

MIL-C-44236  
27 August 1986  
SUPERSEDING  
(See 6.7)

MILITARY SPECIFICATION

CLOTH, KNITTED, ARAMID, BI-PLY

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

1. SCOPE

1.1 Scope. This document covers a knitted aramid bi-ply cloth.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Documents. The following documents form a part of this document 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

PPP-P-1133 - Packaging of Synthetic Fiber Fabrics

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014, 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 8305

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MIL-STD-105 - Sampling Procedures and Tables for Inspection  
by Attributes

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies may be obtained without charge from the Federal Trade Commission, Washington, DC 20580.)

2.2 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 shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Standard sample. The dyed and finished cloth shall match the standard sample for shade and appearance and shall unless otherwise indicated (see 3.3.2) be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 Material (see 6.5).

3.2.1 Fiber. The fiber shall be an approved aramid, 1.5 or 2 denier per filament, cut to a staple length of 1-1/2 to 2 inches. The fiber shall not char at a temperature less than 675°F.

3.2.2 Yarn. The yarn shall be spun into singles for both the wales and courses.

3.3 Color. The color shall be as specified (see 6.2). The color shall be obtained by the use of producer spun solution colored fibers.

3.3.1 Matching. The color and appearance of the dyed and finished cloth shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7000  $\pm$  500 K, with illumination of 100  $\pm$  20 foot candles, and shall be a good match to the sample under incandescent lamplight at 2300  $\pm$  100 K.

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3.3.2 Colorfastness. The dyed and finished cloth shall show colorfastness to light equal to or better than the standard sample or equal to or better than a rating of "fair" when tested as specified in 4.2.3. The dyed and finished cloth shall show colorfastness to laundering and perspiration equal to or better than the standard sample or equal to or better than a rating of "good" when tested as specified in 4.2.3.

3.4 Construction. The cloth shall consist of two layers of plain or jersey cloth, knitted at the same time and tied together by a tuck stitch every sixth course and twelfth wale on a 14-cut circular knitting machine.

3.4.1 Physical requirements. The finished knit cloth shall conform to the requirements specified in table I when tested as specified in 4.2.3.

TABLE I. Physical requirements

Characteristics	Requirement
Weight, oz/yd <sup>2</sup>	6.0 to 7.0
Texture (min):	
Wales	22
Courses	24
Flame resistance:	
After flame, seconds (max):	
Wales	2.0
Courses	2.0
After glow, seconds (max):	
Wales	25.0
Courses	25.0
Char length, inches (max):	
Wales	3.5
Courses	3.5

3.4.2 Width. The width of the finished unsplit tubular cloth shall be 17 inches  $\pm$  1 inch.

3.5 Nonfibrous material. The finished cloth shall contain no more than 1.0 percent starch and protein including chloroform-soluble and water-soluble material when tested as specified in 4.2.3.

3.6 Dimensional stability. The finished cloth shall not shrink or elongate more than 6.0 percent in the wale direction and 4.0 percent in the course direction when tested as specified in 4.2.3.

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3.7 pH. The pH value of the water extract of the finished cloth shall be no less than 5.0 nor more than 8.5 when tested as specified in 4.2.3.

3.8 Length and put-up. Unless otherwise specified (see 6.2), the finished cloth shall be furnished in continuous length not less than 40 yards. Each length shall be put-up on full width rolls as specified in 5.1.

3.9 Fiber identification. Each roll shall be labeled or ticketed for fiber content in accordance with the Textile Fiber Products Identification Act.

3.10 Workmanship. The finished cloth shall conform to the quality of product established by this document. 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 or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the document 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 document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the document 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 indicted 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 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

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

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4.2.2 End item examination.

4.2.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined on the face side 1/, and defects clearly noticeable at normal inspection distance (3 feet) shall be classified as listed below. The defects found shall be counted regardless of their proximity to each other, except when 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 yard or fraction thereof in which it occurs. The lot size shall be expressed in yards. The sample unit shall be 1 linear yard. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects. The number of rolls from which the sample yardage is to be selected shall be in accordance with table II. The sample yardage shall be apportioned equally among the selected rolls.

1/ The side of the cloth which has the tuck stitch loop shall be considered the face side of the cloth.

Defects	Classification	
	Major	Minor
Hole, cut, tear, break, or mend	X	
Run or dropped stitch	X	
Tuck stitch missing, pulled stitch, or needle streak		X
End out, loose or floated end	X	
Abrasion mark resulting in a weak area	X	
Thin or uneven cloth	X	
Fine or tight twisted yarn		X
Crease or wrinkle, embedded		X
Knots extending above surface of cloth		X
Edges frayed, raveled, rolled, folded, scalloped, or uneven		X
Shade bar, spot, or stain		X
Slubs		X
Foreign matter		X

4.2.2.2 Overall examination. The cloth shall be examined for the defects listed below. Each defect listed shall be counted not more than once in each roll examined. The sample size shall be the applicable number of rolls indicated in table II. Each roll in the sample shall be examined over its entire length. The lot shall be rejected if the total number of defects in the sample exceeds the acceptance number specified in table II.

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Defects

Width less than specified  
 Overall uncleanness  
 Off shade; shaded end to end, side to side, side to center,  
 or throughout the roll  
 Uneven knitting throughout piece  
 Mottled, streaky, or cloudy appearance  
 Not labeled in accordance with the Textile Fiber Products Identification Act

TABLE II. Sample size

Lot size (yards)	Sample size (rolls)	Acceptance number
Up to 1200 <u>1/</u>	3	0
1201 up to and including 3200	5	0
3201 up to and including 10,000	8	0
10,001 up to and including 35,000	13	0
35,001 up to and including 150,000	20	1
150,001 and over	32	2

1/ If a lot contains fewer than three rolls, each roll in the lot shall be examined.

4.2.2.3 Length examination. Each roll of cloth used in the yard-by-yard examination shall be examined for the defects listed below. If the total number of defects in the sample rolls exceeds the applicable acceptance number specified in table II or if the total of the actual lengths of the sample rolls is less than the total of the lengths marked on the roll tickets, the lot shall be rejected.

Defects

Any gross length less than the specified minimum length.  
 Any gross length more than 2 yards less than gross length marked on roll ticket.

4.2.3 End item testing. The cloth shall be tested for the characteristics listed in table III. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in table III shall be followed. The physical and chemical values specified in section 3, except when otherwise indicated, apply to the results of the determinations made on a sample unit for test purposes as specified in the applicable test methods. All test reports shall contain the individual values utilized in expressing the final results. The sample unit shall be 2 yards full width of the finished cloth. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified. The sample size shall be in accordance with the following:

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<u>Lot size (yards)</u>	<u>Sample size (sample units)</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

TABLE III. End item tests

<u>Characteristic</u>	<u>Requirement paragraph</u>	<u>Test method</u>
Material identification:		
Aramid	3.2.1	<u>1/</u>
Denier	3.2.1	<u>1/</u>
Staple length	3.2.1	<u>1/</u>
Colorfastness:		
Light	3.3.2	5660 <u>2/</u>
Laundering	3.3.2	5614
Perspiration	3.3.2	5680
Type of knit	3.4	Visual <u>1/</u>
Weight	3.4.1	5041
Texture	3.4.1	5070
Flame resistance:		
After flame time:		
Wales	3.4.1	5903
Courses	3.4.1	5903
After glow:		
Wales	3.4.1	5903
Courses	3.4.1	5903
Char length:		
Wales	3.4.1	5903
Courses	3.4.1	5903
Nonfibrous material	3.5	2611
Dimensional stability	3.6	5556 <u>3/</u>
pH	3.7	2811

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

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2/ Except that the specimens shall be compared with the standard sample or rated objectively after an exposure of 6 standard fading hours.

3/ The cotton laundering procedures shall be followed.

4.2.4 Packaging inspection. The inspection shall be in accordance with the quality assurance provisions of PPP-P-1133.

5. PACKAGING

5.1 Put-up and preservation. Put-up and preservation shall be level A or Commercial as specified (see 6.2).

5.1.1 Levels A and Commercial. The cloth shall be put-up and preserved in accordance with the applicable requirements of PPP-P-1133.

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

5.2.1 Levels A, B, and Commercial. The cloth shall be packed in accordance with the applicable requirements of PPP-P-1133.

5.3 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with the applicable requirements of PPP-P-1133.

6. NOTES

6.1 Intended use. This cloth is intended for use in the fabrication of the Hood, Combat Vehicle Crewman, (Balaclava).

6.2 Ordering data. Acquisition documents should specify the following:

- a. Title, number, and date of this document.
- b. Color required (see 3.3).
- c. Length required if other than specified (see 3.8).
- d. Selection of applicable levels of put-up, preservation, and packing (see 5.1 and 5.2).

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

6.4 Fiber identification. The "Nomex type 456 or 457" Aramid fiber manufactured by E.I. duPont deNemours Company, Wilmington, DE meets the requirements of this document. Approval of other fiber is the responsibility of the U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014, and is based on more extensive tests, which are not set forth in this document.



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6.5 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the document.

6.6 Subject term (key word) listing.

Aramid  
Knitted cloth

6.7 Supersession data. This document includes the requirements of Purchase Description LP/P DES. 12-80, dated 29 December 1980, for Cloth, Knitted, Aramid, Bi-Ply.

Custodians:

Army - GL  
Navy - NU  
Air Force - 99

Preparing activity:

Army - GL  
Project No. 8305-0111

Review activities:

Army - MD  
Navy - MC  
Air Force - 82  
DLA - CT

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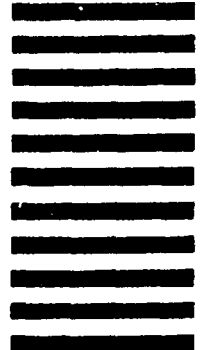


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## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

*(See Instructions - Reverse Side)*

<b>1. DOCUMENT NUMBER</b> MIL-C-44236	<b>2. DOCUMENT TITLE</b> CLCTH, KNITTED, ARAMID, BI-PLY
<b>3a. NAME OF SUBMITTING ORGANIZATION</b>  	<b>4. TYPE OF ORGANIZATION (Mark one)</b> <input type="checkbox"/> VENDOR  <input type="checkbox"/> USER  <input type="checkbox"/> MANUFACTURER  <input type="checkbox"/> OTHER (Specify) _____
<b>5. PROBLEM AREAS</b>	
<b>a. Paragraph Number and Wording</b>          	
<b>b. Recommended Wording</b>          	
<b>c. Reason/Rationale for Recommendation</b>          	
<b>6. REMARKS</b>          	
<b>7a. NAME OF SUBMITTER (Last, First, MI) - Optional</b>	<b>b. WORK TELEPHONE NUMBER (Include Area Code) - Optional</b>
<b>c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional</b>	<b>8. DATE OF SUBMISSION (YYMMDD)</b>

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