

PURCHASE DESCRIPTION

SHIRT, ADVANCED COMBAT

This purchase description is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

1.1 Scope. This purchase description covers the requirements for a flame retardant (FR), Advanced Combat Shirt (ACS) which is worn under body armor, i.e. Outer Tactical Vest (OTV), in combat operations.

1.2 Classification. This purchase description covers three Types of the Shirt, Advanced Combat in seven sizes. (See figures 2, 2a, 3, 3a, 4 and 4a, starting on page 31 for configuration details). The three Types are specified in 1.2.1 and 3.13.

1.2.1 Types.

- Type I.
- a. Contains a zippered shoulder pocket on the left and right sleeves
 - b. Accommodates a name tape, rank insignia and American flag patch on right shoulder pocket
 - c. Contains loop fastener tape with approximate dimensions of 4 inch x 6-1/2 inch on left sleeve pocket. Also contains loop fastener tap with IFF (Identification Friend or Foe) tape and a fabric cover sewn and centered on left sleeve pocket
 - d. Contains a two-channel, flapped pen pocket on the left and right sleeve forearms.

- Type II.
- a. Contains a zippered shoulder pocket on the left and right sleeves
 - b. Contains a zippered utility pocket on the left and right forearm sleeves

Comments, suggestions, or questions on this document should be addressed to: U.S. Army Natick Research, Development and Engineering Center, ATTN: NSRDEC-RDNS-WPW-C 20 Kansas Street, Natick MA. 01760

- Type III: a. Contains a zippered shoulder pocket on the left and right sleeves
b. Contains loop fastener tape with approximate dimensions of 4 inches x 6 ½ inches on left and right sleeve pockets. Also contains loop fastener tap with IFF (Identification Friend or Foe) tape and a fabric cover sewn and centered on left and right sleeve pockets. Contains a two-channel, flapped pen pocket on the left and right sleeve forearms.

1.2.2 Schedule of sizes: X-Small, Small, Medium, Large, X-Large, XX-Large, XXX-Large

NOTE: The above sizes may be abbreviated as XS, S, M, L, XL, XXL, and XXXL.

2. APPLICABLE DOCUMENTS.

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

2.2 Government documents.

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

FEDERAL SPECIFICATIONS

FED-STD-4 Glossary of Fabric Imperfections

COMMERCIAL ITEM DESCRIPTIONS

A-A-55217A - Thread, Aramid, Spun Staple
A-A-55195 - Thread, Aramid
A-A-55126 - Fastener Tapes, Hook and Loop, Synthetic
A-A-55634 - Zippers (Fasteners, Slide Interlocking)

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

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

DRAWINGS

U.S. ARMY NATICK SOLDIER CENTER

- 2-1-2519 Universal Camouflage Pattern
- 2-1-2519-1 ARPAT Camouflage Pattern Desert Sand 500
- 2-1-2519-2 ARPAT Camouflage Pattern Urban Gray 501
- 2-1-2519-3 ARPAT Camouflage Pattern Foliage Green 502

(Copies of drawings are available from the U.S. Army Natick Research Development and Engineering Center, Natick Soldier Center, ATTN: RDNS-WPW-C, Natick, MA 01760)

AIR FORCE UNIFORM PROGRAM OFFICE

- 05-AFCTO-194 AF digital tiger stripe print (10 Aug 04)
- 05-AFCTO-194 AF digital tiger stripe Tan 1639 (ground shade)
- 05-AFCTO-194 AF digital tiger stripe Gray 1640
- 05-AFCTO-194 AF digital tiger stripe Sage Green 1641
- 05-AFCTO-194 AF digital tiger stripe Blue 1642

(Copies of drawings are available from the Defense Supply Center Philadelphia, ATTN: DSCP-CBTC (Bldg 6) 700 Robbins Ave. Philadelphia, PA 19111-5096

NAVY UNIFORM PROGRAM OFFICE (TBD)

XXXXXXXXXX
XXXXXXXXXX
XXXXXXXXXX

(Copies of drawings are available from the XXXXXXXX)

FEDERAL MOTOR VEHICLE SAFETY STANDARD AND REGULATIONS

FMVSS 302 Flammability of Interior Materials – Passenger Cars, Multipurpose Passenger Vehicles, Trucks and Buses

(Copies of this document is available online at <http://www.access.gpo.gov> from the Code of Federal Regulations(CFR) Title 49 (Volume V, Chapter III part 571.302) or can be obtained for a cost from U.S. Government Printing Office, Superintendent of Documents, Mail Stop SSOP, Washington, DC 204-9328 or (Copies are available online at <http://www.ul.com/info/standard.htm> or from Underwriters Laboratories Inc. 333 Pfingsten Road, Northbrook, IL 60062-2096 USA)

PURCHASE DESCRIPTIONS

PD YACL 05-1 – Cloth Twill Air Force Digital Tiger Stripe Print Camouflage Pattern, 25 July 2005, plus amendments

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from 648 AESS/TA, 7980 Lindbergh Landing, Brooks City-Base, TX 78235-5119.)

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

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- AATCC Test Method 8 - Colorfastness to Crocking; AATCC Crockmeter Method
- AATCC Test Method 15 - Colorfastness to Perspiration
- AATCC Test Method 16 - Colorfastness to Light
- AATCC Test Method 20A - Fiber Analysis: Quantitative
- AATCC Test Method 61 - Colorfastness to Laundering: Accelerated
- AATCC Test Method 81 - pH of Water-Extract from Bleached Textiles
- AATCC Test Method 88B - Smoothness of Seams in Fabrics
- AATCC Test Method 100 - Assessment of Antibacterial Finishes on Textile Materials
- AATCC Test Method 135 - Dimensional Changes of Fabrics after Home Laundering
- AATCC Evaluation Procedure 1 - Gray Scale for Color Change
- AATCC Evaluation Procedure 2 - Gray Scale for Staining
- AATCC Evaluation Procedure 8 - Chromatic Transference Scale, 9-Step
- AATCC Evaluation Procedure 9 - Visual Assessment of Color Difference of Textiles

(Copies of are available on line at www.aatcc.org or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

AMERICAN SOCIETY FOR QUALITY (ASQ)

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

(Copies are available online at <http://www.asq.org> or from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

ASTM INTERNATIONAL

- ASTM D 276 - Standard Test Methods for Identification of Fibers in Textiles
- ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-tension
- ASTM D 629 - Standard Test Methods for Quantitative Analysis of Textiles
- ASTM D 737 - Standard Test Method for Air Permeability of Textile Fabrics
- ASTM D 1056 - Standard Specification for Flexible Cellular Materials – Sponge or Expanded Rubber
- ASTM D 2256 - Standard Test Method for Tensile Properties of Yarns by the Single Strand Method
- ASTM D 3512 - Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester

- ASTM D 3575 - Standard Test methods for Flexible Cellular Materials made from Olefin Polymers
- ASTM D 3776 - Standard Test Methods for Mass per Unit Area (Weight) of Fabric
- ASTM D 3787 - Standard Test Method for Bursting Strength of Textiles-Constant-Rate-of Traverse (CRT) Ball Burst Test
- ASTM D 3884 - Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method)
- ASTM D 4964 - Standard Method for Tension and Elongation of Elastic Fabrics
- ASTM D 6193 - Standard Practice for Stitches and Seams
- ASTM D 6413 - Standard Test Method for Flame Resistance of Textiles (Vertical Test)

(Copies of documents are available online at www.astm.org or from the ASTM INTERNATIONAL, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

OTHER PUBLICATIONS

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

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

Sears Roebuck and Co.

Sears Fabric Defect Replica Scales
(Copies available from Sears Roebuck and Co., "Fabric Defect Replica Kit" Dept 817 (ATTN: FC 554B), 3333 Beverly Road, HG, FC568B, Hoffman Estates, IL 60179. For information call (847-286-8952).)

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

3. REQUIREMENTS

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

3.2 Standard sample. The finished shirt shall match the standard sample for shade and appearance, and shall, unless otherwise indicated, be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

3.3 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 Materials.

3.4.1 Basic Material. The shirt shall be made out of four (4) basic fabrics.

3.4.1.1 Torso and Neck Material. Torso and neck cloth for the shirt shall be knitted flame retardant cloth. The material must be comfortable next to the skin on the torso. The color shall be Foliage Green 504 for Type I and Type II or Light Coyote 481 for Type III, and shall meet the requirements of Table I, Table IIB or Table III as applicable, Table IV, Table V and the tests specified in 4.6.

3.4.1.2 Sleeve and Side Panel. Sleeve and side panels of the shirt shall be knitted jersey flame retardant cloth. For Type I and Type II, the cloth shall be in a Universal Camouflage pattern conforming to Drawing 2-1-2519 or Digital Tiger Stripe Camouflage pattern conforming to the requirements specified in PD YACL 05 and for Type III, the cloth shall be Light Coyote 481. All Types shall meet the requirements of Table I, Table II or IIA or IIB as applicable, Table IV, Table V and the tests specified in 4.6.

3.4.1.3 Modesty Panel. The modesty panel component of the shirt shall be knitted jersey flame retardant cloth. The material must be comfortable next to the skin on the torso. The color shall be Foliage Green 504 for Type I and Type II or Light Coyote 481 for Type III, and shall meet the requirements of Table I, Table IIB or Table III as applicable, Table IV, Table V and the tests specified in 4.6.

3.4.1.4 Backing Material. The backing material shall be used for the forearm pocket, sleeve cuff and shoulder pocket. This material shall be used as a lining for the aforementioned components to enhance the structure reinforcement. The material used for the backing shall be a Flame Retardant woven cloth. The color shall be non-descript and shall meet the requirements of Table IV and Table V and the tests specified in 4.6.

3.4.2 Elbow Pads. The shirt shall have elbow pads consisting of encapsulated, flame retardant foam with an abrasion resistant dot coating. The abrasion dot coating shall have a minimum average of 300 abrasion cycles (minimum 5 repetitions) without rupture when tested as specified in 4.6. The elbow pad cover with abrasion resistant dots shall not degrade the spectral reflectance of the base material as specified in Tables II, IIA, IIB and Table III as applicable (see Figures 2A, 3A and 4A) and the tests specified in 4.6.4.

3.5 Color.

3.5.1 Labile Sulfur. Dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid shall not be used.

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

3.5.3 Colorfastness. The finished cloths shall conform to the colorfastness requirements listed below in Table I when tested as specified in 4.6.

TABLE I. Colorfastness requirements

	Laundrying (4 cycles) 1/ (min.)	Light (40 hrs or 170 kJ) 2/ (min.)	Perspiration (acid & alkaline) 1/ (min.)	Crocking 3/ (min.)
All colors for Neck and Torso, Side and Sleeve Panel, and Modesty Panel	3	3	3	3

1/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change and AATCC Evaluation Procedure 2, Gray Scale for Staining.

2/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change

3/ Rated using the AATCC Evaluation Procedure 8, AATCC 9-Step Chromatic Transference Scale

3.6 Pattern execution. The pattern on the printed finished cloth (side and sleeve material) shall be reproducible to the standard sample in respect to design, colors and registration of the respective areas. The pattern repeat shall be 36.00 (+1.25, -2.50) inches in the warp direction. The various areas of the pattern shall be properly registered in relation to each other and shall present definite sharp demarcations with a minimum of feathering or spew. Each pattern area shall show solid coverage; skitteriness exceeding that shown on the standard sample in any of the printed areas will not be acceptable. When the standard sample is not referenced for pattern execution, a pattern drawing shall be provided and the pattern shall match Drawing 2-1-2519 or Drawing 05-AFCTO-194 or XXXXX(TBD).

3.7 Spectral reflectance. The reflectance values shall conform to the requirements listed below in Tables II, IIA, IIB, and Table III as applicable when tested as specified in 4.6.

TABLE II. Infrared reflectance requirements:
Universal Camouflage Pattern (side and sleeve material)

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

TABLE IIA. Infrared reflectance requirements:
Digital Tiger Stripe Camouflage Pattern (side and sleeve material)

Wavelengths Nanometers	Tan 1639		Grey 1640		Sage Green 1641 & Blue 1642	
	Min.	Max.	Min.	Max.	Min.	Max.
600	30	40	16	26	5	18
620	32	42	16	26	5	18
640	35	48	18	28	5	20
660	37	56	21	30	5	26
680	42	60	22	34	8	26
700	43	60	24	38	12	28
720	47	62	26	42	16	30
740	48	64	30	46	18	30
760	48	64	32	48	20	32
780	52	68	34	48	20	34
800	52	68	34	48	22	36
820	52	68	36	52	24	38
840	53	70	38	52	24	38
860	53	70	40	53	26	40

TABLE IIB. Infrared reflectance requirements:
Light Coyote Camouflage Pattern /solid(TBD) (side and sleeve material)

Wavelengths	Light Coyote 481	
Nanometers	Min.	Max.
700	19	41
720	20	41
740	20	42
760	21	42
780	21	42
800	22	43
820	23	45
840	24	46
860	25	48

TABLE III. Infrared reflectance requirements: Foliage Green 504(solid)
(neck/torso and modesty panel material)

Wavelengths Nanometers (nm)	Min	Max
600	8	18
620	8	18
640	8	20
660	10	26
680	10	26
700	12	28
720	16	30
740	16	30
760	18	32
780	18	34
800	20	36
820	22	38
840	24	40
860	26	42

3.8 Material requirements. The finished shirt shall conform to the requirements, listed below in Table IV, when tested as specified in 4.6.

TABLE IV. Material requirements

Characteristic	Neck and Torso	Sleeve and Side Panel	Modesty Panel	Backing Material
Weight (oz/sq yd)				
minimum	5.2	6.9	6.2	3.2
maximum	5.9	7.6	6.9	3.9
Bursting strength (pounds)				
minimum	40	60	40	N/A
Air permeability (cu.ft/min/sq.ft.)				
minimum	300	(35 – 115) ^{1/}	30	N/A
Wicking (inches/hour) (Wales and Courses)				
minimum	3.0	3.0	3.0	N/A
Stretch and Recovery (%)				
Width	55	20	55	N/A
Length	55	20	55	
Recovery (Width and Length)				
minimum	75	80	70	
Pilling	3	3	3	N/A
Dimensional stability (%) ^{2/}				
maximum				
Wales	7.0	5.0	7.0	N/A
Courses	9.0	5.0	9.0	

^{1/} Minimum to Maximum range due to test method variability

^{2/} Home launderings shall be conducted in accordance with AATCC Test Method 135 (1, IIIA, ii), 105° F wash.

3.9 Finish.

3.9.1 Flame Retardant. The fabrics shall be tested for flame resistance. They must meet the requirements listed below in Table V, when tested as specified in 4.6.

TABLE V. Flame retardant requirements (all cloths)

Characteristic	Neck and Torso <u>1/</u> , <u>2/</u>	Sleeve and Side Panel <u>1/</u> , <u>3/</u>	Modesty Panel <u>1</u> , <u>3/</u>	Backing Material <u>1/</u> <u>3/</u>
Afterflame, <u>4/</u> (maximum seconds) Initial and after 25 and 50 or 100 laundering cycles (Both Wales and Courses)	2	2	2	2
Afterglow, <u>4/</u> (maximum seconds) Initial and after 25 and 50 or 100 laundering cycles (Both Wales and Courses)	3	2	2	2
Char length, <u>4/</u> (maximum inches) Initial and after 25 and 50 or 100 laundering cycles (Both Wales and Courses)	5	4	4.5	4

1/ Values are maximum average values allowed for each direction (Wales and Courses) when tested in accordance with ASTM D 6413. Flaming melt/drip on any sample constitutes a failure.

2/ 50 wash requirements is only required during First Article inspection and 25 wash requirements is required for lot testing.

3/ 100 wash requirement is only required during First Article Inspection and 25 wash requirement is required for lot testing.

4/ Home laundings shall be conducted in accordance with AATCC Test Method 135 (1, IIIA, ii), 105° F wash.

3.10 pH. The pH of the water extract of all cloths shall be a minimum of 5.0 and a maximum of 8.50 when tested as specified in 4.6.

3.11 Toxicity. The finished shirt shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.6. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.12 Antimicrobial Properties. The materials used for the neck and torso and the material used for the sleeve and side panel shall contain odor reducing properties showing a 1-log reduction of microbes when tested against Staphylococcus Aureus when tested as specified in 4.6.

3.13 Design and Construction.

3.13.1 Design. The shirt shall be a multi-fabric design using three separate fabrics for the main garment construction; one for the torso and neck areas, one for the side and sleeve components, and one for the modesty panel. The torso and neck material shall be of a knit

construction covering the stomach, back and neck area. An additional woven fabric will be used as seam reinforcement lining where needed. The side panels shall be of a knit construction and extend the length of the shirt from underneath the arm pit to the waist. The sleeve material is made of the same fabric as the side panels. The modesty panel shall be of a knit construction and shall cover the chest area. The shirt shall be long sleeve and extend from the waist to the wrist area. Flame resistant foam shall be sewn in the elbow patch and the patch shall be sewn into each sleeve with an abrasion resistant coating covering the elbow area of the garment. The sleeve cuffs shall be of knit construction with a hook and loop tab closure fastener. The bottom hem shall be 3/4 inch wide, single turned and two-needle cover-stitched.

Type I

- a. The right and left sleeves shall each have a shoulder pocket on upper sleeve (see patterns for exact placement). Each pocket closure shall be a 6-1/2 inch slide fastener (zipper) and shall have an opening of 6-1/4 inch for all sizes.
- b. The right and left sleeves shall each contain a two-channel pen pocket with a single closure mechanism for securing both channels located at the lower forearm.

Type II

- a. The right and left sleeves shall each have a shoulder pocket on upper sleeve (see patterns for exact placement). Each pocket closure shall be a 6-1/2 inch slide fastener (zipper) and shall have an opening of 6-1/4 inch for all sizes.
- b. The right and left sleeve shall each contain a utility pocket on the lower sleeve above the cuff. Each pocket closure shall be a 6-1/2 inch slide fastener (zipper) and shall have an opening of 6-1/4-inches for all sizes.

Type III

- a. The right and left sleeves shall each have a shoulder pocket on upper sleeve (see patterns for exact placement). Each pocket closure shall be a 6-1/2 inch slide fastener (zipper) and shall have an opening of 6-1/4 inch for all sizes. Each pocket shall also have a single channel pen pocket with a single mechanism for securing.
- b. The right and left sleeve shall each contain a two-channel pen pocket with a single closure mechanism for securing both channels located at the lower forearm.

NOTE: Refer to Figures 2, 2a, 3, 3a, 4, and 4a for Type I, II and III configurations.

3.13.1.1.1 Loop fastener configuration. Loop fastener configurations on the sleeves of the shirt shall be Type I, Type II, or Type III as referenced in 3.13.1.1.1, 3.13.1.1.2 and 3.13.1.1.3. Refer to Figures 2, 2a, 3, 3a, 4 and 4a for placement.

3.13.1.1.1 Type I. The right sleeve shoulder pocket shall have three (3) separate loop fastener tapes to accommodate the name tape, rank insignia, and American flag patch. The left sleeve shoulder pocket shall have loop fastener tape with approximate dimensions of 4 inch x 6-1/2 inches addition to loop fastener tape with IFF (Identification Friend or Foe) tape and a fabric cover sewn and centered on the pocket face.

3.13.1.1.2 Type II. Neither the right nor left sleeve shoulder pockets contain loop fastener tape.

3.13.1.1.3 Type III. The left and right sleeve shoulder pockets shall have loop fastener tape with approximate dimensions of 4 inches by 6-1/2 inches in addition to loop fastener tape with IFF (Identification Friend or Foe) tape and a fabric cover sewn and centered on the pocket face.

3.13.2 Components.

3.13.2.1 Slide fastener (Zipper). The slide fastener for the pocket closures (both left and right sleeves) shall be a Single-pull, Two-stop non-separating, non-reversible, Size 5, high temperature resistant plastic individual element fastener (IEF), high temperature resistant aramid tape material conforming to Type I, Style 7 of A-A-55634. The opening for the slider pull-tabs shall be a minimum of 5mm length x 7mm width. The thong shall have two bartacks for secure attachment and to prevent fraying. The thong shall have a finished length after assembly to the pull of 2-3/4 inches \pm 1/8 inch and a width of 3/8 inches. The strength of the thong shall comply with A-A-55634. For Types I and II, the color of the tape, thong and components shall match Foliage Green 504; Type III shall match Light Coyote 481. For all three types, there shall be "good" colorfastness to laundering when tested in accordance with AATCC-61.

3.13.2.2 Tape, hook and loop. The hook and loop fastener tape shall conform to A-A-55126, Type II, Class 1 with (FR) treatment. No slit or split edges are permitted. Sew all hook and loop with a minimum of 1/8 inch from bound selvage to prevent needle cutting along edges. To prevent raveling, do not sew directly on selvage. Each required width shall maintain a tolerance of plus 1/16 inch or minus 1/16 inch as to prevent stitching runoffs or improper fit into automatic sewing equipment. The hook and loop shall contain a flame retardant treatment. The color shall match Foliage Green 504 for Types I and II. For Type III, the color shall match Light Coyote 481. All hook and loop shall be sewn on shirt as indicated on the figures. (See patterns for placement).

3.13.2.3 Sleeve cuff. The loop fastener for sleeve cuff shall be 5/8 inches wide and approximately 4-1/2 inches in length. The hook fastener for sleeve cuff tab shall be 1 inch wide and approximately 2-1/2 inches in length (see patterns for placement).

3.13.2.4 Name tape (for Type I only). The loop fastener for the name tape shall be 1-inch wide by approximately 5-1/2 inches in length (see patterns for placement).

3.13.2.5 American flag patch. (for Type I only) The loop fastener for the American flag patch shall be 2 inches wide and approximately 3-1/2 inches in length (see patterns for placement).

3.13.2.6 Rank patch (for Type I only). The loop fastener for the rank patch shall be 2 inches wide and approximately 2 inches in length (see patterns for placement).

3.13.2.7 Identification Friend or Foe (IFF) Cover. The hook fastener located at the end of the IFF cover shall be 1-inch wide and 3/4 inch in length.

3.13.2.8 IFF Material. The IFF material shall be 3/4 inch wide and 3/4 inch in length. Acceptable sources are Night Vision Equipment Company IFF-55 sew-on IR glo-tape; Omniglow, part number 9-30142; TVI, part number 2B with knit or equal (see patterns for placement).

3.13.2.9 Foam. The foam used in the elbow pad shall be lightweight flame retardant foam. The material shall meet the requirements in Table VI and the tests that are applicable for foam in Table XI. Flame retardant testing for the foam is conducted in the elbow pad configuration as specified in 3.4.2.

TABLE VI. Foam requirements

Characteristic	Requirement
Density, (pound/cubic foot- lb/ft ³)	3.0 – 4.5
Tensile strength, (pound/sq.inch - psi), minimum	40
Compression Deflection @ 25%, psi	1.5 – 3.5
Water Absorption, (Percent %), maximum	7
Elongation, (Percent %), minimum	125
Flame Retardance <u>1/</u>	UL Listed (FMVSS 302)

1/ This component shall be tested for Flame Resistance in the elbow pad configuration as specified in section 4.6.4.

3.13.2.10 Labels. The labels shall use a flame retardant ink (requirements to children's sleepwear) and shall be heat transferred to the inside of the garment and centered on the top of the back under the neck seam. Heat transfer shall be conducted at 325°F and 60 psi pressure for 7 seconds and then peeled while hot. The label shall conform to all toxicity requirements as specified in 4.6.3. The dimensions of the label (applied) shall be a maximum of 3-1/2 inches wide and 2-1/4 inches in height. . The basic design shown below in Figure 1, 1A and 1B shall be followed for the use and care label for Type I, Type II and Type III.

FIGURE 1. Basic label design – Type I



 NSN: XXXX-XX-XXX-XXXX	<p>Fabric Producer Information</p>
	<p>ADVANCED COMBAT SHIRT - TYPE I</p> <p># W XXXXX- XXX</p> <p>Manufacturing Information, Fiber Content, Care and Content Information, Contact Information and Origin</p>

FIGURE 1A. Basic label design – Type II

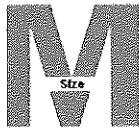

 NSN: XXXX-XX-XXX-XXXX	<p>Fabric Producer Information</p>
<p>USAF Approved Garment</p>	<p>ADVANCED COMBAT SHIRT - TYPE II</p> <p># W XXXXX- XXX</p> <p>Manufacturing Information, Fiber Content, Care and Content Information, Contact Information and Origin</p>

FIGURE 1B. Basic label design – Type III

 NSN: XXXX-XX-XXX-XXXX	Fabric Producer Information
US NAVY Approved Garment	ADVANCED COMBAT SHIRT - TYPE III # W XXXXX- XXX Manufacturing Information, Fiber Content, Care and Content Information, Contact Information and Origin

3.13.2.11 Thread. The thread for all seaming and stitching shall be aramid, Type I or higher, Tex size 27, conforming to A-A-55217A or Tex size 40 conforming to A-A-55195 or A-A-55217A. Tex size 40, A-A-55195 or higher aramid thread shall be used to attach all pockets, hook and loop fasteners, Identification Friend or Foe (IFF) material, elbow pads, and the bottom waist hem. Type I or higher, Tex size 27, A-A-55217A or A-A-55195 thread shall be used on all garment seams, and Tex size 40 shall be used on the bottom waist hem. All thread shall be non-staining and show a rating of 4 for colorfastness to laundering (4-cycles). Color of the thread shall match Foliage Green 504 for Type I and II shirts or Light Coyote 481 for Type III shirts and shall meet the requirements of Table XI and the tests specified in 4.6.

3.13.2.12 Barcoding. Bar codes (if applicable) shall be as specified in the solicitation and/or contract (see 6.2).

3.13.3 Figures. The figures 1, 1A, 1B, 2, 2A, 3, 3A, 4 and 4A, are furnished for informational purposes only. If there are any inconsistencies between the written document and the figures, the written document shall control.

3.13.4 Patterns. Standard patterns, which show directional line markings for proper cutting and assembly, shall not be altered in any way and are to be used as a guide for cutting contractor's working patterns. Seam allowances are determined by pattern specifications and may not be altered. Pockets, pocket flaps, pencil pocket, elbow patches, cuffs, collar, slide fastener, patch loop tape and other hook and loop fastener tape shall be located in accordance with marks on patterns and table references. Bottom hem shall be single turned and 3/4 inch clean finished. The pattern list in Table VIIA, VIIB and VIIC are provided to insure that the pattern set provided is complete. The working patterns will be identical to the Government patterns except that additional notching to facilitate manufacture is permissible. Also minor

modifications are permitted where necessary to accommodate manufacture's processes and using automatic equipment. These modifications shall not alter the serviceability or appearance requirements.

TABLE VIIA. Pattern parts – Type I

<u>Nomenclature</u>	<u>Pattern Abbreviations</u>	<u># of Cut Parts</u>
BACK	ACS 1 BACK	CUT 1
COLLAR	ACS 1 COLLAR	CUT 1
FRONT BOTTOM	ACS 1 FRNT BTM	CUT 1
FRONT TOP	ACS 1 FRNT TOP	CUT 1
FRONT CENTER	ACS 1 FRNT CTR	CUT 1
UPPER SLEEVE	ACS 1 SLV UPPER	CUT 2
MIDDLE SLEEVE	ACS 1 SLV MIDDLE	CUT 2
BOTTOM SLEEVE	ACS 1 SLV BOTTOM	CUT 2
GUSSET	ACS 1 GUSSET	CUT 2
SHOULDER PK	ACS 1 SHLDR PKT	CUT 2
SHOULDER PKT STRIP	ACS 1 SLDR PKT STRIP	CUT 2
IR TAB COVER	ACS 1 IR TAB	CUT 1
FA PKT	ACS 1 FA PKT	CUT 2
FA PKT FLAP	ACS 1 FA PKT FLAP	CUT 2
CUFF TAB	ACS 1 CUFF TAB	CUT 2
ELBOW DOTS	ACS 1 ELBOW	CUT 2
ELBOW PAD	ACS 1 ELBOW PAD	CUT 2
SHLDR PKT BACKING	ACS 1 SHLDR PKT BKG	CUT 2
CUFF BACKING	ACS 1 CUFF BKNG	CUT 2
FA PKT BACKING	ACS 1 FA PKT BKG	CUT 2
FA PKT FACE	ACS 1 FA PKT FACE	CUT 2
FA PKT FLAP FACE	ACS 1 FA PKTFLP FACE	CUT 2

TABLE VIIB. Pattern parts – Type II

<u>Nomenclature</u>	<u>Pattern Abbreviations</u>	<u># of Cut Parts</u>
BACK	ACS 2 BACK	CUT 1
COLLAR	ACS 2 COLLAR	CUT 1
FRONT BOTTOM	ACS 2 FRNT BTM	CUT 1
FRONT TOP	ACS 2 FRNT TOP	CUT 1
FRONT CENTER	ACS 2 FRNT CTR	CUT 1
UPPER SLEEVE	ACS 2 SLV UPPER	CUT 2
MIDDLE SLEEVE	ACS 2 SLV MIDDLE	CUT 2
BOTTOM SLEEVE	ACS 2 SLV BOTTOM	CUT 2
GUSSET	ACS 2 GUSSET	CUT 2
SHOULDER PK	ACS 2 SHLDR PKT	CUT 2

TABLE VIIB. Pattern parts – Type II-Continued

SHOULDER PKT STRIP	ACS 2 SLDR PKT STRIP	CUT 2
CUFF TAB	ACS 2 CUFF TAB	CUT 2
FA PKT A	ACS 2 FA PKT A	CUT 2
FA PKT B	ACS 2 FA PKT B	CUT 2
ELBOW DOTS	ACS 2 ELBOW	CUT 2
ELBOW PAD	ACS 2 ELBOW PAD	CUT 2
SHLDR PKT BACKING	ACS 2 SHLDR PKT BKG	CUT 2
CUFF BACKING	ACS 2 CUFF BKNG	CUT 2

TABLE VIIC. Pattern parts – Type III

<u>Nomenclature</u>	<u>Pattern Abbreviations</u>	<u># of Cut Parts</u>
BACK	ACS 3 BACK	CUT 1
COLLAR	ACS 3 COLLAR	CUT 1
FRONT BOTTOM	ACS 3 FRNT BTM	CUT 1
FRONT TOP	ACS 3 FRNT TOP	CUT 1
FRONT CENTER	ACS 3 FRNT CTR	CUT 1
UPPER SLEEVE	ACS 3 SLV UPPER	CUT 2
MIDDLE SLEEVE	ACS 3 SLV MIDDLE	CUT 2
BOTTOM SLEEVE	ACS 3 SLV BOTTOM	CUT 2
GUSSET	ACS 3 GUSSET	CUT 2
SHOULDER PK	ACS 3 SHLDR PKT	CUT 2
SHOULDER PKT STRIP	ACS 3 SLDR PKT STRIP	CUT 2
IR TAB COVER	ACS 3 IR TAB	CUT 2
FA PKT	ACS 3 FA PKT	CUT 2
FA PKT FLAP	ACS 3 FA PKT FLAP	CUT 2
CUFF TAB	ACS 3 CUFF TAB	CUT 2
PEN PKT FLAP	ACS 3 PEN PKT FLAP	CUT 2
PEN PKT BACK	ACS 3 PEN PKT BK	CUT 2
ELBOW DOTS	ACS 3 ELBOW	CUT 2
ELBOW PAD	ACS 3 ELBOW PAD	CUT 2
SHLDR PKT BACKING	ACS 3 SHLDR PKT BKNG	CUT 2
CUFF BACKING	ACS 3 CUFF BKNG	CUT 2
FA PKT BACKING	ACS 3 FA PKT BKNG	CUT 2
FA PKT FACE	ACS 3 FA PKT FACE	CUT 2
FA PKT FLAP FACE	ACS 3 FA PKTFLP FACE	CUT 2
FA PPEN PKT FACE	ACS 3 PEN PKT FACE	CUT 2
SHLDR PEN PKT	ACS 3 SHLDR PEN PKT	CUT 2
PEN PKT FLAP FACE	ACS 3 PENFLP FACE	CUT 2

3.13.5 Configuration. Each shirt shall conform to figures 2, 2A, 3, 3A and 4 and 4A for construction and appearance and the finished measurements in Table IX and shall be in compliance to end item performance tests in order to provide a uniform appearance, comfort and durability in combat operations.

3.13.6 Stitches and Seam types. All seams shall be consistent and exhibit a uniform appearance. The backside of seams (inside garment) shall be flat with no protruding seam allowance to prevent irritation or discomfort. Stitches, seam types and stitch placement specified in Table VIII shall conform to ASTM D 6193. Whenever two or more methods of stitches and seam types are given for the same location, either may be used. Seams shall be sewn so that no raw edges, open seam, run-offs, twists, pleats or puckers will result. Seam shall start and finish evenly.

TABLE VIII. Stitch and seam type and locations

Seam Location	Seam type	Stitch type
Torso, Sleeves, Side Seams (4 in strips) / Underarm seams	Fsa-1 (Adjust tension to allow maximum stretch with no thread cracking or breakage)	606/607 with cover over all raw edges
Arm Sleeve Pocket Assembly and Attachment	Lsb-1	Slide fastener - attach 301, bartack top and bottom of slide fastener, opens from the top
	SSa-1 (Boxstitch)	Loop tapes - Attach 301, center stitch on 4 inch loop tape
	Osf-1	Form bellow seams - 301
	Lsb-1	Attach pocket - single 301 sides
	EFP-2	Assemble 4 inch ID tab
	Lsb-1	Fold over IFF Tab 1/2 inch. Attach 3/4 inch X 1 inch Hook tape - 301 Boxstitch
	7/8 inch Bartack	Attach tab in center of upper loop tape - Fold right edge over 1/2 inch - 7/8 inch Bartack on end
	7/8 inch Bartack	7/8 inch Bartack 1 inch to left
	SSbd-1	Black IFF - Boxstitch 1/2 inch IFF tab

TABLE VIII. Stitch and seam type and locations - Continued

Elbow Patch Assembly and Attachment	BSc-1	Edge of Dot patch fabric - Circumvent 3/8 inch bias binding around edge - 301
	SSv-1	Attach Patch - 5 radial top stitches - 301
	Lsb-1 (Boxstitch)	Attach Assembly - with Bias to arm sleeve with binding ends attached into side seam - 301
Arm Sleeve Cuff Assembly	SSbd-1	4 inch long hook tab - Assemble into 1 inch strip and top strip 2-1/2 inches x 1 inch hook tape - 301
	Efa-2	Cuff - fold cuff 2 inches with 402 stitch (No cover on face side), cover stitching shall cover raw fabric inside edge
	SSbd-1	Hook tab - Fold hook tab 3/8 inch and attach with double bartack hook tab to cuff with bartack 3/4 inch apart
	SSa-1 (Boxstitch)	5/8 inch X 4-1/2 inch loop tape - Top stitch loop tape to cuff
Hem	Efa-2 (Adjust tension to allow maximum stretch with no thread cracking or breakage)	Fold over 3/4 inch with 402 with cover on inside to cover raw inside edge
Neck Cuff	FSa-1 (Adjust tension to allow maximum stretch with no thread cracking or breakage)	Fold neck pattern in half and attach to body with 607 with cover stitching each side to cover raw edges
Forearm Pocket Assembly and Attachment (Type II only)	Slide fastener - attach 301, bartack top and bottom of slide fastener, opens from the top	Lsb-1
	Attach pocket - with Double 301 with 1/4 inch gauge top and bottom	Lsb-2

TABLE VIII. Stitch and seam type and locations – Continued

Seam Location	Seam type	Stitch type
Pencil Pocket Assembly and Attachment (Type I & III only)	Efd-1	3-1/4 inch x 6-1/2 inch innerlining – Overedge with 504
	Ssau-2 (Boxstitch)	Place inside arm sleeve per pattern placement and topstitch with 301
	Efa-2	Top pencil pocket – Topstitch with Single 301
	LSb-2	Turn in 3 remaining sides and topstitch with double 301 and 1/4 inch gauge
	SSv-1	Center stitch
	LSb-2	Attach Flap with double 301 and with a 1/4 inch gauge
	Ssau-2 (Boxstitch)	Boxstitch Velcro onto Pen Pkt Flag & Pen Pkt Flap face with 301
	Ssa-1	Fold Pkt Flap face in with flap backing between, sew around 3 edges with 301
	Ssc-2	Top stitch Flap around 3 edges with Double 301
	Lsb-2	Attach Flap with double 301 with a 1/4-inch gauge
Bartacks		Required at ends of all arm sleeve cuff joining seams
		Neck cuff seams - double bartack on hook tab (2), slide fastener ends (2), corners of bellow seams (2), openings of pencil pocket (3), and each side of IFF tab (2)
Shoulder pen Pocket Assembly (Type III only)	Efd-1	Cover Right & Left vertical raw edges of pen pkt with pen pkt bkng with 504
	Ssau-2 (Boxstitch)	Boxstitch Pen Pkt & Pen Pkt Bkng to Shldr pkt with 301
	Ssau-2	Top stitch around pen opening with 301
	Ssau-2 (Boxstitch)	Boxstitch Velcro with 301
	Ssau-2 (Boxstitch)	Boxstitch Pen Pkt Face to Shoulder Pkt Backing with 301
	Osf-1	Sew bellows with Shoulder Pkt Backing with 301

TABLE VIII. Stitch and seam type and locations – Continued

Seam Location	Seam type	Stitch type
Shoulder pen Pocket Assembly (Type III only)- Continued	Ssv-1	Top stitch Pen Pkt inside edge & bottom with 301
Shoulder Pen Pkt Flap Assembly	Ssau-2 (Boxstitch)	Boxstitch Velcro onto Pen Pkt Flap & Pen Pkt Flap face with 301
	Ssa-1	Fold Pkt Flap face in with flap backing between, sew around 3 edges with 301
	Ssc-1	Top stitch Flap around 3 edges with 301
	Lsb-2	Attach Flap with double 301 with a 1/4-inch gauge

3.13.6.1 Seam efficiency. The finished shirt shall have a seam efficiency of no less than 80 percent when tested as specified in Table XI.

3.13.6.2 Seam puckering. The finished seam shall have a grade no less than Class 3 when evaluated as specified in Tables X and XI.

3.13.6.3 Stitches per inch. The flat seam stitches per inch shall be 14-18 stitches and the lockstitch stitches per inch shall be 8-9 stitches with a tolerance of ± 2 stitches.

3.13.6.4 Bartacks. No stitch run-off is allowed and no needle cutting by bartack. Double bartacks (one on top of the other) will be avoided to prevent needle cutting and weakening of the attachment point. Bartacks used shall be 1/4, 5/8, or 7/8 of an inch. The 1/4 inch bartacks will be placed across the bottom waist seam, on the neck seam, and sleeve cuff seam. The 5/8 inch bartacks will be used on the sleeve pockets and forearm pocket. 7/8 inch bartacks will be used on IFF cover and sleeve cuff tab.

3.13.6.5 Repairs. Repairs such as mends, darns, patches, or splices shall not be permitted.

3.13.7 Finished measurements. The shirt shall conform to the finished measurements specified in Table IX.

TABLE IX. Finished measurements (inches)

	X- Small	Small	Medium	Large	X- Large	XX- Large	XXX- Large	Tolerance
Sleeve Length – From center back collar to end of cuff	31-1/2	32-1/4	33	33-3/4	34-1/4	35-1/4	36	± 3/8
Chest Width - on Half, 1 inch below armhole	18 -1/2	19-1/2	20-1/2	21-1/2	22-1/2	23-1/2	25-1/2	± 3/8
Center Back Length - From below collar to end of hem	29	29-1/2	30	30-1/2	31	31-1/2	32	± 3/8
Center Front Length – From below collar to end of hem	24	24-1/2	25	25-1/2	26	26-1/2	27	± 3/8
Collar – minimum neck stretch on half	11-1/2	12	12	12	12	12	12	± 1/2

3.14 Use of automated apparel equipment. Automated apparel equipment may be used to manufacture shirts to this purchase description, provided that the stitch and seam types are as specified and the finished component conforms to the required configuration. When a Government furnished shaper pattern is forwarded, the component shall conform to that pattern.

3.15 Workmanship. After completion of the final assembly, the shirt shall be thoroughly cleaned and all threads, lint and foreign matter shall be removed. The shirt shall not contain any fabric defects. The shirts shall be uniform in quality and shall be free from irregularities or defects which could adversely affect performance, reliability or durability. The shirt shall conform to the quality of product established by this purchase description.

4. VERIFICATION

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

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

4.2 First article inspection. A first article, submitted in accordance with 3.1 shall be inspected, examined for appearance, color and finished defects as specified in 4.5 and tested for the characteristics as specified in 4.6.

4.3 Conformance inspection. Conformance inspection shall include the examination of 4.5 and the tests of 4.6.1 through 4.6.6 as specified in 6.2. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4 and with acceptance quality limits as specified in the contract and/or order, except where otherwise indicated (see 6.2).

4.4 Inspection Conditions. Unless otherwise specified, all inspections shall be performed in accordance with all the requirements of referenced documents, unless otherwise excluded, amended, modified or qualified in this specification or applicable procurement documents (see 6.2).

4.5 Examination.

4.5.1 End item examination. The finished examination sample size, acceptance quality limits and acceptance criteria shall be specified in the solicitation or contract (see 6.2).

4.5.2 End item visual examination. Each shirt shall be subjected to visual examination. All defects shall be scored in accordance with Table X which are clearly noticeable at normal viewing and affect serviceability and appearance of the Shirt material defects are defined in Section 1 of FED-STD-4. If needed, closer inspection will be performed to verify compliance to specification requirements. Shade shall be evaluated at a distance of 3 feet.

4.5.3 End item dimensional examination. The shirts shall be examined for conformance to the finished measurement requirements as specified in 3.13.7. Each size of shirt present in the lot shall be represented in the sample selected for this examination. When a measurement deviates from a dimension and tolerance specified, the shirt shall be scored as a defect (Major/Minor).

TABLE X. End item visual defects

Examination	Defect	Classification	
		Major	Minor
Material defects:	Any hole, cut, tear, smash, burn, needle chew, drill hole, exposed, scorched area, run, or open place - up to 1/4-inch inclusive	101	201
	- more than 1/4-inch		
	Any knot greater than Sears scale level C or slub greater than Sears Scale Level D		202
	Broken and missing section of yarn, visible mend, thin place, or shade bar	102	
	Loose yarn or coarse yarn on outside or knit-in waste	103	
Shaded parts	Variation in shade on outside within a part or between parts, poor dye penetration, dye streak(except for the neck) as observed 3 ft away	104	

TABLE X. End item visual defects - Continued

Examination	Defect	Classification	
		Major	Minor
Cleanness	Any spot or stain on outside, visible at 3-feet	105	
	Thread ends not trimmed to 1/4-inch or less throughout (more than 3)		203
	Thread end caught for a distance of more than 1/4-inch in line of stitching on outside		204
	Two or more shade or size tickets or loose threads not removed		205
	Any size or shade marking or residue on outside, score as spot or stain		206
Component and assembly	Any component part or operation omitted (unless otherwise classified herein)	106	
	Any component not as specified	107	
	Any component part twisted, distorted, pleated, misshaped, tight or full (unless otherwise classified herein)		207
	Fullness creating unwanted permanent, fold, pleat, crease, in fabric or garment	108	
	Edge of any component part required to be forced out, having folds of more than 1/8-inch (unless otherwise classified herein)	109	
Cutting	Any component part not cut in accordance with specified pattern or directional line on patterns, or not in accordance with this document	110	
Stitching and Seams	Seam irregular, twisted, pleated, or wavy	111	
	Seam puckered (score only when on major portion of seam) 1/	112	
	Any part of shirt caught in an unrelated stitching (unless otherwise specified)		208
	End of stitching not back stitched or caught in other seams as required.	113	
	Thread break secured by stitching back of the break less than 1/2-inch		209
	End of continuous line of stitching overlapped less than 1/2-inch		210
	Gage of stitching and seam allowance irregular or not within range specified or varies more than 1/16-inch when no range is specified	114	

TABLE X. End item visual defects – Continued

Examination	Defect	Classification	
		Major	Minor
Stitching and Seams- Continued	Edge or raised stitching sewn too close to edge, resulting in damage to cloth	115	
	Seam allowance not as specified or varies more than 1/8-inch (score only when on major portion of seam)		211
	Open seam: (On all seams) up to 1/2-inch inclusive		212
	more than 1/2-inch	116	
	NOTE: One or more broken stitches or two or more continuous skipped or run-off stitches on joining seam		
	On double-stitched seams, a seam is considered open when one or both sides of seam are open.		213
	Runoff on joining seam, (score as an open seam)		
	Raw edges:		
	On outside		
	1/8 to 1/4-inch inclusive		214
	More than 1/4-inch	117	
	On inside:		
	More than 1/4-inch	118	
	On over-edged edge:		
	1-inch to 2-inches inclusive		215
	More than 2-inches	119	
	Stitch and seam type:		
	Not specified stitch and seam type	120	
	Any line of stitching omitted	121	
	Any line of stitching not beginning or ending where specified		216
	Broken, missing, or skipped stitches on edge or raised stitching		
	1/2-inch inclusive		217
	More than 1/2-inch	122	
	Stitch tension:		
	Loose tension resulting in a loose seam:		
	up to 1/2-inch		218
	More than 1/2-inch	123	
	Loose tension on raised or edged stitching resulting in exposed loose thread		219
	Tight tension (stitches break when normal strain is applied in the direction of the seam or stitching)	124	
	All other seams		
	Stitches per inch (to be scored only when the condition exists on the major portion of seam or stitching) (exclusive of overedge stitching):		

TABLE X. End item visual defects – Continued

Examination	Defect	Classification	
		Major	Minor
Stitching and Seams- Continued	Less than the minimum	125	
	More than the maximum		220
	Overedge stitching, two or more stitches less than s s specified		221
Bartacks or tacks	Missing, insecure, misplaced, not specified size or type, not serving intended purpose	126	
	Loose stitch tension		222
Neck	Tight at joining to neck, causing puckers or pleats on front or back	127	
Pockets	Construction and position	128	
	Pocket construction or position not as specified		223
	Edges of pocket pleated or twisted in stitching		224
	Raw edge of pocket hems not turned in		225
	Pocket flap tight, causing fullness, twisting or curling of pocket flap		226
	Pocket flap not completely covering slide fastener		227
	Pockets set on crookedly, or poorly shaped		228
	Pockets out of alignment by more than 1/4-inch		229
Sleeves	Pencil pocket channels vary more than 1/8 inch in width		229
	Sleeves reversed (i.e., right sleeve in left armhole, left sleeve in right armhole)	129	
	Sleeve puckered or pleated at joining to armhole		230
	Sleeve tight at armhole, causing puckers, or pleats on fronts or back at armhole seam		231
	Sleeve back arm seams unequal distance from shoulder seams by more than 3/4 inch	130	
	Bottom edges of top and under sleeve not aligned at bottom by more than 1/8 inch if alternate hemming is used		232
	Sleeve lengths vary by more than 3/4 inch	131	
Slide Fastener	Cuff and cuff tab out of alignment with bottom folded edge of sleeve hem by more than 1/8 inch		233
	Any part of side fastener bent, broken, distorted, damaged, or other wise defected	132	
	Not closing as specified	133	
	Length not as specified, wrong style or type	134	
	Color not as specified		234
	Thong omitted or not as specified		235
	Not located correctly on shirt		236

TABLE X. End item visual defects – Continued

Examination	Defect	Classification	
		Major	Major
Labels	Missing , incorrect, or illegible	135	237
	Not positioned as specified More than 1-inch off center		
	Bar code label tag(if applicable): Bar code omitted or not readable by scanner	136	238
	Human readable interpretation (HRI) omitted or illegible	137	
	Not visible on packaged item Causes damage to item	138	
IFF Material	Not specified material or missing	139	
	Cover: Not able to cover IFF tab	140	
Loop for Name Tape Patch, Rank Patch and American Flag Patch	Not specified size		239
	Not specified location		240
Elbow Patches	Not attached as specified	141	
	Abrasion dots missing	142	
	Missing elbow foam	143	
Bottom Hem	Stitching across ends of Hem omitted or insecure	144	241
	Twisted, puckered, pleated, wavy or distorted	145	
	Width less than 3/8-inch or more than 3/4-inch		
	Irregular in width by 1/4-inch or more		
Tape, hook and loop fastener	Not material specified (color and Type)	146	
	Misplaced or not located as specified on patterns	147	
	Not serving intended purpose	148	
	Missing	149	
	Cut length/width not within tolerance	150	
	Damaged, twisted or distorted when closed.	151	
Packaging	Out of alignment causing a bulge or more than 1/4 inch	152	243
	Any shirt not packaged in accordance with contract or purchase order		

1/ Seams suspected of being puckered shall be examined at a distance of 3 feet in comparison with the AATCC photographic comparative rating for seams (AATCC Test Method 88B). Puckering on a major portion of the suspected seam that is worse than a rating of SS-3 for single.

4.6 End item testing. Material, components and end items shall be tested for the characteristics listed in Table XI where applicable. The methods of testing as specified wherever applicable and as listed in Table XI shall be followed. All test reports shall contain the individual values utilized in expressing the final results.

TABLE XI. End item testing

Characteristic	Requirement Reference	Test Method
Cloth:		
Fiber content 1/	3.4.1	AATCC-20A or ASTM-D-629 2/
Elbow Pad Abrasion Dots	3.4.2	ASTM-D-3884 (H-18 wheel 500 gram load)
Visual shade matching	3.5.2	AATCC Evaluation Procedure 9, Option A or C
Colorfastness: Light (after 40 hrs or 170 kilojoules) Laundering (after 4 cycles) Crocking Perspiration (acid & alkaline)	3.5.3 Table I Table I Table I Table I	AATCC 16 Opt 1 or 3 AATCC 61 Test 1A AATCC 8 AATCC 15
Spectral reflectance: Sleeve and Side Panel Neck/Torso and Modesty Panel	Table II, IIA or IIB IIB or III	4.6.1 4.6.1
Weight	Table IV	ASTM D 3776
Bursting Strength	Table IV	ASTM D 3787
Air Permeability	Table IV	ASTM D 737
Wicking	Table IV	4.6.2
Stretch Recovery	Table IV	4.6.6
Pilling	Table IV	ASTM D 3512
Dimensional Stability (after 1 cycle)	Table IV	AATCC Test Method 135: 1, IIIA, ii, 105°F wash
Flame Resistance (all cloths) Afterflame Afterglow Char Length	Table V Table V Table V	ASTM D 6413 ASTM D 6413 ASTM D 6413
Abrasion Dot Configuration – Flame Resistance Afterflame Afterglow Char length	Table V Table V Table V	ASTM D 6413, 4.6.4 ASTM D 6413, 4.6.4 ASTM D 6413, 4.6.4
pH 1/	3.10	AATCC 81
Toxicity 3/	3.11	4.6.3
Antimicrobial Properties 1/	3.12	AATCC 100

TABLE XI. End item testing - Continued

Characteristic	Requirement Reference	Test Method
Foam: 1/		
Density	Table VI	ASTM D 3575
Tensile strength	Table VI	ASTM D 412 (DIE A)
Compression deflection (@25%)	Table VI	ASTM D 1056
Water Absorption	Table VI	ASTM D 1056
Elongation	Table VI	ASTM D 412 (DIE A)
Flame Resistance	Table VI	UL Listed (FMVSS 302)
Thread		
Breaking strength and elongation	3.13.2.11	ASTM D 2256 , 4.6.5
Colorfastness	3.13.2.11	AATCC-61, 3A (4 cycles)
Design and Components:		
Seaming	Table VIII 3.13.6	ASTM D 6193
Seam Puckering	3.13.6.2	AATCC 88B

1/ Tested during first article inspection only.

2/ In case of dispute, the ASTM method prevails.

3/ If the toxicity requirement (see 3.11) can be demonstrated with historical data testing may not be required (see 6.2).

4.6.1 Spectral Reflectance. Spectral reflectance data for Types I and II shall be obtained from 600 to 860 nanometers (nm) and Type III shall be obtained from XXX to XXX(TBD) nanometers (nm) at 20 nm intervals on a spectrophotometer relative to the barium sulfate standard, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white, e.g. magnesium oxide or vitrolite tiles. The spectral band width shall be less than 26 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65.

Measurements shall be taken on a minimum of two (2) different areas and the data averaged. The measured areas should be at least 6 inches away from the selvage. The specimen shall be measured as a single layer backed with four layers of the same shade. The specimen shall be viewed at an angle no greater than 10° from normal, with the specular component included. Measurements shall be taken on a minimum of two different areas. Specimens shall be oriented in different directions during testing. When possible, the specimens tested shall not contain the same Wales or courses when presented to the sample port. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nm. The diameter for standard

aperture size used in the color measurement device shall be 1.0 to 1.25 inches for Foliage Green 504, XXX (TBD) for Light Coyote 481 and 0.3725 inches or larger for the Universal Camouflage pattern or Digital Tiger Stripe pattern. Any color having spectral reflectance values falling outside the limits at four or more of the wavelengths specified shall be considered a test failure.

4.6.2 Wicking. Wicking data will be collected using the following procedure. A sample size of 6 inch by 1 inch will be cut with the 6 inch cut measured in the wale direction. A 500 ml Erlenmeyer flask shall be filled with 200 ml of colored water (food coloring used shall be a contrasting color to the cloth material to make the water level visible on the sample). The top edge of the sample will be pierced with a long straight pin and the sample then suspended from the top of the flask. After 1 minute remove the sample from the flask and measure water level on sample in inches and record. Return sample to the flask. Repeat the following measurement at 3 minutes, 5 minutes and each 5 minute interval until the water level reaches 6 inch or 1 hour has elapsed. Values are reported as inches per hour. A minimum of 3 samples shall be tested with the average value reported along with each individual measurement.

4.6.3 Toxicity Test. When required (see 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the shirt is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (see 2.3). If the toxicity requirement (see 3.11) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

4.6.4 Abrasion Dot Flame Resistance Testing. The material shall be tested in accordance with ASTM D 6413. Any form of melt drip during the ASTM D 6413 test constitutes a failure.

4.6.5 Breaking strength and elongation test. The thread shall meet the requirements stated in 3.13.2.11 and the tests specified in Table XI except testing speed shall be 12 (± 0.5) in/min and a 10-inch gauge shall be used.

4.6.6 Stretch and Recovery. Stretch recovery data will be collected using the test method outlined in ASTM D 4964, modified as follows:

- a. Specimen size (section 8.1.1): 13 inch x 3 inch sewn into a 5 inch loop (1.5 inch overlap)
- b. Gage length (section 8.2): 100 mm (+ 1) mm
- c. Loading crosshead speed (9.1.2): 250 mm/min (+ 15) mm/min
- d. Cycling force (section 9.1.4): 50 N (10 lbf)
- e. Anvil spacing (section 9.2.3.8/9): 130 mm

Results. Results for the percent elongation (stretch) will be reported for both width and length of the fabric at a loop tension of 10 lbs as described in method section 4.2. Recovery will be calculated by measuring the distance between the gage marks one hour after the elongation test has been run on a specimen, then calculating the percentage recovery relative to the 100 mm initial gage length (e.g. a 120 mm length one hour after elongation would be equivalent to 80% recovery).

5. PACKAGING.

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department 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 shirt is for wear by military personnel in the United States Army, Air Force or Navy Air Force as a modular combat uniform shirt to be worn with the designated body armor during combat operations.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this document.
- b. Type and sizes required (see 1.2)
- c. The specific issue of individual documents referenced (see 2.1 - 2.4)
- d. When first article sample is required (see 3.1, 4.2, 6.3)
- e. Universal Camouflage, Digital Tiger Stripe or XXXX pattern drawing if required(**TBD**) (see 3.6)
- f. When Barcoding (if applicable) is required (see 3.13.2.12)
- g. Conformance inspection acceptance quality limits (see 4.3)
- h. Inspection Conditions (see 4.4 & 4.5)
- i. When Toxicity testing is required (see 4.6.3)
- j. Packaging requirements (see 5.1)

6.3 First Article. When a first article inspection is required (see 3.1), it will be inspected and approved under the appropriate provisions of FAR 52.209-4. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Standard sample. For access to samples and pattern drawings, address the contracting activity issuing the invitation for bids or request for proposal.

6.5 Known Material Sources.

6.5.1 IFF Material. (As listed below or equal)

- a. Night Vision Equipment Company, P.O. Box 219, Fogelsville, PA 18104
- b. Omniglow Corporation (CAGE 0BY83), 96 Windsor Street, West Springfield, MA 01089,
- c. TVI Corporation, 7100 Holladay Tyler Road, Glenn Dale, MD 20769, (301) 352-8800 ext. 245

6.5.2 Tape, Hook and Loop. (As listed below or equal)

- a. Velcro USA, Inc. 406 Brown Avenue, Manchester, NH 03103
- b. YKK USA, Inc. c/o Diversified Marketing Group, Inc. 109 Forrest Avenue, Narberth, PA 19072 , (610)-667-5589

6.5.3 Fabric. (As listed below or equal)

- a. Massif Mountain Gear Company, LLC, 415 Williamson Way, Ashland, OR 97520, (541) 201-0023

6.5.4 Foam. (As listed below or equal)

- a. Rubberlite Inc., 2501 Guyan Avenue, Huntington, WV 25703 (304)-525-3116
- b. Rogers Foam Corp., 120 Clarence Drive, Mt. Sterling, KY 40353, (859)-497-0702

6.5.5 Abrasion Dots. (As listed below or equal)

- a. Massif Mountain Gear Company, LLC, 415 Williamson Way, Ashland, OR 97520, (541) 201-0023
- b. HDM Inc., 570 Hale Avenue, Oakdale, MN 55128 (615) 730-6203 or (866) 730-6200.

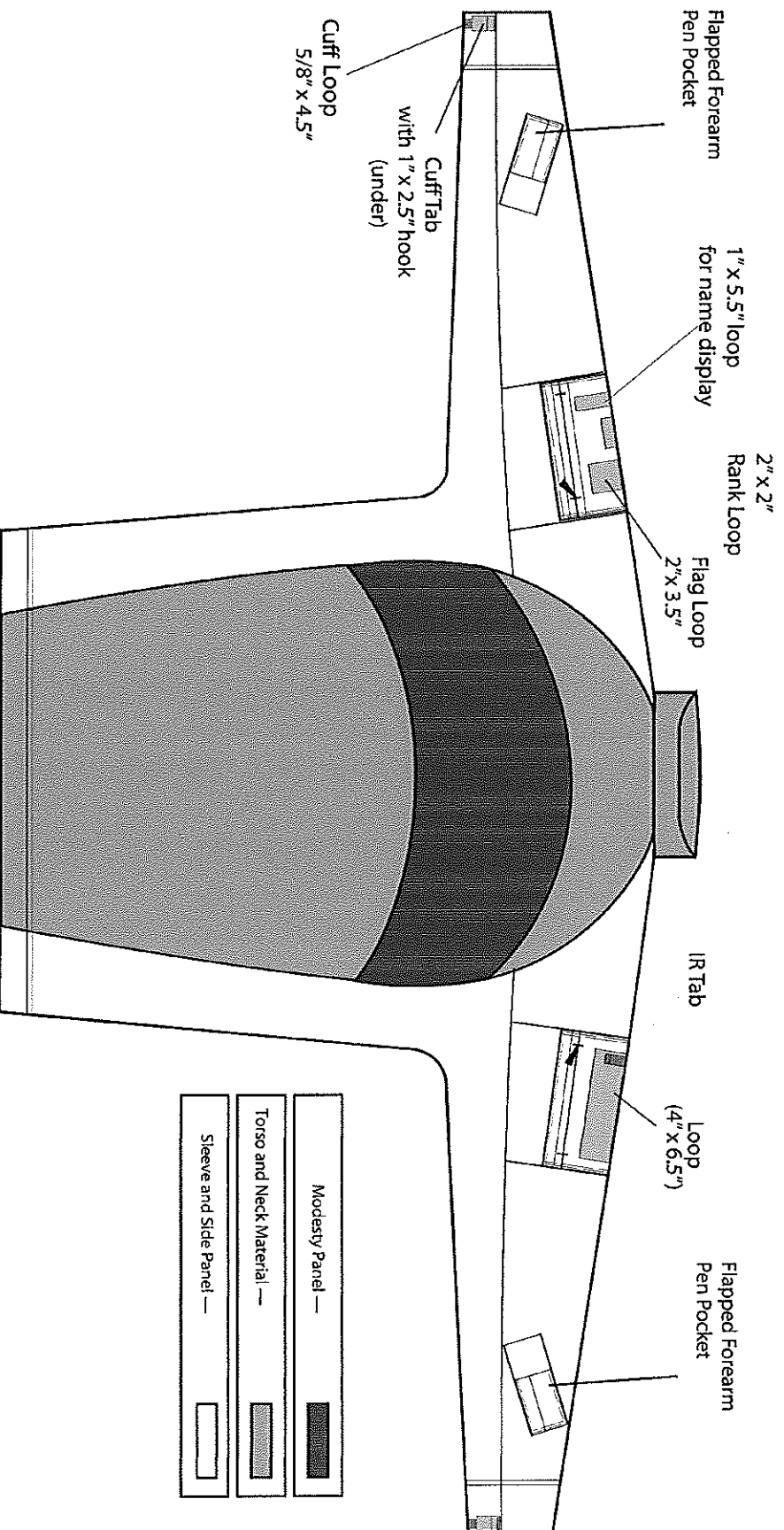
6.5.6 Slide fastener/Zipper. (As listed below or equal)

- a. YKK USA, Inc. c/o Diversified Marketing Group, Inc. 109 Forrest Avenue, Narberth, PA 19072 , (610)-667-5589

6.6 Subject term keyword listing:

Camouflage clothing
Fire Retardant

FIGURE 2. Front view advanced combat shirt Type I



Modesty Panel —	
Torso and Neck Material —	
Sleeve and Side Panel —	

FIGURE 2A. Back view advanced combat shirt Type I

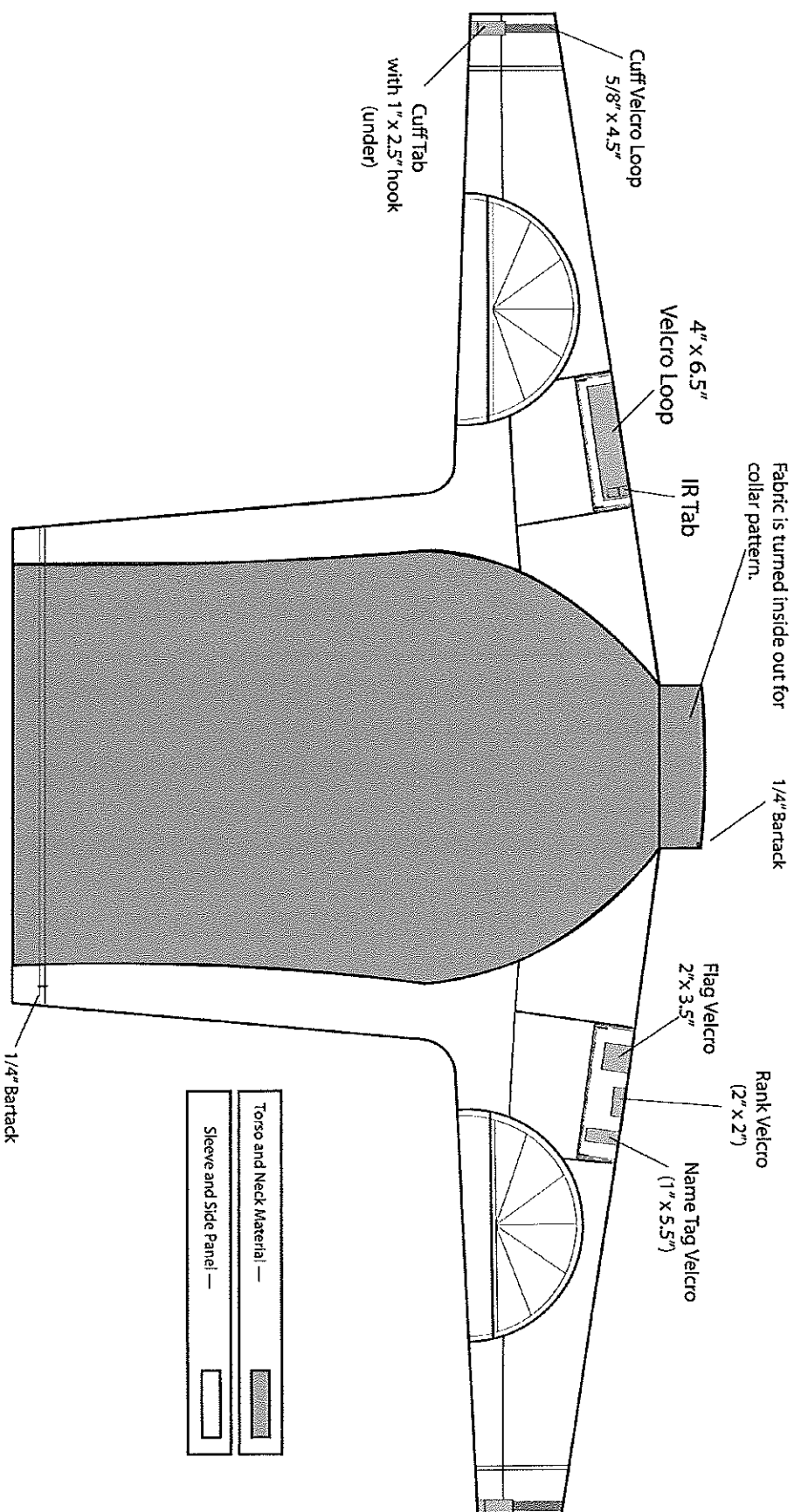


FIGURE 3. Front view advanced combat shirt Type II

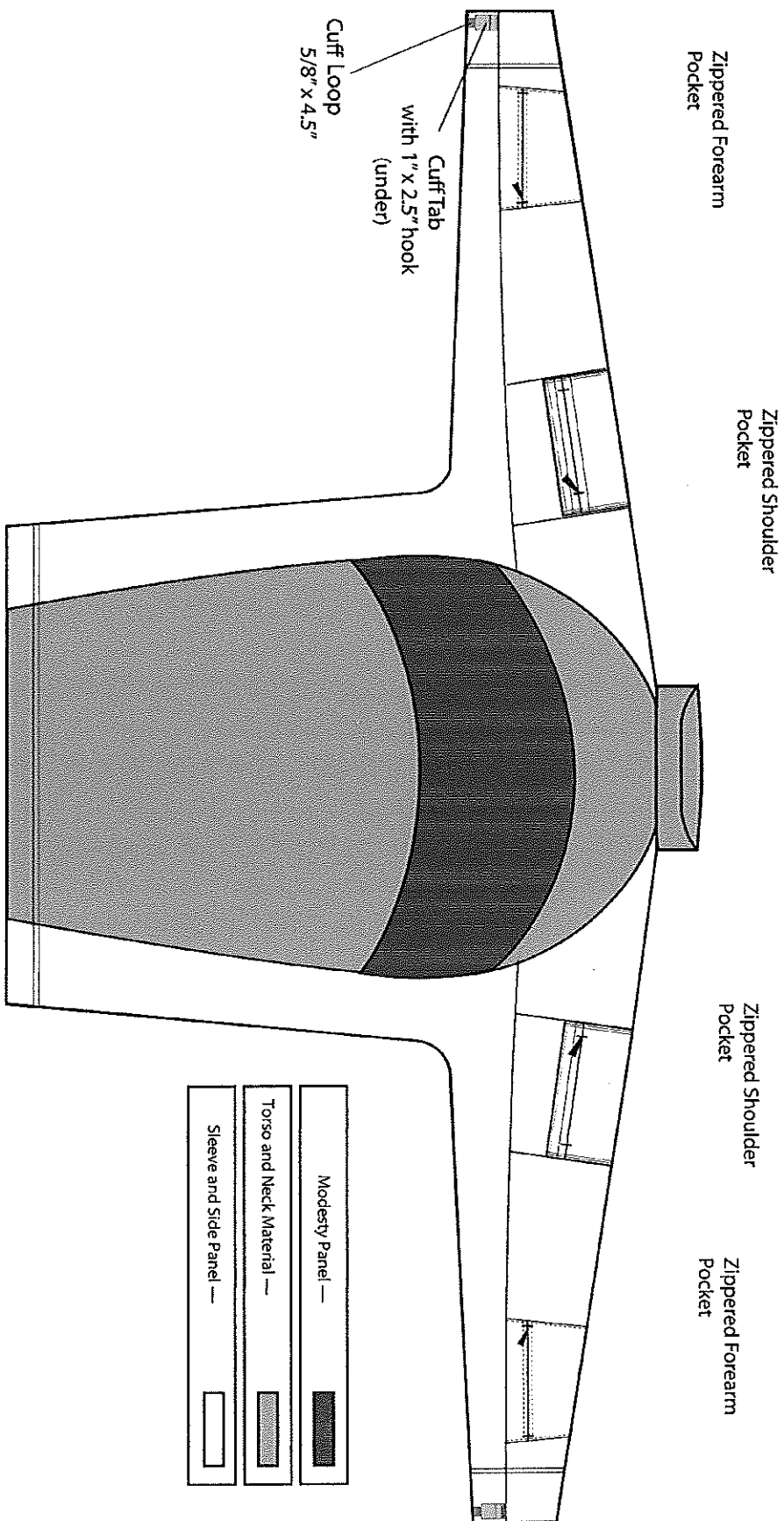


FIGURE 3A. Back view advanced combat shirt Type II

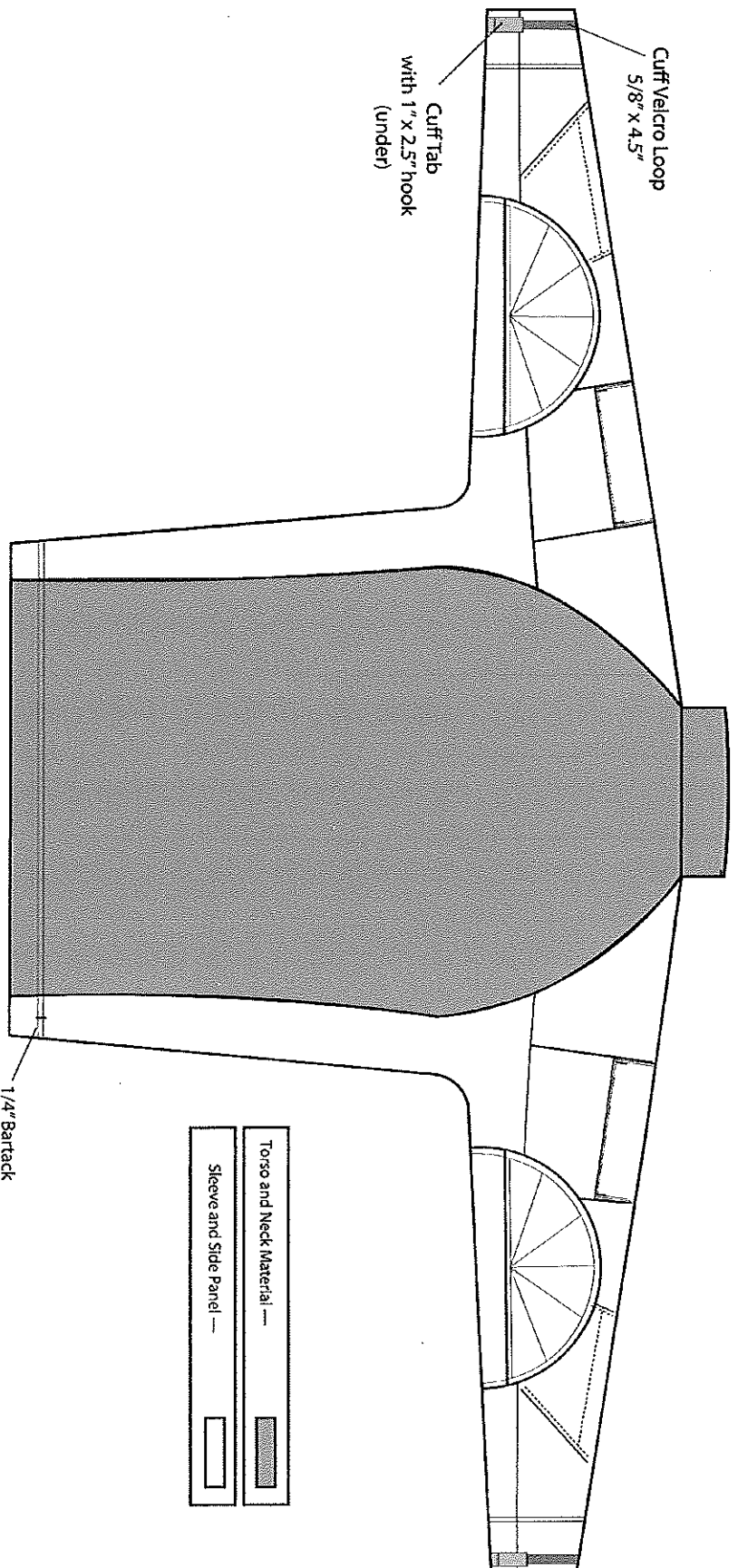


FIGURE 4. Front view advanced combat shirt Type III

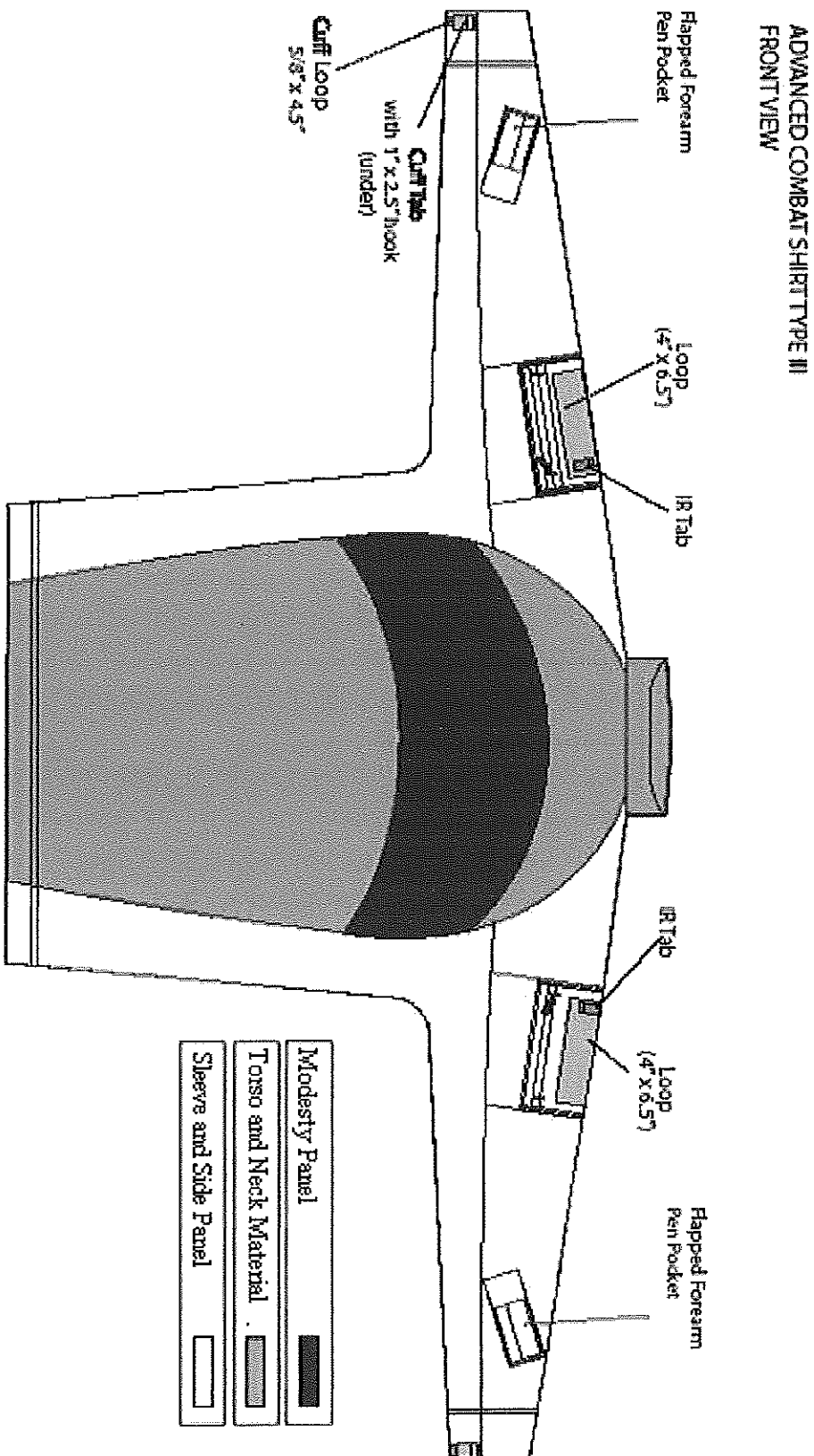


FIGURE 4A. Back view advanced combat shirt Type III

ADVANCED COMBAT SHIRT TYPE III
BACK VIEW

