INCH-POUND

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MILITARY SPECIFICATION

CUFFS, KNIT, WRIST AND ANKLE, AND CLOTH, KNITTED

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 ankle and wrist cuffs knitted to shape and for knitted fabrics for making ankle and wrist cuffs, waistbands, balaclavas and collars.

* 1.2 Classification. The knitted cuffs and cloth shall be procured in the following types, classes and sizes as specified (see 6.2):

Type I - Wool

Class 1 - Cuffs, ankle, 1 x 1 rib
Class 2 - Cuffs, wrist, 1 x 1 rib

Size 1 - 8 inches
Size 2 - 8 3/4 inches

Class 3 - Cloth, knitted; for ankle and wrist cuffs, waistbands and collars, 1 x 1 rib
Class 4 - Cloth, knitted; for balaclavas, 1 x 1 rib

Type III - Polyester

Class 2 - Cuffs, wrist, 1 x 1 rib

Size 2 - 8 3/4 inches

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 8315

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

Type IV - Aramid

Class 1 - Cuffs, ankle, 1 x 1 rib

Class 2 - Cuffs, wrist, 1 x 1 rib

Size 2 - 8 3/4 inches

Class 3 - Cloth, knitted; for ankle cuffs and waistbands, 1 x 1 rib

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 specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

NN-P-71	- Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial)
PPP-B-636	- Boxes, Shipping, Fiberboard
PPP-T-45	- Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing

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MIL-P-15011	- Pallets, Material Handling, Wood, Post Construction, 4-Way Entry
MIL-B-17757	- Boxes, Shipping, Fiberboard (Modular Sizes)
MIL-C-43665	- Cloth, Wool: Mothproofing Treatment of

STANDARDS

FEDERAL

FED-STD-191	- Textile Test Methods

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-1491	- Glossary of Knitting Imperfections

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be

obtained from the procuring activity or as directed by the contracting officer.)

* 2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

LAWS AND REGULATIONS

US POSTAL SERVICE MANUAL

RULES AND REGULATIONS UNDER THE WOOL PRODUCTS LABELING ACT OF 1939

(Applications for copies should be addressed to the Superintendent of Documents, US Government Printing Office, Washington, DC 20402-0001.)

US DEPARTMENT OF AGRICULTURE

Methods of Test for Grades of Wool Top

(Applications for copies should be addressed to the US Department of Agriculture, Agricultural Marketing Service, Washington, DC 20580-0001.)

RULES AND REGULATIONS UNDER THE TEXTILE FIBER PRODUCTS LABELING ACT

(Applications for copies should be addressed to the Federal Trade Commission, Washington, DC 20250-0001.)

* 2.2 Other publications. The following document(s) form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Applications 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

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

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

Chromatic Transference Scale

Method No. 8 Colorfastness to Crocking: AATCC Crockmeter Method

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

* 2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Standard sample. When a standard sample is available, the finished types I, III and IV knitted cuffs and cloth shall be equal to or better than the standard sample with respect to all the characteristics for which the standard sample is referenced.

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

3.3 Materials.

3.3.1 Wool. The wool used in the fabrication of the type I cuffs and cloth shall be fleece or pulled sheep's wool or any combination thereof, not lower in grade than 56's US Standard (see 4.4.1). The use of reprocessed, reused or waste wool is prohibited.

3.3.1.1 Yarn. The yarn shall be 2-ply, spun from combed top (see 4.4.1).

3.3.2 Polyester. The polyester used in the fabrication of the type III cuffs shall be semi-dull, continuous filament and texturized, made from glycol terephthalate (see 4.4.1).

3.3.3 Aramid. The aramid used in the fabrication of the type IV cuffs and cloth shall conform to the requirements specified in 3.3.3.1 through 3.3.3.2.2 when tested as specified in 4.4.1 (see 6.4).

3.3.3.1 Fiber. The fiber shall be aramid, 1.5 or 2.0 denier per filament, cut to a staple length of 1 1/2 to 2 inches. The fiber shall not carbonize (turn black or become a soft friable char) at a temperature below 675°F.

3.3.3.2 Yarns. The knitting aramid yarn and the yarn for double covering of the spandex core shall conform to the requirements specified in 3.3.3.2.1 and 3.3.3.2.2. The aramid yarn shall be autoclaved prior to knitting and covering.

3.3.3.2.1 Knitting yarn. The fiber specified in 3.3.3.1 shall be spun and twisted into two (2) ply yarn.

3.3.3.2.2 Elastic yarn. The elastic yarn shall be a 140 denier spandex core double-covered (inner and outer cover). The core yarn shall be covered with a nominal count of 50/1 (cotton count) aramid yarn.

* 3.4 Color. The color of the finished types I, III and IV cuffs and cloth shall be as specified by the procuring activity (see 6.2). The color of the type I, class 4 cloth shall be Camouflage Green 483 (see 6.6).

3.4.1 Wool. The color of the dyed type I cuffs and cloth shall be obtained by either top, yarn or piece dying, using suitable dyestuffs of required fastness properties to meet the requirements specified in 3.4.5 and spectral reflectance requirements for type I class 4 cloth as specified in 3.4.1.2.

3.4.1.1 Mothproofing. In the dyeing operation the top, yarn or fabric shall be mothproofed in accordance with MIL-C-43665.

* 3.4.1.2 Spectral reflectance. The dyed and finished type I, class 4 cloth shall conform to the reflectance values specified below when tested as specified in 4.5.

Spectral reflectance requirements for type I class 4 cloth

Wavelength Nanometers (nm)	Type I Reflectance (%) Max.	Min.
600	10	4
620	10	4
640	11	4
660	13	4
680	15	4
700	20	6
720	30	9
740	40	14
760	49	19
780	55	24
800	60	29
820	64	34
840	67	39
860	69	45

3.4.2 Polyester. The color of the dyed type III cuffs shall be obtained with suitable dyestuffs of required fastness properties to meet the requirements specified in 3.4.5.

* 3.4.3 Aramid. The color of the dyed type IV cuffs and cloth shall be obtained by the use of a blend of producer-colored fibers using suitable dyestuffs of required fastness properties to meet the requirements specified in 3.4.5.

3.4.4 Matching. The color and appearance of the dyed and finished types I, III and IV cuffs and cloth shall match the available standard sample when viewed under filtered tungsten lamps that approximate artificial daylight, having a correlated color temperature of 7500° (± 200°) K, with illumination

of 100 (± 20) foot candles and shall be a good match to the standard sample under incandescent lamplight at 2300° (± 200°) K.

3.4.5 Colorfastness.

* 3.4.5.1 Types I and III cuffs and cloth. The dyed and finished types I and III cuffs and cloth shall show colorfastness to light, laundering, perspiration, wet-dry cleaning and crocking equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available, the dyed and finished types I and III cuffs and cloth shall show a minimum of "good" fastness to light, laundering, perspiration, wet-dry cleaning and shall have an AATCC Chromatic Transference Scale rating for crocking of not lower than 3.5, when tested as specified in 4.5.

* 3.4.5.2 Type IV cuffs and cloth. The dyed and finished type IV cuffs and cloth shall show colorfastness to light and laundering (after 3 cycles) equal to or better than the standard sample when tested as specified in 4.5. As a limit of acceptability or when no standard sample is available, the dyed and finished type IV cuffs and cloth shall show a minimum of "fair" fastness to light and "good" fastness to laundering (after 3 cycles) when tested as specified in 4.5.

3.5 Shrink resistant treatment. When specified (see 6.2), the wool used for the type I cuffs and cloth shall be treated for resistance to felting shrinkage in top, yarn or fabric form by a chlorination method approved by the procuring activity.

3.5.1 Alkali solubility. When specified (see 6.2) the alkali solubility of the shrink resistant wool for the finished type I cuffs and cloth in the form in which it has been treated (top, yarn or fabric) shall not be increased by more than 6.0 percent (absolute) over the untreated material when tested as specified in 4.4.1 or 4.5.

3.6 Construction.

3.6.1 Type I, class 1 ankle cuffs. The wool ankle cuffs, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed seamless in one size on a circular knitting machine using a 1 x 1 rib stitch with one end of yarn per feed (see 3.3.1.1). The ends of the cuffs shall be tapered with a tuck or expanding stitch (see A, Figure 1).

3.6.2 Type I, class 2 wrist cuffs. The wool wrist cuffs, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed seamless in two sizes on a circular knitting machine using a 1 x 1 rib stitch with one end of yarn per feed (see 3.3.1.1). The ends of the cuffs shall be tapered with a tuck or expanding stitch (see A, Figure 1).

* 3.6.3 Type I, classes 3 and 4 knitted cloth. The knitted cloth for ankle and wrist cuffs, waistbands and collars, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed on a circular or flat knitting machine using a 1 x 1 rib stitch with one end of yarn per feed (see 3.3.1.1 and 6.9). Class 4 cloth shall be

knitted utilizing 0.35 to 0.40 inches of yarn per rib.

3.6.4 Type III, class 2 wrist cuffs. The polyester wrist cuffs, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed seamless in one size on a circular knitting machine using a 1 x 1 rib stitch with yarn as specified in 3.3.2 (see 6.5). The ends of the cuffs shall be tapered with a tuck or expanding stitch (see A, Figure 1).

3.6.5 Type IV, class 2 wrist cuffs. The aramid wrist cuffs, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed seamless in one size on a circular knitting machine using a 1 x 1 rib stitch with one end of the elastic yarn specified in 3.3.3.2.2 laid in every sixth course in the rib knit area (see B, Figure 1). The ends of the cuffs shall be tapered with a tuck or expanding stitch, with one end of the above specified elastic yarn laid in every third course (see A, Figure 1).

* 3.6.6 Type IV, class 1 ankle cuffs. The aramid ankle cuffs, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed seamless in one size on a circular knitting machine using a 1 x 1 rib stitch with one end of the elastic yarn specified in 3.3.3.2.2 laid in every sixth course in the rib knit area (see B, Figure 1). The ends of the cuffs shall be tapered with a tuck or expanding stitch, with one end of the above specified elastic yarn laid in every third course (see A, Figure 1).

* 3.6.7 Type IV, class 3 knitted cloth. The aramid knitted cloth for ankle cuffs and waistbands, conforming to the physical requirements specified in Table I when tested as specified in 4.5, shall be constructed on a circular or flat knitting machine using a 1 x 1 rib stitch with one end of the elastic yarn specified in 3.3.3.2.2 laid in every eighth course.

Table I - Physical requirements

Type	Class	Size	Characteristic	Requirement Min.	Max.
I	1	-	Wales per inch	14	-
			Courses per inch	19	-
			Weight per dozen pairs, ounces	15.0	-
I	2	1	Wales per inch	14	-
			Courses per inch	19	-
			Weight per dozen pairs, ounces	11.0	-
I	2	2	Wales per inch	14	-
			Courses per inch	19	-
			Weight per dozen pairs, ounces	11.0	-
I	3	-	Wales per inch	14	-
			Courses per inch	19	-
			Weight, ounces per square yard	11.0	-

Requirement Type	Class	Size	Characteristic	Min.	Max.
I	4	-	Wales per inch (face)	17	-
			Courses per inch	25	-
			Weight, ounces per square yard	14.0	-
			Bursting Strength, lbs.	100	-
III	2	2	Wales per inch	13	-
			Courses per inch	17	-
			Weight per dozen pairs, ounces	11.0	-
IV	1	-	Wales per inch	15	-
			Courses per inch	22	-
			Weight per dozen pairs, ounces	15.0	-
IV	2	2	Wales per inch	15	-
			Courses per inch	22	-
			Weight per dozen pairs, ounces	15.0	-
IV	3	-	Wales per inch	15	-
			Courses per inch	24	-
			Weight, ounces per square yard	12.5	-
			Flame resistance: 1/		
			After-Flame time, seconds	-	2.0
			After-Glow time, seconds	-	25.0
			Char length, inches	-	3.5

1/ Test to be conducted in both the length (wale) and width (course) direction of fabric.

Table II - Finished measurements

Type	Class	Size	Measurement									
			A 1/ (Min)	B 1/ (Min)	C 1/ (Min)	C 1/ (Max)	D 1/ (Min)	D 1/ (Max)	Length 2/ (Min)	Length 2/ (Max)	Width 2/ (Min)	Width 2/ (Max)
I	1	-	2 1/2	6	11	11 3/4	3	3 3/4	-	-	-	-
I	2	1	1 3/4	4 1/2	8	8 1/4	2 5/8	2 3/8	-	-	-	-
I	2	2	2	4 3/4	8 3/4	9 1/2	2 1/4	2 3/4	-	-	-	-
I	3	-	-	-	-	-	-	-	3/ as specified	3/ as specified	as specified	as specified
I	4	-	-	-	-	-	-	-	3/ as specified	3/ as specified	as specified	as specified
III	2	2	2	4 3/4	8 3/4	9 1/2	2 1/4	2 3/4	-	-	-	-
IV	1	-	2 1/2	6	11	11 3/4	3	3 3/4	-	-	-	-
IV	2	2	2	4 3/4	8 3/4	9 1/2	2 1/4	2 3/4	-	-	-	-
IV	3	-	-	-	-	-	-	-	3/ as specified	3/ as specified	as specified	as specified

1/ See Figure 1.

2/ The length of the knitted material shall be interpreted in the direction of the wales and the width in the direction of the courses.

3/ Unless otherwise specified, waistbands procured by the Department of the Army and Air Force shall be not less than 8 3/4 inches nor more than 9 1/2 inches in length (wale) direction.

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3.7 Measurements. The finished cuffs and cloth shall conform to the dimensions specified in Table II. All measurements are expressed in inches.

3.8 Figure. Figure 1 is furnished for information purposes only. When inconsistencies exist between the written specification and the figure, the written specification shall govern.

* 3.9 Shrinkage. When specified (see 6.2), the finished type I wool cuffs and cloth shall not shrink or elongate more than 13 percent in the length or width when subjected to a test for felting shrinkage, including relaxation shrinkage as specified in 4.5. The shrinkage shall be calculated on the basis of the original unrelaxed condition of the material. The finished type I, class 4 cloth shall not shrink or elongate more than 7 percent in length and width when tested as specified in 4.5.

3.10 Wool content. The finished type I wool cuffs and cloth shall contain not less than 95 percent wool based on the dry weight of the specimen when tested as specified in 4.5.

* 3.11 Finishing of type I, class 4 cloth. The type I, class 4 cloth shall be wet-out with water, extracted and tumble dried after knitting to yield a finish equal to or better than the standard sample.

3.12 Fiber content label. The type I wool cuffs and cloth, when applicable, shall be labeled in accordance with the Wool Products Labeling Act of 1939. The types III and IV cuffs and cloth shall be labeled in accordance with the Textile Fiber Products Identification Act (see 2.2).

3.13 pH. The pH value of the water extract of the finished type I wool cuffs and cloth shall be not less than 4.0 nor more than 8.0, and for the type III polyester cuffs not less than 5.0 nor more than 8.5 when tested as specified in 4.5.

3.14 Non-fibrous material. The starch and protein content, including chloroform-soluble and water soluble material shall not exceed 3.0 percent for the type I cuffs and cloth when tested as specified in 4.5.

3.15 Length and put-up. Unless otherwise specified (see 6.2), the finished types I and IV knitted cloth shall be furnished in continuous lengths, each not less than 40 yards. The put-up shall be as specified in Section 5.

3.16 Workmanship. The finished items shall conform to the quality established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor 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 the specification where such

inspections are deemed necessary to assure 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance 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. When required, the first article submitted in accordance with 3.2 shall be visually inspected as specified in 4.4.2.1 or 4.4.2.2 for compliance with design, construction, workmanship and dimensional requirements.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated herein.

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 purchase document. In addition, testing shall be performed on the applicable component listed in Table IV for the characteristics specified and in accordance with the referenced test methods of FED-STD-191 whenever applicable. The physical and chemical values specified in section 3 apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test method. The sample unit and the basis for expressing the lot size shall be as specified in Table III. All test reports shall contain the individual values utilized in expressing the final results. The sample size shall be as follows:

Sample Size

Lot size (yards)	Sample size
800 or less	2
801 up to and including 22,000	3
22,001 and more	5

Table III - Sample unit and the basis of lot size

Component	Basis of lot size	Sample unit
Wool		
Top	Pound	1 yard
Yarn	Pound	1 yard
Polyester yarn	Pound	1 yard
Aramid yarn	Pound	1 yard

The lot shall be unacceptable if one or more sample units fail to meet any of the requirements specified.

Table IV - Component tests

Component	Characteristic	Requirement Paragraph	Test method
Wool	Material Identification	3.3.1	1100 1/
	Type of wool	3.3.1	1/
	Wool grade	3.3.1	4.4.1.1
	Ply of yarn	3.3.1.1	Visual 2/
	Alkali solubility	3.5.1	2800 3/
Polyester	Material identification	3.3.2	1600 1/
	Luster	3.3.2	1/
	Texturized yarn	3.3.2	1/
Aramid	Material identification	3.3.3.1	1530 1/
	Carbonization point	3.3.3.1	1/
	Yarn		
	Autoclaving of knitting yarn	3.3.3.2	1/
	Knitting yarn	3.3.3.2.1	1/
	Elastic yarn	3.3.3.2.1	1/

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable for the stated requirement.
2/ One determination per sample unit shall be made and the results reported as "pass" or "fail".
3/ The wool shall be tested in the form in which it has been treated and the sample unit shall consist of equal amounts of both treated and untreated material.

4.4.1.1 Wool grade. The wool shall be visually examined for grade in top form prior to shrink resistant treatment when applicable, by comparison with the applicable U.S. standard (see 2.1.2). In the event of a dispute resulting from this examination, the wool grade shall be determined by the width method (wedge) approved by the government. The sample unit shall be one yard of untreated top. The results of each sample unit shall be reported separately.

4.4.2 Examination of the end item. The finished cuffs, ankle and wrist;

waistbands and cloth, furnished as piece goods shall be examined in accordance with 4.4.2.1 and 4.4.2.2.

4.4.2.1 Cuffs, ankle and wrist and waistbands. The defects found during the examination of the applicable end item, shall be classified in accordance with 4.4.2.1.1 and 4.4.2.1.2. The inspection levels and the acceptable quality levels (AQL'S) shall be as specified in 4.4.2.1.3. The sample unit shall be one completely fabricated ankle cuff, wrist cuff or waistband each. The lot size shall be expressed in units of ankle cuffs, wrist cuffs or waistbands.

Defects	Classification Major	Minor
I. MATERIAL DEFECTS AND DAMAGES		
a. Any hole, cut, tear or rip	X	
b. Broken yarn, dropped stitch or run	X	
c. Slubby yarn more than twice the diameter of the normal size yarn		X
d. Visible mend, thin place or uneven knitting, or abrasion mark resulting in a weak area		X
e. Crease or wrinkle embedded in fabric		X
f. Loose yarn, pulled or snagged yarn or float		X
g. Barre mark		X
h. Knitted in waste		X
i. Shade bar, dye streak, or area of no dye penetration		X
NOTE: For knitted fabric defect definitions, see MIL-STD-1491		
II. CLEANNESS		
a. Any spot or stain		X
b. Kinks or untrimmed ends		X
III. ANKLE OR WRIST CUFFS		
a. When applicable, ends of cuffs not tapered as specified	X	
b. Non-uniform in overall appearance, e.g., not well shaped		X
c. Off shade or paired items mismatched for shade		X
d. When applicable, tuck or expanding stitches omitted at one or both ends	X	
e. When applicable, folded edge(s) of cuff scalloped		X
f. Type of knit stitch or construction other than specified	X	
IV. WAISTBANDS		
a. Type of knit stitch or construction other than specified	X	
b. When applicable, folded edge(s) of waistband scalloped		X
c. Off shade		X

Defects	Classification Major	Minor
V. LABEL		
Not labeled in accordance with the Wool Products Labeling Act of 1939 or the Textile Fiber Products Identification Act (see 3.12)		X

4.4.2.1.2 Dimensional examination. The finished end items shall be examined for dimensional defects. Any dimension that is not within the established tolerance shall be classified as a defect. (see 3.7).

4.4.2.1.3 Inspection levels and acceptable quality levels (AQL's). The inspection levels and acceptable quality levels, expressed in defects per hundred units for visual and dimensional examination, shall be as follows:

	Inspection level	AQL Major	Total
For defects applicable to 4.4.2.1.1	II	2.5	6.5
For defects applicable to 4.4.2.1.2	S-3		4.0

* 4.4.2.2 Cloth, knitted for ankle and wrist cuffs, waistbands, collars and balaclavas. Examination of the knitted cloth shall be in accordance with 4.4.2.2.1 through 4.4.2.2.3.2.

* 4.4.2.2.1 Yard by yard examination. The required yardage of each roll shall be examined and visual defects as defined in MIL-STD-1491 shall be classified as listed below. All defects found shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the cloth, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each wale-wise (lengthwise) yard or fraction thereof in which it occurs. The sample unit shall be one linear yard. The sample size shall be in accordance with inspection level II of MIL-STD-105. The acceptable quality levels shall be 2.5 major defects and 6.5 total defects (major and minor combined) per 100 units. The lot size shall be expressed in units of one linear yard each. The number of rolls selected shall be in accordance with Table V. An approximate equal number of yards shall be examined from each roll in the sample.

Defects 1/	Classification Major	Minor
Hole, cut, tear or rip	X	
Broken yarn, dropped stitch or run	X	
Slubby yarn, more than twice the diameter of the normal size of the yarn		X
Visible mend, thin place or uneven knitting, or abrasion mark resulting in a weak area		X
Off shade (except type I, class 4)		X
Off shade (type I, class 4)	X	
Crease or wrinkle embedded in fabric		X
Loose yarn, pulled or snagged yarn or float		X

Defects 1/	Classification Major	Minor
Any spot or stain		X
Cockled (ridgy) fabric		X
Kinks or untrimmed ends		X
Knitted in waste		X
Barre mark		X

1/ Clearly visible at normal inspection distance (approximately three feet).

4.4.2.2.2 Overall examination. Each defect listed below shall be counted not more than once in each roll examined. The sample unit shall be one roll. The sample size (number of rolls selected as sample) and the number of defects acceptable shall be as shown in Table V.

Defects

Overall uncleanness throughout the roll.
Uneven knitting throughout the roll.
Off shade, shaded end to end, side to side, side to center, or throughout the roll.
Poor dye penetration, mottled, streaky or cloudy throughout the roll.
Edges frayed, raveled, curled, rolled, folded, scalloped or uneven continuously throughout the roll.
Not labeled in accordance with the Wool Products Labeling Act of 1939 or the Textile Fiber Products Identification Act as applicable (see 3.12).
Degree and character of finish not equal to standard sample when available throughout the roll.

Table V - Sample size

Lot size (yards)	Sample size (rolls)	Maximum Number of defects acceptable in sample 2/
Up to 1200 inclusive	3 1/	0
1201 up to and including 3200	5	0
3201 up to and including 10,000	7	0
10,001 up to and including 35,000	10	0
35,001 up to and including 150,000	15	1
150,001 and over	25	1

1/ If a lot contains fewer than three (3) rolls, each roll in the lot shall be examined.
2/ Except that the acceptance number shall be "0" for color and uniformity of shade defects found in the overall examination (see 4.4.2.2.2).

4.4.2.2.3 Examination for length.

4.4.2.2.3.1 Individual rolls. The rolls shall be examined for gross length. Any gross length found to be less than the minimum specified or more than 2 yards less than the gross length marked on the roll ticket shall be considered

a defect with respect to length. The sample unit shall be one roll. The sample size (number of rolls selected as the sample) and the acceptance number shall be as shown in Table V.

4.4.2.2.3.2 Total yardage in sample. The lot shall be unacceptable if the total of the actual gross lengths of rolls in the sample is less than the total of the gross lengths marked on the roll tickets.

* 4.4.3 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 AQL shall be 2.5 defects per hundred units.

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 or roll, incomplete closure of roll, inadequate securing or sealing of wrapping materials.
Content	Number of bundles or rolls per shipping container is more or less than required. Number of pairs (cuffs) per bundle is more or less than specified. 1/ Number of waistbands per bundle is more or less than specified. 1/

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

* 4.4.4 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 AQL, expressed in terms of defects per hundred units, shall be 6.5 in accordance with 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.

4.5 Testing of the end item. The methods of testing specified in FED-STD-191 wherever applicable, and as listed in Table VI shall be followed. The physical and chemical values specified in section 3 apply to the average of determinations made on a sample unit for test purposes as specified in the applicable test method. All test reports shall contain the individual values utilized in expressing the final result. For the finished knitted cloth, when furnished as piece goods, the lot size shall be expressed in units of one yard each and the sample size shall be in accordance with 4.4.1. The sample unit shall be 2 continuous yards full width except when the type I wool cloth subjected to a shrink resistant treatment is applicable 1/4 yard of the untreated material shall also be required for comparable purposes. For the finished cuffs and waistbands the lot size shall be expressed in units of one cuff or waistband each. With the exception of weight per dozen pair of cuffs, the sample size shall be in accordance with 4.4.1. The sample unit shall be as follows:

Cuffs, wrist and ankle.
Weight determination - One dozen (12) pairs of cuffs in one size, with a sample size of one (1) regardless of lot size.

All remaining test characteristics - Six (6) individual cuffs except when the type I wool cuffs subjected to a shrink resistant treatment are applicable, three (3) untreated cuffs shall also be required for comparable purposes.

Waistbands.
Six (6) individual cuffs except when the type I wool cuffs subjected to a shrink resistant treatment are applicable, three (3) untreated cuffs shall also be required for comparable purposes.

The lot shall be unacceptable if one or more sample units fail to meet any requirement specified.

Table VI - End item tests

Characteristic	Requirement paragraph	Test method
Colorfastness to (types I and III cuffs, waistbands and cloth):		
Light	3.4.5.1	5660
Laundering	3.4.5.1	5614 1/
Perspiration	3.4.5.1	5680 1/
Wet-Dry cleaning	3.4.5.1	5622
Crocking	3.4.5.1	AATCC TM 8-1985

Table VI - End item tests - Continued

Characteristic	Requirement paragraph	Test method
Colorfastness to (types IV cuffs, waistbands and cloth):		
Light	3.4.5.2	5660 2/
Laundering (after 3 cycles)	3.4.5.2	5610 1/ 3/
Alkali solubility (types I cuffs, waistbands and cloth when applicable):	3.5.1	2800 4/
Type of knit stitch and construction	3.6.1, 3.6.2, 3.6.3, 3.6.4 3.6.5, 3.6.6 and 3.6.7 as applicable	Visual 5/
Wales per inch of cuffs, waistbands and cloth	Table I	5070
Courses per inch of cuffs, waistbands and cloth	Table I	5070
Weight per dozen pairs of cuffs	Table I	4.5.1
Weight per square yard of waistbands and cloth	Table I	5041
After-Flame time	Table I	5903
After-Glow time	Table I	5903
Char length	Table I	5903
Bursting Strength (type I, class 4)	Table I	5120
Spectral Reflectance (type I, class 4)	Table I	4.5.2
Shrinkage (type I cuffs, waistbands and cloth, when applicable)	3.9	5554 6/
Wool content (type I cuffs, waistbands and cloth)	3.10	2101
pH (types I and III cuffs, waistbands and cloth)	3.13	2811
Non-fiberous material (types I and III cuffs, waistbands and cloth)	3.14	2611

Table VI - End item tests - Continued

1/ On the color transfer cloth, only the stain on the wool, polyester or the nylon fiber, whichever is applicable, shall be evaluated.
2/ Except that the contractor's submission shall be compared with the standard sample or rated adjectively after exposure of 6 standard fading hours.
3/ The specimens must be dried after each of the three laundering cycles.
4/ Three treated and three untreated specimens per sample unit.
5/ One determination shall be performed per sample unit and the results reported as "pass" or "fail".
6/ For type I, class 4 cloth, do not press specimens prior to measuring dimensional stability.

4.5.1 Determination of weight per dozen. Twelve (12) pairs of the types I, III and IV ankle or wrist cuffs as applicable, shall be allowed to reach equilibrium under standard conditions as defined in FED-STD-191. When under standard conditions, the cuffs shall be weighed as a unit to the nearest 1.0 ounce. The entire lot shall be rejected if the weight per dozen is below the minimum weight specified in Table I.

* 4.5.2 Spectral reflectance test. Spectral reflectance data shall be obtained from 600-860 nm relative to a barium sulfate standard, the preferred white reference standard. Other reference white standards may be used, provided they are calibrated to an absolute white; i.e., Halon, magnesium oxide or vitrolite tile. The spectral band width at 860 nm shall be less than 26 nm. Reflectance measurements may be made either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65 in the visible spectrum. The specular component of reflection shall be included in the measurement. Specimens shall be measured as a single layer of fabric backed by six layers of the same fabric. Readings will be taken on a minimum of two different areas and the data averaged. The specimen shall be viewed at an angle no greater than 10 degrees from normal. Photometric accuracy of the spectrophotometer shall be within 1 percent and the wavelength accuracy shall be within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. Failure of the spectral reflectance requirements will have occured when spectral reflectance limits are exceeded at four or more specified wavelengths.

5. PACKAGING

5.1. Preservation-packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 Cuffs, ankle and wrist and waistbands. Twelve (12) pairs of ankle or wrist cuffs as applicable or ten (10) each waistbands folded in quarters to approximate dimensions of 14 inches in length by 4 3/4 inches in width, consisting of one type, class and size only, shall be evenly stacked in a bundle and tied at each end with cotton tape, twine or rubber bands.

* 5.1.1.2 Cloth, knitted (rolls). The cloth furnished for ankle and wrist cuffs, waistbands, balaclavas and collars, of one type and class only, shall be rolled open width on a convolute or spiral-wound chipboard tube. The tube shall conform to the following requirements:

a. The tube shall have an outer cover of kraft paper glued to the surface.
b. The ends of the tube shall have a minimum wall thickness of 0.1875 inch and a minimum inside diameter of 1.5 inches.

The ends of the tube shall be flush with or extend not more than one inch beyond each side of the maximum width of the rolled fabric. The cloth shall be restrained from unwinding by securing the fabric with cloth or cotton tape. Each roll of cloth shall be wrapped with a sheet of commercial grade kraft paper. The roll shall be wrapped so that the paper will completely encircle the roll twice with a minimum overlap of 3 inches and the width of the sheet of paper shall be sufficient to fold over and protect the ends of the roll. Gummed paper tape conforming to type III, grade C, 2 1/2 inches minimum width, of PPP-T-45 shall be applied on the overlap seam the full length of the roll, across each end and approximately 2 1/2 inches on the side of the roll opposite the overlap seam. Strips of tape shall be applied crosswise over the ends and shall extend a minimum of 2 1/2 inches along the length of the roll.

5.1.2 Level C. Cuffs, waistbands or cloth, whichever is applicable, shall be packaged to afford adequate protection against 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.

* 5.2.1.1 Type I and IV, class 1 ankle cuffs. Two hundred eighty-eight (288) pairs of ankle cuffs, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class weather-resistant, variety DW, grade V15c, size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, two in length, three in width, and four 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.

* 5.2.1.2 Types I, III and IV, class 2 wrist cuffs. Five hundred seventy six (576) wrist cuffs of one type and size only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class weather-resistant, variety DW, grade V15C, size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed

within the shipping container on side edge, eight per layer and six in depth as follows:

Place five bundles against one side panel, with the length of the bundles parallel to the end panels.

Place three bundles parallel to the side panel of the container in the remaining space at the opposite side panel.

Each alternate layer shall be reversed.

Each container shall have the contents completely covered on the top and bottom with a sheet of commercial grade kraft paper.

* 5.2.1.3 Types I and IV, class 3 waistbands. Two hundred fifty (250) waistbands of one type only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class weather-resistant, variety DW, grade V15c, size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, five in length, one in width, and five 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.

* 5.2.1.4 Types I and IV cloth. Rolls of cloth of one type only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class weather-resistant, variety DW, grade V15c of PPP-B-636. The inside of each shipping container shall be fitted with a taped box liner conforming to type CF, class domestic of PPP-B-636. Each container shall be closed, waterproofed and reinforced in accordance with the appendix of the box specification. The net weight of contents in each shipping container shall not exceed 65 pounds. 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.

* 5.2.2.1 Type I and IV, class 1 ankle cuffs. Two hundred eighty-eight (288) pairs of ankle cuffs, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class domestic, variety DW, grade 275 size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, two in length, three in width, and four 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.

5.2.2.2 Types I, III and IV, class 2 wrist cuffs. Five hundred seventy six (576) wrist cuffs of one type and size only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class domestic, variety DW, grade 275, size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed within the shipping container on side edge, eight per layer and six in depth as follows:

Place five bundles against one side panel, with the length of the bundles parallel to the end panels.

Place three bundles parallel to the side panel of the container in the remaining space at the opposite side panel.

Each alternate layer shall be reversed.

Each container shall have the contents completely covered on the top and bottom with a sheet of commercial grade kraft paper.

* 5.2.2.3 Types I and IV, class 3 waistbands. Two hundred fifty (250) waistbands of one type only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class domestic, variety DW, grade 275, size 3A of MIL-B-17757. The fiberboard for the box liner shall conform to type CF, class domestic of MIL-B-17757. Level A packages shall be packed flat, five in length, one in width, and five 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.

* 5.2.2.4 Types I and IV cloth. Rolls of cloth of one type only, packaged as specified in 5.1.1 shall be packed in a fiberboard shipping container assembled, closed and reinforced conforming to type CF, class domestic, variety DW, grade 275 of PPP-B-636. The inside of each shipping container shall be fitted with a taped box liner conforming to type CF, class domestic of PPP-B-636. Each container shall be closed, waterproofed and reinforced in accordance with method II as specified in the appendix of the box specification. The net weight of contents in each shipping container shall not exceed 65 pounds. Each container shall have the contents completely covered on the top and bottom with a sheet of commercial grade kraft paper.

5.2.3 Level C. Item 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 US Postal Service Manual, Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

* 5.2.4 Palletization. When specified (see 6.2) item, packed as specified 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 the bonding means C, K, and L or O or P. Pallet patterns shall be in accordance with the appendix of MIL-STD-147.

The pallet shall be 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 1, 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 first be approved by the contracting officer.

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

6. NOTES

* 6.1 Intended use. The cuffs, ankle and wrist, waistbands and cloth covered by this specification are intended for use in coveralls and hoods by Military personnel of the Department of Defense. Type I, class 4 cloth is intended for use as the shell fabric component for ECWCS balaclava.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification.
b. Type, class or size required (see 1.2).
c. When a 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 arrangement for examinations, quantity and testing and approval.
d. Color(s) required (see 3.4).
e. Shrink-resistant treatment required (see 3.5).
f. Alkali-solubility requirements required (see 3.5.1).
g. Felting shrinkage requirements required (see 3.9).
h. Minimum length, if other than specified (see 3.15).
i. Selection of the applicable levels of packaging and packing (see 5.1 and 5.2).
j. When palletization is required (see 5.2.4).

6.3 Standard sample. For access to the standard sample, address the procuring activity issuing the invitation for bids.

* 6.4 A 95/5 nomex/kevlar blend fiber, manufactured by E. I. Dupont de Nemours & Company (Type 457), has been found to be satisfactory in meeting the requirements of this specification.

6.5 The construction of the type III polyester wrist cuffs using three ends of 150 denier yarn per feed has been found to be satisfactory in meeting the requirements of this specification.

* 6.6 Dye formulation, type I, class 4. A suggested dye formulation for Camouflage Green 483 is as follows:

Intralan Yellow 3RL
Intralan Navy NLF
Acid Green 25

* 6.7 White standard. Barium sulfate of suitable quality for use as a white standard is available from Eastman Kodak Company. Tiles are available from the instrument manufacturer (see 4.5.2).

* 6.8 Spectrophotometers. Suitable spectrophotometers for measuring spectral reflectance in the visible/near-infrared are the Diano Hardy, Diano

Match-Scan, Hunter D545P-IR, Hunter VIS/NIR Spectrocolorimeter and Macbeth 1500 with IR option.

* 6.9 Type I, class 4 cloth. Cloth produced on a 10 cut rib circular knitting machine (10 needles per inch) utilizing 2/25's yarns made from 58 grade, shrink resistant and top dyed wool has been found acceptable for meeting the requirements of type I, class 4 cloth.

6.10 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

* 6.11 Subject Term (Key Word) listing.
Aramid
Cloth, knitted
Cuff, ankle
Cuff, wrist
Polyester

Custodian:
Army - GL
Navy - NU
Air Force - 99

Review Activity:
Navy - MC
Army - MD
Air Force - 11
DLA-CT

User Activity:
Navy - AS

Preparing Activity:
Navy - NU

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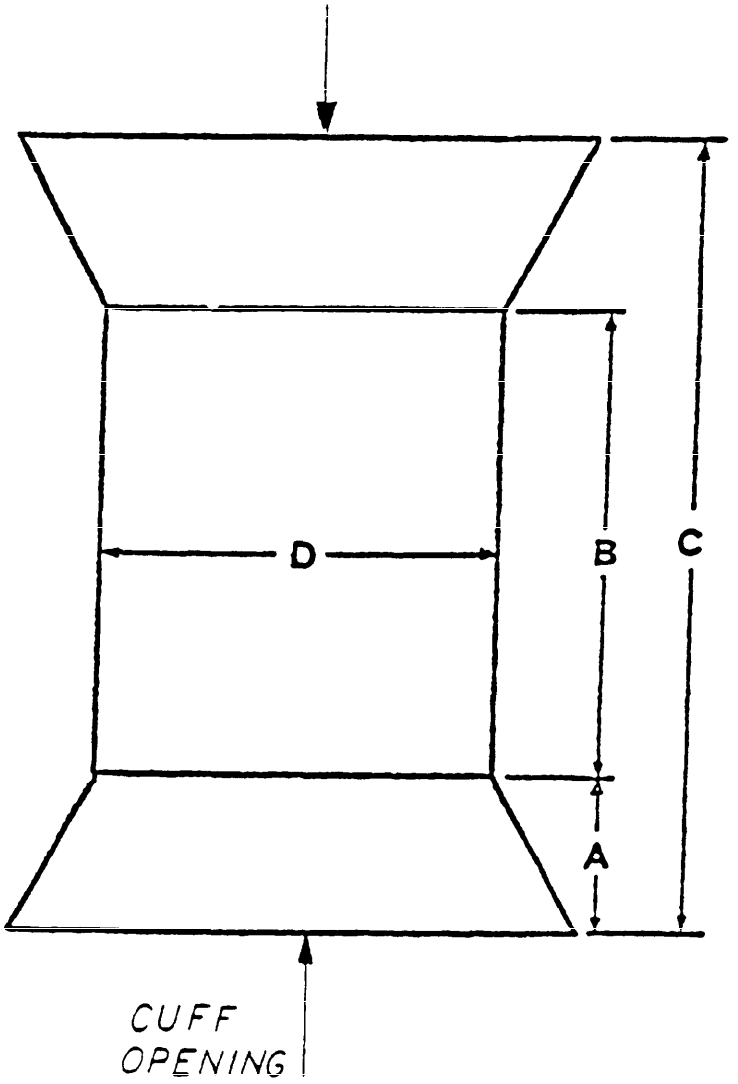

Figure 1 - Cuffs, Knit, Wrist and Ankle, and Cloth, Knitted

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-3735E	CUFFS, KNIT, WRIST AND ANKLE, AND CLOTH, KNITTED

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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