

MIL-C-87156  
6 January 1981

## MILITARY SPECIFICATION

### CLOTH, PARACHUTE, ARAMID, INTERMEDIATE MODULUS

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

#### 1. SCOPE

1.1 Scope. This specification covers canopy fabrics made from intermediate modulus aramid yarn for fabrication of parachutes.

1.2 Classification. The cloths shall be of the following types as specified (see 6.2):

Type I - 3.0 ounces per square yard, maximum weight.

Type II - 2.25 ounces per square yard, maximum weight.

Type III - 2.0 ounces per square yard, maximum weight.

#### 2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

#### SPECIFICATIONS

##### FEDERAL

PPP-P-1133 Packaging and Packing of Synthetic Fiber Fabrics

#### STANDARDS

##### FEDERAL

FED-STD-191 Textile Test Methods

##### MILITARY

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: AFWAL/MLSA, WPAFB, OH 45433 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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(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.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

Textile Fiber Products Identification Act

(Copies may be obtained from the Federal Trade Commission, Washington, DC 20580.)

### 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), the contractor shall furnish one sample unit for first article inspection and approval (see 4.5 and 6.4).

3.2 Material. The yarn used shall be an intermediate modulus aramid yarn (see 6.5). The material shall not carbonize below 779°F (415°C).

3.2.1 Denier and twist. The yarn used in the manufacture of the cloth shall be of the denier and twist specified in Table I. A twist designation of zero (0) signifies that no twist is to be added to the producer's twist as delivered.

3.3 Weave. The weave pattern for all types of cloth shall be a plain weave.

3.4 Physical properties. The physical properties of the finished cloth shall conform to Table I.

TABLE I. Physical requirements.

Property	Type I	Type II	Type III
Weight (oz/sq yd) (maximum)	3.0	2.25	2.0
Breaking strength (lb/inch) (minimum)			
warp	350	250	230
filling	350	250	220
Air permeability (cu ft air/min/sq ft at 1/2 inch water pressure)	50 to 90	100 to 175	50 to 90
Yarns per inch (min)			
warp	48	40	36
filling	48	40	34
Yarn denier	200	200	200

TABLE I. Physical properties. - continued

Property	Type I	Type II	Type III
Yarn ply			
warp	single	single	single
filling	single	single	single
Yarn twist, per inch			
warp	5.0	4.0	0
filling	0	0	0

3.5 Color. The color of the cloth shall be as specified by the contracting officer (see 6.2).

3.6 Dimensions.

3.6.1 Width. Unless otherwise specified, the overall width of the finished cloth shall be  $36.5 \pm 0.5$  inches (see 6.2).

3.6.2 Length and put-up. Unless otherwise specified, the cloth shall be in continuous pieces, each not less than 50 yards. The pieces shall be put up on rolls as specified in PPP-P-1133 (see 6.2). Shorter cuts may be included in accordance with the following schedule:

- 75 percent of total yardage in cuts 50 to 150 yards
- 15 percent of total yardage in cuts 25 to 50 yards
- 10 percent of total yardage in cuts 15 to 25 yards.

3.7 Fiber identification. Each piece of cloth shall be labeled or ticketed, and invoiced for fiber content in accordance with the rules and regulations under the Textile Fiber Products Identification Act (see 4.6.1.2).

3.8 Identification of product. Each roll of finished cloth shall be marked for identification in accordance with PPP-P-1133. In addition, each piece of cloth in each roll shall be clearly and legibly marked with the finisher's roll number or code, and each roll shall have attached a durable tag on which the finisher's roll number or code is listed. The date of manufacture of the cloth shall be included on the tag attached to each roll.

3.8.1 Age. The cloth shall not be more than two years old from date of manufacture of the yarn to date of delivery of the cloth.

3.9 Workmanship. The finished cloth shall be clean and evenly woven and shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the applicable acceptance levels.

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## 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.

4.1.1 Certification of compliance. The contractor shall submit certificates of compliance for the following characteristics:

<u>Characteristic</u>	<u>Requirement Paragraph</u>
Age of cloth	3.8.1

4.2 Inspection for acceptance. Sampling for inspection shall be in accordance with MIL-STD-105, except where otherwise indicated herein.

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

- a. First article inspection (see 4.5).
- b. Quality conformance inspection (see 4.6).

4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in FED-STD-191.

4.5 First article inspection. When required (see 6.4), the first article sample submitted in accordance with 3.1 shall be visually inspected for appearance and color and tested in accordance with the methods specified in 4.8.

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

4.6.1 Examination of product. Examination of the end item shall be in accordance with 4.6.1.1 through 4.6.1.4.2.

4.6.1.1 Yard-by-yard examination. A sufficient number of rolls shall be selected at random from an inspection lot so that the required sample yardage will be obtained by inspecting approximately 25 consecutive yards out of each sample roll. The required yardage of each piece shall be examined and the visual defects classified as listed in Table II. The sample size

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shall be in accordance with inspection level III of MIL-STD 105. The acceptable quality level expressed in defects per 100 units (yards) shall be 2.5 for major defects and 10 for total defects. The lot size shall be expressed in units of 1 yard each. The unit of product for this examination shall be 1 linear yard (i.e., increment of 1 yard on the measuring device of the inspection machine).

TABLE II. Classification of defects.

Defect	Description	Major	Minor
Abrasion	Any abrasion mark showing fuzziness	X	
Biased Filling	Biased filling more than two inches from horizontal at greatest point of bias	X	
Bowed Filling	Bowed filling more than two inches in height (as measured from a straight line chord to highest point of arc)	X	
Missing End	Two or more contiguous: regardless of length	X	
	Single: 36 or more inches long	X	
	Single: less than 36 inches		X
Missing pick	Two or more contiguous, regardless of length	X	
	One missing pick, full width		X
Break, cut, hole or tear (other than pinhole, etc)	Three or more warp or filling threads ruptured at adjoining points	X	
Floats or skips	Any multiple float $\frac{3}{16}$ inch square or more	X	
	Single floats $\frac{1}{4}$ inch or more in length	X	
	Contiguous pin floats, the sequence of which measures an inch or more in length		X
	Multiple floats up to $\frac{3}{16}$ inch square		X
	Single floats up to $\frac{1}{4}$ inch long		X
	Contiguous floats or pin floats $\frac{1}{4}$ , the sequence of which measures less than one inch in length	X	
Filling bar variations	Over $\frac{1}{8}$ inch and up to $\frac{1}{2}$ inch in width with ten percent or less variation above normal pick count		X

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TABLE II. Classification of defects. - Continued

Defect	Description	Major	Minor
Filling bar variations	Over 1/8 inch and up to 1/2 inch in width with more than ten percent variation below normal pick count	X	
	Over 1/2 inch in width with more than ten percent variation from normal pick count	X	
	One-eighth inch or less in width and varying ten percent or more from normal pick count		X
Jerked-in filling	Any jerked-in filling occurring more than four times within ten linear inches		X
Loops, kinks, or snarls (except selvage)	All over 1/8 inch in length	X	
	Three or more in any linear yard up to 1/8 inch in length	X	
	Up to two in any linear yard up to 1/8 inch in length		X
Mispick	Three or more picks in a shed	X	
	Double or two picks		X
Yarn deformations (types I and III)	Over six yarn deformations or shifts of 1/32 inch or more over six inches in length occurring within an area equal to a six inch diameter circle	X	
	Three to six yard deformations of 1/32 inch or more over six inches in length occurring within an area equal to a six inch diameter circle		X
Selvage defects	Any cut, broken, torn, scalloped or clearly noted waviness along selvage edge (check for waviness under no tension)	X	
	More than three inches of continuous stringy or loopy selvage projecting 1/8 inch or more	X	
	Continuous stringy or loopy selvage projecting up to 1/8 inch		X

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TABLE II. Classification of defects. - Continued

Defects	Description	Major	Minor
Selvage defects	Any clearly noticeable roll of edge or edges when tension is released (tight selvage)	X	
Smash	Any smash	X	
Weaver's stain	Any spot, stain or streak (not dye streaks) of the following magnitudes: <ul style="list-style-type: none"> <li>a. Single ends or picks 15 inches or more in length</li> <li>b. Double ends or picks eight inches or more in length</li> <li>c. More than two ends or picks five inches or more in length or a clearly noticeable area more than 1/4 inch square inch in area, whichever is greater</li> <li>d. Single ends or picks 2½ inches up to 15 inches in length</li> <li>e. Double ends or picks 2½ inches up to eight inches in length</li> <li>f. Over two ends or picks less than five inches in length or a clearly noticeable area ¼ square inch or less in area, whichever is greater</li> </ul>	X X X	X X X
Slubs, strip-back, etc.	Any abruptly thickened place in the fabric caused by extraneous material woven in the fabric or a stripback continuing for more than 1½ inches and being more than 1/16 inch wide for that length	X	
	Slubs smaller than 1½ inches long or 1/16 wide		X
Weave	Pattern other than that specified	X	
Width	Less than the specified width	X	
Wrong draw	Clearly noticeable warpwise streak more than 18 inches in length	X	

1/ A pin float is defined as a float measuring 1/8 inch or less. Single pin floats up to 1/8 inch shall not be considered defects.

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4.6.1.2 Examination for compliance with the Textile Fiber Products Identification Act. During the yard-by-yard examination, each roll shall be examined for fiber identification. The lot shall be unacceptable if two or more rolls in the sample are not labeled in accordance with the rules and regulations under the Textile Fiber Products Identification Act.

4.6.1.3 Overall examination. During the yard-by-yard examination, each piece shall be examined for overall defects. The unit of product for overall examination shall be one piece. Each piece shall be examined, and should any piece contain any of the following defects, the lot represented shall be rejected:

- a. Objectionable odor
- b. Uncleanliness throughout
- c. Uneven weaving.

4.6.1.4 Examination for length.

4.6.1.4.1 Individual rolls. During the yard-by-yard examination, each roll shall be examined for length. Any roll length found to be less than the minimum specified, or more than two yards below the length marked on the ticket, shall be considered a defect with respect to length. The lot shall be unacceptable if two or more rolls in the sample are defective with respect to length.

4.6.1.4.2 Total yardage. The lot shall be unacceptable if the total of the actual lengths of roll examined is less than the total of the lengths marked on the ticket.

4.7 Packaging inspection. An examination shall be made in accordance with the provisions of PPP-P-1133 to determine that packaging, packing, and marking requirements of Section 5 of this specification are complied with.

4.8 Methods of examination and test. The methods of testing specified in FED-STD-191, wherever applicable and as listed in Table III shall be followed. The physical values specified in Section 3, except where otherwise specified, apply to the results 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 4 yards (full width) of the finished cloth. The lot size shall be expressed in units



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of one yard each. 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:

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

TABLE III. Test methods.

Test characteristics	Requirement paragraph	Test method
Material	3.2	<u>1/</u>
Denier	3.2.1	<u>1/</u>
Twist	3.2.1	<u>1/</u>
Weave	3.3	Visual
Yarns per inch	Table I	5050
Yarn ply	Table I	Visual
Weight	Table I	5041
Breaking strength	Table I	5100
Air permeability	Table 1	4.8.1
Width	3.7.1	5020

1/ Unless otherwise specified, a certificate of compliance shall be submitted and will be acceptable in lieu of test results.

4.8.1 Air permeability. The test specimen shall be 7 inches long and full width of the cloth. The air permeability test shall consist of five individual readings made in accordance with Method 5450 of FED-STD-191. The individual readings shall be equally spaced across the width (between selvages) of the test specimen except that no readings shall be taken within an area from the selvage equal to 10 percent of the specimen width. The air permeability of the test specimen shall be the arithmetic mean or average of the five individual readings.

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5. PACKAGING

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

5.1.1 Levels A and C. The cloth, put up as specified, shall be packaged in accordance with the applicable requirements of PPP-P-1133.

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 the applicable requirements of PPP-P-1133.

6. NOTES

6.1 Intended use. The intermediate modulus aramid cloth is intended for use in the manufacture of personnel, cargo and deceleration parachutes.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Type (see 1.2).
- c. Quantity.
- d. Width, if other than specified in 3.6.1.
- e. Length and put-up (see 3.6.2).
- f. Selection of the applicable levels of packaging and packing (see 5.1 and 5.2).
- g. First article, when specified (see 3.1).
- h. Color.

6.3 For standard sample, contact the procuring activity issuing the invitation for bids.

6.4 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. The first article should be a preproduction sample. The first article should consist of 4 yards (full width). The contracting officer should include specific instructions in all procurement instruments, regarding arrangements for inspection and approval of the first article.

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6.5 Kevlar 29 yarn manufactured by the E. I. du Pont de Nemours and Company and identified as 200-134-0 Type 964 is an acceptable yarn.

Custodians:  
Air Force - 11  
Army - GL  
Navy - AS

Preparing Activity:  
Air Force - 11

Project Number: 8305-0710

Review Activities:  
Air Force - 45, 99

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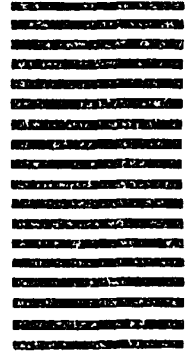
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