INCH-POUND
GL/PD-06-06
19 April 2006

PURCHASE DESCRIPTION

JACKET, EXTREME COLD/WET WEATHER (GEN III)

1. SCOPE

1.1 Scope. This purchase description covers the requirements for a waterproof, extreme cold/wet weather jacket, which serves as a layer of the GEN III ECWCS.

1.2 Classification. The jacket shall be of one type in the following sizes, as specified (see 6.2).

SCHEDULE OF SIZES

Size	Small	Medium	Large	X-Large
Regular	X	X	X	X
Long			X	X

2. 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 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 SPECIFICATIONS

V-T-295 - Thread, Nylon

FEDERAL STANDARDS

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

COMMERCIAL ITEM DESCRIPTIONS

A-A-55126 - Fastener Tapes, Hook and Loop, Synthetic
AA-A-55634 - Zipper, (Fastener, Slide Interlocking)

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-STD-129 – Military Marking for Shipment and Storage
MIL- STD-1487 – Glossary of Cloth Coating Imperfections
MIL-PRF-5038 - Tape, Textile and Webbing, Textile, Reinforcing Nylon
MIL-W-5664 – Webbing, Textile elastic
MIL-DTL-32075 - Label: For Clothing, Equipage, and Tentage (General Use)

(Copies of these documents are available from the Acquisition Streamlining and Standardization Information System (ASSIST) database, online at http://assist.daps.dla.mil/quicksearch/ or www.dodssp.daps.mil or the Standardization Document Order Desk, 700 Robbins Ave. Philadelphia, PA 19111-9054).

2.2.2 Other Government documents, drawings and publications. The following other Government documents, drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

U.S. ARMY NATICK SOLDIER CENTER

DRAWINGS

2-1-2519 – Universal Camouflage Pattern

(Copies of drawings are available from the U.S. Army Natick Soldier Center, ATTN: AMSRD-NSC-IP-E, Kansas St., Natick, MA 01760-5019)

CODE OF FEDERAL REGULATIONS

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

(Copies of these documents are available online at: www.access.gpo/nara/cfr or from the Superintendent of Documents, U.S. Government Printing Office, North capitol & “H” Streets, N.W., Washington, DC 20402-0002.)

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.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC-8 - Colorfastness to Crocking: AATCC Crockmeter Method
AATCC-16 - Colorfastness to Light
AATCC-22 - Water Repellency: Spray Test
AATCC-61 - Colorfastness to Laundering, Home and Commercial: Accelerated
AATCC-96 - Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics, Except Wool
AATCC-135 - Dimensional Changes in Automatic Home Laundering of Woven and Knitted Fabrics, Except Wool
AATCC–150 - Dimensional Changes in Automatic Home Laundering of Garments

(Copies of these documents are available from www.aatcc.org or American Association of Textile Chemists and Colorists (AATCC), P.O. Box 12215, Triangle Park, NC 27709-2215.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D-747 - Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
ASTM D-751 - Standard Test Method for Coated Fabrics
ASTM D-1776 - Practice for Conditioning and Testing Textiles
ASTM D-2582 - Film, Plastic and Thin Sheeting, Puncture Propagation Tear, Resistance of
ASTM D-3776 - Mass Per Unit Area (Weight) of Fabric
ASTM D-5034 - Breaking Strength and Elongation of Textile Fabrics (Grab Test)
ASTM D-6193 - Practice of Stitches and Seams
ASTM E-96 - Water Vapor Transmission of Materials
ASTM F–392 - Flex Durability of Flexible Barrier Materials

(Application for copies are available from www.astm.org or American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

AMERICAN NATIONAL STANDARDS INSTITUTE

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

(For all inquiries, please contact the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036. Website address www.ansi.org)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

NATIONAL AEROSPACE STANDARD (NASM)

NASM 20652/1B - Eyelets, Metallic, and Eyelet Washers, Metallic-FSC 5325

(Application for copies are available from the Aerospace Industries Association, 1250 Eye Street NW, Washington, DC 20005.)

MISCELLANEOUS

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

(Copies of this document is available from Raven Press, 1185 Avenue of the Americas, New York, NY 10036)

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

(Copies of this document are available from the U.S. Army Center for Health Promotion and Preventative Medicine, ATTN: MCHB-DC-TTE, Bldg., E-2100, Aberdeen Proving Ground, MD 21010-5422.)

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3 .1 First article. When specified (see 6.3), a sample shall be subjected to first article inspection (see 4.1).

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 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. The hard shell jacket shall be water-proof.

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).

3.5.1.1 Basic shell material. The cloth shall be a waterproof and moisture vapor permeable, laminated cloth utilizing a 100% nylon, ripstop face fabric. The cloth shall meet the performance requirements of Table I when tested as specified in 4.5. The color of the face side of the cloth shall be Universal Camouflage pattern. 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.

* 3.5.1.2 Physical requirements. The cloth shall conform to the physical requirements specified in Table I when tested as specified in 4.5.

TABLE I. Basic Shell Material - Physical Requirements

Characteristic	**Requirement**
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, $g/m^2/24h$ (min.) -	

Characteristic	Requirement
Initial	
Procedure B	650
Procedure BW	4500
After synthetic perspiration	
Procedure B	650
Procedure BW	4500
Stiffness, in-lbs (max.) – At 70°F	0.001
At 32°F	0.001
Blocking, rating (max.)	No. 1
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 and 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	Universal Camouflage
Pattern Execution	Universal Camouflage Pattern
Spectral Reflectance	Table II
Colorfastness to:	
Laundering	Equal to or better than "3-4" rating on AATCC Gray Scale for Color Change
Light	Equal to or better than "3-4" rating on AATCC Gray Scale for Color Change
Crocking	Equal to or better than the standard sample or not less than AATCC chromatic transference scale rating of 3.5.
Toxicity	1/

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

3.5.1.3 Color

3.5.1.3.1 Army Universal Camouflage. 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.

3.5.1.4 Pattern Execution.

3.5.1.4.1 Army Universal Camouflage pattern execution. 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 36.00 inches (+1.25 inches, -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.

3.5.1.5 Spectral Reflectance.

3.5.1.5.1 Spectral reflectance, Army Universal Camouflage. The spectral reflectance of the colors in the Universal Camouflage cloth shall conform to the requirements specified in Table II, initially and after laundering when tested as specified in 4.6.8 and 4.6.8.1.

TABLE II. Spectral Reflectance Requirements: Reflectance (percent)

Wavelengths Nanometers (nm)	Desert Sand 500		Urban Gray 501		Foliage Green 502	
	Min	Max	Min	Max	Min	Max
600	28	42	12	26	8	18
620	30	44	14	26	8	18
640	34	50	14	28	8	20
660	38	59	14	30	10	26
680	44	63	18	34	10	26
700	46	69	24	38	12	28
720	48	71	26	42	16	30
740	48	76	30	46	16	30
760	50	80	32	48	18	32
780	54	80	34	48	18	34
800	54	80	34	50	20	36
820	54	80	36	54	22	38

840	56	82	38	54	24	40
860	56	82	40	56	26	42

3.6 Components.

3.6.1 Thread. The thread for all seaming and stitching shall be V-T-295, “Thread, Nylon” Type I or II, size B, 3 ply at 6.0 pounds breaking strength, with “Water-Repellent” treatment, conforming to V-T-295. As an alternate, bobbin/looper threads can be Nylon, size AA, 2-ply, with a minimum breaking strength of 4.0 pounds, with “Water-Repellent “finish. The color of the thread shall be Foliage Green 504.

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 selvage edges. No slit or split edges are permitted. Sew all hook and loop minimum of 1/8 inch from bound selvage to prevent needle cutting along edges. To prevent raveling, do not sew directly on selvage. However, each required width shall maintain a tolerance of $\pm$ 1/32 inch as to prevent stitching runoffs or improper fit into automatic sewing equipment. The color shall match Foliage Green 504.

3.6.2.1 Alternate tape, loop. As an alternate, loop fastener tape without selvages edges (reduce field fraying) shall conform to class 1 of A-A-55126 except without selvage edges; the following products may be used: YKK Cosmolon Edge to Edge" with heat-sealed edges or Velcro "DD", an edge-to-edge loop tape. Sew all loop tape minimum of 1/8 inch from edge to prevent needle cutting along edges. However, each required width shall maintain a tolerance of $\pm$ 1/32 inch as to prevent stitching runoffs or improper fit into automatic sewing equipment. The color shall match Foliage Green 504.

3.6.2.2 Alternate tape, hook. As an alternate to hook tape without selvages (reduce field fraying), the following products may be used: Extruded plastic hook tape identified as "Velcro brand HTH 841" or "YKK brand SA200A". The color shall match Foliage Green 504.

3.6.2.3 Colorfastness, tape hook and loop. Unless otherwise specified, Foliage Green 504 fastener tapes (hook and loop) shall show fastness equal to or better than a rating “4-5” to light, equal to or better than a rating of “2-3” for laundering using AATCC Gray Scale for Color Change and equal to or better that rating of “4” for crocking using AATCC Chromatic Transference Scale. The color depreciation for laundering and light shall remain in the same hue as compared to the original sample. (Hue/cast is defined as the attribute of color that classifies a color as red, blue, green etc.).

3.6.2.4 Hook and loop laundry durability test method. When tested in accordance with 4.6.16, 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, minus 0 inch, elastic cord, elongation: 120% +/- 10%; weight per linear yard, 0.2-ounces mimimum; pick per inch, 60 minimum; number of carriers 16 minimum; end 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.

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 lbs. minimum crosswise strength with a water repellent treated slide fastener tape and thong on top slider. The color shall be Foliage Green 504.

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 lbs min. crosswise strength with water repellent treated tape and thong. The color shall be Foliage Green 504.
*Reverse chain is when zipper tape side and slider pull represents face

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 in accordance with 4.6.13. The barrel lock shall be ½-inch x 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.

3.6.5.1 Eyelet. The two eyelets on each side of the hood shall be in accordance with MIL-E-20652/1B dash No. ABE-131.

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 1-5 and patterns for more details.

3.7.1 Bartacks. All reinforcement bartacks shall use Nylon Size B thread with WR treatment. Bartacks include arm sleeve cuff at intersection of elastic and adjustment tab underarm seam, lower and upper ends of front closure slide fastener tape on both pin and box sides, rear hide-away standup collar at openings (where hood tucks into). Bartack length is 3/8 inch with 24 stitches.

3.7.2 Seams. The seams shall be consistent, exhibit a uniform appearance and conform to ASTM D- 6193 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 side on the outside of the garment and its other side on inside of the garment).

3.7.2.1 Seam sealant tape. If used, 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.

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 4.6.17.1 and 4.6.17.2.

3.7.3 Primary seams. Side seams, Underarm seams, Arm sleeve seams, Shoulder seams, Hood 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 in. beyond seam allowance.

3.7.4 Hem seam. EFb-1 with 1-inch turn-in. 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 with 5/8 x 7/8 in. hook tape topstitched on underside of tabs. All rank 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 - 5/16 in. from slide fastener (zipper) tape edge, turn in and top stitch tape and extension strip 1/16 in. 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 5 loop (5/8 x 3 in.) tape strips and 3-3/8 in. long triangular rank tab with 5/8 x 7/8 in. hook tape and 5/8 x 3/4 in. 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 in. nominal from edge for pin side slide fastener (zipper) tape cover. Conduct same operation for right box side slide fastener (zipper) tape except topstitch 5 hook (5/8 x 3 in.) 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 in. nominal from turn-in. Repeat operation for right box side. Catch lower ends of extension and cover strips into hem and double stitch. Bartack bottom and top of slide fastener (zipper) pin and box tapes. Finished appearance of slide fastener (zipper) covers shall be 1-3/4 in width nominal with 1/2 in 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.

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 in. 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 two (2), (5/8 x 4 in.) loop tapes and double stitch 2-1/2 in. rank tab with 5/8 x 7/8 in. hook tape to center hood fabric per pattern placement. Set in 1/8 in. eyelets on both side hood panels per pattern placement. Sew three primary panels with SSa-1 seam. Fold cord-lock tunnel lengthwise in half with elastic cord within tunnel and sew with SSa-1 seam. Topstitch tunnel strip onto visor facing pattern piece with seam SSa-2 seam. Sew visor facing pattern piece to top of hood with SSc-1 seam. Set pass-through eyelets 1-1/2 in. 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.

3.7.7.1 Hide-away (HA) collar. Topstitch 5/8 x 4 in. hook strip to HA collar lining per pattern placement. Seam lining to 4 in. wide outer back HA collar strip with SSc-1 seam. Sew interior standup collar strip to 2-1/2 in collar facing with LSb1 seam. Seam 3-1/2 in. wide rear standup collar strip to interior standup collar assembly and outer back HA collar strip with SSa-1 seam, turn and top stitch to provide for a SSc-1 seam appearance. Seam entire HA collar assembly upper portion jacket assembly with SSa-1 turn and topstitch backside 1/16 in. from edge.

3.7.7.2 Finished HA collar appearance. HA collar assembly shall exhibit complete hood with protruding 3/4 in. cord tunnel, 2-1/2 in. visor, and exterior cord locks 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 loop tape and inner collar lining hook tab. Stand up collar final dimension allows a 4 in. nominal rise from jacket main collar seam with ends of front closure zipper at top.

3.7.8 Armsleeve cuff. Insert 4-1/4 inch elastic webbing and arm sleeve cuff adjustment tab into underarm seam. Foldover arm sleeve pattern piece 1 in and topstitch to produce cuff with seam LSd-1. Attach 1 x 5 in. loop strip per pattern placement on cuff. Double stitch opposite elastic end. Finished cuff assembly shall be able to stretch 6-3/4 in. 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 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:
(a) 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.

(b) 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.

(c) 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 IV 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 III.

Table III. List of Pattern Parts.

Material	Code	Nomenclature
Basic shell material	HRDSHLT-FTYOKE	Front yoke
	HRDSHLT-FRTCNT	Front center
	HRDSHLT-SIDEFRT	Side front
	HRDSHLT-PKTFAC	Pocket facing
	HRDSHLT-ZIPTAPE	Zipper tape
	HRDSHLT-LWNDFLP	Left wind flap
	HRDSHLT-RWNDFLP	Right wind flap
	HRDSHLT-ZIPEXT	Zipper extension
	HRDSHLT-BTMFRT	Bottom front
	HRDSHLT-SLV	Sleeve
	HRDSHLT-BACK	Back
	HRDSHLT-INCLR	Inner collar
	HRDSHLT-INTOPCLR	Inner top collar
	HRDSHLT-INBTMCLR	Inner bottom collar
	HRDSHLT-SLVTAB	Sleeve tab

	HRDSHLT-HOOD	Hood
	HRDSHLT-HOODCNT	Hood center
	HRDSHLT-HOODFAC	Hood facing
	HRDSHLT-HOODTNL	Hood tunnel
	HRDSHLT-RANKTAB	Rank tab
	HRDSHLT-HOODTAB	Hood tab
	HRDSHLT-BKHEMFAC	Back hem facing
	HRDSHLT-ZIPCOVER	Zipper cover

3.9 Type 301 stitching. When Type 301 stitching is used, the ends of all stitching shall be backstitched or overstitched not less than ½ 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 ½ 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.

a. 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 ½ inch back of the end of the stitching. 1/

b. Except for pre-stitching, thread breaks or two 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 ½ inch in back of the defective area, continue over the defective area, and continue a minimum of ½ 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 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 ¼ inch unless otherwise specified.

4. VERIFICATION

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

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

4.2 First article inspection. When a first article is required (see 3.1 and 6.3), it shall be examined for the defects specified in 4.6.19, dimensions specified in 4.6.20, and tested as specified in 4.4.1, and 4.5.

4.3 Conformance inspection. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4, as defined by contract, except where otherwise specified.

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.

4.4.1 Component and material certification. Unless otherwise specified, a certificate of compliance will be acceptable as evidence that the requirements of 3.5 and 3.6 are met. When certificate of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

* 4.5 Basic material testing. The basic materials specified in 3.5 shall be tested for the characteristics listed in Table IV in accordance with the test method cited.

TABLE IV. Basic Material Testing.

Characteristics	Reference Paragraph	Test Method
Basic shell material		
Fiber identification and weave		1/
Weight	3.5.1.2	ASTM D-3776 (Method C)
Breaking strength	3.5.1.2	ASTM D-5034 (G-E or G-T)
Tearing strength	3.5.1.2	ASTM D-2582 3/
Hydrostatic Resistance		
Initial	3.5.1.2	4.6.11.1
After strength of coating	3.5.1.2	4.6.11.2
After high humidity	3.5.1.2	4.6.11.3
After diethyltoluamide		
Initial and after laundering	3.5.1.2	4.6.11.4, 4.6.10 & 4.6.11.1
Moisture vapor transmission Initial (Procedure B &BW)	3.5.1.2	4.6.1-4.6.1.2
After synthetic perspiration (Procedure B & BW)	3.5.1.2	4.6.3.2 & 4.6.1-4.6.1.2

Characteristics	Reference Paragraph	Test Method
Stiffness		
At 70°F	3.5.1.2	ASTM D-747 4/
At 32°F	3.5.1.2	2/ & ASTM D-747 4/
Blocking	3.5.1.2	4.6.2
Water permeability –		
Initial	3.5.1.2	4.6.3
After synthetic perspiration		
Initial and after laundering	3.5.1.2	4.6.3.2, 4.6.10 & 4.6.3
After physical surface appearance	3.5.1.2	4.6.3.3 & 4.6.3
After flex (70°F)	3.5.1.2	4.6.3.1
After diethyltoluamide		
Initial and after laundering	3.5.1.2	4.6.11.4, 4.6.10 & 4.6.3
Spray rating		
Initial	3.5.1.2	4.6.4.1
After 5 launderings	3.5.1.2	4.6.4.2
Resistance to organic liquid		
Initial	3.5.1.2	4.6.5.1
After 5 launderings	3.5.1.2	4.6.5.2
Dimensional stability	3.5.1.2	AATCC – 96, Option 1C
Sealed Seams		4.6.17
Color	3.5.1.2	4.6.6
Pattern Execution	3.5.1.2	4.6.7
Spectral Reflectance	Table II	4.6.8 & 4.6.8.1
Colorfastness to:		
Laundering	3.5.1.2	4.6.9.1
Light	3.5.1.2	4.6.9.2
Crocking	3.5.1.2	AATCC - 8
Toxicity	3.5.1.2	4.6.18
Elastic cord		
Elongation	3.6.3	4.6.14
Weight	3.6.3	ASTM D- 3776
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
Fastener Tape, Hook and Loop		
Color	3.6.2	4.6.6
Colorfastness To:		
Dry cleaning	3.6.2.3	AATCC -132
Light	3.6.2.3	4.6.9.2
Laundering after 5 cycles	3.6.2.3	AATCC – 61, Opt. 3A

Characteristics	Reference Paragraph	Test Method
Crocking	3.6.2.3	AATCC - 8
Laundry Durability	3.6.2.4	4.6.16-4.6.16.4

1/ A certificate of compliance shall be submitted for these requirements.
2/ The test specimens and testing machine shall be exposed to 32°F±2°F for 4 hours. The test shall then be performed in still air at that temperature.
3/ Tear strength. ASTM D-2582, with exceptions as follows: Five warp and five filling specimens shall be tested. Specimen size shall be 8-inches by 8-inches. Only one 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 mm. 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.
4/ Stiffness (bending moment) shall be conducted in accordance with ASTM D-747 except as follows:

a. Unless otherwise specified, the testing conditions shall be in accordance with ASTM D-1776.
b. The test specimen shall be a rectangle of cloth of dimensions two (2) by one (1) inches with the long dimension parallel to the fabric direction under test, warp or filling, as applicable.
c. The load scale reading shall be recorded only at the specimen angular deflection of 60 degrees.
d. The stiffness is the bending moment of specimen at a deflection angle of 60 degrees and shall be calculated to three significant figures as follows:

$$\text{Bending moment, in.-lb.} = \frac{\text{Load scale reading x moment weight*}}{100}$$

* Testing machine of Tinius Olsen Testing Machine Co.

4.6 Methods of testing. All testing shall be done in a standard condition environment defined by the ASTM D-1776, if not specifically defined by the individual test procedure.

4.6.1 Moisture Vapor Transmission Rate. ASTM E-96 with temperature and humidity conditions of $73.5^{o} \pm 1^{o}$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^2/24h (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 three (3) inches below the position of the inverted cup test specimen.

4.6.1.1 Procedure B, ASTM E-96. 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 sixteen (16) hours (Conditioning time of less than 4 hours may be used provided that equilibrium conditions have be demonstrated to exist within the test sample/sample cup/wind tunnel. In cases of dispute, the conditioning time shall be 4 hours.). After conditioning, the cup shall be immediately weighed to start the test and again after exactly twenty-four (24) hours to complete the test. Five (5) specimens shall be tested.

4.6.1.2 Procedure BW, ASTM E-96. 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 D-751, Blocking Resistance at Elevated Temperatures, except that the tests shall be performed at a temperature of $180^{o} \pm 2^{o}F$ 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 D-751, Hydrostatic Resistance, Procedure B, Procedure 2 with a fixed hydrostatic head of 50 centimeters applied to the face side of the test specimen for 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 $70^{o}F$. One 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 F-392, 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 poweder, 1.0 gram normal propyl propionate, 0.5 gram of liquid lecithin and 500 ml of distlled 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 ml of perspiration solution at 35°C onto the center of an 8-inch by ¼-inch glass plate. Place the specimen on the glass plate with the back side contacting the glass. Dispense an additional 2 ml of synthetic perspiration solution onto the center of the specimen. Place a second 8-inch by 8-inch by ¼-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 twenty (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 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 5 launderings. Test specimens shall be laundered for five (5) laundering cycles 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 5 launderings. Test specimens shall be laundered for five (5) laundering cycles in accordance with 4.6.10 and then tested for resistance to organic liquids in accordance with 4.6.5.1.

4.6.6 Color Matching. The color and appearance of the cloth shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight and that have a correlated color temperature of $7{,}500^{o} \pm 200^{o}$K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at $2{,}300^{o} \pm 200^{o}$K.

4.6.7 Pattern Execution. The pattern of the cloth shall be matched to the pattern drawing (see 3.5.1.4.1).

4.6.8 Spectral reflectance. Spectral reflectance data shall be determined on the face side and shall be obtained from 600 to 860 nanometers (nm) at 20 nm intervals on a spectrophotometer relative to the barium sulfate standard, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white, e.g., magnesium oxide or vitolite tiles. The spectral band width shall be less than 26 nm at 860 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a source that simulates either CIE source A or CIE source D65. The specimen shall be measured as a single layer, backed with six layers of the same fabric and shade. Measurements shall be taken on a minimum of two (2) different areas and the data averaged. The measured areas should be at least 6 inches away from the selvage. The specimen shall be viewed at an angle no greater than 10 degrees from the normal, with the specular component included. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. Any color having spectral reflectance values falling outside the limits at four or more of the wavelengths specified shall be considered a test failure.

4.6.8.1 Accelerated laundering (Spectral Reflectance Durability Test). The cloth shall be laundered separately in accordance with AATCC-61 (Option 3A) except that a 4-gram sample size shall be used (Note: A sample size large enough to evaluate the spectral reflectance shall be used) and that the procedure shall be conducted using (10) stainless steel spheres and the 1993 AATCC Standard Reference Detergent (non-phasphate) without optical brightener. The samples shall then be evaluated for spectral reflectance in accordance with 4.6.8.

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, Option A (after 40 fading units) or E (after 170 kilojoules).

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 ($100^{o} + 10^{o}F, -0^{o}F$) 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^{o}-$160^{o}F$, and dry for approximately fifteen (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 D-751, 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.

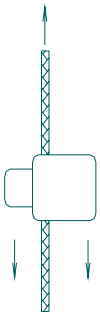
4.6.11.2 Hydrostatic resistance after strength of coating. ASTM D-751, except that the testing machine clamp separation rate shall be 5 mm/sec (12 in/min) and a load of 20 pounds shall be applied. Hydrostatic resistance shall be determined in accordance with 4.6.11.1.

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 $\pm$ 2^{o}F for a period of 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) specimens shall be laid flat, face side up on a 4-inch by 4-inch by ¼-inch, glass plate. Three (3) drops of diethyltoluamide containing 75% diethyltoluamide and 25% 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^{o}F and 32^{o}F

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 D-5034) at 2 inches/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 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 2 minutes, take a measurement between the two marks and calculate the increase in length as follows:

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

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 3.6.2.4 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 test replica samples from basic material paragraph 3.5.1.1. One 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, paragraphs 3.6.4-3.6.4.2, 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 test replica samples, one hook sample and one loop sample, or two 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 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 different seam locations as follows: One on each side seam, one on the center hood seam, and two on the seam joining the hood to the neck of the jacket. The five determinations shall be reported separately as "pass" or "fail". More than one area of the five test areas on each parka showing leakage shall constitute a failure.

4.6.17.1 Resistance to Laundering. From each production lot, 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 D-751, 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 or more different places or the continuous flow of water through the material or seams at one 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 end item shall be retained for use as the unlaundered sample in evaluating the jackets after laundering. Place two (2) end items, (one 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 ($100^{o} + 10^{o}$, - 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 (150-160° F) and run approximately for 45 minutes. Conduct five 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.

a. After five 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 beyond 3/4 inch of the sewn seam shall be tested for hydrostatic resistance in accordance with 4.6.17.2.

b. Color loss in print areas of universal camouflage pattern. After five 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.

c. Physical surface appearance changes of the basic shell material. After five 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.

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

4.8.18.1 Toxicity documents. All finishes/chemicals used to process the garment shall be identified and accompanied by the appropriate Material Safety Data Sheet (MSDS) information. The use of chemicals recognized by the Environmental Protection Agency (EPD) as human carcinogens is prohibited.

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 VA, 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 V. 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 V. Material Visual Examination

Examination	Defect
Fabric	Hole, cut, tear, smash, burn, exposed drill hole, run, thin place, dye streak, color not as specified, misweave visible mends. Knots greater than Sears Scale Level C (See 6.9) Slubs greater than Sears Scale Level D (See 6.9)
Skitteriness	Pattern design not equal to standard sample; Excessive feathering or spew of pattern; Pattern repeat not equal to the standard sample; Army Universal Camouflage pattern less than 33-1/2 inches or more than 37-1/4 inches.

TABLE VA. Jacket Visual Examination

Examination	Defect
Component Part	Component part of jacket omitted, not as specified, distorted, full, tight, or twisted; any part of jacket in unrelated stitching, the edge of any component part required to be forced out having folds of more than 1/8 inch. Fullness creating unwanted permanent fold, pleat, or crease in fabric or garment.
Stitching and Seams	Jacket seam: open stitching, puckered, distorted, pleated, wavy, twisted, irregular, or loose or tight stitch tension, broken or missing thread or stitch, needle chew, edge or raise stitching sewn too close to the edge resulting in damage to cloth, seam allowance not as specified, no visible raw edge (more than one occurrence of inside raw edge greater than 1 inch) Stitching not as specified Double needle intersecting seams staggered by more than 1/4 inch Run off of more than ½ inch for edge and raised stitching Thread color not as specified
Evenness	Length of jacket fronts uneven by more than 1/4 inch at top or bottom when closed Collar curls, puckers, pleats, or twists Sleeve lengths vary by more than 1/2 inch; hem by more than 1/8 inch.
Hook & Loop	Hook & loop misplaced, damaged or omitted, twist or distortion when closed, out of alignment causing bulge Hook & loop out of alignment by more than 1/4 inch Hook & loop color or type not as specified

Examination	Defect
Hems	Hem of jacket bottom less than 1- inch or more than 1 1/8-inch Ends of hem not sewn closed, twisted puckered, pleated, wavy, distorted
Slide Fastener	Not specified length, not specified type Twisted, distorted, damaged, puckered, color not as specified Thong omitted, not as specified Not located in correct position on jacket front
Pocket and Flaps	Pocket companions not uniform in size or shape Pockets twisted, curled or puckered, not stitched as specified Pocket flaps not completely covering pocket opening, not positioned as specified Pocket construction not as specified Pockets out of alignment 1/4 inch or more Bellows exposed
Eyelets	Omitted, misplaced, improper size or caught in stitching. Stitch type not as specified
Shade	Shade variation within part or between parts
Cleanness	Spot stain, excessive thread ends no more than ¼ inch (more than 3) not trimmed or removed, odor, affecting appearance or serviceability
Bar-tack	Omitted, misplaced, loose stitching, not specified size, not serving intended purpose.
Labels	Any label omitted, incorrect, illegible, not attached where specified
Packaging	Any jacket not packaged in accordance with contract or purchase order

4.6.20 Finished measurements. The jacket finished measurements shall be in accordance with table VI.

Table VI. Jacket Finished Measurements (inches)

Description	Tolerance	Small Reg	Medium Reg	Large Reg	Large Long	XLarge Reg	XLarge Long
Chest	-1/4, +1/2	TBD	52	TBD	TBD	TBD	TBD
Sweep	-1/4, +1/2	TBD	51	TBD	TBD	TBD	TBD
Back Length	-1/4, +1/2	TBD	30	TBD	TBD	TBD	TBD
Sleeve Inseam	-1/4, +1/2	TBD	23 ¾	TBD	TBD	TBD	TBD
Sleeve Outseam	-1/4, +1/2	TBD	25 ½	TBD	TBD	TBD	TBD
Sleeve Underarm Width	-1/4, +1/2	TBD	11 ¾	TBD	TBD	TBD	TBD
Collar Height @ CB	-1/4, +1/2	TBD	4	TBD	TBD	TBD	TBD
Collar Height @ CF	-1/4, +1/2	TBD	2 ½	TBD	TBD	TBD	TBD
Hood Width	-1/4, +1/2	TBD	9 ¾	TBD	TBD	TBD	TBD
Hood Height	-1/4, +1/2	TBD	14	TBD	TBD	TBD	TBD

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).

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 specification.
b. Size required (see 1.2)
c. When a first article is required (see 3.1, 4.2, and 6.3)
d. Packaging (see 5.1)

6.3 First Article. When a first article is required, it shall be inspected and approved under the appropriate provision of FAR 52.209. 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 also 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 Material sources.

6.5.1 Fabric - Basic shell

W. L. Gore & Associates, Inc.

6.5.2 Webbing, elastic cord.
RI Textile Company

Part Number: DLB 48
or
Hope Global
Part Number: 2831

6.5.3 Tape, hook and loop.

Velcro USA, Inc
or
YKK Corporation of America

6.5.4 Barrel lock.

ITW Nexus
or
YKK Corporation of America
Part Number LC055/H

6.6 Diethyltoluamide (DEET Insect Repellent) reagent. The insect repellent reagent shall be a solution of 75% 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% 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% 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 Fabric defect scale. Fabric Defect Replica Kits are available from Sears, Roebuck and Company, Department 817HG, FC568B, 3333 Beverly Road, Hoffman Estates, IL 60179.

6.7 Subject term (key word) listing.

Jacket
Extreme Cold Weather Clothing System
Hard Shell Jacket
ECWCS
Cold weather clothing

6.8. Asterisk (*) denotes change/update has been made to the paragraph compared to previous revision.

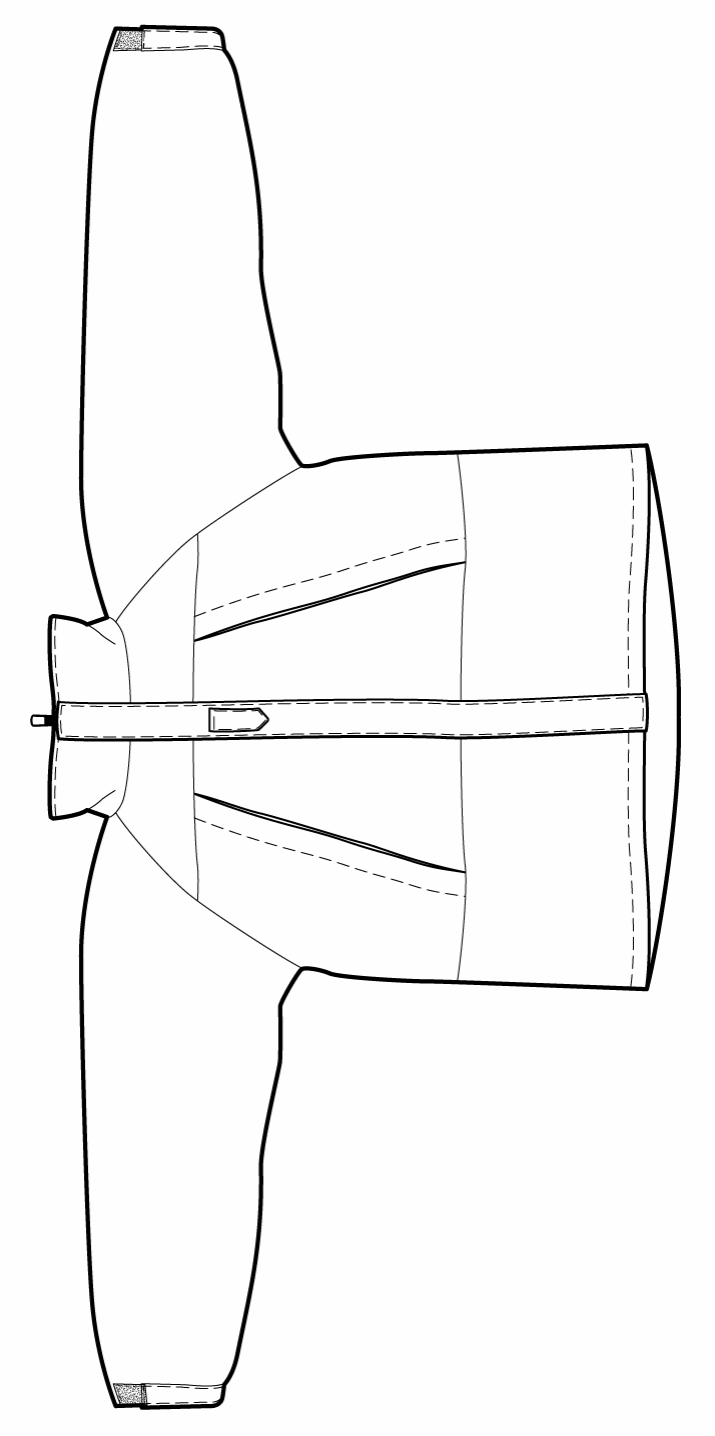


Figure 1. Hard Shell Top – Front.

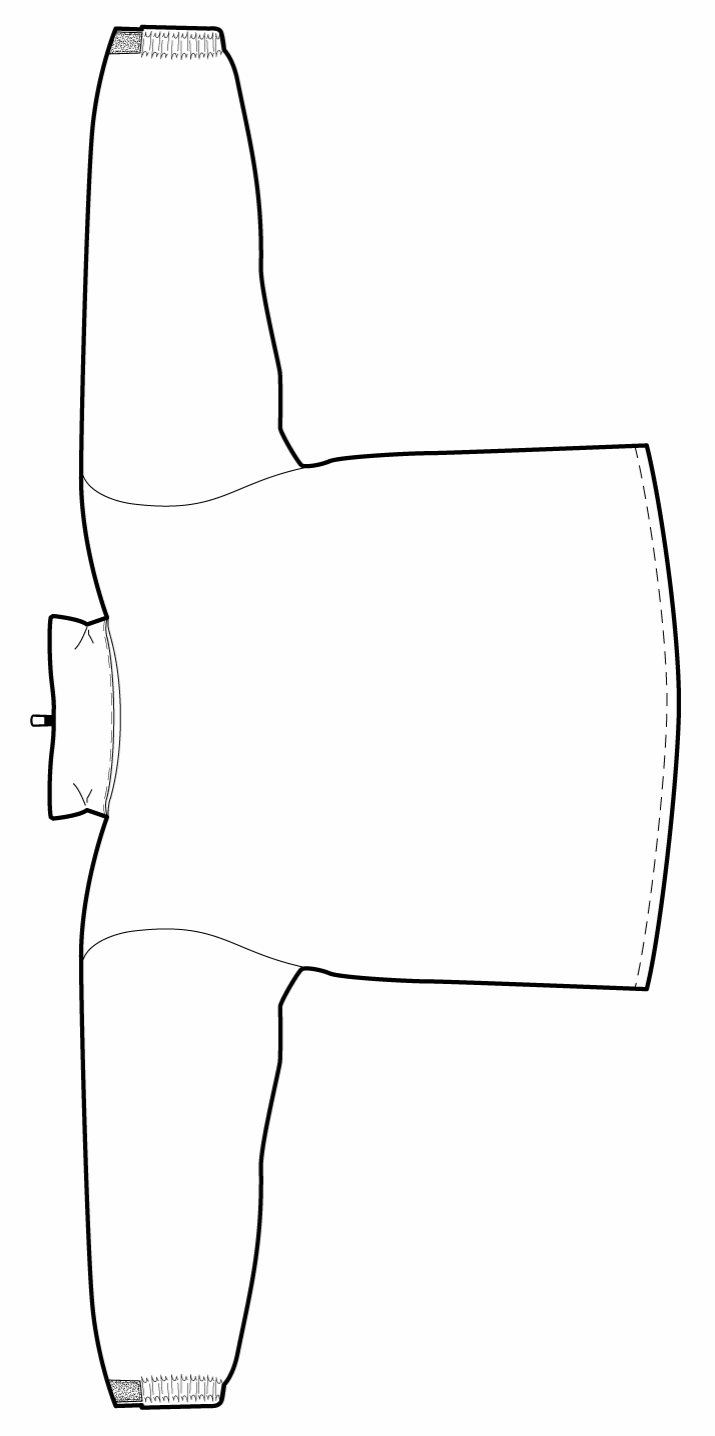
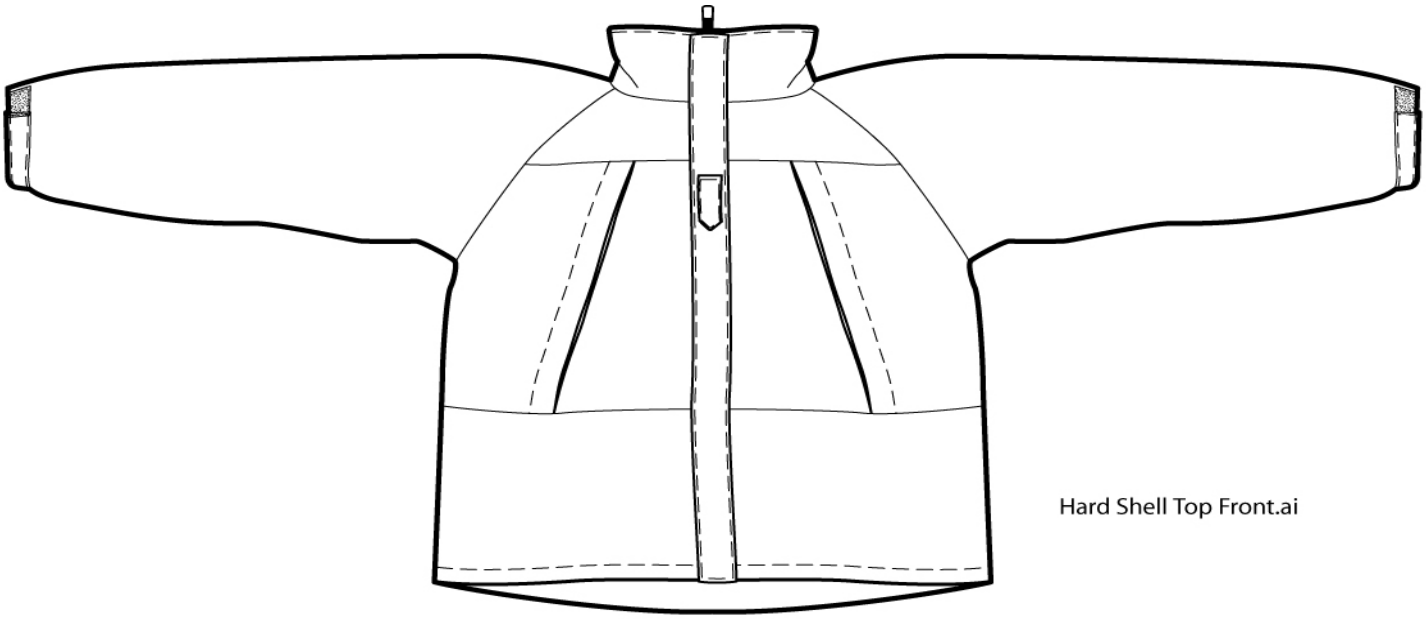
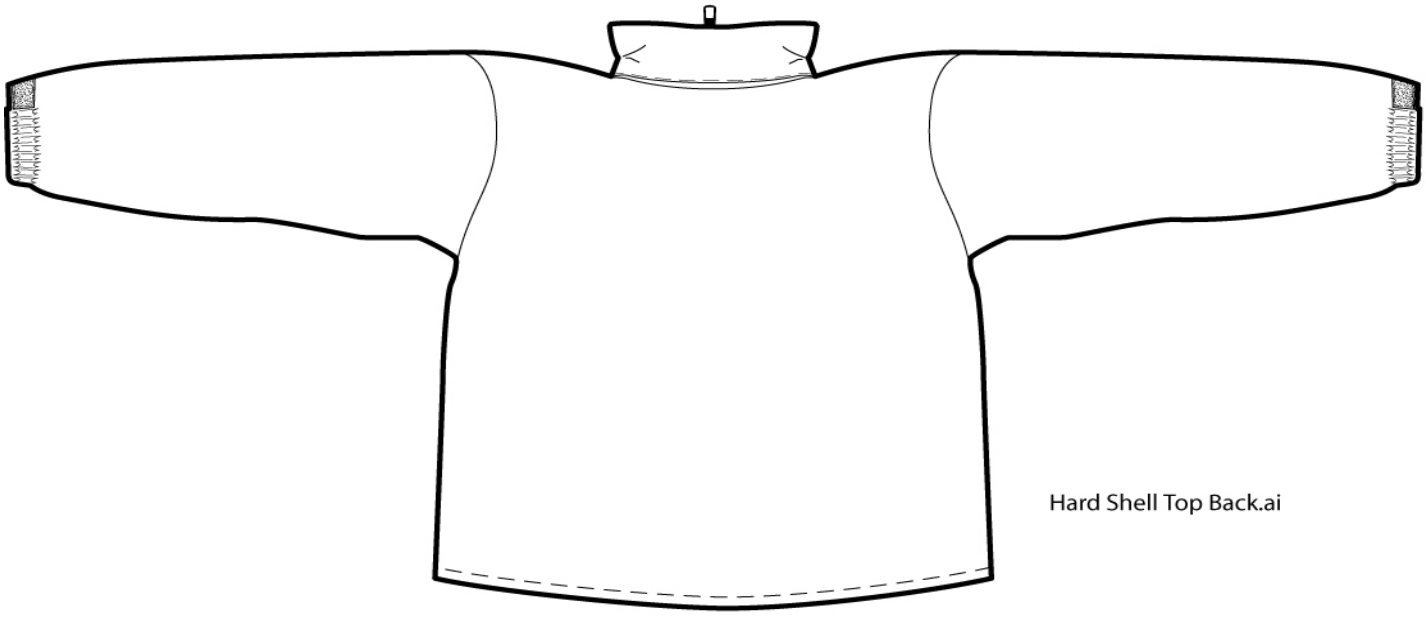


Figure 2. Hard Shell Top – Back.



Hard Shell Top Front.ai



Hard Shell Top Back.ai

Hard Shell Top F & B.ai

Figure 3

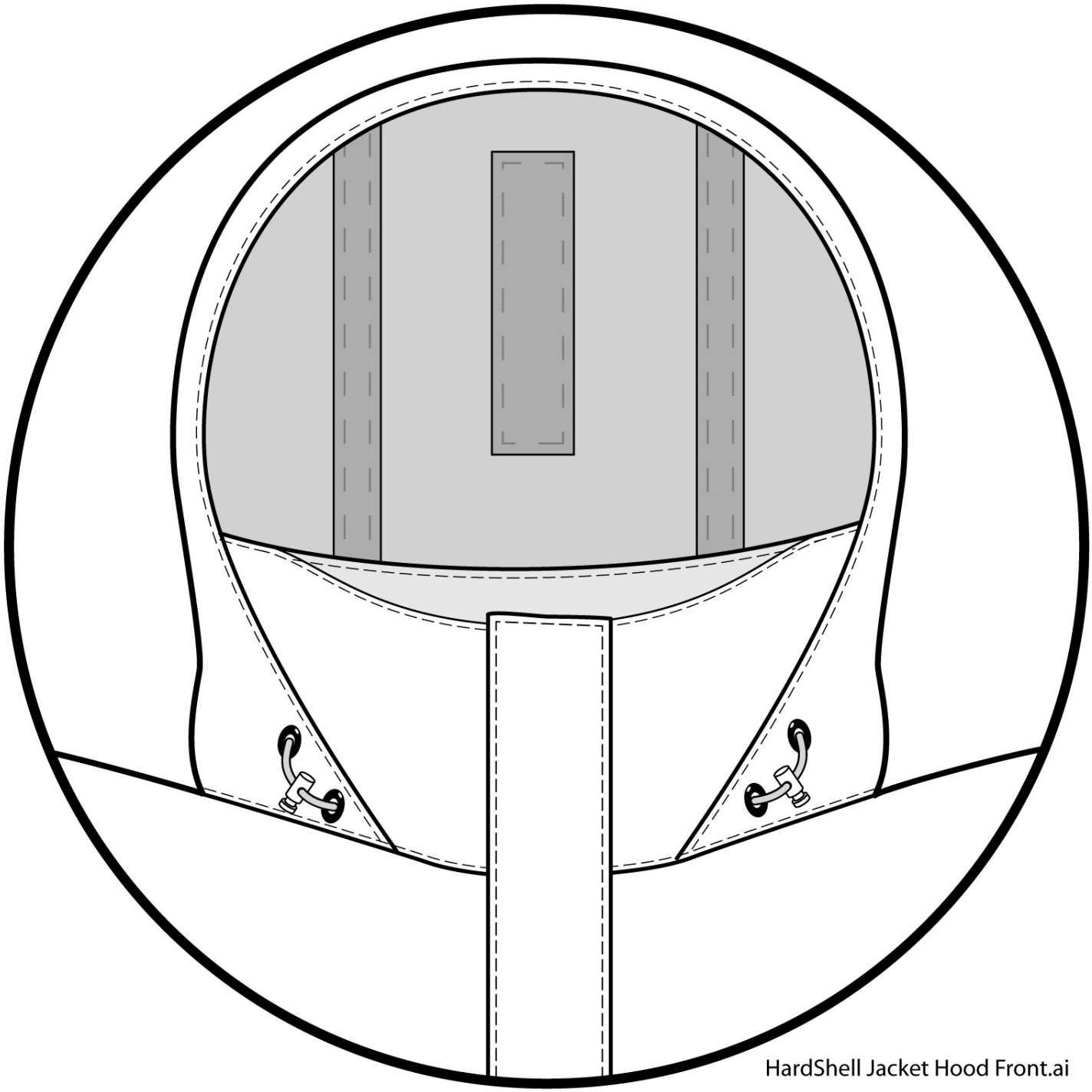


Figure 4

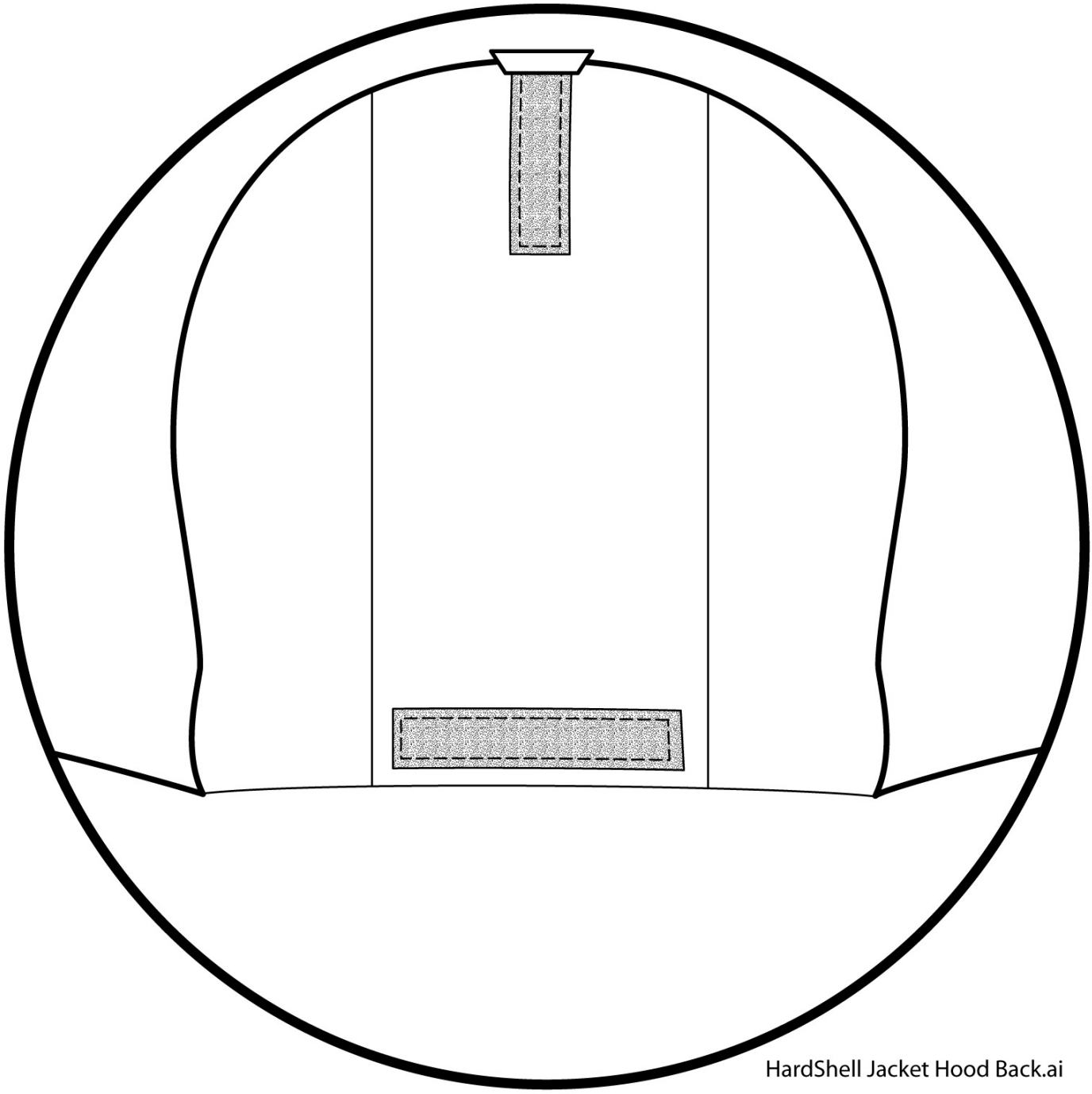


Figure 5