

**U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE**

SPECIFICATION

PANTS, FLAME-RESISTANT ARAMID

1. SCOPE AND CLASSIFICATION

1.1 Scope. This document covers the requirements for flame-resistant pants.

1.2 Classification. The pants shall be of following type and sizes, all dimensions in inches (see 6.2):

Type I - Meta-Aramid Fiber Blend
Type II - Para-Aramid Fiber Blend

Size - Waist range - length (Short, Reg or Long)

Waist Range	Short	Inseam Regular	Long
24-28	30	33	36
26-30	30	33	36
28-32	30	33	36
30-34	30	33	36
32-36	30	33	36
34-38	30	33	36
36-40	30	33	36
38-42	30	33	36
40-44	30	33	36
42-46	30	33	36
44-48	30	33	36
46-50	30	33	36
48-52	30	33	36

Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be used in improving this document should be addressed to: USDA Forest Service, Missoula Technology and Development Center, 5785 Highway 10 West, Missoula, MT 59808, ddavis02@fs.fed.us.

5100-92M

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals.

SPECIFICATIONS

FEDERAL

A-A-50198 - Thread, Gimp, Cotton, Buttonhole
A-A-55126 - Fastener Tapes, Hook and Loop, Synthetic
A-A-55217 - Thread, Aramid, Spun Staple
A-A-55634 - Zippers (Interlocking Slide Fasteners)

USDA FOREST SERVICE

5100-88 - Cloth, Trouser, Aramid

STANDARDS

FEDERAL

FED-STD-123 - Marking for Shipment (Civil Agencies)
FED-STD-376 - Preferred Metric Units for Use By the Federal Government

(Unless otherwise indicated, copies of federal and military specifications and standards are available online at <http://assist.daps.dla.mil/quicksearch/> or in hard copy from the Standardization Documents Order Desk, Building 4D, 700 Robbins Ave., Philadelphia, PA 19111-5094. Copies of USDA Forest Service specifications are available from the preparing activity, 6.7)

2.1.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those in effect on the date of the invitation for bids or request for proposals.

DRAWINGS

USDA FOREST SERVICE

MTDC-973 - Patterns, Pants

(Copies are available from USDA Forest Service, Missoula Technology and Development Center, 5785 Highway 10 West, Missoula, MT 59808.)

2.2 Non-Government publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those in effect on the date of the invitation for bids or request for proposals.

5100-92M

AMERICAN SOCIETY FOR QUALITY (ASQ)

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

(Copies are available from the American Society for Quality, PO Box 3005, Milwaukee, WI 53201-3005.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 1974 - Standard Practice for Methods of Closing, Sealing, and Reinforcing Fiberboard Boxes

D 3951 - Standard Practice for Commercial Packaging

D 5118 - Standard Practice for Fabrication of Fiberboard Shipping Boxes

D 6193 - Standard Practice for Stitches and Seams

SI-10 - Standard For Use of the International System of Units (SI): The Modern Metric System (IEEE/ASTM Standard available from ASTM)

(Copies are available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959,
Website: <http://www.astm.org/>.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1977-2005 - Protective Clothing and Equipment for Wildland Fire Fighting, 2005 Edition

(Copies are available from National Fire Protection Association, 1 Batterymarch Park, P.O. Box
9101, Quincy, MA 02269-9101.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Copies are available from American Trucking Association, Inc., Traffic Department, 1616 P St. NW,
Washington, DC 20036.)

(Non-Government standards and other publications normally are 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.

5100-92M

3. REQUIREMENTS

3.1 First article. Unless otherwise specified (see 6.2), only sample pants with regular (33 inch) inseams shall be submitted for first article inspection (see 6.3) in accordance with 4.3. During the term of the contract the contractor shall be required to notify the contracting officer in writing when a component, or the component supplier, changes in any way; when a major manufacturing process changes in any way; or when a manufacturing location changes. The contracting officer may at any time require the contractor to submit a new first article sample when substantive changes occur during the term of the contract.

3.1.1 NFPA 1977. The pants shall be third party certified as being in compliance with National Fire Protection Association (NFPA) Standard 1977, Protective Clothing and Equipment for Wildland Fire Fighting. Proof of this certification shall be presented at the time of First Article submission.

3.2 Materials and components. Materials and components shall be as specified herein and in the applicable drawing, MTDC-973. In addition, the materials and components shall comply with NFPA 1977 (3.1.1).

3.2.1 Basic material. The Type I basic material shall be in accordance with the requirements of Type I of USDA Forest Service specification 5100-88. The Type II basic material shall be in accordance with the requirements of Type II of USDA Forest Service specification 5100-88.

3.2.2 Thread. The aramid thread shall conform to Type I, Tex size 35-40 and Tex size 70-80, or Type II, Tex size 27 and Tex size 60, of A-A-55217. Thread color shall be a good approximation of the basic material (3.2.1).

3.2.3 Gimp. The cotton gimp for reinforcing buttonholes shall conform to Soft Finish Tex 210, or Glazed Finish Tex 180 or 210, of A-A-50198. The color shall be a good approximation of the basic material (3.2.1).

3.2.4 Zipper. The zipper shall be brass with a short tab pull, and shall conform to Type I, Style 1, Size 1-2 or 3-4 of A-A-55634, the tape shall be spun aramid. The color of the tape shall be black.

3.2.5 Button and tack. The button and tack materials shall be of the quality normally used by the manufacturer for tack buttons and button tacks. Material composition and thickness shall withstand the forming operations without wrinkling or cracking.

3.2.5.1 Button. The 27 ligne tack button shall have a flat antique brass front shell with an epoxy finish. YKK Snap Fasteners, Inc. Part No. 0450000346 meets this requirement (see 6.4).

3.2.5.2 Tack. The button tack shall be YKK Snap Fasteners, Inc. Part No. 5040000310C.

3.2.6 Waist take-up tape. The waist take-up tape shall be 5/8 inch wide aramid tape, and shall be C.M. Offray & Son, Inc., style #70-6185-2007-5/8 inch, color black (see 6.4).

3.2.7 Double-bar buckle. The double-bar buckle for the waist take-up shall be Albest Metal Stamping Corp. part no. BB340-10BD, 5/8 inch, black; or ITW Waterbury part number 00482-09-21883(see 6.4).

5100-92M

3.2.8 Leg cuff adjuster metal loop. The metal loop shall be 1-1/16 inch x 3/8 inch, wire thickness 0.105 inch, welded steel, black finish, Albest Metal Stamping Corp. part no. WR17x6-12 BWBD meets this requirement (see 6.4).

3.2.9 Fastener tape, hook and pile. The hook and pile fastener tape shall conform to 1 inch width, type II, class 1 of A-A-55126. The color of the tape shall be green.

3.2.10 Labels. Each pair of pants shall have two labels which shall include a combination identification/instruction/care label and a size label. The labels may be woven or non-woven, and shall meet the requirements of NFPA 1977.

3.2.10.1 Combination label. The combination identification/care label shall meet the product labeling requirements of NFPA 1977. :

(The following information shall be printed in letters at least 3/32 inch in height)

THIS WILDLAND FIRE FIGHTING PROTECTIVE GARMENT MEETS THE REQUIREMENTS
OF NFPA 1977, STANDARD ON PROTECTIVE CLOTHING AND EQUIPMENT FOR
WILDLAND FIRE FIGHTING, 2005 EDITION.

DO NOT REMOVE THIS LABEL (1/)

(The following information shall be printed with letters at least 1/16 inch in height.)

PANTS, FLAME-RESISTANT ARAMID, Type (I or II) 2/

[Manufacturer's name] (2/)

[Manufacturer's address] (2/)

[Country of origin] (2/)

[Manufacturer's garment identification number, lot number, or serial number] (2/)

DATE OF MANUFACTURE: [mm/yy] (2/)

USDA FOREST SERVICE SPECIFICATION 5100-92M

SIZE: [] (2/)

CONTRACT NUMBER: [] (2/)

NSN: [] (2/)

MATERIALS CONTENT: (TYPE I: 93 % META-ARAMID, 5% PARA-ARAMID, 2%
ANTISTATIC. TYPE II: 62% PARA-ARAMID, 37% ARAMID, 1% ANTISTATIC.) 2/

[Authorized mark of certifying organization] (2/)

DATE OF CERTIFICATION [mm/yy (as a minimum)] (2/)

CARE INSTRUCTIONS

- a. Machine wash hot. NO BLEACH.
- b. Wash separately from flammable, lint-producing fabrics.
- c. Rinse thoroughly. Soap or detergent residues will burn.
- d. DO NOT STARCH. Starch will burn.
- e. Tumble dry medium. Remove garment promptly.

1/ When a split label is used, this legend shall appear on both labels."

2/ The manufacturer shall insert the applicable information.

5100-92M

3.2.10.2 Size label. The size label shall finish a minimum of 1 inch wide and shall be long enough to allow a 3/8 inch seam allowance at each end. The numbers and lettering shall be a minimum 3/8 inch high and a minimum 3/16 inch wide. The label shall be white, the numbers and lettering shall be black. The size label shall consist of the waist range in inches and the inseam (SHORT, REG, or LONG), separated by a space (i.e. 26-30 SHORT).

3.2.11 End user instructions. End User Instructions meeting the requirements of NFPA 1977 shall be supplied with each pair of pants, see figure 4.

3.3 Design. The pants have two front quarter top pockets, two cargo pockets with flaps closed with hook and pile tape, two hip patch pockets with flaps closed with hook and pile tape, hemmed bottoms with cuff straps, zipper front closure, and waistband tack button closure.

3.4 Patterns. Standard patterns (MTDC-973) will be furnished by the Government (see 6.4). The standard patterns shall not be altered in any way and shall be used only as a guide for cutting the contractor's working patterns. The contractor's working patterns shall be identical to the standard patterns. The standard patterns provide an allowance of 3/8 inch for all joining seams, unless otherwise specified.

3.4.1 List of pattern parts. The pants shall be cut from the materials specified herein in accordance with the number of pattern parts indicated in table I, except belt loops and leg cuff adjustment straps. See table III, operation 16, for cutting requirements for the belt loops. See table III, operation 17 for the requirements for the leg cuff adjustment straps.

Table I. List of pattern parts

Material	Pattern nomenclature	Cut parts
Basic material (see 3.2.1)	Front	2
	Back	2
	Fly	2 right and 1 left
	Cargo pocket	2
	Cargo pocket flap	2
	Hip pocket	2
	Hip pocket flap	2
	Waistband	1
	Front pocket	2

3.5 Construction.

3.5.1 Stitches, seams, and stitching. Stitch, seam and stitching types, as specified in table III shall conform to ASTM D 6193. When two or more seams or stitch types are given for the same part of an operation, any one of them may be used. Where stitch type 401 is used, the chain, or under side of the stitch, shall be on the inside of the pants. Seam allowances shall be maintained with seams sewn so that no raw edges, run-offs, twists, pleats, puckers, or open seams will result. All seams shall start and finish evenly. Thread tension shall be maintained so that there is no tight or loose stitching. For stitch type 301 the lock shall be imbedded in the materials sewn. Edge stitching and top stitching shall be uniformly gauged throughout the garment. Seams required to be worked out, that have a depth between the fold of 1/16 inch or more shall be considered a nonconformity.

5100-92M

3.5.1.1 Safety and overedge stitching. The gage of safety stitching shall be 5/16 or 3/8 inch. The gage of overedge stitching and the overedge portion of safety stitching shall be 3/16 or 1/4 inch. The guides and knives for the safety stitch and overedge machines shall be set to trim only the raveled edges of the fabric.

3.5.1.2 Thread breaks and ends of seams. Ends of all seams and stitching produced with 301 stitch type, when not caught in other seams or stitching, shall be backtacked not less than 1/2 inch. Thread breaks (all stitch types) shall be secured by stitching back of the break not less than 1/2 inch. Skipped stitches and thread breaks for 401 stitch type may be repaired using 301 stitch type. The ends of a continuous line of stitching (except labels and automatic stitching) shall overlap not less than 1/2 inch. The ends of the label and automatic stitching shall be overlapped not less than three stitches.

3.5.1.3 Stitches per inch. The minimum and maximum number of stitches per inch shall be as specified in table III.

3.5.2 Puckering. In the course of the sampling examination, seams suspected of being puckered shall be examined, at a distance of 3 feet, any seam that is puckered for 2 or more inches so that it causes visible distortion of the garment, shall be scored as a puckered seam.

3.5.3 Buttonhole. The buttonhole shall be eyelet-end tapered bar type worked over gimp with not less than four tacking stitches at bar end catching gimp ends (not counting crossover stitch). The purling shall be on outside of waistband. The cut length shall be 3/4 to 7/8 inch. The buttonhole shall be clean-cut with the stitching securely caught in the fabric.

3.5.4 Bartacks. Unless otherwise specified, bartacks shall be as follows (bartacking shall be free from thread breaks and loose stitching):

<u>Length</u>	<u>Width</u>	<u>Min. Stitches Per Bartack</u>
1/2 ± 1/16 inch	1/8 ± 1/32 inch	28
3/4 ± 1/16 inch	1/8 ± 1/32 inch	42

3.5.5 Button and tack. The complete and assembled buttons and tacks shall sustain a pull of not less than 60 pounds without deforming or separation of the components or assembly. The back and front of the finished buttons and tacks shall be clean and free from any rough or sharp edge, burr or sliver, oil, dents, digs, pits, wrinkle, grease or dirt. Buttons and tacks shall not be cracked, broken, or malformed. The set button and tack parts shall not rotate when twisted. The distance between the top of the button to the bottom of a tack when set shall be 0.335 ± 0.010 inch.

3.6 Manufacturing operations. The pants shall be manufactured in accordance with all operation requirements specified in table III. The contractor is not required to follow the exact sequence of operations provided the finished pants are identical to those produced by following the sequence listed in table III. Any additional basting or holding stitching used to facilitate manufacture is permissible provided that the thread is removed or does not show on the finished pants.

5100-92M

3.6.1 Shade and size marking. The cut parts of the pants shall be marked to insure a uniform shade and size throughout the garment. Any method of marking may be used except:

- a. Corrosive metal fastening devices.
- b. Sew-on type tickets.
- c. Adhesive type tickets that discolor the material or leave traces of paper or adhesive on material after ticket removal.

3.7 Finished measurements. Finished measurements shall be as specified in table II.

Size	1/2 Waist (+/-1/4) (1/)	Inseam (+/-1/2) (2/)
24-28	14	30, 33, 36
26-30	15	30, 33, 36
28-32	16	30, 33, 36
30-34	17	30, 33, 36
32-36	18	30, 33, 36
34-38	19	30, 33, 36
36-40	20	30, 33, 36
38-42	21	30, 33, 36
40-44	22	30, 33, 36
42-46	23	30, 33, 36
44-48	24	30, 33, 36
46-50	25	30, 33, 36
48-52	26	30, 33, 36

1/One-half waist measurement taken along top edge of waistband, with waistband buttoned from folded edge to folded edge.

2/Inseam measurement taken from crotch seam to bottom edge of leg hem.

3.8 Deviations and waivers. Deviations and waivers to the materials or construction specified herein shall not be allowed unless authorized in writing by the contracting officer.

3.9 Workmanship. The finished pants shall conform to the quality of product established by this specification. The occurrence of nonconformities shall not exceed the applicable acceptable point values. The finished pants shall conform to NFPA 1977 requirements for protective clothing.

3.10 Metric products. Products manufactured to metric dimensions will be considered on an equal basis with those manufactured using inch/pound units, provided they fall within the tolerances specified using conversion tables contained in the latest revision of IEEE/ASTM SI-10, and all other requirements of this specification are met.

3.11 Recovered materials. The contractor is encouraged to use recovered material in accordance with Federal Acquisition Regulation 23.4 to the maximum extent practical.

5100-92M

Table III. Manufacturing Operations Requirements

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
1.	<p><u>Cutting</u></p> <p>a. Cut pants in strict accordance with patterns furnished, which show directional lines, size, placement of pockets and pocket flaps, and notches for proper assembly of all parts. Unless otherwise specified, directional lines shall be placed in the warp direction. The face of the fabric shall finish on the outside of the pants. The use of drill holes will be acceptable provided they are covered by other parts of the seam allowance; otherwise, exposed drill holes shall be considered as holes in the fabric.</p> <p>NOTE: Except where noted, the patterns provided only address the right side for the major parts. The left side is produced using a mirror image of the provided patterns.</p> <p>b. Directional lines on the fronts and backs may vary from the warp direction by not more than 1-1/2 inches. Measurements shall be taken at top and bottom edges of the pattern from the directional line to the selvage edge (on the even side of the lay) of the fabric and the difference between the two measurements shall not exceed 1-1/2 inches.</p> <p>c. Cut all parts of the pants from the same piece of basic material except fly parts, belt loops, pocket facings, and flap linings (when made of two-piece construction), which may be cut from ends. Parts cut from ends shall approximate the shade of the pants.</p> <p>d. Cut the stripping for the belt loops of sufficient length and width to comply with operation 16.</p>				

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
e.	Cut two pieces of pile tape and two pieces of hook tape 1-1/2 ±1/8 inches long for the hip pocket flap closure (see operations 4 and 5).				
f.	Cut two pieces of pile tape and two pieces of hook tape 4-1/2 ±1/8 inches long for the cargo flap closure (see operations 7 and 8).				
g.	Cut 4 pieces of tape for the waist take-up, 2 pieces 3 inches long and 2 pieces 6 inches long.				
h.	Cut 2, 4-1/4 inch long pieces of pile tape and 2, 4-1/4 inch long pieces of hook tape for the leg cuff adjustment straps.				
i.	Cut the stripping for the leg cuff adjustment straps of sufficient length and width to comply with operations 17.				
2.	<p><u>Replacement of nonconforming components</u> During the spreading, cutting, and manufacturing process, components having material nonconformities or damages that are classified in 4.3.4.1 shall be removed from production and replaced with conforming and properly matched components.</p>				
3.	<p><u>Marking</u> a. Mark or ticket all component parts of the pants, except parts cut from ends, to ensure correct size and uniform shade throughout the pants. b. The use of ink pad numbering machine, rubber stamp, or pencil will be acceptable provided the numbers do not show through the outside of the garment or are covered by the seam allowance.</p>				

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
NOTE: The Contractor may alter the order of steps in order to accommodate seam construction.					
4.	<u>Make hip pocket flaps (2)</u>				
	a. Fold flap in half, correct side back to back. Close ends.	301	SSe-2(a)	9-13	35-40
	b. Turn, and work out corners.				
	c. Topstitch flaps 1/4 inch from the sides and bottom edge.	301	SSe-2(b)	9-13	35-40
	d. Overedge top edges of both plies of pocket flap together.	503 or 504	SSa-1	9-13	35-40
	e. Position the hook tape (see operation 1f) on the face of the flap as indicated by marks on the pattern and stitch 1/8 ±1/16 inch from the edge on all four sides.	301	LSbj-1	7-12	70-80
5.	<u>Make outside patch hip pockets (2)</u>				
	a. Hem top of patch pockets with the raw edges turned in and stitch 1/16 to 1/8 inch from edge. The pocket hem shall finish 1-1/4 ±1/8 inch wide.	301	EFb-1	9-13	35-40
	b. Position pile tape on outside of pocket to coincide on finished pant with hook tape on pocket flap (operation 4) and stitch 1/16 to 3/32 inch from edges on all four sides through hem and pocket.	301	LSbj-1	7-12	70-80
	c. Turn in bottom and side edges and crease for setting				
6.	<u>Make two (2) front pockets</u>				
	a. Fold pocket in half with the insides out, position at notches and stitch to close bottom and back edge of pocket.	515 or 516	SSe-2(a)	9-13	70-80 (chainstitch) 35-40 (overedge)
	b. Turn pockets right side out and topstitch 1/4 ±1/16 inch from bottom and back edge of pockets.	301	SSe-2(b)	9-13	70-80
7.	<u>Make cargo pocket flaps (2)</u>				
	a. Fold flap in half, correct side back to back. Close ends.	301	SSe-2(a)	9-13	35-40
	b. Turn, and work out corners.				
	c. Topstitch flaps 1/4 inch from the sides and bottom edge.	301	SSe-2(b)	9-13	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
	d. Overedge top edges of both plies of pocket flap together.	503 or 504	SSa-1	9-13	35-40
	e. Position the hook tape (see operation 1f) on the face of the flap as indicated by marks on the pattern and stitch $1/8 \pm 1/16$ inch from the edge on all four sides of each strip.	301	LSbj-1	7-12	70-80
8.	<u>Make cargo pockets</u>				
	a. Fold the front pleat at marks indicated on pattern so folded pleat edge faces towards the rear on the finished pants. Stitch along the folds, $1/16$ to $1/8$ inch from edge.	301	OSf-1	9-13	35-40
	b. Fold the rear bellows at marks indicated on pattern, so that fold is oriented the same as the front pleat. Stitch along both folds, $1/16$ to $1/8$ inch from edge.	301	OSf-1	9-13	35-40
	c. Hem top of cargo pockets with the raw edges turned under and stitched $1/16$ to $1/8$ inch from both the top and bottom folded edges. The pocket hem shall finish $1-1/4 \pm 1/8$ inch wide. Alternatively, stitching along top of hem may be omitted as long as the middle bellow is stitched vertically from the bottom folded edge stitch line to the top folded edge of the pocket.	301	EFt-2	9-13	35-40
	d. Position pile tape on outside of pocket hem to coincide with hook tape on flap (operation 7e) and stitch $1/8 \pm 1/16$ inch from edges on all four sides of each strip through hem.	301	LSbj-1	7-12	70-80
	e. Horizontally bartack pleat at hem stitch line.	1/2 inch Bartack		28 per bartack	35-40
	f. Turn in bottom and side edges and crease for stitching.				

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
9.	<u>Make left fly</u>				
	a. Overedge left side of left fly from bottom edge to top.	503 or 504	EFd-1	9-13	35-40
	b. Position left side of zipper on left fly so the edge of chain will be 1/2 to 5/8 inch from front edge of finished fly at both top and bottom, with the bottom end of the chain 1/4 to 1/2 inch above fly notch. Top end of zipper tape shall extend a minimum of 3/8 inch into waistband. An individual or continuous type zipper chain may be used. Attach with a 3/16 or 1/4 inch gage double needle stitch; the first row shall be 1/8 to 3/16 inch back of the chain.	301 or 401	SSau-2	9-13	70-80
10.	<u>Make right fly</u>				
	<u>Option 1 – One piece</u>				
	<u>Fold lengthwise with outside facing out, top stitch front and bottom of fly single stitch 1/16 to 1/8 inch from edge.</u>	301 or 401	OSf-1	9-13	35-40
	<u>Or</u>				
	<u>Option 2 – Two pieces.</u>				
	a. With outsides facing each other, sew the front and bottom edge of the two pieces of the right fly together..	301 or 401	SSe-2(a)	9-13	35-40
	b. Turn fly correct side out, force out edges and topstitch on the front of fly, with a single stitch, 1/16 to 1/8 inch from edge.	301 or 401	SSe-2(b)	9-13	35-40
11.	<u>Attach flies to front and join crotch seam</u>				
	a. Stitch left fly to left front, with bottom of fly matching notch.	301	SSe-2(a)	9-13	70-80
	b. Turn and topstitch fly, 1/16 to 1/8 inch from edge.	301	SSe-2(b)	9-13	70-80
	c. Position back edges of right front, right zipper tape, and right fly together and safety stitch through all layers, 3/16 inch gage to the notch/bottom of fly.	515 or 516	SSa-2	9-13	70-80 (chainstitch) 35-40 (overedge)
	d. Turn right front toward side seam and topstitch through all layers, 1/16 to 1/8 inch from edge. The stitching shall be continued along crotch from notch, with the right front turned to outside, 1/16 to 1/8 inch from edge.	301	LSq-2(b)	9-13	70-80

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
	e. Turn left fly and stitch up from bottom forming fly curve and continue stitching to top of waistband. Stitching shall be 1-1/2 ± 1/8 inch from front of fly.	301	LSbj-1	9-13	70-80
	f. Turn edge of left front crotch seam to inside and double stitch, catching the right front crotch seam with both rows of stitching through right fly. The double stitching shall be 3/16 to 1/4 inch gage with the outer row of stitching 1/16 inch to 1/8 inch from the folded edge. The top end of stitching shall terminate at the stitching along the back edge of the left fly.	301	LSc-2	9-13	70-80
12.	<u>Set two (2) front pockets</u>				
	a. Position pocket to front at notches and attach with single stitch.	301 or 401	SSe-2(a)	9-13	70-80
	b. Turn front back and roll out welt so stitching finishes to the inside.				
	c. Stitch pocket welt, 3/16 to 1/4 inch gage from edge.	301	SSe-2(b)	9-13	70-80
13.	<u>Attach combination label to jean backs</u>				
	Position label(s) on left back so that on the finished pants it(they) will be under the hip pocket, will face the wearer and the top will be toward the top of the pants. Stitch on all four sides (of each label) 1/16 to 1/4 inch from edge. The stitching shall not be through the printing.	301	LSbj-1	7-11	35-40
14.	<u>Set hip pockets and flaps</u>				
	a. Position hip pocket on each back panel at location marks and attach with a double stitch 1/4 inch gauge with outside row of stitching 1/16 to 1/8 inch from the folded edge.	301	LSd-2	9-13	70-80
	b. Fold under top edge of flap. Position flap so that the top of the flap shall measure approximately 3/4 inch from the top of the pocket, making sure pocket hem and opening are completely covered by the flap and that the flap is aligned with the pocket.				

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
	c. Double stitch flap 1/4 inch gage with the top row of stitching 1/16 to 1/8 inch from folded edge.	301	LSd-2	9-13	70-80
15.	<u>Bartack hip pockets and flaps</u> Horizontally bartack the ends of the pocket openings; the bartacks shall capture the ends of both stitch lines of the pocket attachment stitching. Pocket opening shall not finish less than 5-3/8 inches between bartacks for all sizes. For the flaps only, the flap attachment stitch lines shall be backstitched 1/2 inch..	1/4 inch Bartack		21 per bartack	35-40
16.	<u>Make seven belt loops (operation 25)</u> a. All the loops shall measure 5/8 to 3/4 inch in width. The belt loops shall be cut of sufficient length to measure 2-1/8 to 2-1/2 inches between bartacks on finished pants. The end turnunders of all the belt loops shall be 3/8 to 1/2 inch. b. Fold underside raw edges with edges abutted and double stitch length of loop, with stitching 1/4 to 1/2 inch gage, using coverstitch on the underside.	406 or 402	EFh-1	9-13	35-40
17.	<u>Make leg cuff adjustment straps</u> a. Straps shall measure 1 inch in width, and 5-3/4 and 2-1/2 inches in length. b. Fold underside raw edges with edges abutted and double stitch length of strap, with stitching 1/4 to 1/2 inch gage, using coverstitch on the underside.	406 or 402	EFh-1	9-13	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
18.	<u>Join side seams</u>				
	Option 1				
	a. Join side seams with a safety stitch catching the back edge of front pockets, continue stitching to the knee, fold knee pleat so edge faces down on the outside of pants and catch the fold in the seaming, continue stitching to the placement marks for the leg cuff adjustment strap. Insert the 2-1/2 inch strap with metal loop into the seam and continue the safety stitch to the bottom edge of the seam. The coverstitched face of the strap shall be to the inside of the loop.	515 or 516	SSa-2	9-13	70-80 (chainstitch) 35-40 (overedging)
	b. Fold seam edge to rear and top stitch 1/16 to 1/8 gage from top to 1/2 inch below cargo pocket flap location.	301	LSq-2	9-13	70-80
	c. Horizontally bartack bottom of opening of front pocket 1/4 inch on the rear panel and 3/4 inch on the front panel.	1-inch bartack		48 per bartack	35-40
	d. Fold the 2-1/2 inch leg cuff adjustment strap with metal loop to the outside rear of pants and place a 3/4 inch bartack on the front panel vertically 1/8 inch from side seam, capturing all layers of seam material.	3/4 inch bartack		42 per bartack	35-40
	OR				
	Option 2				
	a. Join side seams with full feld seam the entire length. Fold knee pleat so that edge faces down. Insert the 2-1/2 inch strap with metal loop at placement marks.	301 or 401	LSc-2	9-13	70-80
	NOTE: Contractor must adjust pattern for 3/8 inch full feld seam in lieu of 3/8 inch safety stitch seam.				
	b. Horizontally bartack bottom of opening of front pocket through both front and rear panels.	1-inch bartack		48 per bartack	35-40
	c. Fold the 2-1/2 inch leg cuff adjustment strap with metal loop to the outside rear of pants and place a 3/4 inch bartack along the center line of the seam.	3/4 inch bartack		42 per bartack	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
19.	<u>Set cargo pockets and flaps</u>				
	a. Position cargo pocket at location marks on sideseams and attach with a single row of stitching 1/16 to 1/8 inch from the edge. The pocket opening shall finish 8-1/4 ±1/8 wide at the top. The upper stitched edge of the pocket bellows shall fall 1/8 inch inside the stitch line on the rear pocket edge. Alternatively, allow the upper stitched edge of the pocket bellows to align with the pocket edge. Contractor may modify cargo pocket pattern to accommodate this alternative.	301	LSd-1	9-13	70-80
	b. Fold under top edge of flap. Position flap so that the top of the flap shall measure approximately 3/4 inch from the top of the pocket, making sure pocket hem and opening are completely covered by the flap and that the flap is aligned with the pocket.				
	c. Double stitch flap 1/4 inch gage with the top row of stitching 1/16 to 1/8 inch from folded edge.	301	LSd-2	9-13	70-80
20.	<u>Bartack cargo pockets and flaps</u>				
	Bartack the bottom of the bellows rear edge of the pocket; alternatively, the bartack may be placed vertically at the bottom of the bellows vertical stitch line. Bartack the ends of the pocket openings vertically on the front panel, for the rear panel bartack horizontally 1/4 inch from top edge; vertically bartack bottom front corner of flap 1/4 inch from front edge. The bartacks shall be superimposed on the pocket stitching and on the raised stitching of the flap. For the flaps only, at the manufacturer's option, the stitch lines may be backstitched 1/2 inch in lieu of bartacking.	1/2 inch Bartack		28 per bartack	35-40
21.	<u>Waistband label</u>				
	Attach size label on left inside surface of the waistband. Sew on all four sides 1/16 to 1/8 inch from edge.	301 or 401	LSbj-1	7-11	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
22.	<u>Seatseam</u> (Option 1)				
	a. Position left and right backs at base of fly and tandem needle stitch bottom to top 1/2 inch from each edge. Rows of tandem needle stitching shall be between 1/64 to 1/32 inch apart. Needles shall be offset to form staggered stitches.	401	SSa-2	9-13 each needle	70-80
	b. Overedge seatseam.	503 or 504	SSa-1	9-13	35-40
	c. Fold seam edge to left rear panel and top stitch 1/8 to 3/16 gage OR (Option 2) Join rear panels using full feld seam for entire length of seam. NOTE: Contractor must adjust pattern for 3/8 inch full feld seam in lieu of 1/2 inch superimposed (safety stitch) seam.	301 or 401	LSq-2	9-13	70-80
23.	<u>Join inseams</u> The seat and seam crotch seams shall not be staggered more than 3/8 inch (measured from the center of the seams). Fold the knee pleats so the edges face down on outside of pant leg and catch the folds in the seaming				
	a. (Option 1) Safety stitch join the inseams in one continuous operation.	515 or 516	LSq-2(a)	9-13	70-80 (chainstitch) 35-40 (overedging)
	b. Fold seam edge to rear and top stitch 1/16 to 1/8 inch gage. OR (Option 2) Join inseams using a full feld seam the entire length. NOTE: Contractor must adjust pattern for 3/8 inch full feld seam in lieu of 3/8 inch safety stitch seam.	301 or 401	LSq-2(b)	9-13	70-80
		301 or 401	LSc-2	9-13	70-80

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
24.	<u>Attach fastener slide and stop</u> (when using continuous chain) a. Position and attach fastener slide. b. Attach fastener stop at base and top of right fly.				
25.	<u>Set and topstitch waistbands</u> Finish appearance. The waistband shall be sewn on flat and smooth without fullness, gathers, or pleats. The waistband shall finish 1-1/2 ±1/8 inch. NOTE: When attaching waistband, capture zipper tape in waistband.				
	a. Attach waistband to fronts and backs with 1/8 inch gage stitching for the bottom row and 1/8 inch gage stitching for the top waistband folded edge.	301 or 401	BSc-2	9-13	70-80
	b. Overedge front waistband ends.	503 or 504	EFd-1	9-13	35-40
	c. Turn in end of right waistband 2 ±1/8 inch and stitch along top of waistband 1/8 inch below top for 1-5/8 ±1/16 inch starting at the front edge; turn and stitch down to overlap stitching on right front by a minimum of 5/8 inch. The use of a “U-tack” on both ends of waistband is acceptable.	301	SSa-1	9-13	70-80
	d. Turn in end of left waistband 2 ±1/8 inch and stitch along top of waistband 1/8 inch below top, for 1-5/8 ±1/16 inch starting at the front edge, turn and stitch down to overlap stitching on the left front curve by a minimum of 5/8 inch. The use of a “U-tack” on both ends of waistband is acceptable.	301	SSa-1	9-13	70-80
26.	<u>Attach waist take-up</u> a. Thread one of the pieces of waist take-up tape around one bar of a double bar buckle. On the outside of the pants, attach above the side seam 3/8 inch above bottom edge of waistband with a bartack as shown in Figure 1.	1/2 inch Bartack		28 per bartack	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
	b. On the outside of the pants, position the folded under end of the 6 inch piece of take-up tape 4-1/2 inches to the rear of the loop attachment(26a), 3/8 inch above the bottom edge of the waistband, with the free end pointing to the front, and attach with a bartack. Repeat on other side.	1/2 inch Bartack		28 per bartack	35-40
	c. Thread the loose end of the long pieces through the double bar buckle as shown in figure 1. Double fold the loose end toward the outside of the pants and bartack.	1/2 inch Bartack		28 per bartack	35-40
27.	<u>Attach belt loops</u> Position belt loops as follows:				
	a. One on each outseam, with seam allowance folded to one side.				
	b. One centered between the outseam and center front of the pants.				
	c. One on right back and one left back midway ($\pm 1/2$ inch) between outseam and seatseam.				
	d. One centered on seatseam, with seam allowance folded to one side.				
	e. Fold under belt loop ends and horizontally bartack 1/8 inch from folded ends. Top of belt loops shall finish even with top of waistband.	1/2 inch Bartack	LSD-1	28 per bartack	35-40
28.	<u>Bartack fly and front pockets</u>				
	a. Bartack the fly horizontally at base of fly stitching at the junction of the crotch seam and fly, crossing crotch seam by 1/8 inch.	1/2 inch Bartack		28 per bartack	35-40
	b. Bartack right and left fly together on inside, at bottom outside corner	1/2 inch Bartack		28 per bartack	35-40
	c. Bartack the top of the front pocket openings across the pocket welt.	1/2 inch Bartack		28 per bartack	35-40

5100-92M

Table III. Manufacturing Operations Requirements (continued)

No.	Manufacturing operations	Stitch type	Seam and stitching type	Stitches per inch	Thread
29.	<u>Attach waistband button and buttonhole</u>				
	a. Make horizontal buttonhole 3/4 ±1/8 inch from top of left waistband with end of buttonhole 1/2 ±1/8 inch from front edge.	Buttonhole		50-60 per buttonhole	35-40
	b. Attach a tack button on right waistband to correspond with buttonhole in left fly at waistband, and in line with right fly slide fastener.				
30.	<u>Hem bottoms</u>				
	Turn up bottoms as indicated on patterns with the raw edges turned in and single stitch through the legs of the pants 1/16 to 1/8 inch from the edge of the fold, starting and finishing at the inseams. The hem shall finish 1 ±1/8 inches in width.	301	EFb-1	9-13	35-40
31.	<u>Attach leg cuff adjustment strap</u>				
	a. Fold over 1/2 inch of one end of the 5-3/4 inch strap. Position the hook tape (see operation 1.h.) even with the end of the strap, covering the 1/2 inch fold and the coverstitched face of the strap. Stitch 1/8±1/16 inch from the edge on all four sides of each strip.	301	LSbj-1	7-12	70-80
	b. Position pile tape on outside of pants as indicated by placement marks on pattern. Position the remaining raw edge of the 5-3/4 inch strap, 1/2 inch under the end of the pile tape that is closest to the side seam. Attach the pile tape and strap to pants with stitching 1/8±1/16 inch from the edge on all four sides.	301	LSbj-1	7-12	70-80
32.	Clean pants				
	a. Trim all thread ends to less than 1/2 inch and remove all loose threads, spots, stains and shade or size tickets.				
	b. Close the fly slide fastener and button waistband				

5100-92M

3.12 Figures: Figure 1 is referred to in Table III, figures 2 and 3 are provided for clarity and visual reference of part placement, figure 4 is provided as the template for the User Instructions to be included with each pair of pants. The descriptions contained within this document take precedence if there appears to be any conflict between them and the figures.

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/her own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for certification. An approved Certification Organization shall certify that the pants meet the requirements of NFPA 1977. The contractor shall provide all required materials, garments, and information to the Certification Organization to permit such certification.

4.1.2 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 nonconforming material, either indicated or actual, nor does it commit the Government to acceptance of nonconforming material.

4.1.3 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.

4.1.4 Certification of compliance. Unless otherwise specified, certificates of compliance supplied by the manufacturer of the item, component, or material, listing the specified test method and test results obtained, may be furnished in lieu of actual lot by lot testing performed by the contractor (see 4.3.2). Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

4.2 Sampling for inspections and tests. Sampling for inspections and tests shall be made in accordance with ASQ Z1.4. The inspection level and acceptable quality level (AQL) shall be as specified.

5100-92M

4.3 Quality conformance inspection. Each end item lot shall be sampled and inspected as specified in 4.3.4.1 and 4.3.4.2. As part of quality conformance inspections, test results shall be submitted to determine compliance of the basic cloth with the requirements of Forest Service specification 5100-88. The packaging shall be sampled as specified in 4.4. Packaging is not required when first articles are presented. Unless otherwise specified (see 6.2), the first articles submitted in accordance with 3.1 shall be inspected as specified in 4.3.4.1 and 4.3.4.2. The presence of any nonconformity or failure to pass any test shall be cause for nonacceptance of a first article sample.

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

4.3.2 Certification. As a part of the first article submission the contractor shall provide certificates of compliance (COC) for the materials of the pants. COCs shall be provided for the following components:

- Basic material (3.2.1)
- Thread (3.2.2)
- Gimp (3.2.3)
- Zipper (3.2.4)
- Button and Tack (3.2.5.1, 3.2.5.2)
- Waist take-up tape (3.2.6)
- Double-bar buckle (3.2.7)
- Leg cuff adjuster metal loop (3.2.8)
- Hook and Pile fastener tape (3.2.9)
- Labels (3.2.10)

4.3.2.1 COC Contents. For items that are specified by part number or choice of part numbers (and not "or equal"), purchasing documents showing the part number are sufficient as a COC.

Otherwise, the COC shall include the following:

- Specification with type, class, etc.
- Quantity purchased
- Purchase source, address, and telephone number
- Purchase date

4.3.2.2 Test Reports. The COCs shall be supported by test reports for the following components:

- Basic material (3.2.1)
- Thread (3.2.2)

These test reports shall also be submitted as a part of the first article submission. Test reports supplied by the manufacturer are acceptable.

4.3.2.3 NFPA 1977. As a part of first article submission, the contractor shall provide copies of the third party certification to NFPA 1977.

5100-92M

4.3.3 In-process inspection. Inspection shall be made at any point or during any phase of the manufacturing process to determine whether cut and finished lengths, cut parts, marking for location of components, and location of assembled component parts are in accordance with specified requirements and the drawings. Whenever non-conformance is noted, corrections shall be made to the parts and lot affected in-process. Parts that cannot be corrected shall be removed from production.

4.3.4 Examination of the end item. Examination of the end items shall be in accordance with 4.3.4.1 and 4.3.4.2.

4.3.4.1 Visual examination. Each sample pair of pants selected from lots presented for delivery (see 4.3.4.1.1) shall be examined for nonconformities in color, design, material, construction, workmanship, and marking and the nonconformities classified in accordance with table IV as follows:

TABLE IV. End item classification of visual nonconformities

Nonconformity	Point value
<u>Material Nonconformities and Workmanship Damages</u>	
a. Any hole, cut, tear, mend, burn, needle chew, exposed drill holes, or open place.	3
b. Knot larger than 1/32 inch (unless otherwise classified herein).	1
c. Woven in waste on outside.	1
d. Misweave, area of poor dye penetration, dyestreak, broken and missing section of yarn, visible mend, or thin place.	1
NOTE: Material nonconformities and workmanship damages are to be classified as indicated above only when the condition is one that definitely weakens the structure of the garment or when it is clearly noticeable.	
<u>Shaded Parts</u>	
a. Shaded parts (excluding hip pocket flap liners, right and left fly pieces, belt loops, and cuff closure pieces).	2
b. Any shade bar appearing on finished pants except on waistband or on any place on leg more than 18 inches below the crotch.	1
c. Part cut from ends is badly shaded.	1
<u>Cleanness</u>	
a. Any spot or stain on outside.	1
b. Five or more thread ends not trimmed to 1/2 inch or less	1
c. Two or more size or shade tickets not removed.	1
d. Size or shade marking or residue visible on outside.	1
e. Use of any corrosive metal fastening device or sew-on ticket	3
<u>(cont)</u>	

5100-92M

TABLE IV. End item classification of visual nonconformities

Nonconformity	Point value
<u>Cutting</u>	
a. Any component part not cut in accordance with specified pattern or directional lines as indicated on patterns or not cut in accordance with specification requirements.	3
b. Directional line on front or back varying from the warp directional by more than 1-1/2 inches.	3
c. Twill line of any outside part not running in specified direction.	3
d. Any component part or required operation omitted (unless otherwise classified herein).	3
e. Any operation not performed as specified (unless otherwise classified herein).	1
f. Any component not as specified.	3
g. The edge of any component part required to be forced out, having folds of more than 1/8 inch (unless otherwise classified).	1
h. Overedge machines trimming more fabric than the raveled edges. NOTE: Examine trim from overedge machines to determine this nonconformity.	3
<u>Seams and Stitching</u>	
a. General:	
1. Seam irregular, twisted, pleated, or wavy (unless otherwise classified herein).	2
2. Seam puckered (score only when on major portion of seam) (see 3.5.2).	1
3. Any part of garment caught in any unrelated operation or stitching.	2
4. End of 301 seam, when not caught in other seam or stitching, backtacked less than 1/2 inch (except stitching for attaching labels and automatic stitching).	1
5. Thread break (all stitch types) stitched less than 1/2 inch beyond each end of break.	1
6. Ends of a continuous line of stitching overlapped less than 1/2 inch on all seams except labels and automatic stitching, or less than three stitches on labels and automatic stitching.	1
7. Thread color not as specified.	1
b. Gage of stitching and seam allowance:	
1. Gage irregular or not within range specified.	2
2. Seam allowance not as specified or varies more than 1/8 inch.	2
3. Edge or raised stitching sewn too close to edge resulting in damage to cloth.	3
c. Open seams: NOTE: One or more broken, skipped, or runoff stitches on a joining seam constitutes an open seam.	
1. On all seams except leg bottoms and label stitching:	
(a) Up to 1/2 inch (inclusive)	1
(b) More than 1/2 inch up to 3/4 inch (inclusive)	2
(c) More than 3/4 inch	3
(cont)	

5100-92M

TABLE IV. End item classification of visual nonconformities

<u>Nonconformity</u>	<u>Point value</u>
2. On leg bottoms more than 3/8 inch.	1
3. On label stitching	1
d. Runoffs:	
1. On joining seam, score as an open seam.	
2. Edge or raised stitching (when not resulting in an open seam):	
(a) 1/4 inch up to 1/2 inch (inclusive)	1
(b) More than 1/2 inch.	2
e. Raw edges:	
1. Raw edge not caught in stitching shall be classified as an open seam (unless otherwise specified).	
f. Seam and stitch type:	
1. Seam or stitch type not as specified.	3
2. Loper thread on outside.	3
3. Any required line of stitching omitted.	3
4. Any line of stitching not beginning or ending where specified (unless otherwise classified herein).	1
g. Stitch tension:	
1. Loose tension, resulting in a loose seam.	3
2. Loose tension on edge or raised stitching, resulting in exposed loose thread.	2
3. Tight tension (stitches break when normal strain is applied to seam or stitching).	3
NOTE: Puckering is evidence of tight tension. When puckering is evident, seam shall be tested by exerting pull in lengthwise direction of seam or stitching. If broken stitching results from the pull, score as specified above.	
4. Lock of 301 stitch not imbedded in materials sewn.	1
h. Stitches per inch:	
1. Stitches per inch to be scored only when the condition exists on more than half the length of seam or stitching:	
(a) Less than the minimum specified	2
(b) More than maximum specified.	1
<u>Buttonholes</u>	
a. Omitted, misplaced, added, not specified type, or not finished as specified.	3
b. Gimp omitted or uncut buttonhole.	1
c. Ragged edge, incomplete stitching, stitching not securely caught in fabric.	2
d. One or more broken stitches or two or more skipped stitches in one or more buttonholes.	1
e. Buttonhole stitching extending beyond bartack; stitches per buttonhole less than minimum specified. (1/)	1
f. Finished cut length not as specified.	1
g. End of buttonhole tacked with less than four stitches per bar.	1
h. Gimp color not a good approximation of the color of the basic material	1
<u>(cont)</u>	

1/ Stitches per buttonhole shall be determined by counting the number of needle perforations containing stitch floats to the outside of the buttonhole gimp.

5100-92M

TABLE IV. End item classification of visual nonconformities

Nonconformity	Point value
<u>Tack Button and Button Tack</u>	
a. Missing.	3
b. Wrong type, size, color, or finish.	3
c. Misplaced.	1
d. Improperly set; loose, allowing tack to turn or distance from top of button to bottom of tack incorrect distance.	2
e. Button or tack not clean, evidence of oil, grease, or dirt	1
f. Rough or sharp edge, burr or sliver, dent, dig, pits or wrinkle on button or bottom of tack.	2
g. Button or tack cracked, broken, or malformed.	2
h. Lettering detail is marred, missing, or obliterated or is not clear.	2
<u>Fastener Tapes</u>	
a. Missing.	3
b. Misplaced or nonconforming, i.e., not serving intended purpose.	2
c. Length or width not as specified.	1
d. Incorrect color.	1
<u>Bartacks</u>	
a. One missing, loose or misplaced; not specified size or not serving intended purpose.	1
NOTE: Any bartack running off hip or cargo pockets or flaps by more than 1/8 inch shall be classified as a misplaced bartack.	
b. Two missing, loose, or misplaced; not specified size or not serving intended purpose.	2
c. Three or more missing, loose, or misplaced; not specified size or not serving intended purpose.	3
d. Bartack missing from any belt loop (each occurrence).	3
e. Loose stitch tension.	1
<u>Labels (Combination and Woven Size)</u>	
a. Woven size label missing, incorrect, or illegible.	3
b. Combination label missing, incorrect, or illegible.	3
c. Combination label not stitched on all four sides.	2
d. Any label not positioned as specified.	2
e. Stitching through the printing on any label.	1
<u>Zipper</u>	
NOTE: Operate slider on chain twice opening and closing the complete length of chain and locking slider each time.	
a. Nonconforming, affecting function.	3
b. Not size or style specified.	3
c. Cut, tear, or hole in zipper tape.	3
d. Zipper attached with less than two rows of stitching through length of tape (each side).	3
<u>(cont)</u>	

5100-92M

TABLE IV. End item classification of visual nonconformities

<u>Nonconformity</u>	<u>Point value</u>
e. Stitching too close to metal chain, not permitting slider to pass freely.	3
f. Edge of chain not positioned within specified range at top or bottom from finished edge of left fly.	1
<u>Waistband</u>	
a. Width of finished waistband not as specified.	1
b. Left waistband buttonhole positioned less than 5/8 or more than 7/8 inch from top of waistband.	1
c. End of left waistband buttonhole less than 3/8 or more than 5/8 inch from front edge.	1
d. Right waistband tack button not aligned with buttonhole, causing bulge or twist.	2
<u>Belt Loops</u>	
a. Omitted, covering stitch on outside, or incorrect width.	2
b. Set at an angle (more than 3/16 inch off perpendicular), insecure, not attached as specified, width not as specified, or poorly shaped.	1
c. Space between bartacks on one or more belt loops less than 2-1/8 inches or more than 2-1/2 inches.	2
d. Front belt loop more than 1/2 inch off center.	1
e. Side belt loop more than 1/4 inch from outseam.	1
f. Back belt loop more than 1/2 inch from midway between outseam and seatseam.	1
g. Belt loop on center back more than 1/4 inch from seatseam.	2
h. Belt loop end turn under not as specified.	1
<u>Front Opening</u>	
a. Closed flys uneven in length by more than 1/4 inch.	1
b. Fly twisted or puckered (see 3.5.2).	2
c. Fly facing exposed beyond front edge.	1
d. Bottom ends of fly not caught in stitching of crotch seam.	2
e. Stitching on left fly irregular or not positioned as specified or not terminating where specified.	2
f. Seam joining right fly to front exposed when fly is closed.	2
g. Top end of zipper tape not set into waistband as specified.	3
h. Right edge of zipper tape cut when overedger used.	1
<u>Hip Pockets (and Flaps), Cargo Pockets (and Flaps), and Front Pockets</u>	
a. End of pocket opening exposed beyond end of flap.	1
b. Pocket or flap on right side not in alignment with corresponding pocket or flap on left side by more than 1/4 inch.	1
c. Flap excessively full, twisted or puckered (3.5.2).	1
d. Flap does not lie smooth and flat when closed.	1
e. Bottom of hook tape less than 1/2 inch or more than 5/8 inch from edge of flap.	1
f. Hook tape on hip pocket flap off center by more than 1/4-inch.	1
<u>(cont)</u>	

5100-92M

TABLE IV. End item classification of visual nonconformities

<u>Nonconformity</u>	<u>Point value</u>
g. Hip, cargo or front pocket opening finishing less than specified.	3
h. Hip or cargo pocket hem not finishing 1-3/8 ±1/4 inch.	1
i. Pile tape not positioned correctly on pocket hem	1
j. Outside folded pleat on cargo pocket not facing towards back of pants.	3
<u>Seatseam</u>	
a. Seatseam constructed with less than two needle threads or less than two bobbin or looper threads.	3
b. Needle thread stitching on seatseam forming stitches that are not staggered or specified distance apart.	1
<u>Inseams and outseams</u>	
a. Folds at knees missing on inseam or outseam.	3
b. Folds at knee facing up.	1
<u>Leg Bottom</u>	
a. Not finished as specified.	1
b. Width of hem not as specified or irregular by more than 1/4 inch.	1
<u>Waist take-up</u>	
a. Any of the waist take-up tapes missing from either side, hardware missing, incorrect hardware.	3
c. Loose end of either side not bartacked, buckle incorrectly threaded.	2
<u>Cuff closure</u>	
a. Cuff closure strap missing, incorrectly placed, incorrect hardware.	3

4.3.4.1.1 Acceptable point values. The sample size based on the lot size and the acceptance values for 3 and 2 point nonconformities and total (3, 2, and 1 point) nonconformities listed in 4.3.4.1 shall be as specified in table V. The sample unit shall be one pair of pants and the lot shall be unacceptable if either or both of the following occur:

a. The point value for 3 and 2 point nonconformities exceeds the applicable maximum acceptable point value.

b. The point value for total (3, 2, and 1 point) nonconformities exceeds the applicable maximum acceptable point value.

5100-92M

Table V. Sampling provisions for visual examination

	Lot size	Sample size	Maximum acceptable point values	
			3 & 2 point nonconformities (1/)	3, 2, & 1 point nonconformities
Normal Inspection	Up to 500	50	18 points	25 points
	501 to 1,200	80	25 points	36 points
	1,201 to 3,200	125	32 points	50 points
	3,201 to 10,000	200	45 points	73 points
	10,001 and over	315	68 points	110 points
Tightened Inspection	Up to 500	50	13 points	20 points
	501 to 1,200	80	20 points	30 points
	1,201 to 3,200	125	32 points	40 points
	3,201 to 10,000	200	45 points	58 points
	10,001 and over	315	68 points	88 points
Reduced Inspection	Up to 1,200	32	13-20 points	25 points
	1,201 to 3,200	50	16-25 points	32 points
	3,201 to 10,000	80	23-32 points	43 points
	10,001 and over	125	32-41 points	54 points

1/ For reduced inspection, when the first value is exceeded but not the second value, the lot shall be accepted, but normal inspection shall be reinstated (see 4.3.4.1.4.4). The second value is the maximum acceptable point value.

4.3.4.1.2 Initiation of inspection. Normal inspection shall be used at the start of inspection unless otherwise directed by the responsible procurement quality assurance element administering the contract.

4.3.4.1.3 Continuation of inspection. Normal, tightened, or reduced inspection shall continue unchanged on successive lots except where switching procedures in 4.3.4.1.4 require change.

4.3.4.1.4 Switching procedures.

4.3.4.1.4.1 Normal to tightened. When normal inspection is in effect, tightened inspection shall be instituted when two out of five consecutive lots have not been accepted on original inspection (i.e., ignoring resubmitted lots for this procedure).

4.3.4.1.4.2 Tightened to normal. When tightened inspection is in effect, normal inspection shall be instituted when five consecutive lots have been considered acceptable on original inspection.

4.3.4.1.4.3 Normal to reduced. When normal inspection is in effect, reduced inspection shall be instituted, providing that all of the following conditions are satisfied:

- a. The preceding 10 lots have been on normal inspection and none have not been accepted on original inspection; and
- b. The total number of points for 3 and 2 point nonconformities in the samples from the preceding 10 lots is equal to or less than 60 percent of the total maximum acceptable point values for 3 and 2 point nonconformities from the preceding 10 lots; and

5100-92M

- c. The total number of points for 3, 2 and 1 point nonconformities in the sample from the preceding 10 lots is equal to or less than 75 percent of the total maximum acceptable point values for 3, 2 and 1 point nonconformities from the preceding 10 lots; and
- d. Production is at a steady rate; and
- e. Reduced inspection is considered desirable by the procurement quality assurance element administering the contract.

4.3.4.1.4.4 Reduced to normal. When reduced inspection is in effect, normal inspection shall be instituted if any of the following occur on original inspection:

- a. A lot is not accepted; or
- b. A lot is considered acceptable but exceeds the applicable first value (see 4.3.4.1.1); or
- c. Production becomes irregular or delayed; or
- d. Other conditions warrant that normal inspection be instituted.

4.3.4.2 Dimensional examination. The appropriate number of pants, determined from table VI, shall be examined for conformance to the dimensional requirements cited in table II. When a measurement deviates from a dimension and tolerance specified, the pants shall be penalized 1 point. Each pair of pants shall also be penalized 1 point when the inseams are uneven in length by 1/2 inch or more. The lot shall be unacceptable if the total point value resulting from this examination exceeds the maximum acceptable point value. Each size of pants present in the lot should be represented in the sample selected for this examination.

Table VI. Sampling provisions for dimensional examination

Lot size	Sample Size	Maximum acceptable point values
Up through 500	8	0
50 - 3,200	13	1
3,201 - 35,000	20	2
35,001 and up	32	3

4.4 Packaging inspection. An examination shall be made to determine that preservation, packing, and marking comply with the section 5 requirements. Nonconformities shall be scored in accordance with Table VII. The sample unit shall be one shipping container fully packaged with the exception that it need not be closed. Examination of closure nonconformities listed below shall be made on shipping containers fully packaged. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the AQL, expressed in terms of nonconformities per hundred units, shall be 2.5.

Table VII. Packaging Examination

<u>Examine</u>	<u>Nonconformity</u>
Markings	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.
Materials	Any component missing or not as specified. Any component damaged, affecting serviceability.
Workmanship	Inadequate application of components, such as: incomplete closure of container flaps, improper taping, loose strapping, inadequate stapling. Bulged or distorted container.
<u>Contents</u>	<u>Number of items per container is more or less than required.</u>

5. PACKAGING

5.1 Preservation. Preservation shall be in accordance with ASTM D 3951 and as specified in the contract or purchase order (see 6.2).

5.1.1 Packaging. Each pair of pants, with the fly and pocket flaps closed and the inseams meeting, shall be folded from the leg bottom up toward the waistband to an overall length of approximately 23 inches. For larger sizes it may be necessary to adjust the seat area with a tuck to achieve the desired width of approximately 14-1/2 inches.

5.2 Packing. Thirty (30) pairs of pants of one size, packaged in accordance with 5.1.1, shall be packed in a fiberboard box. The box shall comply with the Uniform Freight Classification and the National Motor Freight Classification. Boxes shall be type CF, variety SW, class Domestic, grade 350 (ECT 55) of ASTM D 5118; the closure shall be in accordance with method IV of the appendix. The box size shall be 24" L x 15-1/2" W x 17" D.

5.3 Marking. In addition to any special marking required by the contract or purchase order, shipping containers shall be marked in accordance with FED-STD-123.

6. NOTES

6.1 Intended use. The pants are intended to be worn with flame-resistant shirts for fighting wildland fires and for conducting controlled burning operations.

6.2 Acquisition requirements. Acquisition documents must specify:

- a. Title, number, and date of this specification.
- b. Sizes of pants in listed waist range and inseam length (S, R, or L) and quantities required (see 1.2).
- c. When required, the specific issue of individual document referenced (see 2.1 and 2.2).
- d. When lot by lot testing is required in lieu of certificates of compliance (see 4.3.2).
- e. Packaging requirements if other than specified (see 5.1 and 5.2).

5100-92M

6.3 First article. When first articles are required, they shall be inspected and approved under the appropriate provisions of FAR 52.209. First articles shall be preproduction samples. The contracting officer should include specific instructions in all acquisition documents regarding arrangements for selection, inspection, and approval of the first articles.

6.4 Known sources. The following are know sources for items referenced in this document:

Waist take-up tape

Offray Specialty Narrow Fabrics, Inc.
360 Route 24
P.O. Box 421
Chester, NJ 07930
Ph: 908-879-3636
Fax: 908-879-3630

Double-bar buckle

Albest Metal Stamping Corp.
One Kent Avenue
Brooklyn, NY 11211-1014
718-388-6000

ITW Waterbury
952 South Main Street
Waterbury, CT 06706
203-753-1161

Leg cuff adjuster metal loop

Albest Metal Stamping Corp.
One Kent Avenue
Brooklyn, NY 11211-1014
718-388-6000

Button and tack

YKK Snap Fasteners, Inc.
P.O. Box 240
Lawrenceburg, KY 40342
502-839-6971

6.5 Notice. When Government drawings, specifications, or other data are used for any other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever.

6.6 Bidder information. For bidding purposes, 11" X 17" drawings will be furnished upon request. They will contain sufficient information regarding size, shape, and quantity of material for bidding purposes. It is the bidder's responsibility to determine yield and waste from the provided 11" X 17" drawings and no further direction or clarification will be provided by the government. Color shade samples, full-size drawings and full-size patterns will be furnished only to successful bidders upon contract award.

5100-92M

6.7 Preparing Activity. USDA Forest Service, Missoula Technology and Development Center (MTDC), 5785 Highway 10 West, Missoula, Missoula, Montana 59808.

5100-92M

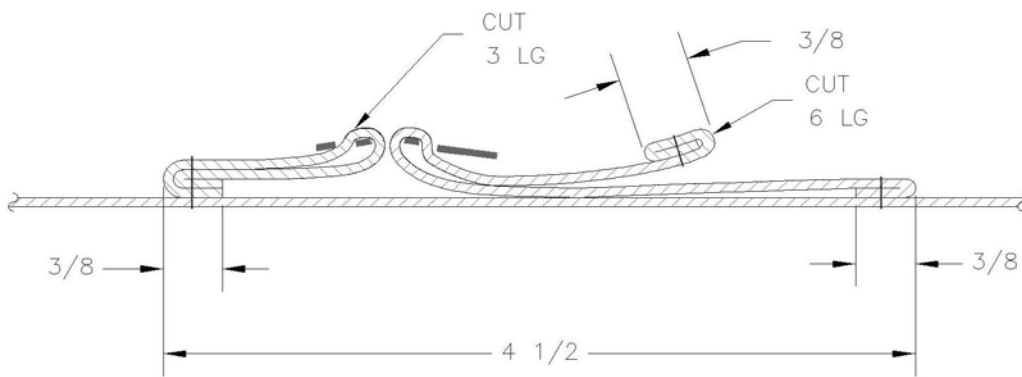
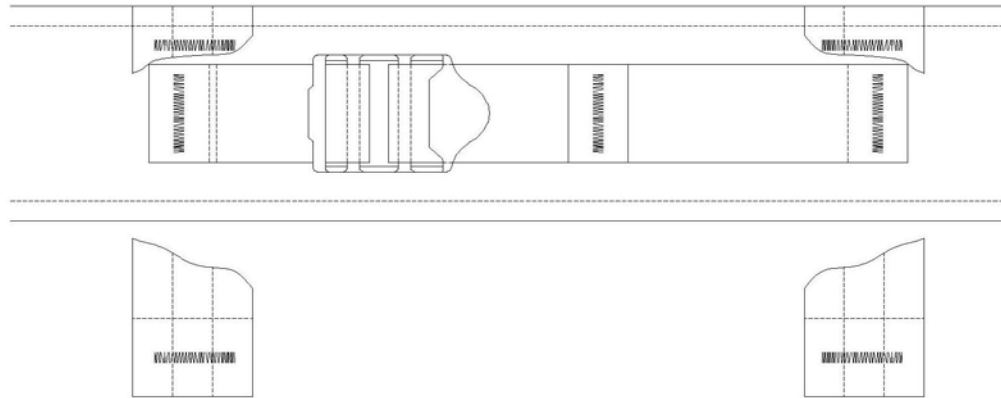


FIGURE 1 – WAIST TAKE-UP TAPE

5100-92M

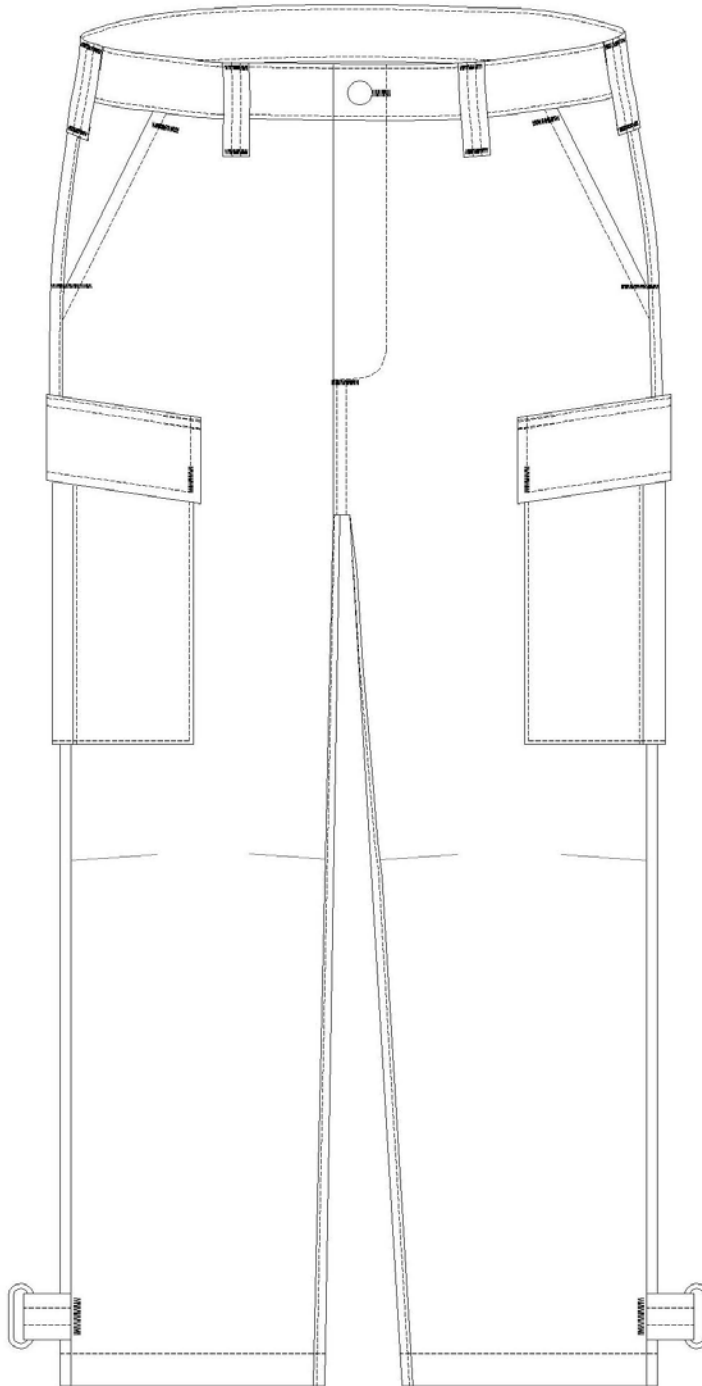


FIGURE 2 — PANTS — FRONT

5100-92M

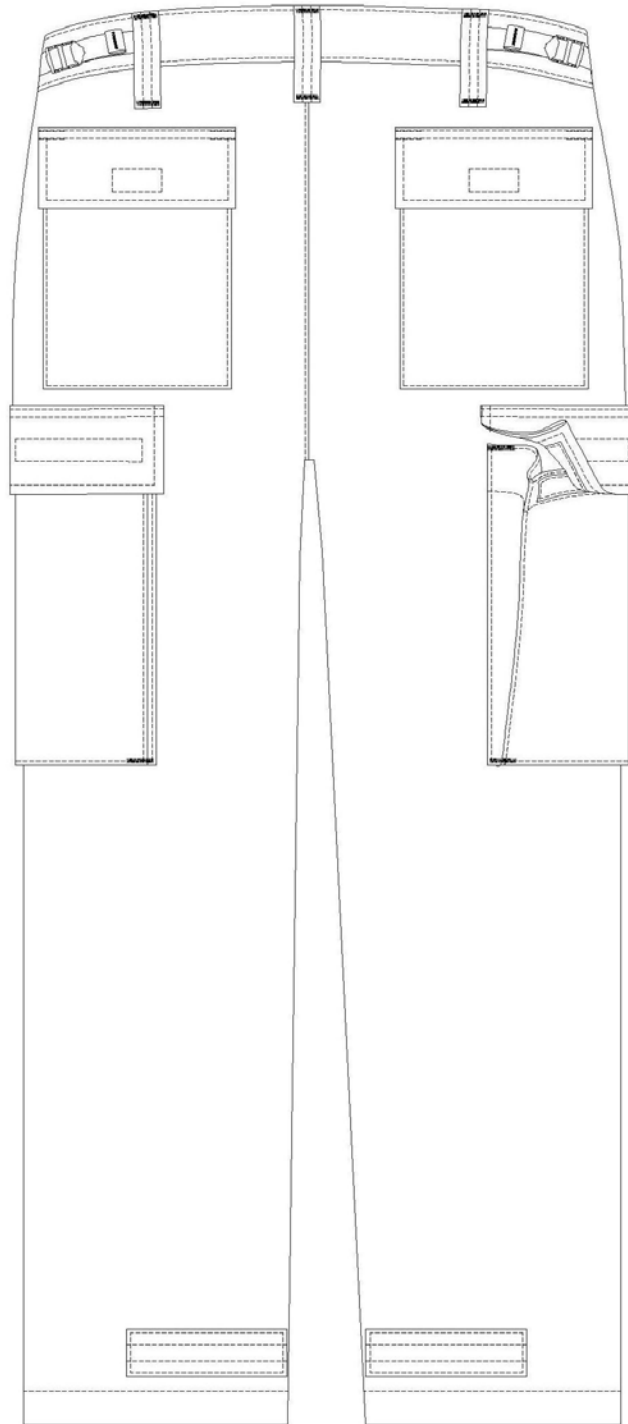


FIGURE 3 — PANTS — BACK

**User Instructions
(Remove only by end user)**

Pants, Flame-resistant. US Forest Service Specification – 5100-92

1. Pre-Use Information

- a) Safety Considerations. Use this garment in conjunction with all other required PPE, including hard hat, gloves, flame-resistant shirt, leather boots and fire shelter. This garment should be used only by personnel who have completed the required formal training courses for wildland fire fighting operations and fully understand the limitations and use of this garment.
- b) This garment provides limited thermal and physical protection from the hazards associated with wildland fire fighting.
- c) This garment should not be marked.
- d) The protective properties of this garment cannot be tested by users in the field.
- e) The contractor warrants this garment to be free from defects in workmanship and materials for one year after date of purchase. The warranty assumes that the garment is used by trained personnel following accepted wildland fire fighting procedures.

2. Preparation for Use, Donning/Doffing

- a) Sizing/Adjustment: Pants should be loose fitting. Pants are available in 8 waist sizes with short, regular or long inseam length options.
- b) Interface Issues: These pants are an outer garment; undergarments should be made of 100% cotton, wool, silk, aramid or other flame resistant materials.
- c) Recommended storage: Clean and dry these pants properly before storage. Store in a dry place - out of direct sunlight and extreme temperatures.

3. Inspection Frequency and Details

Inspect garment upon receipt and after each cleaning. Inspect for holes, tears and proper operation of fasteners.

4. Maintenance and Cleaning

- a) Do not use this garment if it is not thoroughly cleaned and dried.
- b) Machine wash in hot water, NO BLEACH. Wash separately from flammable, lint producing fabrics. Rinse thoroughly, soap and detergent residues will burn. Do not starch. Tumble dry medium and remove promptly.

5. Decontamination Procedures

- a) Decontamination is dependent upon what the protective clothing has been exposed to; however chlorine bleach cannot be used under any circumstances.
- b) For extreme contamination with products of combustion or fire debris, remove the contaminants by flushing with water as soon as possible, followed by appropriate cleaning.

6. Retirement/Disposal Criteria

It is recommended that individual units establish their own criteria for routine inspection and subsequent repair or retirement of this garment.

7. **Proper use should be consistent with NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, and 29 CFR 1910.132, "Personal Protective Equipment."**

Figure 4
User Instructions