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400 COMMONWEALTH ORIVE, WARRENOALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 3909

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Revised

CLOTH, PARACHUTE, ARAMID, Intermediate Modulus

1. SCOPE:

1.1 Form: This specification and its supplementary detail specifications cover an intermediate modulus aramid yarn in the form of cloth.

1.2 Application: Primarily for use in construction of parachutes.

1.3 Classification: The requirements specified herein and in the applicable detail specifications define each cloth by weight and breaking strength, both of which are shown in the titles of the detail specifications.

2. APPLICABLE DOCUMENTS: The following documents form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

2.2 U. S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.2.4.

2.2.1 Federal Specifications:

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

2.2.2 Federal Standards:

FED-STD-191 - Textile Test Methods

2.2.3 Military Standards:

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

2.2.4 Other Publications: Available from Federal Trade Commission, Washington, DC 20580.

Textile Fiber Products Identification Act, Rules and Regulations

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specifications: The requirements for a specific cloth shall consist of the requirements specified herein in addition to the requirements specified in the applicable detail specification. In case of conflict between the requirements of this specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material: Cloth shall be woven from an intermediate modulus aramid yarn (See 8.1) which shall not carbonize at a temperature lower than 415°C (780°F), determined in accordance with FED-STD-191, Method 1534.

3.3 Properties: Shall conform to the requirements specified in the applicable detail specifications. Tests shall be performed on the cloth supplied and in accordance with FED-STD-191 and the methods specified in 4.5.

3.4 Quality: Cloth, as received by purchaser, shall be clean, evenly woven, and free from foreign materials and from imperfections detrimental to usage of the cloth.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the cloth shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the cloth conforms to the requirements of this specification and the applicable detail specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each lot:

Requirement	Paragraph Reference
Weight	See Detail Specification
Breaking Strength	See Detail Specification
Quality	3.4

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification and the applicable detail specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of cloth to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U. S. Military procurement, substantiating test data, and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.

4.3 Sampling:

4.3.1 For Acceptance Tests: Sufficient cloth shall be taken from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall be all cloth of a single weight and breaking strength produced in a single production run under the same fixed conditions and presented for vendor's inspection at one time. A lot may be packaged in smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 The sample unit shall be 4 yd (3.7 m), full width, of the finished cloth. The sample size shall be as shown below. Lot size shall be expressed in units of 1 yd (1 m). The lot shall be unacceptable if one or more sample units fail to meet any specified requirement.

Lot Size				Sample Size
Yards		Metres		
	Up to 800, incl		Up to 730, incl	2
Over 800	to 22,000, incl	Over 730	to 20,100, incl	3
Over 22,000		Over 20,100		5

4.3.1.3 Yard-by-Yard (Metre-by-Metre) Examination: A sufficient number of rolls shall be selected from an inspection lot so that the required sample length will be obtained by inspecting approximately 25 consecutive yd (23 consecutive m) out of each sample roll. The required length of each piece shall be examined on both sides and visual defects classified as listed in Table I. All defects found shall be counted regardless of their proximity to one 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 defect for each warp-wise yd (m) or fraction thereof in which it occurs. The lot size for this examination shall be 1 linear yd (1 linear m). The sample size shall be in accordance with MIL-STD-105, Leval III. The acceptance quality level (AQL), expressed in defects per 100 units [yd (m)], shall be 2.5 for major defects and 10.0 for total

4.3.1.3 (Continued):

defects. The unit of product for this examination shall be 1 linear yd (1 linear m).

4.3.1.4 Overall Examination: The unit of cloth for overall examination shall be one piece. Each piece shall be examined for the following defects. If any one piece contains any of the defects, the lot represented shall be rejected.

Defects

Objectionable odor
Uncleanliness throughout
Uneven weaving throughout
Not labeled in accordance with the Textile Fiber Products Identification Act

4.3.1.5 Examination for Length:

4.3.1.5.1 Individual Rolls: Any roll length found to be less than specified, or more than 2 yd (2 m) below the length marked on the ticket, shall be considered a defect with respect to length. The lot shall be unacceptable if 2 or more rolls in the sample are defective with respect to length.

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

4.3.1.6 When a statistical sampling plan and acceptance quality leval (AQL) in accordance with MIL-STD-105 other than as specified herein have been agreed upon by purchaser and vendor for testing other than quality (3.4), sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6.1 shall state that such plan was used.

4.3.2 For Preproduction Tests: Shall be as agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample cloth shall be approved by purchaser before cloth for production use is supplied, unless such approval be waived by purchaser. Results of tests on production cloth shall be essentially equivalent to those on the approved sample cloth.

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production cloth which are essentially the same as those used on the approved sample cloth. If necessary to make any changes in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material, processing, or both and, when requested, sample cloth. Production cloth made by the revised procedure shall not be shipped prior to receipt of reapproval.

TABLE I
Classification of Defects

Defect	Description	Major	Minor
Abrasion Marks	Any abrasion mark showing fuzziness.	X	
Biased filling	Over 2 in. (50 mm) from horizontal at the greatest point of bias.	X	
Bowed filling	Over 2 in. (50 mm) in height (measured from a straight line chord to the highest point of arc).	X	
Break, cut, hole, or tear (other than pinhole, etc.)	Three or more warp or filling threads ruptured at adjoining points.	X	
Filling bar variations	Over 0.125 in. (3 mm) and 0.5 in. (12.5 mm) and under in width with 10% or less variation above normal pick count.		X
	Over 0.125 in. (3 mm) and 0.5 in. (12.5 mm) and under in width with more than 10% variation below normal pick count.	X	
	Over 0.5 in. (12.5 mm) in width with more than 10% variation from normal pick count.	X	
	0.125 in. (3 mm) and under in width and varying 10% or more from normal pick count.		X
Floats or skips	Any multiple float 3/16 in. (4.7 mm) square or over.	X	
	Single floats 1/4 in. (6 mm) or over in length.	X	

TABLE I
Classification of Defects (Continued)

Defects	Description	Major	Minor
Floats or skips (Continued)	Contiguous pin floats, the sequence of which measures 1 in. (25 mm) or over in length.		X
	Multiple floats under 3/16 in. (4.7 mm) square.		X
	Single floats under 0.25 in. (6 mm) in length.		X
	Contiguous floats or pin floats 1/, the sequence of which measures under 1 in. (25 mm) in length.	X	
Jerked-in filling	Any jerked-in filling occurring more than 4 times within 10 linear in. (250 linear mm).		X
Loops, kinks, or snarls (except selvage)	All over 0.125 in. (3 mm) in length.	X	
	Three, or more, in any 1 linear yd (1 linear m) 0.125 in. (3 mm) and under in length.	X	
	Up to 2 in any 1 linear yd (1 linear m) 0.125 in. (3 mm) and under in length.		X
Mispick	Three, or more, picks in a shed.	X	
	Double or 2 picks.		X
Missing end	Two or more contiguous regardless of length:		
	Single 36 in. (900 mm) and over in length.	X	
	Single under 36 in. (900 mm) in length.		X

1/ A pin float is defined as a float 0.125 in. (3 mm) and under in length. Single pin floats under 0.125 in. (3 mm) shall not be considered as defects.

TABLE I
Classification of Defects (Continued)

Defect	Description	Major	Minor
Missing pick	Two or more contiguous regardless of length.	X	
	One missing pick, full width.		X
	Continuous stringy or loopy selvage projecting under 0.125 in. (3 mm).		X
Selvage defects	Any cut, broken, torn, scalloped, or clearly noted waviness along the selvage edge (check for waviness under no tension).	X	
	Over 3 in. (75 mm) of continuous stringy or loopy selvage projecting 0.125 in. (3 mm) or over.	X	
	Any clearly noticeable roll of edge or edges when the tension is released (tight selvage).	X	
Slubs, strip-back, etc	Any abruptly thickened place in the fabric caused by extraneous material woven in the fabric or a strip-back continuing over 1.5 in. (37.5 mm) in length and being more than 1/16 in. (1.6 mm) wide for that length.	X	
	Slubs 1.5 in. (37.5 mm) and under or 1/16 in. (1.6 mm) and under in width.		X
Smash	Any smash.	X	
Weave	Pattern other than specified.	X	
Weaver's stain	Any spot, stain, or streak (not dye streaks) of the following magnitudes:		
	Single ends or picks 15 in. (375 mm) or over in length.	X	
	Double ends or picks 8 in. (200 mm) or over in length.	X	

TABLE I
Classification of Defects (Continued)

Defect	Description	Major	Minor
Weaver's stain (Continued)	More than 2 ends or picks 5 in. (125 mm) or over in length or a clearly noticeable area over 0.25 in. (6 mm) in area, whichever is greater.	X	
	Single ends or picks 2.5 to 15 in. (62.5 to 375 mm) in length.		X
	Double ends or picks 2.5 to 8 in. (62.5 to 200 mm) in length.		X
	Over 2 ends or picks under 5 in. (125 mm) in length or a clearly noticeable area 0.25 sq in. (160 mm^2) or under in area, whichever is greater.		X
Width	Less than the specified width.	X	
Wrong draw	Clearly noticeable warpwise streak over 18 in. (450 mm) in length.	X	
Yarn deformations (Types I and III)	over 6 yarn deformations or shifts of 1/32 in. (0.8 mm) or more over 6 in. (150 mm) in length occurring within an area equal to a 6 in. (150 mm) diameter circle.	X	
	Three to 6 yd (2.7 to 5.5 m) deformations of 1/32 in. (0.8 mm) or more over 6 in. (150 mm) in length occurring within an area equal to a 6 in. (150 mm) diameter circle.		X

4.5 Test Methods: Shall be in accordance with Table II and the following; vendor's certificate of compliance is acceptable for material, denier, and twist:

TABLE II
Test Methods

Requirement	FED-STD-191, Test Method
Weave	Visual
Yarns per in. (25.4 mm)	5050
Yarn ply	Visual
Weight	5041
Breaking strength	5100
Air permeability	5450 and 4.5.1
Width	5020

4.5.1 Air Permeability: The test specimen shall be 7 in. (175 mm) long and full width of the cloth. 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% of the specimen width.

4.5.1.1 The air permeability of the test specimen shall be the arithmetic mean of five individual readings.

4.6 Reports:

4.6.1 The vendor of cloth shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance tests and stating that the cloth conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3909 and the applicable detail specification number, vendor's material designation, lot number, weight, and quantity.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3909 and the applicable detail specification number, contractor or other direct supplier of cloth, supplier's product identification, part number, and quantity. When cloth for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of cloth to determine conformance to the requirements of this specification and the applicable detail specification and shall include in the report either a statement that the cloth conforms or copies of laboratory reports showing the results of tests to determine conformance.