**INCH-POUND**

**MC/PS 03-2015 SYSCOM**

**15 March 2015**

SUPERSEDING

MC/PD 06 2011 SYSCOM, dated

30 October 2011

**PERFORMANCE SPECIFICATION**

**UNDERWEAR SET,**

**PULLOVER SHIRT, FLAME RESISTANT MIDWEIGHT, COLD WEATHER**

This specification is approved for use by all departments and agencies of the Department of Defense.

**1. SCOPE**

1.1 Scope. This specification prescribes the performance requirements and identifies verification procedures for the US Marine Corps flame resistant midweight cold weather underwear set pullover shirt, hereafter referred to as the pullover shirt.

1.2 Classification. The pullover shirt will be one type and in the following sizes.

## Schedule of Sizes

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| X-Small | Small | Medium | Large | Extra Large |
| Regular | Regular | Regular | Regular | Regular |
|  |  | Long | Long | Long |

**2. APPLICABLE DOCUMENTS**

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

Comments, suggestions, or questions on this document should be addressed to: Defense Supply Center Philadelphia, Clothing and Textiles Directorate, Attn: DLA Troop Support, 700 Robbins Avenue, Bldg. 3D, Philadelphia, PA 19111-5092, or emailed to elizabeth.roland@dla.mil. Since contact information can change, you may want to verify the currency of this address information by using the ASSIST Online database at [www.dodssp.daps.mil](http://www.dodssp.daps.mil).

AMSC N/A. FSC 8415

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*distribution is unlimited.*

2.2 Government documents.

2.2.1 Specifications, standards and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be cited in the solicitation or contract (see 6.1).

COMMERCIAL ITEM DESCRIPTIONS

A-A-55195 Thread: Para-Aramid, Spun, Intermediate Modulus

A-A-55217B Thread, Aramid, Spun Staple

A-A-55634A Zippers (Fasteners, Slide Interlocking)

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-83429B Cloth, Plain and Basket Weave, Aramid

MIL-DTL-32075 Labels: For clothing, Equipage, and Tentage (General Use)

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those specified in the solicitation or contract (see 6.2).

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

AATCC - 8 Colorfastness to Crocking: AATCC Crockmeter Method

AATCC - 16 Colorfastness to Light

AATCC-20A Fiber Analysis: Quantitative

AATCC - 61 Colorfastness to Laundering, Home and Commercial: Accelerated

AATCC - 135 Dimensional Changes in Automatic Home Laundering of Woven and Knit Fabrics

AATCC Evaluation Procedure - 9 Visual Assessment of Color Difference of Textiles

(Copies of these documents are available online at [http://www.aatcc.org](http://www.aatcc.org/) or AATCC, PO Box 12215, Research Triangle Park, NC 27709-2215.)

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI/ASQ Z1.4 Sampling Procedures and Tables for Inspection of Attributes

(For all inquiries please contact the American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036. Website address: <http://www.ansi.org>)

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D737 Standard Test Method for Air Permeability of Textile Fabrics

ASTM D1776 Standard Practice for Conditioning and Testing Textiles

ASTM D1777 Standard Test Method for Thickness of Textile Materials

ASTM D2594 Standard Test Method for Stretch Properties of Knitted Fabrics Having Low Power

ASTM D3512 Standard Test Method for Pilling Resistance and Other Related Surface Changes of Textile Fabrics: Random Tumble Pilling Tester

ASTM D3776 Standard Test Method for Mass Per Unit Area (Weight) of Fabric

ASTM D3787 Standard Test Method for Bursting Strength of Textiles—Constant-Rate-of-Traverse (CRT) Ball Burst Test

ASTM D5034 Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM D6193 Standard Practice for Stitch and Seam Types

ASTM D6413 Standard Test Method for Flame Resistance of Textiles (Vertical Test)

(Copies of these documents are available online at <http://www.astm.org> or from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

MISCELLANEOUS

Marzulli, F. and H. Maibach, “Contact Allergy: Predictive Testing in Humans,” Advances in Modern Toxicology, Volume 4, pp 353-372, 1977.

(Copies of this document are available from the U.S. Army Center for Health Promotion and Preventative Medicine, ATTN: MCHB-DC-TTE, Bldg., E-2100, Aberdeen Proving Ground, MD 21010-5422.)

Principle and Methods of Toxicology, A Wallace Hayes (editor), pp 394-396, 1989.

(Applications for copies of referenced documents should be addressed to Raven Press, 1185 Avenue of the Americas, New York, NY 10036)

ISO 11092 “Measurement of Thermal and Water Vapor Resistance under Steady-State Conditions (Sweating Guarded- Hot Plate Test)

(Copies for these documents are available from American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036-7417.)

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

**3. REQUIREMENTS**

3.1 First article. When specified (see 6.1), a sample shall be subjected to first article inspection (see 6.2) in accordance with 4.2.

3.2 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.

3.3 Materials and components. The materials and components shall conform to applicable specifications, standards, drawings, and patterns required herein.

3.3.1 Basic material. The basic material for the pullover shirt shall be a flame resistant grid plaited circular knit fabric, constructed with a modacrylic/polyester/rayon/spandex blend, Polartec style 91371, or equal. The fabric shall have stretch and moisture management provided either by yarn denier differential in the construction and/or a chemical treatment. The face shall be durable and low pilling. The color shall be Coyote 498. The fabric shall show no toxicity when used as intended and when tested as specified in 4.4.4. The fabric shall conform to the physical requirements specified in Table I when tested as specified in paragraph 4.4.3.

**TABLE I. Basic material physical requirements**

| **Material Characteristic** | **Material Requirement** | **Test Method** |
| --- | --- | --- |
| Construction | Grid plaited circular knit | Visual |
| Fiber Content | Modacrylic, polyester, rayon, spandex | AATCC 20A |
| Weight, ounces/ square yard | 7.625 ±0.625 | ASTM D3776 |
| Colorfastness to: (minimum)  Laundering (3 cycles) | 4.0 | AATCC - 61, Test No. 2A, grade polyester only |
| Crocking  Wet  Dry | 3.0  4.0 | AATCC - 8 |
| Light, Xenon method | 4 | AATCC - 16, Option E (85 kJ) |
| Dimensional Stability, % (max) –  Wales  Courses | 5.0  5.0 | AATCC - 135, 3 Cycles, (1), III, (A), ii |
| Pilling (jersey face) (minimum):  Initial  After Laundering (3 cycles) | 4.0  4.0 | ASTM D3512  AATCC - 135, (1), III, (A), ii |
| Air Permeability, cubic feet/square feet/minute | 120 minimum | ASTM D737 |
| Thickness, inch @ 0.06 pounds per square inch | 0.06-0.08 | ASTM D1777 |
| Fabric Stretch, % (minimum)  Wales  Courses | 35  60 | ASTM D2594 (Loose Fit) |
| Vertical Flame – initial (maximum)  Wales and Courses  After flame, seconds  After glow, seconds  Char length, inches  Report Melt and Drip | 2.0  0  5.0  No Melt / No Drip | ASTM D6413 1/ |
| Vertical Flame – after 5 launderings (maximum)  Wales and Courses  After flame, seconds  After glow, seconds  Char length, inches  Report Melt and Drip | 2.0  0  5.0  No Melt / No Drip | ASTM D6413 1/;  AATCC 135,1,III, Aii |
| Bursting Strength, pounds (minimum) | 40 | ASTM D3787 |
| Thermal insulation (Clo)  Initial  After 3 launderings | 0.3 min  0.25 min | ISO 11092  AATCC TM 135 (120 + 5°F, tumble dry low) |

1/ The vertical flame test shall be conducted on samples of the knitted cloth and aramid cloth conforming to MIL-C-83429. Both materials shall be cut in the same direction for each test. Place the knitted cloth in the sample holder, face side facing up. The bottom edge (toward the flame) shall be folded back 1/2 inch. The back side of the fabric shall now be facing the flame. Place the aramid cloth along the edge of the knitted cloth and secure in the sample holder.

3.3.2 Under collar, zipper protective flap backing and lower front facings. The material for the under collar, zipper protective flap, and lower front facings shall be plain weave aramid cloth; the fiber content shall be 95% meta-aramid and 5% para-aramid in accordance with MIL-C-83429B. The fiber shall be 1.5 denier per filament, and 1-1/2 to 2 inches in staple length. The fiber shall not char at a temperature less than 675 °F. The yarn for both the warp and filling shall be spun into 2-ply. The color shall be Coyote 498. The fabric shall show no toxicity when used as intended and when tested as specified in 4.4.4. The material shall conform to the requirements in the Table II when tested as specified in paragraph 4.4.3.

**TABLE II. Aramid cloth material physical requirements**

| **Material Characteristic** | **Material Requirement** | **Test Method** |
| --- | --- | --- |
| Fiber Content | 95% Meta-aramid/ 5% Para-aramid | AATCC 20A |
| Weight (ounces/square yard) | 4.5 ±0.5 | ASTM D3776 |
| Breaking Strength, lbs.  Warp  Filling | 125  90 | ASTM D5034 |
| Colorfastness to:  (minimum)  Laundering (3 cycles) | 4.0 | AATCC - 61, Test No. 2A |
| Crocking  Wet  Dry | 3.0  4.0 | AATCC - 8 |
| Light (Xenon) | 3.0 | AATCC - 16, Option 5 (85 kJ) |
| Dimensional Stability (3 cycles) - % (maximum) –  Wales  Courses | 3.5  3.5 | AATCC - 135, (1), III, (A), ii |
| Vertical Flame – initial (maximum)  Warp and Fill  After flame, seconds  Char length, inches  Report Melt and Drip | 2.0  5.0  No Melt / No Drip | ASTM D6413 |
| Vertical Flame – after 5 launderings (maximum)  Warp and Fill  After flame, seconds  Char length, inches  Report Melt and Drip | 2.0  5.0  No Melt, No Drip | ASTM D6413;  AATCC - 135,1,III, Aii |

3.3.3 Pocket Lining. The pocket lining for the pullover shall be a flame resistant jersey knit fabric constructed with a modacrylic/polyester/rayon/spandex blend, Polartec style 20111, or equal. The color of the fabric shall be Coyote 498. The fabric shall show no toxicity when used as intended and when tested as specified in 4.4.4. The fabric shall conform to the physical requirements specified in Table III when tested as specified in paragraph 4.4.3. Unless otherwise specified, the fabric shall be conditioned and tested in accordance with ASTM D1776.

**TABLE III. Pocket lining physical requirements**

| **Material Characteristic** | **Material Requirement** | **Test Method** |
| --- | --- | --- |
| Fiber Content | Modacrylic, polyester, rayon, spandex | AATCC 20A |
| Weight (ounces/square yard) | 6.75-8.25 | ASTM D3776 |
| Colorfastness to: (minimum)  Laundering (3 cycles) | 4.0 | AATCC - 61, Test No. 2A, grade polyester only |
| Crocking  Wet  Dry | 3.0  4.0 | AATCC - 8 |
| Dimensional Stability (3 cycles) - % (maximum) –  Wales  Courses | 5%  5% | AATCC - 135, I, III, Aii |
| Vertical Flame – initial (maximum)  Wales and Courses  After flame, seconds  Char length, inches  Report Melt and Drip | 2.0  5.0  No melt/no drip | ASTM D6413 |
| Vertical Flame – after 5 launderings (maximum)  Wales and Courses  After flame, seconds  Char length, inches  Report Melt and Drip | 2.0  5.0  No melt/no drip | ASTM D6413  AATCC - 135, 1 III, Aii |
| Water Sorption/Wicking  Before laundering  After 20 launderings | Pass  Pass | See 4.4.3.1 |
| Fabric Stretch, % (minimum)  Wales  Courses | 30%  50% | ASTM D2594 |
| Bursting Strength, pounds (minimum) | 40 | ASTM D3787 |

3.3.4 Components.

3.3.4.1 Thread. The thread for the pullover shirt shall be aramid, Tex Size 40 bobbin/looper conforming to A-A-55217 or as an alternate, para-aramid spun staple thread, Tex Size 39 conforming to A-A-55195, Type I, may be used. The color of the thread shall be Coyote 498. The thread shall show fastness to laundering equal to or better than the standard sample. When no standard is available, the thread shall show “good” fastness to laundering.

3.3.4.2 Labels.

3.3.4.2.1 Marine Corps Exclusive Label. Each pullover shirt shall have a woven USMC exclusive label, cut single, fused edge, 33mm x 50mm (1.299 inches x 1.969 inches), Bell Label or equal. The information on the label shall include the following: “Made Expressly for” at the top; followed by a woven USMC emblem in the center; below the emblem, the contractor’s name and at the bottom of the label the abbreviated size – length designation. All lettering shall be in gold. The exclusive label shall be placed at center back of the neck, the top edge shall be caught in collar setting seam and the label stitched on all four sides.



3.3.4.2.2 FROG Label. Each pullover shirt shall have a woven FROG label, 63mm x 63mm (2.480 inches x 2.480 inches), cut single, fused edge, manufactured by IbisTek, Bell Label or equal in the following configuration:



A woven FROG label/patch must be sewn on each pullover shirt at the left lower front (as worn) below pocket opening and centered between rows of stitching; bottom of label shall be directly above the hem.

3.3.4.2.3 Combination identification and instruction label. The combination identification and instruction label shall be in accordance with Type VI, Class 14 of MIL-DTL-32075. The color of the label shall be white. The label shall be caught in the stitching of the left side seam approximately 2-1/2 inches from the hem. The combination label shall be facing the body and shall not be visible from the outside when the pullover shirt is in use. The combination identification and instruction label shall include the following information:

**Identification Information:**

PULLOVER SHIRT, FR MIDWEIGHT

CONTRACT NO.:

NSN:

FIBER CONTENT:

CONTRACTOR’S NAME:

**Instruction Information:**

Machine Wash in Luke Warm Water (105oF)

Tumble Dry Low Temperature or Line Dry  
Avoid Use Fabric Softeners

DO NOT BLEACH, DRY CLEAN

OR IRON

3.3.4.2.4 Bar-code label/tag. Each pullover shirt shall be individually bar-coded with a Type VI, Class 17, and label/tag of MIL-DTL-32075. The bar-code 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 item.

3.3.4.3 Slide fastener. The slide fastener for the front opening of the pullover shirt shall be a continuous element polyester mono-filament, size 5-6 with a minimum crosswise breaking strength of 175 lbs., conforming to type I, Style 7 of A-A-55634A and the color shall be Coyote 498. The slider shall have an opening large enough to accommodate a 3/8-inch wide thong. Slide fastener lengths for the front opening are 14 inches for all sizes.

3.3.4.4 Webbing. The webbing used to reinforce the end of the slide fastener on the pullover shirt shall be 1-inch wide, 4 panel, Coyote 498 in color, spun polyester webbing (no melt/no drip) conforming to Elastic Cord and Webbing, Inc. Style # 4056, or equal. Cut edges of webbing shall be turned under.

3.4 Design and construction.

3.4.1 Design. The pullover shirt has long sleeves with a thumbhole to aid in donning and a collar with a reinforcing outer collar that converts into a mock turtleneck when the front opening slide fastener is completely closed. The slide fastener front opening extends from the top of the collar to the mid-chest and is backed with a full-length throat protection flap. The base of the front opening shall be reinforced with a 1 x 1-1/2 inch piece of webbing. A large hand warmer pocket backed with a lighter weight pocketing extends from the lower chest area to the base of the pullover. To provide insulation and improve lower back protection, the back of the pullover shirt is shaped to be longer than the front. All joining seams shall be flat locked and all hems cover stitched. See Figures 1 and 2.

3.4.2 Construction. The following specifics will provide garments with uniform appearance, comfort and durability for use during field duties, combat and operations other than war. End item construction and appearance shall conform to the figures provided and the finished measurements cited (see 3.7) to maintain end item configuration.

3.4.2.1 Patterns. Standard patterns, providing a seam allowance of 3/8-inch for all seams - except 1/2-inch for setting of zipper, will be furnished by the Government. The list of pattern parts and computer nomenclature in Table IV is provided to insure that the pattern set provided is complete. The Government patterns shall not be altered in any way, and are to be used only as a guide for cutting the contractor’s working patterns. The working patterns will be identical to the Government patterns, except that additional notching, if needed, to facilitate manufacture is possible. Minor modifications are permitted where necessary to accommodate the manufacturer’s processes and the use of automated equipment. These modifications shall not alter the serviceability or appearance requirements of these garments.

3.4.2.1.1 Pattern parts. The component parts shall be cut from the specified material in accordance with the pattern parts listed in Table IV.

**TABLE IV. List of Pattern Parts**

| **Material** | **Nomenclature** | **Cut Parts** |
| --- | --- | --- |
| Basic material | Back  Upper front  Bottom front  Side lower front  Top collar  Side lower back facing  Sleeve  Sleeve facing  Zipper protective flap | 1  1  1  2  1  2  2  2  1 |
| Plain weave aramid | Under collar  Side lower front facing  Zipper protective flap lining | 1  2  1 |
| FR Knit (pocket lining) | Bottom front pocket | 1 |

3.4.2.2 Seaming. All seams shall exhibit a uniform appearance and conform to the ASTM D-6193, Stitch Types listed in Table V. The stitches per inch shall be 10-14 for all seams except stitch type 607 which shall be 12-14 stitches per inch. All material edges shall not ravel. Edges may be turned-in, turned-under, or serged to prevent raveling.

**TABLE V. Seams, stitch types and bartack locations**

| **Seaming Areas** | **Seam Type** | **Stitch Type** |
| --- | --- | --- |
| Join shoulders. | 607 | FSa-1 |
| Join edges of zipper flap, turn and topstitch with 1/4”- 3/16” topstitch. | 301 | SSe-2 |
| Overedge sides and bottom edge of side lower back facing and raw edges of zipper flap. | 504 | EFd-1 |
| Attach side lower back facings to bottom front pocket around all sides | 301 | LSbj-1 |
| Join lower front facings and lower front panel, turn and topstitch 3/16”-1/4” from folded edge of pocket opening. Turn under back edge of facing and stitch to lower front 1/8”- 3/16” from turned edge. | 301 | LSct-2a &  LSct-2b |
| Join bottom front to bottom front pocket. | 301 | SSa-1 |
| Join side lower fronts to completed bottom front. | 607 | FSa-1 |
| Join top collar and undercollar, and overedge bottom of top collar. | 504 | SSa-1 |
| Turn down collar joining seam and raise stitch. | 301 | SSa-1 |
| Set collar catching USMC/size label at center back. | 607 | FSa-1 |
| Sew USMC/size label down around remaining edges. | 301 | SSa-1 |
| Set zipper with flap into pullover front opening, close collar, and topstitch collar and zipper 3/16”- 1/4” from folded edge. | 301 | LSbu-2a &  LSbu-2b |
| Attach reinforcement webbing at base of zipper opening. | 301 | Box Stitch |
| Join completed upper front to completed bottom front. | 607 | FSa-1 |
| Bind thumbhole openings. | 402 | BSc-2 |
| Set sleeves flat. | 607 | FSa-1 |
| Close side seams, catching care label in left side seam 2”- 3” above bottom edge of pullover. | 607 | FSa-1 |
| Turn sleeve hems to outside 1/2” and hem. | 605 | EFa-2 |
| Turn bottom hem under 3/4” and hem. | 605 | EFa-2 |
| Bartack top and bottom of thumbholes, catching seam tails. Bartack sleeve hem endings and bottom hem ending. | Bartack | N/A |
| Attach FROG label to lower front left side between seam joining lower front to side lower front, and pocket facing seam, bottom edge of label aligned directly above top edge of bottom hem seam. | 301 | LSbj-1 |

3.4.2.2.1 Bartacks. Bartacks shall be added for reinforcement in the following locations and as shown in Figures 1 and 2

**TABLE VI. Bartack locations**

|  |  |  |
| --- | --- | --- |
| **Bartack Locations** | **Length, in Inches** | **Quantity per Garment** |
| Sleeve hem @ inseam | 5/8 | 2 |
| End of bottom hem | 5/8 | 1 |
| Hand Warmer Pocket Openings – 1 at top and bottom of each opening | 5/8 | 4 |
| Thumb Hole Opening – 1 at top and bottom of each opening | 5/8 | 4 |

3.4.2.3 Tacking and backstitching. Ends of seams and rows of stitching with 301 type stitch, when not caught in other seams or stitching, shall be securely backstitched not less than 1/4 inch. Thread breaks (all stitch types) shall be secured by stitching back of the break not less than 1/2 inch.

3.5 Toxicity. The pullover shirt shall not present a health hazard and shall show compatibility with prolonged direct skin contact when tested as specified in 3.5.1. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used. The contractor must furnish information, which certifies that the finished product is composed of materials, which have been safely used commercially or provided sufficient toxicity data to show compatibility with prolonged, direct skin contact.

3.5.1 Toxicity Test. An acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of the studies indicate the pullover is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure. If the toxicity requirement (see 3.5) can be demonstrated with historical data, then toxicity testing may not be required. All finishes/chemicals used to process the garment shall be identified and accompanied by the appropriate Material Safety Data Sheet (MSDS) information. The use of chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens is prohibited.

3.6 Color.

3.6.1 Visual shade matching. The color and appearance of the material shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 + 200 K illumination of 100 + 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 + 200K.

3.6.2 Colorfastness. The basic material and components shall conform to the colorfastness requirements listed in Tables I - III.

3.7 Finished measurements. The finished pullover shirt shall conform to the measurements listed in Table VII. All measurements shall be taken with the garment laid flat. Sleeve lengths should not be uneven by more than 1/2 inch.

**TABLE VII. Pullover shirt finished measurements (inches)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **REGULAR** | **X-Small** | **Small** | **Medium** | **Large** | **X-Large** | **TOL** |
| 1/2 CHEST 1/ | 19 | 21 | 23 | 25 | 27 | ± 1/2 |
| BACK LENGTH 2/ | 29 | 29-1/2 | 30 | 30-1/2 | 31 | ± 3/4 |
| SLEEVE LENGTH 3/ | 25-3/4 | 26-1/8 | 26-1/2 | 26-7/8 | 27-1/4 | ± 1/2 |
| COLLAR WIDTH AT CF | 3 1/4 | 3 1/4 | 3 1/4 | 3 1/4 | 3 1/4 | ± 1/4 |
| **LONG** |  |  | **Medium** | **Large** | **X-Large** |  |
| BACK LENGTH 2/ |  |  | 32 | 32-1/2 | 33 | ± 3/4 |
| SLEEVE LENGTH 3/ |  |  | 27-1/2 | 27-7/8 | 28 | ± 1/2 |

1/ Measure from side seam to side seam at base of armhole

2/ Measure from base of collar joining seam down center back to bottom of pullover hem.

3/ Measure from shoulder seam along the outer folded edge of sleeve to bottom of hem/binding.

3.8 Workmanship. The finished pullover shirt shall be free from loose thread, foreign matter, and irregular defects that can adversely affect usage or durability. The finished pullover shirt shall be uniform in quality, free from defects that adversely affect form, fit or function and those defects specified in Table VIII.

**4. VERIFICATION**

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

1. First article inspection (see 4.2).

2. Conformance inspection (see 4.3).

4.2 First article inspection. A first article inspection when required (see 3.1) shall consist of the end item examinations and tests specified in Tables I-III. The presence of excessive defects, as defined by contract, (see 4.1) or failure to pass any test shall be cause for rejection of the first article.

4.2.1 First article samples. Unless otherwise specified in the procurement document, first article samples shall be provided. The sample size will be specified in the procurement document. The sample unit shall be one pullover shirt and the lot size shall be expressed in units of pullover shirts.

4.2.1.1 Materials and components inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document. In addition to testing provisions specified in referenced documents, components shall be tested for the characteristics specified in this specification. Tests shall be conducted with both the specimen and test apparatus under standard conditions as defined in the various ASTM, and AATCC test methods. All requirements are applicable to the sample unit. All test reports shall contain the individual values utilized in expressing final results. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. Unless otherwise specified in subsidiary specifications, sampling shall be as follows:

Lot Size (yards) Sample size

800 or less 2

801 up to and including 22,000 3

22,001 and over 5

4.3 Conformance inspection. In accordance with 4.1, conformance inspection shall include the examination specified in 4.3.1. Sampling for inspection shall be performed in accordance with ASQC Z1.4, as defined by contract, except where otherwise indicated.

4.3.1 Conformance inspection samples. Sampling for conformance inspection shall be performed in accordance with ASQC Z1.4 (see 6.2). The sample unit shall be one pullover shirt and the lot shall be expressed in units of pullover shirts.

4.4 Examinations and tests.

4.4.1 Visual examination. The end item shall be visually examined for compliance to 3.4. The pullover shirt shall be examined for defects in shade, design, material, construction, and workmanship, with defects classified in accordance with Table VIII.

**TABLE VIII.** **Material and end item visual examination**

|  |  | **CLASSIFICATION** | |
| --- | --- | --- | --- |
| **EXAMINATION** | **DEFECT** | **MAJOR** | **MINOR** |
| Workmanship | Component part omitted, distorted, full, tight, or twisted; any part of end item caught in any unrelated stitching; the edge of any component part required to be forced out having folds of more than 1/8 inch. | 101 |  |
| Material | Hole, cut, tear, smash, burn, drill hole, run, needle chew, visible mend, thin place, or misweave affecting appearance or serviceability. | 102 |  |
| Shade | Shade variation within a part or between parts. Thread color not as specified. | 103 |  |
| Dye streak; color not as specified | 104 |  |
| Seam and Stitching | Seam: puckered, distorted, pleated, wavy, or twisted; edge or raised stitching sewn too close to edge resulting in damage to cloth. |  | 201 |
| Irregular or open seam; raw edge affecting appearance or serviceability | 105 |  |
| Seam allowance not as specified; |  | 202 |
| Loose or tight stitch tension |  | 203 |
| Box X-stitching missing; stitches insecure, misplaced, not specified size; stitches loose or broken. |  | 204 |
| Bartacks | Bartacks missing, insecure, misplaced, not specified size, stitches loose or broken. |  | 205 |
| Cleanness | Spot, stain, excessive thread ends not trimmed or removed, odor. |  | 206 |
| Labels | Label omitted, incorrect, illegible, or not attached as specified | 106 |  |
| Bar codes omitted or not readable by scanner; human-readable interpretation (HRI) omitted or illegible |  | 207 |
| Bar code not visible on folded, packaged item |  | 208 |
| Bar code attachment causes damage to the item | 107 |  |
| Packaging | Any end item not packaged in accordance with the contract or purchase order. |  | 209 |

4.4.2 Dimensional examination. The end item shall be examined for conformance to the dimensions specified in Table VII.

4.4.3 Material and garment testing. The cloth and/or garment shall be tested for the characteristics listed in Table IX. The testing shall be performed using the test methods as specified in Table IX. All test reports shall contain the individual values utilized in expressing the final results. For material testing, the sample unit shall be 5 continuous yards full width of the finished cloth, for all physical and chemical tests. For garment testing, the sample unit shall be one pullover shirt per lot. The lot shall be considered unacceptable if one or more sample units fail to meet any requirements specified.

**TABLE IX. Material and Garment Testing Requirements**

| **Characteristic** | **Requirement Paragraph** | | | **Test Method** |
| --- | --- | --- | --- | --- |
| **Basic Material** | **Aramid Cloth** | **Pocket Lining** |
| Construction | 3.3.1 | 3.3.2 | 3.3.3 | Visual 1/ |
| Fiber Content | 3.3.1 | 3.3.2 | 3.3.3 | AATCC-20A 1/ |
| Weight | 3.3.1, Table I | 3.3.2, Table II | 3.3.3, Table III | ASTM D3776 (Method C) |
| Colorfastness  Laundering (3 cycles)  Crocking  Light, Xenon method | 3.3.1, Table I, 3.6.2 | 3.3.2, Table II, 3.6.2 | 3.3.3, Table III, 3.6.2 | AATCC-61, Option 2a  AATCC-8  AATCC-16, Option E (85 kJ) |
| Dimensional Stability | 3.3.1,Table I | 3.3.2, Table II | 3.3.3, Table III | AATCC-135, (1), III, (A) , ii |
| Bursting Strength | 3.3.1, Table I | N/A | 3.3.3, Table III | ASTM D3787 |
| Breaking Strength | N/A | 3.3.2, Table II | N/A | ASTM D5034 |
| Pilling | 3.3.1, Table I | N/A | N/A | ASTM D3512 |
| Air Permeability | 3.3.1, Table I | N/A | N/A | ASTM D737 |
| Thickness | 3.3.1, Table I | N/A | N/A | ATM D1777 |
| Fabric Stretch and Growth | 3.3.1, Table I | 3.3.2, Table I | 3.3.3, Table III | ASTM D2594 (Loose Fit) |
| Water sorption and wicking  Back (water sorption)  Face (wicking) | N/A  N/A | N/A  N/A | 3.3.3, Table III | 4.4.3.1.3  4.4.3.1.2 |
| Vertical Flame | 3.3.1, Table I | 3.3.2, Table II | 3.3.3, Table III | ASTM D6413 |
| Thermal insulation (Clo) | 3.3.1, Table 1 | N/A | N/A | ISO 11092, AATCC 135 1/ |
| Toxicity | 3.5, 3.5.1 | 3.5, 3.5.1 | 3.5, 3.5.1 | 4.4.4, 4.4.4.1 1/ |
| Visual color matching | 3.6.1 | 3.6.1 | 3.6.1 | AATCC Evaluation Procedure 9, Option A |

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.

4.4.3.1 Water sorption and wicking. Water sorption and wicking shall be determined using the following procedure:

4.4.3.1.1 Water sorption and wicking test specimens. Fabric specimens shall be conditioned in accordance with ASTM-D-1776 and tested in that environment. The specimen size shall be 6-inches by 6-inches; three (3) separate specimens shall be used for each of the face side and back side tests. A fabric shall be considered passing only when tests on both the face side and the back side meet the respective test pass/fail criteria on all individual specimens tested.

4.4.3.1.2 Face side wicking test. The test specimen shall be laid flat on a glass plate with back side up (i.e., inner or skin surface when used in a garment). One (1) drop of 0.10 + 0.01 milliliters of distilled water at 70oF + 2 oF shall be placed in the center of the test specimen using a pipettor and a stopwatch/timer immediately started. The test specimen shall then be immediately turned over on the glass plate with test specimen face side up. The diameter of the wicked water area (denoted by a darkened water mark) shall be measured at a total elapsed time of 10 seconds. The specimen shall be considered passing if the diameter of the wicked water area (darkened water mark) is equal to or greater than 1-3/16 inches.

4.4.3.1.3 Back side sorption test. The test specimen shall be laid flat on a glass plate with back side up (i.e., inner or skin surface when used in a garment). One (1) drop of 0.10 + 0.01 milliliters of distilled water at 70°F + 2°F shall be placed in the center of the test specimen using a pipettor and a stopwatch/timer immediately started. The water (denoted as a darkened water mark) shall be observed and the time for the water mark to disappear (water sorption, denoted as a lightened water mark approximating the shade of the basic material) shall be recorded. The specimen shall be considered passing if the water sorption (disappearance of the darkened water mark) is 10 seconds or less.

4.4.4 Toxicity assessment**.** The contractor must furnish information (see 4.4.4.1) certifying that the finished product is composed of materials which have been safely used commercially OR which provide sufficient toxicity data to show compatibility with prolonged, direct skin contact. At a minimum, toxicity data should include results from a primary dermal irritation study in laboratory animals and a repeated insult human patch test (Modified Draize Procedure). The latter must be conducted under the supervision of a qualified dermatologist using at least 100 free-living individuals.

4.4.4.1 Toxicity Documents. All finishes/chemicals used to process the garment shall be identified and accompanied by the appropriate Material Safety Data Sheet (MSDS) information. The use of chemical recognized by the Environmental Protection Agency (EPA) as known human carcinogens is prohibited.

**5. PACKAGING**

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.1). When packaging of materiel 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 the Inventory Control Point’s packaging activities 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**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number and date of this document, including any amendments.

b. Types, classes and sizes required (see 1.2).

c. National stock number.

d. Applicable Government patterns and drawings, including revisions (see 3.4.21).

e. When first article sample is required (see 4.2 and 6.2).

f. Number of first article inspection samples (see 4.3)

g. Issue of DODISS to be cited in the solicitation and, if required, the specific issue of individual documents referenced (see 2.2 and 2.3).

h. Packaging requirements (see 5.1)

6.2 First article. When first article inspection (see 4.2) is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be first article sample, a first production item, or a standard production item from the contractor’s current inventory, and the number of items to be tested as specified in 4.2.1. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for pending contract. Bidders should not alternate submit bids unless specifically requested to do so in the solicitation.

6.3 Suggested Sources.

Basic material and pocket lining:

Polartec, LLC, 46 Stafford St., Lawrence, MA 01841, (978) 685-6341

Webbing:

Elastic Cord & Webbing, Inc., 155 Prairie Lake Rd., Unit G, East Dundee, IL 60118, (847) 844-4122

Woven and adhesive labels:

Bell Label, 777 Main St., Lewiston, ME 04240, (207) 784-2961

Ibis Tek, LLC, 912 Pittsburgh Rd., Butler, PA 16002, (724) 586-6005

ITW Graphics, 375 New State Rd., Manchester, CT 06042, (860) 533-5107

6.4 Key words.

Flame resistant

Underwear

Pullover Shirt



Aramid Under Collar

**FIGURE 1**



Aramid Under Collar

**FIGURE 2**