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INCH - POUND
MIL-C-24935
22 December 1988

MILITARY SPECIFICATION

COVERALLS, FIREMEN'S

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a flame resistant coverall with a para-aramid and polybenzimidazole (PBI) blend outershell, a quilted aramid liner and a waterproof moisture barrier interlining.

1.2 Classification. The coveralls shall be of one type in the following sizes (see 6.2).

1.2.1 Sizes

Small, Medium, Large, X-Large, X-Large-Long

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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760-2490 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 8415

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SPECIFICATIONS

FEDERAL

V-F-106	- Fastener, Slide, Interlocking
KK-L-2004	- Leather, Cattlehide, Deerskin and Horsehide, Chrome Tanned
NN-P-71	- Pallets, Material Handling, Wood, Stringer Construction, 2 Way and 4 Way Entry (Partial)
DDD-L-20	- Label; For Clothing, Equipage, and Tentage (General Use)

MILITARY

MIL-C-3735	- Cuffs, Knit, Wrist and Ankle, and Cloth Knitted
MIL-T-5624	- Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-W-5664	- Webbing, Textile, Elastic
MIL-A-8243	- Anti-icing and Deicing - Defrosting Fluid
MIL-P-15011	- Pallet, Material Handling, Wood Post Construction, 4-Way Entry
MIL-B-17757	- Boxes, Shipping, Fiberboard, (Modular Sizes)
MIL-E-20652	- Eyelet, Metallic, Rolled Flange Type, and Eyelet Washer
MIL-F-21840	- Fastener Tapes, Hook and Loop, Synthetic
MIL-C-24939	- Cloth, Ripstop, Para-aramid/PBI, Water Repellent
MIL-C-43774	- Cloth, Plain or Pajama Check Weave, Aramid
MIL-T-44100	- Thread, Para-Aramid, Spun, Intermediate Modulus
MIL-B-87002	- Batting, Synthetic Fibers, Quilted, Aramid

STANDARDS

FEDERAL

FED-STD-191	- Textile Test Methods
FED-STD-311	- Leather, Methods of Sampling and Testing
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-1668	- Provisions for Evaluating Quality of Cloth Coveralls

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

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

U.S. POSTAL SERVICE MANUAL

(Copies of the manual may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be 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).

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Association, ATTN: Traffic Department, 1616 P Street, N.W., Washington, DC 20036-1404).

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606-5808).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 96 - Water Vapor Transmission of Materials

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

TECHNICAL MANUAL OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

Test Method 135 - Dimensional Changes in Automatic Home Laundering of Durable Press Woven or Knit Fabric

(Application for copies should be addressed to AATCC, P.O. Box 12215, Research Triangle Park, NC 27709-2215)

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NATIONAL FIRE PROTECTION ASSOCIATION STANDARD

NFPA 1971 Protective Clothing for Structural Firefighting - 1986 Edition

(Application for copies should be addressed to NFPA, 60 Batterymarche Street, Boston, MA 02110.)

(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 Guide sample. Samples, when furnished, are solely for guidance and information to the contractor (see 6.3). Variations from this specification may appear in the sample in which case this specification shall govern.

3.2 First Article. When specified, the contractor shall furnish sample unit(s) for first article inspection and approval (see 4.3 and 6.2).

3.3 Material.

3.3.1 Basic material. The material for the outershell shall be a ripstop para-aramid/PBI water repellent (see 6.7) fabric conforming to MIL-C-24939.

3.3.2 Quilted lining. The material for the quilted lining shall be in accordance with MIL-B-87002 except that the batting filler shall be covered on one side only with pajama check aramid cloth. The batting shall consist of virgin or reprocessed 100% aramid fibers, natural or solution dyed and meet the following requirements when tested as specified in MIL-B-87002:

Weight - 6.0 - 7.0 oz/yd^2
Thickness - 0.13 - 0.21 inch
Compressional recovery - 80% (min)

The face side of the quilt shall be a fire resistant aramid pajama check weave cloth in accordance with MIL-C-43774, color natural. The thread used to stitch the cover cloth to the batting shall be made of spun aramid fiber as specified in MIL-B-87002. The quilt pattern shall be "chicken wire" design in accordance with figure 2. The stitch pattern shall contain 6-8 stitches per inch.

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3.3.3 Cloth, laminated. The interlining material for the coverall shall be a two layer laminated cloth which is waterproof and moisture vapor permeable. The back of the cloth shall be a flame resistant, aramid pajama check weave cloth conforming to MIL-C-43774, except that the antistat shall not be applied to the fabric and the requirement for antistat shall be deleted. Color of the fabric shall be natural. The face side of the laminated cloth shall contain a micropourous, expanded polytetrafluoroethylene film weighing 0.7 ± 0.3 oz/yd^2 as tested in 4.4.1 and an adhesive suitable for the purpose intended and compatible with the film. The face and back cloths shall be laminated together in such a manner that the assembled (finished) cloth shall comply with the requirements specified in Table I when tested as specified in 4.4.1. (see 6.6).

TABLE I

Characteristic	Requirement
Moisture Vapor Transmission rate, gms/m^2/24hrs (min)	
Procedure B	550
Procedure BW	3500
Hydrostatic Resistance, PSI (min)	50
Leakage After Exposure to Aircraft Fluids	No leakage
Dimensional Stability (after 5 wash/dry cycles) Warp and Fill (max)	5%
Flame Resistance (after 5 wash/dry cycles)	
Char length (inch) Warp and Fill (max)	4.0
After Flame (sec) Warp and Fill (max)	2.0
Leakage After 5 Wash/Dry Cycles	No Leakage
Thermal Shrinkage (max)	10.0%

3.3.4 Leather. The leather strip for binding the leg bottoms, slide fastener thong and reinforcing the pockets and knees shall be a flesh split cattlehide, natural color of tannage, of not less than 2-3/4 nor more than 3-1/2 ounce thickness conforming to type IV, Class 2 of KK-L-2004 after silicone treatment specified in 3.3.4.1, except for the following:

a. Shrinkage temperature shall be not less than 105°C.
b. Tests for percent ash and chloroform-soluble material not required.

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3.3.4.1 Silicone treatment. The leather shall be treated with an approved durable silicone compound (see 6.7) to lower its water absorption. The treated leather shall not absorp more than 30 percent water when tested as specified in 4.4.1.

3.3.5 Cloth, corduroy. The material for the topcollar shall be 100% cotton. It shall have a minimum of eight wales per inch and weigh not less than 8.0 oz/yd^2. The cloth shall be fast dyed (no sulphur) either dark blue, brown, dark green, black, or olive drab and have an approved durable flame resistant treatment (see 4.4.1 and 6.7). The dyed and treated cloth shall show good colorfastness to crocking and perspiration.

3.3.6 Eyelets and washers. The eyelets and washers for the pockets shall conform to rolled flange type, M20652/1-BBE114 and M20652/1-BBW101 of MIL-E-20652, except that the finish shall be brass.

3.3.7 Elastic. The material for the elastic waistband shall be webbing conforming to Type I, Class 1 of MIL-W-5664, 1 inch wide, except that the colorfastness requirements shall not apply.

3.3.8 Snap fasteners. Snap fasteners for the front closure shall be in accordance with the following Universal Fastener style nos. or equal (see 4.4.1, 6.6, and 6.8):

# 24 ligne Capped Top	- Brass - Nickel Plated
710 Socket	- Brass - Nickel Plated
720 Stud	- Brass - Nickel Plated
# 18 Fastener	- Brass - Nickel Plated

3.3.9 Wristlets. The material for the wristlets shall be in accordance with MIL-C-3735, Type IV, except that it shall be a rib (1x1) para-aramid knit fabric. Fibers shall be 1.5 denier, 8 singles yarn ct., and a minimum of 15 wales per inch and 18 courses per inch, when tested as specified in 4.4.1. The color shall be natural and the finished width of the tube shall be 3 ($\pm$ 1/2) inches.

3.3.10 Aramid non-woven with neoprene coating fabric. The material for the knee patch backing shall be an aramid nonwoven needled fabric coated with fire retardant neoprene on one side. The non-woven component shall consist of 60% ($\pm$ 5%) reprocessed aramid fibers and 40% ($\pm$ 5%) virgin aramid fibers, needled to a polyester scrim, at a minimum weight of 1.8 oz/yd^2. The finished material shall meet the requirements of Table II, when tested as specified in 4.4.1.

TABLE II

Characteristic	Requirement
Weight - oz/yd^2	19.0 ($\pm$1.0)
Thickness - inches	.080 - .180

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3.3.11 Reflective tape. The reflective tape shall be in accordance with 3M style 8986 fluorescent red-orange, 3 inch wide or equal (see 6.6 and 6.8).

3.3.12 Seam sealing tape. The tape (see 4.4.1 and 6.4) for covering and sealing all designated seams and stitching shall be cut in 1 (+1/8,-0) inch wide strips. The tape shall consist of the following components bonded together:

1. A microporous polytetrafluoroethylene film weighing a minimum of 0.6 oz/yd^2
2. Adhesive, thermoplastic not less than 5.4 mils thick

3.3.13 Thread. The thread for seaming the outershell and liners shall be a para-aramid thread, size T 50 for the needle and size T 35 for the bobbin/looper, natural in color, conforming to MIL-T-44100.

3.3.14 Hook and loop fastener tape. The hook and loop fastener tapes shall conform to Type II, Class 1 of MIL-F-21840. The width of the tape shall be as specified in Table III. The color shall be natural or black.

3.3.15 Slide fastener. The slide fastener for the front closure shall conform to Type I, Style 15, Size MH of V-F-106 and the slide fastener for the leg closures shall conform to Type I, Style 3, Size MH of V-F-106, except that all metal components for all the slide fasteners shall be fabricated of brass and purchased from the same contractor. The tape of the fasteners shall be high-temperature resistant aramid. The color of the tape shall be black and shall meet commercially acceptable colorfastness requirements for aramid fabric. The tab shall be a long pull. The finished length of the slide fastener for the front closure shall be 23 (±1/2) inches for sizes Small and Medium, 24 (±1/2) inches for sizes Large and X-Large and 26 inch for size X-Large Long. Finished length for the leg slide fastener shall be 9.0 (+1/4) inches for all sizes. (see 4.4.1).

3.3.16 Label. Each coverall shall have a combination instruction and identification label conforming to Type VI, Class 15 of DDD-L-20. The fastness to laundering requirement of DDD-L-20 shall apply. The label shall bear the following inscription:

COVERALLS, FIREMEN'S
FIBER CONTENT:
Outershell - 60% Para-aramid/ 40% PBI
Interlining - PTFE laminated to 100% Para Aramid
Lining - 100% Para-Aramid Quilt
CONTRACT NO: DLA-100-00-0-0000 (EXAMPLE)
NAME OF CONTRACTOR:
NAME OF MANUFACTURER: (If other than contractor)

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LAUNDERING INSTRUCTIONS
HAND WASH IN LUKE WARM WATER
DO NOT BLEACH
HANG TO DRY

OR

NAVEDTRA 414-01-45-81 FORMULA III
TUMBLE DRY - LOW HEAT
NOTE: TURN COVERALL INSIDE OUT BEFORE TUMBLE DRY
HIGH DRYING TEMPERATURES COULD DAMAGE MATERIALS

WARNING
OUTERSHELL, MOISTURE BARRIER AND THERMAL BARRIER MUST BE INTACT AND IN PLACE WITH ALL CLOSURES FASTENED WHEN IN USE. DO NOT KEEP IN DIRECT CONTACT WITH FLAME. KEEP GARMENT CLEAN - SOILING WILL REDUCE PROTECTIVE QUALITIES. FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN SERIOUS INJURY.

DO NOT STORE THIS GARMENT IN DIRECT SUNLIGHT

DO NOT REMOVE THIS LABEL

3.3.16.1 Size label. A seperate size label conforming to Type VI, Class 2 of DDD-L-20 shall indicate the size and stock number.

3.4 Design. The coveralls shall have a double slider slide fastener, front fly closure secured with snaps and hook and loop fastener tapes spaced down the length of the opening. Two large cargo pockets with flaps that have hook and loop fastener tape closures are positioned on each leg front. A radio pocket is positioned on the left sleeve. The inseams have leg openings with a slide fastener closure. The waistband is elastic threaded thru for waist adjustment. Para-aramid wristlets with thumb holders are attached to the cuffs. Leg openings are bound with leather. Also the knees have leather patches backed with a neoprene coated non-woven aramid. The neck is secured with a throat strap that is adjustable by means of hook and loop fastener tape. The top collar is flame retardant treated corduroy. Reflective tape shall be positioned on the back, arms and around the waist.

3.4.1 Figure. The figures are furnished for information purposes only. When inconsistencies exist between the written specification and a figure, the written specification shall govern.

3.5 Patterns. Standard patterns to be used to cut working patterns will be furnished by the Government (see 6.3). The working patterns shall be identical to the Government patterns. Neither the Government patterns nor the working patterns shall be altered in any way, except that additional notches for use during construction are permitted on the working patterns. Minor modifications are permitted where necessary when using automatic equipment. These modifications shall not alter the appearance, serviceability, or dimensional requirements cited in the specification. The patterns allow 1/2 inch for all seams, except as otherwise indicated in Table III.

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3.5.1 List of pattern parts. The component parts of the coverall shall be cut from the materials as specified and in accordance with the number of parts required for the manufacturing process as follows:

Material	Nomenclature of pattern parts	Cut parts
Basic material	Back top	2
	Front top	2
	Back bottom	2
	Front bottom	2
	Front sleeve	2
	Back sleeve	2
	Bellow	2
	Under collar	1
	Cargo pocket	2
	Cargo pocket bellow	2
	Cargo pocket top flap	2
	Cargo pocket under flap	2
	Radio pocket	1
	Radio pocket flap	1
	Throat strap	2
	Waistband	1
Interlining	Back top interlining	2
	Front top interlining	2
	Back bottom interlining	2
	Front bottom interlining	2
	Sleeve interlining	2
	Collar interlining	1
	Throat strap interlining	1
Leather	Knee patch	2
	Cargo pocket patch	2
	Cargo pocket bellow patch	2
Nonwoven aramid	Knee patch backing	2
Lining	Back top lining	2
	Front top lining	2
	Back bottom lining	2
	Front bottom lining	2
	Sleeve lining	2
	Collar lining	1
	Throat strap lining	1
Corduroy	Top collar	1 1/
Templates	Waistband/Elastic, Marker	
	Snap placement - left front marker	
	Fastener tape placement - left front marker	

1/ As an alternate the collar may be cut in 2 pieces with a 1/2 inch seam allowance for the center back seam.

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3.6 Construction.

3.6.1 Stitches, seams, and stitchings. Stitch, seam, and stitching types shall conform to FED-STD-751. Wherever two or more methods for seam or stitch types are given for the same part of the operation, any one may be used. Where stitch type 401 is used, the looper, that is the underthread, shall be on the inside of the coveralls. Seam allowances shall be maintained with seams sewn so that no raw edges, runoffs, twists, pleats, or open seams will result. Unless otherwise specified, top or edge stitching shall be 1/16 to 1/8 inch from edge, hook and loop fastener tape and reflective tape stitching shall be 1/16 to 1/8 inch from edge of tape. Unless otherwise specified, double needle stitching shall be 1/4 inch gauge with the outer row of stitching 1/16 inch from the finished edge.

3.6.2 Thread breaks and ends of seams. Ends of all seams and stitchings, when not caught in other seams or stitchings, shall be backtacked not less than 1/2 inch. The ends of a continuous line of stitching shall be overlapped 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 or thread breaks (401 stitch type) may be repaired by using 301 stitch type. When stitch type 401 is permitted as an option, it shall not be used unless the ends are caught in other seams of stitching.

3.6.3 Stitches per inch. The minimum and maximum number of stitches per inch shall be specified in Table III.

3.6.4 Heat sealing. All seams on the interlining shall be sealed with heat sealing tape on the film side of the interlining. The entire width of the seam tape shall be hot air sealed over the seam. The tape shall be applied by blowing high temperature air on the thermoplastic adhesive face of the sealing tape, which is then driven through pressurized rollers, attaching the tape and sealing the seams. All seam tapes shall be applied without tension and shall be applied so that a minimum of 3/16 inch overlap is on both sides of the sewn seam. Every effort shall be made to avoid tape end joints where the tape passes over the taped seams of the interlining. All seam tapes shall overlap a minimum of 3/4 inch at joining points, all crossover seams shall be sealed with crossover sealer. Sealed seams shall show no leakage when tested as specified in 4.4.1.1.

3.7 Manufacturing operations requirements. The coverall shall be manufactured in accordance with operation requirements specified in Table III. The contractor is not required to follow the exact sequence of operations listed provided that the finished coveralls are identical to those produced by following the sequence of operations as listed in Table III. Minor modifications are permitted where necessary when using automatic equipment. These modifications shall not alter the appearance, serviceability, or dimensional requirements cited in the specification.

3.7.1 Shade and size marking. The component parts shall be marked, ticketed, or bundled to insure a uniform size, shade and proper assembly throughout the coverall. Any method of shade and size marking may be used except:

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1. The use of corrosive metal fastening devices
2. Sew-on tickets
3. Adhesive type shade tickets which discolor or adhere to the material upon removal of tickets

Note: The use of ink pad numbering machine, rubber stamp, or pencil is acceptable provided the numbers do not show through the outside of the coverall. Whenever possible, numbers shall be covered by the seam allowance.

3.7.2 Abbreviations in table of operations. The abbreviations used in Table III are as follows:

Stch	-	Stitch
in	-	inch
Ndl	-	Needle
Bob	-	Bobbin
Lpr	-	Looper
Mchne	-	Machine
Brtck	-	Bartack
Comrcl	-	Commercial
smlr	-	similar
Btnhl	-	Buttonhole
incl	-	including
dbl	-	double

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
1.	Cutting.					
	a. Cut the coverall in accordance with patterns which show directional lines, marks, and notches for proper assembly. Directional lines shall not appear on the coated cloth or the quilted fabric.					
	b. Cut all component parts from the same piece of material except the waistband, which may be cut from ends and when so cut shall match the main assembly.					
	c. Cut the wristlets to finish 7 inches long (double thickness) on the finished coverall.					
	d. Cut 2 inch wide leather strips to bind the leg bottoms.					
	e. Cut leather thong for slide fastener 5 inches long and 1/2 inch wide.					
	f. Cut reflective tape long enough to be caught in the finished seam.					
	g. The hanger loop shall be cut from the basic material not less than 5 inches in length and wide enough to finish 1-1/2 to 1-3/4 inches.					
	h. The face side of materials to be assembled shall be considered as follows: Outershell - as marked Interlining - PTFE laminate side Lining - Pajama check nomex side					
2.	Replacement of defective components.					
	During the spreading, cutting, and manufacturing process, components having material defects or damages that are classified as defects in MIL-STD-1668 shall be removed from production and replaced with non-defective and properly matched components.					

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
3.	Attach knee patches.					
	a. Place the non-woven aramid knee patch backing behind the leather knee patch with coated side away from the wearer. Position knee patch on outer shell in accordance with pattern marks and double stitch all sides.	301 or 401	LSbj-2	8-10	50	35
4.	Make cargo pocket flaps and attach pile tape.					
	a. Position cargo pocket top flap and cargo pocket under flap, face to face with bottom edges even and stitch 3/8 (± 1/16) inch from sides and top raw edges. Turn to finished position forcing out edges and points.	301 or 401	SSe-2(a)	8-10	50	35
	b. Edge stitch sides and bottom edges of flap.	301	SSe-2(b)	8-10	50	35
	c. Overedge stitch top raw edges of cargo pocket flap.	503 or 504 or 602	EFd-1	8-10	50	35
	d. Position a 1 inch by 2 inch piece of loop fastener tape on each corner of the pocket flaps as indicated by the marks on the patterns. Stitch tape along both sides and top and bottom edges.	301	LSbj-1	8-10	50	35
5.	Assemble cargo pockets.					
	a. Superimpose cargo pocket patch on the cargo pocket as indicated by pattern marks, with lower edges even and double stitch top edge of the leather.	301	SSa-2	8-10	50	35
	b. Turn outside edge of pocket bellow under 1/2 inch and position the pocket bellow patch even with turned edges and in accordance with pattern marks. Stitch 1/8 inch from tops and outside edges of pocket bellow.	301	SSa-1	8-10	50	35
	c. Center and position two eyelets on the pocket bellow in accordance with pocket bellow patch pattern marks.					

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	d. Position leather sides of the pocket and bellow face to face matching pocket bottom with notches on bellows, stitch and overedge stitch simultaneously, 3/8 (± 1/16) inch from raw edges, thru all plies.	515 or 516 or 519	SSa-2	8-10	50	35
6.	Hem and attach hook tape to cargo pockets.					
	a. Turn top raw edge of pocket under 1/4 inch, turn again to form a 1/2 inch hem as indicated by pattern marks and doublestitch top edge of pocket.	301	EFb-2	8-10	50	35
	b. Position two 1 inch by 2 inch hook fastener tape pieces on cargo pocket according to marks on patterns. Stitch tape along both sides and top and bottom edges.	301	LSbj-1	8-10	50	35
7.	Attach reflective tape to sleeves.					
	a. Top and bottom rows of reflective tape shall be positioned in accordance with pattern marks. Stitch each side of tape to sleeve.	301 or 401	LSbj-1	8-10	50	35
	b. Position sleeves face to face and stitch and overedge stitch the underarm seam.	515 or 516 or 519	SSa-2	8-10	50	35
	NOTE: Reflective tape shall be positioned evenly and the lines on the tape shall meet on the finished seams.					
8.	Make radio pocket and flap and attach to sleeve.					
	a. Turn under top raw edge of radio pocket 1/4 inch and form a 1/2 inch hem as indicated by pattern marks. Doublestitch top folded edge.	301	EFb-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	b. Position an eyelet on the bottom end of the radio pocket as indicated by pattern marks.					
	c. Fold radio pocket according to fold lines on patterns. Position bottom edges face to face and stitch 3/8 (±1/16) inch from raw edges.	301	SSa-1	8-10	50	35
	d. Edge stitch along all fold lines.	301	SSa-1	8-10	50	35
	e. Center a 2 inch by 1 inch piece of hook fastener tape on the front of the radio pocket in accordance with pattern marks. Stitch along both sides and top and botttom edges.	301	LSbj-1	8-10	50	35
	f. Fold radio pocket flap face to face according to pattern marks and stitch 3/8 (±1/16) inch from side raw edges. Trim corners and turn to finished position and edge stitch turned and folded edges.	301	SSe-2	8-10	50	35
	g. Overedge stitch the top raw edges of the pocket flap together.	503 or 504 or 602	SSa-1	8-10	50	35
	h. Position a 2 inch by 1 inch piece of loop fastener tape according to pattern marks on the underside of the finished end of radio pocket flap and stitch along both sides and top and bottom edges.	301	LSbj-1	8-10	50	35
	i. Turn under raw edges of radio pocket 3/8 (± 1/8) inch, and center on left front sleeve with the top edge of the pocket positioned according to pattern marks. Doublestitch side and bottom edges of pocket to coverall sleeve, using a 3/16 inch gauge with the outer row of stitching 1/16 inch from the folded edge.	301	LSd-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	j. Turn under overedged edge of radio pocket flap 1/4 inch and position folded edge of flap in accordance with pattern marks on left and doublestitch, enclosing overedged edges.	301	LSd-2	8-10	50	35
	k. Stitch a 5/8 inch vertical bartack at the top corners of the pocket and a 5/8 inch horizontal bartack at the top corners of the pocket flap. The bartacks shall be superimposed on the double row of stitching.	Bartack		42 per bartack	50	35
9.	Assemble collar.					
	a. If the option to cut the top collar in two pieces is exercised, position the top collars face to face and stitch center back 1/2 inch from the raw edges. Open seam flat. Turn to finished position.	301	SSa-1	8-10	50	35
	b. Assemble the undercollar and top collar with the back sides of the interlining and lining facing the top collar. Starting 1 inch from neckline edge, stitch 3/8 (±1/16) inch from the ends and outer edge of collar.	301	SSe-2(a)	8-10	50	35
	c. Trim corners and turn to finished position forcing out edges and points. Starting 1 inch from neckline, stitch 1/4 (±1/16) inch from the turned edges, leaving bottom neck seam allowance free.	301	SSe-2(b)	8-10	50	35
10.	Make and attach throat strap.					
	a. Assemble throat strap top and bottom outershell plies with the back sides of the interlining and lining facing the top ply of the throat strap. Turn in the raw edges of the sides and wide end 1/2 inch overlapping the lining and interlining pieces and edge stitch the turned edges.	301	SSc-1	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
11.	Attach throat strap and fastener tape to collar.					
	a. Position a 1-1/2 inch by 3 inch piece of loop tape on the bottom ply of wide end of the throat strap in accordance with pattern marks. Stitch tape along both sides and top and bottom edges.	301	LSbj-1	8-10	50	35
	b. Position throat strap on left end of undercollar, in accordance with pattern marks, and in the direction to mate with the hook fastener tape on the right end of undercollar. Stitch strap to undercollar with a box stitch approximately 2-1/4 inches long by 3/4 inches wide, thru all plies.	301	LSbk-2	8-10	50	35
	c. Position 1-1/2 inch by 3 inch pieces of hook fastener tape on the right and left ends of the undercollar in accordance with pattern marks. Stitch tape along both sides and top and bottom edges, thru all plies.	301	LSd-1	8-10	50	35
12.	Assemble outer shell back top.					
	a. Join center backs of outershell back tops with a double lapped and doublestitched seam, with left back over right back.	301 or 401	LSc-2	8-10	50	35
	b. Position two vertical strips of reflective tape down the back of the coverall with the outside edge of tape in accordance with pattern marks. Stitch each side of the tape to the back. Bottom end of vertical tape shall extend 1-1/2 (± 1/8) inches under the bottom and top horizontal tape.	301 or 401	LSbj-1	8-10	50	35
	c. Position a horizontal strip of reflective tape across the bottom of the back from side edge to side edge in accordance with pattern marks. Stitch each side of the tape to the back. See operation 7 NOTE.	401	LSbj-1	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	d. Cut reflective tape for top horizontal stripe long enough to have a 1/2 inch turn under on each end and to finish even with outside edges of previously positioned vertical stripes. Position tape in accordance with pattern marks. Fold under each end of tape 1/2 inch and stitch ends and sides of the tape to back. Ends of stitching shall overlap 1/2 inch.	301 or 401	LSbj-1	8-10	50	35
	e. Fold pleat on back as indicated by notches at shoulder and waistline, with the folded edge of pleat facing the armhole. Stitch 3/8 (±1/16) inch from folded edge of back pleats.	301	OSf-1	8-10	50	35
	f. Stitch 1/8 inch from top and bottom raw edges holding the pleats in place.	301	SSa-1	8-10	50	35
13.	Assemble outershell front tops.					
	a. Position a horizontal stripe of reflective tape on the front tops from side edge to center in accordance with pattern marks. Stitch each side of the tape to front. See operation 7 NOTE.	301 or 401	LSbj-1	8-10	50	35
	b. Position two 1 inch by 2 inch pieces of loop tape on the face side of the left front in accordance with template. Stitch along sides and top and bottom edges of both pieces.	301	LSbj-1	8-10	50	35
14.	Attach outershell back top and front top.					
	a. Position back top and front top face to face and stitch and overedge side seams in one continuous operation from armhole to waist edge. See operation 7 NOTE.	515 or 516 or 519	SSa-2	8-10	50	35
15.	Assemble outershell back bottom.					
	a. Join outershell back bottom seat with a double lapped and double stitched seam, with left back over right back.	301	LSc-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
16.	Assemble outershell front bottoms.					
	a. Turn crotch seam allowance in on each side and doublestitch.	301	SSa-2	8-10	50	35
	b. Join crotch seam with with a double row of stitching, with left front lapped over right front.	301	LSq-3	8-10	50	35
17.	Join outershell back and front bottoms.					
	a. Position front and back bottoms face to face and stitch and overedge the side seams.	515 or 516 or 519	SSa-2	8-10	50	35
	b. Position reflective tape across the width of the leg bottoms in accordance with pattern marks. Stitch top and bottom edges of the tape to the legs. See operation 7 NOTE.	401	LSbj-1	8-10	50	50
18.	Attach cargo pockets.					
	a. Position folded edge of cargo pocket over side seams as indicated by the marks on front bottom patterns. Double stitch thru all plies, sides and bottom of pockets to the coverall.	301	LSd-2	8-10	50	35
	b. Turn overedged edge of pocket flap under 1/2 inch and position turned edge of flap on front bottom, as indicated by pattern marks. Doublestitch pocket flap to coverall enclosing overedged edge.	301	LSd-2	8-10	50	35
	c. Stitch a 5/8 inch diagonal bartack at the corners of the pockets and a 5/8 inch vertical bartack on corners of pocket flap. The diagonal bartack shall be positioned from top left to right bottom. The bartacks shall be superimposed on the previous lines of stitching.	Bartack		42 per bartack	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
19.	Attach inseams.					
	a. Stitch and overedge stitch inseams in one continuous operation starting and stopping at the outlet for the leg slide fasteners. The seam at the crotch junction shall not be staggered more than 3/8 inch (measured from the center of the seam to the center of the seam).	515 or 516 or 519	SSa-2	8-10	50	35
20.	Join top and bottom at waist.					
	a. Position top and bottom, back to back, at waist and stitch. Seam shall finish on the outside.	515 or 516 or 519	SSa-2	8-10	50	35
21.	Attach waistband and left front snap fasteners.					
	a. Cut a piece of elastic as specified in 3.3.7 according to the marker. Position the 1/2 inch bartack in accordance with waistband/elastic marker.	Brtck		28 per brtck	50	30
	b. Position waistband from front edge to front edge of coverall with both long edges of waistband turned in 1/4 inch. Center over waist seam and double stitch each side of band to coverall. Elastic shall not be caught more than 1/8 inch from edge in stitching.	301 or 401	LSb-2	8-10	50	35
	d. Overedge stitch the raw edges of the left and right front openings.	503 or 504 or 602	EFd-1	8-10	50	50
	e. Attach snap fastener caps and sockets to the left front according to left front snap placement marker template and one centered between the doublestitching located at waistband top. The socket shall face the wearer on the finished coverall.					
22.	Join sleeves and attach to body.					
	a. Position underarm bellow face to face with the underarm of the sleeve matching notch on bellow with underarm seam. Stitch and overedge together.	515 or 516 or 519	SSa-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	b. Set sleeve to armhole face to face, simultaneously stitching and overedging in one operation.	515 or 516 or 519	SSe-3(a)	8-10	50	35
	c. Turn seam allowance into sleeve, and doublestitch the armhole, using a 3/16 inch gauge with the outside row of stitching 1/16 inch from finished edge.	301 or 401	SSe-3(b)	8-10	50	35
	d. Join the shoulder seam and the sleeve top seam 1/2 inch from raw edge, face to face, simultaneously stitching and overedging in one operation. The pleats at the shoulders shall finish with the folded edge facing the armhole and the raw edges of the reflective tape on the sleeves shall be caught in the stitching. See operation 7 NOTE.	515 or 516 or 519	SSa-2	8-10	50	35
23.	Make hanger loop.					
	a. Fold hanger loop in half lengthwise, face side out, turn in raw edges parallel to the fold and doublestitch.	301	EFs-2	8-10	50	35
24.	Assemble lining.					
	a. Position back top linings together face to face and stitch and overedge stitch center back seam together.	515 or 516 or 519	SSa-2	8-10	50	35
	b. Fold pleat in back top lining toward armhole, as indicated by notches at shoulder and waistline. Stitch 1/8 inch from top and bottom raw edges holding the pleats in place.	301	SSa-1	8-10	50	35
	c. Position front top and back top linings face to face and stitch and overedge stitch shoulder seams together.	515 or 516 or 519	SSa-2	8-10	50	35
	d. Set sleeve lining into armhole with underarm seam meeting at side seam. Stitch and overedge stitch sleeve in armhole in one continuous operation.	515 or 516 or 519	SSa-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	e. Position sleeve lining, front top and back top linings, face to face, matching underarm seams and stitch and overedge stitch underarm and side seams in one continuous operation.	515 or 516 or 519	SSa-2	8-10	50	35
	f. Position back bottom linings together, face to face, and stitch and overedge stitch seat seam together.	515 or 516 or 519	SSa-2	8-10	50	35
	g. Stitch crotch seam of front bottom linings, from notch to inseam together face to face.	515 or 516 or 519	SSa-2	8-10	50	35
	h. Join lining inseam in one continuous operation from slide fastener outlet to slide fastener outlet.	515 or 516 or 519	SSa-2	8-10	50	35
	i. To secure operation 24 h, tack inseam 3/4 inch above slide fastener opening.	301	tack	10-12 per tack	50	35
	j. Join leg outseams together face to face and stitch and overedge stitch together.	515 or 516 or 519	SSa-2	8-10	50	35
	k. Position top and bottom linings face to face and stitch and overedge stitch together at waist.	515 or 516 or 519	SSa-2	8-10	50	35
	l. Center combination label on the face side of the back with top edge of label 1-1/2 to 2 inches below the finished neckline. Stitch all sides of the label 1/16 to 1/8 inch from edge.	301	LSbj-1	6-8	50	35
25.	Assemble interlining.					
	NOTE: All seams shall be sealed with heat sealing tape on the film side of the interlining.					
	a. Position back top interlinings together face to face. Stitch and overedge stitch center back seam together.	515 or 516 or 519	SSa-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	b. Fold pleats in back top interlinings with folded edge of pleats facing the armhole, as indicated by notches at shoulder and waistline. Stitch 1/8 inch from top and bottom raw edges holding the pleats in place.	301	SSa-1	8-10	50	35
	c. Position front top and back top interlinings face to face. Stitch and overedge stitch shoulder seams together.	515 or 516 or 519	SSa-2	8-10	50	35
	d. Set sleeve interlining into armhole with underarm seam meeting at side seam. Turn shoulder seam toward the front. Stitch and overedge stitch sleeve in armhole.	515 or 516 or 519	SSa-2	8-10	50	35
	e. Position sleeve interlining and front top and back top interlinings face to face. Stitch and overedge stitch underarm and side seams in one continuous operation.	515 or 516 or 519	SSa-2	8-10	50	35
	f. Position back bottom interlinings together face to face and stitch. Stitch and overedge stitch seat seam together.	515 or 516 or 519	SSa-2	8-10	50	35
	g. Stitch crotch seam of front bottom interlining together face to face.	515 or 516 or 519	SSa-2	8-10	50	35
	h. Stitch and overedge stitch interlining inseam in one continuous operation from notch to notch.	515 or 516 or 519	SSa-2	8-10	50	35
	i. To secure operation 25H, tack inseam 3/4 inch above slide fastener opening.	301	tack	10-12 per tack	50	35
	j. Join leg outseams together face to face and stitch and overedge stitch together.	515 or 516 or 519	SSa-2	8-10	50	35
	k. Position top and bottom interlinings face to face. Stitch and overedge stitch together at waist.	515 or 516 or 519	SSa-2	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
26.	Join lining and interlining.					
	a. Position the lining inside the interlining with the back side of the lining against the face of the interlining. Align the bottom edges of the sleeves and legs.					
	b. Join lining and interlining at front opening edges and neckline by stitching and overedge stitching in one operation, 3/8 (±1/8) inch from raw edges.	515 or 516 or 519	SSa-2	8-10	50	35
27.	Attach wristlets.					
	a. Fold wristlet in half with raw edges even and align raw edges of wristlet and sleeve outershell face to face. Superimpose sleeve lining on outershell sleeve and match underarm and top sleeve seams. Stitch around sleeve openings, thru all plies.	515 or 516 or 519	SSa-2	8-10	50	35
	b. Form thumb holder by placing bartack on underarm seam side of cuff 1 inch in and 1-1/2 inches from bottom edge of cuff, thru all plies.	Brtck		28 per brtck	50	35
	c. Position face side of liner assembly to the wrong side of the outershell with underarm seams matching and stitch around the sleeve opening matching quilt side of liner to knit wristlet.	515 or 516 or 519	SSa-1	8-10	50	35
28.	Position lining assembly into the outershell.					
	a. Pull sleeve to finished position and insert lining assembly into outershell garment aligning the bottom edges of the legs and neckline.					
	CAUTION: The interlining shall finish so that the pajama check faces toward the outershell.					

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
29.	Attach front slide fastener and finish front opening.					
	a. Position bottom stop of front slide fastener according to pattern marks on left front outershell and position tape even with overedged edge, turn down top end of slide fastener tape even with teeth and stitch 1/4 inch from the overedged edge.	301	SSa-1	8-10	50	35
	b. Align left front of liner assembly with left front outershell in accordance with notch at neck edge. Turn outershell face to face at notch for front facing and stitch thru all plies, 1/2 inch from raw edge at neckline from folded edge to collar notch. Turn facing to finished position and stitch front opening 1-1/2 (± 1/8) inches from the front folded edge starting at top stop of slide fastener and continuing down the front to form the J-stitching at the bottom of the coverall.	301	SSe-2	8-10	50	35
	c. Align right front of liner assembly with right front outershell in accordance with notch at neck edge. Tack liner to the outershell by stitching front opening 1/4 inch from raw edge of lining assembly.	301	LSbu-2(b)	8-10	50	35
	d. Turn right front facing face to face at notch for facing and stitch 1/2 inch from raw edges at neckline from folded edge to collar notch. Turn right front facing to finished position.	301	SSa-1	8-10	50	35
	e. Position slide fastener on inside of right front with teeth 3/8 inch from the front folded edge. Align slide fastener with left front, turn top of tape down to finish even with top teeth and stitch to right front. Stitch 1/4 inch from front folded edge, starting at top neck edge and continuing down front superimposed on the tacking stitch.	301	SSa-1	8-10	50	35
	f. With left front lapped over right front doublestitch crotch with stitching superimposed on the previous lines of stitching.	301	LSq-3	8-10	50	35

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	g. Place 5/8 (±1/16) inch horizontal bartacks as follows: one at the bottom of the J-stitching (across the double stitching), one 1/2 inch above the bottom stop of the slider fastener (across the double stitching), one directly across from the previous bartack positioned on the J-stitching, and one 1 inch below the bottom of the J-stitching (across the double stitching). Bartacks shall go thru all plies of material.	Brtck		42 per brtck	50	35
	h. Place a 5/8 (±1/16) inch vertical bartack superimposed on the stitching at the top of the slide fastener on the right and left fronts.	Brtck		42 per brtck	50	35
30.	Attach hook fastener tape to the right front.					
	a. Position two pieces of 1 inch by 2 inch pieces of hook fastener tape on the outside of the right front to correspond with the loop fastener tape on the left front. Stitch tape along both sides, top, and bottom edges thru all plies.	301	SSa-1	8-10	50	35
	b. Position snap and stud fasteners to the right front thru all plies to correspond the with sockets positioned in operation 21e. The studs shall finish on the outside facing away from the wearer.					
31.	Attach slide fastener to leg openings.					
	a. Overedge stitch through all plies, each side of the leg slide fastener openings, catching the ends of reflective tape.	503 or 504 or 505	EFd-1	8-10	50	35
	b. Fold the leg openings in 1 inch and position slide fastener so the teeth finish 3/8 inch from the folded edge. Stitch 1/4 inch from folded edge and across top of slide fastener, thru all plies.	301	SSa-1	8-10	50	35
	NOTE: Leg slide fastener shall finish so that the stop is located at top of leg opening.					

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TABLE III - CONSTRUCTION OF COVERALLS

No.	Operation	Stch Type	Seam/ Stch type	Stch in	Thread Ndl	Thread Bob/ Lpr
	c. Position a 5/8 (±1/16) inch horizontal bartack across the inseams 1/2 inch above the top of the leg openings. Slide fastener tapes must be caught in bartack.	Brtck		42 per brtck	50	35
32.	Attach leather leg bindings.					
	a. Fold leg leather binding in half and using a folder, stitch each leg opening with a double row of stitching 3/8 inch gauge with outer row of stitching 1/8 to 3/16 inch from edges of leather strip , though all plies of material with ends starting and stopping even with the slide fastener opening.	301	BSa-2	6-8	50	35
33.	Attach collar.					
	a. Position top collar face to face with lining assembly and stitch according the notches on collar line, 1/2 inch from raw edges, simultaneously catching the hanger loop and size label at center back neck.	301	SSa-1	8-10	50	35
	b. The finished hanger shall have a free opening 2-1/4 (±1/4) inches.					
	c. Turn under collar under 1/2 inch and stitch to neckline thru all plies of material.	301	LSb-1	8-10	50	35
34.	Cleaning.					
	a. Trim all thread ends.					
	b. Remove all loose threads.					
	c. Remove all spots, stains, and shade tickets.					
	NOTE: Care shall be taken when trimming thread ends that damage to the fabric does not result.					

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3.8 Sizes and measurements. Sizes and measurements of finished coveralls shall be as shown in Table IV (see Figure 1). All measurements are expressed in inches.

Table IV - Measurements of Coveralls

Sizes	Front (A)	Sleeve (B)	Waist (C)	Leg Inseam (D)	Back (E)
Small	23	32	36-1/2	28	15-1/4
Medium	25-3/4	33	41	28	16
Large	28-1/4	34	45-1/2	28	17
X-Large	30-1/4	34	49-1/2	29	18-1/4
X-Large -Long	30-1/4	36	49-1/2	31	18-1/4
Tolerance	± 1	± 1	± 1	± 1.5	± 1

NOTE: Front, sleeve, waist, leg inseams and back measurements shall be taken with coveralls fully zippered and laid flat.

(A) Front - Measurement shall be taken across the front at base of armholes from side seam to side seam.

(B) Sleeve - Measurement shall be taken from center back neck seam across shoulder seam and down top of sleeve seam to sleeve cuff attachment seam.

(C) Waist - Twice the measurement taken across the center of the waistband from side seam to side seam, with the waistband fully extended.

(D) Leg inseam - Measurement shall be taken from junction of crotch and seat seam along leg inseam to bottom of leg.

(E) Back - Measurement shall be taken from pleat fold to pleat fold, 12 inches above top of waistband.

3.9 Workmanship. The finished coveralls shall conform to the quality of product established by this specification. The occurrence of defects shall not exceed the applicable point value or defect limit.

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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 or purchase order may use his own or any other facilities suitable for 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 specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must 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 acceptance of defective material.

4.1.2 Certificate of compliance. 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 Classification of inspection. The inspection requirements specified herein are classified as follows:

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. The first article submitted in accordance with 3.2 shall be inspected for compliance with design, construction, workmanship, appearance and dimensional requirements.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-1668.

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4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable procurement documents. A certificate of compliance shall be acceptable for the sealing tape requirements of 3.3.12 and 3.6.4 and for stating that all components of the slide fastener have been furnished by the same supplier (see 3.3.15). In addition, the hydrostatic resistance of the sealed interlining seams shall be as specified in 4.4.1.1. Unless otherwise indicated, testing shall be conducted in accordance with FED-STD-191. All test reports shall contain the individual values utilized in expressing the final results. The lot shall be unacceptable if one or more sample units fail to meet any of the test requirements specified. The sample for testing shall be as follows:

Lot Size	Sample Size
800 or less	2
801 to 22,000 inclusive	3
22,001 and over	5

The basis for lot size and sample units for testing shall be as follows:

Component	Lot size expression	Sample unit
Laminated cloth	yards	4 yards full width
Film only	yards	1-1/2 yards full width
Taped seams	liners	1 complete liner
Leather	square feet	two 3 x 1.5 inch samples
Cloth, corduroy, cotton	yards	2 yards full width
Snaps	gross	6 each
Wristlets	yards	2 yards-tubular
Aramid non-woven	yards	2 yards full width

Table V Component Tests

Component and Sample Unit	Characteristic	Requirement	Test Method Paragraph
Laminated cloth	Moisture vapor transmission rate:	3.3.3	
	Procedure B		ASTM E96 1/ 2/ 9/
	Procedure BW		ASTM E96 1/ 3/ 9/
	Hydrostatic resistance	3.3.3	5512 1/
	Leakage After Exposure to Aircraft Fluids	3.3.3	4/ 7/ 9/
	Dimensional Stability After 5 Wash/Dry Cycles	3.3.3	AATCC 135, 1, IIIB 6/
	Flame Resistance After 5 Wash/Dry Cycles	3.3.3	NFPA 1971, 3.2.1 AATCC 135, 1, IIIB 5/

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Table V Component Tests

Component and Sample Unit	Characteristic	Requirement Paragraph	Test Method
	Leakage After 5 Wash/Dry Cycles	3.3.3	5516 5/ 7/ AATCC 135, 1, IIIB
	Thermal Shrinkage	3.3.3	NFPA 1971, 3.2.2
Film	Weight	3.3.3 3.3.12	5041 8/
Leather	Silicone identification	3.3.4.1	9/
	Water absorption	3.3.4.1	8111.1 of FED-STD-311 10/
Corduroy cloth	All requirements	3.3.5	9/
Snaps	Metal identification	3.3.8	9/
	Style	3.3.8	Visual
Wristlets	Knit	3.3.9	Visual
	Yarn count	3.3.9	9/
	Wales per inch	3.3.9	5070 9/
	Courses per inch	3.3.9	5070 9/
Aramid non-woven	Weight	3.3.10	5041 9/
	Thickness	3.3.10	5030 9/

1/ The film side shall face the water.

2/ The free stream air velocity shall be 550 ± 50 ft/min as measured in the center of the air flow cross section at the down stream end of the chamber's test section. The test shall be run for 24 hrs and weight measurements shall be taken at only the start and completion of the test. At the start of the 24 hour test period, the air gap between the water surface and the back of the specimen shall be 3/4 (± 1/16) inch. Five specimens shall be tested. Test chamber temperature shall be 73.4°F ± 1°F and relative humidity shall be 50 ± 2%.

3/ The free stream air velocity shall be 550 ± 50 fpm as measured in the center of the air flow cross section at the down stream end of the chamber's test section. The test shall run for 2 hours and weight measurements shall be taken at only the start and completion of the test. Five specimens shall be tested. The specimens shall be sealed in any manner which prevents wicking and or leakage of water out of the cup. Test chamber shall be 73.4 (± 1) °F and relative humidity shall be 50% (±2 %).

4/ One specimen per sample unit shall be tested for leakage after exposure to aircraft fluids. The specimens shall be not less than 6 inches in diameter. Specimens shall be placed on a flat surface and 1 ml of JP-4 (jet fuel conforming to MIL-T-5624) spread over the middle of the aramid fabric followed by a 1 ml of deicing fluid conforming to MIL-A-8243. Place the horizontal specimens flat in an air circulating oven at 50°C for 30 minutes. Remove from oven and test as specified in footnote 7/.

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5/ The specimen size shall be full width by 1 yard. The total load shall be 4 lbs. The dummy load shall be comprised of comparable material.

6/ The specimen size shall be 15 inches by 15 inches. The total load shall be 4 lbs. The dummy load shall be comprised of comparable material.

7/ The water permeability shall be measured as specified in Method 5516 of FED-STD-191, except that the pajama check cloth shall contact the water. The hydrostatic head shall be 50 cm and shall be held for 3 minutes. The report shall only include measurement of the appearance of water drops. Leakage is defined as the appearance of water any place within the 4-1/2 inch diameter test area. The test may be performed using any test device which tests the same specimen area at the equivalent pressure using an appropriate size specimen. In cases of dispute, the apparatus described in Method 5516 of FED-STD-191 shall be used.

8/ The plastic film shall be tested in accordance with Method 5041 of FED-STD-191 except that each specimen shall be 25 square inches and shall be cut in diagonal fashion from each sample unit and may be tested under ambient conditions. The specimens shall be equally spaced across the full width of the sample unit no closer than 2 inches to the edges of the sample unit. The distance between the top of a specimen and the bottom of the next specimen shall be 3 inches. No two specimens shall overlap in the width or lengthwise direction. The sample unit shall be 1.5 yards full width of the plastic film. The lot shall be rejected if any specimen weighs less than 0.4 or greater than 1.0 ounces per square yard, or if the difference in weight between any two specimens in the sample unit is greater than 0.3 ounces per square yard.

9/ A certificate of compliance shall be accepted for this characteristic.

10/ The leather shall be immersed for 30 minutes instead of the specified 24 hours.

4.4.1.1 Hydrostatic resistance test. The hydrostatic resistance of sealed interlining seam areas shall be tested in accordance with Method 5516 of FED-STD-191, except for the following: The seam area of the interlining sample unit, shall be tested without cutting or otherwise damaging the interlining and the sample shall be tested with the cloth towards the water. The test may be performed on any device which tests the same specimen area at the equivalent pressure. The hydrostatic head shall be 50 cm pressure for 3 minutes. The interlining shall be tested at four different locations as follows: one on the leg outseam, one on the curved portion of the inseam and one at the juncture of the side and underarm seams and on an additional crossover seamed area. Evidence of leakage in one or more seam locations shall be considered a test failure.

4.4.2 In-process inspection. Inspection shall be made at any point during any phase of the manufacturing process to determine whether operations or assemblies are performed as specified. The Government reserves the right to exclude from consideration for acceptance any material or sevice in which in-process inspection has indicated non-conformance.

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4.4.2.1 In-process inspection of interlining assembly. The heat sealed seams of the interlining shall be examined after the completion of operation 25 of Table III. The sample unit shall be 1 interlining. The lot size shall be expressed in the same terms as the sample. The inspection and acceptance quality levels (AQL's) expressed per 100 units for visual examination shall be as follows:

	AQL	Inspection level
Major	2.5	II
Total (major & minor combined)	6.5	II

NOTE: If one or more critical defects are found during sampling inspection, the lot shall be rejected. For each lot found to be acceptable by the sampling plan, the balance of the lot shall be inspected for critical defects only. Any critical defect found shall be removed from the lot and repaired or replaced with a conforming item. A seam may be repaired by re-taping the defective area using the same procedure outlined in 3.6.4. Only 2 seam repairs per interlining are permitted.

The heat sealed seams shall be examined for the defects listed below:

Defect	Classification		
	Critical	Major	Minor
a. Any seam not taped	X		
b. Any hole, cut, tear or burn	X		
c. Delamination	X		
d. Crossover sealer omitted		X	
e. Tape less than 3/16 overlap on both sides of sewn seam			X
f. Tape overlap less than 3/4 inch at joining points			X

4.4.3 Examination of the end item. Examination of the end item shall be in accordance with MIL-STD-1668 and the following:

CLASSIFICATION OF DEFECTS

Defect	Point Value
I. ACCURACY OF SEAMING	
1. Seam twisted, pleated or puckered	2
2. Edge of seam tape lifting off fabric	3
II. WRISTLET	
1. Bartack missing	3
III. KNEE PATCHES AND BACKING	
1. Misplaced by more than 3/4 inch as specified	1
2. Puckered, twisted, pleated or poorly shaped affecting appearance	2

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CLASSIFICATION OF DEFECTS

Defect		Point Value
IV.	REFLECTIVE TAPE	
	1. Not positioned as specified within (±) 1/4 inch	2
V.	BACK	
	1. Pleats not facing direction specified	1
VI.	LEGS	
	1. Binding not positioned as specified	1
	2. Slide fastener not positioned properly	2
VII.	COMPLETE ASSEMBLY	
	1. Layers not assembled as specified	3
VIII.	LEATHER	
	1. Not type specified	2
	2. Grain cracked, peeled, abraded, or thin spot	2
	3. Leather improperly cut, excessive stretch	1
	4. Wrinkles or loose, spongy or boardy leather	1
	5. Any hole (except needlehole or pinhole) cut or tear	2
IX.	HOOK AND LOOP FASTENER TAPE	
	1. Not positioned as specified within (±) 1/8 inch	1
X	EYELET	
	1. Not positioned as specified within (±) 1/8 inch	1
	2. Any omitted	2
	3. Finish or type not as specified	2
	4. Any broken or malformed	2
	5. Any having a rough or sharp edge	1
	6. Tightly clinched, damaging material	1

4.4.4 Examination of packaging requirements. An examination shall be made to determine that packaging, packing, and marking comply with Section 5 requirements of this specification. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery. Defects of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot size shall be on the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the acceptable quality level shall be 2.5 defects per hundred units.

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Examine	Defect
Marking (exterior and interior)	Omitted, incorrect, illegible, of improper size, location, sequence, or method of application.
Materials	Any component missing, damaged, or not as specified.
Workmanship	Inadequate application of components, such as: incomplete closure of container flaps, loose strapping, improper taping, inadequate stapling, bulged or distorted container.
Content	Number of items per shipping container is more or less than required. Size shown on one or more items not as specified on shipping container. 1/

1/ For this defect, one item from each shipping container in sample shall be examined.

4.4.5 Palletization examination. An examination shall be made to determine that the palletization complies with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one palletized unit load fully packaged. The lot size shall be the number of palletized unit loads in the end item inspected lot. The inspection level shall be S-1 and the acceptable quality level, expressed in terms of defects per hundred units, shall be 6.5, as specified in MIL-STD-105.

Examine	Defect
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 with required straps 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-packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

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5.1.1 Level A. Each coverall shall be folded as follows:

1. Secure slide fasteners, snaps and hook and pile fasteners.
2. Place coverall flat, front down.
3. Fold legs up over back approximately 25 inches
4. Fold sleeves at right angles across the back.
5. Fold length of coverall in half. The folded coverall shall measure approximately 23 inches by 15 inches.

Each completely folded coverall shall be inserted in a close-fitting clear polyethylene film bag having a thickness of 0.003 inch (± 20%). The bag shall be formed with heat sealed seams that are straight, continuous and parallel to each other and the formed edges of the bag. The final closure of the bag shall be heat sealed with the heat seal made as close as possible to the open end. A 1/4 inch diameter hole shall be made at one corner of the polyethylene bag to allow excess air to escape. Alternately, the final closure of the polyethylene bag may be accomplished by means of a tuck or reverse flap.

5.1.2 Level C. Coveralls shall be packaged to afford adequate protection against deterioration and physical damage during shipment from the supply source to the first receiving activity. The package and the quantity per package shall be the same as that normally used by the contractor for retail distribution.

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

5.2.1 Level A. Five (5) coveralls of one size only, packaged as specified in 5.1, shall be packed in a fiberboard shipping container assembled, closed, and reinforced conforming to type CF, class weather resistant, grade V15C, variety DW, size 2A of MIL-B-17757. The fiberboard for the liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, two in depth within the shipping container. Each container shall have the contents completely covered on the top and bottom with a sheet of commercial grade kraft paper.

5.2.2 Level B. Five (5) coveralls of one size only, packaged as specified in 5.1, shall be packed in a fiberboard shipping container assembled, closed, and reinforced conforming to type CF, class domestic, grade 200, variety DW, size 2A of MIL-B-17757. The fiberboard for the liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, two in depth within the shipping container. Each container shall have the contents completely covered on the top and bottom with a sheet of commercial grade kraft paper.

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5.2.3 Level C. Coveralls, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. The quantity per shipping container shall be the same as that normally used by the contractor for retail distribution. Containers shall comply with the U.S. Postal Service Manual, Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

5.3 Palletization. When specified (see 6.2), coverall packaged as specified in 5.2, shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means C, K, and L or O or P. Pallet pattern shall be in accordance with the appendix of MIL-STD-147.

The pallet shall be a 4-way, Type IV; Type V, Class 1 size 2; or Type VIII, fabricated from wood groups I, II, III, or IV, Grade A of NN-P-71, or 4-way, Style I, Size A, Type I, Class 1, fabricated from wood groups specified , of MIL-P-15011. Interlocking of loads shall be effected by reversing the pattern of each course. If the container is of a size which does not conform to any of the patterns specified in MIL-STD-147, the pallet pattern used shall be approved by the contracting officer.

5.4 Marking. In addition to any special marking required by the contract or order, interior packages, shipping containers, and palletized unit loads shall be marked in accordance wtih MIL-STD-129.

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 coveralls are intended for wear by Navy shipboard personnel engaged in firefighting. The coverall is worn in conjunction with Firefighter's gloves, boots and helmet, and Anti-flash hood.

6.2 Acquisition data. Acquisition documents should specify the following:

a. Title, number and date of this specification.
b. Sizes required (see 1.2.1).
c. Issue of DODISS to be cited in the solicitation, and if required, the specified issue of individual documents referenced (see 2.1.1 and 2.2).
d. When first article inspection is required (see 3.2). The item will be tested and should be a first article sample. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, quantity, and testing and approval of the first article.
e. Selection of applicable levels of packing and packaging (see 5.1 and 5.2).
f. When palletization is required. (see 5.3)

6.3 Samples and patterns. For access to samples and patterns, address the procuring activity issuing the invitation for bids.

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6.4 A suggested source of supply for the laminated material and seam sealing tape is W. L. Gore and Associates, INC, 3 Blue Ball Rd, P.O. Box 1130, Elkton, Maryland 21921.

6.5 A suggested source of supply for the reflective tape in 3.3.11 is 3M Safety and Security Systems Division, St. Paul, Minnesota 55144.

6.6 A suggested source of supply for the snap fasteners is Universal Fastener INC., P.O. Box 240, Factory Ave., Lawrenceburg, Kentucky 40342.

6.7 Silicone compounds, water repellant and flame resistant treatments. Only those silicone compounds, water repellant and flame resistant treatments approved by the U.S. Army Natick Research, Development and Engineering Center, Natick, Massachusetts 01760, and the appropiate medical service and so listed in the invitation for bids or request for proposal, shall be considered acceptable for the related procurement (see 3.3.1, 3.3.4.1 and 3.3.5).

6.8 Equal item. Prior to the use of an "or equal" item, the contractor shall submit the item with supporting data to the contracting officer for subsequent approval or disapproval by the responsible Military Agency.

6.9 Subject term (key word) listing.

Clothing, Protective
Coveralls, Damage Control
Coveralls, Flame Resistant
Coveralls, PBI
Coveralls, Pyrotechnic Handlers' Protective
Coveralls, Reflective Tape

Custodian:
Navy - NU

Review Activity:
DLA - CT
Navy - CG

Preparing Activity:
Navy - NU

Project Number:
8415-N585

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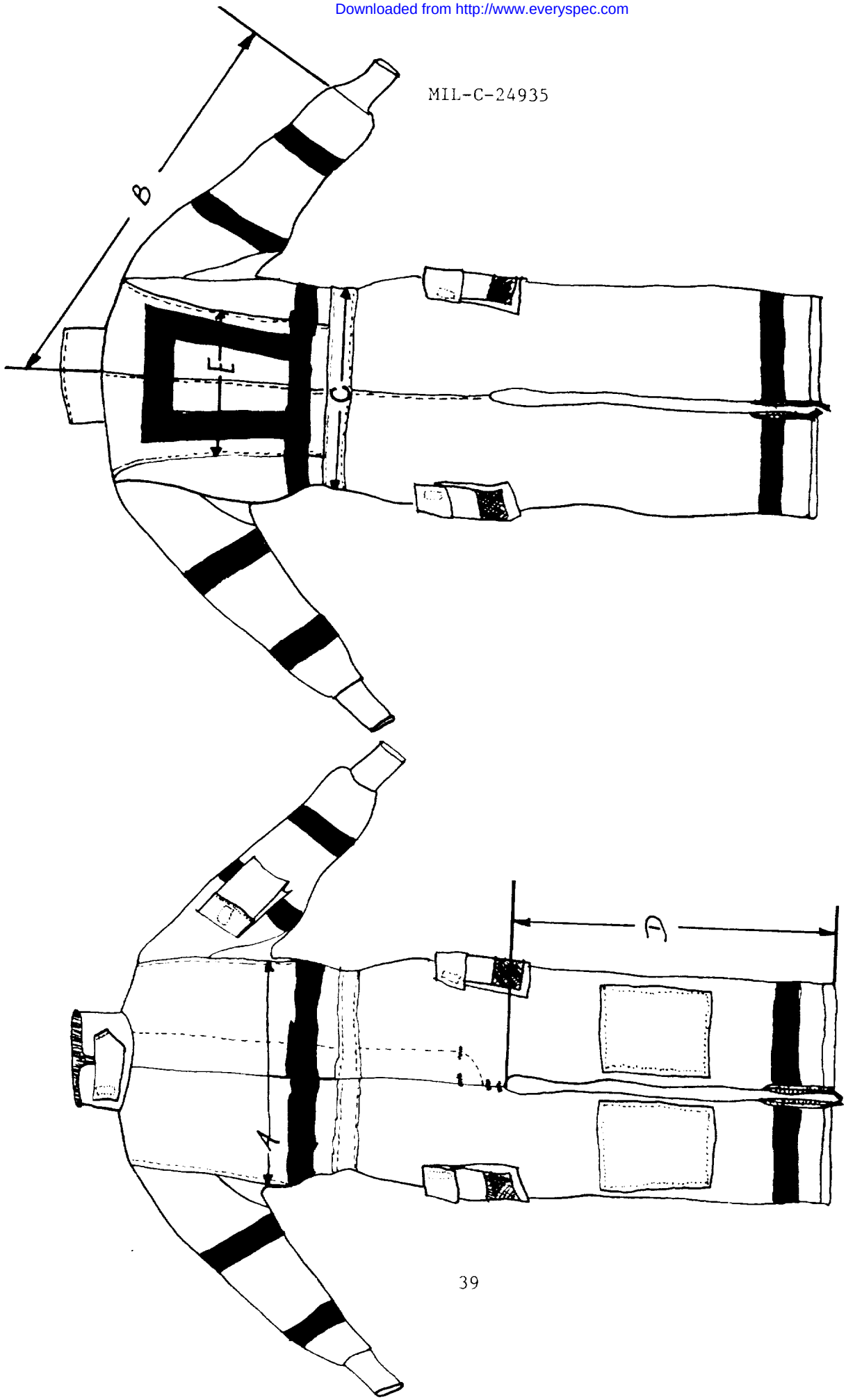

FIGURE 1

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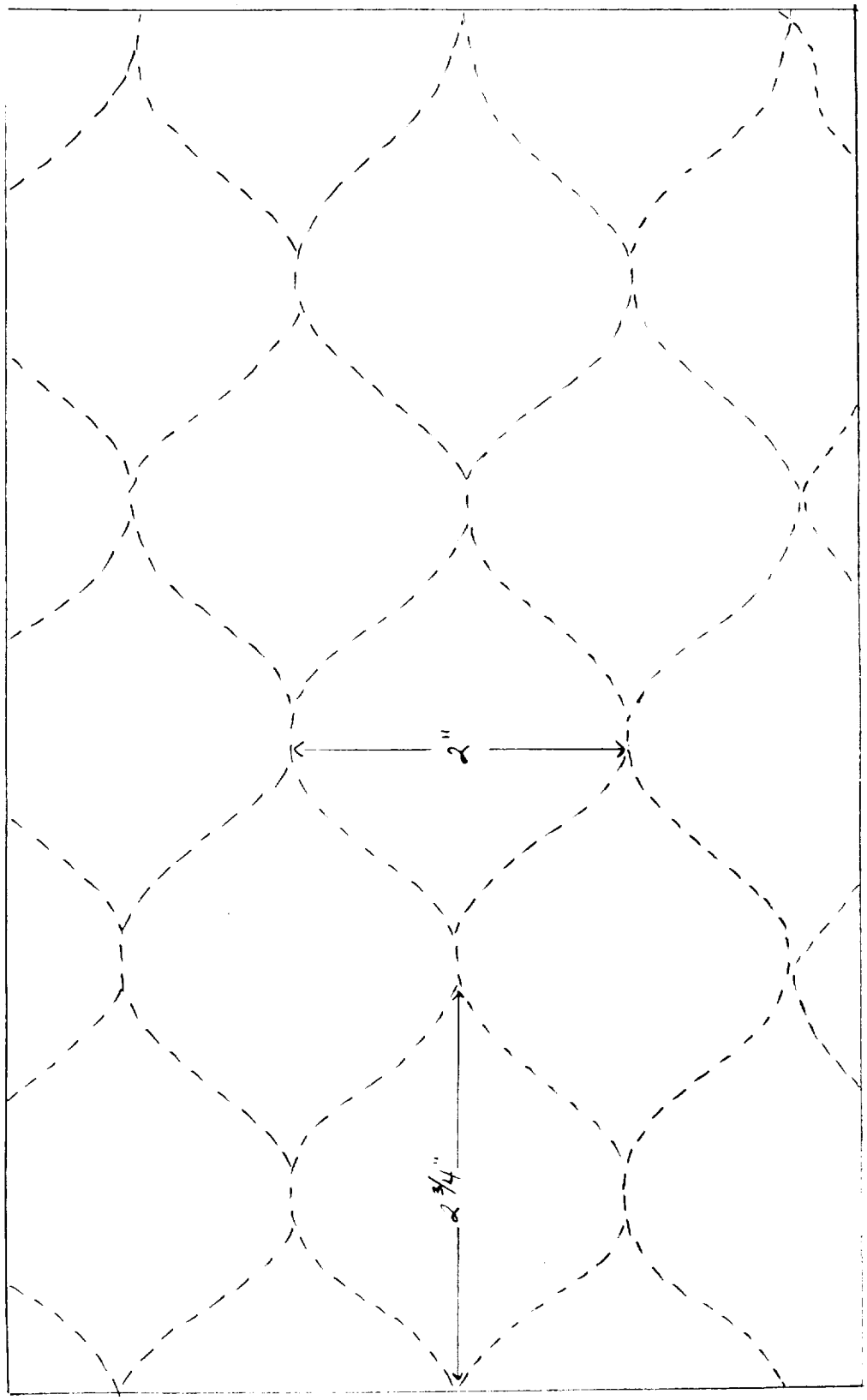

CHICKEN WIRE PATTERN

FIGURE 2

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-24935	COVERALLS, FIREMEN'S

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
	☐ USER
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ MANUFACTURER
	☐ OTHER *(Specify)*: _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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NOTE: This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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