://www.astm.org> or from the ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19426-2959.)

#### OTHER PUBLICATIONS

Repeat Insult Patch Test – Modified Draize Procedure  
Principles and Methods of Toxicology, (fourth edition) A Wallace Hayes (editor), pp 1057 – 1060, 2001

(Copies are available online at <http://www.taylorandfrancis.co.uk/> or from Taylor and Francis, 325 Chestnut Street, Philadelphia PA 19106.)

### Sears Fabric Defect Replica Scales

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

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 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 Materials.

3.3.1 Basic material (Type I only). The basic material for the Type I coat shall be a 50/50 nylon/cotton blend, wind resistant poplin ripstop cloth in a Universal Camouflage Pattern (UCP) conforming to Class 8, or Operation Enduring Freedom Camouflage Pattern (OEF-CP) conforming to Class 11, or Operational Camouflage Pattern (OCP) conforming to Class 14 of MIL-DTL-44436 as specified (see 6.2).

3.3.1.1 Basic material (Type II only). The basic material for the Type II coat shall be a 65/25/10 Flame Resistant (FR) rayon/para-aramid/nylon blend ripstop cloth in a Universal Camouflage Pattern (UCP) conforming to GL-PD-07-12 Type I, Class 1, or Operation Enduring Freedom Camouflage Pattern (OEF-CP) conforming to Type I, Class 2, or Operational Camouflage Pattern (OCP) conforming to Type I, Class 3 as specified (see 6.2).

3.3.1.2 Basic material (Type III only). The basic material for the Type III coat shall be an FR ripstop cloth in a Universal Camouflage Pattern (UCP) conforming to GL-PD-07-12 Type III Class 1, or Operation Enduring Freedom Camouflage Pattern (OEF-CP), conforming to Type III Class 2, or Operational Camouflage Pattern (OCP), conforming to Type III Class 3, as specified (see 6.2).

3.3.2 Fusible interlining (all types, styles and classes). The fusible interlining for all Styles shall conform to MIL-C-44296, Type V, VI or VII, style B or C substrate with Class 1

(polyamide) or Class 3 (Polyethylene, high density) adhesive. The fusible shall meet the bonding strength and shrinkage requirements, initial and after three (3) launderings as specified in MIL-C-44296.

3.4 Insect bite protection (Class 2 only). The Class 2 coat shall be treated for insect bite protection. The coat shall be strictly limited to the level specified in 3.4.1 and provide the minimum insect bite protection specified in 3.4.2.

3.4.1 Permethrin - Insect repellent treatment (Class 2 only). 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 2 coats shall comply with EPA Toxicological Category IV. The Class 2 coat shall have an EPA registered (see 6.4) 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 MIL-DTL-44411 (Labels and labeling) shall also be applicable to finished garment. The coat shall be labeled in accordance with 3.8.2.1 and 3.8.2.2. The permethrin finish shall be uniformly applied across the fabric and garment and **strictly** controlled to ensure that the permethrin concentration level meets the requirements specified below. The treatment level shall provide the percent (%) bite protection specified in 3.4.2. The permethrin treatment shall be durable to repeated laundering. The permethrin level testing shall be as specified 4.4.2. The permethrin treatment shall not degrade any performance characteristics of the garment or present any latent defects to the cloth or garment. See 6.5.

Condition	<u>Type I, Class 2</u>		<u>Type II, Class 2</u>		<u>Type III, Class 2</u>	
	<u>mg/cm<sup>2</sup></u>		<u>mg/cm<sup>2</sup></u>		<u>mg/cm<sup>2</sup></u>	
	Min	Max	Min	Max	Min	Max
Initial	0.095	0.135	0.087	0.130	0.095	0.140
After 20 Launderings	0.025	0.135	0.025	0.130	0.025	0.140

3.4.1.1 Permethrin garment treatment of camouflage patterns. The mixing of camouflage patterns in the same permethrin treatment garment application is not allowed. Patterns shall be treated separately.

3.4.1.2 Permethrin garment application, finished measurements. Manufacturers shall comply with the finished measurement requirements in 3.12 and compensate for actual fabric shrinkage or growth after the application of garment treatment.

3.4.2 Percent (%) insect bite protection (Class 2 only). Class 2 finished permethrin treated garments shall provide bite protection specified below when assessed by the bite protection testing specified in 4.4.2. Government notification and approval is required initially, and any time there is a change in the permethrin treatment formulation or processing conditions (see 3.13.1).

Condition	<u>Type I, Class 2</u> % Bite Protection	<u>Type II, Class 2</u> % Bite Protection	<u>Type III, Class 2</u> % Bite Protection
Initial	>/= 90%	>/= 85%	>/= 85%
After 20 launderings	>/= 90%	>/= 80%	>/= 80%
After 50 launderings	>/= 90%	>/= 70%	>/= 80%

3.4.3 pH (Class 2 only). 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 4.4.2.

3.5 Components materials and shade (All types, styles and classes). The component materials for coats shall be made in accordance to paragraphs 3.5.1- 3.5.9. Component materials for the coat are for all types, classes and styles unless otherwise noted. All component shade shall match Foliage Green 504 for UCP uniforms, Tan 499 for OEF-CP, or OCP uniforms with the exception of 3.5.9, Integrated Patch Kit (IPK). IPK shade shall be the camouflage print of the uniform.

3.5.1 Slide fasteners.

3.5.1.1 Coat front slide fastener. The slide fastener shall be a two (2) -way separating, non-reversible, automatic locking slider, Size 5, plastic individual element fastener (IEF) conforming to Type III, Style 13, Class 1 of A-A-55634 and shall have a double pin separating unit at bottom. The slide fastener shall have a crosswise breaking strength of not less than 100 pounds (average) with no individual reading less than 90 pounds, a minimum single element slippage of 16 pounds, minimum separable pin holding strength of 35 pounds and a minimum slider tab 90 degree pull off strength of 35 pounds when tested as specified in A-A-55634. The pin engagement and disengagement force into the dual sliders shall be a smooth single action without sticking or having to rework pin or sliders. The opening for the slider's top and bottom pull-tabs shall be a minimum of 5 millimeters length x 7 millimeters width. The length of the slide fastener shall be as follows:

Style A. Unisex slide fastener lengths (inches)

Length	All sizes
XX-Short	15
X Short/ Short	16
Regular/Long	17
X-Long/XX-Long	18

NOTE: Unisex slide fastener lengths are coordinated with coat lengths and not coat size.

Style B. Female slide fastener lengths (inches)

Length	Size 30	Size 33	Size 36	Size 39
X-Short	15	15	16	16
Short	15	15	16	16
Regular	16	16	17	17
Long	16	16	17	17
X-Long	17	17	18	18

NOTE: Female slide fastener lengths are coordinated with coat lengths and coat size.

3.5.1.2 Upper sleeve pocket slide fastener. The slide fastener for the coat pocket closure shall be in accordance with A-A-55634, Type I, Style 7. The slide fastener shall be plastic individual element Class 1, single slider, Size 5 with 100 pounds minimum cross-wise strength and closed bottom and top stops. The slider pull hole shall be large enough to accommodate thong (pull tab) specified in 3.5.1.3. Slide fastener length shall be a minimum of 6-1/2-inches with a minimum chain opening of 5-1/2-inches from top stop to top of slider set upon bottom stop.

3.5.1.3 Slide fastener thongs. The slide fastener thong (pull tab) for the coat front and the upper sleeve pocket shall be a tape 3/8-inch wide conforming to Type III of MIL-PRF-5038. The thong shall finish 2 ( $\pm 1/8$ ) inches in length when folded. To prevent raveling, the ends of the tape shall be either heat cut or enclosed by folding inward. The thong shall be placed through the pull tab (top pull-tab only for coat front), and secured with a vertical bar-tack.

3.5.2 Tape. The nylon tape to cover the identification friend or foe (IFF) material and FR identification marker (Type II and III coat only) shall be 1-inch wide conforming to Type III of MIL-PRF-5038. The ends of the tape shall be heat cut to prevent raveling.

3.5.3 Fastener tape, hook and loop. The hook fastener tape shall conform to Type II, Class 1 or Class 4 of A-A-55126. The loop fastener tape shall conform to Class 1 or Class 4 of A-A-55126. The widths shall be as specified for each application throughout this purchase description. The fastener tape, hook and loop, shall be consistent in manufacturer within a garment.

3.5.3.1 Fastener tape, hook and loop use. The use of hook and loop with and without selvage within a garment is allowed (does not need to be consistent within the garment). Hook and loop without selvage shall be heat slit along edges by hook and loop manufacturer only and shall not fray and shall meet the requirements of A-A-55126.

3.5.4 Identification friend or foe (IFF) material. The IFF material shall conform to Type I of CO-PD-06-05.

3.5.5 Thread (Type I only, all styles and classes). The thread for seaming and stitching for the Type I coat shall conform to Table I. All thread shall be non-staining and the requirements in each Commercial Item Description (CID) shall apply.



TABLE I. Thread requirements, Type I only.

Component area	Thread specification	Needle thread <u>1/</u> (Tex size)	Bobbin/Looper thread <u>1/</u> (Tex size)
All seaming, stitching and bar-tacking	A-A-50199, Type II	36-45 or 46-60	36-45 or 46-60
Button attachment	A-A-50199, Type II	71-105	71-105
Overedge stitching (raw edges)	A-A-50199, Type II	31-35	31-35

1/ Needle & Bobbin/Looper shall use same Tex size thread

3.5.6 Thread (Types II and III only, all styles and classes). The thread for seaming and stitching of the Types II and III Flame Resistant coat shall be as specified in Table II. All thread shall be non-staining and the requirements in each CID shall apply.

TABLE II. Thread requirements, Types II and III only.

Component area	Thread specification	Needle thread <u>1/</u> (Tex size)	Bobbin/Looper thread <u>1/</u> (Tex size)
All seaming except small parts	A-A-55195, Type I	78	78
	A-A-55195, Type II	59	59
	A-A-55217, Type I	70-80	70-80
Safety stitch with top stitch, bar-tack, small parts, (hook/loop, pockets, flaps, collar, front placket, eyelet, top stitching, cuffs, tabs, and hems), IFF material & tab cover, identification marker, labels and slide fastener	A-A-55195, Type I	59	59
	A-A-55195, Type II	20	20
	A-A-55217, Type I	50-60	50-60
Overedge/Serge for portions of safety stitch operation for raw edge cover	A-A-55195, Type I	39	39
	A-A-55195, Type II	16	16
	A-A-55217, Type I	24-27	24-27
Button attachment	A-A-55195, Type I	59	59
	A-A-55195, Type II	39	39
	A-A-55217, Type I	50-60	50-60

1/ Needle & Bobbin/Looper shall use same Tex size thread

3.5.7 Gimp. The cotton gimp for reinforcing buttonholes shall conform to A-A-50198, soft or glazed finish, Tex Size 180 or 210.

3.5.8 Buttons. Buttons shall be dull finish, four (4) holes, 30 ligne conforming to V-B-871, Type II, Class D, Style 26. When attached to the coat, the button and thread shall withstand a pull/break of 40 pounds (minimum) when tested as specified in 4.4.2.

3.5.9 Integrated Patch Kit, (IPK) (Types II and III only, all styles and classes). The IPK shall conform to the requirements of GL/PD 10-08. UCP uniforms shall use Class 1, Size R, OEF-CP uniforms shall use Class 2, Size R, or OCP uniforms shall use Class 3, Size R.

3.6 Design. The coat design for Style A-Unisex and Style B-Female has a single-breasted front with a slide fastener (double slider) closure and a secondary hook and loop fastener tape closure; a band collar; long sleeves with cuffs and one (1) button, three (3) buttonholes adjustable cuff tab; and a bi-swing back. The collar has a fusible interlining. The front has two (2) angled chest pockets with flaps with hook and loop fastener tape closures. Above each chest pocket there is loop tape to accommodate the Name and US Army Tapes. The front placket has a loop tape for the Rank Patch. The coat has two (2) bellow style upper sleeve pockets and includes an eyelet drain-hole and loop fastener tape on the outside of the pocket. Each sleeve pocket has a slide fastener (zipper) closure on the front side (as worn) (see figure 4). The coat sleeves have an elbow reinforcement patch. Both sleeves have an Identification Friend or Foe tab cover that can be opened and closed using hook and loop fastener. The IFF tab cover is centered and sewn onto the sleeve above the upper sleeve pocket. The left sleeve has a two (2) channel pencil pocket. The coat has a double turned and cleaned finished hem. The Type II and Type III coat has an FR indicator located on the outside of the left sleeve cuff.

3.7 Construction (all types, styles and classes). The construction for coats shall be made in accordance to paragraphs 3.7.1 - 3.7.13. Construction is for all types, styles and classes unless otherwise noted. All garment material edges shall be clean finished, either, turned-in, turned-under or serged unless otherwise indicated. All components with a grain line shall follow the grain line of the basic garment material or as indicated on pattern.

3.7.1 Fastener tape (hook and loop). All widths of hook and loop tape shall be sewn 1/8-inch to 3/16-inch from bound selvage (for fastener tape with selvage) or from tape edge (for fastener tape without selvage) to prevent needle cutting along edges, stitching runoffs or improper fit into automatic sewing equipment. To prevent raveling on fastener tape with selvage, do not sew directly on the selvage. The use of fastener tape that is slit, has split edges, or any splicing of fastener tape is not permitted. Under no circumstances shall any fastener tape be re-stitched for repair purposes. New tape shall be used for repairs to prevent needle cutting, thus offering maximum field life. All fastener tape may be sewn through all layers on coat as indicated on the figures, (see patterns for placement). Tolerance for all lengths shall be ( $\pm 1/8$ ) inch.

3.7.2 Collar. The collar (see figure 3) shall be interlined with a fusible as specified in 3.3.2.

3.7.3 Front closure. The front closure is a (double slider) slide fastener with a secondary hook and loop tape closure (see figure 1). The secondary closure consists of three (3) pairs of hook and loop fastener tape. The hook portion is on the underside of the front overlapping facing (left side) and is additionally stitched with a box-x stitch. The loop portion is stitched to the front side of the under facing (right side) and is additionally stitched with a box-x stitch and coincides with the hook. The hook and loop fasteners for the front closure shall be 1-inch wide by 1-1/2-inches in length. See pattern for placement.

3.7.3.1 Front facing. As an option the overlapping facing may be fused (see Tables IVA and IVB).

3.7.4 Upper sleeve pockets. Both upper sleeve pockets shall have a slide fastener.

3.7.4.1 Upper sleeve pocket. The sleeve pocket shall have a bellows at front, back and bottom with a slide fastener opening and eyelet at the bottom right of bellow. The pocket shall finish 5 ( $\pm 3/16$ ) inches in width and 7-1/4 ( $\pm 3/16$ ) inches in length. Each pocket shall have a 4-inch wide by 6-1/2-inch cut length loop fastener tape sewn on all sides, positioned 3/8-inch from bottom and top of pocket and centered side to side. The loop tape shall be additionally stitched with a crisscrossed-X pattern of stitching (see figure 4). See pattern for pocket loop fastener tape and eyelet placement.

3.7.4.2 Upper sleeve pocket slide fastener. The slide fastener shall be on the forward side of the pocket (as worn) and shall be 6-1/2-inches in length. The slide fastener shall close from bottom to top and provide a minimum opening of 5-1/2-inches.

3.7.4.3 Eyelets. The sewn-in eyelets for the sleeve pocket bellows shall have a 1/4-inch ( $\pm 1/16$ ) diameter finished opening.

3.7.4.3 Pencil pocket. The left sleeve shall have a 2-channel pencil pocket above the sleeve cuff. The pocket shall be 2-3/8 ( $\pm 1/8$ ) inches wide and have a 3/4-inch double turned cleaned finished hem (see figure 1). The pocket shall two (2) evenly spaced channels (permitted variation within 1/8-inch). See pattern for placement.

3.7.5 Sleeve cuff. The sleeve cuff shall be as specified in the pattern. The main body of the sleeve cuff shall have three (3) buttonholes spaced as per pattern. The sleeve cuff shall have a pointed adjustable tab with one (1) button sewn to the underside for closure adjustment (see figures 1 and 2). The sleeve tabs shall be 2-1/8 ( $\pm 1/8$ ) inches wide by 3-1/8 ( $\pm 1/8$ ) in length for all sizes.

3.7.5.1 Buttonholes. The buttonholes shall be eyelet-end tapered bar type (eyelet end toward the cuff edge-see figure 2) worked over gimp for the cuff with not less than four (4) tacking stitches at bar end catching the gimp ends (not counting the crossover stitch). The purling shall be on the inside surface. The cut lengths shall be 3/4 to 7/8-inch. The buttonholes shall be clean cut with the stitching securely caught in fabric.

3.7.6 Elbow reinforcement. The coat shall have an elbow reinforcement patch on each sleeve, stitched down on all four (4) sides. See pattern for placement.

3.7.7 Chest pockets and flaps. There shall be two (2) chest pockets with flaps, one (1) on each chest side.

3.7.7.1 Front chest pockets. The chest pockets shall be angled downward/inward toward the front placket facing (see figure 1). The pocket shall finish 6-3/4 ( $\pm 1/8$ ) inches in width and have a pocket opening of 6-3/8 ( $\pm 1/8$ ) inches between bar-tacks. See Table VI for bar-tack/back-tack

requirements. Chest pocket and body of coat grainline shall match. Each pocket shall have a piece of loop fastener tape, 5/8-inch wide by 6-3/4-inches in cut length, sewn onto it. See pattern for loop fastener tape placement.

3.7.7.1.1 Front chest pocket depth (Style A. Unisex only, all types and classes). The finished depth of each pocket for sizes X-Small and Small shall be 3-3/4 (+1/8, -0) inches, Medium, Large, X-Large, and XX-Large shall be 5-1/4 (+1/8, -0) inches.

3.7.7.1.2 Front chest pocket depth (Style B. Female only, all types and classes). The finished depth of each pocket for sizes 30 and 33 shall be 3-3/4 (+1/8, -0) inches, for size 36 shall be 4-3/4 (+1/8, -0) and for size 39 shall be 5-1/4 (+1/8, -0) inches.

3.7.7.2 Chest pocket flaps. The chest pocket flaps shall finish 1-1/2 ( $\pm$  1/8) inches in width and be of sufficient length to cover the top of the pocket. The top of the folded finished pocket flaps shall finish 1/4-inch from the folded edge of pocket top (see pattern for placement). The underside of each chest pocket flap shall have a piece of hook fastener tape, 5/8-inch wide by 6-3/4-inches in cut length, sewn onto it for pocket closure. The stitching shall be through the hook tape and both layers of pocket flap (see Figure 1). Chest pocket flap and body of coat grainline shall match.

3.7.8 Coat hem. The coat hem shall finish 5/8 ( $\pm$ 1/8) inch wide, double turned and clean finished.

3.7.9 Name tape and U.S. Army tape. Above each chest pocket flap there shall be a piece of loop fastener tape 1-inch by 5-1/4-inches in cut length, sewn on to accommodate the name tape and U.S. Army tape. The loop tape shall be placed horizontal and be 1/8-inch (+1/8, -0) above the top corner of the pocket flap (see figure 1). See pattern for loop fastener tape placement. Both loop tapes shall be in horizontal alignment with each other when coat is zipped.

3.7.10 Identification Friend or Foe (IFF) configuration. The IFF material shall be on both sleeves. A 1-inch width loop fastener tape finishing 3-1/4-inches in length shall be stitched onto the sleeve base material. A 1-inch width nylon tape finishing 1-7/8 ( $\pm$ 1/16) inches in length shall have a 1-inch hook fastener tape finishing 1/2-inch in length and sewn onto the nylon tape. The nylon tape shall be of sufficient length to cover the IFF material when the hook is engaged. See IFF webbing template (Table IVA and Table IVB) and pattern for placement. The IFF material shall be in accordance with 3.7.10.1.

3.7.10.1 Identification Friend or Foe (IFF) material. The IFF material as specified in 3.5.4 shall finish 3/4-inch wide and 3/4 ( $\pm$ 1/16) inch in cut length.

3.7.11 Rank patch. The rank patch shall be a piece of loop fastener tape, 2-inches wide by 2-inches in cut length. See pattern for placement.

3.7.12 Identification FR marker (Types II and III only, all styles and classes). The Types II and III coat shall have a tape FR identification marker (see figure 1) on the left sleeve cuff as worn (see pattern for placement) and shall be visible from the outside when worn. The tape

marker shall be clean finished or heat sealed 1 ( $\pm 1/8$ ) inch in length. The finished tape identification marker shall be box stitched as specified in Table V. The thread shall be in accordance with the requirements for the Types II and III coat (see 3.5.6).

3.7.13 Integrated Patch Kit (IPK) placement (Types II and III only, all classes and styles).

The Types II and III coat shall have an IPK placed into the finished right upper sleeve pocket, as worn. The IPK shall be placed into the pocket after garment treatment with the longest dimension vertical and shall lie flat after placement in pocket. The pocket slide fastener shall be engaged to prevent IPK from falling out.

3.8 Labels (all types, styles and classes). Labels are for all types, styles and classes unless otherwise noted. All garments shall have a size label and a combination identification/care label sewn into the coat. All garments shall have a Barcode hang tag. Class 2 coats shall have an additional insect protection/identification/care label sewn into the coat and a hang tag. The printing for all labels shall be black. The font size for the inscription of the size label shall be 10 points. The inscription shall have a minimum font size of 8 points for identification/care label and insect protection/identification/care label only. Inscription shall be legible. Sewn in labels and printing shall last the expected life of the coat.

3.8.1 Size label. The size label shall conform to Type VI, Class 2 of MIL-DTL-32075 and shall be sewn on the inside center back approximately 1/2-inch below the neckline. The label shall be sewn on all four (4) sides and the stitching shall not cover the printing. The color of the size labels for the Types I and II coat shall be white or approximate the ground shade of the basic fabric. For the Type III coat only, the color of the size label shall be Urban Gray 501. The size label shall include the information in Table IIIA and Table IIIB for the applicable size:

TABLE IIIA. Style A. Unisex size label.

X-Small - XX-Short Height: 55 to 59 in. Chest: Up to 33 in. NSN No. NATO Size: 4050/7484	X-Small - X-Short Height: 59 to 63 in. Chest: Up to 33 in. NSN No. NATO Size: 5060/7484	X-Small - Short Height: 63 to 67 in. Chest: up to 33 in. NSN No. NATO Size: 6070/7484
X-Small - Regular Height: 67 to 71 in. Chest: up to 33 in. NSN No. NATO Size: 7080/7484	X-Small - Long Height: 71 to 75 in. Chest: Up to 33 in. NSN No. NATO Size: 8090/7484	X-Small - X-Long Height: 75 to 79 in. Chest: Up to 33 in. NSN No. NATO Size: 9000/7484

TABLE IIIA. Style A. Unisex size label. – Continued

Small – XX-Short Height: 55 to 59 in. Chest: 33 to 37 in. NSN No. NATO Size: 4050/8494	Small – X-Short Height: 59 to 63 in. Chest: 33 to 37 in. NSN No. NATO Size: 5060/8494	Small – Short Height: 63 to 67 in. Chest: 33 to 37 in. NSN No. NATO Size: 6070/8494
Small – Regular Height: 67 to 71 in. Chest: 33 to 37 in. NSN No. NATO Size: 7080/8494	Small – Long Height: 71 to 75 in. Chest: 33 to 37 in. NSN No. NATO Size: 8090/8494	Small – X-Long Height: Above 75 in. Chest: 33 to 37 in. NSN No. NATO Size: 9000/8494
Medium – XX-Short Height: 55 to 59 in. Chest: 37 to 41 in. NSN No. NATO Size: 4050/9404	Medium – X-Short Height: 59 to 63 in. Chest: 37 to 41 in. NSN No. NATO Size: 5060/9404	Medium – Short Height: 63 to 67 in. Chest: 37 to 41 in. NSN No. NATO Size: 6070/9404
Medium – Regular Height: 67 to 71 in. Chest: 37 to 41 in. NSN No. NATO Size: 7080/9404	Medium – Long Height: 71 to 75 in. Chest: 37 to 41 in. NSN No. NATO Size: 8090/9404	Medium – X-Long Height: 75 to 79 in. Chest: 37 to 41 in. NSN No. NATO Size: 9000/9404
Medium – XX –Long Height: Above 79 in. Chest: 37 to 41 in. NSN No. NATO Size: 0010/9404	Large – XX-Short Height: 55 to 59 in. Chest: 41 to 45 in. NSN No. NATO Size: 4050/0414	Large – X-Short Height: 59 to 63 in. Chest: 41 to 45 in. NSN No. NATO Size: 5060/0414
Large – Short Height: 63 to 67 in. Chest: 41 to 45 in. NSN No. NATO Size: 6070/0414	Large – Regular Height: 67 to 71 in. Chest: 41 to 45 in. NSN No. NATO Size: 7080/0414	Large – Long Height: 71 to 75 in. Chest: 41 to 45 in. NSN No. NATO Size: 8090/0414
Large – X-Long Height: 75 to 79 in. Chest: 41 to 45 in. NSN No. NATO Size: 9000/0414	Large- XX-Long Height: Above 79 in. Chest: 41 to 45 in. NSN No. NATO Size: 0010/0414	X-Large – XX-Short Height: 55 to 59 in. Chest: 45 to 49 in. NSN No. NATO Size: 4050/1424

TABLE IIIA. Style A. Unisex size label. - Continued

X-Large – X-Short Height: 59 to 63 in. Chest: 45 to 49 in. NSN No. NATO Size: 5060/1424	X-Large – Short Height: 63 to 67 in. Chest: 45 to 49 in. NSN No. NATO Size: 6070/1424	X-Large – Regular Height: 67 to 71 in. Chest: 45 to 49 in. NSN No. NATO Size: 7080/1424
X-Large – Long Height: 71 to 75 in. Chest: 45 to 49 in. NSN No. NATO Size: 8090/1424	X-Large - X-Long Height: 75 to 79 in. Chest: 45 to 49 in. NSN No. NATO Size: 9000/1424	X-Large - XX-Long Height: Above 79 in. Chest: 45 to 49 in. NSN No. NATO Size: 0010/1424
XX-Large - Regular Height: 67 to 71 in. Chest: 49 to 53 in. NSN No. NATO Size: 7080/2435	XX-Large - Long Height: 71 to 75 in. Chest: 49 to 53 in. NSN No. NATO Size: 8090/2435	XX-Large - X-Long Height: 75 to 79 in. Chest: 49 to 53 in. NSN No. NATO Size: 9000/2435
XX-Large - XX-Long Height: Above 79 in. Chest: 49 to 53 in. NSN No. NATO Size: 0010/2435	-----	-----

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TABLE IIIB. Style B. Female size label.

30 – X Short Height: 54 to 58 in. Chest: 30 to 33 in. NSN No. NATO Size: 4050/7484	33 – X Short Height: 54 to 58 in. Chest: 33 to 36 in. NSN No. NATO Size: 4050/8494	36 – X Short Height: 54 to 58 in. Chest: 36 to 39 in. NSN No. NATO Size: 4050/9404	-----
30 – Short Height: 58 to 62 in. Chest: 30 to 33 in. NSN No. NATO Size: 5060/7484	33 – Short Height: 58 to 62 in. Chest: 33 to 36 in. NSN No. NATO Size: 5060/8494	36 – Short Height: 58 to 62 in. Chest: 36 to 39 in. NSN No. NATO Size: 5060/9404	39 – Short Height: 58 to 62 in. Chest: 39 to 42 in. NSN No. NATO Size: 5060/9404
30 – Regular Height: 62 to 66 in. Chest: 30 to 33 in. NSN No. NATO Size: 6070/7484	33 – Regular Height: 62 to 66 in. Chest: 33 to 36 in. NSN No. NATO Size: 6070/8494	36 – Regular Height: 62 to 66 in. Chest: 36 to 39 in. NSN No. NATO Size: 6070/9404	39 – Regular Height: 62 to 66 in. Chest: 39 to 42 in. NSN No. NATO Size: 6070/9404
-----	33 – Long Height: 66 to 70 in. Chest: 33 to 36 in. NSN No. NATO Size:7080/8494	36 – Long Height: 66 to 70 in. Chest: 36 to 39 in. NSN No. NATO Size: 7080/9404	39 – Long Height: 66 to 70 in. Chest: 39 to 42 in. NSN No. NATO Size: 7080/9404
-----	-----	36 – X Long Height: 70 to 74 in. Chest: 36 to 39 in. NSN No. NATO Size: 8090/9404	39 – X Long Height: 70 to 74 in. Chest: 39 to 42 in. NSN No. NATO Size: 8090/9404

3.8.2 Identification and care label (all types, styles and classes). The combination identification/care label shall conform to Type VI, Class 15 of MIL-DTL-32075 and shall be stitched on inside of coat under the right chest pocket (as worn) vertically or parallel with the pocket angle with the top part of the label facing the top of the coat. The label shall be stitched on all four (4) sides. The stitching shall not penetrate the printing and shall not be visible on coat front. The color of the combination identification and care label shall be white or approximate the ground shade of the basic fabric 3.3.1 and 3.3.1.2.

3.8.2.1 Identification and care label (Type I only, all styles and classes). The Type I label shall include the following information:



This section is intentionally blank

Coat, Army Combat Uniform - Unisex  
or  
Coat, Army Combat Uniform – Female  
Contract Number:  
Fiber Content:  
Contractor Name:  
Lot Number 1/

**USE AND CARE**

**PRIOR TO LAUNDERING:** Empty pockets and remove patches. Close zipper and hook and loop fasteners. Turn inside out. Pre-treat stains with commercially available pre-treatments.

**HOME LAUNDERING:** Use cold water detergent. Wash in cold water using permanent press cycle. Rinse in cold water. Tumble dry low.

**WASHING BY HAND:** Use cold water detergent. Wash in cold water. Rinse completely. Never twist or wring dry. Hang dry on a rust-proof hanger. Do not hang dry in direct sunlight.

**NOTE:** Wash garment separate from other garments. In military field operations, garment may be washed with other garments.

**CAUTION:**

DO NOT USE BLEACH, BLEACH ALTERNATIVES, FABRIC SOFTENER, OR STARCH. DO NOT DRY CLEAN OR COMMERCIALY HOT PRESS. DO NOT APPLY HEAT OR AN IRON TO ANY HOOK AND LOOP FASTENER.

**DO NOT REMOVE THIS LABEL**

1/ Lot number shall be stamped with indelible black ink prior to shipment.

3.8.2.2 Identification and care label, flame resistant (Type II and III only, all styles and classes). The label for Type II and III shall include the following information:

This section is intentionally blank



Coat, Army Combat Uniform - Unisex

or

Coat, Army Combat Uniform – Female

FLAME RESISTANT

Contract Number:

Fiber Content:

Contractor Name:

Lot Number 1/

This product meets the manufacturing and performance testing requirements as specified by the Program Executive Office – Soldier

### **USE AND CARE**

**PRIOR TO LAUNDERING:** Empty pockets and remove patches. Close zipper and hook and loop fasteners. Turn inside out. Pre-treat stains with commercially available pre-treatments.

**HOME LAUNDERING:** Use cold water detergent. Wash in cold water using permanent press cycle. Rinse in cold water. Tumble dry low.

**WASHING BY HAND:** Use cold water detergent. Wash in cold water. Rinse completely. Never twist or wring dry. Hang dry on a rust-proof hanger. Do not hang dry in direct sunlight.

**NOTE:** Wash garment separate from other garments. In military field operations, garment may be washed with other garments.

### **CAUTION:**

DO NOT USE BLEACH, BLEACH ALTERNATIVES, FABRIC SOFTENER, OR STARCH. DO NOT DRY CLEAN OR COMMERCIALY HOT PRESS. DO NOT APPLY HEAT OR AN IRON TO ANY HOOK AND LOOP FASTENER.

**DO NOT REMOVE THIS LABEL  
THIS GARMENT IS FLAME RESISTANT**

1/ Lot number shall be stamped with indelible black ink prior to shipment.

3.8.3 Insect protection/identification/care label (Class 2 only, all types and styles). The combination insect protection/identification/care label shall conform to Type VI, Class 15 of MIL-DTL-32075 and shall be stitched on inside of coat under the left chest pocket (as worn) vertically or parallel with the pocket angle with the top of the label facing the top of the coat. The label shall include both permanent insect protection and brand labeling information; and shall comply with the approved EPA registration (see 6.4). The label shall be stitched on all four

(4) sides. The stitching shall not penetrate the printing and shall not be visible on coat front. The color for the insect protection/identification/care label (Class 2) shall be white or approximate the ground shade of the basic fabric. The Class 2 label shall include the following information:

<p><b>Insect Repellent Brand Name:</b> <b>INSECT REPELLENT APPAREL</b> Refer to hangtag for more information Contractor Name: (Permethrin Applicator Name) EPA REG. NO.: EPA EST. NO.:</p>								
<p>- Do Not Dry Clean - Dry Cleaning removes active ingredient - Wash separate from other clothing - In military field operations, garment may be washed with other garments. - Do Not Re-treat with other permethrin products - Dispose of garment in trash in accordance with Army regulations</p> <p>Repels mosquitoes Repellency remains effective for 25 washings</p> <table><thead><tr><th><b>ACTIVE INGREDIENT</b></th><th><b>%W/W</b></th></tr></thead><tbody><tr><td>Permethrin.....</td><td>..0.52%</td></tr><tr><td>OTHER INGREDIENTS: (Garment).....</td><td>99.48%</td></tr><tr><td>TOTAL.....</td><td>100.00%</td></tr></tbody></table> <p>It is a violation of Federal Law to use this product in a manner inconsistent with its labeling</p> <p style="text-align: center;"><b>DO NOT REMOVE THIS LABEL</b></p>	<b>ACTIVE INGREDIENT</b>	<b>%W/W</b>	Permethrin.....	..0.52%	OTHER INGREDIENTS: (Garment).....	99.48%	TOTAL.....	100.00%
<b>ACTIVE INGREDIENT</b>	<b>%W/W</b>							
Permethrin.....	..0.52%							
OTHER INGREDIENTS: (Garment).....	99.48%							
TOTAL.....	100.00%							

3.8.4 Hang tag, insect protection (Class 2 only, all types and styles). Each Class 2 coat shall have an individual paper tag attached to the garment conforming to Type VIII, Class 15 of MIL-DTL-32075. The color for the hang tag shall be white. The paper tag shall be Swift tacked at center back on inside collar joining seam. The tag shall provide additional insect protection information in accordance with and as required by EPA registration and labeling. The hang tag shall contain the following information:

<p><b>Insect Repellent Brand Name:</b>  <b>INSECT REPELLENT APPAREL</b>  Contractor Name: - (Permethrin Applicator Name)  Contractor Address – (Permethrin Applicator Address)  EPA REG. NO.:  EPA EST. NO.:</p>									
<ul style="list-style-type: none"> <li>- Do Not Dry Clean</li> <li>- Dry Cleaning removes active ingredient</li> <li>- Wash separate from other clothing</li> <li>- In military field operations, garment may be washed with other garments.</li> <li>- Do Not Re-treat with other permethrin products</li> <li>- Dispose of garment in trash in accordance with Army regulations</li> <li>- For protection of exposed skin, use in conjunction with a repellent registered for direct application to the skin.</li> </ul> <p>Repels mosquitoes  Repellency remains effective for 25 washings</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"><b>ACTIVE INGREDIENT</b></td> <td style="text-align: right;"><b>%W/W</b></td> </tr> <tr> <td>Permethrin .....</td> <td style="text-align: right;">.0.52%</td> </tr> <tr> <td>OTHER INGREDIENTS: (Garment)....</td> <td style="text-align: right;">.99.48%</td> </tr> <tr> <td>TOTAL.....</td> <td style="text-align: right;">100.00%</td> </tr> </table> <p>It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.</p> <p>Retain hangtag for future reference on proper handling of this garment.</p> <p style="text-align: center;"><b>THIS TAG NOT TO BE REMOVED EXCEPT BY CUSTOMER</b></p>		<b>ACTIVE INGREDIENT</b>	<b>%W/W</b>	Permethrin .....	.0.52%	OTHER INGREDIENTS: (Garment)....	.99.48%	TOTAL.....	100.00%
<b>ACTIVE INGREDIENT</b>	<b>%W/W</b>								
Permethrin .....	.0.52%								
OTHER INGREDIENTS: (Garment)....	.99.48%								
TOTAL.....	100.00%								

3.8.5 Barcode hang tag (all types, styles and classes). Each coat shall have a white paper barcode hang tag conforming to Type VIII, Class 17 of MIL-DTL-32075. The hang tag shall be Swift tacked at center back on inside collar joining seam and shall be completely visible on the coat when it is folded and/or packaged as specified and so it causes no damage to the coat. The bar coding element shall be a 13 digit National Stock Number (NSN). There shall be a 12 digit Universal Product Code (UPC) number assigned for all NSNs by the contracting activity. The initials “UPC” must appear beneath the code.

NOTE: The hang tag for insect protection and barcode may be applied jointly with the use of one Swift tack.

3.9 Figures. Figures are furnished for informational purposes only. To the extent of any inconsistencies between the written document and the figures, the written document shall govern.

3.10 List of pattern parts. The Government shall furnish patterns, which show directional line markings for proper cutting and assembly, and are to be used as a guide for cutting contractor’s working patterns. The Government patterns provide a seam allowance of 1/2-inch

for side seams, shoulder seams, and sleeve seams, 3/8-inch allowance for collar and all other seams, except where otherwise specified, and 1/4-inch allowance for pocket flaps. Pockets, pocket flaps, pencil pocket, elbow patches, cuffs, collar, slide fastener, patch loop tape, other hook and loop fastener tape, and bar-tacks shall be located in accordance with marks on patterns and table references. Minor modifications to the pattern are permitted where necessary to accommodate manufacture's processes to include garment treatments and use of automatic equipment. These modifications shall not alter the final design, serviceability, appearance or final finished measurements. Table IVA and Table IVB pattern list is provided to insure that the pattern set is complete for all Types and Styles of coats (see 6.2).

TABLE IVA. Style A. Unisex list of pattern parts

<b>Material</b>	<b>Nomenclature</b>	<b>Pattern Abbreviation</b>	<b>Cut Number</b>
Basic Material	Back	PD1404A-BACK	1
	Side Back	PD1404A-SIDE_BACK	2
	Left Front	PD1404A-FRONT_LFT	1
	Right Front	PD1404A-FRONT_RT	1
	Top Sleeve	PD1404A-TOP_SLEEVE	2
	Under Sleeve	PD1404A-UNDR_SLEEVE	2
	Collar	PD1404A-COLLAR	2
	Elbow Patch	PD1404A-ELBOW_PATCH	2
	Sleeve Pocket	PD1404A-SLEEVE_PCKT	2
	Sleeve Pocket Zipper Facing	PD1404A-SLV_PKT_ZIP	2
	Right Front Chest Pocket	PD1404A-FT_CHST_PKR	1
	Left Front Chest Pocket	PD1404A-FT_CHST_PKL	1
	Right Front Chest Pocket Flap	PD1404A-FLP_CHSTPKR	1
	Left Front Chest Pocket Flap	PD1404A-FLP_CHSTPKL	1
	Cuff	PD1404A-CUFF	2
	Cuff Tab	PD1404A-CUFF_TAB	2
Left Pen Pocket	PD1404A-LFT_PEN_PKT	1	
Fusible	Font Facing Fusible (Optional)	PD1404A-FF_FUS-OPT	2
	Collar Fusible	PD1404A-COLLAR_FUSE	1
Templates	IFF Webbing Template	PD1404A-IFF_WEB_TEMP	0

TABLE IVB. Style B. Female list of pattern parts

<b>Material</b>	<b>Nomenclature</b>	<b>Pattern Abbreviation</b>	<b>Cut Number</b>
Basic Material	Back	PD1404B-BACK	1
	Side Back	PD1404B-SIDE_BACK	2
	Left Front	PD1404B-FRONT_LFT	1
	Right Front	PD1404B-FRONT_RT	1
	Top Sleeve	PD1404B-TOP_SLEEVE	2
	Under Sleeve	PD1404B-UNDR_SLEEVE	2
	Collar	PD1404B-COLLAR	2
	Elbow Patch	PD1404B-ELBOW_PATCH	2
	Sleeve Pocket	PD1404B-SLEEVE_PCKT	2
	Sleeve Pocket Zipper Facing	PD1404B-SLV_PKT_ZIP	2
	Right Front Chest Pocket	PD1404B-FT_CHST_PKR	1
	Left Front Chest Pocket	PD1404B-FT_CHST_PKL	1
	Right Front Chest Pocket Flap	PD1404B-FLP_CHSTPKR	1
	Left Front Chest Pocket Flap	PD1404B-FLP_CHSTPKL	1
	Cuff	PD1404B-CUFF	2
	Cuff Tab	PD1404B-CUFF_TAB	2
Left Pen Pocket	PD1404B-LFT_PEN_PKT	1	
Fusible	Font Facing Fusible (Optional)	PD1404B-FF_FUS-OPT	2
	Collar Fusible	PD1404B-COLLAR_FUSE	1
Templates	IFF Webbing Template	PD1404B-IFF_WEB_TEMP	0

3.11 Configuration. Each coat shall conform to design, appearance (see Figures 1-5), the finished measurements in Table VIIA and VIIB and the construction methods specified in 3.11.1 through 3.11.2, and Tables V and VI in order to maintain configuration compliance.

3.11.1 Seams and stitching. All seams shall be consistent and exhibit a uniform appearance and conform to the ASTM D 6193 seam and stitch types listed in Table V. The backside of seams (inside garment) shall be flat with no protruding seam allowance to create irritation or discomfort. All material edges shall be clean finished, either, turned-in, turned-under or serged. All pocket flaps shall be serged prior to setting. Needle and bobbin thread tension shall be balanced such that neither is too tight nor too loose relative to each other. The seams for all outside visible stitching shall be sewn with 11 ( $\pm$  1) stitches per inch. Overedge or pre-hemming shall be 10 ( $\pm$  2) stitches per inch. Buttons shall be attached with 16 stitches per button. Buttonholes shall be 54 ( $\pm$  2) stitches per inch including tack. All hook and loop tape shall be sewn with 10 ( $\pm$  2) stitches per inch. The IFF material shall be sewn with 8 ( $\pm$  1) stitches per inch. The sewn eyelets for the bellows pockets shall have a minimum of 16 stitches. The width of the bight of stitching shall not be less than 1/16-inch. The eyelet stitching shall have at least

four (4) overlapping stitches with the purling on the outside. All stitches per inch and gauge requirements shall be met prior to any applicable garment treatments.

3.11.1.1 Repair of stitch.

3.11.1.2 Repairs of stitching. Repairs of stitching shall be as follows:

- a. When thread breaks or bobbin run-outs occur during stitching, the stitching shall be repaired by restarting the stitching a minimum of 1/2-inch in back of the end of the stitching.
- b. Thread breaks or two (2) or more consecutive skipped or run-off stitches noted during end item inspection shall be repaired by overstitching. The stitching shall start at a minimum of 1/2-inch in back of the defective area and continue a minimum of 1/2-inch beyond the defective area onto the existing stitching. Loose or excessively tight stitching shall be repaired by removing the defective stitching, without damaging the materials, and restitching in the required manner.

**NOTE:** When making the above repairs, the ends of the stitching are not required to be backstitched. The loose ends shall be trimmed with scissors. **Caution:** Pulling or breaking the loose ends is not allowed.

3.11.1.3 Repairs of type 401 stitching only. All repairs shall be in accordance with 3.11.1.1 and 3.11.1.2, except substitute 3/4-inch for 1/2-inch wherever 1/2-inch appears. Repairs to stitch Type 401 may be accomplished by use of stitching type 301.

3.11.2 Stitching for hook and loop tape. The hook and loop tape shall be sewn with the use of a straight stitch, box stitch or box-X stitch with special stitched corners as specified in Table V.

TABLE V. Seam and stitch types

Seam placement	Seam type	Gauge	Stitch type
Side seams, back sleeve seams, set in sleeves, armhole, shoulder seams	LSc-2	3/16 to 1/4-inch gauge (double lap seam)	301 or 401
Bi-swing seam Inner seam	SSa-2	3/8 to 1/2-inch gauge	301 and 602
Outer seam (pleat)	OSf-2	3/16 to 1/4-inch gauge	301
Top stitch pleat of bi-swing	OSf-2	Two (2) rows 3/16 to 1/4-inch gage apart	301
Top stitching of pencil pocket, collar and front edge	OSf-1	1/16 to 1/8-inch from edge	301

TABLE V. Seam and stitch types- Continued

<b>Seam placement</b>	<b>Seam type</b>	<b>Gauge</b>	<b>Stitch type</b>
Top stitching of sleeve cuff tabs	OSf-1	3/16 to 1/4-inch from folded edge	301
Upper sleeve pocket bellows, inside pleat	OSf-1	1/16 to 1/8-inch from edge	301
Attachment of pockets (When using automatic pocket setting equipment topstitching shall be 1/6, 1/8, or 3/16 gauge)	LSd-1	1/16 to 1/8-inch from edge	301
Setting of chest pocket flaps			
Top stitch	LSba-2	Two (2) rows 3/16 to 1/4-inch apart	301
OR			
Top stitch	LSb1-2	3/16 to 1/4-inch from serged edge, then turn flap burying raw edge and top stitch one (1) row 1/4 to 5/16-inches from turned edge	301
Top stitching of chest pocket flaps	OSf-1	3/16 to 1/4-inch from folded edge	301
Attachment of elbow reinforcements	LSd-2	Two (2) rows 3/16 to 1/4-inch apart	301
Front slide fastener			
Placement	-----	See pattern for placement of slide fastener teeth from front edge	-----
Attachment	SSak-2	Two (2) rows 3/16 to 1/4-inch apart	301
Upper sleeve pocket slide fastener			
Placement	-----	See pattern for placement of slide fastener teeth from edge	-----
Attachment	SSak-2	Two (2) rows 1/8 to 1/4-inch apart	301
Bottom hemming	EFb-1	1/2 to 3/4-inch wide hem, double turned clean finished, stitching 1/16 to 1/8-inch from hem fold	301
Setting cuffs	LSd-1	1/16 to 1/8-inch from edge	301



TABLE V. Seam and stitch types - Continued

<b>Seam placement</b>	<b>Seam type</b>	<b>Gauge</b>	<b>Stitch type</b>
Topstitch collar	SSa-1	1/16 to 1/8-inch from edge	301
Front closure hook and loop tape	LSbj-1	Box-X, 1/8 to 3/16-inch from selvage edge	301
Chest pocket flap hook tape	LSbj-1	Box, 1/8 to 3/16-inch from selvage edge	301
Name tape, U.S. Army tape, IFF, Rank tape and chest pocket loop tape	LSbj-1	Box, 1/8 to 3/16-inch from selvage edge	301
Glint material attachment to IFF loop tape	LSbj-1	Box, 1/8 to 3/16-inch from selvage edge (see IFF template)	301
Nylon tape attachment onto IFF loop tape	LSbj-1	1/16 to 1/8-inch from edge of nylon tape (see IFF pattern template)	301
Hook fastener tape attachment onto IFF tab nylon tape cover	LSbj-1	Box, 1/8 to 3/16-inch from selvage edge (see IFF pattern template)	301
FR identification marker to left sleeve cuff, visible from outside (Types II and III only)	LSbj-1	Box, 1/8 to 3/16-inch from selvage edge	301
Labels	LSbj-1	1/8 to 3/16-inch from edge	301

3.11.3 Bar-tacks and back-tacks. To maintain durability and functionality, bar-tacks shall be placed as specified in Table VI. Bar-tacks shall be 1/8 to 3/16-inch wide. Nominal lengths and stitches per tack shall also be as specified in Table VI. Back-tacks shall have two (2) to four (4) rows of stitching.

TABLE VI. Bar-tack and back-tack placement

<b>Bar-tack or back-tack placement</b>	<b>Size of tack (inches)</b>	<b>Stitches per tack <math>\frac{1}{}</math></b>	<b># of Bar-tacks per garment</b>	<b># of Back-tacks per garment</b>	<b>Horizontal</b>	<b>Vertical</b>
Front chest pocket flaps (superimposed on topstitching) a. Top (left and right)	5/8	36	4	----	X	----

TABLE VI. Bar-tack and back-tack placement – Continued

<b>Bar-tack or back-tack placement</b>	<b>Size of tack (inches)</b>	<b>Stitches per tack <u>1/</u></b>	<b># of Bar-tacks per garment</b>	<b># of Back-tacks per garment</b>	<b>Horizontal</b>	<b>Vertical</b>
Chest pockets and flaps						
a. Loop tape (pocket)	5/8	36	4 or 4	4 or 4	----	X
b. Hook tape (flap)	5/8	36	4 or 4	4 or 4	----	X
Lower sleeve cuff tab at ends	1/2	30	4	----	----	X
Pencil pocket						
a. Top (left, center, right)	5/8	36	3	----	----	X
b. Bottom (center)	5/8	36	1	----	----	X
Upper sleeve pocket - through all layers						
a. Top front	5/8	36	2	----	X	----
b. Bottom front	5/8	36	2	----	X	----
c. Top back (opposite slide fastener)	5/8	36	2	----	X	----
Upper sleeve pockets						
a. Loop tape <u>2/</u>	5/8	36	8	----	X	----
Front slide fastener tape						
a. Top	5/8	36	2	----	----	X
b. Bottom	5/8	36	2	----	----	X
All slide fastener thongs at center (front and upper sleeve pockets)	5/8	36	3	----	----	X
Bi-swing (locations as indicated on patterns)						
a. Upper	5/8	36	2	----	X	----
b. Lower	5/8	36	2	----	X	----
End of cuff (underarm seam)	5/8	36	2	----	X	----
Name Tape loop tapes <u>2/</u>	----	----	----	4	----	X
U.S. Army loop tapes <u>2/</u>	----	----	----	4	----	X
Rank loop Tape <u>2/</u>	----	----	----	4	----	X
Front bottom hem stitch line at center front (see figure 1)	1/2 - 5/8	30 - 36	1 or 1		X	----
Front placket top stitch bottom (see figure 1)	1/2 - 5/8	30 - 36	1 or 1		----	X

1/ The tolerance shall be ( $\pm 2$ ) stitches per tack except where range is given.

2/ The bar-tack/back-tack shall catch both loop and basic material, as long as it does not interfere with the garment construction/feature or if there is interference, the bar-tack or back-tack shall be set on loop tape and loop tape selvage. When back-tack is used the number of

stitches onto the basic material shall be no less than two (2) stitches. See figure 5a and b for techniques.

3.12 Measurements. All measurements referenced in this document, except for end item measurements specified in 3.12.1 shall be made prior to garment treatment if applicable.

3.12.1 Finished measurements (Style A and B, all types and classes). The coat shall conform to the finished measurements specified in Table VIIA and Table VIIB.

TABLE VIIA. Style A. Unisex finished measurements (inches) all types and classes

<b>Size</b>	<b>XX-Short</b>	<b>X-Short</b>	<b>Short</b>	<b>Regular</b>	<b>Long</b>	<b>X-Long</b>	<b>XX-Long</b>	<b>Tol.</b>
<b>Back Length, <u>1/</u></b>								
X-Small	25	26	27	28-1/2	29-7/8	31-1/4	-----	± 1/2
Small	25-1/2	26-1/2	27-1/2	29	30-3/8	31-3/4	-----	
Medium	26	27	28	29-1/2	30-7/8	32-1/4	33-5/8	
Large	26-1/2	27-1/2	28-1/2	30	31-3/8	32-3/4	34-1/8	
X-Large	27	28	29	30-1/2	31-7/8	33-1/4	34-5/8	
XX-Large	-----	-----	-----	31	32-3/8	33-3/4	35-1/8	
<b>Half Chest, <u>2/</u></b>								
X-Small	20-1/4	20-1/4	20-1/4	20-1/4	20-1/4	20-1/4	-----	± 1/2
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	
Large	26-1/4	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	28-1/4	28-1/4	
XX-Large	-----	-----	30-1/4	30-1/4	30-1/4	30-1/4	30-1/4	
<b>Sleeve Length, <u>3/</u></b>								
X-Small	19-3/8	20-3/8	21-3/8	22-3/8	23-3/8	24-3/8	-----	± 1/2
Small	19-5/8	20-5/8	21-5/8	22-5/8	23-5/8	24-5/8	-----	
Medium	19-7/8	20-7/8	21-7/8	22-7/8	23-7/8	24-7/8	25-7/8	
Large	20-1/8	21-1/8	22-1/8	23-1/8	24-1/8	25-1/8	26-1/8	
X-Large	20-3/8	21-3/8	22-3/8	23-3/8	24-3/8	25-3/8	26-3/8	
XX-Large	-----	-----	-----	23-5/8	24-5/8	25-5/8	26-5/8	

1/, 2/, 3/ - See 3.12.1.1 for methods of measurement.

This section is intentionally blank

TABLE VIIB. Style B. Female finished measurements (inches) all types and classes

<b>Size</b>	<b>30</b>	<b>33</b>	<b>36</b>	<b>39</b>	<b>Tol.</b>
<b>Back Length, <u>1/</u></b>					
X-Short	23-1/2	24	24-1/2	25	± 1/2
Short	24-1/2	25	25-1/2	26	
Regular	25-1/2	26	26-1/2	27	
Long	26-1/2	27	27-1/2	28	
X-Long	27-1/2	28	28-1/2	29	
<b>Half Chest, <u>2/</u></b>					
X-Short	19-1/2	21	22-1/2	24	± 1/2
Short	19-1/2	21	22-1/2	24	
Regular	19-1/2	21	22-1/2	24	
Long	19-1/2	21	22-1/2	24	
X-Long	19-1/2	21	22-1/2	24	
<b>Sleeve Length, <u>3/</u></b>					
X-Short	21	21-1/4	21-1/2	21-3/4	± 1/2
Short	21-1/2	21-3/4	22	22-1/4	
Regular	22	22-1/4	22-1/2	22-1/4	
Long	22-1/2	22-3/4	23	23-1/4	
X-Long	23	23-1/4	23-1/2	23-3/4	
<b>Shoulder, <u>4/</u></b>					
X-Short	15	15-3/4	16-1/2	17-1/4	± 1/2
Short	15	15-3/4	16-1/2	17-1/4	
Regular	15	15-3/4	16-1/2	17-1/4	
Long	15	15-3/4	16-1/2	17-1/4	
X-Long	15	15-3/4	16-1/2	17-1/4	
<b>Half Sweep, <u>5/</u></b>					
X-Short	21	22-1/2	24	25-1/2	± 1/2
Short	21	22-1/2	24	25-1/2	
Regular	21	22-1/2	24	25-1/2	
Long	21	22-1/2	24	25-1/2	
X-Long	21	22-1/2	24	25-1/2	
<b>Half Sleeve Opening, <u>6/</u></b>					
X-Short	5-3/4	6	6-1/4	6-1/2	± 1/2
Short	5-3/4	6	6-1/4	6-1/2	
Regular	5-3/4	6	6-1/4	6-1/2	
Long	5-3/4	6	6-1/4	6-1/2	
X-Long	5-3/4	6	6-1/4	6-1/2	

1/, 2/, 3/, 4/, 5/, 6/ - See 3.12.1.1 for methods of measurement.

3.12.1.1 Methods of measurement. The measurements in Table VIIA and Table VIIB shall be taken in accordance with the footnotes listed below Table VIIB and shall be zipped at the front placket and placed flat upon a table for measuring.

- 1/ Back length - Measure along center back from collar joining seam to bottom edge of coat.
- 2/ Half chest - With slide fastener closed, hook and loop fasteners attached, and bi-swing facing up and folded in, lay coat flat on table and measure in line with arm pit of armhole from outside folded edge to opposite outside folded edge.
- 3/ Sleeve length - Measure along underarm seam from sleeve joining seam to bottom of sleeve (including cuff).
- 4/ Shoulder - Measure armhole seam to armhole seam at shoulder joining seam.
- 5/ Half sweep - With slide fastener closed, hook and loop fasteners attached, lay coat flat on table and measure across bottom outside folded edge to opposite outside folded edge.
- 6/ Half sleeve opening - With cuff unbuttoned measure along edge of cuff from outside folded edge to opposite outside folded edge

3.13 Toxicity. The finished coat shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.5.3. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.13.1 Toxicity documents. Finishes/chemicals used in the process of this garment shall be identified and accompanied by the appropriate Material Safety Data Sheet (MSDS) information.

3.14 Workmanship. After completion of the final assembly, the coat shall be thoroughly cleaned and all thread scraps, lint and foreign matter shall be removed and all closures engaged prior to packaging. The coat shall not contain any fabric defects. The coat shall be uniform in quality and shall be free from irregularities or defects which could adversely affect performance, reliability or durability. The coat shall conform to the quality established by this specification.

#### 4. VERIFICATION

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

- a. First article inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 First article inspection. First article, submitted in accordance with 3.1 shall be inspected for design, configuration in Tables V and VI and overall workmanship. The first article shall also include the finished measurements in Tables VIIA and VIIB, examination for defects in Table VIII and the testing in Table IX. The presence of excessive defects, as defined in the contract (see 6.2) or failure of any testing shall be cause for rejection of the first article.

4.3 Conformance inspection. Conformance inspection shall include shade and appearance of all components, finished measurements in Tables VIIA and VIIB, examination for defects in Table VIII and the testing in Table IX. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4, as defined by contract, except where otherwise indicated.

4.4 Component and end item inspections. In accordance with 4.3, 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 and test all components and end items to determine conformance to requirements.

4.4.1 End item visual examination. Each coat shall be subjected to visual examination. In accordance with Table VIII, fabric and garment defects shall be scored which are clearly noticeable at normal viewing distance (3-feet) and which affect the serviceability or appearance of the garment. Material defects are defined in Section I of FED-STD-4. If needed, closer inspection will be performed to verify compliance to specification requirements. Shade shall be evaluated at a distance of 3-feet.

TABLE VIII. Coat visual examination

Examination	Defect	Classification	
		Major	Minor
Material	Incorrect, not as specified (see 3.3.1, 3.3.1.1 and 3.3.1.2)	101	
	Hole, cut, tear, smash, burn, needle chew, exposed drill hole, thin place, dye streak, color not as specified, misweave, visible mend or otherwise damaged	102	
	Knots greater than Sears Scale Level C		201
	Slubs greater than Sears Scale Level D		202
Fusible interlining	Omitted or added where not specified Bubbling, delaminating, wrinkling, puckering or misplaced	103	203
Shade	Shade variation within part or between parts of coat, affecting appearance or serviceability	104	
<b>Components</b>	Component not in accordance to the specification	105	
Slide fasteners	Omitted, Twisted, distorted, damaged or puckered	106	
	Color or type not as specified		204
	Thong omitted or not as specified Not located in correct position.	107	205
Tape	Omitted or misplaced	108	
	Any tape distorted, full, tight, frayed, damaged or twisted Color or type not as specified		206 207
Fastener tape - hook and loop	Misplaced, damage, frayed, spliced or omitted	109	
	Color or type not as specified Tape piece edges not cut straight (at approximately 90 degrees)		208 209
IFF material	Omitted, damage or frayed	110	
Thread and gimp	Color or type not as specified		210

TABLE VIII. Coat visual examination – Continued

Examination	Defect	Classification	
		Major	Minor
Buttons	Omitted, damaged or ragged Not specified type, size or color	111	211
Patch kit	Omitted Not placed in correct pocket position Patch color, type or packaging not as specified	112	212 213
Labels, hangtags, bar code/UPC/ HRI Codes	Omitted, illegible Color or type not as specified Human readable interpretation (HRI) illegible	113 114	214
<b>Construction</b>	Any construction part of the coat omitted (3.7.1 to 3.7.12)	115	
Hook and loop attachment	Twisted or distorted when closed Out of alignment causing bulge Joining pieces out of alignment with each other by more than 1/4-inch Not stitched to coat as specified Stitching on tape selvage rather than hook or loop Tape piece not securely stitched to coat cloth Tape stitched less than 1/8-inch or more than 3/16-inch from edge	116  117 118 119 120 121	215
Collar	Incorrect design not as specified in patterns, not specified width	122	
Front closure	Hook and loop omitted, not secured, or incorrect placement Length of coat fronts uneven by more than 1/4-inch at top or bottom when closed	123 124	
Sleeve cuff	Incorrect design, grainline not as specified in patterns, not specified width Sleeve lengths vary by more than 1/2-inch Cuff and cuff tab out of alignment with bottom folded edge of sleeve hem by more than 1/4-inch	125 126 127	
Pocket and flaps (all)	Pocket construction and openings not as specified Pocket companions and openings not uniform in size by 1/4-inch Pocket flaps or openings not as specified Pocket flaps twisted, curled or puckered, not stitched as specified or not well formed Pocket flaps not completely covering pocket opening left to right, positioned or grain line not as specified Pocket flap finished uneven from left to right more than 1/4-inch	128 129 130 131 132 133	

TABLE VIII. Coat visual examination – Continued

Examination	Defect	Classification	
		Major	Minor
Upper sleeve pocket	Omitted or incorrect size	134	
	Incorrect placement of loop tape or IFF material	135	
Pencil pocket	Omitted or incorrect size	136	
	Channels varying more than 1/8-inch in width		216
Chest pockets	Omitted, incorrect size, or angle of pockets	137	
	Missing or incorrect placement of hook and loop	138	
Front name and U.S. Army loop tapes	Not in horizontal alignment or uneven by more than 1/4-inch	139	
Elbow reinforcement	Omitted, not attached as specified, opening - if applicable not as specified	140	
Coat hem	Ends of hem not sewn closed, twisted, puckered, pleated, wavy, or distorted	141	
	Side seam lengths varying by more than 1/2-inch (prior to treatment)	142	
Bar-tacks, back-tacks	Omitted, misplaced, or improper size	143	
	Loose stitching, not specified size, incorrect number of stitches		217
Buttonholes and eyelets	Omitted, misplaced, or improper size	144	
	Buttonholes not in specified direction		218
	Buttonhole thread loose, purling on wrong side, not clean cut or securely caught in fabric	145	
	Alignment of buttonholes and buttons causing bulge, twist or distortion when engaged	146	
	Buttonholes or eyelet not cleanly cut to required size		219
Rank loop patch	Omitted or misplaced	147	
IFF tab cover	Incorrect tab design or IFF material placement	148	
FR marker tape (Type II and III only)	Omitted, incorrect type or placement	149	
Labels, hangtags, UPC/HRI Codes	Size, combination identification/care labels not placed correctly		220
	Hangtags/UPC labels not securely attached in correct location		221
	Barcode/UPC code not visible on folded, packaged item		222
	Any label or tag having incorrect printed content	150	
	Any label, hangtag, or barcode attachment causing damage to item	151	



TABLE VIII. Coat visual examination – Continued

Examination	Defect	Classification	
		Major	Minor
Seams and stitching	Open seams, puckered, distorted, wavy, twisted, or irregular	152	
	Loose or tight stitch tension		223
	Less than 1/2-inch in length		
	Greater than 1/2-inch in length	153	
	Missing stitches greater than 1/4-inch length	154	
	Edge or raised stitching sewn too close to the edge or needle chew resulting in damage to fabric over 1/4-inch in length	155	
	Seam allowance not as required by stitch type		224
	Visible raw edge on outside of coat (inside raw edge greater than 1-inch)	156	
	Stitching not as specified	157	
	Double needle intersecting seams staggered by more than 1/4-inch	158	
	Run off of stitching more than 1/2-inch for edge or raised stitching	159	
	Stitching caught in components or fabric causing unwanted permanent folds, pleats or fullness in the garment	160	
	Free floating stitching not secured in a seam or other stitching by less than 1/4-inch or ends of a continuous line of stitching not overlapped over 1/4-inch (except label stitching)	161	
Stitching of seams incorrectly repaired	162		
Cleanness and workmanship	Spot/Stain affecting appearance or serviceability	163	
	Odor	164	
	Thread ends (more than three (3))		225
	Between 1/4 to 1-1/2-inches		
	Over 1-1/2-inches	165	
All closures on coat not engaged		226	
Packaging	Any coat not packaged in accordance with contract or purchase order		227

4.4.2 End item testing. The finished coat shall be tested for the characteristics listed in Table IX. The methods of test shall be as specified in Table IX. All test reports shall contain the individual values utilized in expressing the final results. The testing requirements and test sampling plan shall be as specified in the contract and or purchase order.

TABLE IX. End item testing (all types, styles and classes)

<b>Characteristic</b>	<b>Requirement paragraph</b>	<b>Test method</b>
Permethrin content (Class 2 only)		
Initial	3.4.1	4.5.1
After 20 launderings	3.4.1	4.5.1 <u>1/</u>
% Insect bite protection (Class 2 only)		
Initial	3.4.2	4.5.2
After 20 launderings	3.4.2	4.5.2 <u>1/</u>
After 50 launderings	3.4.2	4.5.2 <u>2/</u>
pH (Class 2 only)	3.4.3	AATCC 81
Button pull/break (Class 2 prior to treatment)	3.5.8	ASTM D 5034
Toxicity	3.13	4.5.3

1/ After 20 launderings as per AATCC 135, 3, Viii, except laundering cycles 5, 10, 15, 19 and 20 shall be performed without adding any detergent to minimize detergent accumulation in specimen.

2/ After 50 launderings as per AATCC 135, 3, Viii, except laundering cycles 5, 10, 15, 19, 20, 25, 30, 35, 40, 45, 49 and 50 shall be performed without any detergent.

#### 4.5 Methods of inspection.

4.5.1 Permethrin content analysis (Class 2 only). 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. Testing shall be conducted according to the following test method. Alternate method(s) of extraction and analysis, and specimen size are subject to Government approval and laboratory cross correlation prior to implementation.

#### **Evaluation of Permethrin Treated Fabric Materials: Extraction and Analysis by Gas Chromatography-Mass Spectrometry (GC/MS)**

**Note:** The conditions described in this method are optimum for the gas chromatograph employed. These conditions may vary based on the gas chromatograph used. The carrier gas flow rate shall be adjusted so the elution of the first permethrin isomer is greater than five (5) minutes. Alternate methods of extraction and analysis are subject to government approval and laboratory cross correlation prior to implementation.

#### A. Apparatus.

A.1 Analytical Balance. 0.0001g sensitivity, Mettler Toledo, or equal

A.2 Analytical Balance. 0.000001g sensitivity, Mettler Toledo, or equal

A.3 Glassware.

- a. 10-100mL volumetric flasks
- b. Funnel
- c. Pipettes

A.4 Automatic Die Cutter. Freeman Atom, or equal

A.4.1 3-Inch Cutting Die. 3-inch diameter circular steel die cutter

A.5 Extraction Apparatus.

A.5.1 Accelerated Solvent Extractor (ASE) Dionex Corporation or equal

- a. Liquid Nitrogen Cylinder to Deliver High Pressure Gas, 230psi
- b. Complete Extraction Cells, 22mL
- c. Cellulose filters, 1.98cm
- d. 40mL Amber Glass Collection Vials
- e. Solvent Resistant Teflon-Silicone Coated Septa
- f. 3mm-4mm borosilicate glass beads

A.5.2 Soxhlet.

- a. Electric heater with variable control
- b. Heat resistant glass flask when using Soxhlet extractor. The flask shall be a 250mL, flat or round bottom, and single neck.
- c. Extractor condenser
- d. Boiling condenser
- e. Cellulose extraction thimbles

A.6 Agilent 6890N (G1530N) Series Gas Chromatograph(GC). Gas Chromatograph equipped with ChemStation software, or equal

- a. Carrier Gas Cylinder, Appropriate Regulator Set at 80psi
- b. Hewlett-Packard Capillary Column, 5% Phenyl Methyl Siloxane/30.0m x 250 $\mu$ m x 0.25 $\mu$ m nominal, 325°C Max, or equal.
- c. Split Inlet Liner, Packed with Silanized Glass Wool/5mm
- d. Injector Microliter Syringe, Capable of Delivering 1 $\mu$ L
- e. GC Amber Injection Vials and Rinse Vials

A.7 Agilent Series 5973N (G2579A) Mass Spectrometer(MS) or equal.

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

A.8 Ultrasonic cleaner. Branson, or equal

A.9 High temperature convection oven. 500°C Max

A.10 Refrigerator storage. 4°C

B. Reagents.

B.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

B.2 Solvent mixture. Solvent mixture shall be 80% Acetonitrile/Analytical Grade and 20% Methanol/Analytical Grade

B.3 High purity helium carrier gas. Carrier gas shall be  $\geq 99.999\%$

B.4 Cleaning solutions. Cleaning solutions shall be as follows:

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

C. Calibration of apparatus.

C.1 Analytical balance.

C.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.

C.1.2 Manufacturer calibrations. Obtain manufacturer certifications within 12 months prior to taking measurement.

C.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).

C.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 (3) to six (6) hours (see A.9).
- c. Sonicate A.S.E. Cells in the solvent that was used for the extraction (see A.8).

D. Sampling and test specimens.

D.1 Sample size. The sample size (Class 2 coat) shall consist of a minimum of three (3) sample units (garments) unless otherwise noted in the contract or purchase order.

D.2 Test specimens.

a. From each sample garment being evaluated (unlaundered and after 20 launderings), select three (3), 3-inch diameter specimen (use a 3-inch circular cutting die having surface area of 45.6037 cm<sup>2</sup>) for each test condition. Cut specimen from single ply areas so that no two (2) specimen 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). Specimen 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 specimen shall be cut from different ply areas across the garment.

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

E. Standard Preparation.

a. Prepare six (6) concentrations of permethrin standards which are 20, 50, 75, 100, 150, and 200 ng/μL, [1 ng/μL is equal to 1 part-per-million (ppm)]

b. Using the balance specified in A.2, weigh 10 mg (± 1) mg of permethrin crystals and place into a 50 mL volumetric flask and fill with 80% acetonitrile/20% methanol solvent to obtain the standard of 200 ng/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.

F. Extraction procedure (see A.5).

F.1 ASE

F.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.

F.1.2 Quality control. Extract a specimen blank for every run to detect if any carryover of permethrin is significant.

F.1.3 Accelerated solvent extraction procedures.

F.1.3.1 Parameters.

Cell Size	22 mL
Collection vials	60 mL, 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

F.1.3.2 Preparation for analyses. Dilute or concentrate each vial to 40 mL and prepare a 1 mL aliquot from every specimen extraction for GC analysis. Permethrin recovery must be 95% or greater (see F.4).

F.2 Soxhlet. Place each specimen into cellulose Soxhlet extraction thimble. Add 160 mL of the acetonitrile/methanol mixture and boiling chips into a 250 mL flask. Assemble the Soxhlet apparatus and extract the permethrin treated specimen for six (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 40 mL.

F.3 Storage. After the specimen 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 (3) months. When ready to analyze, allow the temperature of the GC vials to equilibrate in the area of evaluation before injection into GC.

F.4 Extraction efficiency.

- a. Select three (3) random specimen from any permethrin treated fabric sample and perform three (3) 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.

#### G. Analytical procedure.

G.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 (10) specimen. If any blank, after multiplying concentration by five (5), 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 carryover. 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.

#### G.2 Standard injection.

a. All six (6) permethrin standards will be injected at the beginning and at the end of each series of specimen 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.

G.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.

#### G.4 Gas Chromatograph/Mass Spectrometer parameters (see A.6).

##### G.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  $\mu\text{L}$  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.

##### G.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 $\mu\text{L}$
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

##### G.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.

#### H. Calculations.



H.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 ( $\text{mg}/\text{cm}^2$ ), with the option of expressing in terms of weight permethrin per weight of specimen (W/W%):

H.1.1 Concentration. The concentration of permethrin in milligrams per square centimeter shall be calculated as follows:

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

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

Where:

40 mL = 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

45.6037  $\text{cm}^2$  = area of specimen

H.1.2 Conversion to permethrin weight percent content (W/W%).

Concentration (W/W%) = [Concentration ( $\text{mg}/\text{cm}^2$ ) multiplied by (surface area )  $\text{cm}^2$  divided by (weight of specimen) mg] multiplied by 100.

I. Report. Report the permethrin concentrations in milligrams per square centimeter squared to the nearest 0.001 mg of the three (3) individual specimen per sample unit (garment) for all units 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 3.4.1 as long as the average of the three (3) specimens meet the specified levels. Although, for initial testing only the single individual specimen allowed to fall outside the specified range in 3.4.1 shall not fall below 0.060  $\text{mg}/\text{cm}^2$  or above 0.170  $\text{mg}/\text{cm}^2$  in which case the sample unit (garment) shall be considered a failure whether or not the sample average falls within the minimum/maximum range specified and 3.4.1. A single retest shall be allowed; when a garment fails, a complete set of specimens shall be pulled from an additional sample unit (garment) and retested. The retest shall then be used to rate pass or fail.

4.5.2 Percent (%) biting protection assay. Percent (%) bite protection shall be measured on a finished permethrin treated garment, Class 2, under three (3) test conditions and using a control specimen (non-permethrin treated, garment, Class 1) against the two (2) selected insect species specified in 4.5.2.3. The three (3) test conditions shall be one (1) unlaundered, two (2) after 20 launderings, and three (3) after 50 launderings, from garments produced in the same lot. Corresponding permethrin content for each of these conditions will be measured as specified in 4.5.1 to correlate biological toxicity with the particular garment treatment used to meet requirements specified in 3.4.1.

4.5.2.1 Number of determinations. Three (3) determinations will be run for each of the two (2) insect species (see 4.5.2.3.3). Each determination for each insect is conducted with three (3) volunteers using three (3) different fabric conditions; unlaundered, after 20 launderings and after 50 launderings and compared to non-treated control. A single untreated unlaundered control sleeve can be used for the three (3) determinations for each volunteer provided that the control is run against the same insect population, on the same day the specimen being tested, and tested on an arm that has not been used for testing a treated sleeve (see 4.5.2.3.6). The total number of specimen for the three (3) determinations is outlined below. It is estimated that one (1) coat yields three (3) specimen and one (1) trouser yields three (3) specimen consisting of largely a single ply fabric area (see 4.5.2.2). See 6.6.

<u>Number of Insect tests</u> X	<u>Number of Determinations</u> X	<u>Number of Fabric conditions</u>	=	<u>Total Specimens per garment type</u>
Mosquitoes <u>1/</u>	3 x	3 x	=	9 <u>2/</u>
Control <u>2/</u>	1 x	1 x	=	1 <u>2/</u>

1/ One (1) set of treated specimens will be used twice to test each mosquito species

2/ Total garments estimated, required to conduct three (3) determinations are;

Three (3) treated coats and one (1) untreated coat

4.5.2.2 Specimen size. Specimen will be cut to the shape and dimensions illustrated in Figure 6. Specimen 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 4.5.2.3.5). Specimen 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.

4.5.2.3 Procedure. The procedure to conduct biting protection assay is derived from the “EPA Product Performance Test Guidelines, OPPTS 810.3700, Insect Repellents For Human Skin and Outdoor Premises, December 1999 (see 2.2.2), and is described in part below, noting any exceptions to this procedure.

4.5.2.3.1 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.

4.5.2.3.2 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 4.5.2.2 (see Figure 6) 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.

4.5.2.3.3 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 mosquitoes is a contractual requirement. Insect genus, species and subspecies, colony origin and approximate age shall be used as specified below and in 4.5.2.3.3.

Mosquitoes:

Aedes (Stegomyia) aegypti

Anopheles albimanus

4.5.2.3.3.1 Insect characteristics. Mosquito ages employed for these studies shall be 5 to 11 days old after emergence from the pupal stage. Mosquitoes shall be laboratory-reared and disease free, and have been kept in stock cages containing both males and females. The mosquitoes will be maintained on 10% sugar water and have not been provided a blood meal. Methods should be used to preselect females for the studies. Use either a hand draw box or suitable aspirating device to collect host-seeking mosquitoes for the required cage density (see 4.5.2.3.3.3).

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

4.5.2.3.3.3 Cage conditions. A cage density of 200 ( $\pm 25$ ) female insects per cage is required to meet the biting pressure density of at least one (1) female mosquito per 300 cm<sup>3</sup> cage volume. (Cages shall be 60,000 ( $\pm 6,000$ ) 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 three (3) sides, or an aluminum bottom panel with light weight clear plastic on two (2) sides. The top of the cage and side opposite the cloth sleeve should consist of screen rather than plastic. Tests shall be conducted with fluorescent lights on and under room conditions (22-27°C, and 30-80% RH). Tests should not be conducted if the temperature or humidity is outside of the specified range.

4.5.2.3.4 Subjects. A minimum of three (3) test volunteers shall be used in each study for each insect species at each test facility. The same three (3) subjects can be used to evaluate different insect species done at the same facility. Due to the replication, the number of volunteers is now decreased from the five (5) or more recommended in OPPTS 810.3700, section (c)(3)(i). Collection of data from both females and males are preferred for the study. Cosmetics and alcohol shall be avoided 12 hours 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.

4.5.2.3.5 Volunteer's test area. The test area shall consist of the region from the wrist to approximately 1/2-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 4.5.2.3.2. 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.

4.5.2.3.6 Controls. For each set of specimen, a control shall be conducted. The control shall consist of the same fabric as the specimen, will not be laundered and will not contain the insect protection treatment. It will be identical in size to the test swatch (see 4.5.2.2). Controls will be cut in clean area and stored in separate plastic bags to avoid residual permethrin contamination. The controls will be tested on the arm opposite the treated specimen, or on the same arm used for experiments provided that the control is tested prior to testing treated specimens.

4.5.2.3.7 Biting exposure. Arms containing the controls and treated specimen shall be exposed to a cage of insects for 15 minutes. The order of testing specimens on the arm will be sequential and in order of the most laundered to least laundered. Therefore, if the same arm will be used to test the control and specimens, the order of testing shall be control, followed by the specimen laundered 50 cycles, followed by the specimen laundered 20 cycles, and then conclude with testing the unlaundered treated specimen. Tests should be conducted with as little elapsed time as possible in between testing of a volunteer's arms.

4.5.2.3.8 Raw data. Raw data shall consist of the insect information as described in 4.5.2.3.3, 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.

4.5.2.4 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 (three (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 volunteers tested. Total % bite protection will be calculated by averaging the overall results for each species and meet the requirements set forth in paragraph 3.4.2.

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

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.

4.5.3 Toxicity test. When required, (see 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the coat is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see 2.3). If the toxicity requirement (see 3.13) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Permethrin packaging (Class 2 only) Every box containing permethrin treated uniforms must be labeled according to EPA requirements as stated in Federal Insecticide, Fungicide And Rodenticide Act (FIFRA) (see 2.2.2).

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory or contractually binding.)

6.1 Intended use. The coat is for wear by military personnel in the United States Army as a combat uniform in garrison and combat missions.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this Purchase Description document.
- b. Type, style, class and sizes, required (see 1.2).
- c. The specific issue of individual documents referenced (see 2.2).
- d. When first article sample is required (see 3.1, 4.2 and 6.3).
- e. Camouflage pattern required (see 3.3.1, 3.3.1.1 and 3.3.1.2).
- f. Pattern required (see 3.10).
- g. When toxicity testing is required (see 3.13 and 4.5.3)
- h. Conformance inspection acceptance quality limits (see 4.3).
- i. Inspection conditions (see 4.4).
- j. Packaging requirements (see 5.1 and 5.2).

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 Approved EPA permethrin registrations. Samples of approved permethrin treatment registrations and labels are shown at the EPA web site: <http://oaspub.epa.gov/pestlabl/ppls.home>

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

6.5 Permethrin garment application. To assist in minimizing defects that may be caused during the permethrin garment application process, all garment closures should be engaged prior to the application.

6.6 Percent insect bite protection. The following facilities are known to perform percent bite protection testing in conformance with 4.5.2.

Aedes aegypti and Anopheles albimanus:

United States Department of Agriculture-Agriculture Research Service  
 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 Unit  
 Ph: (352) 374-5917  
 E-mail: uli.bernier@ars.usda.gov

6.7 Pattern guide factors & measurement tables. Measurements in tables in 6.7.1 - 6.7.2 are dimensional measurements using the given stretch factor.

6.7.1 Stretch factor (Type I only). Length (X) x Width (Y) axis, 2.0% x 1.5%.

6.7.1.1 Style A. Unisex, Type I only stretch factor.

Style A. Unisex, Type I only

Size	XX-Short	X-Short	Short	Regular	Long	X-Long	XX-Long	Tol.
<b>Back Length, <math>\frac{1}{2}</math></b>								
X-Small	25-5/8	26-5/8	27-5/8	29-1/8	30-1/2	31-7/8	-----	± 1/2
Small	26-1/8	27-1/8	28-1/8	29-5/8	31	32-3/8	-----	
Medium	26-5/8	27-5/8	28-5/8	30-1/8	31-1/2	32-7/8	34-1/4	
Large	27-1/8	28-1/8	29-1/8	30-5/8	32	33-3/8	34-3/4	
X-Large	27-5/8	28-5/8	29-5/8	31-1/8	32-1/2	33-7/8	35-1/4	
XX-Large	-----	-----	-----	31-5/8	33	34-3/8	35-3/4	

Style A. Unisex, Type I only - Continued

Size	XX-Short	X-Short	Short	Regular	Long	X-Long	XX-Long	Tol.
<b>Half Chest, <u>2/</u></b>								
X-Small	20-3/4	20-3/4	20-3/4	20-3/4	20-3/4	20-3/4	-----	± 1/2
Small	22-3/4	22-3/4	22-3/4	22-3/4	22-3/4	22-3/4	-----	
Medium	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	
Large	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	
X-Large	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	
XX-Large	-----	-----	30-3/4	30-3/4	30-3/4	30-3/4	30-3/4	
<b>Sleeve Length, <u>3/</u></b>								
X-Small	20	21	22	23	24	25	-----	± 1/2
Small	20-1/4	21-1/4	22-1/4	23-1/4	24-1/4	25-1/4	-----	
Medium	20-1/2	21-1/2	22-1/2	23-1/2	24-1/2	25-1/2	26-1/2	
Large	20-3/4	21-3/4	22-3/4	23-3/4	24-3/4	25-3/4	26-3/4	
X-Large	21	22	23	24	25	26	27	
XX-Large	-----	-----	-----	24-1/4	25-1/4	26-1/4	27-1/4	

1/, 2/, 3/ - See 3.12.1.1 for methods of measurement.

6.7.1.2 Style B. Female, Type I only stretch factor.

Style B. Female, Type I only

Size	30	33	36	39	Tol.
<b>Back Length, <u>1/</u></b>					
X-Short	24	24-1/2	25	25-1/2	± 1/2
Short	25	25-1/2	26	26-1/2	
Regular	26	26-1/2	27	27-1/2	
Long	27	27-1/2	28	28-1/2	
X-Long	28	28-1/2	29	29-1/2	
<b>Half Chest <u>2/</u></b>					
X-Short	20	21-1/2	23	24-1/2	± 1/2
Short	20	21-1/2	23	24-1/2	
Regular	20	21-1/2	23	24-1/2	
Long	20	21-1/2	23	24-1/2	
X-Long	20	21-1/2	23	24-1/2	

Style B. Female, Type I only - Continued

<b>Size</b>	<b>30</b>	<b>33</b>	<b>36</b>	<b>39</b>	<b>Tol.</b>
<b>Sleeve Length, <u>3/</u></b>					
X-Short	21-1/2	21-3/4	22	22-1/4	± 1/2
Short	22	22-1/4	22-1/2	22-3/4	
Regular	22-1/2	22-3/4	23	23-1/4	
Long	23	23-1/4	23-1/2	23-3/4	
X-Long	23-1/2	23-3/4	24	24-1/4	
<b>Shoulder, <u>4/</u></b>					
X-Short	15-3/8	16-1/8	16-7/8	17-5/8	± 1/2
Short	15-3/8	16-1/8	16-7/8	17-5/8	
Regular	15-3/8	16-1/8	16-7/8	17-5/8	
Long	15-3/8	16-1/8	16-7/8	17-5/8	
X-Long	15-3/8	16-1/8	16-7/8	17-5/8	
<b>Half Sweep, <u>5/</u></b>					
X-Short	21-1/2	23	24-1/2	26	± 1/2
Short	21-1/2	23	24-1/2	26	
Regular	21-1/2	23	24-1/2	26	
Long	21-1/2	23	24-1/2	26	
X-Long	21-1/2	23	24-1/2	26	
<b>Half Sleeve Opening, <u>6/</u></b>					
X-Short	5-7/8	6-1/8	6-3/8	6-5/8	± 1/2
Short	5-7/8	6-1/8	6-3/8	6-5/8	
Regular	5-7/8	6-1/8	6-3/8	6-5/8	
Long	5-7/8	6-1/8	6-3/8	6-5/8	
X-Long	5-7/8	6-1/8	6-3/8	6-5/8	

1/, 2/, 3/, 4/, 5/, 6/ - See 3.12.1.1 for methods of measurement.

6.7.2 Stretch factor (Type II & III only). Length (X) x Width (Y) axis, 3.0% x 1.5%.

6.7.2.1 Style A. Unisex, Type II & III only, stretch factor.



Style A. Unisex, Type II and III only

Size	XX-Short	X-Short	Short	Regular	Long	X-Long	XX-Long	Tol.
<b>Back Length, <u>1/</u></b>								
X-Small	26	27	28	29-1/2	30-7/8	32-1/4	---	± 1/2
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	
Large	27-1/2	28-1/2	29-1/2	31	32-3/8	33-3/4	35-1/8	
X-Large	28	29	30	31-1/2	32-7/8	34-1/4	35-5/8	
XX-Large	---	---	---	32	33-3/8	34-3/4	36 1/8	
<b>Half Chest, <u>2/</u></b>								
X-Small	20-3/4	20-3/4	20-3/4	20-3/4	20-3/4	20-3/4	-----	± 1/2
Small	22-3/4	22-3/4	22-3/4	22-3/4	22-3/4	22-3/4	-----	
Medium	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	24-3/4	
Large	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	26-3/4	
X-Large	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	28-3/4	
XX-Large	-----	-----	30-3/4	30-3/4	30-3/4	30-3/4	30-3/4	
<b>Sleeve Length, <u>3/</u></b>								
X-Small	20-1/4	21-1/4	22-1/4	23-1/4	24-1/4	25-1/4	---	± 1/2
Small	20-1/2	21-1/2	22-1/2	23-1/2	24-1/2	25-1/2	---	
Medium	20-3/4	21-3/4	22-3/4	23-3/4	24-3/4	25-3/4	26-3/4	
Large	21	22	23	24	25	26	27	
X-Large	21-1/4	22-1/4	23-1/4	24-1/4	25-1/4	26-1/4	27-1/4	
XX-Large	---	---	---	24-1/2	25-1/2	26-1/2	27-1/2	

1/, 2/, 3/ - See 3.12.1.1 for methods of measurement.

6.7.2.2 Style B. Female, Type II and III only, stretch factor.

Style B. Female, Type II and III only

Size	30	33	36	39	Tol.
<b>Back Length, <u>1/</u></b>					
X-Short	24-7/8	25-3/8	25-7/8	26-3/8	± 1/2
Short	25-7/8	26-3/8	26-7/8	27-3/8	
Regular	26-7/8	27-3/8	27-7/8	28-3/8	
Long	27-7/8	28-3/8	28-7/8	29-3/8	
X-Long	28-7/8	29-3/8	29-7/8	30-3/8	
<b>Half Chest <u>2/</u></b>					
X-Short	20	21-1/2	23	24-1/2	± 1/2
Short	20	21-1/2	23	24-1/2	
Regular	20	21-1/2	23	24-1/2	
Long	20	21-1/2	23	24-1/2	
X-Long	20	21-1/2	23	24-1/2	

## Style B. Female, Type II and III only – Continued

Size	30	33	36	39	Tol.
<b>Sleeve Length, <u>3/</u></b>					
X-Short	23-7/8	22-1/8	22-3/8	22-5/8	± 1/2
Short	22-3/8	22-5/8	22-7/8	23-1/8	
Regular	22-7/8	23-1/8	23-3/8	23-5/8	
Long	23-3/8	23-5/8	23-7/8	24-1/8	
X-Long	23-7/8	24-1/8	24-3/8	24-5/8	
<b>Shoulder, <u>4/</u></b>					
X-Short	15-3/8	16-1/8	16-7/8	17-5/8	± 1/2
Short	15-3/8	16-1/8	16-7/8	17-5/8	
Regular	15-3/8	16-1/8	16-7/8	17-5/8	
Long	15-3/8	16-1/8	16-7/8	17-5/8	
X-Long	15-3/8	16-1/8	16-7/8	17-5/8	
<b>Half Sweep, <u>5/</u></b>					
X-Short	21-1/2	23	24-1/2	26	± 1/2
Short	21-1/2	23	24-1/2	26	
Regular	21-1/2	23	24-1/2	26	
Long	21-1/2	23	24-1/2	26	
X-Long	21-1/2	23	24-1/2	26	
<b>Half Sleeve Opening, <u>6/</u></b>					
X-Short	5-7/8	6-1/8	6-3/8	6-5/8	± 1/2
Short	5-7/8	6-1/8	6-3/8	6-5/8	
Regular	5-7/8	6-1/8	6-3/8	6-5/8	
Long	5-7/8	6-1/8	6-3/8	6-5/8	
X-Long	5-7/8	6-1/8	6-3/8	6-5/8	

1/, 2/, 3/, 4/, 5/, 6/ - see 3.12.1.1 for methods of measurement.

6.8 Subject term (key word) listing.

Clothing  
Clothing, Flame Resistant  
Insect protection  
Operation Enduring Freedom Camouflage Pattern (OEF-CP)  
Operational Camouflage Pattern (OCP)  
Permethrin  
Universal Camouflage Pattern (UCP)

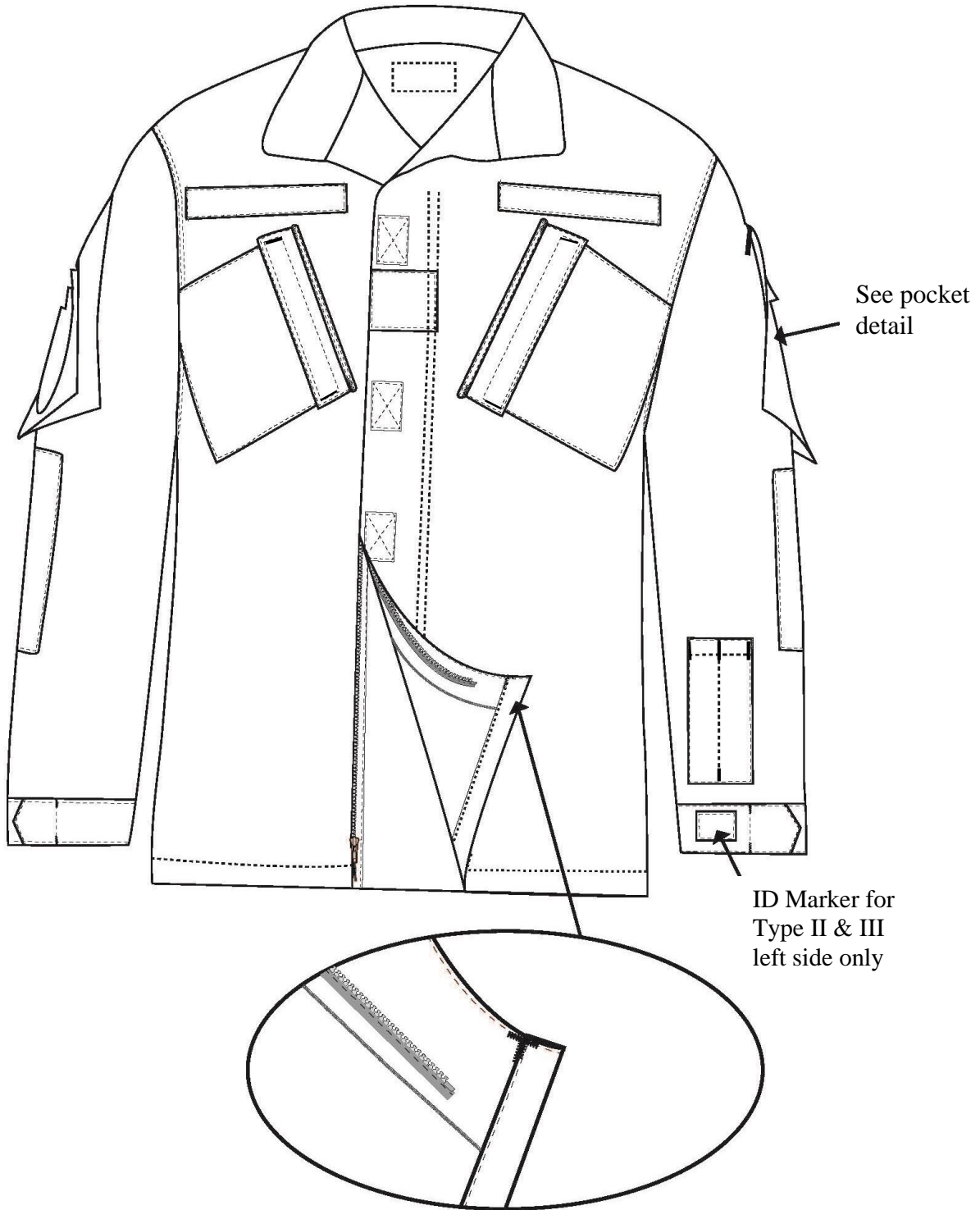


FIGURE 1. Coat Front, Army Combat Uniform

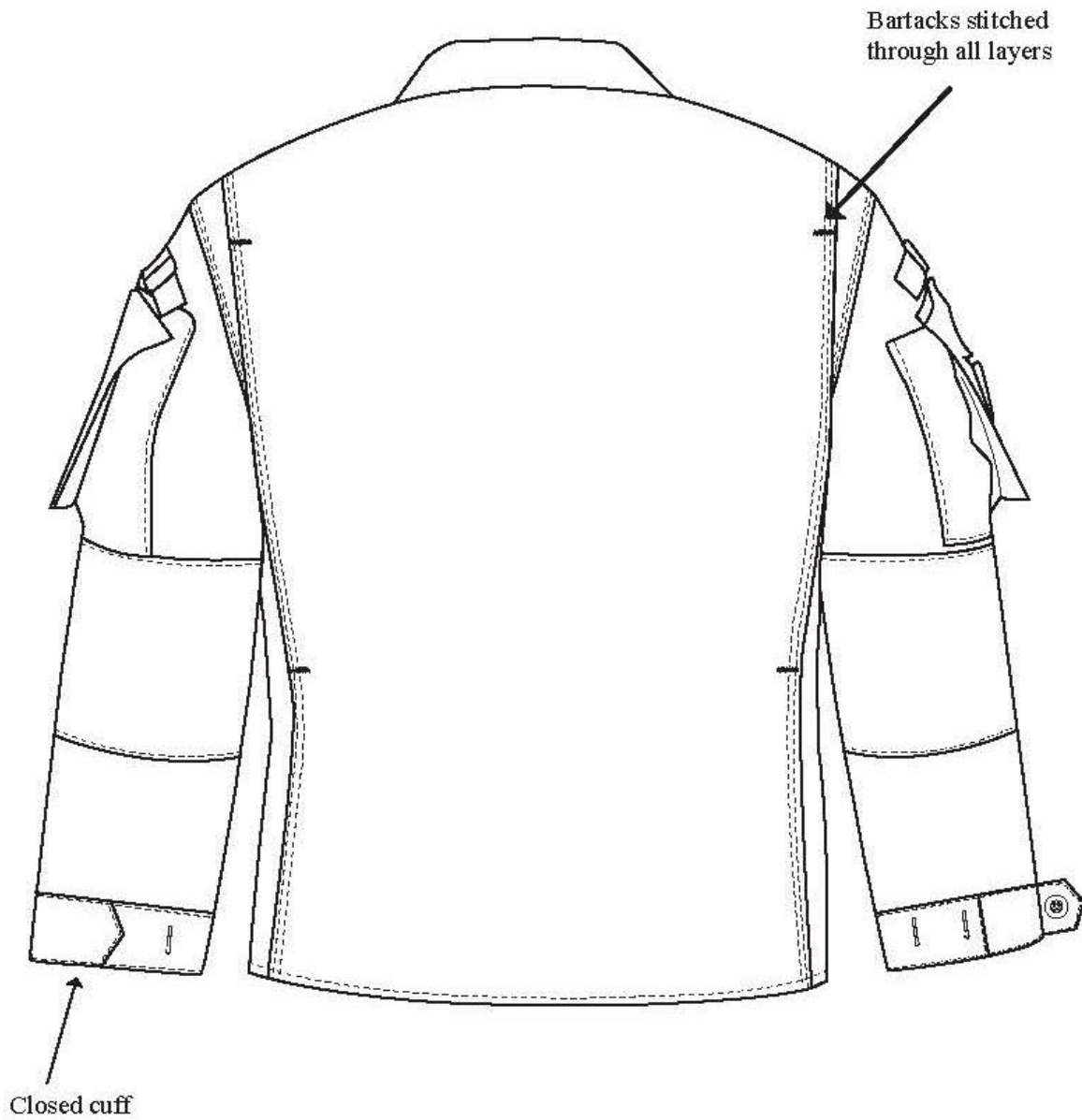


FIGURE 2. Coat Back, Army Combat Uniform

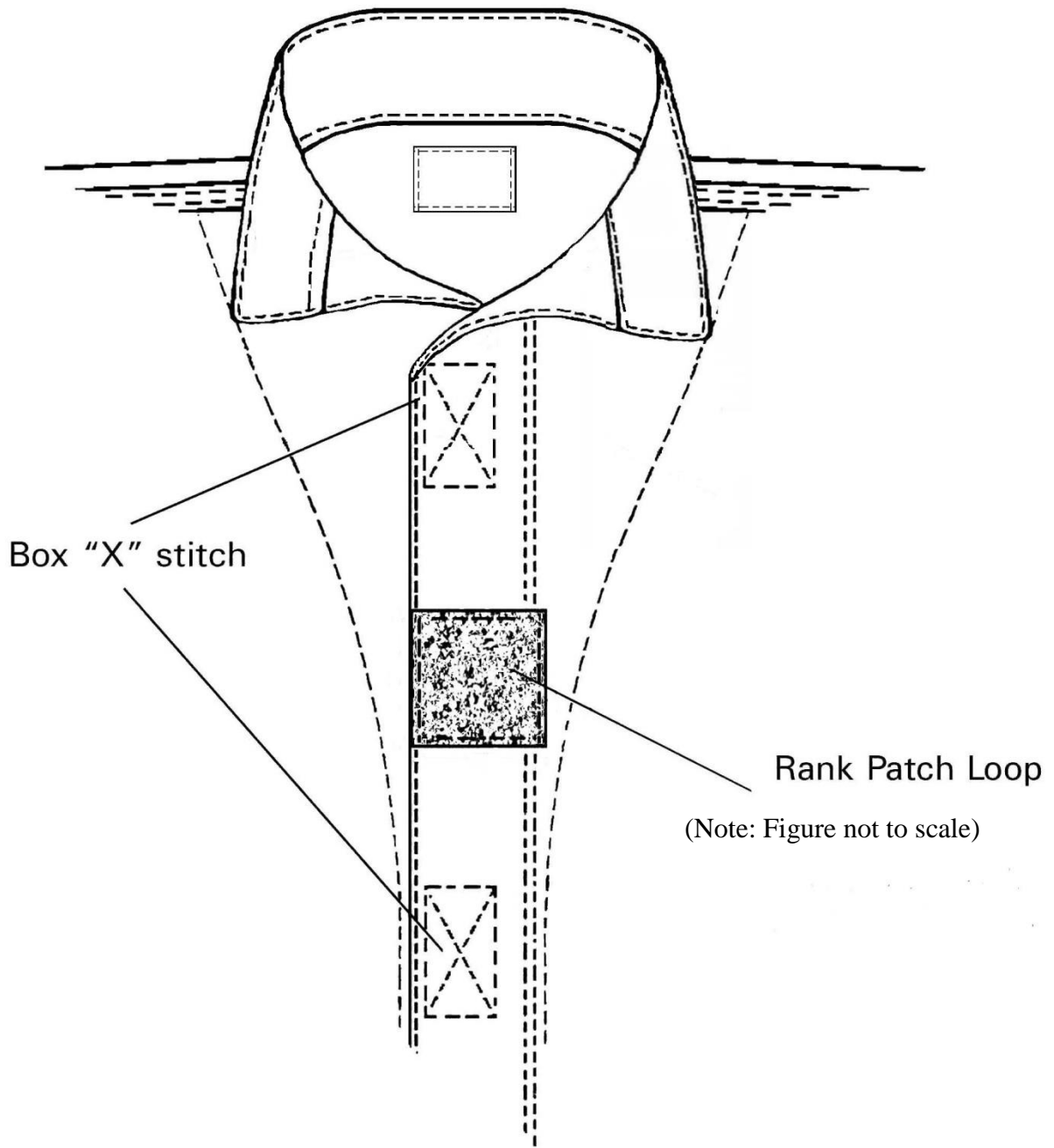


FIGURE 3. Coat Collar, Army Combat Uniform

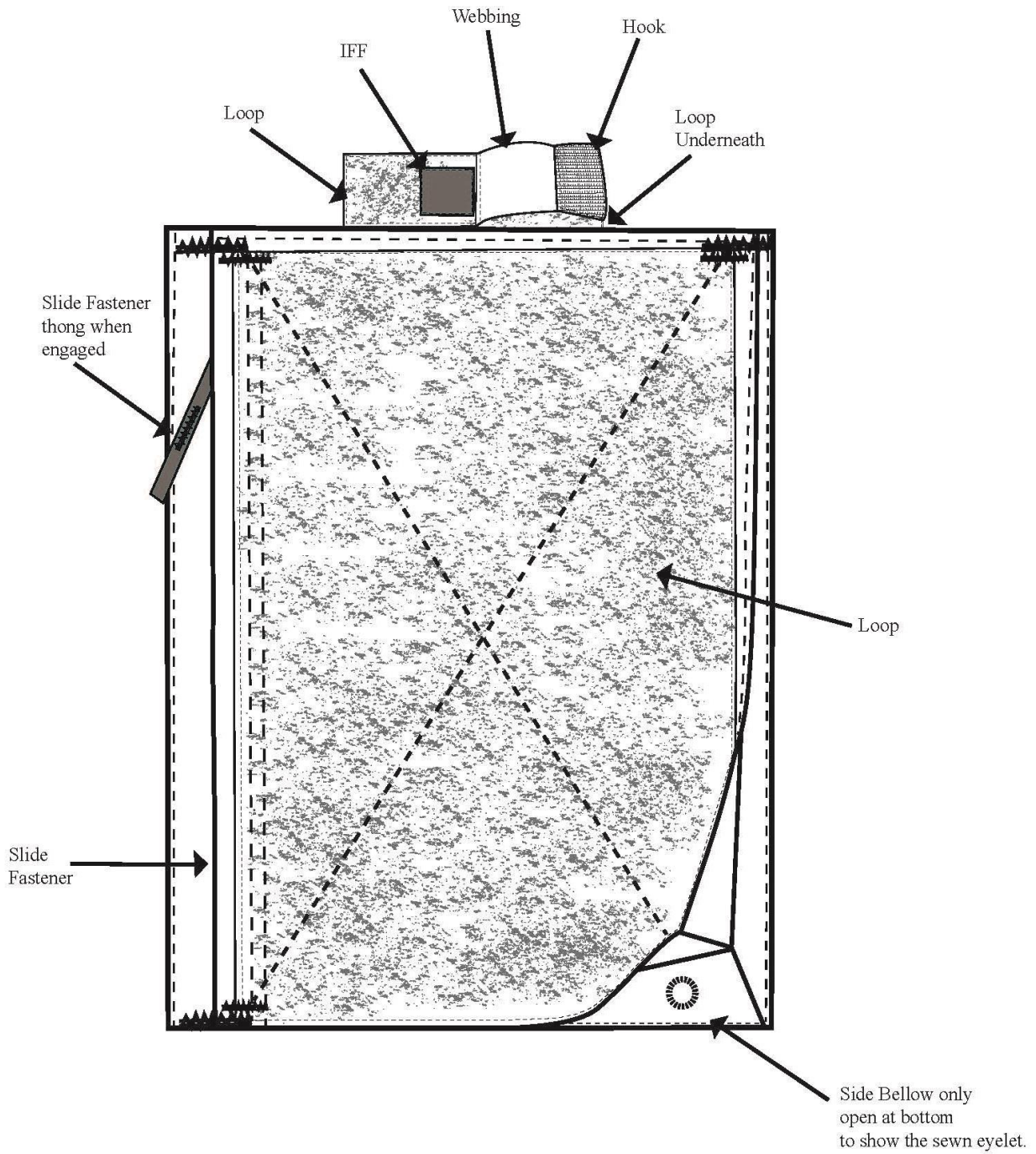


FIGURE 4. Coat Upper Sleeve Pocket, Army Combat Uniform

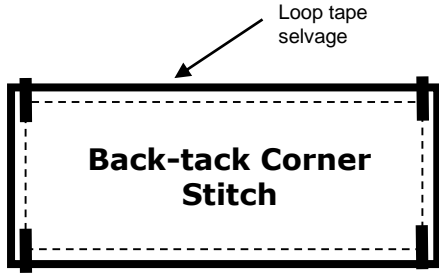


Figure 5a – Back-tack Corner Stitch

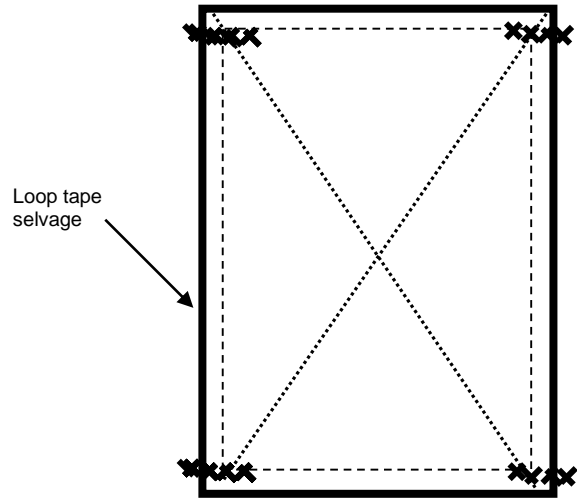


Figure 5b – Sleeve Pocket "X" Stitch with Bar-tack Stitch

FIGURE 5. Loop Tape, Reinforcement Techniques.

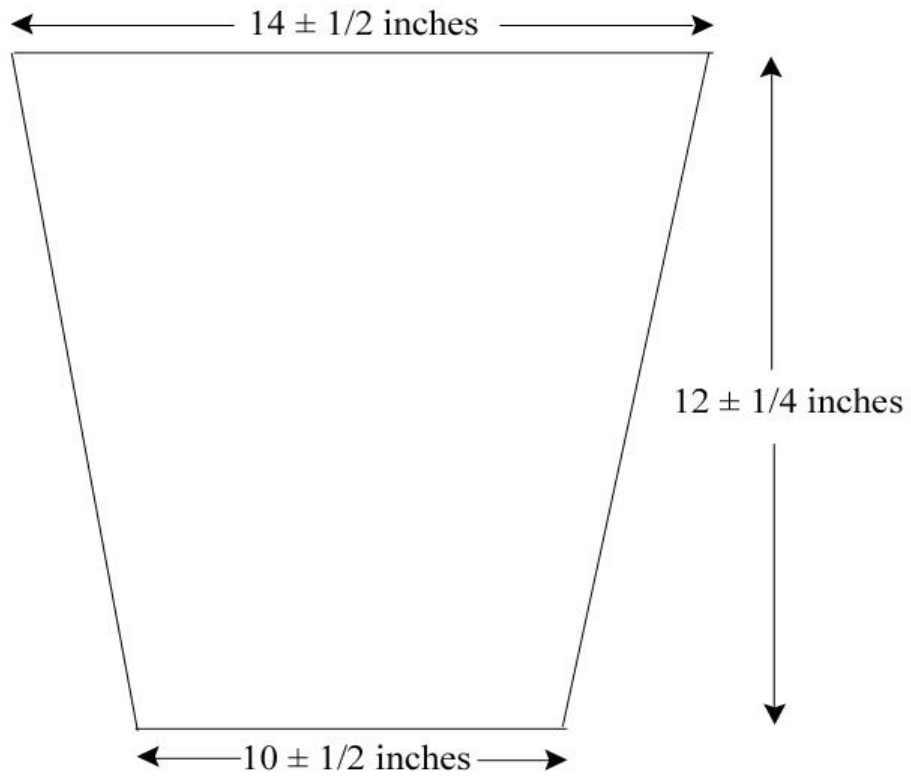


FIGURE 6. Test Specimen, % Bite Protection Test

CUSTODIAN:  
Army – GL

PREPARING ACTIVITY:  
DLA – CT