

INCH-POUND

MIL-C-87263(USAF)

11 February 1992

## MILITARY SPECIFICATION

### CLOTH, KNIT, JERSEY, POLYBENZIMIDAZOLE/ARAMID BLEND

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 an intimately blended Polybenzimidazole (PBI) and aramid, dyed, jersey, knit cloth.

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents

**2.1.1 Specifications and standards.** Unless otherwise specified (see 6.2), the following specifications and standards, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation, form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: ASD/ENES, Wright-Patterson AFB OH 45433-6503 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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### SPECIFICATIONS

#### FEDERAL

PPP-P-1133 - Packaging of Synthetic Fiber Fabrics

### STANDARDS

#### FEDERAL

FED-STD-191 - Textile Test Methods  
FED-STD-595 - Colors Used in Government Procurement

#### MILITARY

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

(Copies of specifications, standards, handbooks, drawings and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting 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.

### FEDERAL REGULATIONS

Rules and Regulations under the Textile Fiber Products Act

(Application for copies should be addressed to the Federal Trade Commission, Washington, DC 20580).

**2.1.3 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

### 3. REQUIREMENTS

**3.1 Standard sample.** The dyed and finished cloth shall match the standard sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

**3.2 First article.** This specification contains provisions for first article inspection and approval. (see 4.4 and 6.2).

#### 3.3 Material

**3.3.1 Fiber.** The fibers shall be (1) polybenzimidazole (PBI), 1.4 denier per filament cut to staple length of 2.0 inches and (2) non-melting aramid, 1.5 denier per filament, cut to a staple length of 2.0 inches. The aramid fiber shall not char at temperature less than 675° F (358° C) and the PBI fiber shall not char at temperature less than 675° F (358° C) when tested as specified in 4.7.

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**3.3.2 Yarn.** The yarn shall be an intimate blend with 20 percent by weight being PBI fiber and 80 percent being aramid fiber. Yarn shall be spun with a minimum twist multiple of 3.5.

**3.4 Color.** Unless otherwise specified, the color of the cloth shall be sage green, USAF color shade No. 1590 in accordance with FED-STD-595 (see 6.4).

**3.4.1 Matching.** The color of the finished cloth shall match the standard sample under artificial daylight having a correlated color temperature of  $7000 \pm 500$  Kelvin and shall be a good approximation to the standard sample under incandescent lamplight at  $2850 \pm 100$  Kelvin.

**3.4.2 Colorfastness.** The dyed and finished cloth shall show colorfastness to light and to laundering equal to or better than the standard sample when tested as specified in 4.7.

**3.5 Physical properties.** The physical properties shall conform to table I, when tested as specified in 4.7.

**3.6 Width.** Unless otherwise specified, the overall minimum width shall be 63 inches (see 6.2).

**3.7 Finish.** The cloth shall be scoured, dyed, and heat set. Cloth edges shall be gummed to prevent curling. Gum shall not extend more than one (1) inch into fabric from edge. Other finishes may not be applied to cloth.

**3.8 Length and put up.** Unless otherwise specified (see 6.2), the cloth shall be furnished in continuous lengths, each not less than 100 yards, and shall be put up in rolls as specified in PPP-P-1133.

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

**3.10 Workmanship.** The finished cloth shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the point level specified.

## 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, 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 specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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TABLE I. Physical Properties.

Characteristics	Requirements
Weight (ounces per square yard) (minimum)	2.0
Wales per inch (minimum)	30.0
Courses per inch (minimum)	26.0
Flame resistance	
After flame time (seconds) (maximum)	1.0
After glow time (seconds) (maximum)	15.0
Char length (inches) (maximum)	4.5
Type of knit	Circular knit jersey
Diaphragm Burst (pounds per square inch) (minimum)	40.0
Nonfibrous material (percent) (maximum)	1.0 <u>1</u>
Curling	Shall be flat without distortion and show no evidence of curling
pH	4.0 - 9.0 <u>2/</u>

1/ Including starch and protein matter as well as chloroform and water soluble material.

2/ Determined on the water extract of the cloth.

**4.1.1 Responsibility for compliance.** All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations is an acceptable practice to ascertain compliance to requirements. However, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept 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.

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

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

**4.3 Inspection conditions.** Unless otherwise specified, all shall be performed in accordance with the test conditions specified in 4.7.

**4.4 First article inspection.** The first article inspection shall consist of specified examinations and tests performed on samples of PBI/Aramid knit jersey cloth to determine that the production item conforms to the requirements of this specification.

**4.4.1 First article samples.** Unless otherwise specified, as soon as practical after the award of the contract or order, the manufacturer shall submit three linear yards of the knit cloth for subjection to the examinations and tests specified in 4.4.2. The sample shall be representative of the construction, workmanship, components, and materials to be used during production.

**4.4.2 First article tests.** The first article sample shall be subjected to tests specified in 4.5.

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

**4.5.1 Component and material inspection.** In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements or referenced specifications, drawings, and standards, unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase documents.

**4.5.2 Examination of the end item.** Examination of the end item shall be in accordance with the provisions of 4.5.2.1 through 4.5.2.5.

**4.5.2.1 Yard by yard examination.** The required yardage of each roll shall be examined on the face side and visual defects as defined herein shall be classified as listed in table II. All defects found shall be counted regardless of their proximity one to another 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 sample unit for each lengthwise yard or fraction thereof in which it occurs. The sample unit for this examination shall be one linear yard. The sample size shall be in accordance with Inspection Level II of MIL-STD-105. The Acceptable Quality Level (AQL) shall be 4.0 major defects and 10.0 total defects per 100 units (yards). The total size shall be expressed in units of one linear yard. An approximate equal number of yards shall be examined from each roll selected for yard by yard examination.

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TABLE II. Classification of Defects.

Defect	Classification	
	Major	Minor
Any hole, cut , or tear .....	X	
Run or dropped stitch, or end out ..	X	
Seam . . . . .	X	
Float, pulled stitch or needle streak ...		X
Mends		
Patch using knit and suitable adhesive .....		X
Sewn hole over 3 inches in diameter .....	X	
Sewn hole less than 3 inches in diameter .....		X
Tight yarn <u>1/</u> .....		X
Any slub or slug, more than twice the size of normal yarn .....		X
Foreign matter <u>1/</u> .....		X
Knots extending above the surface of the cloth <u>1/</u> .....		X
Kinks, untrimmed ends .....		X
Crease or wrinkle (embedded) ...		X
Tension too tight or too loose .....		X
Barre, stop mark, or shade bar <u>1/</u> .....		X
Spot or stain .....		X
Bowing ...		X

1/ Clearly visible at normal inspection distance (3 feet)

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**4.5.2.2 Overall examination.** The sample unit shall be examined for overall defects specified in table III. The sample unit shall be one roll. The sample size and the acceptance number shall be specified in table IV. Each defect listed in table IV shall be counted not more than once in each roll examined.

TABLE III. Overall Defects.

Defect	Classification	
	Major	Minor
Objectionable odor .....	X	
Overall uncleanness .....		X
Uneven knitting throughout the piece .....	X	
Off shade, shaded end to end, side to side, side to center .....		X
or throughout the roll		
Poor dye penetration, mottled, streaky or cloudy .....		X
Overall width less than specified .....	X	

TABLE IV. Sample Size.

Lot size in yards	Sample size in rolls	Maximum number of defects acceptable in sample
Up to 1200 <sup>1/</sup>	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

<sup>1/</sup> If lot is fewer than three rolls, each roll in the lot shall be examined.

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### 4.5.2.3 Examination for length

**4.5.2.3.1 Individual rolls.** During the yard-by-yard examination, each roll in the sample shall be examined for length. Any length found to be less than the minimum specified or more than 2 yards less than the length marked on the ticket shall be considered a defect with respect to length. The maximum number of defects acceptable in the sample shall be in accordance with table IV.

**4.5.2.3.2 Total yardage in sample.** The lot shall be unacceptable if the total of the actual lengths in rolls in the sample is less than the total of the lengths marked on the tickets. The rolls examined shall be those selected for the examination of individual rolls.

**4.5.2.4 Examination for compliance with Textile Fiber Products Identification Act.** During the yard-by-yard examination, each roll in the sample shall be examined for conformance to the Textile Fiber Products Identification Act. Each roll not labeled in accordance with this Act shall be a defect. The lot shall be unacceptable, if two or more of these defects occur.

**4.6 Examination of preparation for delivery requirements.** An examination shall be made in accordance with the provisions of PPP-P-1133, to determine that packaging, packing, and marking complies with the Section 5 requirements.

**4.7 Testing of the end item.** The methods of testing specified in FED-STD-191, as listed in table V, shall be followed. The physical and chemical values specified in Section 3, except where otherwise specified, apply to the average of the determinations made on the 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. The sample unit shall be 3-1/2 yards (full width) of the finished cloth and 1/4 yard (full width) of unfinished cloth. The lot size shall be expressed in units of one yard. The lot shall be unacceptable if one or more units fail to meet any test requirement specified. The sample size (number of sample units) shall be in accordance with the following:

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

## 5. PACKAGING

**5.1 Put-up and packaging.** Put-up and packaging shall be level A or C as specified (see 6.2).

**5.1.1 Level A and C.** The cloth shall be put-up and packaged in accordance with the applicable requirements of PPP-P-1133.

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TABLE V. Test Methods.

Characteristic	Requirement paragraph	FED-STD-191 Test Method
Staple		
Denier	3.3.1	Visual <u>1/</u>
Length	3.3.1	Visual <u>1/</u>
Fiber identification (non melting aramid, PBI)	3.3.1	<u>1/</u>
No charring	3.3.1	<u>1/ 5/</u>
Yarn		
Blend	3.3.2	<u>1/</u>
Twist	3.3.2	<u>1/</u>
Color	3.4	<u>1/ 2/</u>
Colorfastness to Light	3.4.2	5660 <u>3/</u>
Laundering	3.4.2	5610
Weight	3.5	5041
Wales	3.5	5070
Courses	3.5	5070
Flame resistance	3.5	5903
Knit	3.5	Visual <u>1/</u>
Diaphragm bursting strength	3.5	5122
Nonfibrous material	3.5	2611
Curl	3.5	<u>4/</u>
pH	3.5	2811

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- 1/ Unless otherwise specified, a certificate of compliance may be submitted for the stated requirement.
- 2/ Color of the cloth shall be sage green, USAF color shade No. 1590 in accordance with FED-STD-595.
- 3/ Except that the suppliers submission shall be compared with the standard sample after 6 hours and evaluated.
- 4/ Two specimens of cloth, 1-1/2 inches wide by 6 inches long shall be cut from gummed edge of fabric, one having the long dimension parallel to the wales and the other with the long dimension perpendicular to the wales. Both shall be placed on a flat surface for at least five minutes and then visually examined for evidence of curling.
- 5/ Fiber puffs shall be suspended in oven such that the entire specimen is no less than 2 inches from any oven surface. Oven shall not be vented, nor shall air within the oven be circulated artificially during the test. Fiber shall be exposed for a minimum of five (5) minutes to the temperature specified. Oven recovery time shall not be more than 3 minutes and shall not be counted as exposure time.

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

**5.2.1 Levels A, B and C.** 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 order, shipments shall be marked in accordance with PPP-P-1133.

## 6. NOTES

**6.1 Intended use.** The cloth is intended for use as the liner layer in laminated material for chemical protective flyer's coverall.

**6.2 Ordering data.** Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. First article (see 3.2 and 4.4)
- c. Width of cloth required when other than specified (see 3.6).
- d. Length required if other than specified (see 3.8)
- e. Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

**6.3 Knitting information.** This cloth has been successfully knit on a 28 cut circular, single, jersey knit machine using 40/1 cotton count yarn. The 1.4 denier, 2.0 inch PBI fiber used to manufacture this yarn was obtained from Hoechst Celanese Corporation, PBI Products Division, and the 1.5 denier, 2.0 inch cut length, T-455 aramid fiber from E. I. DuPont DeNemours Company.

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**6.4 Standard sample.** Standard sample may be obtained from the procuring activity or as directed by the contracting officer.

### **6.5 Subject term (key word) listing**

Aramid blend  
Cloth  
Colorfastness  
Curling  
Defects  
Dye  
Fiber  
Fire-resistant  
Knit jersey  
Polybenzimidazole  
Wales  
Yarn

Custodian:  
Air Force - 11

Preparing Activity.  
Air Force - 11

Review Activity:  
DLA - CT

Project No. 8305-F451

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

- 1 The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
- 2 The submitter of this form must complete blocks 4, 5, 6, and 7.
- 3 The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE This form may not be used to request copies of documents, not to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

## I RECOMMEND A CHANGE:

1 DOCUMENT NUMBER  
MIL-C-87263 (USAF)

2 DOCUMENT DATE (YYMMDD)  
920211

## 3. DOCUMENT TITLE

Cloth, Knit, Jersey, Polybenzimidazole/Aramid Blend

## 4 NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)

## 5 REASON FOR RECOMMENDATION

## 6 SUBMITTER

a NAME (Last, First Middle Initial)

b ORGANIZATION

c ADDRESS (Include Zip Code)

d TELEPHONE (Include Area Code)  
(1) Commercial

e DATE SUBMITTED  
(YYMMDD)

(2) AUTOVON  
(If applicable)

## 8 PREPARING ACTIVITY

a NAME

AF CODE 11

b TELEPHONE (Include Area Code)

(1) Commercial (2) AUTOVON (If applicable)  
(513) 255-6281 DSN 785-6281

c ADDRESS (Include Zip Code)

ASD/ENES

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