

**INCH POUND**  
**FQ/PD 07-05B**  
**12 October 2007**  
**SUPERSEDES**  
**FQ/PD 07-05A**  
**28 JUNE 2007**

**PURCHASE DESCRIPTION**  
**BODY ARMOR, MULTIPLE THREAT / INTERCEPTOR**  
**IMPROVED OUTER TACTICAL VEST**

This document is approved for use by all Departments and Agencies of the Department of Defense (DOD). Recommended improvements, simplifications, or reductions in paperwork are encouraged and should be directed to the preparing activity.

**1. SCOPE**

1.1 Scope. This purchase description provides for a multiple threat body armor system consisting of a base vest and modular components for tailoring protection levels to defeat multiple ballistic hazards across the battlefield continuum and manage armor weight. This specification delineates system, subsystem, component, and subcomponent level performance requirements to accomplish the end item body armor performance (see paragraph 6.1). Body armor, multiple threat is functionally integrated with Modular Lightweight Load Equipment (MOLLE).

Classification. Body armor, multiple threat components; base vest assembly, front yoke and collar assembly, back yoke and collar assembly, lower back protector assembly, groin protector assembly, deltoid protector, small arms protective inserts (SAPI, ISAPI, ESAPI, XSAPI) shall be one type in the following sizes. Body armor, multiple threat will be issued separately as three subsystems, as follows.

- 1) The Improved Outer Tactical Vest (IOTV) subsystem; consisting of the base vest assembly, front yoke and collar assembly, back yoke and collar assembly, lower back protector assembly, groin protector assembly, and deltoid protector components.
- 2) The SAPI subsystem; consisting of a set of SAPI, ISAPI, ESAPI and XSAPI in the same size as the IOTV.
- 3) The Enhanced Side Ballistic Insert subsystem; consisting of a set of ESBI in one standard size or a set of X-Small ESAPI.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: Project Manager – Soldier Equipment, Program Executive Office – Soldier, US Army, 10170 Beach Road, Building 325, Fort Belvoir, Virginia 22060 or emailed to [james.qing.zheng@us.army.mil](mailto:james.qing.zheng@us.army.mil) or [john.glisson@us.army.mil](mailto:john.glisson@us.army.mil).

COMPONENT	SIZES
Base Vest Assembly	11 sizes: X-Small, Small, Medium, Medium-Long, Large, Large-Long, X-Large, X-Large-Long, 2X-Large, 3X-Large, 4X-Large
Back Yoke and Collar Assembly	8 sizes: X-Small, Small, Medium / Medium-Long, Large / Large-Long, X-Large / X-Large-Long, 2X-Large, 3X-Large, 4X-Large
Front Yoke and Collar Assembly	One size
Lower Back Protector Assembly	One size
Groin Protector Assembly	2 sizes: X-Small to Medium-Long, and Large to 4X-Large
Deltoid Protector	Three sizes: X-Small to Small, Medium to Large, and X-Large to 4X-Large
Small Arms Protective Insert (SAPI, ISAPI, ESAPI, XSAPI)	5 sizes: X-Small, Small, Medium, Large, X-Large
Enhanced Side Ballistic Insert (ESBI)	One size

## **2. APPLICABLE DOCUMENTS**

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

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the Solicitation (see paragraph 6.2).

## SPECIFICATIONS

### DEPARTMENT OF DEFENSE

MIL-DTL-32075	- Label: For Clothing, Equipage, and Tentage (General Use).
MIL-PRF-5038	- Tape, Textile and Webbing, Textile, Reinforcing Nylon
MIL-PRF-63460	- Lubricant, Cleaner and Preservative for Weapons and Weapons Systems (Metric)
CO/PD 00-03	- Small Arms Protective Inserts (SAPI)
CO/PD 05-02	- Improved, Small Arms Protective Inserts (ISAPI)
CO/PD 04-19	- Enhanced, Small Arms Protective Inserts (ESAPI)
FQ/PD 07-03	- X Small Arms Protective Inserts (XSAPI)
CO/PD 06-20	- Enhanced Side Ballistic Insert (ESBI)

A-A-55301	- Webbing, Textile Textured or Multi-Filament
A-A-55126	- Fastener Tape, Hook and Pile, Synthetic
MIL-W-4088	- Webbing, Textile Woven Nylon
MIL-C-43734	- Cloth, Duck, Textured Nylon
MIL-STD-810	- Environmental Engineering Considerations and Laboratory Tests
MIL-W-17337	- Webbing, Textile, Woven Nylon
V-T-295	- Thread, Nylon
MIL-DTL-508	- Cloth, Oxford, nylon, 3 Ounce
MIL-C-8061	- Cloth, Nylon, Raschel Knit
MIL-STD-810	- Environmental Engineering Considerations and Laboratory Tests

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094 or [www.dsp.dla.mil](http://www.dsp.dla.mil) using Assist Quick Search).

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

#### **DRAWINGS**

Project Manager – Soldier equipment, Program Executive Office – Soldier, Fort Belvoir, VA  
Drawing No. 2-1-2519 Universal Camouflage Pattern 60 inches  
Drawing No. 2-1-2519-1 Universal Camouflage Desert Sand 500  
Drawing No. 2-1-2519-2 Universal Camouflage Urban Gray 501  
Drawing No. 2-1-2519-3 Universal Camouflage Foliage Green 502

#### **MANUALS**

TM 10-8400-203-23 General Repair Procedures for Individual Equipment; Chapter 25, Maintenance of Interceptor Body Armor System (Copies of drawings, publications, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.3 Non-government publications. The following documents forms a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are Department of Defense adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see paragraph 6.2).

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

AATCC METHOD 8 - Colorfastness to Crocking; AATCC Crockmeter Method  
AATCC METHOD 15 - Colorfastness to Perspiration  
AATCC METHOD 16 - Colorfastness to Light  
AATCC METHOD 22 - Water Repellency; Spray Test  
AATCC METHOD 61 - Colorfastness to Laundering, Home and Commercial: Accelerated  
AATCC METHOD 70 - Water Repellency: Tumble Jar Dynamic Absorption Test

AATCC METHOD 96 - Dimensional Changes in Commercial Laundering of Woven and Knitted Fabrics Except Wool  
AATCC METHOD 118 - Oil Repellency: Hydrocarbon Resistance Test  
AATCC METHOD 119 - Color Change Due to Flat Abrasion (Frosting): Screen Wire Method  
AATCC METHOD 127 - Water Resistance: Hydrostatic Pressure Test  
AATCC Procedure 1 - Gray Scale for Color Change  
AATCC Procedure 2 - Gray Scale for Staining  
(Applications for copies should be addressed to the American Association of Textile Chemists and Colorists, PO Box 12215, Research Triangle Park, NC 27709-2215 or [www.aatcc.org](http://www.aatcc.org)).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D-204 - Sewing Threads  
ASTM D-1388 - Stiffness of Fabrics  
ASTM D-1683 - Failure in Sewn Seams of Woven Fabrics  
ASTM D-1693 - Standard Practice for Stitches and Seams  
ASTM D-1777 - Standard Method for Testing Thickness of Textile Materials  
ASTM D-3575 - Materials, Flexible Cellular, Made From Olefin Polymers  
ASTM D-3776 - Mass Per Unit Area (Weight) of Woven Fabric  
ASTM D-3884 - Abrasion Resistance of Textile Fabrics, (Rotary Platform, Double Head Method)  
ASTM D-3886 - Abrasion Resistance of Textile Fabrics, (Inflated Diaphragm)  
ASTM D-4485 - Standard Specification for Performance of Engine Oils  
ASTM D-5034 - Breaking Force and Elongation of Textile Fabrics (Grab Test)  
ASTM D-6193 - Standard Practice for Stitches & Seam  
ASTM D-6413 - Standard Test Method for Flame Resistance of Textiles (Vertical Test)  
ASTM G21-90 - Test Methods for Evaluation of Effect of Fungi on Synthetic Polymeric Materials

(Applications for copies should be addressed to ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959 or [www.astm.org](http://www.astm.org))

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

International Standard 110902 - Measurement of thermal and water vapor resistance under steady state conditions

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 paragraph 6.2), complete Body armor, multiple threat samples, representing full production quality, shall be subjected to first article inspection in accordance with 4.2.

3.2 Materials and components. The materials and components shall conform to applicable specifications, standards, and patterns required herein. Use of recycled material is encouraged when practical, provided the requirements of this specification are met.

3.2.1 Cloth Outer Shell. The cloth(s) utilized to fabricate the outer shell shall be made from lightweight, durable, synthetic cloths meeting the characteristics outlined in Table I when tested as specified in 4.5 Table XIII. Color: Universal Camouflage and Foliage Green 504.

**Table I. Cloths: Outer Shell Carrier**

<b>Characteristic</b>	<b>Outershell Cloth</b>
Breaking Strength; lb. (min.) Warp X Filling	360 X 270
Dimensional Stability; % (max.) Warp X Filling	3.0 X 2.0
Abrasion Resistance: (min.) Number of Cycles	1000
Water Repellency: Spray Rating (min) Initially After 1 Laundering	100,100,90 90,80,80
Hydrostatic Resistance: cm (min) Initially and After 1 Laundering After 1 Laundering and POL Contamination After 1 Laundering and Insect Repellent Contamination After 1 Laundering and Sweat Contamination After Laundering and Sea Water Contamination	35
Dynamic Absorption: % (max.) After 1 Laundering	20
Resistance to Organic Liquids (min) After 1 Laundering	No wetting by n-dodecane

3.2.1.1 Flame Retardant Requirements: The finished cloth shall exhibit flame resistance as measured by ASTM-D-6413. All materials tested shall be tested in accordance with ASTM D 6413 in both the warp and fill directions. There shall be no melt/drip that occurs at any point during testing. The average afterflame in each direction (warp and fill) shall be no longer than 3.0 seconds, the average afterglow in each direction shall be no longer than 2 seconds, and the

average char length in each direction shall be no longer than 4 ½ inches, as defined by ASTM D 6413.

3.2.1.2 Weight of Finished Fabric: The weight of the finished fabric (with FR coating) shall be no greater than 9.0 oz/sqyd.

3.2.2 Cloth Collar Material. The collar material next to the skin shall be highly abrasion resistant, non-abrasive to skin, pliable to enable collar to roll down, resistant to oil penetration and dry rot and able to remove oils when cleaned. Collar material next to the skin shall be Mil-C-508, Oxford, Nylon, 3 oz Type I, Class 3. Color: Foliage Green 504.

3.2.3 Cloth Ballistic Panel Cover. Ballistic panel cover should be 70 Denier 1.9 oz. Nylon Ripstop. Color: Foliage Green 504.

3.2.4 Cloth Inner Shell. Inner lining Cloth, Nylon, Raschel Knit, MIL-C-8061, Type I or II 11 or 12 oz/sq yard. Color: Foliage Green 504.

3.2.5 Cloth Spacer Mesh. Spacer Mesh with tricot laminate. Color: Foliage Green 504

3.2.6 Webbing and Tapes. Webbing and tapes shall be heat cut smooth with no burrs or residual melt. When required, angles on webbings shall be  $45^{\circ} \pm 10^{\circ}$  unless otherwise specified on the drawings or templates. Webbings and tapes shall conform to the following requirements.

- a) 1.0 inch Webbing; A-A-55301, Type III, except that the spectral reflectance requirements shall be in accordance with para. 3.4.6 Tables V-A and V-B when tested in accordance with Para 4.5.10. Colors: Universal Camouflage, Foliage Green 504 per para. 3.3.1.16 and 3.3.1.17.
- b) 2.0 inch Webbing; 100% Nylon, width 2 inches  $\pm 0.063$ , weight 1.30 ozs/yd minimum, Tensile strength 2000 lbs minimum, thickness  $0.046 \pm 0.0007$ , ground yarns number of ends - 191 minimum, ground yarns ply/denier/twist - 1/840/0, binder yarns number of ends - 44 minimum, binder yarns ply/denier/twist - 1/840/0, Filling, picks/inch - 40 (double) minimum, filling, ply/denier/twist - 1/1000/0, lockstitch, ply/denier/twist - 1/210/0 minimum, weave, double plain w/binders weaving 2 up, 2 down, the spectral reflectance requirements shall be in accordance with para. 3.4.6 Tables V-B when tested in accordance with Para 4.5.10. Color: Foliage Green 504.
- c) .75 inch Webbing; MIL-W-17337 Class 2, continuous filament textured nylon shall be used. Color: Foliage Green 504.
- d) 1.0 inch Webbing; MIL-W-17337 Class 2, continuous filament textured nylon shall be used except that the spectral reflectance requirements shall be in accordance with para. 3.4.6 Tables V-C when tested in accordance with Para 4.5.10. Color: Desert Sand 503 or Tan 380.

- e) 1.5 inch Webbing; MIL-W-17337 Class 2, continuous filament textured nylon shall be used. Color: Foliage Green 504.
- f) 2.0 inch Webbing; MIL-W-17337 Class 2, continuous filament textured nylon shall be. Color: Foliage Green 504.
- g) 3.0 inch Webbing; MIL-W-17337 Class 2, continuous filament textured nylon shall be used. Color: Foliage Green 504.
- h) 1.0 inch Tape; MIL-PRF-5038, Type III, class 2, continuous filament textured yarns shall be used except that the spectral reflectance requirements shall be in accordance with para. 3.4.6 Tables V-A when tested in accordance with Para 4.5.10. Color: Universal Camouflage pattern.

3.2.6.1 Pattern Execution, Webbing. The pattern of the finished Universal Camouflage pattern webbing shall reproduce the standard sample with respect to design, colors, and registration of the respective areas. The pattern of the webbing shall match the pattern on the specified drawing for the Universal Camouflage, 2-1-1516, 2-1-2240, and 2-1-2519.

3.2.6.2 Shade Execution, Webbing. The shade of each individual color shall match the colors outlined in the Universal Camouflage standard for the Duck Cloth, Textured Nylon, Universal Pattern, MIL-C-43734 Class 7 Type III.

3.2.6.3 Matching, Webbing. The color of the webbing shall match the Universal Camouflage IOTV outer shell standard sample when viewed under filtered tungsten lamp which approximates artificial daylight having a correlated color temperature of 7500+/- 200K, with illumination of 100 +/- 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 +/- 200 K.

3.2.7 Elastic. Elastic shall be heat cut smooth with no burrs or residual melt. Elastic shall conform to the following requirements.

- a) 1 inch; width – 1 inch  $\pm$ .0625, warp – textured polyester 150/2, filler – textured polyester 150/1, rubber – natural rubber, thickness - .060-.095, stretch – 100%  $\pm$ 10%. Color: Foliage Green 504.
- b) 1 1/2 inch; width – 1 1/2 inch  $\pm$ .125, warp – textured polyester 150/2, filler – textured polyester 150/1, rubber – natural rubber, thickness - .055-.085, stretch – 100%  $\pm$ 10%. Color: Optional.
- c) 4 inch; width – 4 inch  $\pm$ .060, construction – knitted, warp – textured polyester 150/1, filler – textured polyester 750d total, rubber – natural or equivalent, rubber strands – 60, thickness - .040-.045, picks per inch – 50  $\pm$ 4, stretch – 110%  $\pm$ 15%. Color: Foliage Green 504.

3.2.8 Fasteners, Hook, and Loop. Hook and loop fasteners shall conform to A-A-55126, Type II, Class 1, in 1.0", 1.5", 2.0", and 4.0" widths. Color: Foliage Green 504.

3.2.9 Foam. The foam (located within the yoke) shall be closed cell with the properties specified in Table II when tested as specified in ASTM D-3575. The foam shall be sandwiched between the ballistic filler. Color: Natural.

**Table II. Foam Characteristics**

Characteristic	Requirement
Density	3.6 – 7.3 lb/cu.ft
Thickness	0.125 inch
Compression Strength @ 25% deflection	10 psi
@ 50% deflection	20 psi
Elongation at Break	150% (min)
Tear Resistance	17 lb/inch (min)
Water Absorption of Surface	0.04 lb/sq ft (max.)

3.2.10 Snap Fasteners. Snap fasteners shall conform to MS27980, style 2, hard action. The snap fasteners shall have a black chemical finish, except that the button cap shell shall have a Foliage Green 504 enamel finish. The enamel shall be uniformly coated over the top surface of the shell including the visible portion of the edge. The enamel shall be capable of withstanding attachment operations without removal of any enamel. The enamel coating shall be smooth and free of sags, runs, and streaks (see 4.5).

3.2.11 Polyethylene. 0.045 ±.005 inches thick, high density. Color: Natural.

3.2.12 Cable. 3/32 Galvanized 7x7 aircraft cable coated to 5/32 +.006/-.0 with natural nylon or 3/32 Galvanized 7x7 aircraft cable coated to .165 +/- .006 with natural nylon.

3.2.13 Cable Sleeves. 5/32 copper sleeves.

3.2.14 Thread. Thread, Nylon, Bonded, Size E (Tex 76) or Size F (Tex 112), V-T-295, Type II, Class A as required. Color: Foliage Green 504.

3.2.15 Coated Fabric. Hypalon Coated Nylon, 16 osy, Reeves Air Safety Products, or equal. Color: Foliage Green 504.

3.2.16 Ladderloc. Trovato, 1" TLL, ITW P/N 154-0100-5676, or equal. Color: Foliage Green 504. Spectral reflectance requirements shall be in accordance with para. 3.4.6 Tables V-B when tested in accordance with Para 4.5.10.

3.2.17 Ring. Rectangular, 1" X 1/2" X .150, Steel, Zinc, Welded. Color: Foliage Green 504.

3.2.18 Loop. 1 1/8" X 3/16" X .120, Steel, Zinc, Welded. Color: Foliage Green 504.



3.2.19 Slide. 25mm, Steel, Zinc, ITW P/N 08090-22-21884, or equal. Color: Foliage Green 504.

3.2.20 Slide. Tri/Glide, Bowed, 2", Steel, ITW P/N 09148-22-21884, or equal. Color: Foliage Green 504.

3.2.21 Slide. 2" X .104, Steel, ITW P/N 00022-22, or equal. Color: Foliage Green 504

3.2.22 Grommet. Plain, brass, black oxide, NASM16491, size 0, type I, class 3

3.2.23 Washer. Plain, brass, black oxide, NASM16491, size 0, type I, class 3

3.3 Design. The Body armor, multiple threat model dismantled system is a modular vest protecting the upper torso from multiple ballistic threats which is easily configured to defeat predicted mission threat at a minimum system weight. The IOTV subsystem (see 3.5) consists of (1) One base vest assembly made up of a camouflage outershell base vest carrier with a ballistic insert set made up of removable ballistic (back and front) inserts, (2) One yoke and collar assembly made up of one each front and back yoke and collar carrier assemblies with a ballistic insert set made up of ballistic inserts (collar ballistic narrow back panels are removable), (3) One groin protector assembly made up of a groin protector carrier with a removable ballistic insert, (4) One lower back protector assembly made up of a lower pack protector carrier with a removable ballistic insert, and (5) One deltoid protector. Components are all attached to the IOTV. The IOTV provides protection from conventional fragmenting munitions and multiple hits from 9mm handgun rounds. The SAPI, ISAPI, ESAPI or XSAPI subsystem consists of a set of interchangeable, sized, and contoured plates inserted into front and back pockets inside the IOTV carrier to provide vital organs protection against multi-hits of small arms rifle bullets and indirect fire flechettes. The ESBI subsystem consists of a set of interchangeable, contoured plates inserted into left and right side pockets of the IOTV carrier. Webbing hanger attachments on the front of the IOTV outershell carrier accommodate limited load carrying compatible with MOLLE modular load bearing vest pockets. The variants of Body armor, multiple threat modular system configurations follow below. Recommended enhancements are encouraged to improve its operational effectiveness and manufacturability (see 4.4).

- a) IOTV base vest only; which does not include any of the front and back yoke and collar, groin protector, lower back protector, deltoid protector or SAPI, ISAPI, ESAPI or XSAPI modular components.
- b) IOTV base vest with one or more, or all of the modular components; front and back yoke and collar, groin protector, lower back protector, deltoid protector and/or one or two SAPI, ISAPI, ESAPI, or XSAPI
- c) IOTV base vest with none, some, or all modular components and limited load carriage using MOLLE pockets.

3.3.1 Patterns. The Government shall furnish patterns for the baseline design from which the contractor can use applicable parts to create cutting working patterns. Compliance with patterns

is needed to meet interface requirements with fielded personnel combat equipment. The working patterns shall include the size, directional lines, placement marks, notches, and provided seam allowances. Baseline patterns require a 3/8" seam allowance +/-1/16" unless otherwise stated on patterns. Except for the ballistic panels, all the components of the vest shall be cut with a tolerance of +/- 1/16" in accordance with the pattern parts indicated except where changes or enhancement(s) to baseline are proposed. The ballistic panels shall be cut with a tolerance of -1/16"/+1/8" to ensure maximum protective area of coverage is achieved (see 3.5 Table VI-B). Drill holes are not permitted.

3.3.1.1 Base Vest and Components Carrier Outer Shell Camouflage.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Front Outer Shell	F OUT SH	1 Face Up
2.	Front Pocket	F PK	1 Pair
3.	Front Flap	F FL	1 Face Up
4.	Front Channel Cover	F CH CVR	1 Pair
5.	Front Right Shoulder Cover	F R SHD CVR	1 Face Up
6.	Front Left Shoulder Cover Top	F L SHD CVR TP	1 Face Up
7.	Front Left Shoulder Cover Bottom	F L SHD CVR BT	1 Face Up
8.	Front Release Handle Cover	F RL HN CVR	1 Face Up
9.	Back Outer Shell	B OUT SH	1 Face Up
10.	Back Upper Flap	B UP FL	1 Face Up
11.	Back Center Flap	B CTR FL	1 Face Up
12.	Back Shoulder Cover	B SHD CVR	1 Pair
13.	Back Channel Cover	B CH CVR	1 Pair
14.	Side Plate Carrier	SPC	1 Pair
15.	Side Plate Carrier Plate Pocket Cap Top	SPC P PK C TP	1 Pair
16.	Side Plate Carrier Plate Pocket Flap	SPC P PK FL	1 Pair
17.	Side Plate Carrier Plate Pocket Outer Cap	SPC P PK OUT C	1 Pair
18.	Collar Front Outer Shell	CLR F OUT SH	1 Face Up
19.	Collar Back Outer Shell	CLR B OUT SH	1 Pair
20.	Lower Back Protector Outer Shell	LBP OUT SH	1 Face Up
21.	Lower Back Protector Overlay	LBP OVLY	1 Face Up
22.	Groin Protector Outer Shell	GP OUT SH	1 Face Up
23.	Groin Protector Inner Shell	GP IN SH	1 Face Up
24.	Deltoid Outer Shell, Upper Inner	DLT UP IN	1 Face Up
25.	Deltoid Outer Shell, Lower Inner	DLT LW IN	1 Face Up
26.	Deltoid Outer Shell	DLT OUT SH	1 Face Up
27.	Deltoid Arm Strap Channel	DLT CHNL	1 Face Up

3.3.1.2 Base Vest and Components Carrier Shell Foliage Green 504.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Front Flap Pocket	F FL PK	1 Face Up
2.	Front Inside Plate Pocket	F IN P PK	1 Face Up
3.	Back Inside Plate Pocket	B IN P PK	1 Face Up

4.	Back Center Flap Inside Pocket	B CTR FL IN PK	1 Face Up
5.	Back Center Flap Pocket	B CTR FL PK	1 Face Up
6.	Side Plate Carrier Plate Pocket	SPC P PK	1 Pair
7.	Side Plate Carrier Plate Pocket Inner Cap	SPC P PK IN C	1 Pair
8.	Side Plate Carrier Stiffener Cover	SPC STF CVR	1 Pair
9.	Internal Elastic Band Outer Cover	IEB OUT CVR	1 Pair
10.	Internal Elastic Band Inner Cover	IEB IN CVR	1 Pair
11.	Yoke Front Outer Shell	YK F OUT SH	1 Face Up
12.	Yoke Front Inner Shell	YK F IN SH	1 Face Up
13.	Yoke Back Outer Shell	YK B OUT SH	1 Face Up

3.3.1.3 Base Vest Carrier Inner Shell.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Front Inner Shell Upper	F IN SH UP	1 Face Up
2.	Front Inner Shell Lower	F IN SH LWR	1 Face Up
3.	Front Inner Shell Side	F IN SH S	1 Pair
4.	Back Inner Shell Upper	B IN SH UP	1 Face Up
5.	Back Inner Shell Lower	B IN SH LWR	1 Face Up
6.	Back Inner Shell Side	B IN SH S	1 Pair
7.	Lower Back Protector Inner Shell Upper	LBP IN SH UP	1 Face Up
8.	Lower Back Protector Inner Shell Lower	LBP IN SH LWR	1 Face Up

3.3.1.4 Collar Material.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Collar Front Inner Shell	CLR F IN SH	1 Face Up
2.	Collar Back Inner Shell Small	CLR B IN SH SM	1 Pair
3.	Collar Back Inner Shell Large	CLR B IN SH LG	1 Pair

3.3.1.5 Spacer mesh.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Yoke Back Inner Shell	YK B IN SH	1 Face Up

3.3.1.6 Ballistic Panel Cover.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Front Ballistic Cover Outer	F BL CVR OUT	1 Face Up
2.	Front Ballistic Cover Inner	F BL CVR IN	1 Face Up
3.	Back Ballistic Cover Outer	B BL CVR OUT	1 Face Up
4.	Back Ballistic Cover Inner	B BL CVR IN	1 Face Up
5.	Collar Back Ballistic Cover Outer	CLR B BL CVROUT	1 Pair
6.	Collar Back Ballistic Cover Inner	CLR B BL CVR IN	1 Pair
7.	Lower Back Protector Ballistic Cover Outer	LBP BL CVR OUT	1 Face Up
8.	Lower Back Protector Ballistic Cover Inner	LBP BL CVR IN	1 Face Up

9.	Groin Protector Ballistic Cover Outer	GP BL CVR OUT	1 Face Up
10.	Groin Protector Ballistic Cover Inner	GP BL CVR IN	1 Face Up
11.	Deltoid Protector Ballistic Cover Outer	DLT BL CVR OUT	1 Face Up
12.	Deltoid Protector Ballistic Cover Inner	DLT BL CVR IN	1 Face Up

3.3.1.7 Ballistic Panel. (Number of Ply Dependent on Proposed Material System)

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Front Ballistic	F BL	1
2.	Back Ballistic	B BL	1
3.	Collar Front Ballistic Narrow	CLR F BL NR	1
4.	Collar Front Ballistic Wide	CLR F BL WD	1
5.	Collar Back Ballistic Narrow	CLR B BL NR	1 Pair
6.	Collar Back Ballistic Wide	CLR B BL WD	1 Pair
7.	Yoke Front Ballistic	YK F BL	1
8.	Yoke Back Ballistic	YK B BL	1
9.	Lower Back Protector Ballistic	LBP BL	1
10.	Groin Protector Ballistic	GP BL	1
11.	Deltoid Protector Ballistic	DLT BL	1

3.3.1.8 Foam.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Yoke Front Foam	YK F FM	1

3.3.1.9 Polyethylene.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Side Plate Carrier Stiffener	SPC STF	1Pair

3.3.1.10 Coated Fabric.

<b>Item</b>	<b>Nomenclature</b>	<b>Computer Nomenclature</b>	<b>Cut</b>
1.	Cable Handle Overlay	CBL HN OVLY	1 Face Up

3.3.1.11 Templates.

<b>Item</b>	<b>Nomenclature</b>
1.	Front and Back Center Flap Strap
2.	Front and Back Inner Plate Pocket Strap
3.	Front Left Shoulder Strap, Narrow
4.	Front Left Shoulder Hook, Long Strap
5.	Front Left Shoulder Hook, Short Strap
6.	Front Right Shoulder Cover Cable Guide
7.	Front Bartacks
8.	Front Flap Bartacks

- 9. Back Drag Strap
- 10. Back Upper Release Loop
- 11. Back Flap Bartacks
- 12. Side Plate Carrier Bartacks
- 13. Internal Elastic Band Metal Loop and Slide Assembly
- 14. Yoke Front and Back Strap, Narrow
- 15. Yoke Front Strap, Wide
- 16. Lower Back Protector Strap
- 17. Lower Back Protector Overlay Bartacks
- 18. Groin Protector Strap
- 19. Cable Assembly Handle
- 20. Shoulder Attachment Assembly
- 21. Cable Stop Tab

3.3.1.12 Fastener Tape, Hook and Loop, A-A-55126.

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>
1.	1" Hook	Pieces are per pattern marking
2.	1 1/2" Hook	Pieces are per pattern marking
3.	2" Hook	Pieces are per pattern marking
4.	4" Hook	Pieces are per pattern marking
5.	1" Loop	Pieces are per pattern marking
6.	1 1/2" Loop	Pieces are per pattern marking
7.	2" Loop	Pieces are per pattern marking
8.	4" Loop	Pieces are per pattern marking

3.3.1.13 Tape, 1" Binding, MIL-PRF-5038

<b>Item</b>	<b>Nomenclature</b>	<b>Usage as Required</b>
1.	Front Right and Left Channel Cover Bottom Edge	
2.	Front Right Shoulder Cover Top Edge	
3.	Front Top Left Shoulder Cover Top Edge	
4.	Front Bottom Left Shoulder Cover Top Edge	
5.	Front Flap Edge	
6.	Front Flap Pocket Bottom Edge	
7.	Front Plate Pocket Top and Bottom Edge	
8.	Front Right and Left Side Pocket Top Edge	
9.	Back Right and Left Shoulder Cover Top and Bottom Edge	
10.	Back Upper Flap Edge	
11.	Back Center Flap Edge	
12.	Back Right and Left Channel Cover Inside Edge	
13.	Back Flap Pocket Bottom Edge	
14.	Back Inside Plate Pocket Top and Bottom Edge	
15.	Side Plate Carrier Edge	
16.	Side Plate Carrier Right and Left Plate Pocket Flap Outer Edge	
17.	Side Plate Carrier Right and Left Plate Pocket Top and Bottom Edge	

- 18. Side Plate Carrier Right and Left Inner Cap Bottom Edge
- 19. Yoke Back Outside and Inside Edge
- 20. Yoke Front Outside and Inside Edge
- 21. Lower Back Protector Edge
- 22. Lower Back Protector Overlay Ends

3.3.1.14 Webbing, 3/4" MIL-W-17337.

Item	Nomenclature	Cut	Qty
1.	Side Plate Carrier Handles	8 1/2	2

3.3.1.15 Webbing 1.0", MIL-W-11737.

Item	Nomenclature	Cut	Qty
1.	Back Upper Release Loops	5 1/4	2
2.	Back Lower Release Loops	5 1/4	2
3.	Back Middle Release Loop	7	1
4.	Back Cable Channel	3	1
5.	Back Cable Channels	4	2

3.3.1.16 Webbing 1.0", A-A-55301, Universal Camouflage.

Item	Nomenclature	Cut
1.	Front	Pieces are per pattern marking
2.	Front Flap	Pieces are per pattern marking
3.	Back Center Flap	Pieces are per pattern marking
4.	Side Plate Carrier	Pieces are per pattern marking
5.	Lower Back Protector Overlay	Pieces are per pattern marking
6.	Deltoid Protector Outershell	Pieces are per pattern marking

3.3.1.17 Webbing 1.0", A-A-55301, Foliage Green.

Item	Nomenclature	Cut	Qty
1.	Front Inner Yoke Attachment	3	4
2.	Front Inner Yoke Attachment	3 1/2	2
3.	Front Inner Groin Attachment	3	2
4.	Front Left Shoulder Snap Closure	2	1
5.	Front Left Shoulder Snap Strap	7 1/2	1
6.	Front and Back Center Flap Closures	8	2
7.	Back Inner Yoke Attachment	3	4
8.	Back Inner Lower Back Attachment	3	2
9.	Back Drag Strap	19 1/4	1
10.	Back Retention Handle	3 1/4	1
11.	Back Upper Loop With Ring	4 1/4	2
12.	Side Plate Carrier Right and Left	25 1/2 w/Angle	4
13.	Side Plate Carrier Flap Closure	5	2

14.	Side Plate Carrier Pocket Closure	8 w/Angle	2
15.	Internal Elastic Band Strap	12 w/Angle	2
16.	Internal Elastic Band Keeper	2 1/2	2
17.	Yoke/Collar Assembly Front and Back Attachment	3	4
18.	Yoke/Collar Assembly Front and Back Strap	7 1/4 w/Angle	4
19.	Lower Back Protector Strap	9 3/4	2
20.	Groin Protector Strap	9	2
21.	Cable Assembly Handle	13	1

3.3.1.18 Webbing 1.5", MIL-W-17337.

<b>I Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Front Right Shoulder Cover Cable Cover Guide	4 1/2	1
2.	Front Right Shoulder Cover Cable Cover Guide	5 1/8	1

3.3.1.19 Webbing 2.0", 100% Nylon

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Front Right Shoulder Strap	16 w/Angle	1
2.	Front Left Shoulder Strap, Long	15	1

3.3.1.20 Webbing 2.0", MIL-W-17337.

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Front and Back Inside Plate Pockets	12	2
2.	Back Inside Drag Strap Reinforcement	8 1/2	1
3.	Yoke/Collar Assembly Front Inner	4 1/2	2
4.	Front Left Shoulder Strap, Short	5	1

3.3.1.21 Webbing 3.0", MIL-W-17337.

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Internal Elastic Band Channel Covers	6	2

3.3.1.22 Elastic 1.0".

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Side Plate Carrier Elastic Keepers	3	4

3.3.1.23 Elastic 4".

<b>Item</b>	<b>Nomenclature</b>	<b>Cut</b>	<b>Qty</b>
1.	Internal Elastic Bands		
	X-Small to Small	10	2
	Medium to Large long	13	2
	X-Large to 2 X-Large	16	2
	3 X-Large to 4 X-Large	19	2

3.3.1.24 Elastic 1 1/2".

Item	Nomenclature	Cut	Qty
1.	Back Channel Cover	7	2

3.3.1.25 Cable.

Item	Nomenclature	Cut	Qty
1.	Cable, total length		
	X-Small to Small	60	1
	Medium to Large long	62	1
	X-Large to X-Large Long	64	1
	2 X-Large to 4 X-Large	66	1

3.4 Multiple Threat Body Armor System Performance Requirements. The following requirements apply to all components and subcomponents of the multiple threat body armor system in any of its potential configurations in accordance with paragraph 3.3.

3.4.1 Functional Integration. All Body armor, multiple threat components shall be integrated for functional and physical interfaces for any Body armor, multiple threat system configuration. All components within a size shall be fully interchangeable with every other system of the same size (i.e. back ballistic panel will fit into any IOTV outer shell back of same size) with no degradation of performance. Any configuration of Body armor, multiple threat in accordance with paragraph 3.3 shall be functionally integrated with any configuration of MOLLE (see 4.4).

3.4.2 Fungus Resistance. All components and parts of the body armor shall not support fungus growth. The visual grade rating shall be 0. All components shall neither support fungus growth nor experience damage due to the presence of fungus spores or adjacent fungus growth (see paragraph 4.5.9)

3.4.3 Individual Repairs. The Table III depicts spares requirements, based on a Company of 150 soldiers.

**Table III. Individual Repairs**

Qty/kit	Description
25	Ladderloc: Buckles used on back panel, Foliage Green
25	Shoulder Attachment Assemblies
10	Cable Assembly - X-Small to Small
10	Cable Assembly – Medium to Large Long
10	Cable Assembly – X-Large to X-Large Long
10	Cable Assembly – 2X-Large to 4X-Large
25	Loop, 1 1/8" X 3/16" X .120, Foliage Green
25	Slide, 25MM, Foliage Green
25	Slide, Tri/Glide, Bowed, 2", Foliage Green
40	Cable Stop Tabs



3.4.4 Use and Care Instruction. An instruction pamphlet will be furnished with each body armor system. The instruction pamphlet will be printed on a durable man made, synthetic paper capable of multiple time use under harsh field conditions.

3.4.5 Camouflage. Table IV outlines the camouflage for multi terrain environment; disruptive patterns and solids, for applicable components to reduce visual and infrared (both near and far IR) signature to an acceptable level (see 4.5.10).

**Table IV. Camouflage Shades**

<b>COMPONENT(S) OR PART(S)</b>	<b>UNIVERSAL</b>
(1) Outer Shell: Base Vest Collar Throat Protector Groin Protector Deltoid Protector	3 Color Pattern: Desert Sand 503 – Ground Shade Foliage Green 502 Urban Gray 501
(2) Base Vest Inner Lining	Foliage Green 504
(3) Ballistic Panel Cover MiL-DTL-508	Foliage Green 504
(4) Webbing Binding Tape Hook & Loop Fastener Thread Labels	Universal Camouflage Pattern* Foliage Green 504* Tan 380 or Desert Sand 503*
(5) Hardware Buckles Snaps	Foliage Green 504

\*As specified in sections 3.2.6 and 3.3.1

3.4.6 Infrared Reflectance. The infrared reflectance for finished components and subcomponents specified in 3.4.5 shall conform to the requirements specified in Tables V-A, B, & C initially and after laundering when tested as specified in 4.5.10. Acetal hardware shall conform to infrared reflectance requirements in Table V-D.

**Table V-A. Infrared Reflectance Requirements (percent) Universal Camouflage**

<b>Wavelengths</b>	<b>Desert Sand 500</b>		<b>Urban Gray 501</b>		<b>Foliage Green 502</b>	
	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>
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 V-B. Infrared Reflectance Requirements (percent) Foliage Green 504**

<b>Wavelengths Nanometers (nm)</b>	<b>Min</b>	<b>Max</b>
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

**Table V-C. Infrared Reflectance Requirements (percent) Tan 380 and Desert Sand 503**

<b>Wavelengths Nanometers (nm)</b>	<b>Tan 380</b>		<b>Desert Sand 503</b>	
	<b>Min</b>	<b>Max</b>	<b>Min</b>	<b>Max</b>
600	28	40	28	40
620	30	42	30	42
640	32	48	34	48
660	34	54	38	56
680	40	58	44	60
700	42	60	46	66
720	42	60	48	68
740	44	62	48	72
760	44	62	50	74
780	46	64	54	76
800	48	64	54	76

820	48	64	54	76
840	48	64	56	78
860	50	66	56	78

**Table V-D. Infrared spectral reflectance requirements for Foliage Green 504 Acetal Hardware**

Wavelengths Nanometers (nm)	Min	Max
600	8	18
620	8	18
640	8	18
660	10	26
680	10	26
700	12	28
720	20	36
740	26	40
760	30	52
780	32	56
800	32	60
820	34	60
840	36	60
860	36	60

3.4.7 Matching. The cloths shall match the standard (see 4.5.14).

3.4.8 Pattern Execution. The pattern of the finished Universal Camouflage pattern cloth shall reproduce the standard sample with respect to design, colors, and registration of the respective areas. The pattern repeat of the universal pattern shall be 27.25” +1.25/-2.50”, when tested as specified in 4.1. Solid shades shall demonstrate level dyeing uniformity. The pattern of the cloth shall match the pattern on the specified drawing for universal camouflage.

3.4.9 Colorfastness Universal Camouflage. The printed finished cloth shall show fastness to laundering (after 3 cycles), light (after 40 standard fading hours or 170 kilojoules), and perspiration equal to or better than the standard sample or 3-4 of the AATCC Gray Scale for Color Change and Color Transfer for each of the pattern areas, except fastness to light shall be equal to or better than a rating of 3 for Color Change. The finished cloth shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating of not lower than 3-4 for all the pattern areas. The finished textile components shall meet the colorfastness requirements when tested as specified in 4.5 Table XIII.

3.5 Improved Outer Tactical Vest (IOTV) subsystem. See paragraph 3.3 for IOTV configuration. The maximum finished weight of the IOTV subsystem components for each size is outlined in Table VI-A when tested as specified in 4.5.7. The minimum area of ballistic coverage for each ballistic panel subcomponent in each size is outlined in Table VI-B when

tested as specified in 4.5.3. Finished base vest measurements for each size are outlined in Table VI-C when tested as specified in 4.5.2.

**Table VI-A: Maximum Finished IOTV Weights; Lbs.**

<b>Finished Component</b>	<b>X-Small</b>	<b>Small</b>	<b>Medium</b>	<b>Medium-Long</b>	<b>Large</b>	<b>Large-Long</b>	<b>X-Large</b>	<b>X-Large-Long</b>	<b>2X-Large</b>	<b>3X-Large</b>	<b>4X-Large</b>
Base Vest Assembly: Outer Base Vest Carrier & 2 Ballistic Panels	9.01	9.33	9.86	10.60	10.97	11.24	11.98	12.51	13.52	15.80	16.17
Front Yoke and Collar Assembly: Carrier and 2 Panels	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56	0.56
Back Yoke and Collar Assembly: One Size Carrier and 2 Panels	0.80	0.83	0.88	0.88	0.91	0.91	0.96	0.96	1.02	1.17	1.17
Groin Protector Assembly: 2 Sizes; Carrier and 1 Panel	0.72	0.72	0.72	0.72	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Lower Back (Kidney) Assembly; One Size Carrier and 1 Panel	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Deltoid Protector: Three Sizes	1.00	1.00	1.20	1.20	1.20	1.20	1.45	1.45	1.45	1.45	1.45
<b>Total System</b>	<b>13.76</b>	<b>14.11</b>	<b>15.09</b>	<b>15.83</b>	<b>16.38</b>	<b>16.65</b>	<b>17.94</b>	<b>18.47</b>	<b>19.54</b>	<b>21.97</b>	<b>22.34</b>

**TABLE VI-B: Minimum Ballistic Panel Area; Sq. In.**

Ballistic Panel	X-Small	Small	Medium	Medium-Long	Large	Large-Long	X-Large	X-Large-Long	2X Large	3X Large	4X Large
Front Panel	305	325	354	379	401	428	444	479	543	610	680
Back Panel	310	333	370	395	415	442	458	495	555	621	689
Back Collar Wide	24	25	26	26	28	28	30	30	31	33	35
Back Collar Narrow.	15	15	16	16	18	18	19	19	20	21	22
Back Yoke	82	86	90	90	94	94	101	101	106	111	109
Front Collar Wide	27	27	27	27	27	27	27	27	27	27	27
Front Collar Narrow	17	17	17	17	17	17	17	17	17	17	17
Front Yoke	57	57	57	57	57	57	57	57	57	57	57
Groin Panel	69	69	69	69	85	85	85	85	85	85	85
Lower Back Panel	52	52	52	52	52	52	52	52	52	52	52
Deltoid Protector	85	85	106	106	106	106	130	130	130	130	130

**TABLE VI-C: IOTV Finished Measurements; Inches\***

Size	Center Front Length +/- 1/2"	Front Width +/- 1/2"	Center Back Length +/- 1/2"	Back Width +/- 1/2"
<b>X-Small</b>	17 1/4	25 1/8	18 3/4	24 3/8
<b>Small Regular</b>	17 1/2	26 1/8	19	25 1/4
<b>Medium Regular</b>	18	27 1/8	19 1/2	27 1/4
<b>Medium-Long</b>	19	27 1/4	20 1/2	27 1/4
<b>Large Regular</b>	18 3/4	29 1/8	20 1/4	29 1/4
<b>Large-Long</b>	19 3/4	29 1/8	21 1/4	29 3/8
<b>X-Large Regular</b>	19 1/2	31 1/8	21	31 1/4
<b>X-Large-Long</b>	20 1/2	31 1/8	22	31 3/8
<b>2X-Large</b>	21 1/2	33	23	33 3/8
<b>3X-Large</b>	22 1/2	34 7/8	24	35 3/8
<b>4X-Large</b>	23 1/2	36 7/8	25	37 1/2

\* See Para. 4.5.2.1 for measurement directions.

3.5.1 Ballistic Protection Levels. The Body armor, multiple threat protection levels follow (see 4.1, 4.4, & 4.6):

- a) IOTV provides fragmentation protection from conventional fragmenting munitions (see paragraph 3.5.2.2).
- b) IOTV provides multi-hit handgun bullet protection for 9mm, 124 gr., Full Metal Jacket (FMJ) Remington projectile (see paragraph 3.5.2.3).
- c) IOTV and SAPI (see 3.7) together provide multi-hit small arms bullet protection from:
  - (1) NATO 7.62 x 51 mm M-80 Ball.
  - (2) Soviet 7.62 mm x 54 R Ball Type LPS
  - (3) U.S. 5.56 mm M855 Ball.
- d) IOTV and ISAPI (3.7) together provide multi-hit small arms bullet protection from
  - (1) NATO 7.62 x 51 mm M-80 Ball.
  - (2) Soviet 7.62 mm x 54 R Ball Type LPS
  - (3) U.S. 5.56 mm M855 Ball.
  - (4) 7.62 x 39 mm API (Russian BZ and Chinese Type 56)
- e) IOTV and ESAPI (3.7) together provide multi-hit small arms bullet protection from
  - (1) NATO 7.62 x 51 mm M-80 Ball.
  - (2) Soviet 7.62 mm x 54 R Ball Type LPS
  - (3) U.S. 5.56 mm M855 Ball.
  - (4) 7.62mm x 63 APM 2
- f) IOTV and XSAPI - classified

3.5.2 Ballistic Performance. The IOTV ballistic material system consists of an outershell, ballistic panel, and an outershell inner lining to accomplish the ballistic characteristics specified in paragraphs 3.5.2.2, 3.5.2.2.1, and 3.5.2.3 as tested in paragraph 4.6.

3.5.2.1 Removable Ballistic Panel Subcomponent. Ballistic panels must be able to be inserted easily into IOTV outershell carriers; collar assembly, lower back protector, and groin protector. The ballistic panels shall provide a means to prevent raveling and soiling, and to secure placement properly within the outershell carrier. The gap/ease between outershell carrier and panel shall be no greater than the ease allowed within the baseline patterns (see 4.5.1).

3.5.2.1.1 Ballistic filler. The ballistic filler weight shall not exceed 1.1 lb sq/ft with a maximum 0.30 inch thickness when tested as specified in 4.5.7 and 4.5.8. Except for ancillary components such as thread, the ballistic filler shall be made entirely of ballistic material. If ballistic filler is non-contiguous, it is required a minimum 1", feathered overlap be achieved when fully extended during individual movements to maintain uniform ballistic protection.

3.5.2.1.2 Flexibility. The ballistic filler stiffness shall not exceed 225 cm-g when tested as specified in 4.6.

3.5.2.1.3 Abrasion Resistance. Any adjacent layers within the ballistic material system shall demonstrate abrasion resistance against each other for a minimum of 2,000 cycles with no broken surface characteristic or delamination of abraded area when tested as specified in 4.5 Table XIII. This requirement applies to interfacing layers of a homogenous filler, any two adjacent layers of different materials if a hybrid filler is used and filler layer in contact with panel cover, etc.

3.5.2.2 IOTV Fragmentation Protection. The ballistic material system (see 3.5.2) shall provide consistent ballistic performance. Table VII requires the minimum V50 values for base vest assembly, yoke and collar assemblies, lower back protector, groin protector, and deltoid protector at specified obliquity when tested with the Right Circular Cylinder (RCC) dry and wet (sea water).

Table VII specifies minimum ballistic performance that shall be maintained after conditioning to hot and cold temperature, accelerated aging and POL contamination. Testing is specified in 4.5. Any change in the IOTV area of coverage must meet minimum casualty reduction potential of the approved system coverage (see 3.5, Table VI-B) and V50 performance (see Table VII) stated herein. Any product improvements in the ballistic performance of the IOTV base vest panels shall not reduce the ballistic performance of the Body armor, multiple threat system small arms protection of base vest and SAPI when tested as specified in SAPI/ISAPI/ESAPI/XSAPI performance requirements (see 2.2).

**Table VII: Base Vest assembly, Groin, Collar, Lower Back, Deltoid Fragmentation Protection; Minimum V50**

<b>Fragment Projectile</b>	<b>V50 @ 0 degree DRY: ft/sec</b>	<b>V50 @ 0 degree WET: ft/sec</b>	<b>V50 @ 45 degree DRY: ft/sec</b>
2 gr. RCC	2710	2575	2800
4 gr. RCC	2400	2300	2460
16 gr. RCC	2050	1920	2080
64 gr. RCC	1660	1610	1660
16 gr. RCC; After hot and cold temperatures, accelerated aging After POL	2000 1900	N/A	N/A

3.5.2.2.1 Yoke Fragmentation Protection. Additional ballistic filler sandwiched in the yoke carrier of outershell and lining shall not exceed 0.40 lb./sq. ft (max.) and 0.10 inch thickness (max.). The minimum V50 is outlined in Table VIII.

**Table VIII. Yoke Area Ballistic Performance; Minimum V50**

<b>Fragment Projectile</b>	<b>V50 @ 0 degree DRY: ft/sec</b>	<b>V50 @ 0 degree WET: ft/sec</b>	<b>V50 @ 45 degree DRY: ft/sec</b>
2 gr. RCC	3080	3000	3350
4 gr. RCC	2700	2550	2800
16 gr. RCC	2280	2150	2330
64 gr. RCC	1800	1700	1900

3.5.2.3 Handgun Protection. The ballistic material system shall be engineered to provide handgun protection at no added weight to the fragmentation material system. Table IX outlines the ballistic material system minimum dry V50, and V0 acceptance for the 9mm, 124 gr., FMJ Remington projectile against 3 hits at 0 degree obliquity and 2 hits at 30 degree obliquity with maximum deformation when tested as specified in 4.6. Desired 9mm performance is required at no added material weight.

**Table IX: Handgun Ballistic Characteristics**

<b>Projectile - 9mm, 124 gr., FMJ Remington</b>	<b>V50 @ 0 degree; ft/sec (min.)</b>	<b>V0 Acceptance; @ 0 &amp; 30 degree ft/sec</b>	<b>Deformation; in (max.)</b>
Required	1525	1400 +50/-0	1.73
Desired	1625	1500 +50/-0	1.73

3.5.3 IOTV Construction. The exterior of the system shall be edge stitched approximately 1/8 inch from all edges EXCEPT front edge contacting the neck area of the individual (see 6.4) and the back starting at the beginning of the shoulder flap continuing around the neck line to the other shoulder flap end. All stitching shall be back-tacked to prevent raveling and demonstrate good stitching quality with no loose ends, consistent stitches per inch, even tension with no loose needle or bobbin thread. Fabric edges shall not ravel.

3.5.3.1 Hook and Loop Fastener. Hook and loop fasteners shall not be stitched in the selvage edge to prevent associated fraying durability problems in repeated use (see 4.5).

3.5.3.2 Stitching. Stitching shall conform to ASTM D-6193, 9-10 stitches per inch. End of seams and stitches (stitch type 301) that are not caught in other seams or stitching shall be securely back tacked or back stitched. Thread breaks or bobbin run-outs occurring during sewing shall be secured by stitching back of the break minimum of 1/2 inch. Thread tension shall be maintained so that there will be no loose stitching resulting in loose bobbin or top thread, or excessively high stitching resulting in puckering of the materials sewn. Thread ends shall be trimmed to a length of not more than 1/4 inch.

3.5.3.3 Automatic Stitching. Automatic stitching machines may be used to perform any of the stitching patterns provided the requirements for the stitch pattern, stitches per inch, size and type



of thread are met, and at least three or more tying, overlapping, or back stitches are used to secure the ends of the stitching.

3.5.3.4 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. Bartack requirements are specified in Table X when tested as specified in 4.5.

**Table X. Bartack**

<b>Characteristic</b>	<b>Stress points; All cloth</b>	<b>Webbing hangers; Webbing + cloth</b>
Length; in	3/8" min	3/4 " +/- 1/16"
Holding Strength: lb. (min.)	60	250

3.5.3.5 Bartack Alignment for MOLLE Pocket Attachment. The required spacing of vertical bartacks is specified below which is needed for physical compatibility of MOLLE pocket attachment on IOTV base vest.

- a) Distance between vertical bartacks on horizontal webbing shall be 1 1/2" – 0/+1/16".
- b) Distance between horizontal webbing shall be 1" -0/+1/8".
- c) Vertical bartacks on consecutive horizontal webbing rows shall be vertical aligned bottom to top in a vertical straight line.

3.5.3.6 Buttonholes. Buttonholes shall be straight cut. Position in accordance with the marks indicated on the pattern, with the ends of the buttonholes securely tacked. All buttonholes will be 1 1/4" with a finished cut of 1" ± 1/16", except for the buttonholes in the back upper flap. The two buttonholes in the back upper flap will be 1 3/8" with a cut of 1 1/8" ± 1/16".

3.5.3.7 Snap setting. A hole shall be prepunched to receive the button and eyelet components of the snap fastener. The hole shall be smaller than the outside diameter of the button and eyelet barrels. The fastener shall be securely clinched without cutting the adjacent materials, and no splits shall occur in the button or eyelet barrels.

3.5.3.8 Drag Strap. The drag strap on the back of the IOTV carrier (all sizes) shall have a peak strength not less than 400 lbf (increased strength is desirable) when tested in accordance with para 4.8.

3.5.3.9 Release Cable. Ends of cable to be free of burrs, sharp edges and be sealed. Cable sleeve to be crimped to disallow movement of cable. The cable will be crimped in the cable sleeve to form a loop on one side two unequal lengths on the other side. The loop will be 1.25" tall, as measured from the edge of the sleeve. The lengths shall be measured from the end of the cable to the closest edge of the sleeve.

**Table XI. Release Cable**

<b>Vest Size</b>	<b>Short section</b>	<b>Long section</b>
X-Small to Small	24.75"	30.75"
Medium to Large long	25.75"	31.75"
X-Large to X-Large Long	26.75"	32.75"
2 X-Large to 4 X-Large	27.75"	33.75"

3.5.3.10 Snap Fastener Reinforcement. Snap reinforcement that will not ravel is required on any single fabric layer application.

3.5.3.11 Binding. All ends of binding not completely encased are to be seared.

3.5.3.12 IOTV Drainage. The IOTV shall provide a durable means to allow water in the vest to drain out quickly and easily.

3.5.3.13 Torso Adjustment. Torso adjustment shall be accomplished using both internal and external means to provide the wearer a means to easily secure the vest to the torso. The internal adjustment, located in front of the wearer, shall be a hook and loop type closure. The external adjustment, located behind the wearer, shall utilize a friction adjustment.

3.5.3.14 Emergency Release Mechanism. An emergency release mechanism shall be provided. The activator shall be located on the front (chest) portion of the vest and be capable of being operated with either hand, gloved or not. Upon activation of the mechanism, the vest shall separate into two distinct pieces (front and back); the front yoke and collar shall remain attached to the front piece.

3.6 Size, Identification, and Instruction Label. Labels will be readable under low light conditions; moonlight and red or blue filtered flashlight. The label shall be of sufficient strength to withstand repeated abrasion during field use and cleaning, and remain intact for a maximum of 15 years and include the following:

- (a) The IOTV base vest component and ballistic panel subcomponent shall have a combination size, identification, serial number, and ballistic protection level and instruction label for the entire IOTV system.

**Table XII. Chest Circumference for Base Vest Outershell Label**

<b>Size</b>	<b>Chest Circumference (Inches)</b>
X-Small	29-33
Small	33-37
Medium-Regular and Medium-Long	37-41
Large-Regular and Large-Long	41-45
X-Large-Regular and X-Large-Long	45-49
2-XLarge	49-53
3X-Large	53-57
4X-Large	57-61

(b) The instruction label shall include do's and don'ts for use and cleaning instructions, and donning/doffing instructions for the entire IOTV system.

(c) The instruction label shall be located on the inside of the back of the base vest. The size of the label shall be 4.5 inches wide by 7.75 inches high. The type shall be no smaller than 10 point and shall be in accordance with MIL-DTL-32075, Type VI, Class 14. Color: Foliage Green. Contents of labels shall be as found in 6.6.

(d) The modular components; front yoke/collar assembly, back yoke/collar assembly, right and left side plate carriers, right and left internal elastic band, cable assembly, lower back protector assembly, groin protector assembly, deltoid protector assembly and ballistic panels are also to be labeled. Label size shall be at the option of the contractor governed by the contents and size of the characters of the inscription, space between lines, and as applicable blank margins on the sides of the labels. The contents of the labels shall be as found in 6.6.

3.7 Small Arms Protective Inserts Subsystem. Shall conform to all performance specifications outlined in Personnel Armor, Small Arms, Ballistic Insert performance requirements (see paragraph 2.2).

3.7.1 SAPI Pocket. The IOTV SAPI pockets shall ensure positioning of the bottom horizontal edge according to the Government patterns for proper organ coverage, and have enough ease to allow the SAPI, ISAPI, ESAPI, or the XSAPI to be easily and quickly inserted into and removed from the vest without struggle or force.

#### **4. VERIFICATION**

4.1 Classification of Inspections. The inspection requirements specified herein are classified as outlined below. Unless otherwise specified, the contractor is responsible for the performance of all inspection requirements specified herein. The Government reserves the right to perform any of the inspections set forth where such inspections are deemed necessary to ensure the supplies conform to prescribed requirements.

a) First article inspection (see 4.2)

b) Conformance inspection (see 4.3)

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 3 and 4 of this specification. The absence of any inspection requirements shall not relieve the contractor of the responsibility of ensuring that all products of supplies submitted to the government for acceptance shall comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements; however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the government to accept defective material. If there is a conflict between the stated requirements and the ANSI standard, the more restrictive requirement shall apply.

4.2 First Article Inspection. When a first article is required (see 6.2), it shall be examined for design (3.3), compatibility and interchangeability of components, inspection requirements in 4.5, ballistic data for all test conditions 4.6.1.1, data, certificate, or compliance for testing requirements in 4.6 and 4.7, and overall workmanship (see Table XIII).

4.3 Conformance Inspection. Conformance inspection shall be in accordance the Government’s acceptance of the contractor’s in-process and end item test plan and contract requirements for ballistic validation. Samples for conformance testing shall be selected in accordance with ANSI Z1.4. Presence of any defect or failure of any test shall be cause for rejection of the lot. Quality assurance requirements are divided in four categories; testing, demonstration, inspection and analysis, as defined below.

4.3.1 Certificate of Compliance (COC). When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.4. Demonstration Verification. The performance requirement is verified by observation and operation that the properties, characteristics and parameters of the item meet the functional requirements specified in applicable paragraphs of Section 3. Pass or fail criteria are simple accept or reject indications of functional performance since no quantitative values exist or are difficult to measure (see Table XIII).

4.5 Requirements and Verifications. Table XIII delineates performance requirements verified through visual methods, including physical measurements in order to determine that no deficiencies exist.

**Table XIII. Requirements and Verifications**

<b>CHARACTERISTIC</b>	<b>REQUIREMENT PARAGRAPH</b>	<b>VERIFICATION PARAGRAPH</b>	<b>FAT For Initial Production</b>	<b>CONFORMANCE Lot Inspection</b>
<i>Cloth Outer Shell</i>	3.2.1	4.5	X	COC
Breaking Strength	3.2.1	ASTM D5034, G-E or G-T	X	COC
Dimensional Stability	3.2.1	AATCC 96 Option 1C, A	X	COC
Outershell Cloth Abrasion Resistance	3.2.1	ASTM D 3884 (Footnote 1)	X	COC
Spray Rating: Initial 1 Laundering	3.2.1	AATCC 22 4.5.12 & AATCC 22	X	COC
Hydrostatic Resistance: Initial After 1 Laundering After 1 Laundering	3.2.1	AATCC 127 4.5.11 & AATCC 22 4.5.12 & AATCC	X	COC

<b>CHARACTERISTIC</b>	<b>REQUIREMENT PARAGRAPH</b>	<b>VERIFICATION PARAGRAPH</b>	<b>FAT For Initial Production</b>	<b>CONFORMANCE Lot Inspection</b>
and POL Contamination After 1 Laundering and Insect Repellent After 1 Laundering and Sweat Contamination After 1 Laundering and Sea Water Contamination		22		
Dynamic Absorption: After 1 Laundering	3.2.1	4.5.12 & AATCC 70	X	COC
Resistance to Organic Liquids: Initial After 1 Laundering	3.2.1	AATCC 118 4.5.12 & AATCC 118	X	COC
Frame Retardant	3.2.1.1	ASTM-D-6413	X	COC
Cloth Collar Material	3.2.2	4.3.1	COC	COC
Cloth Ballistic Panel Cover.	3.2.3	4.3.1	COC	COC
Cloth Inner Shell	3.2.4	4.3.1	COC	COC
Cloth Spacer Mesh	3.2.5	4.3.1	COC	COC
Webbings and Tapes	3.2.6	4.3.1	COC	COC
Elastic	3.2.7	4.3.1	COC	COC
Fasteners, Hook and Loop	3.2.8	4.3.1	COC	COC
Foam	3.2.9	4.3.1	COC	COC
Snap Fasteners	3.2.10	4.3.1 & 4.5.1	X	COC
Polyethylene	3.2.11	4.3.1	COC	COC
Cable	3.2.12	4.3.1	COC	COC
Cable Sleeves	3.2.13	4.3.1	COC	COC
Thread.	3.2.14	4.3.1	COC	COC
Fabric Coated	3.2.15	4.3.1	COC	COC
Ladderloc	3.2.16	4.3.1	COC	COC
Looploc	3.2.17	4.3.1	COC	COC
Ring	3.2.18	4.3.1	COC	COC
Loop	3.2.19	4.3.1	COC	COC
Slide	3.2.20 & 3.2.21	4.3.1	COC	COC
Design	3.3	4.4	X	X

<b>CHARACTERISTIC</b>	<b>REQUIREMENT PARAGRAPH</b>	<b>VERIFICATION PARAGRAPH</b>	<b>FAT For Initial Production</b>	<b>CONFORMANCE Lot Inspection</b>
Patterns	3.3.1	4.4	X	X
System Performance Requirements	3.4	4.4		
Functional Integration	3.4.1	4.4	X	X
Fungus Resistance	3.4.2	4.5.8	X	COC
Individual Repair Kit	3.4.3	4.4	X	X
Use & Care Instruction	3.4.4	4.4	X	X
Camouflage	3.4.5	4.1	X	X
Infrared Reflectance	3.4.6, 3.2.5	4.5.9	X	COC
Matching	3.4.7	4.5.13	X	COC
Pattern Execution	3.4.8	4.1	X	COC
<b><i>Colorfastness to:</i></b>	3.4.9	4.1		
Laundrying: 3 Cycles	3.4.9	AATCC 61 OPTION IA	X	COC
Accelerated Laundrying	3.4.9	4.5.8	X	COC
Light	3.4.9	AATCC 16 OPTION A or E (Exposure shall be 40 hrs or 170 kilojoules)	X	COC
Crocking	3.4.9	AATCC 8	X	COC
Frosting	3.4.9	AATCC 119; EXCEPT IT SHALL BE 300 CYCLES	X	COC
Perspiration	3.4.9	AATCC 16; EXCEPT BOTH ACID AND ALKALINE TEST SHALL BE PERFORMED	X	COC
<b>IOTV Area of Coverage Weight, and Finished Dimensions</b>	3.5	4.5.2, 4.5.5, and 4.5.6	X	COC
<b><i>Ballistic Protection Levels</i></b>	3.5.1	4.1, 4.4, & 4.6	X	X
Ballistic Performance	3.5.2	4.6	X	X
Removable Ballistic Panel Subcomponent	3.5.2.1	4.5.1	X	X

CHARACTERISTIC	REQUIREMENT PARAGRAPH	VERIFICATION PARAGRAPH	FAT For Initial Production	CONFORMANCE Lot Inspection
Ballistic Filler	3.5.2.1.1	4.5.6 & 4.5.7	X	X
Flexibility	3.5.2.1.2	4.6.6	X	COC
Ballistic Filler Abrasion Resistance	3.5.2.1.3	ASTM D-3886 (Footnote 2)	X	COC
<b><i>IOTV Fragmentation</i></b> Protection	3.5.2.2	4.6	X	COC
Yoke Frag. Protection	3.5.2.2.1	4.6	X	COC
Handgun Protection	3.5.2.3	4.6	X	COC
<b><i>IOTV Construction</i></b>	3.5.3	4.3.1 & 4.5.1	X	X
Hook and Loop Fastener	3.5.3.1	4.5.1	X	X
Stitching	3.5.3.2	4.5.1	X	X
Automatic Stitching	3.5.3.3	4.5.1	X	X
Bartacks	3.5.3.4	4.5.1	X	X
Bartack Alignment for MOLLE Pocket Attachment	3.5.3.5	4.5.1 & 4.5.2	X	X
Buttonholes.	3.5.3.6	4.5.1	X	X
Snap setting	3.5.3.7	4.5.1	X	X
Drag Strap	3.5.3.8	4.8	X	COC
Release Cable	3.5.3.9	4.5.1	X	X
Snap Reinforcement	3.5.3.10	4.5.1	X	X
Binding	3.5.3.11	4.5.1	X	X
IOTV Drainage	3.5.3.12	4.5.1	X	X
Torso Adjustment	3.5.3.13	4.3.1 & 4.5.1	X	COC
Emergency Release Mechanism	3.5.3.14	4.5.1	X	X
Labels	3.6	4.5.1	X	X
SAPI Subsystem	3.7	4.4	X	COC
SAPI Pocket	3.7.1	4.4, 4.5.2.2	X	X

**Footnotes:**

1) H-18 abrasive wheel with 1000 gm load shall be used. A hole shall be defined as the wear through of one (1) warp and one (1) filling yarn at the same location.

2) Inflate diaphragm to 4.0 psi with a 5 lb. load in a multi-directional setting. Material with most surface texture will be mounted on upper flat surfaced mount. Materials face or back surface orientation will be the same as in ballistic filler layering. A failure shall be any break in the abraded surface compared to initial.

4.5.1 End Item visual examination. The end items shall be examined for the defects listed below. The lot size shall be expressed in units of vests or the individual components (when component

is purchased separately). The sample unit shall be one completely fabricated vest or individual component.

**Table XIV. END ITEM VISUAL DEFECTS**

EXAMINE	DEFECT	CLASSIFICATION	
		MAJOR	MINOR
Cloth	Any hole, cut, or tear.	101	
	Any abrasion marks, broken or missing yarns or multiple floats	102	
	Any mend, darn or patch.	103	
	Needle Chews.	104	
	Any hole, cuts, tears, or smash.	105	
Webbing or Tape	Not firmly and tightly woven, edges frayed or scalloped.	106	
	Multiple floats.		202
	Abrasion mark, slub, or broken end or pick.	107	
	Ends not fused as required.		203
Cabling	Any hole, cut or tear, incomplete securing of sleeve, impairing function.	108	
	Ends not finished as required.	109	
Fastener Tape	Any hole, cut or tear, hooks flattened, broken or missing, impairing function.	110	
Snap Fasteners	Any fastener not functioning properly i.e., fails to snap closed, provide a secure closure or open freely. NOTE: The fasteners shall be snapped and unsnapped twice to determine whether parts or fasteners separate freely and also affect a secure closure.	109	
	Clinched excessively tight, cutting material.	110	
	Clinched loosely, permitting either component to rotate freely or separate. NOTE: Incomplete roll of end of button or eyelet barrel is evidence of insecure clinching.	111	
	Not specified style or type.	112	
	Splits in button or eyelet		204
	Finish omitted or not as specified.		205
Seams and Stitching:	Incorrect Style.	113	
Open Seams	½ inch or less.		206
	More than ½ inch NOTE: A seam shall be classified as an open seam when one or more stitched joining a seam are broken or when two or more consecutive skipped or runoff stitches occur.	114	



Raw Edges	More than ½ inch when securely caught in stitching. NOTE: Raw edges not securely caught in stitching shall be classified as open seams.		207
Seam & Stitch Type	Wrong seam or stitch type.	115	
Stitch Tension	Tension loose, resulting in loose bobbin or top thread.		208
	Excessively tight, resulting in puckering of material.		209
Bartacks	Any bartack omitted.	116	
	Any bartack not as specified or not in specified location.		210
	Loose stitching, incomplete or broken.		211
Stitching Ends	Not secured as specified.		212
Thread Breaks, Skipped Stitches, or Run-Offs.	Not over stitched as specified. NOTE: Thread breaks or two or more consecutive skipped or run-off stitches not over stitched shall be classified as open seams.		213
Component & Assembly	Any area of ballistic filler bunched (i.e. does not lie flat)	117	
	Any component part omitted or not as specified (unless otherwise classified herein)	118	
	Needle Chews.	119	
	Any mend, darn, patch, holes, splice or other unauthorized repair.	120	
Location Markings	Printed marking more than 1/32 inch in width or not covered by component part.		214
Label	Missing, incorrect, illegible.	122	
Use & Care Pamphlet	Omitted, printing or figures illegible, any page missing.		215

4.5.2 End Item Dimensional Examination. The end items shall be examined for finished measurements (see Table VI). The lot size shall be expressed in units of vests or individual components. The lot inspection level shall be II and the AQL expressed in terms of defects per hundred units shall be 4.0

**Table XV. END ITEM DIMENSIONAL EXAMINATION**

EXAMINE	DEFECT	CLASSIFICATION	
		Major	Minor
Dimensional (overall)	Smaller than nominal dimensions less applicable minus tolerance indicated but not smaller than nominal dimensions less twice the applicable minus tolerance.  Larger than nominal dimensional and applicable plus tolerance.	124	215
Component and Location Dimensions	Not within specified tolerance		216
Stitch Margin or Gage	Not within specified tolerance		217
Box, Box-X and stitching	Dimensions not within specified tolerance		218
Hardware	Not spaced within specified tolerance		219

4.5.2.1 Linear Measurements. Front and back center measurements are taken along the center line by holding the garment taut with a metal measuring device and measurements taken to the nearest 1/16 inch. Front and back width, and webbing hanger's measurements are taken in a flat, relaxed state, with a metal measuring device and measurements taken to the nearest 1/16 inch. Dimensional measurements are taken as described below:

- a) Center Front and Back Lengths: The center front and back length shall be taken on a straight line from the center of the back from the top edge of the base vest neckline (center front and back) to the bottom edge of the shell. Note: Front flap and/or back center flap may be raised while taking measurement.
- b) Front and Back Width: The front and back width shall be taken on a straight line measuring the widest point below the lower armhole opening, edge to edge.
- c) Spacing of Webbing Hangers for MOLLE pockets: The horizontal distance between bartacks shall be taken from the center of one bartack to the center of the adjacent bartack. The spacing between horizontal webbing shall be measured on adjacent webbings from the bottom edge of one to the top edge of the other.

4.5.3 In Process Inspection:

In Process Visual Examination of Cut Parts, Fillers and Patterns. The cut parts for the vest shell assembly, the ballistic filler components, and collars shall be 100 percent inspected during the cutting process to determine that parts containing defects such as a hole, cut, are removed from production. Ballistic fillers shall be 100 percent inspected during the assembly of the individual groups to assure that they contain the correct number of plies, that no individual plies is pieced

and they are marked correctly as to the size and number of plies. In addition, to the above, inspection shall be made of working patterns, to assure that they conform to government patterns in all respects. Whenever nonconformance's is noted, correction shall be made to the item or items affected. Parts that cannot be corrected shall be removed from the production.

4.5.4 In-process Visual Examination of Ballistic Filler Assemblies for Size. The lot shall be expressed in units of front or back ballistic fillers, groin protectors, lower back protectors, and collar assemblies. The sample unit shall be front and one back ballistic filler. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units shall be as follows:

For Front Ballistic Filler	2.5 major 10.0 major minor combined
Lower Back, Groin Protector, Collar	4.0 total (major and minor combined)
For Back Ballistic Filler	2.5 major 10.0 major minor combined

**Table XVI. Visual Examination of ballistic Filler Size**

Examine	Defect	Classification	
		Major	Minor
Size of Individual Ballistic Filler Assembly	A) Smaller than cutting pattern:		
	(1) 3/16 inch to 3/8 inch at any point around the periphery 1/ 2/		X
	(2) More than 3/8 inch at any point around the periphery 1/ 2/	X	
	(3) 1/8 inch up to 3/16 inch around entire periphery 2/		X
	(4) More than 3/16 inch around entire periphery 2/	X	
	B) larger than cutting pattern by 3/8 inch or more at any point 1/ 2/		X

1/ to be scored when condition exists for a length of more than 2 inches or if condition exists in several areas with an accumulated distance of 4 inches.

2/ the front filler or back filler individual components, as applicable shall be examined with the applicable cutting pattern centered on the filler components.

4.5.5 End Item Fit Examination: A fit examination shall be performed with Mock SAPI's conforming to drawings 2-6-0588, 2-6-0589, 2-6-0590, 2-6-0591 and 2-6-0592. The examination shall be performed with a SAPI in each pocket. The pocket flaps shall be closed and secured. It shall be possible to insert and remove in the pocket without effort. A defect shall be scored if any Insert must be forced into or removed from the pocket, or if excessive force is needed to secured the flap.

4.5.6 Area of Coverage. Square inches of coverage are measured by digitized patterns and comparison to working patterns.

4.5.7 Weight. The IOTVs will be examined for weight. See max weights in para 3.5 table VI-A. Inspection level shall be II and the AQL shall be 1.0. Weights are taken on a tared scale and measured to the nearest 0.01 pound. For finished IOTV components, the unit weight shall be the average of 10 finished components of the same size. Areal densities are measured in accordance with ASTM D-3776 except units shall be expressed in lb./sq.ft.

4.5.8 Thickness. Thickness is measured to the nearest 0.01 inch when measured under 0.5 psi when tested according to ASTM D-1777.

4.5.9 Fungus Test. Verification of compliance with the fungus requirement will be performed through the use of certified materials and coupon sampling. A fungus test will be performed on all non-certified materials. Tests will be performed in accordance with Method 508.4 of MIL-STD-810. A sample of each non-certified material will be placed in the fungus test chamber for 28 days.

4.5.10 Infrared Reflectance. Spectral reflectance shall be evaluated initially and after laundering in accordance with Table IV-A. The accelerated three laundering shall be performed using AATCC 61 Opt #A except; a 4 gram sample size shall be used. When evaluating the camouflage printed cloth, each color shall be tested separately. (Note: A sample size large enough to evaluate spectral reflectance shall be used. Ten (10) stainless spheres and 1993 AATCC Standard Reference Detergent without optical brightener shall be used. Spectral reflectance, initially and after laundering, shall be obtained from 600 to 860 nanometers (nm), at 20 nm intervals on an integrating sphere spectrophotometer. The calibration of the instrument shall be traceable to the National Institute of Standards and Technology Perfect Reflecting Diffuser Calibration as stated in a Certificate of Traceability supplied by the instrument calibration standards. The spectral bandwidth shall be less than 26 nm at 860 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a source that simulates either CIE Source A or CIE Source D65. Measurements will be taken on a minimum of 2 different areas and the data averaged. The specimen shall be viewed at an angle no greater than 10 degree from normal, with the specula 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. When the measured reflectance values for any color at four or more wavelengths do not meet the limits specified in Table V, it shall constitute a test failure.

4.5.11 Accelerated Laundering Test. The test procedure shall be as follows using the equipment cited in AATCC 61. Cut five specimens containing predominantly black print, each 4.5" by 3.0 inches, from the basic material and then fold in half, with the face side out, to form a 2.25" x 3.0" dimension. Machine stitch the open edges together (seam allowance of no more than 0.25") to form a bag leaving an opening approximately 1.0" in length. Through the opening, add 35

stainless steel spheres. Close the bag by stapling or stitching. Place the bag in a stainless steel cylinder (one bag per cylinder) without the color transfer cloth; add 50 ml of type II P-D-245 detergent solution (0.5 percent by weight detergent solution) and 100 stainless steel spheres and close tightly. Place the stainless steel cylinder in a preheated Launder-Ometer set at a water bath temperature of 160 +/- 5 degree F. Agitate the cylinder for one (1) hour maintaining a constant temperature. At the end of the laundering cycle, remove the bag from the cylinder and rinse thoroughly in a beaker or in running tap water at 100 +/- 5 degree F for five (5) minutes with occasional stirring or hand squeezing. Remove excess water by squeezing in hand (not extracting) and then dry bag in automatic dryer set on permanent press cycle, 150 – 160 degree F for fifteen minutes (more than one bag can be dried together). If the bag breaks open to release the contained spheres at any time during the test, the test shall be considered invalid and another bag specimen shall be prepared and tested. Remove all spheres from the bag and evaluate each face of the bag without pressing or ironing the bag. Each face of the laundered bag shall be compared to the original sample (unlaundered) in accordance with AATCC evaluation procedure 1 for evaluation of Gray Scale for color change, and the rating shall be based on the portion of the black print exhibiting the most color loss. The lower of the two ratings of each bag shall be recorded as the result for the bag. Failure of any of the five bags to meet required rating shall be considered a test failure.

4.5.12 Resistance to POL, insect repellent, sweat, and sea water after one laundering. IOTV outershell carrier cloths shall be tested, after one laundering per 4.5.10, and after exposure to each DEET, POLs; motor oil, gasoline and weapon lubricant, sweat, and sea water for hydrostatic resistance in accordance with AATCC TM 127. A specimen for each test liquid (i.e., DEET, motor oil, etc) shall be 8 inches by 8 inches. The specimen shall be laid flat, face side up, on a glass plate, 8 inches by 8 inches by ¼ inch and three drops of each test liquid shall be applied to the center of the specimen. A glass plate the same dimensions shall be placed on the specimen and a four pound weight placed in the center of the glass plate assembly. After 16 hours, remove the specimen and test immediately for hydrostatic resistance. DEET test liquid shall be diethyltoluamide (O-I-503 Type II, Concentration A). The motor oil shall conform to ASTM D-4485, Grade CD-II. The weapon lubricant shall conform to MIL-PRF-63460 or commercial Break Free CLP, Santa Ana, CA or equal. The perspiration solution shall be made up in a 500 ml glass beaker by combining 3.0 grams sodium chloride, 1.0 gram of trypticase soy broth powder, 1.0 gram normal propyl propionate, and 0.5 gram liquid lecithin. Add 500 ml of distilled water, add a magnetic stirring bar, and cover the beaker. Place the beaker on a combination hot plate/magnetic stirrer apparatus. While stirring, heat the solution to 50 degree C until all ingredients are dissolved. While stirring, cool the solution to 35 degree C, remove cover, and dispense immediately with pipette or other suitable measuring device. Dispense 2 ml of perspiration solution at 35 degree C onto the center of an 8 inch by 8 inch by 1/4 inch glass plate. Place an 8 inches by 8 inches specimen face up. Dispense an additional 2 ml of perspiration solution onto the center of the specimen. A glass plate (do not rinse) of the same dimensions shall be placed on the specimen and a four pound weight placed in the center of the glass plate assembly. After 16 hours, remove and air dry specimen before testing for hydrostatic distance. See 4.6.1.1.1 for sea water formulation and sample preparation shall be the same as perspiration.

4.5.13 Laundering Procedure. The test specimens and ballast, if needed, shall be placed in an automatic washing machine set on permanent press cycle, high water level and warm (105 degree F +/- 5 degree F) wash temperature. The test specimens shall be taken from the vicinity of the fabric as the specimens for the initial test. 0.5 ounce (14 grams) of 1993 AATCC Standard Reference Detergent. The duration of the laundering cycle shall be 30 +/-5 minutes. After laundering, the specimens and ballast shall be dried in an automatic tumble dryer set on permanent press cycle, 150 to 160 degree F for approximately 15 minutes. The laundering equipment, washer and dryer, shall be in accordance with AATCC TM 135-1992.

4.5.14 Matching. The cloths shall match the standard samples viewed under filtered tungsten lamps that approximate artificial daylight and that have a correlated color temperature of 7500 +/- 200 K, with illumination of 100 +/-20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 +/- 200K.

4.5.15 Flame Retardant. All materials tested shall be tested in accordance with ASTM D 6413 in both the warp and fill directions.

4.6 Ballistic Performance. Testing will be conducted on the end item, or on 15 x 15 inch shoot packs constructed of the approved ballistic material system (see 6.4).

4.6.1 Ballistic Testing. General procedures and requirements are provided in 4.6.2 (see 6.5 for definitions).

4.6.1.1 Conditions. Dry specimens and specimens after; wet, hot temperature, cold temperature, accelerated aging and POL conditioning will be ballistically tested as specified in 3.5.2.2. Dry condition is the standard test condition specified in 4.6.2.3. All non-ballistic components of the ballistic material system (i.e.; outer shell and inner lining) shall be laundered as specified in 4.5.10 prior to assembling test panels to simulate a worn condition. All specimens will be visually inspected after conditioning for coloration, distortion, melting, cracking, or other physical defects and noted.

4.6.1.1.1 Wet Condition. Sea water shall be utilized for wet test conditions. Sea water formulation is 3% sodium chloride/0.5% magnesium chloride. The wet condition is achieved by completely submerging the IOTV system in sea water at 70 +/- 5 degree F for 24 hours. The specimens are submerged such that the fluid is in contact with all exterior surfaces to allow maximum fluid penetration. Excessive water will be drained from the specimen by hanging vertically for 15 minutes and tested within 5 minutes with tests completed within 45 minutes.

4.6.1.1.2 Temperature Extremes Condition. For hot temperature extreme, the IOTV system shall be heated in an oven operating at 155 + 10 degrees Fahrenheit for 6 +/- ¼ hours. The test specimen shall be removed from the oven, mounted and ballistically tested as specified in 4.6.3. Thermo-couples or other temperature measuring device will be used to monitor specimens during testing. Testing must occur at a surface temperature no less than 140 degree F and the mid-point of the material system at 155 + 10 degrees degree F. If test temperature falls below specified surface and mid-point temperatures, then reheat until surface and mid-point temperatures are 155 +/- 10 degree F. For cold temperature extreme, the test specimen shall be

cold temperature exposed to  $-60 \pm 10$  degree F for  $6 \pm \frac{1}{4}$  hours. The test specimen shall be removed from refrigeration, mounted and ballistically tested as specified in 4.6.3. Thermocouples or another temperature measuring device will be used to monitor specimens during testing. Testing must occur at a surface temperature no less than  $-10$  degree F and the mid-point of the material system at  $-60 \pm 10$  degree F. If test temperature rise about the specified surface and mid-point temperatures, then refrigerate specimen until surface and mid-point temperatures are  $-60 \pm 10$  degree F.

4.6.1.1.3 Accelerated Aging. Set up an oxygen pressure aging chamber consisting of a metal vessel large enough to accommodate the specimen. Maintain the chamber at  $300 \pm 10$  psi, 100% oxygen atmosphere controlled by a temperature of  $158 \pm 2$  degree F. The test specimen shall be placed in the chamber with the strike side of specimen face up. Place a representative 30 pound weighted object on top of the specimen for uniform loading. Expose specimens in the aging chamber for a minimum of 7 days. At the end of the test, depressurize the chamber over a period of at least 5 minutes. Place samples in ambient conditions for 16 to 96 hours with weighted object on top. Visually verify that the conditioned specimens do not show appreciable change to original state. Verify that the conditioned specimens performs as specified in 3.5.2.2.

4.6.1.1.4 POL Contamination. The ballistic material system specimens shall be immersed in each of the following; motor oil, and gasoline at room temperature. The specimens shall be placed flat in a pan with  $\frac{1}{8}$ " –  $\frac{1}{4}$ " of the POL fluid. A ten pound weight shall be placed on a 15" x 15" platen to distribute load to allow for maximum fluid penetration. The loaded specimen shall remain immersed for 4 hours at room condition. The specimen shall be hung vertically to drip dry for 15 minutes, excess oil shall be wiped from the surface to facilitate handling of the specimen. The specimen shall be ballistically tested within 30 minutes.

4.6.2 Ballistic Test Criteria. For all Protection Ballistic Limits (BL); V50, Vs/Vr, and V0 acceptance tests the following minimum information is required by the government to validate performance;

- 1) Armor specimen description including exact materials, thickness, sizes, weights of all components and areal density of armor system.
- 2) Conditioning of armor specimen.
- 3) Test projectile with exact nomenclature.
- 4) Temperature and humidity measurements.
- 5) Yaw angle.
- 6) Angles of target obliquity.
- 7) Velocity measurements of each test shot used to test the armor (regardless of whether that particular velocity was used in the V50 or V0 determination).
- 8) Velocity loss and/or corrected striking/residual velocity for fragment simulating projectiles.
- 9) PP (Partial Penetration) and CP (Complete Penetration) next to each shot velocity as determined.
- 10) Angle of spall/debris ejection if applicable.
- 11) Name of company performing tests.
- 12) Type of gun barrel, caliber, and propellant used

13) Range measurements including distances from gun barrel to velocity measurement devices and target.

14) Calculated Ballistic Limit. In a situation where the V50 BL, Vs/Vr or V0 data sheet would compromise the Security Classification Guide for Armor Materials (see 2.2), the data sheet should exclude the specific projectile used during testing.

4.6.2.1 Projectile Velocity Determination. Projectile velocity measurement methods shall employ either high velocity lumiline screens or electrical contact screens which either open or close an electric circuit by passage of the projectile through the detector. Contact screens may consist of metallic foils separated by a thin insulating layer, or may consist of a circuit printed on paper with the circuit spacing such that the projectile passing through the screen will break the circuit. An electric counter type chronograph measuring to the nearest microsecond or as a minimum to the nearest 10 microseconds will be used with these measuring devices. As an alternative radiographic equipment calibrated to capture the projectile at various time intervals of flight can be used. For fragment simulating projectiles, velocity correction methodology shall be used to calculate the actual striking velocity and, where appropriate, actual residual velocity.

4.6.2.2 Weapon Mounting Configuration. The spacing from the weapon muzzle to the first pair of triggering devices shall be sufficient to prevent damage from muzzle blast and obstruction from smoke in case optical devices are used. Recommended distances can be found in USATECOM TOP 4-2-805. Spacing between triggering devices is a function of the expected velocity of the projectile being fired. In many instances, physical restriction, such as short overall distance from muzzle to test sample dictates the spacing of the triggering devices. The last pair of triggering devices shall be placed at least four (4) feet (122 cm) in front of the test sample and should be protected from possible damage resulting from fragments.

4.6.2.3 Environmental Test Conditions. All ballistic tests shall be performed as closely as possible to a standard atmosphere of 68 +/- 10 degree Fahrenheit and 50 +/- 20% relative humidity. Temperature and humidity measurements shall be recorded before the beginning of days test firings and every two hours thereafter

4.6.2.4 Projectile Yaw Determination. Projectile yaw shall be measured for each firing by yaw cards, flash radiograph or photography. Any round for which yaw is determined to be greater than 5 degrees shall be disregarded in the calculation of the ballistic limit. The measurement system employed should be capable of measuring yaw within an accuracy of 0.5 degree.

4.6.3 V50 BL Calculation. In general, three (3) Partial Penetration (PP's) and three (3) Complete Penetrations (CP's) within a 125 ft/sec velocity spread or five (5) Partial Penetration (PP's) and five (5) Complete Penetrations (CP's) within a 150 ft/sec velocity spread yield the V50 BL determination that will be accepted. More shots maybe required to calculate more accurate V50 with standard logistic regression statistical method for First Article Testing or/and production lot testing as specified in FAT/QA protocol document.

4.6.3.1 PP and CP Determination for V50. Complete and partial penetrations (see 6.6) will be determined based on the impressions left on an aluminum witness sheet. A 0.020 in. (0.051 mm thick 2024 T3 sheet of aluminum) will be placed 6 + 1/2 in. (152 + 12.7 mm) behind and



parallel to the target. The aluminum witness sheet will be at least 15 x 15 in. size and be of sufficient size to capture all fragments resulting from the ballistic event, mounted rigidly around its perimeter and placed so that the target impact location is approximately at the center of the aluminum sheet. Restraint is required during testing so that the material is not pulled through the ballistic test window frame. Unrestrained or improperly restrained materials will tend to be pulled down the projectile line of flight. Restraint provides for more accurate and reproducible data if uniformly applied. The following test conditions apply:

- Test samples should be 15.0 x 15.0 inch square size panels and configured in the proposed final armor material system for the First Article Testing Only (see 6.4).
- IOTV Vest panels configured in the armor material system approved under the First Article shall be used for production lot testing.
- For all size test panels a metallic (approx. 0.20 inch thick aluminum or steel) frame with minimum 1.4 inch webbing shall be employed to restrain the test material during ballistic impact.
- The test panel will be sandwiched between 2 frames and restrained with mechanical or pneumatic clamping devices at each of the four corners of the frame.
- The restraining frames will be cut so that a ballistic window with minimum sizing of 12.0 x 12.0 inch square will be used.
- All shots shall be at least 3.0 inch from any edge of the samples.
- Test shots shall be sufficiently spaced so that sequential shots are not influenced by previous impact areas. A minimum shot spacing of 2.5 inch is required but 3.0 inch is recommended especially when testing against handgun projectiles.
- Depending on the test panel size it may be necessary to use 2-3 panels for the V50 determination.
- Test specimens shall be reconditioned to initial shape after every shot.

**4.6.3.2 Vs/Vr and V50 Test Sample Mounting.** Unless otherwise stated the following conditions shall be performed during V50 testing. The armor test sample shall be secured on the test target mount with the impact side at the appropriate angle to the line-of-flight of the projectile. The frame supports, clamps or mounting fixtures must be capable of retaining the sample and withstanding shock resulting from ballistic impact by the test projectiles. The test sample mount shall be capable of adjustment of moving the sample in the vertical and horizontal directions so that the point of impact can be located anywhere on the sample and so that appropriate degree obliquity impacts can be achieved anywhere on the sample. The test sample mount shall be capable of rotating on the vertical or horizontal axis so that various obliquity attack angles can be achieved.

**4.6.4 Vs/Vr Testing.** The testing of Casualty Reduction Analysis is done by starting at the upper end of the velocity spectrum and working down to below the V50. Testing is performed at 0 degrees and 45 degrees obliquity for all projectiles. Both the striking velocity (Vs) and the residual velocity (Vr) of the projectile must be measured. Yaw of the striking projectile should be measured for all shots. Approximate starting velocities are listed below. From the starting velocity subsequent shots are taken at approximately 400 - 500 ft/sec increments down to below the V50 where there are no longer any complete penetrations. Additional shots are then taken above and below the V50, in a similar manner to standard V50 test methodology, to characterize

the performance of the armor system in this area. This testing will require between 15 and 20 valid shots for each size RCC. Approximately half of the shots should be in the regime between the starting velocity and just above the V50. Shots that would not be considered valid include: excessive yaw of the striking projectile; incomplete measurement of the residual velocity of a complete penetration; impacts at incorrect obliquity; or impact closer than 1 inch to any previous impact.

**Table XVII. Vs starting velocity**

<b>Projectile</b>	<b>Starting Velocity</b>
2- grain RCC	4900 ft/s
4- grain RCC	4900 ft/s
16-grain RCC	4600 ft/s
64-grain RCC	4000 ft/s

4.6.5 V0 Determination for Acceptance. For V0 or full protection (no complete penetrations), a minimum velocity (muzzle plus 50 ft/sec) will be the requirement. The following conditions apply; No complete penetration at the maximum specified shot pattern specified is the minimum requirement. Closer positioning of shots without complete penetration is a desired requirement.

- Test samples should be 15.0 x 15.0 inch square size panels and configured in the proposed final armor material system for the First Article Testing Only (see 6.4).
- IOTV Vest panels configured in the armor material system approved under the First Article shall be used for production lot testing.
- Samples will be mounted on clay block described below (see 4.6.5.2).
- The first shot will be 3.0 -0/+1/4" inch from any edge.
- The next shot shall be located 3.5 inch -0/+1/2" from the first shot and at the weakness point in the configuration, e.g.; seamed area or non-uniform area of design.
- The third shot location should be positioned 3.5 inch -0/+1/2" from any of the 2 previous test shots.
- The fourth and fifth shots shall be located 3.5 inch -0/+1/2" from any previous test shots and tested at 30 degrees obliquity.
- The transient deformation shall be measured (see 4.6.5.1) after the third and fifth test firings
- Test shots should be staggered at least 0.25 inch off the horizontal and vertical lines of any previous shots.
- Test specimens shall be reconditioned to initial shape after every shot.

4.6.5.1 Transient Deformation Measurement. The back of the armor test specimen will be attached to a block of non-hardening, oil-based molding clay so that no movement of the test samples occur before, during or after the ballistic event. The clay material shall be in the form of a single block at least 4.0 in. thick and 24 x 24 in. length and height. The clay backing material shall be conditioned in its fixture, using a heated chamber or enclosure. Conditioning time, temperature, and corresponding drop test performance may change as a function of backing material age and usage. Actual conditioning temperature and recover time between uses will be determined by drop test results. Additional clay, conditioned to the same initial temperature as the fixture, shall be used to fill voids and restore the front surface of the backing material as

needed. The clays consistency should be such that depression of 25 + 3 mm (1 + 0.1 in) in depth is obtained when a 1 kg + 10gm (2.2 lb + 0.35 oz) cylindrical steel mass, 44.5 + 0.5 mm (1.75 + 0.02 in) in diameter and having a hemispherical striking end is dropped from a height of 2 m + 2 cm (6.5 + 0.07 ft) onto one of its square faces. The specimen will be strapped or taped to the surface of the clay material. Ballistic testing will be performed at 0 degrees obliquity and 30 degree obliquity. Back-face deformations in the clay will not exceed 1.73 in. when measured from the original undisturbed surface of the backing material to the lowest point of the depression. The specimen may be smoothed between shots.

4.6.5.2 Test Sample Mounting. The molding clay block shall be rigidly held by a suitable (metal) stand. The armor test sample shall be secured in the vertical position, perpendicular to the projectile line of flight. The frame supports must be capable of retaining the sample and withstanding shock resulting from ballistic impact. The test sample mounting shall be capable of adjustment for moving the sample in the vertical or horizontal positions so that the point of impact can be located anywhere on the sample and rotation on the vertical axis so that 0 and 30 degree obliquity impacts can be achieved anywhere on the sample.

4.6.6 Flexibility. The ballistic filler fabric subcomponents of the system shall be tested in accordance with ASTM D 1388, Standard Test Method for Stiffness of Fabrics, with the following noted exceptions, to determine the flexural rigidity in units of cm-g for each component. The restriction of size of sample may be waived such that end item ballistic filler fabric subcomponents may be tested. These results are then used to calculate an overall system flexibility as follows:

$$\text{System Stiffness} = \sum_{\text{Components}} [(G_{i, \text{warp}} + G_{i, \text{fill}}) / 2] \times \text{Layers}_i$$

Where:

- i = different fabric components in the system
- $G_{i, \text{warp}}$  = Flexural Rigidity in the warp direction (cm-g)
- $G_{i, \text{fill}}$  = Flexural Rigidity in the fill direction (cm-g)
- $\text{Layers}_i$  = Number of total layers of the component system

The System stiffness shall be less than 225 cm-g when calculated as above.

Example Calculation:

A system is composed of 12 plies of material a and 6 plies of material b. Component flexural rigidities are as follows:

Material A:	Material B
$G_{A, \text{warp}} = 4.000 \text{ cm-g}$	$G_{B, \text{warp}} = 7.000 \text{ cm-g}$
$G_{A, \text{fill}} = 6.000 \text{ cm-g}$	$G_{B, \text{fill}} = 8.000 \text{ cm-g}$

$$\text{System stiffness} = [(4.000+6.000)/2 \times 12] + [(7.000+8.000)/2 \times 6] = 105.000 \text{ cm-g}$$

The calculated system stiffness is less than 225cm-g and is therefore acceptable.

4.7 Operating Requirements Verification. Complete each verification in this paragraph.

4.7.1 Insertion Demonstration. One barehanded person shall demonstrate insertion of the SAPI into both IOTV pockets without tools or special aids.

4.7.2 Insertion Using Protective Hand Gear Operation Demonstration. Demonstrate SAPI insertion and perform insertion into the IOTV pocket while separately wearing standard Army cold weather gloves (NSNs 8415-01-319-5514, Shell and 8415-01-319-9042, Glove) and chemical protective hand wear (NSN 8415-01-033-3517). Perform insertion into government furnished carrier in a maximum of 30-seconds.

4.8 Drag Strap Seam Strength. Testing shall be accomplished using a constant rate-of-extension test apparatus capable of accurately measuring loads up to  $1,000 \pm 2$  lb. The sample (an actual vest or representative back panel only, as appropriate) shall be firmly clamped across its full width to the base of the test apparatus using a steel bar or other device capable of completely restraining the sample during testing. The clamp shall be placed parallel to, and within 0.25 in of the bottom of the drag strap (i.e., on the SAPI pocket flap). The center of the drag strap shall be directly in line with the center of the loadcell and pulling head. The drag strap shall be affixed to the load cell and pulling head through a loop of 1-in webbing (A-A-55301 Type VI) having a gage length of  $12 \pm 1$  in. A preload of 1 lbf shall be applied prior to the start of testing. The loadcell and pulling head shall be advanced at a constant rate of 2 in./min until failure. The following minimum data shall be recorded: Extension and Load at first-stitch failure (if applicable), Extension and Peak Load; Mode of Failure (i.e., seam failure, fabric tear-out; handle break).

## **5. PACKAGING**

5.1 Packing. For acquisition purposes, the contract or order shall specify complete packaging requirements. When DOD personnel perform material packaging, those personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. The Inventory Control Point packaging activity within the Military Department of defense Agency, or within the Military Department's Systems Command, maintains packaging requirements. 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 multiple threat body armor is a modular body armor providing multiple levels of ballistic protection depending on the system configuration. The Outer Tactical Vest (IOTV) provides protection from conventional fragmenting munitions and 9mm handgun. The area of protective coverage of the body is dictated by the number of modular components worn to extended coverage. IOTV protection is increased to protect vital organs from multiple hits against small arm rifles and indirect fire flechette when front and back small arms protective inserts are worn.

6.2 Acquisition Requirements. Acquisition documents should specify the following:

- a) Title, and date of this document.
- b) When first article, and pre-production items are required.
- c) Camouflage required.
- d) Size Tariff

6.3 Standard Sample. For access to standard samples, contact the procuring activity issuing the invitation for bid.

6.4 Simulant/Surrogate Shoot-Pack. A Simulant/Surrogate Shoot-Pack system of IOTV body armor may be used to represent the ballistic resistant materials of the IOTV. The surrogate shoot pack system will consist of (1) a ballistic filler packet and (2) a ballistic filler carrier with insert pocket. The baseline ballistic filler packet will be 15 x 15 inches in size consisting of X plies proposed ballistic material system used in IOTV base vest (see 3.3.1.6). The ballistic packet will be stitched diagonally across the 4 corners with a 5-inch line of 50 TEX Aramid thread at 5 to 10 stitches per inch.

The ballistic filler carrier will have an insert pocket capable of holding the largest insert stitched on the face fabric. The face fabric and the pocket cover will consist of 500 denier 7.5 oz. / Sq. Yd. Woodland Camouflage, urethane back coated, textured nylon, Cordura. The insert pocket will be stitched on three sides to the face fabric with nylon or polyester thread. The top edge of the pocket will have a minimum of 5 inches of not less than 0.5 inch wide hook and loop fastener centered and stitched at the top. The ballistic filler carrier back cover will consist of 500 denier, solid green or black colored, 7.5 oz. / Sq. Yd. urethane back coated, textured nylon, Cordura. The front and back filler carrier covers will be stitched together on 3 sides with nylon or polyester thread to form a pocket to hold the ballistic filler packet. The fourth side will remain unstitched but will have a minimum of 5 inches of not less than 0.5 inch hook and loop fastener centered and stitched to the top. Approved changes to the ballistic filler packet materials will result in their use in the surrogate shoot pack.

6.5 Ballistic Testing Definitions. The following definitions are provided to assist in understanding the test procedures:

Fair Impact. All three impacts will be at 0 degrees obliquity. A projectile that impacts the armor at an angle of incidence no greater than + 5 degrees from the intended angle of incidence will be considered a fair impact.

Partial Penetration PP(P). Any fair impact that is not a complete penetration shall be considered a partial penetration.

Complete Penetration (CP) for V50 Testing. A complete penetration occurs when the impacting projectile or any fragment thereof, or any fragment of the test specimen perforates the witness plate resulting in a crack or hole which permits light passage when a 60-watt, 110-volt bulb is placed behind the witness plate.

Complete Penetration (CP) for Acceptance Testing. A complete penetration will have occurred when the projectile, fragment of the projectile or fragment of the armor material is imbedded or passes into the clay backing material used to measure transient deformation. Paint or fibrous materials that are emitted from the back of the test specimen and rests on the outer surface of the clay impression are not considered a complete penetration.

Residual Velocity. The velocity at which a projectile exits the rear surface of an armor sample. Used only for Vs/Vr testing.

Areal Density (AD). A measure of the weight of the armor per unit area, usually expressed in pounds per square foot (lb. /ft<sup>2</sup>) or kilograms per square meter (kg/m<sup>2</sup>) of surface area.

Obliquity. A measure, normally in degrees, of the extent to which the impact of a projectile on an armor material deviates from a line normal to the target. Thus, a projectile fired perpendicular to an armor surface at 0 degrees obliquity.

Spall. The detachment or delamination of a layer of material or the ejection of projectile/armor material in the area surrounding the location of impact, which occurs on the front of the armor surface. Spalling may be a threat mechanism even when penetration of the armor itself is not complete.

Yaw. Projectile yaw is the angular deviation of the longitudinal axis of the projectile from the line of flight at a point as close to the impact point on the target as is practical to measure.

V50 Ballistic Limit (BL). In general, the velocity at which the probability of penetration of an armor material is 50 percent.

#### 6.6 Contents of Labels, and Use and Care Instructions:

**IMPROVED OUTER TACTICAL VEST  
FRONT CARRIER**

**SIZE:**

**NSN:**

**THE IMPROVED OUTER TACTICAL VEST (IOTV) WITH ALL SOFT BALLISTIC PANELS INSTALLED PROVIDES PROTECTION FROM FRAGMENTATION AND 9MM SUBMACHINE GUN OR LESSER THREATS. THIS VEST DOES NOT PROTECT AGAINST KNIVES OR SHARP OBJECTS.**

**DO NOT MACHINE WASH OR DRY. FAILURE TO FOLLOW THESE INSTRUCTIONS WILL DAMAGE THE VEST'S PROTECTIVE CAPABILITY.**

**CLEANING INSTRUCTIONS**

1. Remove dirt from outer surface with a cloth or soft bristle brush.
2. Remove all ballistic panels and the Enhanced Small Arms Protective Inserts (ESAPI) and Enhanced Side Ballistic Inserts (ESBI) from the outer shell and the component carriers. Soft ballistic Panels are ONLY to be cleaned by removing loose dirt from the surface and wiping clean with a moistened cloth or a soft bristle brush. Avoid submerging the panels in water; DO NOT bleach! DO NOT machine wash! DO NOT dry clean! DO NOT apply solvents to the ballistic panels! If the ballistic panels become wet allow them to air dry flat away from heat sources and out of direct sunlight. If the ballistic panels become saturated with liquids such as bleaches, gasoline, petroleum, oils or lubricants, turn them in for replacement as soon as possible.
3. Hand wash the IOTV base vest and component outer shells only in cold water with soap or a very mild detergent. DO NOT USE CAUSTIC CLEANERS, CHLORINE BLEACH, YELLOW SOAP, CLEANING FLUIDS OR SOLVENTS, WHICH WILL DISCOLOR AND DETERIORATE THE ITEMS!
4. Rinse the outer shells very thoroughly in clean water to wash out the soap.
5. Air-dry indoors, or in the shade, AWAY FROM HEAT SOURCES.
6. DO NOT ATTEMPT TO DYE THE ITEM OR FIX DISCOLORATIONS.

**TURN IN YOUR ITEM IF:**

1. Frags or bullets have hit them.
2. The outer cover is torn or damaged beyond field repair.
3. The hook and loop cannot be closed completely or repaired.
4. The webbing is torn or damaged beyond repair.
5. The items cannot be adequately cleaned, or are badly discolored.
6. The items have open seams or broken components.

**REFER TO USE & CARE MANUAL FOR THE PROPER USE OF THIS BALLISTIC PROTECTIVE SYSTEM, REPAIR PROCEDURES & RECORDING OF HITS.**

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**SERIAL NO:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:** \_\_\_\_\_

**IMPROVED OUTER TACTICAL VEST  
BACK CARRIER**

**SIZE:  
NSN:**

**THE IMPROVED OUTER TACTICAL VEST (IOTV) WITH ALL SOFT BALLISTIC PANELS INSTALLED PROVIDES PROTECTION FROM FRAGMENTATION AND 9MM SUBMACHINE GUN OR LESSER THREATS. THIS VEST DOES NOT PROTECT AGAINST KNIVES OR SHARP OBJECTS.**

**DO NOT MACHINE WASH OR DRY. FAILURE TO FOLLOW THESE INSTRUCTIONS WILL DAMAGE THE VEST'S PROTECTIVE CAPABILITY.**

**CLEANING INSTRUCTIONS**

1. Remove dirt from outer surface with a cloth or soft bristle brush.
2. Remove all ballistic panels and the Enhanced Small Arms Protective Inserts (ESAPI) and Enhanced Side Ballistic Inserts (ESBI) from the outer shell and the component carriers. Soft ballistic Panels are ONLY to be cleaned by removing loose dirt from the surface and wiping clean with a moistened cloth or a soft bristle brush. Avoid submerging the panels in water; DO NOT bleach! DO NOT machine wash! DO NOT dry clean! DO NOT apply solvents to the ballistic panels! If the ballistic panels become wet allow them to air dry flat away from heat sources and out of direct sunlight. If the ballistic panels become saturated with liquids such as bleaches, gasoline, petroleum, oils or lubricants, turn them in for replacement as soon as possible.
3. Hand wash the IOTV base vest and component outer shells only in cold water with soap or a very mild detergent. DO NOT USE CAUSTIC CLEANERS, CHLORINE BLEACH, YELLOW SOAP, CLEANING FLUIDS OR SOLVENTS, WHICH WILL DISCOLOR AND DETERIORATE THE ITEMS!
4. Rinse the outer shells very thoroughly in clean water to wash out the soap.
5. Air-dry indoors, or in the shade, AWAY FROM HEAT SOURCES.
6. DO NOT ATTEMPT TO DYE THE ITEM OR FIX DISCOLORATIONS.

**TURN IN YOUR ITEM IF:**

1. Frags or bullets have hit them.
2. The outer cover is torn or damaged beyond field repair.
3. The hook and loop cannot be closed completely or repaired.
4. The webbing is torn or damaged beyond repair.
5. The items cannot be adequately cleaned, or are badly discolored.
6. The items have open seams or broken components.

**REFER TO USE & CARE MANUAL FOR THE PROPER USE OF THIS BALLISTIC PROTECTIVE SYSTEM, REPAIR PROCEDURES & RECORDING OF HITS.**

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**SERIAL NO:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**



**IMPROVED OUTER TACTICAL VEST- FRONT BALLISTIC INSERT**

**SIZE:**  
**NSN:**

**INSERT THIS SIDE TO BODY FAILURE TO INSERT THIS BALLISTIC INSERT IN THE IOTV  
OUTERSHELL WILL RESULT IN ABSENCE OF BALLISTIC PERFORMANCE FROM  
FRAGMENTATION & 9MM SUB-MACHINE GUN OR LESSER THREATS.**

**DO NOT LAUNDER BALLISTIC PANELS!**

Avoid submerging in wash water. DO NOT bleach! DO NOT machine wash! DO NOT dry clean! DO NOT apply solvents!

**FOR CLEANING:** ONLY Remove loose dirt from surface & wipe clean with a moistened cloth or soft bristle brush. If Ballistic Panels become wet allow to air dry in a flat position away from heat sources & out of direct sunlight. If Ballistic panels become saturated with liquids such as bleaches, gasoline, petroleum, oils, or lubricants, TURN IN FOR REPLACEMENT AS SOON AS POSSIBLE.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**SERIAL NO:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST- BACK BALLISTIC INSERT**

**SIZE:**  
**NSN:**

**INSERT THIS SIDE TO BODY FAILURE TO INSERT THIS BALLISTIC INSERT IN THE IOTV  
OUTERSHELL WILL RESULT IN ABSENCE OF BALLISTIC PERFORMANCE FROM  
FRAGMENTATION & 9MM SUB-MACHINE GUN OR LESSER THREATS.**

**DO NOT LAUNDER BALLISTIC PANELS!**

Avoid submerging in wash water. DO NOT bleach! DO NOT machine wash! DO NOT dry clean! DO NOT apply solvents!

**FOR CLEANING:** ONLY Remove loose dirt from surface & wipe clean with a moistened cloth or soft bristle brush. If Ballistic Panels become wet allow to air dry in a flat position away from heat sources & out of direct sunlight. If Ballistic panels become saturated with liquids such as bleaches, gasoline, petroleum, oils, or lubricants, TURN IN FOR REPLACEMENT AS SOON AS POSSIBLE.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**SERIAL NO:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST  
RIGHT SIDE PLATE CARRIER  
SIZE:  
NSN:**

Refer to IOTV outershell label for cleaning and maintenance instructions.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST  
LEFT SIDE PLATE CARRIER  
SIZE:  
NSN:**

Refer to IOTV outershell label for cleaning and maintenance instructions.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST  
RIGHT INTERNAL ELASTIC BAND  
SIZE:  
NSN:**

Refer to the IOTV outershell Label for cleaning and maintenance instructions.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST  
LEFT INTERNAL ELASTIC BAND  
SIZE:  
NSN:**

Refer to the IOTV outershell Label for cleaning and maintenance instructions.

**LOT NUMBER:** \_\_\_\_\_  
**DATE OF MFG:** \_\_\_\_\_  
**CONTRACT #:** \_\_\_\_\_  
**MANUFACTURED BY:**

**IMPROVED OUTER TACTICAL VEST  
CABLE ASSEMBLY  
SIZE:  
NSN:**

Refer to IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
CONTRACT #: \_\_\_\_\_  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
YOKE/COLLAR FRONT ASSEMBLY  
NSN:**

Refer to IOTV outershell label for cleaning and maintenance instructions.

LOT NO: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #: \_\_\_\_\_  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
YOKE/COLLAR BACK ASSEMBLY  
SIZE:  
NSN:**

Check to insure the correct side of the Ballistic Panel will be against the Body before attaching to the IOTV. Refer to IOTV outershell Label for cleaning and maintenance instructions.

LOT NO: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #: \_\_\_\_\_  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
RIGHT COLLAR BALLISTIC INSERT  
SIZE:  
NSN:  
INSERT THIS SIDE TO BODY**

**FAILURE TO INSERT THIS BALLISTIC PANEL IN THE COLLAR ASSEMBLY OUTERSHELL WILL RESULT IN ABSENCE OF BALLISTIC PROTECTION.**

DO NOT LAUNDER. Remove loose dirt from cover with a cloth or soft brush. Avoid submerging panels in wash water. DO NOT bleach. DO NOT machine wash. DO NOT dry clean. DO NOT apply solvents. Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #: \_\_\_\_\_  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
LEFT COLLAR BALLISTIC INSERT  
SIZE:  
NSN:**

**INSERT THIS SIDE TO BODY**

**FAILURE TO INSERT THIS BALLISTIC PANEL IN THE COLLAR ASSEMBLY OUTERSHELL WILL RESULT IN ABSENCE OF BALLISTIC PROTECTION.**

DO NOT LAUNDER. Remove loose dirt from cover with a cloth or soft brush. Avoid submerging panels in wash water. DO NOT bleach. DO NOT machine wash. DO NOT dry clean. DO NOT apply solvents. Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
LOWER BACK PROTECTOR OUTERSHELL  
NSN:**

Check to insure the correct side of the Ballistic Panel will be against the Body before attaching to the IOTV. Refer to IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
LOWER BACK PROTECTOR INSERT  
NSN:**

**INSERT THIS SIDE TO BODY**

DO NOT LAUNDER. Remove loose dirt from cover with a cloth or soft brush. Avoid submerging panels in wash water. DO NOT bleach. DO NOT machine wash. DO NOT dry clean. DO NOT apply solvents. Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
GROIN PROTECTOR OUTERSHELL**  
SIZE:  
NSN:

Check to insure the correct side of the Ballistic Panel will be against the Body before attaching to the IOTV. Refer to IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
GROIN PROTECTOR INSERT**  
SIZE:  
NSN:

**INSERT THIS SIDE TO BODY**

DO NOT LAUNDRER. Remove loose dirt from cover with a cloth or soft brush. Avoid submerging panels in wash water. DO NOT bleach. DO NOT machine wash. DO NOT dry clean. DO NOT apply solvents. Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
DELTOID PROTECTOR OUTERSHELL**

SIZE:  
NSN XXXX-XX-XXX-XXXX

Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_  
DATE OF MFG: \_\_\_\_\_  
SERIAL NO: \_\_\_\_\_  
CONTRACT #:  
MANUFACTURED BY:

**IMPROVED OUTER TACTICAL VEST  
DELTOID PROTECTOR BALLISTIC INSERT**

SIZE:

NSN:XXXX-XX-XXX-XXXX

**INSERT THIS SIDE TO BODY**

DO NOT LAUNDER. Remove loose dirt from cover with a cloth or soft brush.

**Avoid submerging panels in wash water. DO NOT bleach. DO NOT machine**

Wash. DO NOT dry clean. DO NOT apply solvents.

Refer to IOTV Outershell Label for cleaning and maintenance instructions.

Check to insure the correct side of the Ballistic Panel will be against the  
Body before attaching to the IOTV

Refer to the IOTV outershell Label for cleaning and maintenance instructions.

LOT NUMBER: \_\_\_\_\_

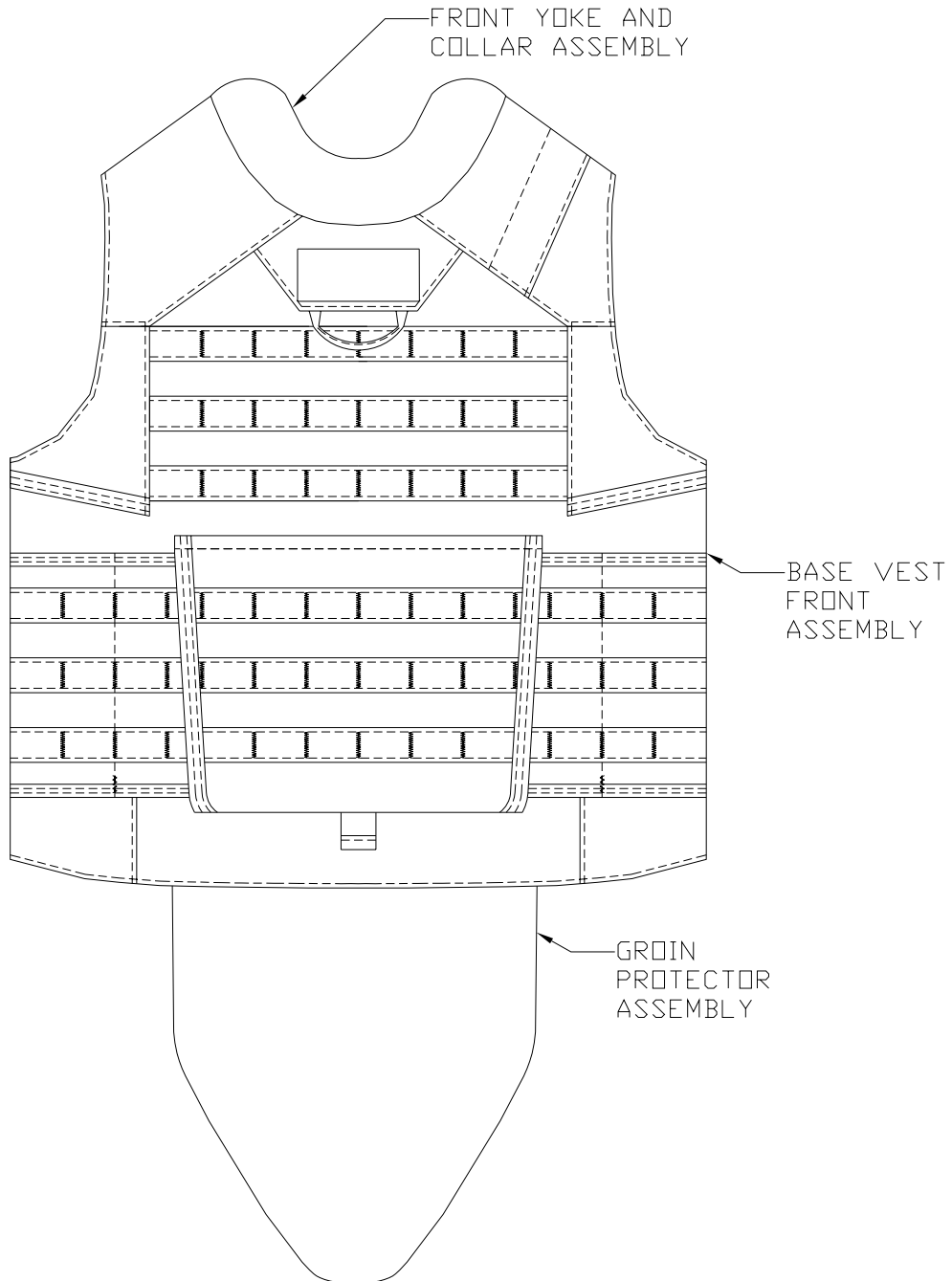
DATE OF MFG: \_\_\_\_\_

SERIAL NO: \_\_\_\_\_

CONTRACT #:

MANUFACTURED BY:

**IOTV FRONT VIEW**  
**(For general reference only, not to be used in place of patterns)**



**IOTV BACK VIEW**  
**(For general reference only, not to be used in place of patterns)**

