MIL-C-81393B
17 March 1988
SUPERSEDING
MIL-C-81393A
15 May 1972

MILITARY SPECIFICATION

CLOTH, KNITTED, POLYAMIDE, HIGH TEMPERATURE RESISTANT, SIMPLEX, JERSEY

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 a high temperature resistant aromatic polyamide jersey knitted cloth used in aeronautical clothing.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

* 2.1.1 Specifications and standards. The following specifications and standards 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

PPP-P-1133	Packaging and Packing 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: Systems Engineering and Standardization Department (Code 53), Naval Air Engineering Center, Lakehurst, NJ 08733-5100, 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

STANDARDS (Continued)

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1491	Glossary of Knitting Imperfections

* 2.1.2 Other Government document. The following other Government document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issue shall be that in effect on the date of the solicitation.

PUBLICATIONS

FEDERAL REGULATIONS

Rules and Regulations Under the Textile Fiber Products Identification Act

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

*(Copies of specifications, standards and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

* 2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), 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. The 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 6.3).

3.2 Materials.

3.2.1 Synthetic yarn. The cloth shall be knit from a high strength, non-melting, aromatic polyamide staple yarn. The yarn shall not carbonize at a temperature less than 357°C (675°F) when tested as specified in 4.4.

3.3 Construction. The knit shall be jersey construction made on a 24 gauge simplex machine, with a front bar of 4-5/3-2/1-0/2-3 and a back bar of 1-0/1-2/3-4/3-2.

3.4 Physical requirements. The finished knit cloth shall conform to the requirements specified in Table I.

TABLE I. Physical properties.

Characteristics	Requirements
Staple denier, nominal	1.5
Staple length, inch	1.5 - 2.0
Linear density of yarn, Tex units, nominal	11
Weight, oz. per square yard	9.0 - 10.0
Texture per inch each side	
Wales	36 - 39
Courses, min.	28
Stretch, percent	
Length, Wales	20 - 35
Width, Courses	60 - 80
Flame resistance - Wales direction	
Flaming time, seconds, max.	2.0
Char length, inches, max.	4.0
pH	5.0 - 8.0

3.5 Color. The color shall be as specified by the procuring activity. The color shall be obtained by the use of melt solution dyed fibers.

* 3.5.1 Matching. The color and appearance of the dyed cloth shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7500 ± 200K, with illumination of 100 ± 20 foot candles, and shall be a good match to the sample under incandescent lamplight at 2300 ± 200K.

3.5.2 Colorfastness. The dyed cloth shall show colorfastness to light and laundering equal to or better than the standard sample when tested as specified in Table V. When no standard sample is available, the dyed cloth shall show good colorfastness to light and laundering when tested as specified in Table V.

3.6 Width. The minimum acceptable width of the finished cloth shall be as specified.

3.7 Length and put-up. Unless otherwise specified, the cloth shall be furnished in continuous lengths, of not less than 30 yards, and shall be put up in rolls as specified in PPP-P-1133.

3.8 Fiber identification. Each roll shall be labeled, ticketed and invoiced for fiber content in accordance with the Textile Fiber Products Identification Act.

3.9 Workmanship. The finished cloth shall conform to the quality of product established by this specification. The occurrence of defects shall not exceed the 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 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 in accordance with 4.4, they shall contain verifiable actual test and inspection data. The Government reserves the right to inspect and test the cloth to verify the validity of the certification.

4.2 Classification of inspections. The inspections specified herein are classified as quality conformance inspections.

* 4.3 Quality conformance inspection. The quality conformance inspection shall consist of the inspections described in 4.3.2 through 4.3.2.3.3 and the end item tests of 4.4.

* 4.3.1 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.3.2 through 4.3.2.3.3 and the end item test of 4.4.

4.3.2 Examination of the end item. Defects found during this examination shall be classified in accordance with 4.3.2.1 through 4.3.2.3.

4.3.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined and defects clearly noticeable at normal inspection distance (3 feet) shall be classified as listed in Table II and as stated in MIL-STD-1491. 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 defects shall be counted. A continuous defect shall be counted as one defect for each yard or fraction thereof in which it occurs. The sample unit shall be one linear yard. The acceptable quality level (AQL) shall be 6.5 defects per 100 units (yards). The sample size shall be in accordance with Inspection Level II of MIL-STD-105. The lot size shall be expressed in units of one yard each. The number of rolls selected shall be in accordance with Table IV. An approximately equal number of yards shall be examined in each roll in the sample.

TABLE II. Defects.

Hole, cut, tear, smash.
Mend or snag.
Missing yarn or miss knit.
Abrasion mark resulting in weak area.
Heavy or thin yarn, more or less than twice the normal thickness.
Slub, slug or kink.
Embedded crease.
Any knot extending above the face of the fabric.
Knitting tension (stretch) too tight or too loose.
Spot or stain (any).
Barre or tiger stripe.

4.3.2.2 Overall examination. Each defect, shown in Table III, 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 IV.

TABLE III. Overall defects.

Off shade.
Width less than specified.
Cut edge is not parallel to wales in finished cloth.
Overall uncleanness.
Uneven knitting throughout the roll.
Not labeled in accordance with the Textile Fiber Products Identification Act.

TABLE IV. Sample size.

Lot size, yardage	Sample Size (Rolls)	Maximum Number of Defects Acceptable in Sample
Up to 1,200 1/	3	0
1,201 up to and including 3,200	5	0
3,201 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.

4.3.2.3 Examination for length.

4.3.2.3.1 Individual rolls. During the yard-by-yard examination each roll 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 ticket shall be considered a defect with respect to length. The sample unit shall be one roll. The lot shall be unacceptable if two or more rolls in the sample are defective with respect to length.

4.3.2.3.2 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. The rolls examined shall be those selected for the examination of individual rolls.

4.3.2.3.3 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.

4.3.3 Examination of preparation for delivery requirements. An examination shall be made in accordance with the provision of PPP-P-1133 to determine that packaging, packing and marking requirements of Section 5 of this specification are complied with.

4.4 Testing of the end item. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in Table V and the following subparagraphs shall be followed. The physical values specified in Section 3 apply to the results of the determinations made on a sample unit for test purposes as specified in the applicable test methods. The sample unit shall be 2-1/2 continuous yards full width of the finished cloth. The lot size shall be expressed in units of 1 yard. The lot shall be unacceptable if one or more sample units fail to meet any test requirement specified. All test reports shall contain the individual value utilized in expressing the final result. The sample size (number of sample units) shall be in accordance with the following:

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

TABLE V. Test methods.

Characteristic	Requirement paragraph	Test method
Material identification	3.2.1	1/
Carbonization point	3.2.1	1/
Melt solution dyed	3.5	1/
Colorfastness to		
Laundering	3.5.2	5610
Light	3.5.2	5660 2/
Staple		
Denier	Table I	1/
Length	Table I	1/
Linear density	Table I	1/
Weight	Table I	5041
Texture	Table I	5070
Stretch	Table I	4.3.1
Flame resistance	Table I	5903
pH	Table I	2811

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

2/ Except that the supplier's submission shall be compared with the standard sample after six hours and evaluation made at this point.

4.4.1 Test for stretch.

4.4.1.1 Test specimens. The test specimen shall be a rectangle 4 inches by not less than 5 inches. The long dimension shall be parallel to the length (wales) of the cloth for length tests and parallel to the width (courses) for width tests. The test specimen shall be taken no nearer the selvage than 1/10 the width of the cloth. Two parallel lines, 3 inches apart shall be drawn at right angles to the long dimension of the specimen. In addition, a line shall be drawn parallel to the long dimension of the specimen and 1 inch in from either edge for properly aligning the specimen in the jaws.

4.4.1.2 Test apparatus. The test device (Figure 1) shall be an apparatus wherein the specimen is held between two clamps. The design of the upper clamp shall be such that one gripping surface or jaw shall be an integral part of the rigid frame of the clamp. The face of the moveable jaw shall measure 1 inch by 1 inch and the face of the fixed jaw shall measure 1 inch by 1-1/2 or more inches with the long dimension perpendicular to the direction of application of the load. The lower clamp shall have similar jaws and when weight is attached, shall weigh a total of 6 pounds. The jaws shall have smooth gripping surfaces, sufficiently flat and parallel to prevent slipping of the specimen during the test.

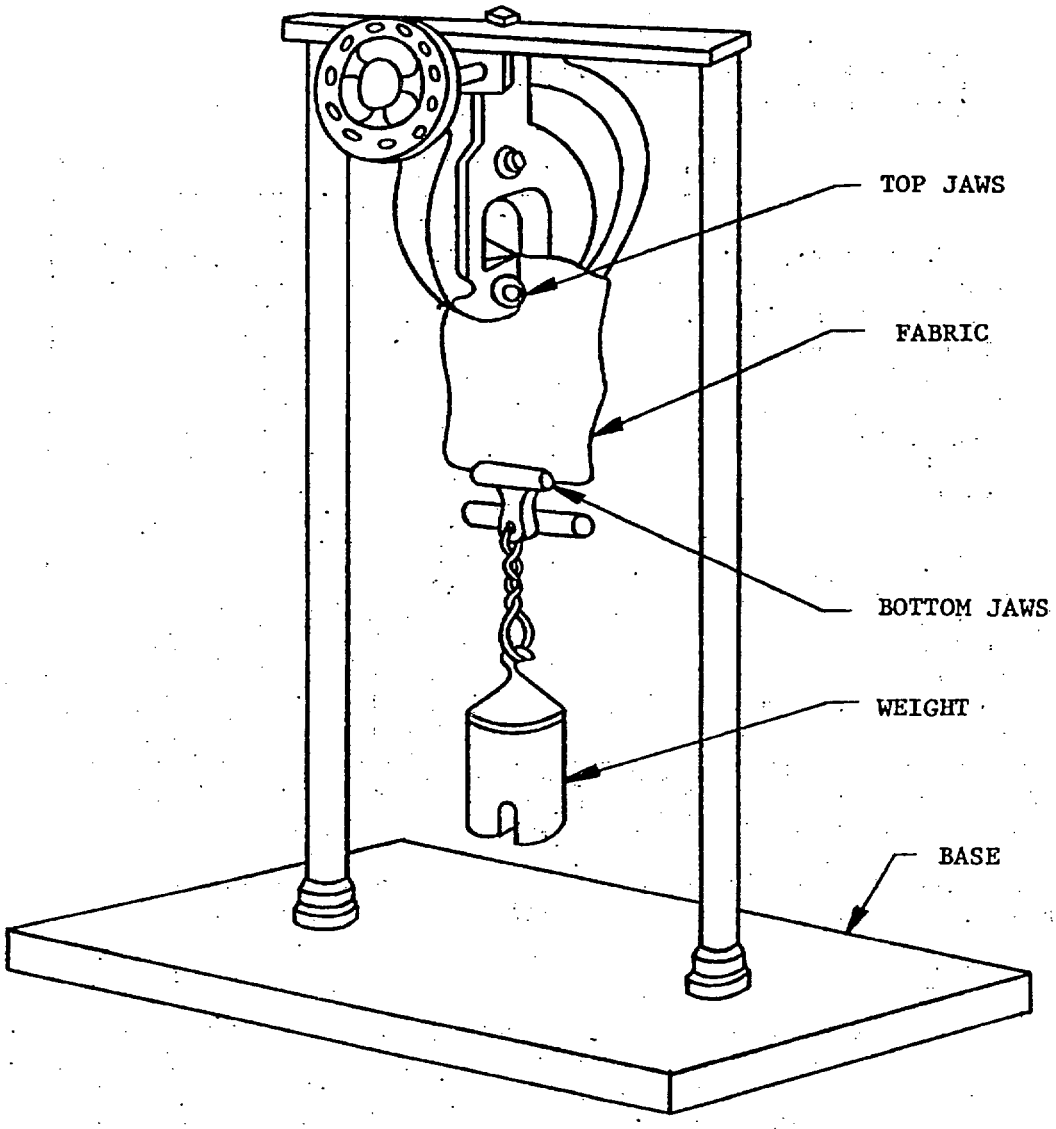

FIGURE 1. Fabric stretch apparatus.

4.4.1.3 Procedure. The specimen shall be placed symmetrically in the clamps of the apparatus with the long dimension parallel and the short dimension at right angles to the direction of the application of the load. Using the specified guidelines, the specimen shall be aligned with one outside edge of the front jaws of each clamp, and with at least 3 inches between jaws. The proper weight shall be added to insure a total of 6 pounds (including the weight of the lower jaws). The load shall be applied for 15 seconds and the distance between jaws measured by a pair of dividers or other suitable instrument. The elongation at the required load shall be expressed as the percent increase in the length of the specimen between the jaws. The percent stretch shall be calculated as follows:

$$\text{Percent stretch} = \frac{\text{Stretch dimension-Original 3 inch dimension}}{\text{Original dimension (3 inches)}} \times 100$$

4.4.1.4 Report. One specimen each from the length (wales) and width (courses) direction shall be tested from each sample unit and the results obtained reported separately to the nearest percent.

5. PACKAGING

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

5.1.1 Level A and C. The cloth shall be preserved 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 cloth covered by this specification is intended for use in the manufacture of light weight flying gloves, MIL-G-81188, Gloves, Flying, Summer, Type GS/FRP-1, and AS2613 Gloves, Flyers, Summer, HAU-11P.

6.2 Ordering data.

6.2.1 Aquisition requirements. Purchasers should exercise any desired options offered herein, and aquisition documents should specify the following:

a. Title, number and date of this specification.

b. Dimensions of cloth required (see 3.6 and 3.7).

c. Color of cloth required (see 3.5).

d. Selection of applicable levels of preservation and packing (see 5.1 and 5.2).

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

6.4 Knitting machine. The following is for information only, and is not a mandatory requirement. The cloth has been made with runners 76 inch bottom, 82.5 inch top, 6 inches to a rack (480 courses).

* 6.5 Subject term (keyword) listing.

Cloth
Flying gloves
High temperature
Jersey
Knitted
Polyamide

6.6 Changes from previous issue. The margins of this specification are marked with asterisks (or vertical lines) 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.

Custodians:
Army - GL
Navy - AS
Air Force - 99

Review Activity:
Army - MD
Air Force - 82

User Activity:
Navy - MC, NU

Preparing Activity:
Navy - AS
(Project No. 8305-0191)