

INCH-POUND

**GL/PD-06-18
28 December 2007**

PURCHASE DESCRIPTION

TROUSERS, EXTREME COLD WEATHER (GEN III)

1. SCOPE

1.1 Scope. This purchase description covers requirements for insulated loft trousers, manufactured from a water repellent nylon cloth and batting material to be used as a component of the Extended Cold Weather Clothing System (ECWCS), GEN III.

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

Extra Small – Short
Extra Small – Regular

Small – Short
Small - Regular
Small – Long

Medium - Regular
Medium – Long

Large - Regular
Large - Long

Extra Large - Regular
Extra Large - Long
Extra Large – Extra Long

Double Extra Large - Regular
Double Extra Large – Long
Double Extra Large – Extra Long

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

COMMERCIAL ITEM DESCRIPTIONS

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

A-A-55634 – Zippers (Fasteners, Slide Interlocking)

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

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-STD-129 – Military Marking for Shipment and Storage

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

MIL-DTL-32072 – Thread, Polyester

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

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

(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 from the Standardization Document Order Desk, 700 Robbins Ave. Philadelphia, PA 19111-9054).

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

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 – 70 - Water Repellency: Tumble Jar Dynamic Absorption Test
- AATCC – 96 - Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics, Except Wool
- AATCC – 132 - Colorfastness to Dry Cleaning
- 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 C-518 - Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- ASTM D-737 - Air Permeability of Textile Fabrics
- ASTM D-747 - Apparent Bending Modulus of Plastics by Means of a Cantilever Beam
- ASTM D-751 - Coated Fabrics
- ASTM D-1388 - Standard Test Method for Stiffness of Fabrics
- ASTM D-1424 - Tearing Strength of Fabrics by Falling-Pendulum Type Apparatus
- ASTM D-1776 - Practice for Conditioning and Testing Textiles
- ASTM D-3775 - Warp End Count and Filling Pick Count of Woven Fabric
- 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

(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 <http://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.)

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 4.2).

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

3.3 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.

3.3.1 Design. The trousers shall be Urban Gray 505 in color throughout, and shall have a 3-piece elastic webbing waistband. The waistband shall have a four nylon tab loops on the inside, two

on the front, and two on the back. The fly slide fastener shall have a (2-way) coil zipper, with a full-length flap secured at the top of the waistband with hook & loop fastener tape. The let bottoms shall have a 1-piece elastic webbing to form a cuff. The outside of each leg (on the pant) shall have a full-length (2-way) individual element zipper from the waistband to the bottom of the leg cuff. The leg zippers shall have hook and loop fastener tapes at the waistband, and the bottom leg cuffs, in the closed position, shall be secured with hook & loop fastener tapes. The trouser shall have reinforced knees (see Figures 1-3).

3.4 Basic materials.

3.4.1 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).

3.4.1.1 Trouser layer shell (outside material). The cloth shall be a plain weave, nylon cloth (texture approximating 115 by 100 yarns per inch, warp and filling, respectively), meeting the requirements of Table I when tested as specified in 4.5. The color of the cloth shall be Urban Gray 505.

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

TABLE I. Trouser Layer Shell (outside material), physical requirements

Characteristic	Requirement
Weight, oz/sq. yd (max.)	3.3
Breaking strength, lbs (min.)	
Warp	100
Filling	100
Tearing Strength, lbs. (min.)	
Warp, Threshold	4.0
Filling, Threshold	4.0
Warp, Objective	6.0
Filling, Objective	6.0
Air Permeability, ft ³ /ft ² /min. (max)	1.0
Moisture vapor transmission	
Rate, g/m ² /24h (min.) -	
Initial, Procedure B, Threshold	600
Objective	1200
Stiffness, in-lbs (max.)	
At 70°F, Objective	0.001
Threshold	0.002
At 32°F, Objective	0.001
Threshold	0.002
Blocking, rating (max.)	No. 2

TABLE I. Trouser Layer Shell (outside material), physical requirements (Cont'd)

Characteristic	Requirement
Water permeability, cm (min) -	
Initial	30
Spray rating, (min.) -	
Initial	100, 100, 90
After 5 launderings	100, 90, 90
Resistance to organic liquid, pass/fail -	
Initial	No wetting
After 5 launderings	No wetting
Dynamic absorption, percent (max.):	
Threshold	5.0
Objective	1.5
Dimensional stability, percent (max.)	
Warp	2.5
Filling	1.5
Color	Urban Gray 505
Spectral Reflectance, %	Table II
Colorfastness to:	Equal to or better than “3-4” rating on AATCC Gray Scale for Color Change
Laundering	
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	<u>1/</u>

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

3.4.1.3 Color.

3.4.1.3.1 Urban Gray 505. The color of the face side of the cloth shall be Urban Gray 505, and shall match the applicable standard sample.

3.4.1.4 Spectral reflectance. The spectral reflectance shall conform to the requirements specified in Table II, initially, and after laundering when tested as specified in 4.5.

TABLE II. Spectral Reflectance Requirements: Reflectance (percent)

<u>Wave length,</u> Nanometers (nm)	<u>Urban Gray 505</u>		
	Min	Max (Objective)	Max (Threshold)
600	12	26	26
620	14	26	26
640	14	28	28
660	14	30	30

TABLE II. Spectral Reflectance Requirements: Reflectance (percent)

<u>Wave length,</u> Nanometers (nm)	<u>Urban Gray 505</u>		
	Min	Max (Objective)	Max (Threshold)
680	18	34	34
700	24	38	50
720	26	42	60
740	30	46	63
760	32	48	65
780	34	48	65
800	34	50	65
820	36	54	65
840	38	54	65
860	40	56	65

3.4.2 Nylon rip-stop cloth (lining cloth). The material for the inside of the loft pants (lining) shall be a rip-stop weave nylon cloth meeting the physical requirements specified in Table III when tested as specified in 4.5. The color of the cloth shall match Urban Gray 505.

TABLE III. Nylon Rip-Stop Cloth - Physical Requirements.

Characteristic	Requirement
Weight, oz/sq. yd (max.)	1.7
Construction, yarns/inch (min.)	
Warp	180
Filling	96
Break Strength, lbs. (min.)	
Warp	115
Filling	80
Tearing Strength, lbs. (min.)	
Warp	7.5
Filling	5.0
Air Permeability, ft ³ /ft ² /min. (max)	1.0 – 3.0
Color	Urban Gray 505
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	<u>1/</u>

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

3.4.3 Batting material (insulation). The batting material used to insulate the loft trousers shall conform to the physical requirements specified in Table IV. Testing shall be as specified in 4.5.

TABLE IV. Batting Material (insulation) - Physical Requirements.

Characteristic	Requirement
Weight oz./sq.yd	6.0+/-0.6
Thickness @0.002 psi, in., max.	1.0
Warmth @0.002psi, clo/oz./sq yd, min.	0.74
Drape stiffness, inches, max.	4.0
Water Gain, wt.%, max.	400%
Dimensional stability, percent max. After 5 Launderings	
Machine/Warp	10.0
Cross Machine/filling	10.0
Toxicity	<u>1/</u>

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

3.4.4 Cloth, nylon (reinforcing material). The cloth for use as knee patches shall be a plain weave, nylon cloth finished to meet the physical requirements of Table V, when tested as specified in 4.5. The color of the cloth shall be Urban Gray 505.

TABLE V. Nylon Cloth (reinforcing material) - Physical Requirements.

Characteristic	Requirement
Weight, oz/sq. yd (max.)	5.5
Yarns per inch (min.) -	
Warp	58
Filling	38
Breaking strength, lbs (min.)	
Warp	280
Filling	180
Tearing Strength, lbs. (min.)	
Warp	8.0
Filling	8.0
Stiffness, in-lbs (max.)	
At 32°F	0.001
At 70°F	0.001
Blocking, rating (max.)	No. 2
Spray rating, rating -	
Initial	100, 100, 90
After 1 laundering	100, 90, 90

TABLE V. Nylon Cloth (reinforcing material) - Physical Requirements. (Cont'd)

Resistance to organic liquid, pass/fail -	
Initial	No wetting
After 1 laundering	No wetting
Dynamic absorption, percent (max.)	<u>1/</u>
Dimensional stability, percent (max.)	
Warp	2.5
Filling	2.0
Color	Urban Gray 505
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	<u>2/</u>

1/ The cloth shall show not more than a 25 percent increase in dynamic absorption properties after one laundering when compared to an unlaundered sample of cloth.

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

3.5 Components.

3.5.1 Elastic webbing. The elastic webbing used in the waistband and leg cuffs shall be 1-1/2 inches wide, natural in color and it shall be equal to or better than Style 9257 of South Carolina Elastic Co., Landrum, SC 29356.

3.5.2 Tape, nylon. The tape for the loops in the waistband (4), and the loops in each trouser leg (2) shall conform to type III, 3/4 inch wide flat nylon tape, of MIL-PRF-5038. The color of the tape shall be Urban Gray 505.

3.5.3 Fastener 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 Urban Gray 505.

3.5.3.1 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: 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 Urban Gray 505.

3.5.3.2 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 Urban Gray 505.

3.5.3.3 Colorfastness, tape hook and loop. Unless otherwise specified, for Urban Gray 505, the fastener tapes (hook and loop) shall show fastness to dry cleaning (if required by contract), light (170 Kilojoules), laundering (after 5 cycles) and crocking when tested in paragraph 4.5. The finished tape fasteners shall show fastness equal to or better than a rating "4-5" to dry cleaning and 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 than a 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.)"

3.5.3.4 Hook and loop laundry durability test method. When tested in accordance with 4.6.11 the hook and loop tapes shall not exhibit fraying edges, peeling yarns, or damage appearance that detracts from the tape appearance or durability.

3.5.4 Interfacing.

3.5.4.1 The interfacing fabric used on the side tabs (with the hook and loop), the leg cuff tabs, and the fly cover shall be Pellon # 933 material or equal .

3.5.4.2 The side leg slide fastener (zipper) flap interfacing shall be 1-inch wide commercial nylon tape that is durable for the life of the garment.

3.5.5 Fasteners, slide, interlocking. All slide fasteners shall conform to A-A-55634, with the types and styles as specified below.

3.5.5.1 Fly slide fastener. The fly slide fastener (zipper) shall be plastic continuous element, Type I, Style 13 (double slider, mouth-to-mouth, autolock, that allows the zipper to open from top and bottom), No. 5 chain, with 175 lbs. (min.) crosswise strength. The zipper shall be connected/attached to water repellent treated tape, and each slider shall have long pull tabs with thongs. The material for the thongs shall be ¼ inch nylon tape binding. The color of the slide fastener and thong shall be Urban Gray 505.

3.5.5.2 Side leg slide fastener. The side leg slide fasteners (zippers) shall be plastic individual element, Type III, Style 13 (separating, except separating pins shall be set at top waistband level, double slider, mouth-to-mouth, autolock, that allows the zipper to open from top and bottom), No. 5 chain with 100 lbs. (min.) crosswise strength. The zippers shall be connected/attached to water repellent treated tape, and each slider shall have long pull tabs with thongs, except that the bottom slider thongs shall be shortened to ¾ to 1 inch finished length. The material for the

thongs shall be ¼ inch nylon tape binding. The color of the slide fastener and thong shall be shall be Urban Gray 505.

3.5.6 Thread. The thread for all seaming and stitching shall be Type I or II, size B, 2-ply at 6.0 pounds breaking strength, with a “Water repellent” treatment, conforming to V-T-295. As an alternate, bobbin/looper thread can be Nylon, size AA, 2-ply, with a minimum breaking strength of 4.0 pounds with a “Water-Repellent” finish. As an alternate to nylon thread, polyester, size B, 2 or 3 ply, conforming to Type I, Class 1, Subclass B of MIL-DTL-32072, or size 40, 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. Stitching shall be 9-12 stitches per inch, lockstitch. The color of the thread shall be Urban Gray 505.

3.5.7 Labels. Each trousers 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.

3.5.7.1 The combination size, identification and instruction label for the trousers. The combination label shall be sewn on the inside of the trouser along the back seam of the waistband. The printed label shall be facing the body. The instruction label shall include the following information:

Trousers, Extreme Cold Weather
Care Instruction Label

LAUNDERING: (DO NOT DRY CLEAN)

a. Home Laundering. The trousers shall be machine laundered using the delicate/gentle fabric cycle or laundered by hand. Use cold water (up to 90°F/32°C) and cold water laundry detergent (i.e. Liquid Tide or Era Plus). Rinse in clean cold water. DO NOT STARCH OR BLEACH. Dry in a tumble dryer at temperature not exceeding 130°F (54°C) as degradation of the component materials will result. Avoid over drying. To drip dry, place on rustproof hanger. DO NOT PRESS.

b. Field Laundering. The trousers shall be field laundered using Formula II of FM 42-414, Appendix E. DO NOT STARCH OR BLEACH.

3.6 Patterns. Standard patterns providing a seam allowance of ½ inch for out seams, seat seams and crotch seams, and a 3/8 inch allowance for all other 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.

3.6.1 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	ECLB_FRONT LEG	SELF	CUT 2
2	ECLB_BACK LEG	SELF	CUT 2
3	ECLB_BOTTOM FRONT	SELF	CUT2
4	ECLB_BOTTOM BACK	SELF	CUT 2
5	ECLB_SIDE ZIP WIND FLAP	SELF	CUT 2
6	ECLB_SIDE WAIST FLAP TOP	SELF	CUT 2
7	ECLB_SIDE WAIST FLAP UNDER	SELF	CUT 2
8	ECLB_ANKLE TAB	SELF	CUT 2
9	ECLB_CROTCH ZIP EXTENSION	SELF	CUT 2
10	ECLB_FRONT ZIP FLAP TOP	SELF	CUT 1 FACE UP
11	ECLB_FRONT ZIP FLAP UNDER	SELF	CUT 1 FACE UP
12	ECLB_FRONT LINING	C2+C3	CUT 2
13	ECLB_BACK LINING	C2+C3	CUT 2
14	ECLB_KNEE	C1	CUT 2
15	ECLB_SIDE WAIST FLAP FUSE	INTERFACNG	CUT 2
16	ECLB_ANKLE TAB FUSE	INTERFACING	CUT 2
17	ECLB_FT ZIP FLAP FUSE	INTERFACING	CUT 1 FACE UP
	COMMENTS BELOW:		
	SELF = BASIC SHELL MATERIAL C1 (CONTRAST1) = NYLON REINFORCING FABRIC C2 (CONTRAST2) = NYLON RIP-STOP CLOTH (LINING CLOTH) C3 (CONTRAST3) = HEAVYWEIGHT BATTING MATERIAL INTERFACING = FUSE OR FUSE ALTERNATIVE		

The lengths of the fly and leg opening slide fasteners for the various size-length trousers shall be as shown in TABLE IX, line items 5 and 6, respectively.

3.7 Stitches, seams, and stitching. All stitches, seams and stitching shall conform to ASTM-D-6193. The type of seam and stitching shall be as specified in Table VII. Seam allowances shall be maintained with seams sewn so that no raw edges, run-offs, pleats, puckers or open seams occur.

3.7.1 Type 301 stitching. 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.

3.7.1.1 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 over stitching. 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.

3.7.1.2 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.

3.7.1.3 Thread ends. All thread ends shall be trimmed to a length of not more than ¼ inch unless otherwise specified.

3.7.2 Seaming. All seams shall be consistent and exhibit a uniform appearance and conform to the ASTM D 6193 stitch and seam types listed in Table VII. The backside of seams (inside garment) shall be flat with no protruding seam allowance to create irritation or discomfort. The seams shall be sewn with 9-12 stitches per inch for all outside visible stitching. The width of the bight of stitching shall not be less than 1/16 inch. All material edges shall be clean finished, either, turned-in, turned-under, or serged. Loop fastener tape shall be stitched on the loop pile and not on the selvage.

Table VII. Seam and Stitching Types

Seam placement	Seam type	Stitch type
Backseam and inseam	SSa-2	301
Side seams	LSq-3	301
Attachment of knee patches	LSd-1 or LSd-2	301
Bottom hemming	EFb-1	301
Waistband lining	OSf-1	301
Hook/Loop	OSf-1	301
Zipppers	--	301

3.7.3 Bartacks. Bartacks shall be added for reinforcement as follows and as shown in TROUSERS, EXTREME COLD WEATHER (GEN III)-VIEW 1 through TROUSERS, EXTREME COLD WEATHER (GEN III)-VIEW 4.

Bartack Location	Bartack Length, Inch	Quantity per Garment
Zipper Pull	$\frac{3}{4}$	6

4. VERIFICATION

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

1. First article inspection (see 4.2).
2. 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 4.4.1.1, the finished dimensions in 4.4.2 and performance 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 3.4 and 3.5 are met. When certificate of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.1.1.1 End item visual examination. Each pair of pants shall be subjected to a visual examination. All fabric and garment defects shall be scored in accordance with Tables VIII. Material defects are defined in Section I of FED-STD-4. All shade evaluation of the garment shall be evaluated at a distance of 3 feet and under the artificial daylight in 4.6.6.

TABLE VIII. End item visual examination

Examination	Defect	Classification	
		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 or shade bar <u>1</u> /	103	201
Cleanliness	Any spot, streak, or stain of a permanent nature on a 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 <u>1</u> /	104	206
	Any component part omitted	105	
	Any required operation omitted or improperly performed <u>1</u> /	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 or having a toggle		209
	Any drawcord insufficient in length	109	
	Any drawcord not caught in center bartack, when specified		210
Slide fastener	Any part of slide fastener bent, broken, otherwise defective	110	
	Not closing or locking properly	111	
	Length not as specified	112	
	Color not as specified		211
	Thong not as specified		212
Labels	Missing, illegible, or incorrect	113	
	Incorrectly placed or attached		213
Accuracy of seaming	Seam twisted, pleated, seaming or puckered <u>1</u> /	114	214
	Part of garment caught in any unrelated operation or stitching <u>1</u> /	115	215
	Thread break secured by stitching back of the break less than ½ inch		216
	Ends of all seams and stitchings when not caught in other seams or stitching, backtacked less than ½ inch		217
	Color not as specified		218
	Gage of stitching uneven or not as specified		219
	Edge of seam tape less than 1/8 inch from seam allowance	116	

TABLE VIII. End item visual examination (Cont'd)

Examination	Defect	Classification	
		Major	Minor
Heat sealed seams and non-wicking buffer	Any sealing tape with wrinkle, turn under, or pleat <u>1/</u>	117	220
	Any seam tape not located as specified		221
	Any required stitching not covered by seam tape	118	
	Any area where heat sealing tape has been removed <u>1/</u>	119	
	Any seam tape not 1/8 inch overlap on each side of sewn seam	120	
	Any seam tape not overlapped 3/4 inch minimum	121	
	Any needle punctures that have not been repaired using heat sealing tape		223
	Any area of the laminate knit fabric bordering the seam tape that is melted exposing laminate film	122	
	More than two layers of heat sealing tape in any one area <u>1/</u>	123	224
	Non-wicking buffer missing	124	
Non-wicking buffer not properly placed	125		
Repairs	Any heat sealing repairs extending beyond 25 inches in length <u>1/</u>	126	225
	More than five repairs on any one item <u>1/</u>	127	226
Seam tape adhesion	Seam tape lifting off fabric within 3/4 inch of seam <u>1/</u>	128	227
	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. The length requirement shall not apply to the leg insert seams <u>1/</u>	129	228
Open seams	More than 1/8 inch up to 1/4 inch	130	229
	More than 1/4 inch		
Seams and stitching	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		
	Not specified seam or stitch type	131	
Stitch tension	Missing, broken or skipped stitches <u>1/</u>	132	230
	Loose tension in any area: - more than 1-inch but not more than 2-inches - more than 2-inches	133	231
	Tight tension (stitches break when normal strain is applied to the seam or stitching)	134	
Stitches per inch (to be scored only when the condition exists on major portion of the seam)	Less than minimum specified: - one stitch - two or more stitches	135	232
	More than maximum specified		233

TABLE VIII. End item visual examination (Cont'd)

Examination	Defect	Classification	
		Major	Minor
Shaded part	Variation in shade within an outside part <u>1/</u>	136	234
	Any part required to be cut from one piece on material shaded <u>1/</u>	137	235
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.			
Bottom hems	Width not as specified		236
	Hems uneven at leg insert by more than ¼ inch		237
Bartacks	Bartack omitted	138	
	Any bartack not in specified location, insecure, or not serving intended purpose:		
	- more than two	139	
	- two or less		238
	Any loose stitching, incomplete or broken		239
	Length or width not as specified		240
Inseams	Inseam staggered at crotch more than specified (center to center)		241
	Crotch and seat seam staggered at inseam more than specified (center to center)		242
Ankle tabs	Missing	140	
	Improperly located or not width specified <u>1/</u>	141	243
Snap fasteners	Any part of assembly missing, mismatched, broken, cracked, bent, not securely clinched, affecting function:		
	- two or more snap fasteners	142	
	- one snap fastener		244
	One or more clinched too tightly cutting surrounding fabric	143	
	Loose, i.e., socket or stud spins freely or wobbles in connection portions		245
	One or more having rough or sharp edge	144	
Label/tag	Barcode omitted or not readable by scanner		246
	Causes damage to the garment	146	

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

4.4.2 Finished measurements. The trousers shall conform to the finished measurements specified in Table IX.

TABLE IX. Finished Measurements (Inches)

REGULAR		XS	S	M	L	XL	2XL	TOL +/-
1	WAIST RELAXED <u>1/</u>	13 ½	15 ½	17 ½	19 ½	21 ½	23 ½	-0.25", +0.5"
2	INSEAM <u>2/</u>	28 1/2	28 1/2	28 1/2	28 1/2	28 1/2	28 1/2	-0.5", +0.5"
3	OUTSEAM <u>3/</u>	40 1/2	41	41 1/2	42	42 1/2	43	-0.5", +0.5"
4	LEG OPENING - FINISHED <u>4/</u>	7	7 ½	8	8 ½	9	9 ½	-0.25", +0.25"
5	FRONT FLY ZIPPER LENGTH <u>5/</u>	10	10 1/2	11	11 1/2	12	12 1/2	-0.5", +0.5"
6	SIDE LEG ZIPPER LENGTH <u>6/</u>	39	39 1/2	40	40 1/2	41	41 1/2	-0.5", +0.5"
SHORT		XS	S					
2	INSEAM <u>2/</u>	26 1/2	26 1/2					-0.5", +0.5"
3	OUTSEAM <u>3/</u>	38	38 1/2					-0.5", +0.5"
5	FRONT FLY ZIPPER LENGTH <u>5/</u>	9 1/2	10					-0.5", +0.5"
6	SIDE LEG ZIPPER LENGTH <u>6/</u>	36 ½	37					-0.5", +0.5"
LONG			S	M	L	XL	2XL	
2	INSEAM <u>2/</u>		30 1/2	30 1/2	30 1/2	30 1/2	30 1/2	-0.5", +0.5"
3	OUTSEAM <u>3/</u>		43 1/2	44	44 1/2	45	45 1/2	-0.5", +0.5"
5	FRONT FLY ZIPPER LENGTH <u>5/</u>		11	11 1/2	12	12 1/2	13	-0.5", +0.5"
6	SIDE LEG ZIPPER LENGTH <u>6/</u>		42	42 1/2	43	43 1/2	44	-0.5", +0.5"
XLONG						XL	2XL	
2	INSEAM <u>2/</u>					32 1/2	32 1/2	-0.5", +0.5"
3	OUTSEAM <u>3/</u>					47 1/2	48	-0.5", +0.5"
5	FRONT FLY ZIPPER LENGTH <u>5/</u>					13	13 1/2	-0.5", +0.5"
6	SIDE LEG ZIPPER LENGTH <u>6/</u>					46	46 ½	-0.5", +0.5"
<u>1/</u> waist measurement taken flat from edge to edge at top of waist.								
<u>2/</u> Inseam is measured from bottom of crotch point straight to hem on inside of leg.								
<u>3/</u> Outseam measurement taken from top of waistband to hem								
<u>4/</u> Leg Opening is taken from edge to edge at bottom leg hem in a relaxed state.								
<u>5/</u> Front fly zipper is measured from btm of waistband to top of zipper stop.								
<u>6/</u> Side leg zipper is measured from top of bottom stop to bottom of top stop.								
SEAM ALLOWANCE: 1/2" : all seams								

4.5 Basic material testing. The basic material specified in 3.4 through 3.4.4 shall be tested for the characteristics listed in Table X in accordance with the test method cited.

TABLE X. Basic Material Testing

Characteristic	Reference paragraph	Test method
Trouser layer shell (outside material)		
Fiber identification, weave and fabric count		<u>1/</u>
Weight	3.4.1.2	ASTM D-3776

TABLE X. Basic Material Testing (Cont'd)

Characteristic	Reference paragraph	Test method
Break strength	3.4.1.2	ASTM D-5034 (GE or GT)
Tearing strength	3.4.1.2	ASTM D-1424
Air permeability	3.4.1.2	ASTM D-737
Moisture vapor transmission	3.4.1.2	4.6.1 & 4.6.1.1
Stiffness		
At 70°F	3.4.1.2	ASTM D-747 <u>5/</u>
At 32°F	3.4.1.2	<u>2/</u> & ASTM D-747 <u>5/</u>
Blocking	3.4.1.2	4.6.2
Water permeability		
Initial	3.4.1.2	4.6.3
Spray rating		
Initial	3.4.1.2	4.6.4.1
After 5 launderings	3.4.1.2	4.6.4.3 & 4.6.4.1
Resistance to organic liquid		
Initial	3.4.1.2	4.6.5.1
After 5 Launderings	3.4.1.2	4.6.5.3
Dynamic Absorption	3.4.1.2	AATCC-70
Dimensional stability	3.4.1.2	AATCC-96, Option 1C, A
Color	3.4.1.2	4.6.6
Spectral reflectance	Table II	4.6.7 and 4.6.7.1
Colorfastness to:		
Laundering	3.4.1.2	4.6.8.1
Light	3.4.1.2	4.6.8.2
Crocking	3.4.1.2	AATCC-8
Toxicity	3.4.1.2	4.6.10
Nylon Rip-stop cloth (lining material)		
Fiber identification and weave		<u>1/</u>
Weight	3.4.2	ASTM D-3776 (Method C)
Fabric count, yarns/ inch	3.4.2	ASTM D-3775
Break strength	3.4.2	ASTM D-5034 (G-E or G-T)
Tearing strength	3.4.2	ASTM D-1424
Air permeability	3.4.2	ASTM D-737
Color	3.4.2	4.6.6
Spectral reflectance	Table II	4.6.7
Colorfastness to:		
Laundering	3.4.2	4.6.8.1
Light	3.4.2	4.6.8.2
Crocking	3.4.2	AATCC-8
Toxicity	3.4.2	4.6.10

TABLE X. Basic Material Testing (Cont'd)

Characteristic	Reference paragraph	Test method
Batting Material (insulation)		
Weight	3.4.3	ASTM D-3776
Thickness	3.4.3	<u>3/</u>
Warmth @ 0.002psi	3.4.3	ASTM C-518
Drape stiffness	3.4.3	ASTM D-1388
Water gain	3.4.3	<u>4/</u>
Dimensional stability	3.4.3	AATCC 135(1)(V)(A)(i)
Toxicity	3.4.2	4.6.10
Cloth, Nylon (reinforcing material for knee patches)		
Weight	3.4.4	ASTM D-3776 (Method C)
Yarns per inch	3.4.4	ASTM D-3775
Breaking strength	3.4.4	ASTM D-5034 (G-E or G-T)
Tearing strength	3.4.4	ASTM D-1424
Stiffness	3.4.4	4.6.9
At 70°F	3.4.4	ASTM D-747 <u>5/</u>
At 32°F	3.4.4	<u>2/</u> & ASTM D-747 <u>5/</u>
Blocking	3.4.4	4.6.2
Spray rating	3.4.4	
Initial	3.4.4	4.6.4.1
After 1 laundering	3.4.4	4.6.4.2 & 4.6.4.1
Resistance to organic liquid		
Initial	3.4.4	4.6.5.1
After 1 laundering	3.4.4	4.6.5.2
Dynamic absorption	3.4.4	
Initial		AATCC-70
After 1 laundering		4.6.8.1.1 & AATCC -70
Dimensional stability	3.4.4	AATCC-96, Option 1C, A
Color	3.4.4	4.6.6
Spectral reflectance	Table II	4.6.7 and 4.6.7.1
Colorfastness to:		
Laundering	3.4.4	4.6.8.1
Light	3.4.4	4.6.8.2
Crocking	3.4.4	AATCC-8
Toxicity	3.4.4	4.6.10
Fastener Tape, Hook and Loop		
Color	3.5.3	4.6.6
Colorfastness To:		
Dry cleaning	3.5.3.3	AATCC -132
Light	3.5.3.3	4.6.8.2
Laundering after 5 cycles	3.5.3.3	AATCC – 61, Opt. 3A

TABLE X. Basic Material Testing (Cont'd)

Characteristic	Reference paragraph	Test method
Crocking	3.5.3.3	AATCC - 8
Laundry Durability	3.5.3.4	4.6.11- 4.6.11.4

1/ A certificate of compliance shall be submitted for these requirements.

2/ The test specimens and testing machine shall be exposed to $32^{\circ}\text{F} \pm 2^{\circ}\text{F}$ for 4 hours. The test shall then be performed in still air at that temperature.

3/ Batting thickness shall be measured on panels using a 12" x 12" calibrated Measure-Matic Thickness Gauge, or equivalent, under a pressure of 0.002 pounds per inch (psi).

4/ The insulation should adsorb a maximum weight gain in water when subjected to room temperature distilled water for 20 minutes with excess water when removed via centrifugation at 1500rpm for 5 minutes.

5/ 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:

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

* 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 $73.5^{\circ} \pm 1^{\circ}\text{F}$ and $50 \pm 2\%$ R.H. The linear air flow velocity in the wind tunnel shall be set to yield an upright, 'open cut' evaporation rate at all test specimen positions of $15000 \pm 1000 \text{ g/m}^2/24\text{h}$ (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).

4.6.1.1 Procedure B, ASTM E-96. The backside 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 $\frac{3}{4} \pm 1/16$ 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 been 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.

4.6.2 Blocking. ASTM D-751, Blocking Resistance at Elevated Temperatures, except that the test shall be performed at a temperature of $180^{\circ} \pm 2^{\circ}\text{F}$ 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 1 with a rising hydrostatic head at 10 mm/sec applied to the face side of the test specimen. Five (5) specimens shall be tested. Leakage is defined as the appearance of one (1) or more droplets of water within the 4-1/2 inch diameter test area.

4.6.4 Spray rating.

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

4.6.4.2 After 1 laundering. (for cloth, nylon (reinforcing)). Test specimens shall be laundered for one (1) laundering cycle in accordance with AATCC-96, Test VI, A.

4.6.4.3 After 5 launderings. Test specimens shall be laundered for five (5) laundering cycles in accordance with 4.6.8.1.1 and ten 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 1 laundering (for cloth, nylon (reinforcing)). Test specimens shall be laundered for one (1) laundering cycle in accordance with AATCC-96, Test VI, A.

4.6.5.3 After 5 launderings (on loft layer shell fabric). Test specimens shall be laundered for five (5) laundering cycles in accordance with 4.6.8.1.1 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 $7500^{\circ} \pm 200^{\circ}\text{K}$, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at $2856^{\circ} \pm 200^{\circ}\text{K}$.

4.6.7 Spectral reflectance. Spectral reflectance data shall be determined on the face side and shall be obtained from 600 to 860 nanometers (nm) at 20nm 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 bandwidth shall be less than 26nm at 860nm. 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 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 test failure.

4.6.7.1 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 without optical brightener. The samples shall then be evaluated for spectral reflectance in accordance with 4.6.7.

4.6.8 Colorfastness.

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

4.6.8.1.1 Laundering procedure. Place 2.0 ± 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 ($100^{\circ}\text{F} + 10^{\circ}\text{F}$, -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 ± 5 minutes. After laundering, place sample and ballast in an automatic tumble dryer set on permanent press cycle, $150^{\circ}\text{F} - 160^{\circ}\text{F}$, and dry for approximately fifteen (15) minutes. The laundering equipment, washer and dryer, shall be in accordance with AATCC-135.

4.6.8.1.2 Light. AATCC-16, Option A (after 40 fading units) or E (after 170 kilojoules).

4.6.9 Stiffness. ASTM D-747.

4.6.10 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.

4.6.10.1 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.

4.6.11 Hook and loop laundering durability test method procedures. The hook and loop tape shall meet the requirements stated in 3.5.3.4 when tested for laundry durability. Use test replica or garment test sample method to verify laundry durability.

4.6.11.1 Test Replica Sample Preparation. Fabricate two test replica samples from basic material paragraph 3.4.1.1. 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 3.5.3 - 3.5.3.2, sewn to the test sample shall represent production widths, lengths and quantities used in trouser 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. 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.

4.6.11.2 Alternate Garment Test Sample. As an alternate, use two (2) loft trousers 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).

4.6.11.3 Wash Procedures for Test Replica Samples or Alternate Garment Test Samples.

Launder two test replica samples, one hook sample and one loop sample, two loft trousers, 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 to represent worse case situation. 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 detergent without bleach for each laundering. Drying time shall be Permanent Press for 40-45 minutes.

4.6.11.4 Number of Laundering/Drying Cycles. A total of 10 laundering and drying cycles for each test replica sample set or loft trouser sets.

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 loft trousers is intended for use by personnel of the Department of Defense as a component of the Extended Cold Weather Clothing System. The principle purpose is to provide protection against the adverse effects of extreme cold weather.

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 Possible material sources.

- a. Elastic webbing.

South Carolina Elastic Co.

- b. Fastener tape, hook & loop

Velcro USA, Inc.

or

YKK Corporation of America

- c. Interfacing fabric.

Freudenberg Nonwovens, LTD

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.

Cold Weather Clothing

ECWCS

Extended cold weather clothing system

Moisture vapor permeable

Loft

Trouser

CUSTODIAN:

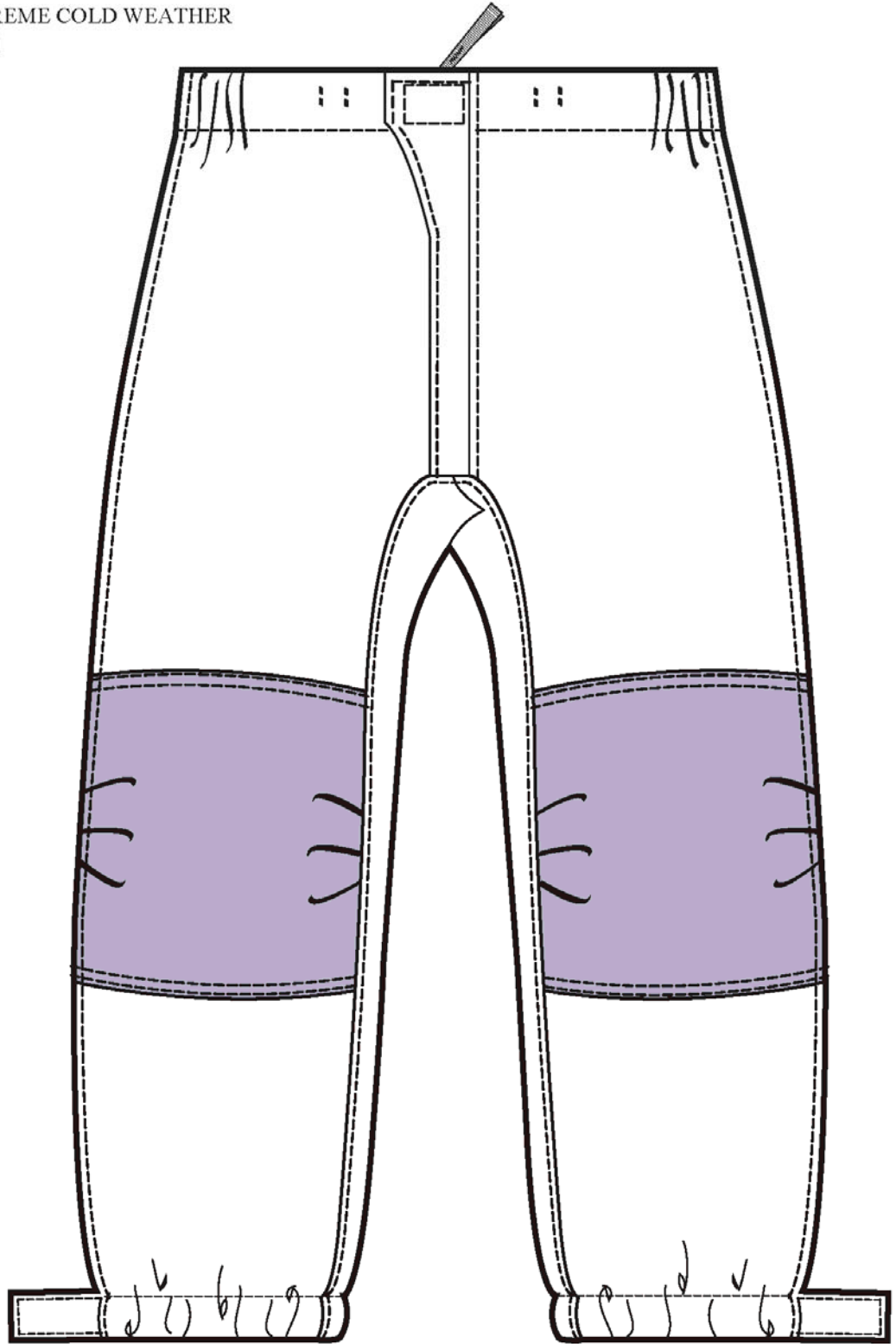
Army – GL

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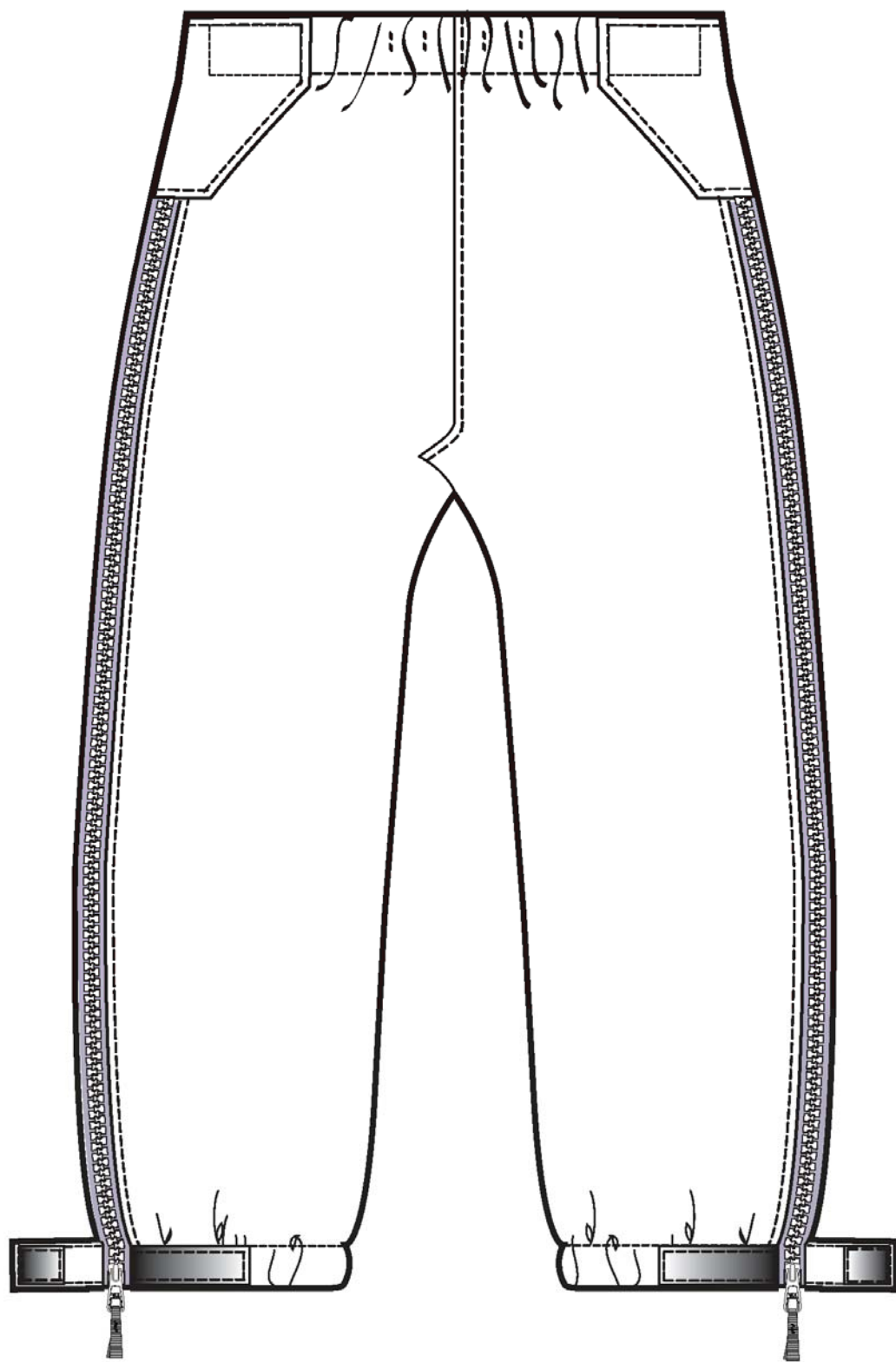
Army - GL

Project No. 8415-

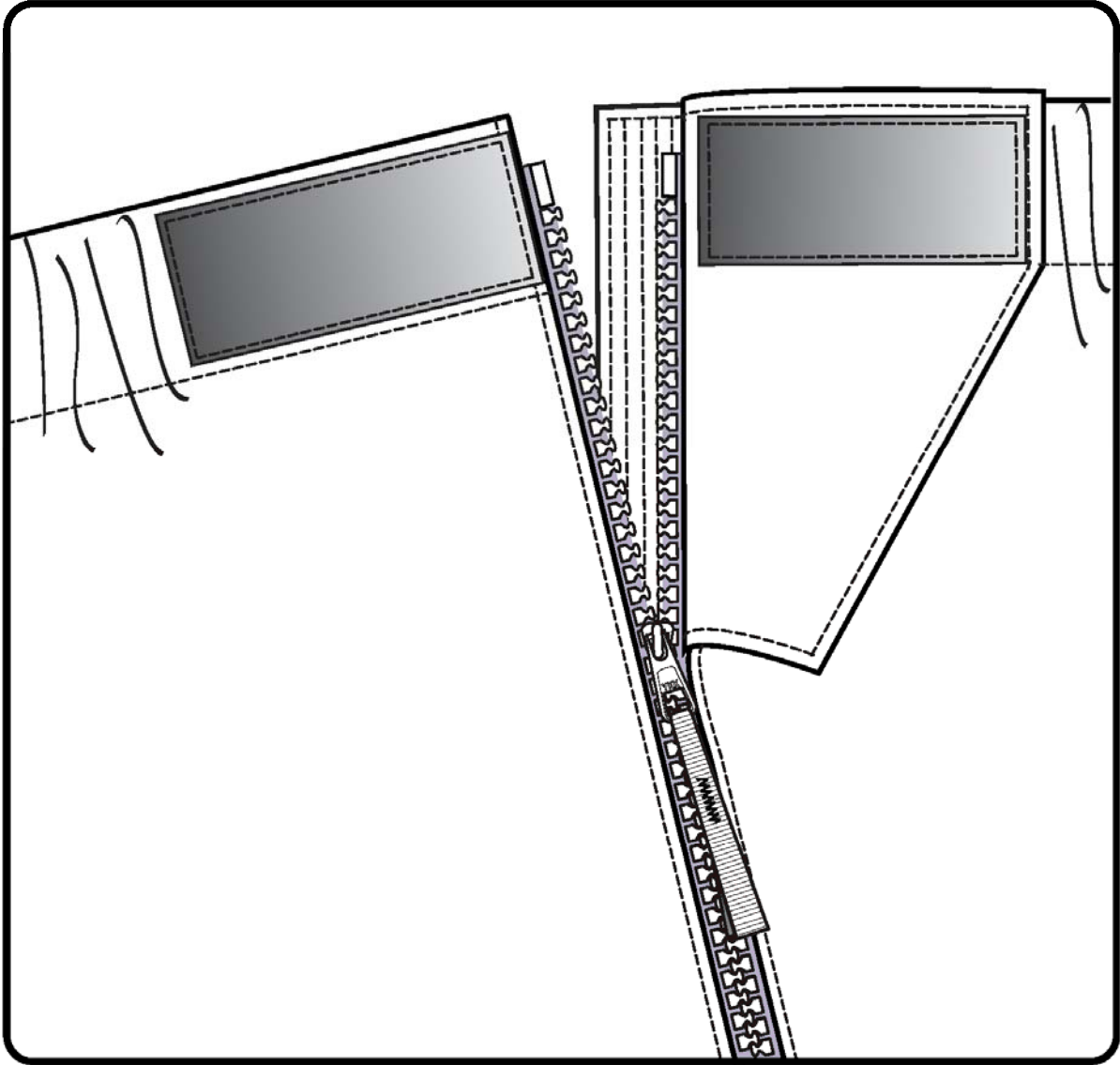
TROUSERS, EXTREME COLD WEATHER
(GEN III)- VIEW 1



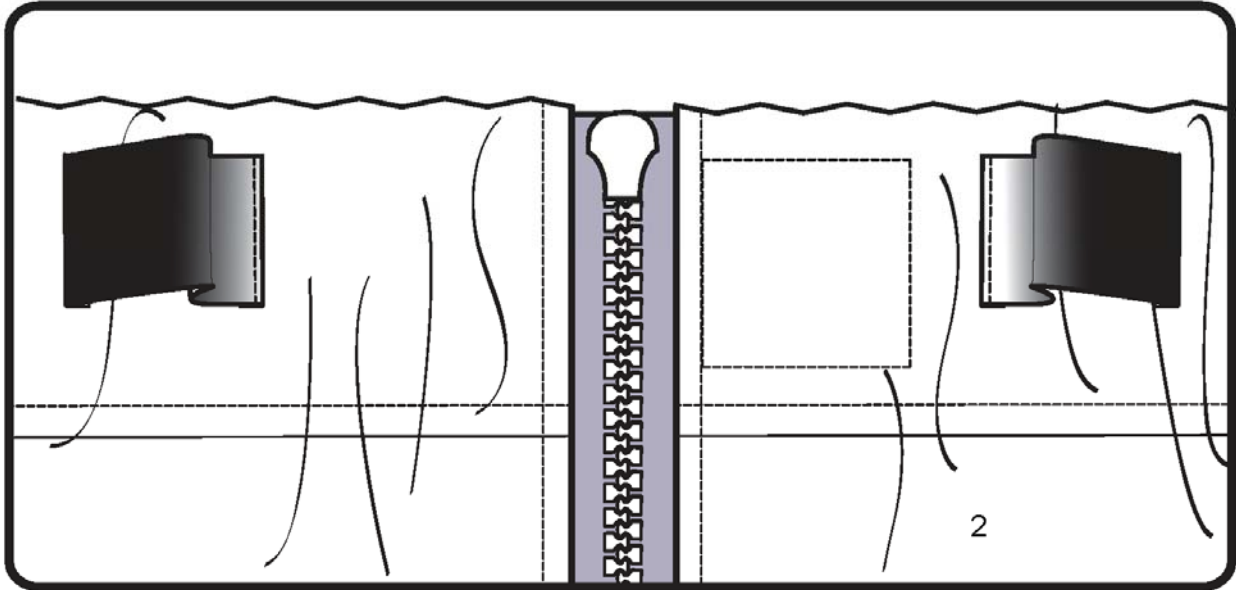
TROUSERS, EXTREME COLD WEATHER
(GEN III) - VIEW 2



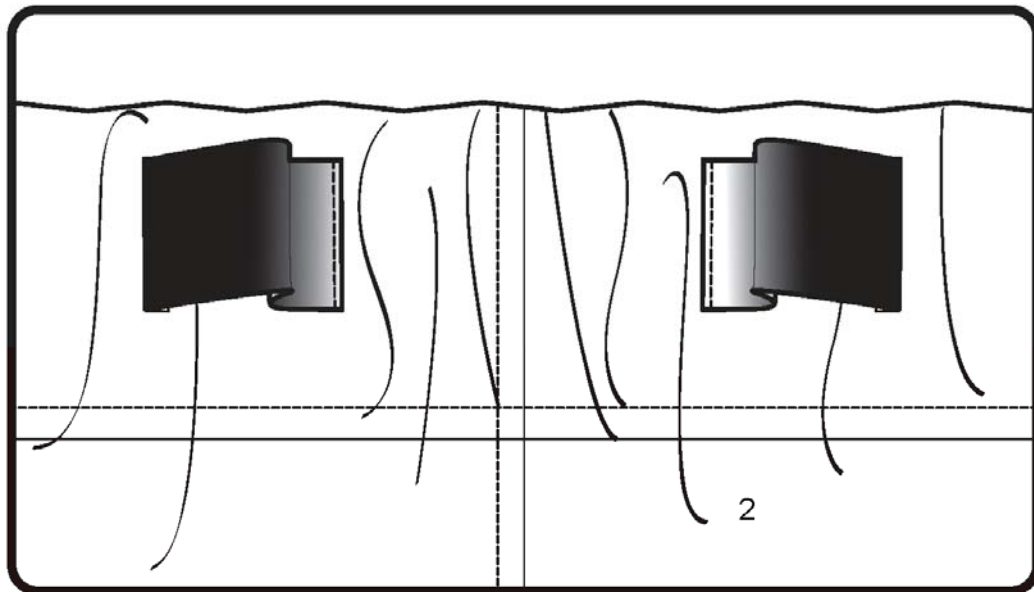
TROUSERS, EXTREME COLD WEATHER (GEN III)
VIEW 3 - SIDE ZIPPER ENTRY @ WAISTBAND



TROUSERS, EXTREME COLD WEATHER (GEN III) - VIEW 4



Inside Center Front



Inside Center Back