

INCH-POUND  
GL-PD 06-06D  
19 August 2016  
SUPERSEDING  
GL-PD-06-06C  
4 March 2016

## PURCHASE DESCRIPTION

### JACKET, EXTREME COLD/WET WEATHER (GEN III)

This Purchase Description is approved for use by all Departments and Agencies of the Department of Defense (DoD).

#### SCOPE

1.1 Scope. This Purchase Description (PD) covers the requirements for a waterproof, extreme cold/wet weather jacket, which serves as a layer of the GEN III Extended Cold Weather Clothing System (ECWCS).

1.2 Classification. The jacket will be of the following classes and sizes, as specified.

##### 1.2.1 Classes.

- Class 1 - Universal Camouflage Pattern (UCP)
- Class 2 - Operation Enduring Freedom Camouflage Pattern (OEF-CP)
- Class 3 - Operational Camouflage Pattern (OCP)
- Class 4 - Desert MARPAT

##### 1.2.2 Schedule of sizes.

#### SCHEDULE OF SIZES

X-Small	Small	Medium	Large	X-Large	XX-Large
Short	Short	Short			
Regular	Regular	Regular	Regular	Regular	Regular
	Long	Long	Long	Long	Long
				X-Long	X-Long

Comments, suggestions, or questions on this document should be addressed to: Department of the Army, Natick Soldier Research, Development and Engineering Center, 10 General Greene Avenue, Natick, MA 01760-5019. ATTN: RDNS-SEW-EWC

AMSC N/A

FSC 8415

Distribution Statement. "GOVERNMENT INTELLECTUAL PROPERTY AND  
TRADEMARK RIGHTS NOTIFICATION (See 6.7)

## APPLICABLE DOCUMENTS.

2.1 General. The documents listed in this section are specified in sections 3 and 4 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 and 4 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## FEDERAL STANDARDS

FED-STD-4 – Glossary of Fabric Imperfections

## COMMERCIAL ITEM DESCRIPTIONS

A-A-50199 - Thread, Polyester Core, Cotton or Polyester-Covered

A-A-55126 - Fastener Tapes, Hook and Loop, Synthetic

A-A-55634 - Zipper, (Fastener, Slide Interlocking)

A-A-59826 - Thread, Nylon

A-A-59963 - Thread, Polyester

## DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-32075 - Label: For Clothing, Equipage, and Tentage (General use)

MIL-DTL-32439 - Cloth, Duck, Textured Nylon

MIL-PRF-5038 - Tape, Textile and Webbing, Textile, Reinforcing Nylon

MIL-STD-1487 - Glossary of Cloth Coating Imperfections

MIL-T-3530 - Thread and Twine, Mildew Resistant or Water Repellent Treated

MIL-W-5664 - Webbing, Textile Elastic

(Copies of these documents are available online at <http://quicksearch.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 cited in the solicitation or contract.

## DRAWINGS

### U.S. ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

- 2-1-2519 - Universal Camouflage, ARPAT, 3-Color
- 2-1-2519-1 - Universal Camouflage, ARPAT, Desert Sand 500
- 2-1-2519-2 - Universal Camouflage, ARPAT, Urban Gray 501
- 2-1-2519-3 - Universal Camouflage, ARPAT, Foliage Green 502
- 2-1-2529 - Desert MARPAT- 4 color (Light Tan 479)
- 2-1-2530 - Desert MARPAT- 4 color (Urban Tan 478)
- 2-1-2531 - Desert MARPAT- 4 color (Light Coyote 481 with EGA symbol)
- 2-1-2532 - Desert MARPAT- 4 color (Highland 480)
- 2-1-2592 - Operational Camouflage Pattern (OCP)

NOTE: For any other camouflage patterns noted in the solicitation and contract, please contact contracting activity and the necessary samples, drawings and or patterns will be provided.

(Copies of drawings are available from the U.S. Army Natick Soldier Research Development and Engineering Center, Natick Soldier Systems Center, 10 General Greene Avenue, Natick, MA 01760-5019 ATTN: RDNS-SEW-EWC)

## CODE OF FEDERAL REGULATIONS

- 16 CFR Part 1500 – Federal Hazardous Substances Act Regulations
- 29 CFR Part 1910 – Occupational Safety and Health Standards

(Copies are available online at <http://www.access.gpo.gov> or from U.S. Government Printing Office, 732 North Capitol Street N.W., Washington, DC 20401.)

(Copies of purchase descriptions, specifications, standards, drawings and publications required by contractors in connection with specification procurement functions should be obtained from the procuring activity or as directed by the Contracting Officer.)

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 cited in the solicitation or contract.

## AEROSPACE INDUSTRIES ASSOCIATION OF AMERICA INC.

- AIA/NAS NASM 20652/1B - Eyelets, Metallic, and Eyelet Washers, Metallic

(Copies are available online at <http://www.aia-aerospace.org> or from the Aerospace Industries Association of America Inc, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928 or from the IHS Standards Store at <http://aero-defense.ihs.com/documents>)

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

- AATCC Test Method 8 - Colorfastness to Crocking: AATCC Crockmeter Method
- AATCC Test Method 15 - Colorfastness to Perspiration
- AATCC Test Method 16.2 - Colorfastness to Light: Carbon Arc
- AATCC Test Method 16.3 - Colorfastness to Light: Xenon
- AATCC Test Method 20 - Fiber Analysis: Quantitative
- AATCC Test Method 22 - Water Repellency: Spray Test
- AATCC Test Method 61 - Colorfastness to Laundering: Accelerated
- AATCC Test Method 96 - Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics, Except Wool
- AATCC Test Method 135 - Dimensional Changes in Automatic Home Laundering of Woven and Knitted Fabrics, Except Wool
- AATCC Test Method 150 - Dimensional Changes in Automatic Home Laundering of Garments
- AATCC Evaluation Procedure 1 - Gray Scale for Color Change
- AATCC Evaluation Procedure 2 - Gray Scale for Staining
- AATCC Evaluation Procedure 8 - Chromatic Transference Scale, 9-Step
- AATCC Evaluation Procedure 9 - Visual Assessment of Color Difference of Textiles

(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

- ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(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 D276 - Standard Test Method for Identification of Fibers in Textiles
- ASTM D747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
- ASTM D751 - Standard Test Method for Coated Fabrics
- ASTM D1776/D1776M - Standard Practice for Conditioning and Testing Textiles
- ASTM D2061 - Standard Test Methods for Strength Tests for Zippers
- ASTM D2582 - Standard Test Method for Puncture Propagation Tear, Resistance of Plastic Film and Thin Sheeting
- ASTM D3776/D3776M - Standard Test Method for Mass Per Unit Area (Weight) of Fabric
- ASTM D5034 - Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
- ASTM D6193 - Standard Practice of Stitches and Seams
- ASTM E96/E96M - Standard Test Method for Water Vapor Transmission of Materials
- ASTM F392/F392M - Standard Test Method for Flex Durability of Flexible Barrier Materials

(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 19428-2959.)  
OTHER PUBLICATIONS

Repeat Insult Patch Test – Modified Draize Procedure  
Principles and Methods of Toxicology, A Wallace Hayes (editor)

(Copies are available on-line at <http://www.taylorandfrancis.com/> or from Taylor and Francis, 7625 Empire Drive, Florence, KY 41042-2919.)

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.

## REQUIREMENTS

### 3.1 Inspections.

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

3.1.2 Conformance inspection. When specified (see 6.2), a sample shall be subjected to conformance inspection in accordance with 4.3.

3.2 Guide samples. Samples, when furnished, are solely for guidance and information to the contractor. Variations from the specification may appear in the sample in which case this specification shall govern.

3.3 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.

3.4 Design. The hard shell jacket shall have a front slide fastener (zipper) with two (2) slide fastener (zipper) pass through front middle pockets. A hood with hook and loop back adjustability, an elastic cord-lock tunnel in the front, a visor and a hide-away collar. The sleeves shall have a built in elastic and a tab with hook and loop for further adjustability (see figures 1, 2, and 5). The hard shell jacket shall be waterproof.

### 3.5 Basic materials.

3.5.1 Standard sample. All cloth materials shall match the applicable standard sample for shade and appearance on the face side, and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

3.5.2 Basic shell material. The cloth shall be a waterproof and moisture vapor permeable,

laminated cloth utilizing 100 percent nylon, ripstop face fabric. The color of the face side of the cloth shall be Universal Camouflage Pattern (UCP) for Class 1, Operation Enduring Freedom Camouflage Pattern (OEF-CP) for Class 2, Operational Camouflage Pattern (OCP) for Class 3, and Desert MARPAT for Class 4. The color of the back side of the cloth shall be a subdued color approximating Universal Camouflage pattern, Foliage Green 504 or Urban Gray 505 for Class 1; Operation Enduring Freedom Camouflage Pattern (OEF-CP), Cream 524 or Tan 525 for Class 2; Operational Camouflage Pattern (OCP), Dark Cream 559 or Tan 525 for Class 3; and Desert MARPAT, Light Tan 479 or Coyote 498 for Class 4. A grey shade may be used as an alternate color for the back side of the cloth for Classes 1, 2, 3 and 4.

3.5.2.1 Physical requirements. The cloth shall meet the physical requirements specified in Table I when tested in accordance with Table VIII.

TABLE I. Basic shell material and end item - physical requirements.

Characteristic	Requirement
Basic Shell Material	
Weight, oz/sq. yd (max.)	3.7
Breaking strength, lbs (min.)	
Warp	100
Filling	100
Tearing strength, kgf (min.)	
Warp	2.3
Filling	2.8
Hydrostatic Resistance, psi (min.)	
Initial	100
After strength of coating	90
After high humidity	90
After diethyltoluamide	
Initial	90
After laundering	90
Moisture vapor transmission rate, g/m <sup>2</sup> /24h (min.)	
Initial	
Procedure B	650
Procedure BW	4500
After synthetic perspiration	
Procedure B	650
Procedure BW	4500
Stiffness, in-lbs (max.)	
At 32°F	0.001
At 70°F	0.001
Blocking, rating (max.)	No. 1

TABLE I. Basic shell material and end item - physical requirements - Continued

Characteristic	Requirement
Basic Shell Material - Continued	
Water permeability	
Initial	No leakage
After synthetic perspiration	
Initial and After laundering	No leakage
After physical surface appearance	No leakage
After flex (70°F)	
Warp and filling directions	No leakage
After diethyltoluamide	
Initial after laundering	No leakage
Spray rating, rating	
Initial	100, 100, 90
After 5 launderings	100, 90, 90
Resistance to organic liquid, pass/fail	
Initial	No wetting
After 5 launderings	No wetting
Dimensional stability, percent (max.)	
Warp	4.0
Filling	2.0
Color	See 3.5.2.2
Colorfastness to:	
Laundering (after 3 cycles)	See 3.5.2.2.5 and Table II
Light (40 AFU or 170 kJ/m <sup>2</sup> nm @ 420nm)	See 3.5.2.2.5 and Table II
Perspiration (Acid and Alkaline)	See 3.5.2.2.5 and Table II
Crocking (Dry and Wet)	See 3.5.2.2.5 and Table II
Pattern Execution	See 3.5.2.3 & 3.5.2.3.1 to
Spectral Reflectance	See 3.5.2.4 & Tables III, IV, IVA
Toxicity	See 3.11 <u>1/</u>
End Item	
Sealed seams	See 3.7.2

1/ The finished cloth shall not present a dermal health hazard when used as intended.

### 3.5.2.2 Color.

3.5.2.2.1 Class 1, Universal Camouflage Pattern (UCP). The color of the face side of the cloth shall be Universal Camouflage pattern and shall match Desert Sand 500, Urban Gray 501, and Foliage Green 502. Each area of the specific color of the pattern shall be in accordance with the applicable standard sample or drawing number 2-1-2519.

3.5.2.2.2 Class 2, Operation Enduring Freedom Camouflage Pattern (OEF-CP). The color of the face side of the cloth shall be Operation Enduring Freedom Camouflage Pattern (OEF-CP) dyed to a

ground shade either matching or approximating Cream 524 and then shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Cream 524, the remaining six (6) colors shall be printed as appropriate, for the Tan 525, Pale Green 526, Olive 527, Dark Green 528, Brown 529 and Dark Brown 530 areas of the pattern. When the ground shade is not dyed to approximate Cream 524 all seven (7) colors of the camouflage pattern shall be printed to match all seven (7) colors. Each area of the specific color of the pattern shall be in accordance with the applicable standard sample (see 6.4).

3.5.2.2.3 Class 3, Operational Camouflage Pattern (OCP). The color of the face side of the cloth shall be Operational Camouflage Pattern (OCP) dyed to a ground shade either matching or approximating Dark Cream 559 and then shall be overprinted with the camouflage pattern. When the ground shade is dyed to match Dark Cream 559, the remaining six (6) colors shall be printed as appropriate, for the Tan 525, Light Sage 560, Olive 527, Dark Green 528, Brown 529 and Bark Brown 561 areas of the pattern. When the ground shade is not dyed to approximate Dark Cream 559 all seven (7) colors of the camouflage pattern shall be printed to match all seven (7) colors. Each area of the specific color of the pattern shall be in accordance with the applicable standard sample or drawing number 2-1-2592.

3.5.2.2.4 Class 4, Desert MARPAT. The color of the face side of the cloth shall be MARPAT desert camouflage print. The cloth shall be dyed to a ground shade either matching or approximating Light Tan 479 and then shall be overprinted with camouflage pattern. The Desert camouflage pattern shall be obtained by roller or screen-printing using either three or four rollers or screens, as appropriate, for the Urban Tan 478, Light Tan 479, Highland 480 and Light Coyote 481 areas of the pattern. Each area of the specific color of the pattern shall be in accordance with the applicable standard sample or drawing numbers 2-1-2529 through 2-1-2532.

3.5.2.2.5 Colorfastness. The colorfastness for finished Class 1 (UCP), Class 2 (OEF-CP), Class 3 OCP, and Class 4 Desert MARPAT cloths shall meet the requirements listed in Table II, when evaluated as specified in Table VIII.

TABLE II. Colorfastness requirements (Classes 1, 2, 3 and 4).

Class	Colors Evaluation	Laundering (3 cycles) Color Change & Staining (min.)	Light (40 AFU or 170 kJ/m <sup>2</sup> nm @ 420nm)) (min.)	Perspiration (acid & alkaline) Color Change & Staining (min.)	Crocking (Wet & Dry) (min.)
Class 1 (UCP)	All colors	3-4	3-4	---	3.5
Class 2 (OEF-CP)	All colors	3-4	---	3-4	3.5
	Dk. Green 528, Brown 529, Dark Brown 530	---	3-4	---	---
	Cream 524, Tan 525, Pale Green 526, Olive 527	---	3	---	---



TABLE II. Colorfastness requirements (Classes 1, 2, 3 and 4).

Class	Colors Evaluation	Laundering (3 cycles) Color Change & Staining (min.)	Light (40 AFU or 170 kJ/m <sup>2</sup> nm @ 420nm) (min.)	Perspiration (acid & alkaline) Color Change & Staining (min.)	Crocking (Wet & Dry) (min.)
Class 3 (OCP)	All colors	3-4	---	3-4	3.5
	Dk. Green 528, Brown 529, Bark Brown 561	---	3-4	---	---
	Dark Cream 559, Tan 525, Light Sage 560 Olive 527	---	3	---	---
Class 4 (Desert MARPAT)	All colors	3-4	3-4	3-4	3.5

### 3.5.2.3 Pattern execution.

3.5.2.3.1 Class 1, Universal Camouflage Pattern (UCP). The Universal Camouflage pattern shall reproduce the standard sample in respect to design, colors and registration of the respective areas. The pattern repeat of the dyed, printed, and finished cloth shall be 36-inches (+1.25, -2.50) inches, in the warp direction. The various areas of the pattern shall be properly registered in relation to each other and shall present definite sharp demarcations with a minimum of feathering or spew. Each pattern area shall show solid coverage; skitteriness exceeding that shown by the standard sample in any of the printed areas shall not be acceptable. When the standard sample is not referenced for pattern execution or design, a pattern drawing shall be provided, and the pattern on the finished cloth shall match that of Drawing 2-1-2519.

3.5.2.3.2 Class 2, Operation Enduring Freedom Camouflage Pattern (OEF-CP). The pattern on the printed finished cloth(s) shall reproduce the standard sample in respect to design, colors and registration of the respective areas. The pattern repeat of the Operation Enduring Freedom Camouflage pattern shall be 25.255-inches (+1.25, -2.50) inches in the warp direction. The various areas of the pattern shall be properly registered in relation to each other and shall present definite sharp demarcations with a minimum of feathering or spew. Each pattern area shall show solid coverage; skitteriness exceeding that shown on the standard sample in any of the printed areas will not be acceptable. When the standard sample is not referenced for pattern execution, a pattern drawing provided by the Government at the time of award shall be used (see 2.2.2, 6.2, and 6.4).

3.5.2.3.3 Class 3, Operational Camouflage Pattern (OCP). The pattern on the printed finished cloth(s) shall reproduce the standard sample in respect to design, colors and registration of the respective areas. The pattern repeat of the Operational Camouflage pattern shall be 25.255-inches (+1.25, -2.50) inches in the warp direction. The various areas of the pattern shall be properly

registered in relation to each other and shall present definite sharp demarcations with a minimum of feathering or spew. Each pattern area shall show solid coverage; skitteriness exceeding that shown on the standard sample in any of the printed areas will not be acceptable. When the standard sample is not referenced for pattern execution or design, a pattern drawing shall be provided, and the pattern on the finished cloth shall match that of Drawing 2-1-2592.

3.5.2.3.3.1 Pattern width (filling direction for OCP Class). The maximum camouflage printed area for Class 3 OCP shall be 68-inches in the filling direction.

3.5.2.3.4 Class 4, Desert MARPAT. The pattern shall reproduce the standard sample in respect to design, colors, and registration of the respective areas. The pattern repeat of the Desert MARPAT camouflage printed finished cloth shall be 35 ( $\pm 1.50$ ) inches in the warp direction. Each pattern area shall show solid coverage; skitteriness exceeding that shown on the standard sample in any of the printed areas will not be acceptable. When the standard sample is not referenced for pattern execution, a pattern drawing will be provided, and the pattern of the finished cloth shall match that of the drawing.

#### 3.5.2.4 Spectral reflectance.

3.5.2.4.1 Spectral reflectance, Class 1, Universal Camouflage (UCP). The spectral reflectance of the colors in the Universal Camouflage cloth shall conform to the requirements specified in Table III, when tested as specified in 4.6.8.

TABLE III. Spectral reflectance requirements: reflectance (percent), for Class 1.

Universal Camouflage Pattern (UCP)						
Wavelengths Nanometers (nm)	Desert Sand 500		Urban Gray 501		Foliage Green 502	
	Min	Max	Min	Max	Min	Max
600	28	40	12	26	8	18
620	30	42	14	26	8	18
640	34	48	14	28	8	20
660	38	56	14	30	10	26
680	44	60	18	34	10	26
700	46	66	24	38	12	28
720	48	68	26	42	16	30
740	48	72	30	46	16	30
760	50	74	32	48	18	32
780	54	76	34	48	18	34
800	54	76	34	50	20	36
820	54	76	36	54	22	38
840	55	78	38	54	24	40
860	56	78	40	56	26	42

3.5.2.4.2 Spectral reflectance, Class 2, Operation Enduring Freedom Camouflage Pattern (OEF-CP). The spectral reflectance of the colors in the OEF-CP cloth shall conform to the requirements specified in Table IV, when tested as specified in 4.6.8.

TABLE IV. Spectral reflectance requirements: reflectance (percent) for Class 2.

Operation Enduring Freedom Camouflage Pattern (OEF-CP)						
	Cream 524 Tan 525		Pale Green 526, Olive 527, Brown 529		Dark Green 528 Dark Brown 530	
Wavelength (nm)	Min	Max	Min	Max	Min	Max
600	22	44	10	30	3	12
620	24	45	11	30	3	12
640	24	45	11	32	4	12
660	25	45	12	32	4	13
680	28	45	14	35	4	18
700	28	48	19	40	6	25
720	30	52	22	43	6	27
740	32	55	25	46	10	29
760	36	56	27	48	14	33
780	38	57	28	50	18	36
800	40	57	29	50	20	37
820	44	58	30	51	20	38
840	46	59	32	51	21	39
860	48	60	33	52	21	40

3.5.2.4.3 Spectral reflectance, Class 3, Operational Camouflage Pattern (OCP). The spectral reflectance of the colors in the OCP cloth shall conform to the requirements specified in Table IVA, when tested as specified in 4.6.8.

TABLE IVA. Spectral reflectance requirements: reflectance (percent) for Class 3.

Operational Camouflage Pattern (OCP)						
	Dark Cream 559 Tan 525		Light Sage 560, Olive 527, Brown 529		Dark Green 528 Bark Brown 561	
Wavelength (nm)	Min	Max	Min	Max	Min	Max
600	22	44	12	30	3	12
620	24	45	12	30	3	12
640	24	45	12	32	4	12
660	25	45	12	32	4	13
680	28	45	14	34	4	18
700	28	48	14	36	6	25
720	30	52	16	39	6	27
740	32	55	18	41	10	29
760	36	56	20	43	14	33
780	38	57	22	45	18	36
800	40	57	22	45	20	37
820	44	58	24	46	20	38
840	46	59	26	47	21	39
860	48	60	28	48	21	40

3.5.2.4.4 Spectral reflectance, Class 4, Desert MARPAT. The spectral reflectance of the colors in the Desert MARPAT cloth shall conform to the requirements specified in Table IVB, when tested as specified in 4.6.8.

TABLE IVB. Spectral reflectance requirements: reflectance (percent) for Class 4.

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

3.5.3 Reinforcing material, elbow. The reinforcement material used for the elbow patches shall be a plain weave, nylon cloth conforming to Type IV Class 2 of MIL-DTL-32439, Class 1 jacket shall be Style D, Class 2 jacket Style G, Class 3 jacket Style H, and Class 4 jacket Style F. The color of the face side of the cloth shall be camouflage printed.

3.5.4 Outer collar lining. Lining fabric shall be tricot knit mesh of 100 percent polyester or equal. The color shall be Urban Gray 505 for Class 1 jackets, Tan 499 for Class 2 and Class 3 jackets, and Coyote 498 or Tan 499 for Class 4 jackets. The lining fabric shall meet the physical requirements specified in Table V when tested in accordance with in Table VIII.

TABLE V. Outer collar lining - physical requirements.

Characteristics	Requirement
Weight (oz./sq yd)	2.0 ( $\pm$ 0.2)
Dimensional Stability, percent (max.)	
Warp	5.0
Filling	5.0
Toxicity <u>1/</u>	See 3.11

1/ The finished cloth shall not present a dermal health hazard when used as intended.

### 3.6 Components.

3.6.1 Thread. The thread for all seaming and stitching shall be nylon conforming to A-A-59826, Type I, Tex size 45-46, 2 or 3 ply (Government size B) or Type II, Tex size 45-51, 2 or 3 ply (Government size B). As an alternate, bobbin/looper threads can be nylon, Type I Tex size 30-32, 2 or 3 ply (Government size AA) or Type II Tex size 30-36, 2 or 3 ply (Government size AA). As an alternate to nylon thread, polyester, Tex size 45 (Government size B), 2 or 3 ply, conforming to Type I, Class 1, Subclass B of A-A-59963, or size Tex size 46-60, 2 or 3 ply polyester core thread conforming to A-A-50199. All thread shall be water repellent treated as specified in MIL-T-3530. The color shall be Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Light Tan 479 or, as an alternate, Tan 380 for Class 4, unless otherwise specified in the contract.

3.6.2 Tape, hook and loop. The hook and loop fastener tape shall conform to Type II, Class 1 of A-A-55126, with selvedge edges. No slit or split edges are permitted. Sew all hook and loop minimum of 1/8-inch from bound selvedge to prevent needle cutting along edges. To prevent raveling, do not sew directly on selvedge. However, each required width shall maintain a tolerance of ( $\pm 1/16$ ) inch as to prevent stitching runoffs or improper fit into automatic sewing equipment. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Light Tan 479 or, as an alternate, Tan 380 for Class 4, unless otherwise specified in the contract.

3.6.2.1 Colorfastness, tape hook and loop. The colorfastness shall meet the requirements as specified in A-A-55126.

3.6.2.2 Hook and loop laundry durability test method. When tested as specified in Table VIII, the hook and loop tapes shall not exhibit fraying edges, peeling yarns, or damage appearance that detracts from the tape appearance or durability.

3.6.3 Elastic cord. The elastic cord shall be 1/8-inch width (+1/32-inch, - 0 inch), elastic cord, elongation: 120 percent ( $\pm 10$ ) percent; weight per linear yard, 0.2-ounces minimum; picks per inch, 60 minimum; number of carriers 16 minimum; ends per carrier, 1; number of elastic strands, 12 minimum; cover yarn, polyester. The elastic cord shall have a seared and knotted end. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract. Testing shall be as specified in Table VIII.

3.6.4 Slide fasteners. The slide fastener for the front closure shall be plastic individual element, A-A-55634, Type III, Style 13 (separating double auto-lock sliders such that open either from top or bottom), No. 5 chain with a 100 pounds minimum crosswise strength with a water repellent treated slide fastener tape and thong on top slider. Zipper thongs (3.6.4.3) shall be 3-inch ( $\pm 1/2$ ) inch on the fold. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract.

3.6.4.1 Pocket slide fastener. The slide fastener (zipper) for the pockets shall be continuous element chain, Type I, Style 7 (closed ends, auto-lock slider that closes when pulled up) No 5 reverse\* chain with 175 pounds minimum crosswise strength with water repellent treated tape and thong. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract. \*Reverse chain is

when zipper tape side and slider pull represents face.

3.6.4.2 Slide fastener lengths. The lengths of the center front, slide fasteners and pocket slide fasteners for the various size-length jackets shall be as shown in Table VII, line items 6 and 10, respectively.

3.6.4.3 Zipper thongs. The zipper thongs shall be nylon tape, 3/8-inch wide conforming to Type III, MIL-PRF-5038. There shall be three (3) per garment with each threaded through a zipper pull and bartacked with 3/4-inch bartack. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract.

3.6.5 Barrel lock. The barrel locks shall maintain a 3-pound minimum holding strength on elastic cord (see 3.6.3) at (-40)°F, 70°F, and 140°F, when tested as specified in 4.6.13. The barrel lock shall be 1/2-inch by 3/8-inch elliptical or 3/8-inch round shape, minimum push-button size to easily operate with gloves. The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract.

3.6.5.1 Eyelets. The eyelets used on each side of the hood (see Figure 2) and in the hem shall be in accordance with NASM-20652/1B, aluminum or brass and have an internal diameter of 0.156 inch to 0.200-inch (dash No. ABE-102) or as an alternate (dash No. BBE-114). The color shall match Foliage Green 504 for Class 1, Tan 499 for Class 2 and 3, and Coyote 498 or Tan 499 for Class 4, unless otherwise specified in the contract. The placement of the eyelets shall be placed 1 (±1/2) inch over from each side of the joining seam and centered on the hem.

3.6.6 Elastic material. The elastic material used on the cuffs shall be in accordance with MIL-W-5664, Type II, 1-inch (± 1/16) inches in width. The color shall be natural.

3.7 Construction. See Figures 1 through 6 and patterns for more details.

3.7.1 Bartacks. Bartacks shall be as follows:

Bartack Location	Bartack Length	Quantity per Garment
Zipper thong	3/4-inch	3

3.7.2 Seams. The seams shall be consistent, exhibit a uniform appearance and conform to ASTM D6193 stitch types except for slide fastener tape, no raw edges of outer shell fabric allowed. Unless otherwise specified, Type 301 lockstitch at 9-12 stitches per inch shall be used. All seams or stitching that are evident on both the outside and inside of the garment shall be waterproof seams (i.e., a seam or stitch line with one (1) side on the outside of the garment and its other side on inside of the garment). Loop fastener tape shall be stitched on the loop pile and not on the selvage.

3.7.2.1 Seam sealant tape. The seam tape shall be launderable and shall prevent water leakage through seams and stitching. Seam tape shall be applied only to the inside of the end

item. Tape shall be cut 7/8-inch to 1-inch wide strips from material that is compatible with the back side of cloth specified in Table I. The shade of the tape shall approximate the back of the basic cloth (see 3.5.2).

3.7.2.2 Waterproof seams. There shall be no leakage of waterproof seams when tested for hydrostatic resistance, initially and after five (5) launderings, as specified in 4.6.17.

3.7.3 Primary seams. Side seams, underarm seams, arm sleeve seams, shoulder seams, hood tunnel and center seams, front upper and lower quadrant horizontal seams shall be seam type SSa- 1, 301 lockstitch / seam tape sealing with minimum of 1/8-inch beyond seam allowance.

3.7.4 Hem seam. EFb-1 with 1-inch turn-in. Add waist drawcord, two (2) eyelets; insert drawcord through tunnel and eyelets, and barrel lock as on pattern. As an alternate the rear center back hem may use separate 1-inch strip using seam type LSq-2 to attach strip to rear outer shell. Top stitch entire upper hem section with single continuous seam.

3.7.5 Rank/cuff adjustment tabs. Rank and cuff adjustment tabs shall be constructed with seam SSc-1. Rank and cuff adjustment tabs hook and loop shall be sized and placed per pattern. Hook tape shall be topstitched on underside of tabs. All tabs shall be double stitched reinforced onto shell jacket per pattern placements.

3.7.6 Slide fastener extension strips. Sew left slide fastener (zipper) tape pin side and slide fastener (zipper) extension strip with SSa-1, 1/4-inch to 5/16-inch from slide fastener (zipper) tape edge, turn in and top stitch tape and extension strip 1/16-inch nominal from slide fastener (zipper) tape edge. Conduct same operation on right slide fastener (zipper) tape box side.

3.7.6.1 Slide fastener (zipper) covers. Top stitch five (5) loop (5/8-inch by 3-inch) tape strips and 3-3/8 inch long triangular rank tab with 5/8-inch by 5/8-inch hook tape and 5/8-inch by 5/8-inch loop tape and per pattern placement. Double stitch top of tab to slide fastener (zipper) cover face. Fold lengthwise in half and top stitch 1/16-inch nominal from edge for pin side slide fastener (zipper) tape cover (see Figure 3). Conduct same operation for right box side slide fastener (zipper) tape except topstitch five (5) hook (5/8-inch by 3-inch) tape strips per pattern placement.

3.7.6.2 Slide fastener (zipper) and cover attachment. Sew left pin side slide fastener (zipper) extension tape with slide fastener (zipper), slide fastener (zipper) cover and front outer shell with SSa-1, turn and topstitch 1/16-inch nominal from turn-in. Repeat operation for right box side. Catch lower ends of extension and cover strips into hem and double stitch. Finished appearance of slide fastener (zipper) covers shall be 1-3/4-inch wide nominal with 1/2-inch nominal protruding slide fastener (zipper) extensions. Slide fastener (zipper) pin and box and slide fastener (zipper) cover hook and loop strips shall be in alignment when engaged (see figure 4).

3.7.6.3 Slide fastener (zipper) pocket pass-through. Per pattern placement (between upper and lower horizontal quadrant seams) topstitch right and left sides of slide fastener (zipper) tape to outer shell fabric with LSb-1 seam, including slide fastener (zipper) top and bottom. Attach

pocket slide fastener (zipper) cover strips to outer shell fabric with LSq-2 seam and topstitch 1-3/8-inch nominal from cover edge inserting each end into quadrant seams. Finished slide fastener (zipper) cover shall cover zipper in flat even manner with no wrinkles or puckering.

3.7.7 Hood. Topstitch loop tape and double stitch hood tab with hook tape to center hood fabric per pattern placement. Set in 1/8-inch eyelets on both side hood panels per pattern placement. Sew three (3) primary panels with SSa-1 seam. Sew visor facing pattern piece to top of hood with SSc-1 seam. Set pass-through eyelets 1-1/2-inch from base of hide-away collar. Run elastic cord through eyelet with cord-lock on external side, finish cord through base eyelet and tie off such that cord is retained by eyelet under stress (see Figures 2 and 6).

3.7.7.1 Hide-away (HA) collar. Topstitch the hook strips to HA collar lining per pattern placement. Stitch outer collar lining 3-1/2-inches wide to outer collar strip with SSc-1 seam. Stitch inner top collar 2-inches to inner bottom collar with LSb1 seam. Stitch 3-inch wide inner collar strip to outer collar assembly with SSa-1 seam, turn and top stitch to provide for an SSc-1 seam appearance. Stitch entire HA collar assembly to upper portion jacket assembly with SSa-1 turn and topstitch backside 1/16-inch from edge.

3.7.7.2 Finished HA collar appearance. HA collar assembly shall exhibit a complete hood with protruding 3-1/8-inch (-1/8,+1/4) inch for the visor and exterior cord lock capable of adjusting and holding hood radius to any degree. Entire hood is capable of being folded and tucked away into HA collar assembly and being secured with hood hook tape and inner collar lining loop tab. Stand up collar final dimension allows a 3-1/2-inch nominal rise from jacket main collar seam with ends of front closure zipper at top. The hood facing shall act as the tunnel for the cord.

3.7.8 Arm sleeve cuff. Insert per Table VII elastic webbing and arm sleeve cuff adjustment tab into underarm seam. Fold over arm sleeve pattern piece 1-inch and topstitch to produce cuff with seam LSd-1. Attach 1-inch by 5-inch loop strip per pattern placement on cuff. Double stitch opposite elastic end. Finished cuff assembly shall be able to stretch 6-3/4-inches minimum.

3.7.9 Labels. Each hard shell jacket shall have a label in accordance with Type VI, Class 14 of MIL-DTL-32075. The color of the labels shall approximate the ground shade of the basic fabric or white. In addition it shall contain a bar coding label in accordance with Type VIII and Class 17.

3 7.9.1 The combination size, identification, and instruction label for the hard shell jacket. The combination label shall be sewn on the left inside of the jacket along the bottom hem seam area. The printed label shall be facing the body and it shall not be visible from the outside after use. The instruction label shall include the following information:



## DO NOT STARCH, BLEACH, DRY CLEAN OR PRESS THE JACKET

## LAUNDERING:

Home Laundering (machine/hand): Delicate/gentle fabric cycle setting or hand washing using a detergent. Rinse thoroughly in warm water. NOTE: Any residual detergent on the jacket will decrease the water repellency.

Home Drying: Tumble dry on permanent press setting. Remove immediately from dryer. Do not overheat or over dry. To drip dry, place on a rust-proof hanger.

Field Laundering: Jacket shall be laundered utilizing Formula II of FM 42-414. Field Drying: Tumble dry at low temperature setting. Remove immediately from dryer. Do not overheat or over dry.

Field Restoration of Water Repellent Finish: Jacket shall be laundered utilizing Formula XII of FM 42-414. Dry jacket at a temperature not to exceed 150°F.

3.8 Patterns. Standard patterns provide a seam allowance of 1/4-inch for all seams except where otherwise specified, will be furnished by the Government. The pattern list in Table VI is provided to insure that the pattern set provided is complete. The Government patterns shall not be altered in any way, and are to be used only as a guide for cutting the contractor's working patterns. The working patterns will be identical to the Government patterns, except that additional notching to facilitate manufacture is possible. Also, minor modifications are permitted where necessary to accommodate manufacturer's processes and using automatic equipment. These modifications shall not alter the serviceability or appearance requirements.

3.8.1 Pattern parts. The component parts shall be cut from the materials indicated and in accordance with the pattern parts listed in Table VI.

TABLE VI. Cutters must (list of pattern parts).

	PIECE NAME	FABRIC	QTY
1	HST_FRONT YOKE	SELF	CUT 2
2	HST_FRONT CENTER	SELF	CUT 2
3	HST_SIDE FRONT	SELF	CUT 2
4	HST_POCKET FACING	SELF	CUT 2
5	HST_ZIP TAPE	SELF	CUT 2
6	HST_WIND FLAP LEFT	SELF	CUT 1 FACE UP
7	HST_WIND FLAP RIGHT	SELF	CUT 1 FACE UP
8	HST_ZIP EXTENSION	SELF	CUT 2
9	HST_BOTTOM FRONT	SELF	CUT 2
10	HST_SLEEVE	SELF	CUT 2
11	HST_ELLOW SLEEVE UNDER	SELF	CUT 2
12	HST_BACK	SELF	CUT 1 FACE UP
13	HST_INNER COLLAR	SELF	CUT 1 FACE UP
14	HST_INNER TOP COLLAR	SELF	CUT 1 FACE UP

TABLE VI. Cutters must (list of pattern parts) - Continued

	PIECE NAME	FABRIC	QTY
15	HST_INNER BOTTOM COLLAR	SELF	CUT 1 FACE DOWN
16	HST_OUTER COLLAR	SELF	CUT 1 FACE UP
17	HST_SLEEVE TAB	SELF	CUT 2
18	HST_HOOD SIDE	SELF	CUT 2
19	HST_HOOD CENTER	SELF	CUT 1 FACE UP
20	HST_HOOD FACING	SELF	CUT 1 FACE UP
21	HST_RANK TAB TOP	SELF	CUT 1 FACE UP
22	HST_RANK TAB UNDER	SELF	CUT 1 FACE UP
23	HST_HOOD TAB	SELF	CUT 1 FACE UP
24	HST_BACK HEM FACING	SELF	CUT 1 FACE UP
25	HST_ZIPPER COVER	SELF	CUT 4
26	HST_ELLOW SLEEVE TOP	CONTRAST	CUT 2
27	HST_OUTER COLLAR LINING	CONTRAST 1	CUT 1 FACE UP
COMMENTS BELOW: SELF = BASIC SHELL MATERIAL CONTRAST = NYLON REINFORCING MATERIAL CONTRAST #1 = MESH TRICOT FABRIC			

3.9 Type 301 stitching. When type 301 stitching is used, the ends of all stitching shall be backstitched or overstitched not less than 1/2-inch except where ends are turned under or caught in other seams or stitching. Ends of a continuous line of stitching shall over-lap not less than 1/2-inch. Thread tensions shall be maintained so that there will be no loose stitching resulting in loose bobbin or top thread or excessively tight stitching resulting in puckering of the materials sewn. The lock shall be embedded in the materials sewn.

3.9.1 Repairs of type 301 stitching. When thread breaks, skipped stitches, run-offs, or bobbin run-outs occur during sewing, the stitching shall be repaired by restarting the stitching a minimum of 1/2-inch back of the end of the stitching. 1/

Except for pre-stitching, thread breaks or two (2) or more consecutive skipped or run-off stitches noted during inspection of the item shall be repaired by overstitching. The stitching shall start a minimum of 1/2-inch in back of the defective area, continue over 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 re-stitching in the required manner. 1/

1/ When making the above repairs, the ends of the stitching are not required to be backstitched.

3.9.1.2 Automatic stitching. Automatic machines may be used to perform any of the required stitch patterns provide the requirements for the stitch pattern, stitches per inch, and size and type of thread are met; and at least three (3) tying, overlapping or back stitches are used to secure the ends of the stitching.

3.9.1.3 Thread ends. All thread ends shall be trimmed to a length of not more than 1/4-inch unless otherwise specified.

3.10 Finished measurements. The jacket finished measurements shall be in accordance with Table VII.

TABLE VII. Jacket finished measurements (measurements in inches).

REGULAR		XS	S	M	L	XL	2XL	TOL ± inches
Are a Ref.	Location							
1	ACROSS CHEST <u>1/</u>	24-	26-	28-	30-	32-	34-1/4	-1/4 ,
2	BACK LENGTH <u>2/</u>	29-	30	30-	31	31-	32	-1/2 ,
3	SLEEVE LENGTH FROM SHOULDER POINT <u>3/</u>	24-	24-	25-	25-	26	26-3/8	-3/8 ,
4	ACROSS BACK <u>4/</u>	20	21-	22-	23-	24-	25-3/4	-1/4 ,
5	CUFF OPENING - FINISHED <u>5/</u>	5-1/2	5-3/4	6	6-1/4	6-1/2	6-3/4	-1/4 , +1/4
6	CENTER FRONT (CF) ZIPPER LENGTH <u>6/</u>	27	27-	28	28-	29	29-1/2	-1/2 ,
7	COLLAR SPREAD WITH ZIPPER <u>7/</u>	22-1/2	23-1/2	24-1/2	25-1/2	26-1/2	27-1/2	-1/4 , +1/4
8	COLLAR WIDTH AT CF <u>8/</u>	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	3-1/2	-1/4 , +1/4
9	CUT ELASTIC CUFF MEASUREMENT <u>9/</u>	3-1/2	3-1/2	4	4	4-1/2	4-1/2	-1/4 ,
10	POCKET ZIPPER LENGTH <u>10/</u>	12	12	12	12	12	12	-1/4 , +1/4
11	HOOD DEPTH <u>11/</u>	11-	12	12-	13	13-	14	-1/4 ,
12	HOOD HEIGHT AT OPENING <u>12/</u>	15-1/2	15-3/4	16	16-1/4	16-1/2	16-3/4	-1/4 , +1/4
13	FRT HOOD OPENING CORD <u>13/</u>	35	35-1/2	36	36-1/2	37	37-1/2	-1/4 , +1/4
14	DRAW CORD LENGTH	47	50	53	56	59	62	-1/2 ,
SHORT		XS	S	M				
2	BACK LENGTH <u>2/</u>	28-	29	29-				-1/2 ,
3	SLEEVE LENGTH FROM SHOULDER POINT <u>3/</u>	23	23-3/8	23-3/4				-1/4 , +3/8
6	CF ZIPPER LENGTH <u>6/</u>	26	26-	27				-1/2 ,

TABLE VII. Jacket finished measurements (measurements in inches) - Continued

Area Ref.	Location	XS	S	M	L	XL	2XL	TOL ± inches
LONG			S	M	L	XL	2XL	
2	BACK LENGTH <u>2</u> /		31	31-1/2	32	32-1/2	33	-1/2 , +1/2
3	SLEEVE LENGTH FROM SHOULDER POINT <u>3</u> /		26-3/8	26-3/4	27-1/8	27-1/2	27-7/8	-1/4 , +3/8
6	CF ZIPPER LENGTH <u>6</u> /		28-1/2	29	29-1/2	30	30-1/2	-1/2 , +1/2
XLONG						XL	2XL	
2	BACK LENGTH <u>2</u> /					33-1/2	34	-1/2 , +1/2
3	SLEEVE LENGTH FROM SHOULDER POINT <u>3</u> /					29	29-3/8	-1/4 ,
6	CF ZIPPER LENGTH <u>6</u> /					31	31-1/2	-1/2 , +1/2
Footnotes	Measurement Instructions							
<u>1</u> /	Across chest measurement is taken from folded edge to fold edge bottom of armhole/							
<u>2</u> /	Back length measurement is taken from bottom of center back neck straight to hem.							
<u>3</u> /	Sleeve length is taken from shoulder point along the outer flattened folded edge of sleeve straight to the bottom of hem.							
<u>4</u> /	Across back is measured 3-inches down from shoulder point along left and right armhole/armseye seam and then straight across from left armhole/armseye seam to right armhole/armseye seam.							
<u>5</u> /	Cuff opening is taken from edge to edge at sleeve hem flat and relaxed.							
<u>6</u> /	CF zipper opening shall start and end at the outer edges of both zipper stops. This is the finished measurement of the center front zipper opening NOT the zipper length.							
<u>7</u> /	Collar spread measurement is taken from edge to edge flat including zipper.							
<u>8</u> /	Collar width at CF - Collar width is taken from top edge to bottom edge of collar.							
<u>9</u> /	Cut elastic cuff measurement.							

TABLE VII. Jacket finished measurements (measurements in inches) - Continued

<u>10/</u>	Front pocket zipper length measurements shall start and end at the outer edges of both zipper stops.
<u>11/</u>	Hood depth is measured 9-inches up from neck point with hood folded in half and flat from the back of the hood to the front.
<u>12/</u>	Hood height is measured with hood folded flat at front opening from base of hood to top of hood.
<u>13/</u>	Reference #'s 4, 5, 7, 8, 9, 10, 11, 12, 13, and 14 for construction purposes only*. *The Government reserves the right to measure any of these areas for end item
	SEAM ALLOWANCE: 1/4-inch: all seams except for: 3/8-inch: CF construction

3.11 Toxicity. The finished extreme cold wet weather jacket shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.6.18. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

#### 4. VERIFICATION

4.1 Classifications of inspections. The inspection requirements specified herein are classified as outlined below.

First article inspection (see 4.2)

Conformance inspection (see 4.3)

4.2 First article inspection. When a first article is required (see 3.1.1 and 6.3), it shall be examined for the defects specified in Table IX, dimensions specified in Table VII and tested as specified in 4.4, and 4.5.

4.3 Conformance inspection. Conformance inspection shall include the examination of 4.4 and 4.5. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4 and with acceptance quality limits (AQL) as specified in the contract and/or order, except where otherwise indicated (see 6.2).

4.4 Component and end item inspections. In accordance with 4.1, components and materials in the end items shall be tested in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified or qualified in this document or applicable procurement documents. The Government reserves the right to inspect all components and end items to determine conformance to requirements.

4.5 Basic shell material ,components and end item testing. The basic materials, components and the end item testing specified in 3.5 and 3.6 shall be tested for the characteristics listed in Tables I - IV, IVA, IVB, and V in accordance with the test methods cited in Table VIII.

TABLE VIII. Basic shell, components, and end item testing.

Characteristic	Reference Paragraph	Test Method
Basic shell material (3.5.2)		
Fiber identification	3.5.2	AATCC-20 or ASTM D276 <u>1/</u>
Weave	3.5.2	Visual
Weight	3.5.2.1 & Table I	ASTM D3776/D3776M (Method C)
Breaking strength	3.5.2.1 & Table I	ASTM D5034 (G-E or G-T)
Tearing strength	3.5.2.1 & Table I	ASTM D2582 <u>2/</u>
Hydrostatic Resistance		
Initial	3.5.2.1 & Table I	4.6.11.1
After strength of coating	3.5.2.1 & Table I	4.6.11.2
After high humidity	3.5.2.1 & Table I	4.6.11.3
After diethyltoluamide		
Initial and after laundering	3.5.2.1 & Table I	4.6.11.4, 4.6.10 & 4.6.11.1
Moisture vapor transmission		
Initial (Procedure B & BW)	3.5.2.1 & Table I	4.6.1 - 4.6.1.2
After synthetic perspiration (Procedure B & BW)	3.5.2.1 & Table I	4.6.3.2 & 4.6.1 - 4.6.1.2
Stiffness		
At 32°F	3.5.2.1 & Table I	<u>3/</u> & ASTM D747 <u>4/</u>
At 70°F	3.5.2.1 & Table I	ASTM D747 <u>4/</u>
Blocking	3.5.2.1 & Table I	4.6.2
Water permeability –		
Initial	3.5.2.1 & Table I	4.6.3
After synthetic perspiration		
Initial and after laundering	3.5.2.1 & Table I	4.6.3.2, 4.6.10 & 4.6.3
After physical surface appearance	3.5.2.1 & Table I	4.6.3.3 & 4.6.3
After flex (70°F)	3.5.2.1 & Table I	4.6.3.1
After diethyltoluamide	3.5.2.1 & Table I	4.6.11.4, 4.6.10 & 4.6.3
Spray rating		
Initial	3.5.2.1 & Table I	4.6.4.1
After one (1) and five (5)	3.5.2.1 & Table I	4.6.4.2
Resistance to organic liquid		
Initial	3.5.2.1 & Table I	4.6.5.1
After one (1) and five (5)	3.5.2.1 & Table I	4.6.5.2

TABLE VIII. Basic shell, components, and end item testing - Continued

Characteristic	Reference Paragraph	Test Method
Dimensional stability		
Warp	3.5.2.1 & Table I	AATCC-96, Option 1C
Filling	3.5.2.1 & Table I	AATCC-96, Option 1C
Toxicity	3.5.2.1, Table I & 3.11	4.6.18
Color matching	3.5.2.1, Table I & 3.5.2.2	4.6.6
Colorfastness to:	3.5.2.1, Table I & 3.5.2.2.5	
Laundering (after 3 cycles)	3.5.2.2.5 & Table II	4.6.9.1 <u>5</u> /
Light (40 AFU or 170kJ/m <sup>2</sup> nm @ 420 nm)	3.5.2.2.5 & Table II	4.6.9.2 <u>6</u> /
Crocking (Dry and Wet)	3.5.2.2.5 & Table II	AATCC-8 <u>7</u> /
Perspiration (Acid and Alkaline)	3.5.2.2.5 & Table II	AATCC-15 <u>5</u> /
Pattern Execution	3.5.2.1, Table I & 3.5.2.3, 3.5.2.3.1 to 3.5.2.3.4 & 3.5.2.3.3.1	4.6.7
Spectral Reflectance	3.5.2.1, Table I & 3.5.2.4.1 to 3.5.2.4.4 & Tables III, IV, IVA & IVB	4.6.8
Component Testing		
Outer collar lining (3.5.4 and Table V.)		
Fiber identification and weave	3.5.4	AATCC-20 or ASTM D276 <u>1</u> /
Weave	3.5.4	Visual
Weight	3.5.4	ASTM D3776/D3776M (Method C)
Dimensional Stability	3.5.4	AATCC-135, IIIA
Toxicity	3.5.4 & 3.11	4.6.18
Fastener Tape, Hook and Loop (3.6.2)		
Color	3.6.2	4.6.6
Laundry Durability	3.6.2.2	4.6.16 - 4.6.16.4

TABLE VIII. Basic shell, components, and end item testing. – Continued

Elastic cord (3.6.3)		
Width	3.6.3	Visual
Elongation	3.6.3	4.6.14
Weight	3.6.3	ASTM D3776/D3776M
Picks/inch	3.6.3	Visual
Number of carriers	3.6.3	Visual
Ends per carrier	3.6.3	Visual
Elastic strands/width	3.6.3	4.6.15
Slide fastener (3.6.4)		
Breaking Strength Crosswise	3.6.4	ASTM D2061
Water repellency	3.6.4	A-A-55634
Barrel lock (3.6.5)		
Strength		
At -40°F	3.6.5	4.6.13
At 70°F	3.6.5	4.6.13
At 140°F	3.6.5	4.6.13
End Item Testing		
Sealed Seams	3.5.2.1, Table I & 3.7.2	4.6.17

1/ In case of dispute, the ASTM Method prevails

2/ Tear strength, ASTM D2582, with exceptions as follows: five (5) warp and five (5) filling specimens shall be tested. Specimen size shall be 8-inches by 8-inches. Only one (1) tear shall be made on a single specimen. The specimen shall be positioned with the face side toward the probe and with the designated yarns of the face fabric at right angles to the direction of tear. The test shall be conducted using the standard drop height of 508 (± 2) millimeters. If the tear is not straight on face side of the specimen, the result shall be considered invalid and another specimen shall be tested. The thickness of the specimen shall not be measured.

3/ The test specimens and testing machine shall be exposed to 32°F (± 2)°F for four (4) hours. The test shall then be performed in still air at that temperature

4/ Stiffness (bending moment) shall be conducted in accordance with ASTM D747 except as follows:

Unless otherwise specified, the testing conditions shall be in accordance with ASTM D1776/D1776M.

The test specimen shall be a rectangle of cloth of dimensions 2-inches by 1-inch with the long dimension parallel to the fabric direction under test, warp or filling, as applicable.

The load scale reading shall be recorded only at the specimen angular deflection of 60 degrees.

The stiffness is the bending moment of specimen at a deflection angle of 60 degrees and shall be calculated to three (3) significant figures as follows:

$$\text{Bending moment, in.-lb.} = \text{Load scale reading} \times \text{moment weight}^*$$

$$100$$



\* Testing machine of Tinius Olsen Testing Machine Co.

1 -- No Blocking. Cloth surfaces are free and separate without any evidence of cohesion or adhesion.

2 -- Trace Blocking. Cloth surfaces show slight cohesion or adhesion.

3 -- Slight Blocking. Cloth surfaces must be lightly peeled to separate.

4 -- Blocking. Cloth surfaces separate with difficulty or coating is removed during separation.

5/ Rated using the AATCC Gray Scale for Color Change and AATCC Gray Scale for Staining.

6/ Rated using the AATCC Gray Scale for Color Change.

7/ Rated using the AATCC 9-Step Chromatic Transference Scale

4.6 Methods of testing. All testing shall be done in a standard condition environment defined by the ASTM D1776/D1776M, if not specifically defined by the individual test procedure.

4.6.1 Moisture vapor transmission rate. ASTM E96/E96M with temperature and humidity conditions of 73.5° (±1)°F and 50 (±2)% R.H. The linear air flow velocity in the wind tunnel shall be set to yield an upright, 'open cup' evaporation rate at all test specimen positions of 15000 (±1000) g/m<sup>2</sup>/24h (the evaporation rate shall be determined by conducting an upright cup, Procedure B test (see 4.6.1.1), without a test specimen for a period of exactly two (2) hours). For specimen testing using Procedure BW, the 'open cup' evaporation rate shall be determined in the air stream at a level not more than 3-inches below the position of the inverted cup test specimen.

4.6.1.1 Procedure B, ASTM E96/E96M. The back side of the basic material shall face the water. The test specimen shall be conditioned, after set-up in the test cup with water level of 3/4 (±1/16) inch below the specimen surface, in the wind tunnel for a period of not less than four (4) hours and not more than 16 hours (Conditioning time of less than four (4) hours may be used provided that equilibrium conditions have been demonstrated to exist within the test sample/sample cup/wind tunnel). In cases of dispute, the conditioning time shall be four (4) hours. After conditioning, the cup shall be immediately weighed to start the test and again after exactly 24 hours to complete the test. Five (5) specimens shall be tested.

4.6.1.2 Procedure BW, ASTM E96/E96M. The back side of the basic material shall face the water. The test specimen shall be set-up in the test cup with water level of 3/4 (± 1/16)-inch below the specimen surface. The cup shall be inverted bringing the water in contact with the back side of the test specimen; the test specimen shall be conditioned in this manner for five (5) minutes. At the end of the conditioning period, the cup and test specimen shall be examined for evidence of water leakage at cup edges or through holes/pinholes in the test specimen; if a leak occurs, the test specimen shall be discarded and the test cup shall be set up with a new test specimen. The cup shall be immediately weighed and placed in the wind tunnel to start the test and removed and weighed again after exactly two (2) hours to complete the test. Five (5) specimens shall be tested.

4.6.2 Blocking. ASTM D751, Blocking Resistance at Elevated Temperatures, except that the tests shall be performed at a temperature of 180° (± 2)°F for 30 minutes. Only one (1) specimen shall be tested. Evaluate the resistance of the specimen to blocking by the scale given below:

- 1 -- No Blocking. Cloth surfaces are free and separate without any evidence of cohesion or adhesion.
- 2 -- Trace Blocking. Cloth surfaces show slight cohesion or adhesion.
- 3 -- Slight Blocking. Cloth surfaces must be lightly peeled to separate.
- 4 -- Blocking. Cloth surfaces separate with difficulty or coating is removed during separation.

4.6.3 Water permeability. ASTM D751, Hydrostatic Resistance, Procedure B, Procedure 2 with a fixed hydrostatic head of 50 centimeters applied to the face side of the test specimen for ten (10) minutes. Five (5) specimens shall be tested. The report shall only include measurement for the appearance of water droplets. For basic shell material, leakage is defined as the appearance of one (1) or more droplets of water within the 4-1/2 inch diameter test area.

4.6.3.1 Water permeability after flex at 70°F. One (1) specimen, 8-inches by 12-inches, shall be cut from the sample unit with the 8-inch dimension in the indicated direction (warp or filling, as applicable). The specimen shall be conditioned and flexed as specified in ASTM F392/F392M, except that the specimen shall not be aged, the short edges shall not be heat sealed or otherwise joined, and the specimen shall be flexed for 1500 cycles. Two (2), 6-inch by 8-inch specimens shall be cut from the 8-inch by 12-inch flexed specimen and tested for water permeability in accordance with 4.6.3.

4.6.3.2 Synthetic perspiration test. The specimen, 8-inches, shall be cut and exposed to synthetic perspiration as follows: The synthetic perspiration solution shall be made by combining 3.0 grams sodium chloride, 1.0 gram trypticase soy broth powder, 1.0 gram normal propyl propionate, 0.5 gram of liquid lecithin and 500 milliliters of distilled water. Cover the solution and stir while heating to 50°C until all ingredients are dissolved. Then, cool the solution to 35°C, remove cover and dispense it immediately with a pipette or other suitable measuring device. Dispense 2 milliliters of perspiration solution at 35°C onto the center of an 8-inch by 1/4-inch glass plate. Place the specimen on the glass plate with the back side contacting the glass. Dispense an additional 2 milliliters of synthetic perspiration solution onto the center of the specimen. Place a second 8-inch by 8-inch by 1/4-inch glass plate on top of the specimen and then place a 4-pound weight on top of and in the center of the assembly. After 16 hours, remove the specimen (do not rinse) and air dry the specimen before testing.

4.6.3.3 Physical surface appearance. Conduct 20 laundering and drying cycles in accordance with 4.6.10. Each sample, 48-inches in length by full width, shall be cut in half across the width of the cloth. One half (1/2) of the sample (24-inches in length) shall be laundered and the remaining half retained as the unlaundered portion for the final evaluation, as necessary. After each drying cycle, examine both sides of the cloth for changes in physical surface appearance when compared to the unlaundered sample.

#### 4.6.4 Spray rating.

4.6.4.1 Initial. Testing shall be conducted in accordance with AATCC-22.

4.6.4.2 After one (1) and five (5) launderings. Test specimens shall be laundered for one (1) and five (5) laundering cycles, as applicable, in accordance with 4.6.10 and then tested for spray rating in accordance with 4.6.4.1.

#### 4.6.5 Resistance to organic liquids.

4.6.5.1 Initial. Place a small specimen of the cloth on a smooth horizontal surface, face side up. Using a pipette or eyedropper, gently deposit one (1) drop of n-tetradecane on the surface of the specimen. After 30 seconds, examine the specimen under light at an angle. Absence of light reflectance at the cloth/drop interface shall be taken as evidence of wetting. Three (3) specimens (or areas) taken at various locations across the sample unit shall be tested. Evidence of wetting on one (1) or more specimens shall be considered a test failure.

4.6.5.2 After one (1) and five (5) launderings. Test specimens shall be laundered for one (1) and five (5) laundering cycles, as applicable, in accordance with 4.6.10 and then tested for resistance to organic liquids in accordance with 4.6.5.1.

4.6.6 Visual shade matching. The color and appearance of the cloth shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A or C, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 ( $\pm 200$ )K illumination of 100 ( $\pm 20$ ) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 ( $\pm 200$ )K.

4.6.7 Pattern execution. The pattern of the cloth shall be matched to the pattern: drawing 2-1-2519 for Class 1; for Class 2 see 6.4; drawing 2-1-2592 for Class 3; and drawings 2-1-2529 through 2-1-2532 for Class 4.

4.6.8 Spectral reflectance test. Spectral reflectance data shall be determined on the face side and shall be obtained from 600 to 860 nanometers (nm) for Universal Camouflage (Class 1), Operational Enduring Freedom Camouflage (OEF-CP – Class 2) and Operational Camouflage (OCP – Class 3) and 700 to 860 nanometers (nm) for Desert MARPAT -Class 4) at 20 nm intervals on a spectrophotometer relative to the polytetrafluoroethylene (PTFE) family of compounds, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white or vitrolite tiles. The spectral band width shall be less than 20 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65. Measurements shall be taken on a minimum of two (2) different areas and the data averaged. The measured areas should be at least 6-inches away from the selvage. The specimen shall be measured as a single layer backed with layers of the same fabric and shade as follows: Classes 1, 2 and 3 with four (4) layers of the same shade and Class 4 four (4) layers of the same shade cut from the standard. The specimen shall be viewed at an angle no greater than 10° from normal, with the specular component included. Measurements shall be taken on a minimum of two (2) different areas. Specimens shall be oriented in different directions during testing. When possible, the specimens tested shall not contain the same Warp or filling yarns/ Wales or courses when presented to the

sample port. Camouflage materials should be measured with the appropriate aperture size to ensure that only one (1) color is measured at a time. (NOTE: The diameter for standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches for Desert MARPAT and 0.3725 inches or larger for the Universal camouflage, OEF-CP and OCP. (NOTE: Always use the largest aperture possible). Photometric accuracy of the spectrophotometer shall be within one (1) percent and wavelength accuracy within two (2) nm. Any color having spectral reflectance values falling outside the limits at four (4) or more of the wavelengths specified shall be considered a test failure.

#### 4.6.9 Colorfastness.

4.6.9.1 Laundering. AATCC-61, Test 1A (3 cycles) except that 1993 AATCC Standard Reference Detergent (non-phosphate) without optical brighteners shall be used.

4.6.9.2 Light. AATCC-16.2 or 16.3 (after 40 AATCC fading units/ after 170 kilojoules/m<sup>2</sup>nm at 420nm).

4.6.10 Laundering procedure. Place 2.0 ( $\pm$  0.2) pounds of the cloth and, if needed, ballast in an automatic washing machine set on permanent press cycle, high water level and warm 100°F (+10°F, -0°F) wash temperature. Place 0.5 ounce (14 grams) of 1993 AATCC Standard Reference Detergent (non-phosphate) without optical brighteners into the washer. The duration of each laundering cycle shall be 30 ( $\pm$  5) minutes. After laundering, place sample and ballast in an automatic tumble dryer set on permanent press cycle, 150°F-160°F, and dry for approximately 15 minutes. The laundering equipment, washer and dryer, shall be in accordance with AATCC-135.

#### 4.6.11 Hydrostatic resistance.

4.6.11.1 Initial. ASTM D751, Hydrostatic Resistance, Procedure A (Pressure Application by Mullen Type Hydrostatic Tester), Procedure 1 with water pressure applied to the face side of the test specimen.

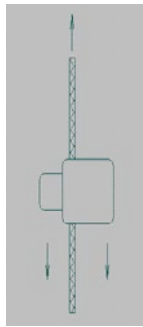
4.6.11.2 Hydrostatic resistance after strength of coating. ASTM D751, except that the testing machine clamp separation rate shall be 5 millimeters per second (12-inches per minute) and a load of twenty (20) pounds shall be applied. Hydrostatic resistance shall be determined in accordance with 4.6.11.1.

4.6.11.3 Hydrostatic resistance after high humidity. Three (3), 4-inch by 4-inch specimens shall be laid flat, face side up, on a supporting plate and the assembly placed in a desiccator containing water in the lower portion. The water level shall be approximately 1-inch below the specimens. The lid of the desiccator shall be put in place and the desiccator placed in a circulating air oven having a temperature of 125°F ( $\pm$  2)°F for a period of seven (7) days. At the end of the aging period, each specimen shall be removed from the desiccator and then immediately examined for colorfastness and tested for hydrostatic resistance. The specimens shall be tested for hydrostatic resistance in accordance with 4.6.11.1.

4.6.11.4 Hydrostatic resistance after diethyltoluamide. Five (5) specimen shall be laid flat, face side up on a 4-inch by 4-inch by 1/4-inch, glass plate. Three (3) drops of diethyltoluamide containing 75 percent diethyltoluamide and 25 percent ethanol (see 6.6) shall be applied to the center of each specimen. A glass plate of the same dimensions shall be placed on the specimen (or specimen assembly) and a pressure of 0.25 pounds per square inch of glass plate contact area shall be applied to the assembly. After 16 hours, the specimens shall be removed from between the glass plates and tested immediately for hydrostatic resistance in accordance with 4.6.11.1 or water resistance in accordance with 4.6.3, as applicable.

4.6.12 Stiffness. Stiffness at 70°F and 32°F in accordance with ASTM D747.

4.6.13 Barrel lock test. The barrel lock holding strength shall be tested as follows:



Barrel lock holding strength: Using tensile testing machine (in accordance with ASTM D5034 at 2-inches per minute, either pull-up cord on stationary engaged cord-lock or vice-versa (see above illustration.).

4.6.14 Elongation. Cut a 14-inch specimen from a representative sample cord and make two (2) marks on the cord so that a distance of 10-inches is between the gage marks. Suspend the cord from a clamp in such a manner as to allow a 2-pound weight to be hung on the lower end of the cord. Gradually lower the weight until the entire load is carried by the cord. After two (2) minutes, take a measurement between the two (2) marks and calculate the increase in length as follows:

$$\text{Elongation (\%)} = \frac{B-A}{A} \times 100$$

A

Where:

A = Initial measurement

B = Measurement of elongation under 2 pound load

4.6.15 Gage of rubber. The gage of rubber (elastic strands) shall be determined by counting the actual number of strands, laid side by side, contained in 1-inch. The gage is equivalent to the actual number of rubber yarns contained in 1-inch. A measuring device that measures the gage of rubber yarns may be utilized providing results are comparable.

4.6.16 Hook and loop laundry durability test method procedures. The hook and loop tape shall meet the requirements stated in 3.6.2.2 when tested for laundry durability. Use test replica or garment test sample method to verify laundry durability.

4.6.16.1 Test replica sample preparation. Fabricate two (2) test replica samples from basic material paragraph 3.5.1.1. One (1) test replica sample shall contain hook tape on the outer surface and the other test replica sample shall contain loop tape on the outer surface. Finished dimensions of each test replica sample shall be 20-inches by 20-inches. The hook and loop tape, as specified in 3.6.2 through 3.6.2.2, sewn to the test sample shall represent production widths, lengths and quantities used in jacket fabrication. Evenly distribute hook and loop tape pieces on both sides of each test replica sample. Sewn hook and loop pieces with box stitch 1/8-inch to 3/16-inch from selvage using 301 stitch type and 9-12 stitches per inch. Insert fabric squares into test replica sample to achieve 1.4-pound minimum weight per test sample. Close test replica sample and stitch around entire sample to prevent curling and balling up of internal fabric squares.

4.6.16.2 Alternate garment test sample. As an alternate, use two (2) jackets sewn with representative hook and loop tapes used in production shall be laundered as a set. To assess worse case situation of hook and loop failure during laundry test, do not engage hook and loop tapes or slide fastener (zipper).

4.6.16.3 Wash procedures for test replica samples or alternate garment test samples. Launder two (2) test replica samples, one (1) hook sample and one (1) loop sample, or two (2) jackets with test method AATCC-150 which includes sample and ballast load weighing a total of 4-pounds. Note: For garment sample, do not engage hook and loop tapes. Wash setting shall be permanent press, 140°F wash and 80°F rinse with a 10 minute agitation time. Use 66 grams of detergent conforming to 1993 AATCC Standard Reference Detergent (non-phosphate) without optical brighteners for each laundering. Drying shall be Permanent Press for 40-45 minutes.

4.6.16.4 Number of laundering. A total of ten (10) laundering and drying cycles for each test replica sample set or jackets.

4.6.17 Sealed seams. The end item shall be tested for initial hydrostatic resistance in accordance with 4.6.17.2 as follows:

Tests shall be run on the finished jacket at five (5) different seam locations as follows: One (1) on each side seam, one (1) on the center hood seam, and two (2) on the seam joining the hood to the neck of the jacket. The five (5) determinations shall be reported separately as "pass" or "fail". More than one (1) area of the five (5) test areas on each jacket showing leakage shall constitute a failure.

4.6.17.1 Resistance to laundering. From production lots when specified, units shall be randomly selected for five (5) launderings in accordance with 4.6.17.3. The units shall be visually examined and then tested for hydrostatic resistance as specified in 4.6.17.2 after the fifth laundering cycle.

4.6.17.2 Hydrostatic resistance of sealed seams. ASTM D751, Procedure B, Procedure 2 shall be utilized to determine if the seams are resistant to leakage at a fixed hydrostatic head pressure of 50 centimeters for three (3) minutes. The hydrostatic pressure shall be applied to the

outside or face of the garment. Leakage is defined as the appearance of water at three (3) or more different places or the continuous flow of water through the material or seams at one (1) or more different places within the 4-1/2-inch diameter test area.

**4.6.17.3 End item laundering test.** Prior to laundering, one (1) jacket shall be retained for use as the unlaundered sample in evaluating the jackets after laundering. Place two (2) end items, (one (1) end item may be ballast) (approximately 4 pounds total load), in an automatic washing machine set on permanent press cycle, high water level and warm 100°F (+ 10°F, - 0°F) wash temperature. If seams are taped sealed, then taped areas of the end item shall be visually examined prior to laundering for physical surface appearance characteristics and initial tape end and integrity conditions. The slide, hook/loop and snap fasteners of each end item shall be closed with the right side of each end item out during the wash and drying cycles. Place 28 grams of detergent conforming to 1993 AATCC Standard Reference Detergent (non-phosphate) without optical brighteners into the washer. The duration of each laundering cycle shall be 30 to 35 minutes. After laundering, place end items in an automatic tumble dryer set on permanent press cycle, high heat setting (150°F -160°F) and run approximately for 45 minutes. Conduct five (5) laundering and drying cycles. After the fifth laundering and drying cycle, test and evaluate the end items for conformance to the required characteristics in 4.6.17.4. The laundering equipment (washer and dryer) shall be in accordance with AATCC-135.

**4.6.17.4 Appearance after laundering of sealed seams.** After five (5) laundering cycles, the end item shall be examined for any sign of tape ends lifting, within 3/4-inch of sewn seam; tape ends lifting more than 1/8-inch when tape extends beyond 3/4-inch of the sewn seam, tape curling, bubbling, separation along tape edges or across the tape width, or tape outer layer more than 1/8-inch. The occurrence of any of these defects shall be considered a test failure. Tape ends lifting more than 1/8-inch beyond 3/4-inch of the sewn seam shall be tested for hydrostatic resistance in accordance with 4.6.17.2. Color loss in print areas of camouflage pattern. After five (5) laundering cycles, the color loss shall be determined by comparing the laundered and unlaundered samples. Any color change on any area of the end item less than the required rating on the AATCC Gray Scale for evaluating change in color shall be considered a test failure. Any physical surface appearance characteristic noted in a taped area on the unlaundered sample shall not be considered a test failure on the laundered end item if there is no adverse change in the characteristic. Puckering and creases within taped areas, not adversely affecting appearance shall not be considered a test failure. Physical surface appearance changes of the basic shell material. After five (5) laundering cycles, the camouflage face side of the end item shall be visually examined on all visible pattern parts for any evidence of physical surface appearance changes as unlaundered sample. Any physical surface appearance change shall be considered a test failure. Any physical surface appearance characteristic noted in a taped area on the unlaundered end item, if seams are tape sealed, shall not be considered a test failure on the laundered end item if there is no adverse change in the characteristic. Puckering and creases within taped areas, not adversely affecting appearance shall not be considered a test failure.

**4.6.18 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 finished cloth 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 3.11) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

4.6.19 End item visual examination. Jackets shall be subjected to a visual examination. All garment defects shall be scored in accordance with Table IX, which, are clearly noticeable at normal viewing, and affect serviceability and appearance of the garment. Material defects are defined in Section I of FED-STD-4, MIL-STD-1487 and Table IX. All shade evaluations of the garment shall be evaluated at a distance of approximately 3-feet and under the artificial daylight as specified in 4.6.6.

TABLE IX. End item visual examination.

		Classification	
Examination	Defect	Major	Minor
Material defects and damages	Any smash, multiple float or loose slub	101	
	Cut, tear, mend, burn, needle chew, or hole	102	
	Misweave, area of poor dye penetration, dyestreak, broken or missing yarn, visible mend, thin place, shade bar or color not as specified 1/	103	201
Cleanliness	Any spot, streak, or stain of a permanent nature on any portion of garment which would be visible when the garment is worn.		202
	Removable spot, streak, or stain on outside of garment		203
	Thread ends not trimmed throughout garment		204
	Any holding or basting threads visible on outside of the finished garment, when applicable		205
Component and assembly	Any defective component 1/	104	206
	Any component part omitted	105	
	Any required operation omitted or improperly performed 1/	106	207
Drawcord	Any drawcord caught in hem or tunnel stitching restricting use of drawcord	107	
	Any end not heat seared		208
	Any drawcord omitted	108	
	Any end not knotted		209
	Any drawcord insufficient in length	109	
	Any barrel lock omitted		210
Slide fastener	Any part of slide fastener bent, broken, otherwise defective	110	
	Not closing as specified	111	
	Length not as specified	112	
	Color not as specified		211
	Thong not as specified		212



TABLE IX. End item visual examination - Continued

Examination	Defect	Classification	
		Major	Minor
Snap fastener	Any part of assembly missing, mismatched, broken, cracked, bent, not securely clinched, affecting function: two (2) or more snap fasteners	113	213
	one (1) snap fastener		
	One (1) or more clinched too tightly cutting surrounding fabric	114	
	Loose, i.e., socket or stud spins freely or wobbles in connection portions		214
	One (1) or more having rough or sharp edge	115	
Wrist tabs	Missing	116	
	Improperly located or not width specified 1/	117	215
Labels	Missing, illegible, or incorrect	118	
	Incorrectly placed or attached		216
Accuracy of seaming	Seam twisted, pleated, seaming or puckered 1/	119	217
	Part of garment caught in any unrelated operation or stitching 1/	120	218
	Thread break secured by stitching back of the break less than 1/2-inch		219
	Ends of all seams and stitching when not caught in other seams or stitching, uneven or backtacked less than 1/2-inch		220
	Color not as specified		221
	Gage of stitching uneven or not as specified		222
	Edge of seam tape less than 1/8 inch from seam allowance	121	
	Seam tape lifting off fabric	122	
	Visible scorching (heat degradation of fabric) in excess of 3/16 -inch width or 1/2-inch in length at any location along a taped seam	123	
Open seams	More than 1/8-inch up to 1/4-inch		223
	More than 1/4-inch	124	
	NOTE: One or more broken or two or more continuous skipped or run-off stitches constitute an open seam. On double stitched seams, a seam is considered open when one or both sides of the seam are open. Raw edge not securely caught in stitching shall be classified as an open seam		
Seams and stitching	Not specified seam or stitch type		224
	Missing, broken, or skipped stitches 1/	125	225

TABLE IX. End item visual examination - Continued

Examination	Defect	Classification	
		Major	Minor
Stitch tension	Loose tension in any area: more than 1-inch but not more than 2-inches	126	226
	more than 2-inches		
	Tight tension (stitches break when normal strain is applied to the seam or stitching)	127	
	Missing, broken, or skipped stitches 1/	128	
Stitches per inch (to be scored only when the condition exists on major portion of the seam)	Less than minimum specified:	129	
	one (1) stitch		227
	two (2) or more stitches		
	More than maximum specified		228
Pockets and flaps	Flap attached crookedly, i.e., distance between sides of pocket and underside of opened flap varies more than 1/4-inch		229
	Pocket or flap poorly shaped		230
	Flap not covering front or back edge of pocket by 3/16-inch or more		231
	Insignia tab set crookedly		232
	Pocket divider not properly placed		233
Heat sealed seams	Any seam tape not located as specified	130	234
	Any seam tape not 1/8- inch overlap on each side of sewn seam	131	
	Any seam tape not overlapped 3/4-inch minimum	132	
	Any required stitching not covered by seam tape		
	Any needle punctures that have not been repaired using heat sealing tape		
	Any area of the laminate knit fabric bordering the seam tape that is melted exposing laminate film	133	
Repairs	Any heat sealing repairs extending beyond 25-inches in length	134	
	More than five (5) repairs on any one (1) item 1/	135	
Seam tape adhesion	Seam tape lifting off fabric within 3/4-inch of seam 1/	136	
	Visible scorching (heat degradation of the fabric on the laminate) in excess of 3/16-inch in width or 1/2-inch in length at any location along a taped seam	137	

TABLE IX. End item visual examination - Continued

		Classification	
Examination	Defect	Major	Minor
Shaded part	Variation in shade within an outside part 1/ Any part required to be cut from one (1) piece on material shaded 1/  NOTE: Parts suspected as being shaded shall be examined at a distance of 3-feet against the background of the other parts and colors of the garment. When the shade difference is readily discernible under these examining conditions, it shall be scored as a shaded part.	138	236
		139	237
Fronts Length of fronts	Hem uneven by 1/4-inch or more at bottom when fastened		238
	Uneven by 1/4-inch or more at neck when fastened		239
	Flaps uneven by more than 1/4-inch when fastened		240
	Left flap less than 1/4-inch longer at bottom than right flap when fastened		241
Bartacks	Bartack omitted	140	
	Any bartack not in specified location, insecure, or not serving intended purpose: more than two (2)	141	
	two (2) or less		242
	Any loose stitching, incomplete, or broken		243
	Length or width not as specified		244
Hood flap	Snap not in locations specified	142	
	Loop fasteners not in locations specified	143	
	Not heat sealed	144	
Label/tag	Barcode omitted or not readable by scanner		245
	Human-Readable-Interpretation (HRI) omitted or illegible		246
	Not attached to location specified		247
	Causes damage to the garment	145	
Fastener tape hook & pile	Not properly placed	146	
	Not specified length		248

1/ This defect shall be scored as major when seriously affecting serviceability and as a minor when affecting serviceability but not seriously.

## 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 materiel is to be performed by DoD or in-house contractor 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 commands. 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.

## 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 ECWCS, GEN III, Extreme Cold/Wet Weather Jacket is for wear by soldiers, as a separate waterproof outer garment, or as a part/layer of multi-component, Third Generation Extended Cold Weather Clothing System. The principle purpose is to provide rain protection.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this Purchase Description document.
- b. Class and size required (see 1.2)
- c. When first article is required (see 3.1.1, 4.2, and 6.3)
- d. Conformance inspection acceptance quality limits (AQL) (see 3.1.2 and 4.3)
- e. Camouflage pattern required (see 3.5.2.2)
- f. When toxicity testing is required (see 3.11, 4.6.18)
- g. Packaging requirements (see 5.1)

6.3 First article. When a first article inspection is required (see 3.1.1), it will be inspected and approved under the appropriate provisions for FAR 52.209-4. The first article should be a preproduction 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 acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Standard shade samples. For access to standard samples, address the contracting activity issuing the invitation for bids or request for proposal.

6.5 Diethyltoluamide (DEET Insect Repellent) reagent. The insect repellent reagent shall be a solution of 75 percent by weight (min) of diethyltoluamide and the remainder denatured alcohol. The diethyltoluamide component of the solution shall be a technical grade and contain N, N-diethyl-metatoluamide of not less than 95 percent purity and the remainder shall consist of entirely or mixture of ortho or para isomers of N, N-diethyltoluamide. The denatured alcohol component of the solution shall be ethanol, U.S.P. 94.9 percent by volume and denatured in

accordance with The Code of Federal Regulations 27 CFR 21, Formula 40 (see 2.1). The insect repellent must be registered with the U.S. Environment Protection Agency in accordance with the Federal Insecticide, Fungicide and Rodenticide (FIFRA) (see 2.1).

(For guidance purposes only, DEET insect repellent conforming to Type II, Concentration A of O-I-503 has been used successfully as a reagent in testing.)

6.6 Subject term (key word) listing.

Extended Clothing System  
Hard Shell Coat

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

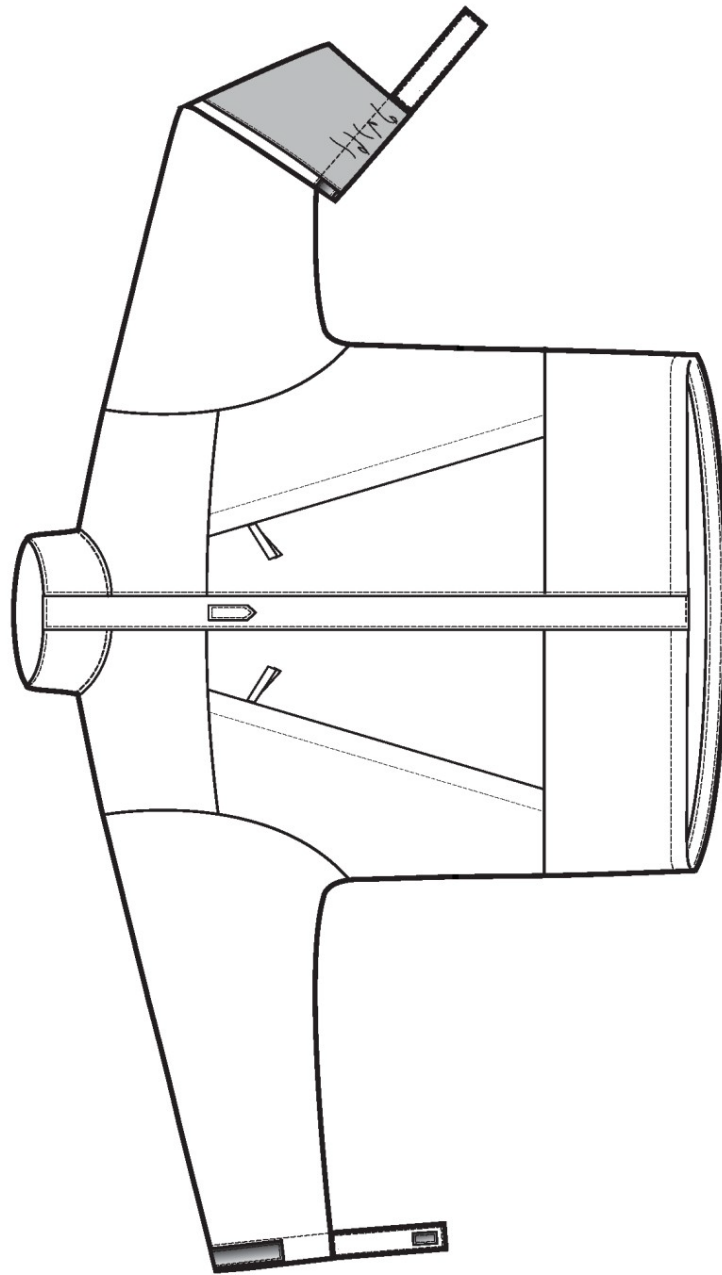


FIGURE 1. Jacket, extreme cold/wet weather (GEN III), front view.

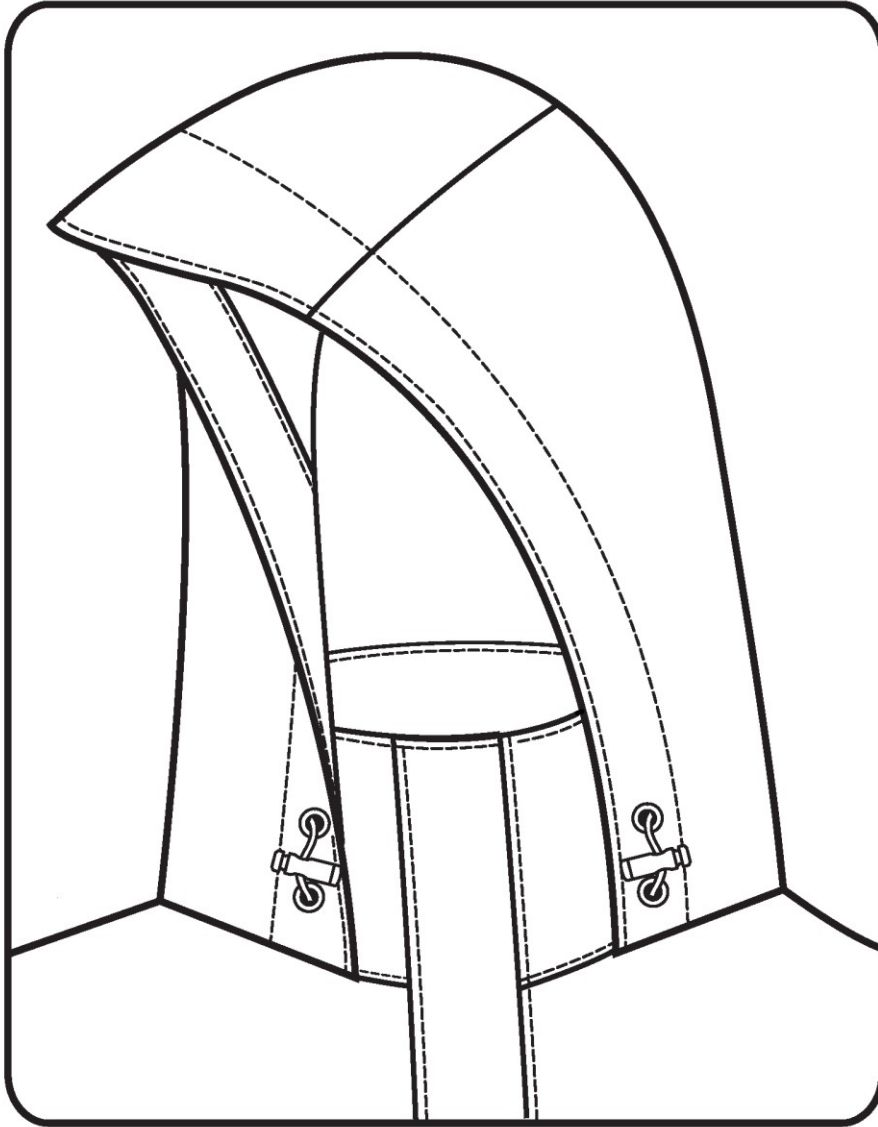


FIGURE 2. Jacket, extreme cold/wet weather (GEN III), hood.

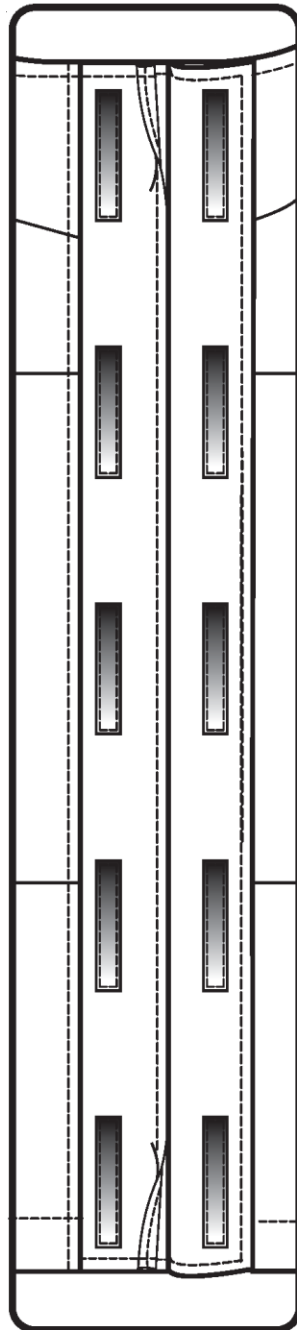


FIGURE 3. Jacket, extreme cold/wet weather (GEN III), Top flap.



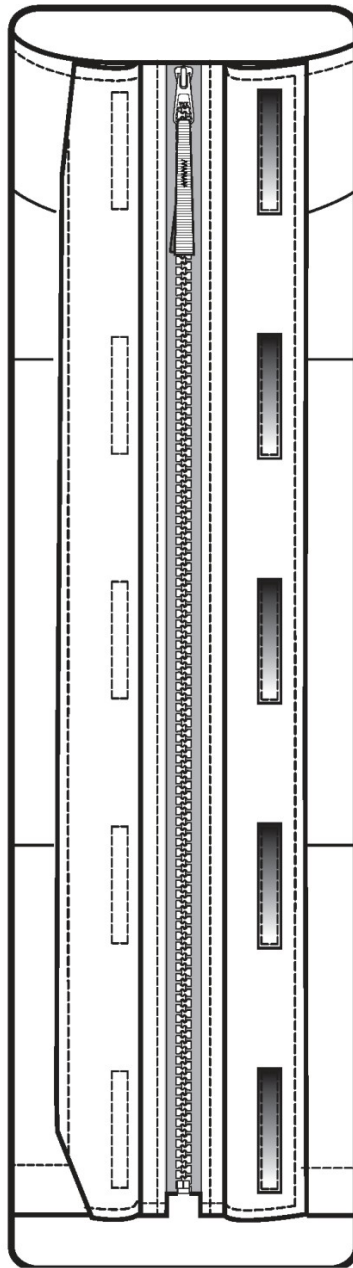


FIGURE 4. Jacket, extreme cold/wet weather (GEN III), wind flap.

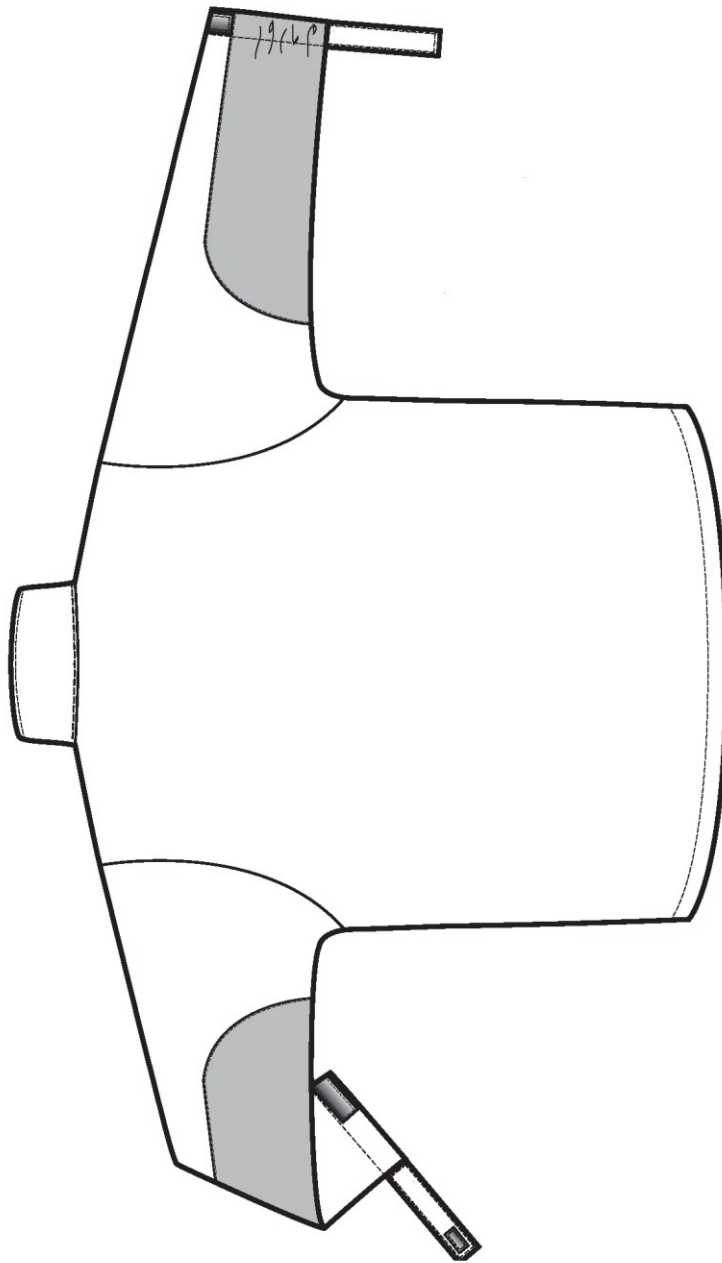


FIGURE 5. Jacket, extreme cold/wet weather (GEN III), back view.

GEN III)

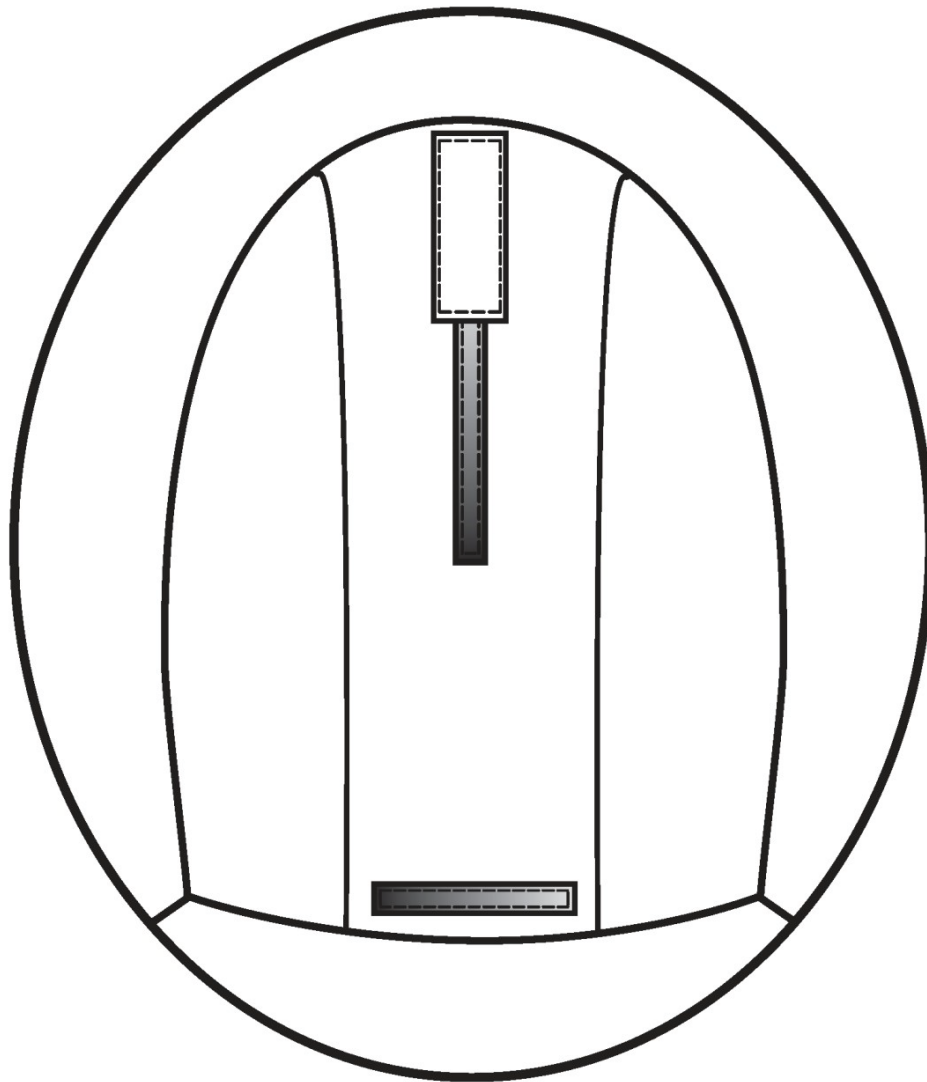


FIGURE 6. Jacket, extreme cold/wet weather (GEN III), back of hood.

CUSTODIAN:

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PREPARING ACTIVITY:

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