

**INCH-POUND**  
NCTRF PD 03-07C  
CAGE CODE 32263  
30 August 2019  
SUPERSEDING  
NCTRF PD 03-07B  
11 January 2018

## APRON, SHIRT, TROUSERS, COVERALLS, OTTO FUEL PROTECTIVE

This purchase description is approved for use by the Naval Surface Warfare Center, Naval Undersea Warfare Center Division, Division Keyport, Navy Clothing and Textile Research Facility, and the Department of the Navy.

### 1. SCOPE

1.1 Scope. This purchase description covers the requirements for Otto Fuel protective garments: apron, shirt, trousers and coveralls.

### 1.2 Classification.

1.2.1 Types and sizes. The Otto Fuel protective garments will be available in the following types and sizes as specified below, except the apron will be available in one size (see 6.2).

Type I - Apron  
Type II - Shirt  
Type III - Trousers  
Type IV - Coveralls

Size schedule for Type II, III and IV garments:

X-Small (XS)  
Small (S)  
Medium (M)  
Large (L)  
X-Large (XL)  
XX-Large (2XL)  
XXX-Large (3XL)

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

## 2. APPLICABLE DOCUMENTS

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

### 2.2 Government documents.

2.2.1 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 cited in the solicitation or contract (see 6.2).

#### DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-32075 - Label: For Clothing, Equipage and Tentage (General Use)  
MIL-F-43573 - Fasteners, Snap, Plastic

(Copies of this document are available from <http://quicksearch.dla.mil>.)

2.3 Non-Government publications. 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 cited in the solicitation or contract (see 6.2).

#### AMERICAN SOCIETY FOR QUALITY (ASQ)

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

(Copies of this document are available from <https://asq.org/>.)

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

AATCC Test Method 20A - Fiber Analysis: Quantitative

(Copies of this document are available from <https://aatcc.org>.)

#### ASTM INTERNATIONAL

ASTM D204 - Standard Test Methods for Sewing Threads  
ASTM D1777 - Standard Test Method for Thickness of Textile Materials  
ASTM D3657 - Standard Specification for Zipper Dimensions  
ASTM D3776 / D3776M - Standard Test Method for Mass per Unit Area (Weight) of Fabric

ASTM D5278 / D5278M - Standard Test Method for Elongation of Narrow Elastic Fabrics  
(Static-Load Testing)

ASTM D6193 - Standard Practice for Stitches and Seams

ASTM F903 - Standard Test Method for Resistance of Materials Used in Protective  
Clothing to Penetration by Liquids

(Copies of these documents are available from <https://www.astm.org/>.)

## INFORMA HEALTHCARE

Repeat Insult Patch Test-Modified Draize Procedure - Principles and Methods of Toxicology

(Copies of this document are available from <https://www.crcpress.com/>.)

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

## 3. REQUIREMENTS

3.1 First article. Sample garments shall be subjected to first article inspection in accordance with 4.2. (See 6.2.)

3.2 Design. The Type I one size fit-all apron, Type II sized shirt, Type III sized trousers and Type IV sized coveralls Otto Fuel protective garments are disposable upon staining or one-time use critical safety items constructed from a white polyethylene coated, spunbonded olefin fabric which shall provide chemical protection to torpedo handlers and other workers exposed to Otto Fuel.

3.2.1 Apron, Type I. The apron shall have a high bib front with a scoop neck. Tie tapes shall be attached along both side of the apron, which will allow adjustment at neck and rear. Folded, finished tie tapes shall be  $\frac{1}{2}$  to  $\frac{3}{8}$  inch wide and shall be even in length. (See Figure 1.) The apron shall be made from the coated cloth in 3.4.2.1.1.

3.2.2 Shirt, Type II. The shirt shall be a below-the-hip length style with one-piece long sleeves, a one-ply collar and a full length front opening secured by five plastic snap fasteners. The shirt shall be made from the coated cloth in 3.4.2.1.1. The shirt shall contain both taped and non-taped seams. The taped seams shall be as specified in Table IV. (See Figures 2 and 3.)

3.2.3 Trousers, Type III. The trousers shall be straight-legged with no side seams, an elasticized rubber tape waistband with no fly opening. The trousers shall be made from the coated cloth in 3.4.2.1.1. The trousers shall contain both taped and non-taped seams. The taped seams shall be as specified in Table IV. (See Figure 4.)

3.2.4 Coveralls, Type IV. The coveralls shall be one piece with no side seams, a one-ply collar and one-piece set-in long sleeves. Front opening zipper shall be covered by a storm flap which shall be secured with peel-to-stick double-sided adhesive tape. The coveralls shall be constructed from the coated cloth in 3.4.2.1.1. The coveralls shall contain both taped and non-taped seams. The taped seams shall be as specified in Table IV. (See Figure 5 through 8.)

3.3 Figures. Figures 1 through 8 are furnished for informational purposes only. When inconsistencies exist between the written specification and the figures, the written specification shall govern.

3.4 Materials and components. The materials and components shall conform to applicable specifications, standards, and figures as specified herein. Equivalent materials and parts shall be submitted through the procuring agency for approval by the Naval Undersea Warfare Center, Keyport Division and Naval Surface Warfare Center (See 6.3).

3.4.1 Recycled, recovered or environmentally preferable materials. Recycled, recovered or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements and promotes economically advantageous life cycle costs.

3.4.2. Materials.

3.4.2.1 Base cloth. The base cloth used to fabricate the apron, shirt, trousers and coveralls shall be a white non-woven spunbonded olefin material.

3.4.2.1.1 Coated cloth. A white or transparent polyethylene coating shall be applied to the base cloth in 3.4.2.1 to form a coated cloth. The coated side of the cloth shall be the face side. The finished coated cloth shall conform to the requirements specified in Table I; see 6.5 for suggested sources of supply.

TABLE I - Physical requirements of coated cloth

Characteristic	Requirement (minimum)
Weight	2.0 oz/yd <sup>2</sup>
Thickness	8 mils
Resistance to Otto Fuel Penetration	No penetration for 5 minutes at atmospheric pressure

3.4.3 Components.

3.4.3.1 Fastener, slide. The slide fastener for the Type IV coveralls shall be a nonseparating, nonreversible, continuous element zipper manufactured from polyester or nylon polymer. It shall have a closed bottom stop and open top stops and shall conform to the dimensions of ASTM D3657 for size 5-6. Finished slide fastener lengths shall conform to measurements in Table II below. The slide pull length shall be 7/8 inch (minimum). The slide fastener tape shall be polyester and 1/2 inch (minimum) wide. Tape ends shall be of a length that is practical for sewing,

unless otherwise specified in the contract. All tape ends shall be treated to prevent fraying. One of the following fray prevention methods shall be used: coated type, bonded, reinforcement, tape impregnation, hot knife, ultrasonic sealing or pinking. The color of the slide fastener shall be white.

3.4.3.1.1 Slide length, Type IV coveralls. The slide fastener lengths for the Type IV coveralls shall be as specified in Table II. Its length shall be from the top edge of the top stop to the bottom edge of the bottom stop.

TABLE II – Slide fastener lengths for Type IV coveralls

Sizes	Zipper Length
X-Small	21.0
Small	21.0
Medium	25.0
Large	25.0
X-Large	25.0
XX-Large	27.0
XXX-Large	27.0
Tolerance:	Minimum

3.4.3.2 Fastener, snaps. The snap fastener shall be white Type II fasteners conforming to MIL-F-43573. This component shall be used on the Type II garment (Shirt) only.

3.4.3.3 Label. Each garment shall have a combination identification, size and cautionary statement label. Unless otherwise specified, the label shall conform to Class 14 of the MIL-DTL-32075. The cautionary statement shall be printed in larger letters than all other lettering on label. The label shall be 2 inches wide (minimum) by 3 inches long (minimum). Commercial manufacturer labels are permitted to identify brands of materials and the product manufacturer. The commercial label's attachment shall not breach nor puncture the coated cloth. When commercial labels are placed on the garments, the information on the label shall not conflict with the label requirements specified in this purchase description. Size abbreviation in 1.2.1 may be used on the label.

3.4.3.3.1 Label inscription example:

OTTO FUEL PROTECTIVE GARMENT, TYPE II (SHIRT) (EXAMPLE)  
CONTRACT NO: SPM1C1-00-C-0000 (EXAMPLE)  
STOCK NO: 8415-00-000-0000 (EXAMPLE)  
SIZE: X-LARGE (EXAMPLE)  
NAME OF CONTRACTOR: ABC COMPANY (EXAMPLE)  
LOT NO: 0001A (EXAMPLE)

**CAUTION**

**THIS GARMENT SHALL NOT BE REUSED AND MUST BE  
DISCARDED WHEN OTTO FUEL STAINS ARE OBSERVED**

3.4.3.3.2 Type I (Apron) label details. The label shall be Type IV or VII of MIL-DTL-32075 and shall be located inside of the apron 2 ( $\pm$  1/4) inches below the neckline and centered. Printing shall be black and label background shall be white. Label inscription may omit SIZE line or enter as SIZE: ONE SIZE FITS ALL.

3.4.3.3.3 Type II (Shirt) label details. The label shall be Type VII of MIL-DTL-32075, the printing shall be black and the label background shall be white. The label shall be located inside of the shirt back 2 ( $\pm$  1/4) inches below the neckline and centered.

3.4.3.3.4 Type III (Trousers) label details. The label shall be Type VII of MIL-DTL-32075 the printing shall be black and the label background shall be white. The label shall be located inside of the trousers 1/2 ( $\pm$  1/4) inch to right of back center seam and 1 ( $\pm$  1/4) inch below the elastic waistband.

3.4.3.3.5 Type IV (Coveralls) label details. The label shall be Type VII of MIL-DTL-32075, the printing shall be black and the label background shall be white. The label shall be located inside of the coveralls back 1/2 ( $\pm$  1/4) inch to the right of center seam and 2 ( $\pm$  1/4) inches below the neckline.

3.4.3.4 Tape, adhesive. The adhesive tape for the Type IV coveralls' storm flap shall be peel-to-stick, double sided, pressure sensitive tape. The tape shall be 1/2 inch (minimum) wide.

3.4.3.5 Tape, elastic rubber. The elastic tape used to create the Type III trousers' elastic waistband shall be 3/8 inch (minimum) wide and shall be a cut rubber tape. As an alternate a woven, braided or knitted elastic webbing may be used. The tape shall have a manual elongation of 45% ( $\pm$  10%). The color shall be white.

3.4.3.6 Tape, seam. The seam tape shall be a white, multilayered thermoplastic adhesive film resistant to Otto Fuel penetration and compatible with the coated fabric in 3.4.2.1.1. The tape shall be 3/4 inches (minimum) wide. Seam tape shall not be required for apron (Type I).

3.4.3.7 Thread. The sewing thread shall be white, polyester thread with a breaking strength of 4.7 lbs. (minimum) and 30% elongation (maximum).

3.4.3.8 Bar code label/tag. Each garment shall be individually bar coded with a Type VII Class 17 label/tag of MIL-DTL-32075. The label/tag shall be located so that it is completely visible on the item when it is folded and/or packaged as specified and shall cause no damage to the garment.

3.5 Patterns. Standard patterns will be furnished by the Government to the contractor for use in cutting working patterns (see 6.2 and 6.3). The standard patterns shall not be altered in any way and are to be used as a guide for making the contractor’s working patterns. Minor modifications of the working patterns are permitted when using automated equipment or to meet a manufacturer’s process but the alterations shall not affect the serviceability, dimensions or appearance of the garment. As an alternate a two-piece sleeve may be used in place of the one-piece sleeve. Unless otherwise specified, patterns provide for a 3/8 inch seam allowance. All garments shall be cut in strict accordance with the pattern’s directional lines.

3.5.1 List of pattern parts. The component parts of the garments shall be cut from the materials specified in accordance with Table III.

TABLE III: Pattern parts

Garment	Pattern Nomenclature	Computer Nomenclature	Cut Parts
Type I - Apron	Apron w/bib	I-APRON	1
Type II - Shirt	Front	II-FRONT	2
	Sleeve, Type II	II-SLEEVE	2
	Alternate sleeve – Type II	II-SLEEVE ALT	4
	Collar, Type II	II-COLLAR	1
	Back	II-BACK	1
Type III - Trousers	Front and Back, Type III	III-FRBK	2
Type IV - Coveralls	Front and Back, Type IV	IV-FRBK	2
	Sleeve, Type IV	IV-SLEEVE	2
	Alternate sleeve – Type IV	IV-SLEEVE ALT	4
	Collar, Type IV	IV-COLLAR	1
	Storm Flap	IV-FLAP	1

3.6 Construction.

3.6.1 Stitches, seams and stitching. Stitches, seams and stitch types shall conform to ASTM D6193. Whenever two or more methods, seams, or stitches are given for the same part of an operation, any one of them may be used. Seam allowances shall be maintained with seam sewn so that no run-offs, pleats, puckers, or open seam occur. Thread tension shall be maintained so there shall be no loose stitching resulting in a loose bottom or top thread or no excessively tight stitching in puckering of materials sewn. Raw edges are permitted on the Otto Fuel garments. Bottom tape ends of the slide fastener for Type IV coveralls shall be backstitched together. Backstitch for tape ends shall be ½ minimum length and shall not breach or puncture the coated cloth. For 301 stitch type, ends of stitching when not caught in other seams or stitching shall be backstitched not less than ½ inch. For 500 series stitch type, a ¼ to ½ inch stitching chain shall remain at the end of the seam to prevent unraveling. The sewing requirements shall be listed in Table IV.

TABLE IV. Construction details for all Otto Fuel protective garments

Seams	Stitch type	Seam type	Stitches per inch (min/max)	Seam tape application
Apron ties (Type I)	301	BSc-1 and EFp-1	6 to 8	None
Sleeve seams, shoulder seams, armhole seams (Type II shirt and Type IV coveralls)	301 or Any 515 through 519	SSa-1 or SSa-2	6 to 8	3.6.3
Side seams (Type II shirt)	301 or Any 515 through 519	SSa-1 or SSa-2	6 to 8	3.6.3
Collar seam (Type II shirt and Type IV coveralls)	Any 515 through 519	SSa-2	6 to 8	None
Waistband (Type III trousers)	Any 500 series stitch except 501, 510, 511, 513	SSa-1	6 to 8 fully extended, (15 to 25 relaxed)	None

TABLE IV. Construction details for all Otto Fuel protective garments - continued

Seams	Stitch type	Seam type	Stitches per inch (min/max)	Seam tape application
Leg inseams, crotch seams (Type III trousers)	301 or Any 515 through 519	SSa-1 or SSa-2	6 to 8	3.6.3
Front crotch seam, storm flap seam and slide fastener attachment (Type IV coveralls)	301	SSa-1	6 to 8	3.6.3
Leg inseams, back seam (Type IV coveralls)	301	SSa-1	6 to 8	3.6.3
Attach slide fastener bottom end tapes together (Type IV coveralls)	Backstitch		6 to 8	3.6.1

3.6.2 Repair of stitching. Thread tension shall be maintained so there will be no loose stitching or tight stitching which could cause breaks in the line of stitching. Skipped stitches and thread breaks shall be repaired by stitching not less than ½ inch beyond each end of the defect using 301 stitch. Ends of 301 stitches shall be backstitched, or overstitched, ½ inch minimum. The ends of a continuous line of stitching shall be overlapped not less than ½ inches.

3.6.3 Seam tape application. Seam tape (see 3.4.3.6) shall be applied using hot air methods to seams specified in Table IV. Seam tape shall be applied in a continuous operation over crotch seam intersections for Type III and Type IV garments. Splicing shall not be permitted. All threads within seam tape application area shall be trimmed to 1/16 inch prior to seam sealing. All thread scraps shall be removed prior to seam sealing. All seam tape shall be applied without tension with a 1/4 inch minimum overlap on both sides of the sewn seam. At no point shall the tape lift from the seam or show signs of curling, bubbling or separation. The seam tape shall cover the entire seam and, when applicable, shall terminate at the garment’s edge. The resulting seams shall be resistant to Otto Fuel penetration (see 4.4.4).

3.7 Finished garment measurements. All finished garment measurements shall be as shown in Tables V through VIII, and shall be measured in accordance with 4.4.3.2.1. All measurements and tolerances are expressed in inches. Letters A through R are used to define the measurements for Otto Fuel protective garments. (Letters I, O and Q were excluded.) See Figure 1 for measurements (A) through (C). See Figure 2 for measurements (D) and (E). See Figure 3 for measurement (F). See Figure 4 for measurements (G) and (H). See Figure 5 for measurements (J), (M), (N), (P) and (R). See Figure 6 for measurement (K). See Figure 7 for measurement (L). The apron ties shall not vary more than ½-inch in length on the same garment. The shirt and coveralls sleeves shall not vary more than 1-inch on the same garment. The trousers and coveralls inseam leg shall not vary more than 1-inch on the same garment. The trousers and coveralls leg openings shall not vary more than ½-inch on the same garment. The length of the shirt fronts (left and right) shall not be uneven by more than 1-inch at top (neck) or bottom (hem)

of shirt when shirt is snapped closed. The length of the coveralls fronts at neck (left and right) shall not be uneven by more than 1-inch at top of coveralls when coveralls are zipped closed.

TABLE V - Type I apron finished measurements

Measurement	Dimensions	Tolerance
(A) Overall length	45-½	±1
(B) Width at top, excluding bib	28	±1
(C) Bottom width	28	±1
Free ends of tie tapes at neck	18	Minimum
Free ends of tie tapes at waist	30	Minimum

TABLE VI - Type II shirt finished measurements

Size	(D) – ½ Chest	(E) - Sleeve Inseam Length	(F) - Center Back Length
X-Small	20-½	22-¾	29-½
Small	21-½	22-¾	30
Medium	23-½	23-⅛	30-½
Large	25-½	23-⅝	31
X-Large	27-½	24	31-½
XX-Large	28-½	24-¾	32
XXX-Large	29-½	24-¾	32-½
Tolerance:	±1	± ½	± ½

TABLE VII - Type III trousers finished measurements

Sizes	(G) – ½ Waist	(H)- Leg Inseam Length
X-Small	21	32
Small	22	32
Medium	24	33-½
Large	26	33-½
X-Large	28	35
XX-Large	29	35
XXX-Large	30	35
Tolerance:	±1	± ½

TABLE VIII - Type IV coveralls finished measurements

Sizes	(J) ½ Chest	(K) Front Opening	(L) Center Back Length	(M) Sleeve Inseam Length	(N) Sleeve Opening	(P) Leg Inseam Length	(R) Leg Opening
X-Small	20-½	21-½	32-½	22-¾	5-½	28	9-½
Small	21-½	21-½	34-½	22-¾	5-½	28	9-½
Medium	23-½	25-½	36-½	23-⅛	6	29-½	10
Large	25-½	25-½	38-½	23-⅝	6	29-½	10
X-Large	27-½	25-½	40	24	6	31	10
XX-Large	28-½	27-½	42	24-⅜	6-½	31	10-½
XXX-Large	29-½	27-½	44	24-¾	6-½	31	10-½
Tolerance:	± 1	± ½	±1	± ½	± ¼	± ½	± ¼

### 3.8 End item performance.

3.8.1 Resistance to Otto Fuel penetration. The coated cloth and seam tape used to fabricate the Otto Fuel garments in this purchase description as well as all finished taped seams on these garments shall be resistant to Otto Fuel penetration (see 4.4.4).

3.8.2 Shelf life. The Otto Fuel garments shall have a shelf life of 60 months (see 4.4.5 and 6.4).

3.8.3 Toxicity. The Otto fuel garments shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.4.6. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used (see 6.7).

3.9 Workmanship. The finished garments shall be uniform in quality and free from loose thread, foreign matter and irregular defects that can adversely affect form, fit or function including usage and durability. The finished garments shall conform to the quality established by this specification. The occurrence of defects cited under Table XI shall not exceed the acceptance quality levels specified in the contract.

## 4. VERIFICATION

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

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

4.2 First article inspection. The first article submitted in accordance with 3.1 and 6.2, shall be inspected as specified in 4.4.1, 4.4.3, and 4.4.4 for compliance with design, construction, workmanship, dimensional requirements and Otto Fuel penetration resistance specified in Section 3. Failure to meet the first article requirements shall be cause for rejection of the first article lot.

4.2.1 First article units. Unless otherwise specified in the solicitation or contract the number of samples for first article visual and dimensional inspection shall be one shirt, trousers or coveralls for each size ordered. For the apron, the sample size shall be three aprons. For Otto Fuel Resistance testing, the sample size shall be five (5) of each garment type ordered. The cloth for first article units may be white or yellow with white seam-sealing tape (see 3.4.3.6). The requirement of white cloth in 3.4.2.1.1 shall still apply for all production lots.

4.3 Conformance inspection. Conformance inspection shall consist of the verifications specified in 4.4.3.1, 4.4.3.2, 4.4.4. Failure to meet the verification requirements shall be cause for reject of the lot.

4.3.1 Conformance inspection samples. The sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4 for visual and dimensional conformance. Sampling for Otto Fuel penetration resistance testing shall be performed according to Table IX. When more than one size is contained in a lot, the testing samples shall include one of each size contained in the lot and be proportional to lot size quantities. The maximum lot size shall be 5000 per garment type. Sampling for shelf-life extension shall be two garments of each size to be extended in the lot.

TABLE IX – Sample size per lot

Sample size (minimum)	Lot Size
2	<500
3	501 - 1500
4	1501 - 3000
5	3001 - 5000

4.4 Methods of verification.

4.4.1 Component and material verification. In accordance with 4.1 components and materials shall be verified in accordance with all the verification requirements of Table X.

TABLE X - Component and material verification

Material	Characteristic	Reference	Verification <u>1/</u>
Basic material (base cloth)	Fiber Identification	3.4.2.1	AATCC 20A
Coated cloth	Coating Identification	3.4.2.1.1	AATCC 20A
	Weight		ASTM D3776, Option C
	Thickness		ASTM D1777, Option 2
	Resistance to Otto Fuel Penetration		ASTM F903 2/
Slide Fastener	Fiber Identification	3.4.3.1	AATCC 20A
	Dimensions		ASTM D3657
Snap Fastener	Material Identification	3.4.3.2	MIL-F-43573
Label	Material Identification	3.4.3.3	MIL-DTL-32075
Elastic Rubber Tape	Material Identification	3.4.3.5	AATCC 20A
	Manual Elongation, %, unlaundered		ASTM D5278
Thread	Breaking Strength	3.4.3.7	ASTM D204
	Elongation, %		ASTM D204
	Fiber identification		AATCC 20A

1/ Shall be tested for all tests and examinations specified in the applicable document.

2/ The resistance to Otto Fuel penetration shall be met as part of end item testing

4.4.2 In-process inspection. Visual and dimensional examinations shall be made at any point or during any phase of the manufacturing process to determine whether construction details which cannot be examined in the finished product are in accordance with requirements specified in Section 3. Materials and components, which can be classified as having a defect in accordance with Table XI, shall be removed from production.

4.4.3 End item verification.

4.4.3.1 Visual and dimensional examination. The aprons, shirts, trousers or coveralls selected for end item verification shall be visually and dimensionally examined for the defects listed in Table XI.

TABLE XI - Classification of end item visual and dimensional defects

Examine	Defect	Classification	
		Major	Minor
General	Any hole, cut, tear, needle chew, scissor or knife tear, needle holes, abrasion, visible mend or burn, abraded area including edges; base material not as specified.	101	

TABLE XI - Classification of end item visual and dimensional defects - continued

Examine	Defect	Classification	
		Major	Minor
General	Color not as specified.	102	
	Any spot or stain clearly visible, i.e. overall uncleanliness, objectionable odor.		201
	Coated cloth: Not as specified, any unbonded area or evidence of delamination of coating from the base cloth, any evidence of foreign matter imbedded in coating, any pinholes or needle holes; objectionable odor.	103	
Seams and Stitching	Any open seam, missing stitches, thread breaks, skipped stitches and run-offs not securely overstitched for at least ½ inch.	104	
	Any seam or attachment of any component twisted, puckered, pleated or caught in any unrelated operation or stitching.	105	
	End of stitching not securely backstitched/ overstitched for ½ inch when not caught in other seams or stitching.	106	
	Seam or stitch type not as specified; seam allowance not as specified.	107	
	Any stitching irregular or unevenly gauged (greater than 50% of the seam length or 4 inches, whichever is less).		202
	Loose tension resulting in loose seams or tight tension resulting in breaking of stitches when normal pull is applied.	108	
	Stitches per inch (greater than 50% of the seam length or 4 inches, whichever is less): More or less than range specified - One stitch - Two or more stitches	109	203

TABLE XI - Classification of end item visual and dimensional defects - continued

Examine	Defect	Classification	
		Major	Minor
Seam sealing	Any seam tape not applied to seams as specified.	110	
	Seam tape not located as specified.	111	
	Any seam or attachment of any component twisted, puckered, pleated or caught in any unrelated operation or stitching that is not properly forced out or contained in a fold more than 1/8 inch.	112	
	Any thread not trimmed to 1/16 inch or thread scraps not removed in seam tape application area prior to seam sealing.	113	
	Any seam tape overlapped less than 1/4 inch on each side of sewn seam; any seam tape lifting off of fabric; any damaged edges greater than 1/16 inch from outside edge.	114	
	Seam-sealing tape not trimmed even to garment edges or seam-sealing tape not full length of seam	115	
Components (seam tape, thread, elastic tape, snaps, slide fastener, adhesive tape and assembly.	Any component part or operation omitted, not as specified, or operation improperly performed.	116	
	Any component part not securely affixed, e.g. elastic tape waistband loosely attached to trousers.	117	
	Any component damaged, distorted or otherwise defective; does not function properly.	118	
	Any component part not cut in accordance with the patterns.		204
	Zipper length and/or dimensions of any components not a specified.	119	
	Coated side of cloth on inside of garment.	120	
	Adhesive tape does not stick; peel strip missing or partially attached or damaged.	121	

TABLE XI - Classification of end item visual and dimensional defects - continued

Examine	Defect	Classification	
		Major	Minor
Label	Missing, illegible, incorrect.	122	
	Cautionary statement lettering not larger than all other lettering.		205
	Not size or type specified.		206
	Misplaced by more than 1/4 inch in any direction.		207
Bar code label/tag only	Bar code omitted or not readable by scanner or human-readable interpretation (HRI); not visible on folded, packaged item		208
	Bar code causes damage to the garment	123	
Coveralls, storm flap	Storm flap does not fully cover bottom of front opening.	124	
Dimensional (see 4.4.3.2)	Any finished garment dimension not within the specified tolerance.	125	
	Sleeve or leg inseam lengths vary by 1 inch or more on the same garment.	126	
	Sleeve or leg openings vary by more than ½ inch in half width on same garment.	127	
	Length of shirt front uneven by more than 1 inch at top or bottom when snapped.	128	
	Length of coveralls front uneven by more than 1 inch at top when zipped.	129	
	Length of free ends of apron ties and/or waist tapes vary by ½ inch or more on same garment.	130	

4.4.3.2 End item dimensional examination. The end items shall be examined for conformance to the dimensions specified in Tables V, VI, VII and VIII.

4.4.3.2.1 Dimensional examination. The finished garments shall be examined for conformance to the dimensions specified in 3.7 and in Tables V through VIII (see Figures 1 through 8). Any dimension not within the specified tolerance shall be classified as a defect. The sample unit shall be one garment. Unless otherwise specified, the garment shall be laid flat and smooth when measurements are taken, with any fasteners closed.

Apron:

(A) Type I - Overall length. Measurement shall be taken from the center high point of scoop neck to bottom edge of apron.

(B) Type I - Width at top. Measurement shall be taken across the front from side to side at intersection of sides and start of bib.

(C) Type I - Bottom width. Measurement shall be taken across the bottom from side to side.

Shirt:

(D) Type II - ½ Chest. Measurement shall be taken across the chest at the base of the armhole from folded edge to folded edge.

(E) Type II - Sleeve inseam length. Measurement shall be taken along inseam from armhole to bottom of sleeve.

(F) Type II - Center back length. Measurement shall be taken along center back from lower edge of neckline to bottom of shirt.

Trousers:

(G) Type III - ½ Waist. Measurement shall be taken from side seam to side seam at waist, with the elastic tape waistband fully extended.

(H) Type III - Leg inseam length. Measurement shall be taken from crotch to bottom open edge of leg.

Coveralls:

(J) Type IV - ½ Chest. Measurement shall be taken one inch below the base of the armhole, across the chest from folded edge to folded edge.

(K) Type IV - Front opening. Measurement shall be taken from the stitch line of the neck at center front to the bottom of the front opening with the garment flat and front side up.

(L) Type IV - Center back length. Measurement shall be taken from the top of the neckline seam at the center back to the intersection of back and front crotch seams.

(M) Type IV - Sleeve inseam length. Measurement shall be taken along inseam from armhole to bottom of sleeve.

(N) Type IV - Sleeve opening. Measurement shall be taken from folded edge to folded edge of flattened sleeve end.

(P) Type IV - Leg inseam length. Measurement shall be taken from the center of the crotch seam, along the leg inseam and to bottom open edge of leg opening.

(R) Type IV - Leg opening. Measurement shall be taken from folded edge to folded edge of flattened leg end.

4.4.4 Otto Fuel penetration resistance test. Finished garments and components selected for Otto Fuel penetration resistance testing shall be evaluated in accordance with ASTM F 903 at Naval Undersea Warfare Center Division, Keyport. There shall be no evidence of Otto Fuel penetration through fabric or sealed (taped) seams for 5 minutes at atmospheric pressure. A failure of this test shall be cause for rejection of the lot.

4.4.5 Shelf-life extension inspection. Finished garments selected for shelf-life extension shall pass the Otto Fuel penetration resistance testing as specified in 4.4.4 (see 3.8.2 and 6.4).

4.4.6 Toxicity Test. When required (see 6.2) an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the garments' cloth is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure cited under the Principles and Methods of Toxicology. If the toxicity requirement can be demonstrated with historical use data, the procuring agency may elect not to require toxicity.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by Inventory Control Point's packaging activity within the Military Service or Defense Agency or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products or by contacting the responsible packaging activity.

## 6. NOTES

6.1 Intended use. The Otto Fuel protective garments are intended to protect torpedo handlers from exposure to Otto Fuel. The shirt, trousers and apron are intended to be worn as an ensemble to provide complete protection. These garments, shirt, trousers, coveralls, and apron are meant for disposal after one-time use or upon noticing stain.

6.2 Acquisition requirements. Procurement documents should specify the following:

- a. Title, number and date of this document
- b. Types and sizes required (see 1.2)
- c. National stock number
- d. Applicable Government patterns (see 3.5)
- e. When first article inspection is required (see 3.1)
- f. Number of first article inspection samples (see 4.2.1)
- g. Name and address of the first inspection facility; and the name and address of the Government activity responsible for conducting the first article inspection program.
- h. Packaging required (see 5.1)
- i. When toxicity testing is required. (see 4.4.6)
- j. Conformance inspection and acceptable quality levels. (4.3)

6.3 Information requests. For access to information such as purchase descriptions and patterns contact the procuring activity. To request to use equivalent materials and/or components, the contractor should submit equivalent items with supporting data to the contracting officer for

subsequent approval or disapproval by the Navy. Requests to make changes to the pattern shall also be sent to the contracting officer for subsequent approval or disapproval by the Navy.

6.4 Shelf-life. This purchase description covers items where the assignment of a Federal shelf-life code is a consideration. Specific shelf-life requirements should be specified in the contract or purchase order, and should include, as a minimum, shelf-life code, shelf-life package markings in accordance with MIL-STD-129 or FED-STD-123, preparation of a material quality storage standard for type II (extendible) shelf-life items, and a minimum of 85 percent shelf-life remaining at time of receipt by the Government. These and other requirements, if necessary, are in DoD 4140.27-M, *Shelf-life Management Manual*. The shelf-life codes are in the Federal Logistics Information System Total Item Record. Additive information for shelf-life management may be obtained from DoD 4140.27-M, or the designated shelf-life Points of Contact (POC). The POC should be contacted in the following order: (1) the Inventory Control Points that manage the item and (2) the DoD Service and Agency administrators for the DoD Shelf-life Program. Appropriate POCs for the DoD Shelf-Life Program can be contacted through the DoD Shelf-Life Management website: <https://www.shelflife.hq.dla.mil/>.”

6.5 Suggested sources of supply. The following suppliers are capable of meeting the coated cloth physical requirements cited under 3.4.2.1.1 Table I.

- a. Dupont Tychem 2000 (Tychem QC)
- b. Kimberly-Clark Kleenguard A70
- c. Ansell MICROCHEM by AlphaTec 2300

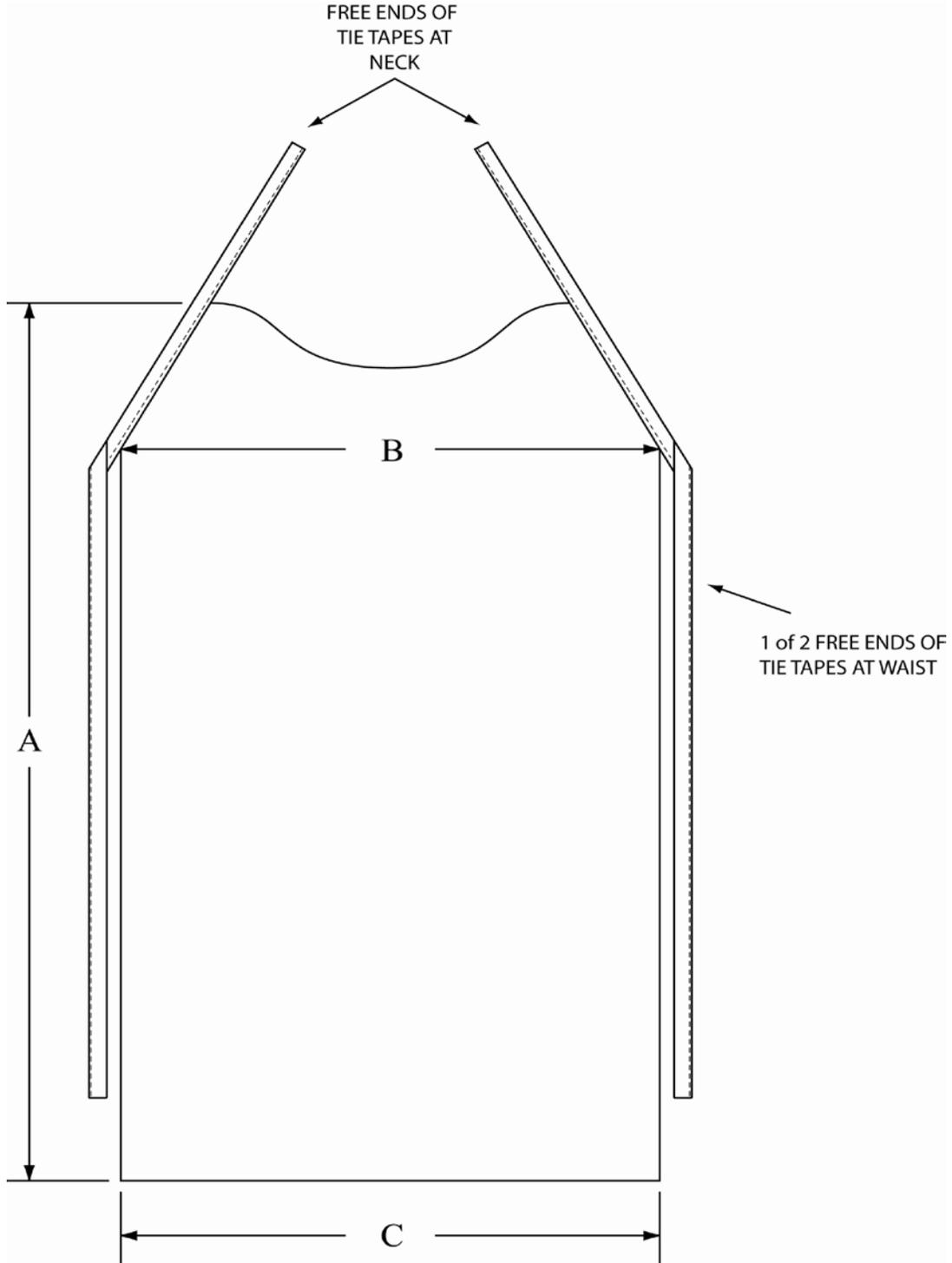


FIGURE 1. Otto Fuel protective garment, Type I - apron

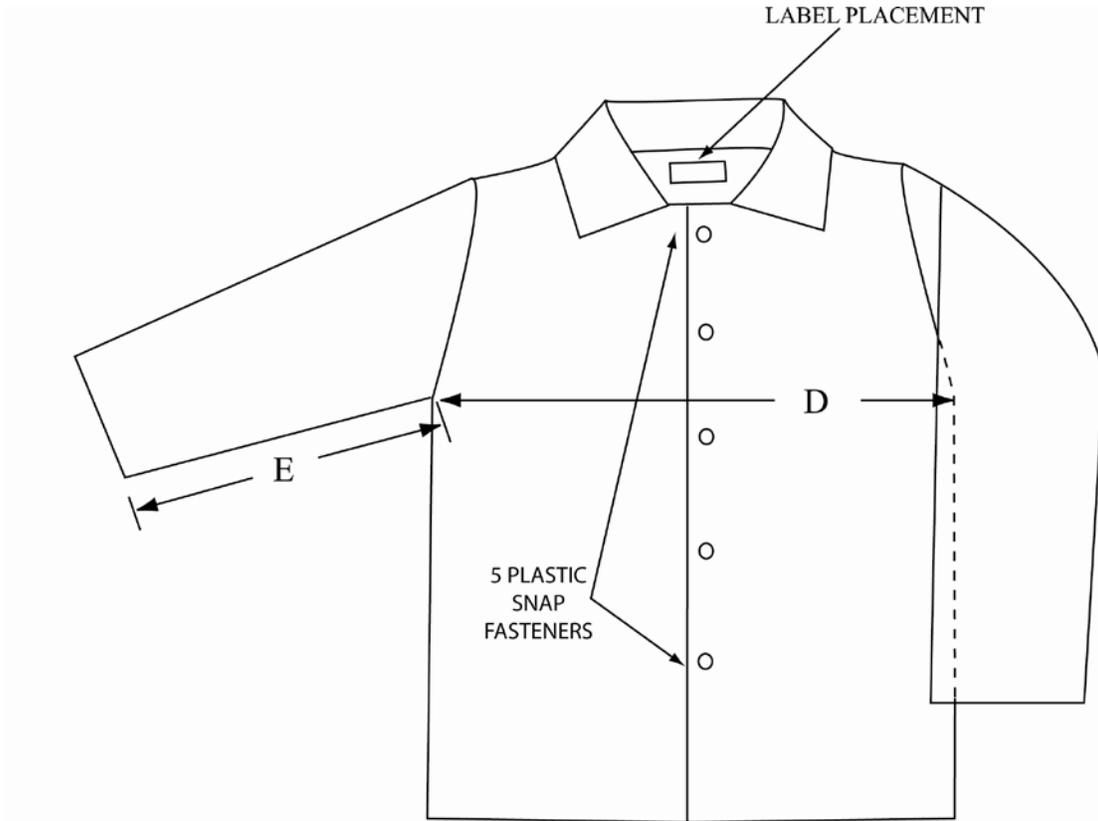


FIGURE 2. Otto Fuel protective garment, Type II – shirt front

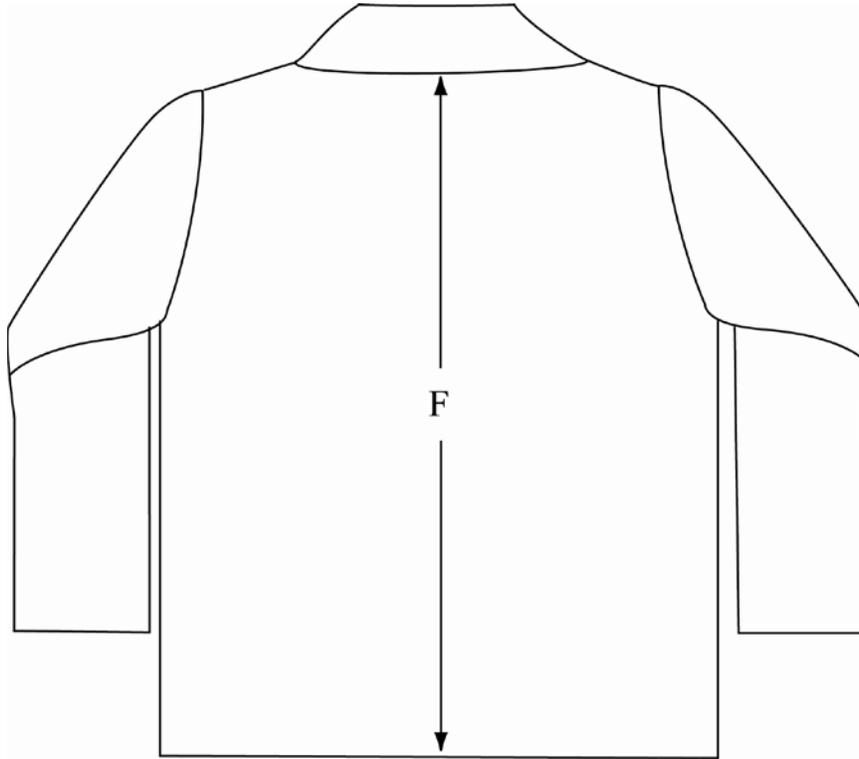


FIGURE 3. Otto Fuel protective garment, Type II – shirt back

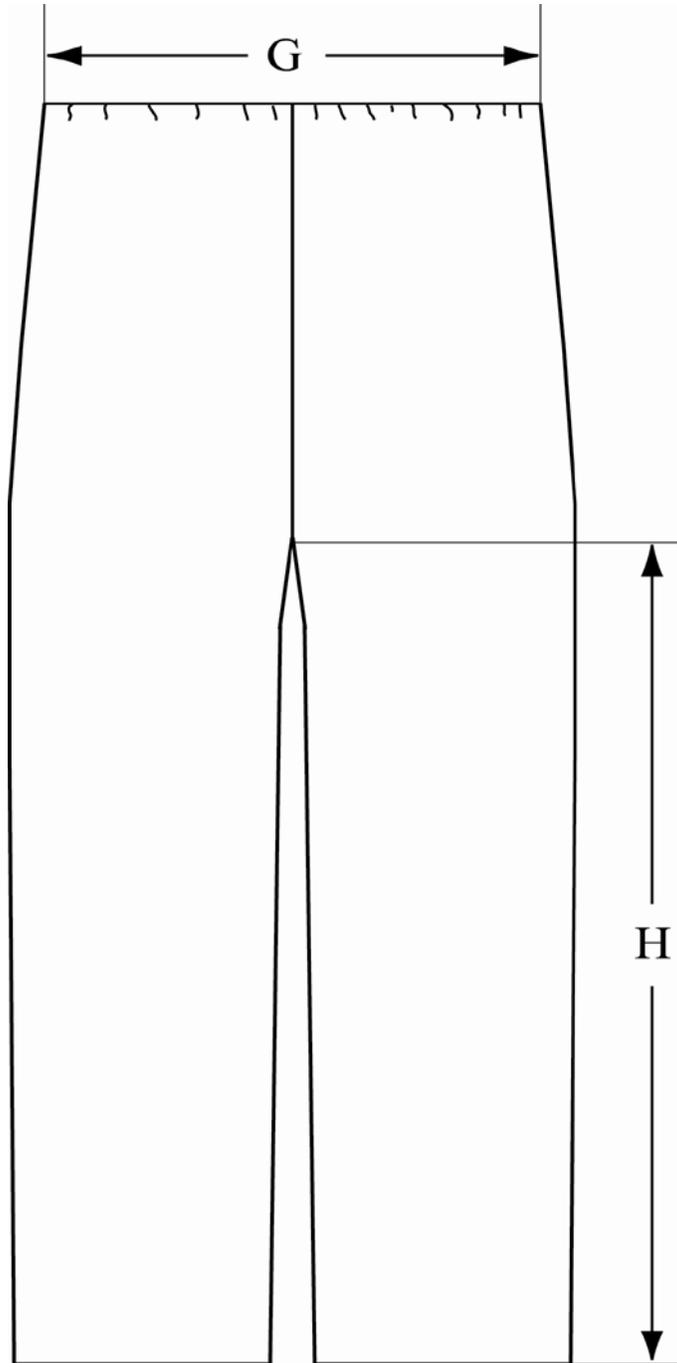


FIGURE 4. Otto Fuel protective garment, Type III – trousers

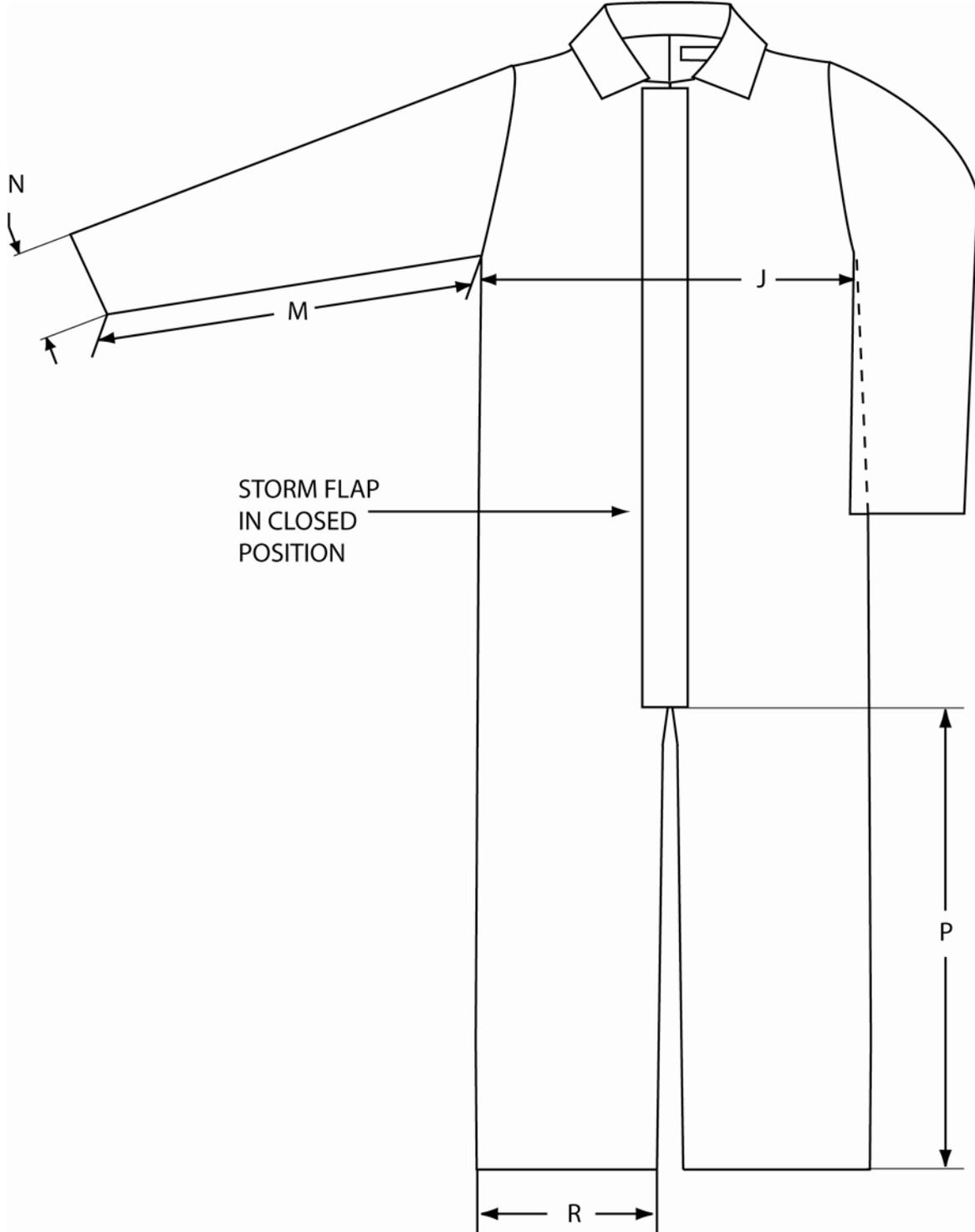


FIGURE 5. Otto Fuel protective garment, Type IV - coveralls front with storm flap closed

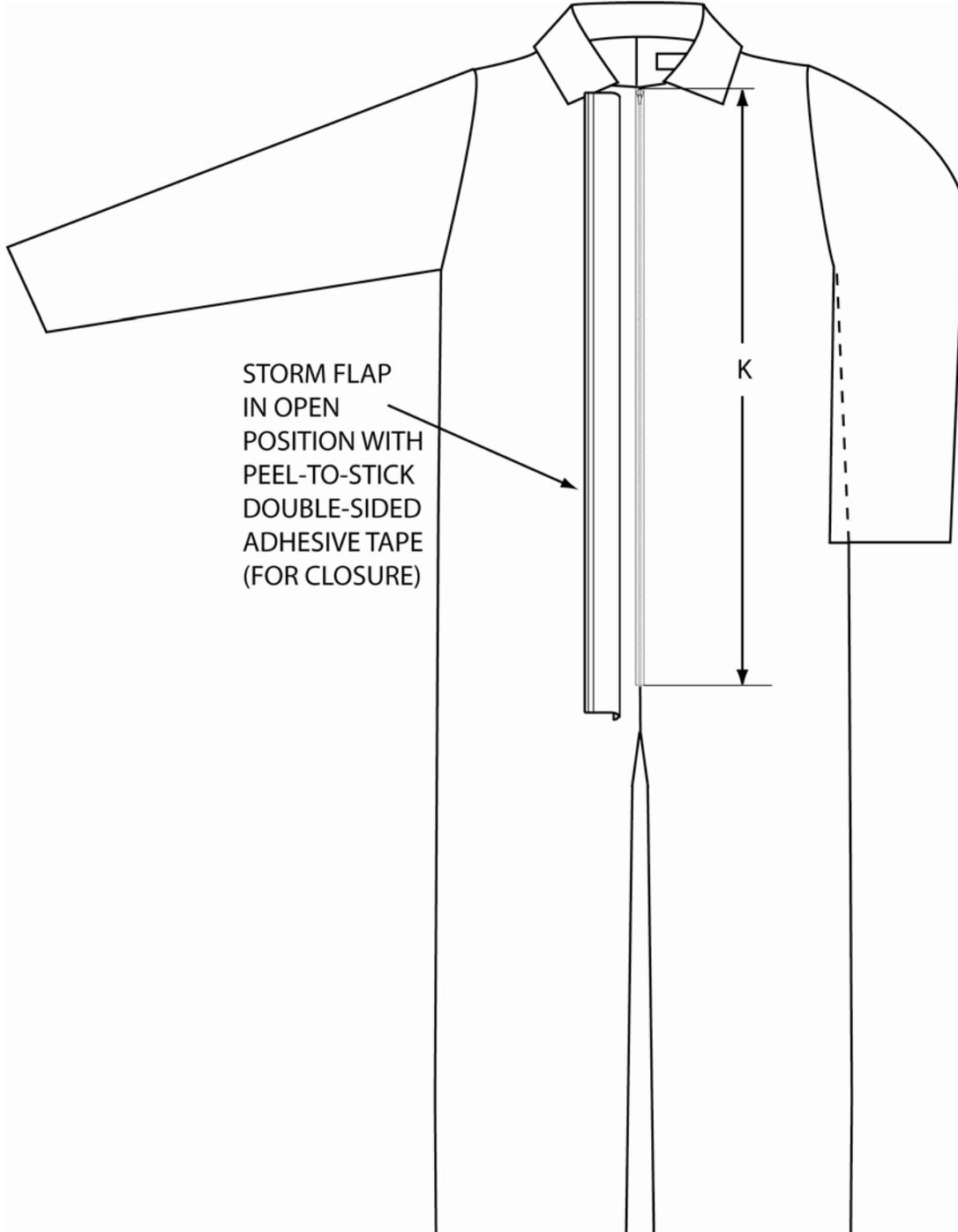


Figure 6. Otto Fuel protective garment, Type IV - coveralls front with storm flap open

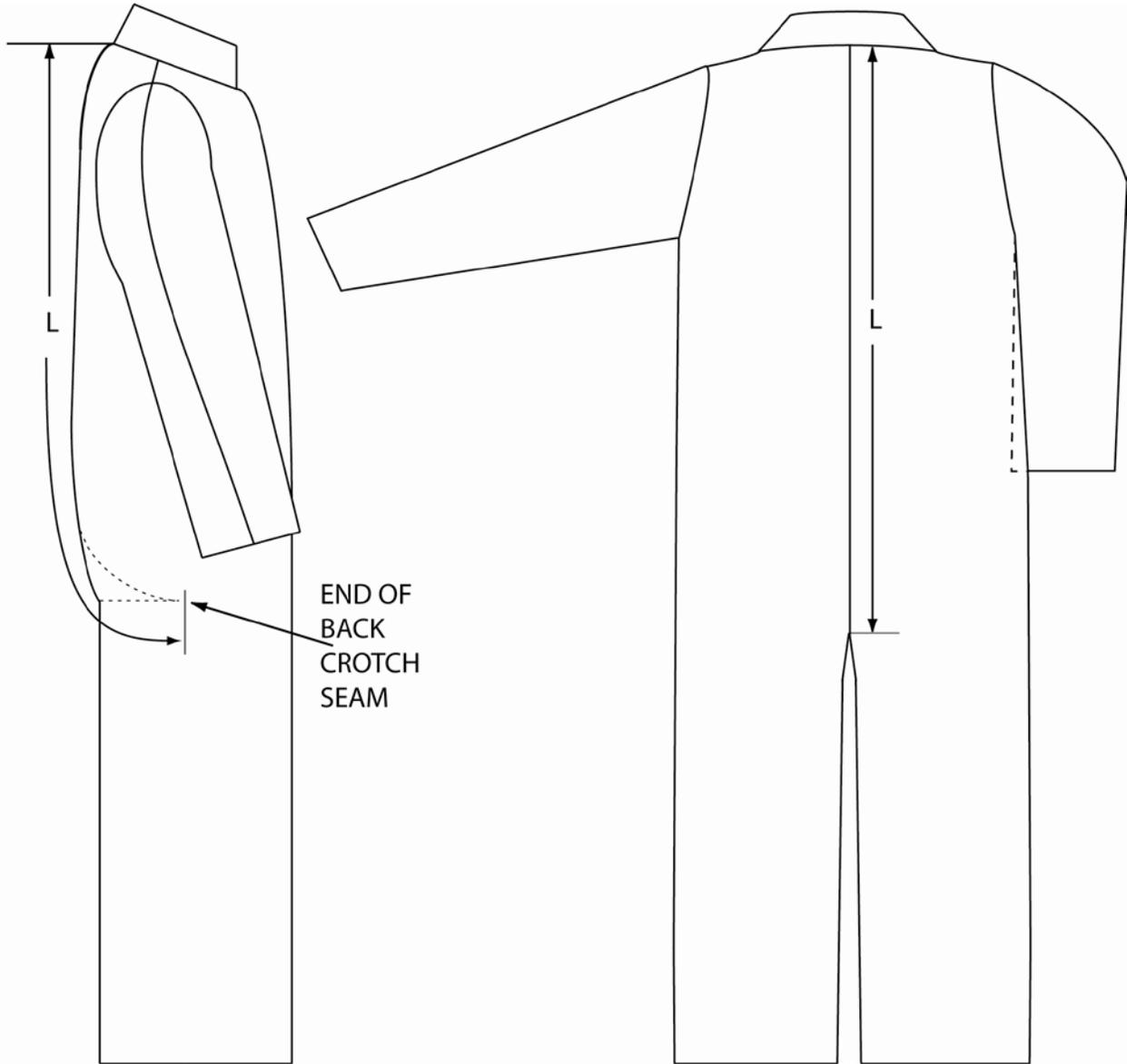


FIGURE 7. Otto Fuel protective garment, Type IV - coveralls back length measurement

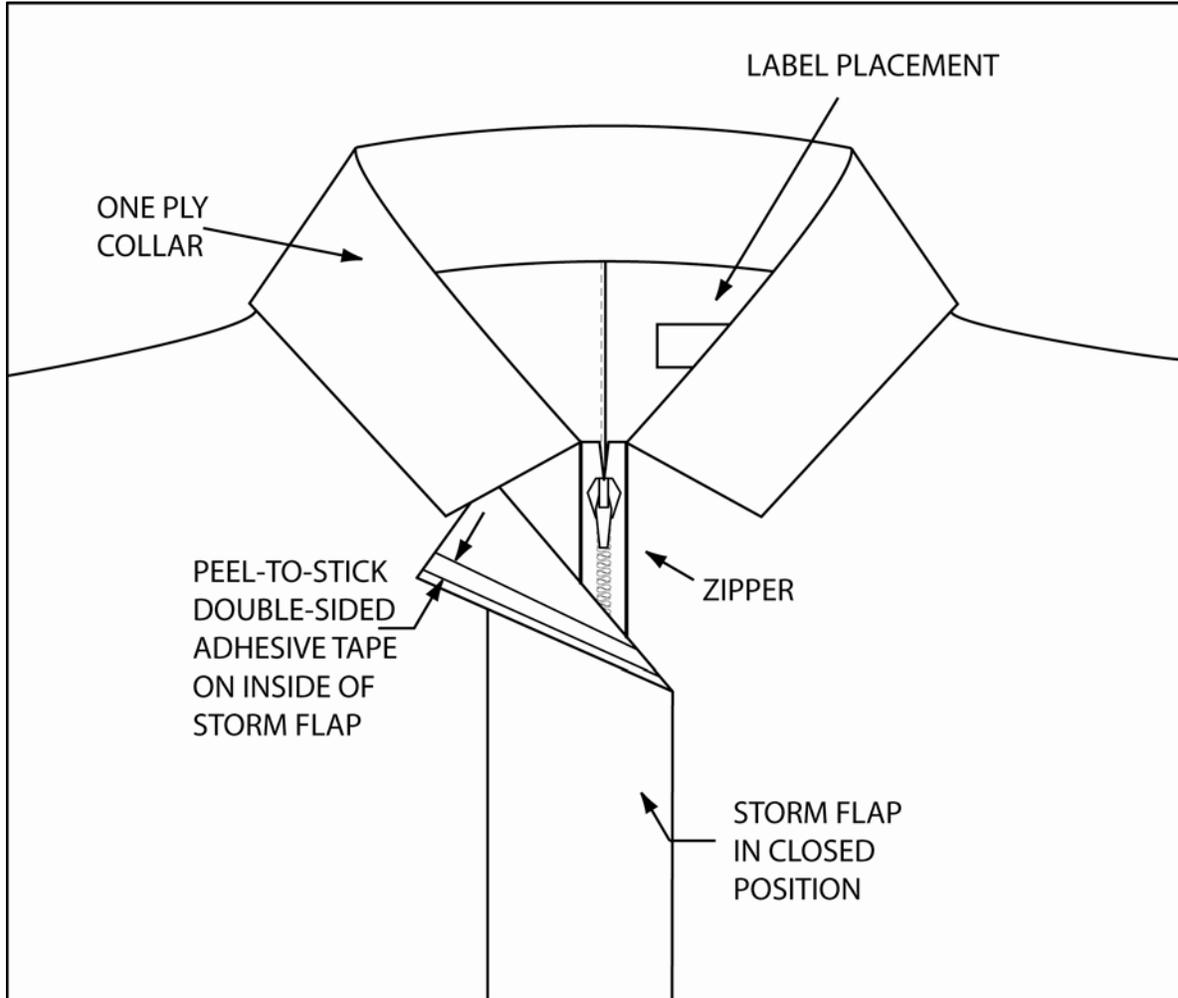


FIGURE 8. Otto Fuel protective garment, Type IV coveralls at collar