

INCH-POUND

MIL-B-44194A

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SUPERSEDING

MIL-B-44194

14 August 1985

MILITARY SPECIFICATION

BODY ARMOR, FRAGMENTATION PROTECTIVE,
UNDERGARMENT, COMBAT VEHICLE CREWMEN'S

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

1. SCOPE

1.1 Scope. This document covers body armor which provides military personnel protection against fragmentation. This is a special purpose Life Support Clothing and Equipment (LSC&E) item. All Government administrative and surveillance procedures applicable to LSC&E items shall be invoked in accordance with the contract or purchase order (see 6.2).

1.2 Classification. The body armor shall be in the following sizes (see 6.2).

Sizes (See 6.1.1)

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8470

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 6.2).

SPECIFICATIONS

FEDERAL

A-A-50083 - Bag, Plastic, Folded Garment
 V-T-285 - Thread, Polyester
 V-T-295 - Thread, Nylon
 DDD-L-20 - Label: for Clothing, Equipage, and Tentage,
 (General Use)
 PPP-B-636 - Boxes, Shipping, Fiberboard

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MIL-C-342 - Cloth, Wind Resistant, Poplin, Cotton
 MIL-W-5664 - Webbing, Textile, Elastic
 MIL-F-21840 - Fastener Tapes, Hook and Loop, Synthetic
 MIL-L-35078 - Loads, Unit: Preparation of Semiperishable
 Subsistence Items; Clothing, Personal Equipment
 and Equipage; General Specification For
 MIL-T-43636 - Thread, Aramid
 MIL-C-43842 - Cloth, Oxford, Aramid
 MIL-C-44050 - Cloth, Ballistic, Aramid

STANDARDS

FEDERAL

FED-STD-751 - Stitches, Seams and Stitchings

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection
 by Attributes
 MIL-STD-129 - Marking for Shipment and Storage
 MIL-STD-147 - Palletized Unit Loads
 MIL-STD-731 - Quality of Wood Members for Containers and Pallets

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(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD 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 6.2).

THE COLOR ASSOCIATION OF THE UNITED STATES

Standard Color Card of America

Department of Defense Standard Shades for Sewing Threads

(Color cards may be available from the Color Association of the United States, 343 Lexington Avenue, New York, NY 10016-0927. If color cards are not available from the Color Association, individual color samples may be obtained from the contracting activity or as directed by the contracting activity.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 3951 - Standard Practice for Commercial Packaging

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

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

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

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3), in accordance with 4.3.

3.2 Guide sample. Guide samples, when furnished, are solely for guidance and information to the contractor (see 6.4). Variation from this specification may appear in the sample, in which case this specification shall govern.

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3.3 Materials. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3.1 Cloth, ballistic, aramid. The cloth for the ballistic inserts shall be aramid ballistic cloth conforming to type I, class 2 of MIL-C-44050.

3.3.2 Cloth, oxford, aramid. The cloth for the carrier outer shells shall be aramid oxford cloth, color Olive Green 106 conforming to MIL-C-43842.

3.3.3 Cloth, wind resistant, poplin, cotton. The cloth for the carrier inner shells shall be cotton poplin wind resistant cloth, color Olive Green 107 conforming to class A of MIL-C-342.

3.3.4 Tape, binding. The tape for binding the ballistic inserts shall be of 45° bias cut polyester/cotton 50/50, 3.5 ounces per square yard, 76 by 60 minimum texture, color white or bleached, conforming to Atlantic Bias Products Style "Polyfrost" or equal (see 6.5). The width shall be sufficient to meet the requirements in table I, operation 11.b or 11.c.

3.3.5 Fastener tape, hook and loop. The hook and loop fastener tapes shall conform to type I, class 2, color Green 3421 of MIL-F-21840. The widths shall be as specified in table I.

3.3.6 Webbing, elastic. The elastic webbing for the side closure straps shall be 1-1/2 inches wide, color Oliver Drab 7 and shall conform to type I, class 1 of MIL-W-5664.

3.3.7 Thread, aramid. The thread for all stitching on the carrier shall be aramid conforming to MIL-T-43636, size B, color Olive Drab S-1, C. A. 66022.

3.3.8 Thread, polyester or nylon. The thread for all stitching on the ballistic inserts shall be polyester thread conforming to type I, class 1, subclass A, size B, color natural of V-T-285 or nylon thread conforming to type I, class A, size B, color natural of V-T-295.

3.3.9 Size, identification, and instruction labels.

3.3.9.1 Ballistic inserts. Each ballistic insert shall be furnished with a combination size, identification, and instruction label conforming to type VI, class 14 of DDD-L-20. The item description for the front inserts shall be "Ballistic Insert, Front; Body Armor, Fragmentation Protective, Undergarment, Combat, Vehicle Crewmen's". The item description for the back inserts shall be the same as for the front except substitute "Back" for "Front". The label shall show fastness to accelerated laundering. Format and contents of the instruction legend shall be as follows:

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WASHING INSTRUCTIONS FOR BALLISTIC INSERTS

1. Wash the inserts as seldom as possible.
2. HAND WASH IN WARM TO HOT WATER AND MILD DETERGENT AND DRY IN ANY CONVENTIONAL MANNER or follow the procedures in 3 or 4 below.
3. Fixed Laundry Procedure: Wash the inserts according to Laundry Wash Formula "K" of FM 10-17, Army Fixed Laundry Organization and Operation. Lightly extract, then tumble dry at 180°F maximum.
4. Field Laundry Procedure: Wash the inserts according to Laundry Wash Formula "I" of TM 10-280, Field Laundry, Bath and Clothing Exchange Operations. Lightly extract, then tumble dry at 180°F maximum.
5. Read the instructions on the carrier.
6. DO NOT DRY CLEAN.

3.3.9.2 Carrier. The carrier shall be furnished with a combination size, identification, and instruction label conforming to type VI, class 14 of DDD-L-20. The label shall show fastness to accelerated laundering. Format and contents of the instruction legend shall be as follows:

READ THESE INSTRUCTIONS CAREFULLY
THIS ARMOR MAY SAVE YOUR LIFE

When worn properly, this armor will protect your vital areas against secondary fragments which may occur inside the vehicle.

INSTRUCTIONS

1. Make sure the ballistic protective inserts are in place and are of the correct size. Two front inserts and two back inserts are required.
2. Wear armor over your T-shirt.
3. Close the body armor by overlapping the back over the front at the sides. Adjust straps by putting a little tension on the elastic and pressing the strap hook tape to the front loop tape. DO NOT KEEP THE ELASTIC STRETCHED TO ITS MAXIMUM LENGTH.

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4. Washing instructions:

a. Remove ballistic inserts before washing the carrier. Attach the hook tape to the loop tape before washing. Wash inserts separately from the carrier and as seldom as possible.

b. HAND WASH THE CARRIER IN WARM TO HOT WATER AND MILD DETERGENT AND DRY IN ANY CONVENTIONAL MANNER or follow the procedures in 4.c or 4.d below.

c. Fixed Laundry Procedure: Wash the carrier according to Laundry Wash Formula "K" of FM 10-17, Army Fixed Laundry Organization and Operation. Lightly extract, then tumble dry at 180°F maximum.

d. Field Laundry Procedure: Wash the carrier according to Laundry Wash Formula "I" of TM 10-280, Field Laundry, Bath and Clothing Exchange Operations. Lightly extract, then tumble dry at 180°F maximum.

5. Read the washing instructions on the insert.

6. Turn in your armor to supply points for exchange when:

a. Any component is torn, damaged or missing.

b. The fastener tapes do not hold.

c. You cannot clean it.

3.4 Design. The body armor shall consist of a carrier and two removable front and two removable back ballistic inserts. Each ballistic insert shall have eight plies of material. The carrier shall be the over-the-head type with no adjustment at the shoulders. The carrier shall form front and back pockets, shaped to firmly support the inserts and shall have four (two at each side) adjustment straps located between the waist and chest levels.

3.5 Construction. The construction shall conform to the requirements specified in table I and herein. During the cutting and fabrication process, the tolerances allowed in table I shall be utilized in such a manner that on the finished body armor, the ballistic inserts lie flat within the carrier without any bulging of the carrier at any point or with no more than 1/4 inch of clearance between the carrier and the ballistic insert around the periphery of the inserts.

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3.5.1 Stitches, seams, and stitching. All stitches, seams, and stitching shall conform to FED-STD-751. The type of seam, stitching, and stitches per inch shall be as specified in table I. Seam allowances shall be maintained with seams sewn so that no raw edges, run-offs, twists, pleats, puckers, or open seams occur.

3.5.1.1 Type 301 stitching. Ends of all stitching shall be backstitched or overstitched 1/2 inch minimum except when caught in other stitching or turned under in a hem. Thread tension shall be maintained so that there will be no loose stitching resulting in loose bobbin or top thread, or excessively tight stitching resulting in puckering of the materials sewn. The lock shall be embedded in the materials sewn.

3.5.1.1.1 Repairs of type 301 stitching. Repairs of type 301 stitching shall be as follows:

a. When thread breaks or bobbin run-outs occur during sewing, the stitching shall be repaired by restarting the stitching a minimum of 1 inch back of the end of the stitching. 1/

b. Thread breaks or two or more consecutive skipped or run-off stitches noted during inspection of the item (in-process or end item) shall be repaired by overstitching. The stitching shall start a minimum of 1 inch in back of the defective area, continue over the defective area and continue a minimum of 1 inch beyond the defective area onto the existing stitching. Loose or excessively tight stitching shall be repaired by removing the defective stitching, without damaging the materials, and restitching in the required manner. 1/

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

3.5.1.2 Type 515, 516, and 519 stitching. The stitch gage for all overedge stitching shall be 3/16 to 1/4 inch and stitch margins for chain stitching shall be $3/8 \pm 1/16$ inch. Thread tension shall be maintained so that there will be no loose stitching. All repairs shall be in accordance with 3.5.1.1.1.a and 3.5.1.1.1.b, except substitute 3/4 inch for 1 inch wherever 1 inch appears.

3.5.1.3 Automatic stitching. Automatic stitching machines may be used to perform any of the required stitch patterns provided the requirements for the stitch pattern, stitches per inch, and 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 stitching.

3.5.1.4 Thread ends. All thread ends shall be trimmed to a length of not more than 1/4 inch.

3.5.2 Repairs. Except as otherwise specified herein, repairs are not allowed to be made to the body armor.

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3.6 Patterns. Standard patterns, which provide an allowance of 3/8 inch unless otherwise specified for all seams, will be furnished by the Government and shall be used by the contractor as a guide for cutting working patterns only. The standard patterns shall not be altered in any way and the working patterns shall be cut to conform exactly with the standard patterns.

3.6.1 List of pattern parts and applicable materials.3.6.1.1 Cloth, ballistic, aramid.

<u>Item</u>	<u>Nomenclature</u>	<u>Cut</u>
1	Ballistic Insert, Front	16
2	Ballistic Insert, Back	16

3.6.1.2 Cloth, oxford, aramid.

<u>Item</u>	<u>Nomenclature</u>	<u>Cut</u>
1	Carrier, Outer Front	1
2	Carrier, Outer Back	1

3.6.1.3 Cloth, wind resistant, poplin, cotton.

<u>Item</u>	<u>Nomenclature</u>	<u>Cut</u>
1	Carrier, Inner Front	1
2	Carrier, Inner Back	1
3	Carrier, Inner, Front Facing	1

3.7 Manufacturing operations requirements. The body armor shall be manufactured in accordance with the use of all operations specified in table I. The contractor is not required to following the exact sequence of operations.

3.8 Use of automated apparel equipment. Automated apparel equipment may be used to perform any of the operations specified in table I, providing that the seam and stitch type are as specified and the finished component conforms to the required configuration. When a government furnished shaper pattern is forwarded, the component shall conform to that pattern.

3.9 Figures. Figure 1 is furnished solely for guidance and information. Should variation from the written specification appear in the figure, the written specification shall govern.

TABLE I.		STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D														
NO.	MANUFACTURING OPERATIONS REQUIREMENTS				NEEDLE	DOBBINI/ LOOPER	COVER												
1.	<p><u>Cutting.</u></p> <p>a. The body armor components shall be marked and cut in strict accordance with patterns furnished which show size, cutting directional lines, placement of components and notches for proper assembling of all parts. A cutting tolerance of $\pm 1/8$ inch is permitted for all parts covered by a pattern.</p> <p>b. The fabric components visible on the exterior of the body armor shall not be drilled for positioning any part except where a component part, when attached, will completely and permanently cover the drill hole. The use of drill holes on the ballistic material is prohibited.</p> <p>c. Cut 1 inch wide hook and loop fastener tape for carrier front. Length of the pieces shall be as follows:</p> <table><tr><td><u>Size</u></td><td><u>Length (inches)</u></td></tr><tr><td>X-Small</td><td>2-3/4</td></tr><tr><td>Small</td><td>3-1/4</td></tr><tr><td>Medium</td><td>4</td></tr><tr><td>Large</td><td>4-5/8</td></tr><tr><td>X-Large</td><td>5-1/4</td></tr></table>	<u>Size</u>	<u>Length (inches)</u>	X-Small	2-3/4	Small	3-1/4	Medium	4	Large	4-5/8	X-Large	5-1/4						
<u>Size</u>	<u>Length (inches)</u>																		
X-Small	2-3/4																		
Small	3-1/4																		
Medium	4																		
Large	4-5/8																		
X-Large	5-1/4																		

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TABLE I. (cont'd)		STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D														
NO.	MANUFACTURING OPERATIONS REQUIREMENTS				NEEDLE	NOBBIN/ LOOPER	COVER												
1.	<p><u>Cutting. (cont'd)</u></p> <p>d. Cut 1 inch wide hook and loop fastener tape pieces for carrier back. Length of the pieces shall be as follows:</p> <table><tr><td><u>Size</u></td><td><u>Length (inches)</u></td></tr><tr><td>X-Small</td><td>15-3/8</td></tr><tr><td>Small</td><td>17-3/8</td></tr><tr><td>Medium</td><td>19-3/8</td></tr><tr><td>Large</td><td>21-3/8</td></tr><tr><td>X-Large</td><td>23-3/8</td></tr></table> <p>e. Cut 1-1/2 inch wide loop fastener tape for carrier front. Length of the pieces shall be 6-1/2 ± 1/8 inches for all sizes.</p> <p>f. Cut 1-1/2 inch wide hook fastener tape for side closure straps. Length of the pieces shall be 3-1/2 ± 1/8 inches for all sizes except for size X-Small. Length for size X-Small shall be 3 ± 1/8 inches.</p> <p>g. Cut 1-1/2 inch wide elastic webbing for side closure straps. Length of the pieces shall be 3-1/2 ± 1/8 inches for all sizes.</p>	<u>Size</u>	<u>Length (inches)</u>	X-Small	15-3/8	Small	17-3/8	Medium	19-3/8	Large	21-3/8	X-Large	23-3/8						
<u>Size</u>	<u>Length (inches)</u>																		
X-Small	15-3/8																		
Small	17-3/8																		
Medium	19-3/8																		
Large	21-3/8																		
X-Large	23-3/8																		
2.	<p><u>Replacement of defective components.</u></p> <p>During the spreading, cutting and manufacturing process, components having material defects or damages that are classified as defects in 4.4.3 shall be removed from production and replaced with nondefective and properly matched components.</p>																		

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NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
3.	<u>Make carrier front inner.</u>						
	a. Overedge top and bottom edges of the front inner facing. Fold top edge 3/8 inch and top stitch 1/4 \pm 1/16 inch from folded edge.	503 or 504	EFd-1	6-10	B	B	
	b. With the folded edge facing down, position the three pieces of 1 inch wide hook fastener tape on the front inner facing with the ends located as shown on the pattern, \pm 1/8 inch. Stitch four sides of each tape with a stitch margin 1/16 to 1/8 inch.	301	LSbj-1	8-10	B	B	
	c. Overedge bottom of carrier front inner.	503 or 504	EFd-1	6-10	B	B	
	d. Stitch inner front facing to carrier front inner. With the bottom edges aligned, top stitch 1/8 to 3/16 inch from edges through three plies. The facing and the hook fastener shall finish to the inside of the completed carrier.	301	LSbj-1	8-10	B	B	
4.	<u>Make carrier front outer.</u>						
	a. Overedge bottom of carrier front outer.	503 or 504	EFd-1	6-10	B	B	
	b. Turn bottom edge 3/8 inch and top stitch 1/8 \pm 1/16 inch from overedged edge.	301	EFa-1	6-10	B	B	
	c. With inner surface of the carrier front outer facing up, position the three lengths of 1 inch wide loop fastener tape with the ends located as shown on the patterns, \pm 1/8 inch. Stitch four sides of each tape with a stitch margin of 1/16 to 1/8 inch.	301	LSbj-1	8-10	B	B	

NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
4.	<u>Make carrier front outer.</u> (cont'd)						
	d. Stitch the four 1-1/2 inch wide loop fastener tapes to the outer surface of the carrier outer front in location shown on the pattern, $\pm 1/8$ inch. Stitch four sides of each tape with a stitch margin of 1/16 to 1/8 inch.	301	LSbj-1	8-10	B	B	
5.	<u>Join carrier front inner and outer.</u>						
	With the outside surfaces facing each other and evenly aligned, turn the facing so that the bottom edge of inner and outer are even. Stitch inner and outer along sides and neck catching the facing and leaving the shoulders open. Turn carrier front right side out. Facing in the finished carrier shall be between the inner and outer and the hook and loop fastener tapes shall be face to face.	515, 516 or 519	SSa-2	6-10	B	B	
6.	<u>Make carrier back inner and attach label.</u>						
	a. Overedge bottom of carrier back inner.	503 or 504	EFd-1	6-10	B	B	
	b. Turn bottom edge 3/8 inch and top stitch 1/8 $\pm 1/16$ inch from overedged edge.	301	EFa-1	6-10	B	B	
	c. With the folded edge facing down, position the 1 inch wide hook fastener tape with the ends located as shown on the pattern, $\pm 1/8$ inch. Stitch four sides of the tape with a stitch margin of 1/16 to 1/8 inch.	301	LSbj-1	8-10	B	B	

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NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
6.	<u>Make carrier back inner and attach label.</u> (cont'd) d. Position the combination size, identification, and instruction label on the outside surface of the carrier back inner in the approximate center of the back, $3\frac{1}{2} \pm \frac{1}{4}$ inches above the finished bottom edge and stitch on all four sides, $\frac{1}{16}$ to $\frac{1}{8}$ inch from the edge. Label shall read from top to bottom of the carrier.	301	LSbj-1	8-10	B	B	
7.	<u>Make carrier back outer.</u> a. Overedge bottom of carrier back outer.	503 or 504	EFd-1	6-10	B	B	
	b. Turn bottom edge $\frac{3}{8}$ inch and top stitch $\frac{1}{8} \pm \frac{1}{16}$ inch from overedged edge.	301	EFa-1	6-10	B	B	
	c. With the folded edge facing up, position the 1 inch loop fastener tape with the ends located as shown on the pattern, $\pm \frac{1}{8}$ inch. Stitch four sides of the tape with a stitch margin of $\frac{1}{16}$ to $\frac{1}{8}$ inch.	301	LSbj-1	8-10	B	B	

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NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
8.	<p><u>Make side closure straps.</u></p> <p>Make four straps as follows: Fold one end of elastic webbing back $3/8 \pm 1/16$ inch and overlap end of hook fastener tape over the foldback $1/2 \pm 1/16$ inch with side edges evenly aligned and hooks of fastener tape facing up. Stitch through overlap with a $1-3/8 \pm 1/16$ inches by $3/8 \pm 1/16$ inch box pattern centered on the overlap.</p>	301	LSb-2	8-10	B	B	
9.	<p><u>Join carrier back inner and outer.</u></p> <p>With outside surfaces facing each other and evenly aligned, fold bottom edge of carrier inner along fold line indicated on the pattern, $\pm 1/8$ inch. Stitch inner and outer along sides and neck catching the fold and side closure straps. Shoulders shall be left open. Each strap shall be positioned between the inner and outer at the locations shown on the pattern, $\pm 1/8$ inch. The hook side of the fastener tape shall face the carrier inner and the ends of the elastic tape shall be even with the edges of the carrier. The fold in the finished carrier shall be between the inner and outer and the hook and loop fastener tapes shall be face to face.</p>	515, 516 or 519	SSa-2	6-10	B	B	
10.	<p><u>Join carrier front and back and topstitch.</u></p> <p>a. With carrier back wrong side out and carrier front right side out, insert front within the back and evenly align all the edges at the shoulders. Front inner shall face back inner. Join the carrier front to the back.</p>	515, 516, or 519	SSa-2	6-10	B	B	

NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
10.	<u>Join carrier front and back and topstitch. (cont'd)</u> b. Turn carrier back right side out and work out all seams fully around the outer periphery, neck and the shoulders. Topstitch around neck and sides of carrier with a stitch margin of 1/8 to 1/16 inch.	301	SSc-1	8-10	B	B	
11.	<u>Make front and back ballistic inserts.</u> NOTE: Two individual front ballistic inserts and two individual back ballistic inserts are required for each body armor assembly. Each individual insert shall consist of a total of eight plies assembled as follows: a. Position the combination size, identification, and instruction label on the outside surface of the first ply of each ballistic insert in the approximate center $3\frac{1}{2} \pm \frac{1}{4}$ inches above the bottom edge and stitch along all four sides, 1/8 to 3/16 inch from edges. Label shall read from top to bottom of the insert at assembly. b. With the instruction label on the first ply facing out superimpose the eight plies of the insert on top of each other and evenly align all edges. Simultaneously, join the plies together and bind the edges with the binding tape specified in 3.3.4. Fold each edge of tape under $\frac{1}{4} \pm \frac{1}{16}$ inch and bind insert around entire periphery with single row of stitching located 3/8 inch minimum from the edge of the ballistic material of the insert and 1/16 to 1/8 inch from the folded edge of the binding. The folded edges of the binding shall finish 1/2 inch	301	LSbj-1	8-10	B	B	
		301	BSc-1	8-10	B	B	

NO.	TABLE I. (cont'd) MANUFACTURING OPERATIONS REQUIREMENTS	STITCH TYPE	SEAM AND STITCHING TYPE	STITCHES PER INCH	T H R E A D		
					NEEDLE	BOBBIN/ LOOPER	COVER
11.	<p><u>Make front and back ballistic inserts.</u> (cont'd)</p> <p>minimum from the edge of the ballistic material of the insert. Ends of tape shall be overlapped 1 inch minimum and end of tape on outside shall be turned under 1/2 inch minimum.</p> <p>- or -</p> <p>c. Bind periphery of insert in two operations. Align edge of binding tape even with edge of insert and stitch all around periphery with stitching located 3/8 inch minimum from edge of insert. Turn tape over onto opposite side, turn edge of binding under $1/4 \pm 1/16$ inch and stitch around periphery of insert with stitching located 3/8 inch minimum from the edge of the ballistic material of the insert and 1/16 to 1/8 inch from the folded edge of the binding. The folded edge of the binding shall finish 1/2 inch minimum from the edge of the insert. Ends of tape shall be overlapped 1 inch minimum and ends of tape on outside shall be turned under 1/2 inch minimum.</p>	301	BSg-2	8-10	B	B	
12.	<p><u>Clean armor.</u></p> <p>Remove all spots and stains. All thread ends and any ballistic cloth yarns protruding from the binding shall be trimmed to a length of not more than 1/4 inch.</p>						
13.	<p><u>Install ballistic inserts in carrier.</u></p> <p>Install the front and back ballistic inserts within the carrier and secure fastener tapes. Secure side closure straps across front of carrier.</p>						

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3.8 Workmanship. The finished body armor shall conform to the quality of product established by this specification and the occurrence of defects shall not exceed the applicable acceptable quality levels. Utmost care shall be taken during component and subassembly fabrication to ensure quality workmanship and safety of the service person using the item.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless otherwise disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance 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.

4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for ensuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to ensure compliance with all dimensional requirements.

4.1.3 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

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

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined for the defects specified in 4.4.3 and 4.4.4.

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4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.4.1.1 Component and material certification. A certificate of compliance may be acceptable as evidence that the binding tape conforms to the requirements specified in 3.3.4.

4.4.2 In-process inspection.

4.4.2.1 Working patterns examination. Examination of the working patterns shall be made to assure that they conform to the Government patterns in all respects.

4.4.2.2 Ballistic inserts visual examination. Prior to binding, each ply of all ballistic inserts shall be examined for defects. Any ply containing a defect which is classified as such in MIL-C-44050 shall be removed and replaced. In addition, all inserts shall be examined to assure that they contain eight plies.

4.4.2.3 Ballistic inserts dimensional examination. Prior to binding, the ballistic insert plies shall be examined for the defects specified in table II. The lot size shall be expressed in units of front or back inserts of one size only. The sample unit shall be one front or back insert, as applicable. The inspection level shall be I and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 1.0 for major defects and 10.0 for total (major and minor combined) defects.

TABLE II. Ballistic inserts dimensional defects

Examine	Defect	Classification	
		Major	Minor
Dimensions of plies in ballistic insert	Smaller or larger than cutting pattern by 1/8 to 3/16 inch		201
	Smaller or larger than cutting pattern by more than 3/16 inch <u>1/</u>	101	

1/ The front insert or back insert, as applicable, shall be examined with the applicable cutting pattern. A defect shall be scored when the condition exists for a length of more than 2 inches or if the condition exists in several areas with an accumulated distance of 4 inches or more.

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4.4.3 End item visual examination. The end item (one complete body armor undergarment) shall be examined for the defects specified in table III. The lot size shall be expressed in units of end items. The sample unit shall be one end item. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 15.0 for total (major and minor combined) defects.

TABLE III. End item visual defects

Examine	Defect	Classification	
		Major	Minor
Cloth, carrier	Any hole (except drill hole), cut, or tear	101	
	Any exposed drill hole		201
	Any abrasion marks, broken or missing yarns, or multiple floats	102	
	Any mend, darn, or patch	103	
	Not cut in accordance with pattern with respect to material directional requirements		202
	Any needle chew	104	
Cloth, ballistic insert	Any hole, cut, or tear	105	
Cloth, binding	Any hole, cut, or tear	106	
	Not cut on a bias	107	
Fastener tape	Cut or tear	108	
	Hooks crushed affecting closure	109	
Webbing elastic	Any hole, cut, tear, or frayed edge	110	
	Needle chew:		
	-Up to and including 1/8 inch in length		203
	-More than 1/8 inch in length	111	
Seams and stitchings:			
Open seams	Up to and including 1/2 inch		204
	More than 1/2 inch	112	

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TABLE III. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Seams and stitchings: (cont'd)			
	NOTE: A seam shall be classified as an open seam when one or more stitches joining a seam are broken, or when two or more consecutive skipped or runoff stitches occur.		
Raw edges (except where required or otherwise classified herein)	More than 1/4 inch when securely caught in stitching		205
	NOTE: Raw edges not securely caught in stitching shall be classified as open seams.		
Seam and stitch type	Wrong seam or stitch type	113	
	Seam pleated or excessively puckered, clearly noticeable		206
Stitch tension	Tension loose, resulting in loose bobbin or top thread		207
	Tension excessively tight, resulting in puckering of material		208
Stitches per inch (all types of stitching)	One stitch less than minimum specified <u>1</u> /		209
	Two or more stitches less than minimum specified <u>1</u> /	114	
	Two or more stitches in excess of maximum specified <u>1</u> /		210
	NOTE: Variation in the number of stitches per inch caused by operator speeding up the machine and pulling the material in order to sew over heavy places, or in turning corners shall be classified as follows:		
	a. Within a minor defect classification - no defect.		
	b. Within the major defect classification - minor defect.		

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TABLE III. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Rows of stitching	Any row omitted	115	
Stitching ends (on type 301 stitching)	Ends of stitching not secured as specified (except when caught in other stitching or turned under in a hem)		211
Assembly - general	Any fastener tape reversed, i.e., loop tape attached where hook tape is required or vice versa		212
	End of side closure strap not fully caught in carrier joining seam	116	
	Side closure strap attached with hook side of fastener tape fac- ing wrong direction	117	
	End of binding tape not turned under		213
Thread breaks, skipped stitches or run-offs (on type 301 stitching)	Overstitched less than 1 inch in each direction beyond defective area		214
Thread breaks, skipped stitches or run-offs (on overedge stitching)	Overstitched less than 3/4 inch in each direction beyond the defective stitching area		215
NOTE: On all types of stitching, thread breaks or two or more consecutive skipped or run-off stitches not overstitched shall be classified as open seams.			
Fit of ballistic inserts within carrier	Carrier smaller than ballistic insert(s), i.e., not permitting assembly to lie smooth and flat within	118	
	Carrier larger than ballistic insert(s) i.e., more than 1/4 inch clearance around periphery when insert is centered within carrier		216

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TABLE III. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Components and assembly	Any component caught in any un-related operation or stitching (not otherwise classified herein)	119	
	Any component part omitted or not attached as specified (not otherwise classified herein)	120	
	Any unauthorized repair	121	
	Any insert incorrect size with respect to carrier size (to be determined by matching identification labels)	122	
Cleanness	Any spot or stain clearly noticeable; thread ends or ballistic cloth yarn ends not trimmed throughout, as specified		217
Labels	Omitted, incorrect, illegible, or not as specified		218

1/ Score only where the condition exists for 3 inches or more in several areas with an accumulated distance of 5 inches or more in an individual seam.

4.4.4 End item dimensional examination. The end item (one complete body armor undergarment) shall be examined for the defects specified in table IV. The lot size shall be expressed in units of end items. The sample unit shall be one end item. The inspection level shall be S-3 and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 10.0 for total (major and minor combined) defects.

TABLE IV. End item dimensional defects

Examine	Defect	Classification	
		Major	Minor
Binding tape on ballistic inserts	Edge of binding on either side of insert less than 1/2 inch up to and including 7/16 inch from edge of insert for an accumulated distance of 6 inches or more		201

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TABLE IV. End item dimensional defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Binding tape on ballistic inserts (cont'd)	Edge of binding on either side less than 7/16 inch from edge of insert for a distance of 1 inch or more	101	
	Stitching located less than 3/8 inch up to and including 5/16 inch from edge of ballistic material of the insert for an accumulated distance of 6 inches or more		202
	Stitching located less than 5/16 inch from edge of ballistic material of the insert for a distance of 1 inch or more	102	
Component and location dimensions (not otherwise classified herein)	Not within specified tolerance		203
Stitch margin or gauge (not otherwise classified herein)	Not within specified tolerance <u>1/</u>		204

1/ Defect to be scored only when the condition exists on major portion of seam, applicable to each individual seam.

4.4.5 Packaging examination. The fully packaged end items shall be examined for the defects listed below. The lot size shall be expressed in units of shipping containers. The sample unit shall be one shipping container fully packaged. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

<u>Examine</u>	<u>Defect</u>
Marking (exterior and unit pack)	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application
Materials	Any component missing, damaged, or not as specified

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<u>Examine</u>	<u>Defect</u>
Workmanship	Inadequate application of components, such as: incomplete closure of container flaps, loose strapping, improper taping, or inadequate stapling Inside dimensions of shipping container not as specified
Content	Number of body armors per shipping container is more or less than required <u>1/</u>

1/ For this defect, one shipping container in the sample shall be examined.

4.4.6 Palletization examination. The fully packaged and palletized end items shall be examined for the defects listed below. The lot size shall be expressed in units of palletized unit loads. The sample unit shall be one palletized unit load, fully packaged. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

<u>Examine</u>	<u>Defect</u>
Finished dimensions	Length, width, or height exceeds specified maximum requirements
Palletization	Pallet pattern not as specified Interlocking of loads not as specified Load not bonded as specified
Weight	Exceeds maximum load limits
Marking	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application

5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial, as specified (see 6.2).

5.1.1 Level A preservation. Each complete body armor, with back panel superimposed over the front panel so that the identification label is visible with side closure straps fastened, shall be inserted flat in a close-fitting clear polyethylene film bag conforming to A-A-50083.

5.1.2 Commercial preservation. Each complete body armor shall be preserved in accordance with ASTM D 3951.

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5.2 Packing. Packing shall be level A, B, or Commercial, as specified (see 6.2).

5.2.1 Level A packing. Ten complete body armors, of one size only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, grade V2s of PPP-B-636. The inside of each shipping container shall be fitted with a box liner conforming to type CF, class weather-resistant, variety DW, grade V15c of PPP-B-636. Level A unit packs shall be packed flat, 10 in depth, each alternately reversed top to bottom within a shipping container. Inside dimensions of each shipping container shall be 26-3/4 inches in length, 21-3/4 inches in width, and 8-3/4 inches in depth ($\pm 1/8$ inch). Each shipping container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.5. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2).

5.2.2 Level B packing. Ten complete body armors, of one size only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. The inside of each shipping container shall be fitted with a box liner conforming to type CF, class domestic, variety DW, grade 275 of PPP-B-636. Level A unit packs shall be packed flat, 10 in depth, each alternately reversed top to bottom within a shipping container. Inside dimensions of each shipping container shall be 26-3/4 inches in length, 21-3/4 inches in width, and 8-3/4 inches in depth ($\pm 1/8$ inch). Each shipping container shall be closed in accordance with method II as specified in the appendix of PPP-B-636, except the inspection shall be in accordance with 4.4.5.

5.2.2.1 Weather-resistant fiberboard containers. When specified (see 6.2), the shipping container shall be a grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.5.

5.2.3 Commercial packing. Body armor, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

5.3 Palletization. When specified (see 6.2), body armor, packed as specified in 5.2.2 and 5.2.3, shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Pallet types shall be type I (4-way entry), type IV, or type V in accordance with MIL-STD-147. Pallets shall be fabricated from wood groups I, II, III, or IV of MIL-STD-731. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means C and D or film bonding means F or G. Pallet pattern shall be number 1 in accordance with the appendix of MIL-STD-147. Interlocking of loads shall be effected by reversing the pattern of each course.

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5.4 Marking. In addition to any special marking required by the contract or purchase order, shipping containers and palletized unit loads shall be marked in accordance with MIL-STD-129 or ASTM D 3951, as applicable.

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 body armor is intended for use by combat vehicle crewmen for fragmentation protection.

6.1.1 Application of sizes. The body armor sizes are intended to fit the following chest and height requirements:

<u>Size</u>	<u>Chest measurement (inches)</u>	<u>Height measurement</u>
X-Small - Short	34 and smaller	Up to 64 inches
X-Small - Regular	34 and smaller	Up to 71 inches
Small - Regular	34 - 38	Up to 71 inches
Medium - Regular	38 - 42	Up to 71 inches
Large - Regular	42 - 46	Up to 71 inches
X-Large - Regular	46 - 50	Up to 71 inches
Small - Long	34 - 38	71 inches or more
Medium - Long	38 - 42	71 inches or more
Large - Long	42 - 46	71 inches or more
X-Large - Long	46 - 50	71 inches or more

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Special provisions for verification inspection of Life Support Clothing and Equipment (see 1.1).
- c. Size required (see 1.2).
- d. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- e. When a first article sample is required (see 3.1, 4.3, and 6.3).
- f. Levels of preservation and packing (see 5.1 and 5.2).
- g. Type and class of unit load required (see 5.2.1).
- h. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1).
- i. When palletization is required (see 5.3).

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

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

6.5 Equal item. Prior to the use of an "or equal" item, the supplier shall submit the item with supporting data to the contracting officer for subsequent approval or disapproval by the responsible military agency.

6.6 Subject term (key word) listing.

Torso protection

6.7 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - GL
Navy - MC
Air Force - 99

Preparing activity:

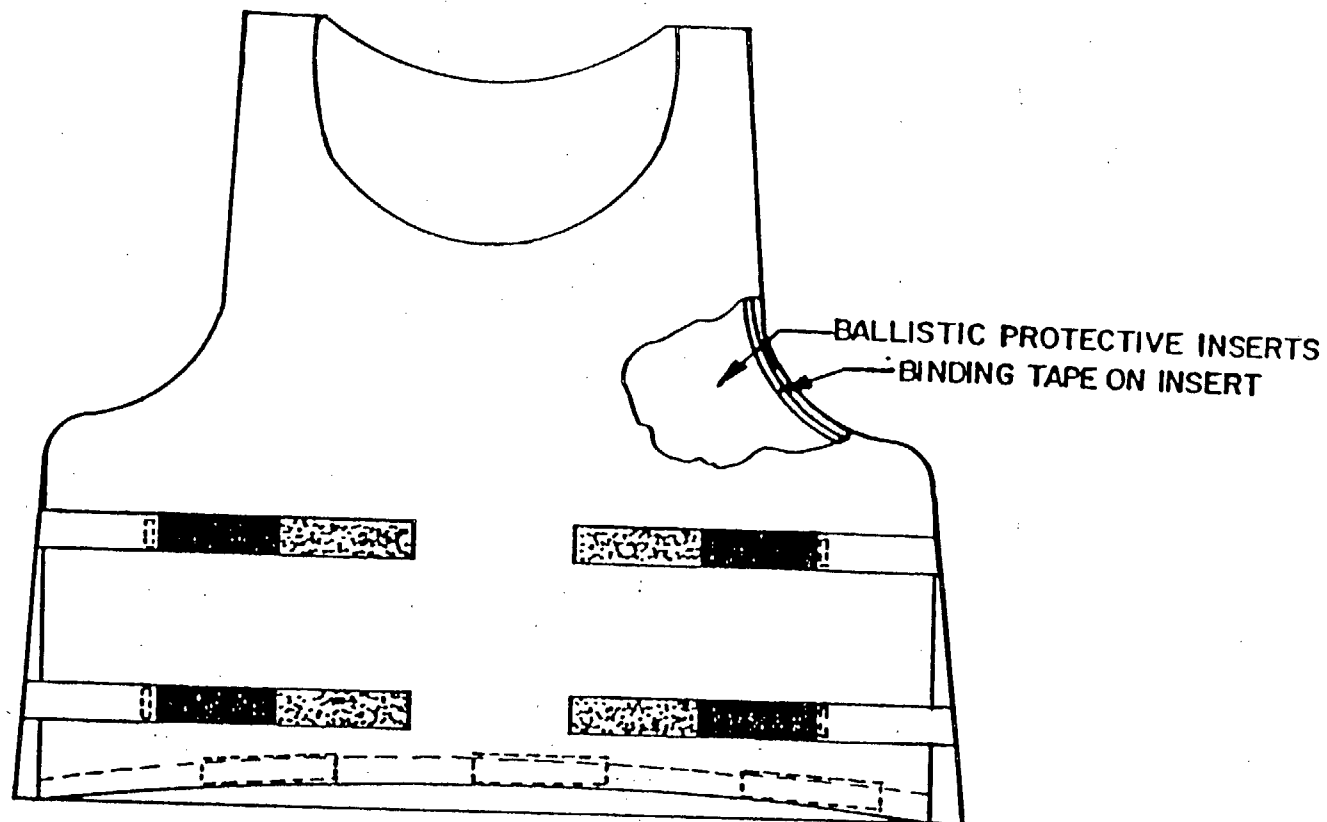
Army - GL
(Project 8470-0129)

Review activities:

Army - MD
Air Force - 82
DLA - CT

User activity:

Air Force - 45



**FIGURE 1: BODY ARMOR, FRAGMENTATION PROTECTIVE
UNDERGARMENT, COMBAT VEHICLE CREWMEN'S**

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