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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 3848

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CLOTH, NYLON, METALLIZED

1. SCOPE:

1.1 Form: This specification and its supplementary detail specifications cover two types of metallized nylon cloth.

1.2 Application: Primarily for use in aerial tow targets and microwave radiation protective clothing.

1.3 Classification: The cloth is classified by application and finish treatment as specified in the detail specifications.

2. APPLICABLE DOCUMENTS: The following publications 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 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B117 - Salt Spray (Fog) Testing

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.3.4.

Printed in U.S.A.

2.3.1 Federal Specifications:

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

2.3.2 Federal Standards:

FED-STD-191 - Textile Test Methods

2.3.3 Military Standards: MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes

2.3.4 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 all requirements specified herein in addition to requirements specified in the applicable detail specification. In case of conflict between requirements of this basic specification, and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Materials:

3.2.1 Base Cloth: Shall be a marquisette woven from 260 denier ±5%, 17 filament, high tenacity nylon yarn.

3.2.1.1 Yarn: Nylon yarn used in the manufacture of the base cloth shall be a polyamide prepared from hexamethylene diamine and adipic acid or its derivatives. It shall have a melting point of 250°C + 6 (482°F ± 10), determined in accordance with FED-STD-191, Method 1534.

3.2.1.2 Vendor's certificate of compliance will be acceptable for determining conformance to requirements for identification of material and melting point.

3.2.2 Coating Material: Shall be metallic silver.

3.2.3 Metallized Cloth: The base cloth shall be equally and uniformly metallized on each side to provide radar reflectivity. The metallizing shall conform to requirements for the finished cloth as specified herein and in the applicable detail specification.

3.3 Properties: Shall be as shown herein and as specified in the applicable detail specification, determined in accordance with 4.5.

3.3.1 Base Cloth: Shall be as follows, determined in accordance with Table I.

3.3.1.1 Weave: Shall be a 4-end leno as shown in Fig. 1, repeating on 2 picks, determined visually.

3.3.1.2 Selvage: Shall be double density. The cloth shall have a selvage of not less than 1 in. (25 mm) woven on each side. In addition, cloth which is 72 in. (1.8 m) wide shall have a false selvage of not less than 1.5 in. (38 mm) woven into the center.

3.3.1.3 Color: Shall be natural.

3.3.1.4 Nonfibrous Materials: The water soluble and chloroform soluble material of the finished base cloth shall not exceed 2.0%.

3.3.1.5 Finish: Shall be permanent.

3.3.2 Metallized Cloth: Shall be as follows, determined in accordance with Table II and the following:

3.3.2.1 Low Temperature Flexibility: The metallized cloth shall not crack nor flake, determined in accordance with 4.5.3.

3.3.2.2 Electrical Conductivity: Shall be determined in accordance with 4.5.4.

3.4 Quality: Finished 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 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
Weight	See Detail Specification
Breaking Strength	See Detail Specification
Electrical Conductivity	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: Shall be as follows:

4.3.1 For Acceptance Tests: Each lot of cloth shall be visually examined as required below for quality (3.4) and sampled at random for all other 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 produced in a single production run under the same fixed conditions and presented for vendor's inspection at one time. An inspection lot shall not exceed 1,000 lb (450 kg). A lot may be packaged and delivered in smaller quantities under the basic lot approval provided lot identification is maintained.

4.3.1.2 When a statistical sampling plan and acceptance quality level (AQL) have been agreed upon by purchaser and vendor, 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.

4.3.1.3 Yard-by-Yard (Metre-by-Metre) Examination of Base Cloth: The sample unit shall be 3 continuous yd (3 continuous m) full width of the cloth. The lot size shall be expressed in units of 1 yd (1 m). 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 as shown below:

Lot Size				Sample
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

4.3.1.4 Yard-by-Yard (Metre-by-Metre) Examination of Metallized Cloth: Shall be in accordance with MIL-STD-105, Level II. The unit of product shall be 1 linear yd (1 linear m). The AQL shall be 2.5 major defects and 10 total defects per 100 units (yd or m). The number of rolls from which the samples are to be selected shall be as shown below. An approximately equal length of cloth shall be examined in each roll sampled.

Lot Size				Sample Size in Rolls	Number of Defects Acceptable max (4.3.1.4.2)
Yards		Metres			
Up to 1,200, incl		Up to 1,100, incl		3	0
Over 1,200 to 3,200, incl		Over 1,100 to 2,925, incl		5	0
Over 3,200 to 10,000, incl		Over 2,925 to 9,150, incl		8	0
Over 10,000 to 35,000, incl		Over 9,150 to 32,000, incl		13	0
Over 35,000 to 150,000, incl		Over 32,000 to 137,160, incl		20	1
Over 150,000		Over 137,160		32	2

4.3.1.4.1 If a lot contains fewer than 3 rolls, each roll in the lot shall be examined.

4.3.1.4.2 Applicable to length only. (See 4.3.1.5)

4.3.1.5 Examination for Length:

4.3.1.5.1 Examination for Length in Individual Roll: Each individual roll in the sample shall be examined for number of pieces, length of pieces, and for gross length. The sample unit for this examination shall be one roll. The sample size (number of rolls to be selected as the sample) and the maximum acceptable number of defects shall be as shown in 4.3.1.4. Any of the following shall be considered a defect with respect to length:

Any roll containing more than 2 or 3 pieces as specified.
Any roll with a gross length less than specified.
Any roll with a gross length more than specified.
Any piece with a gross length less than specified.
Any roll with a gross length over 2 yd (2 m) under length marked on the ticket.
Any piece joined by a seam.

4.3.1.5.2 Examination for Total Yards (Metres) in Sample: The rolls examined shall be those selected for examination of individual rolls as specified in 4.3.1.5.1. The lot shall be unacceptable if the total of the actual gross lengths of the rolls in the sample is less than the total of the gross lengths marked on the roll tickets.

4.3.2 For Preproduction Tests: 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.

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 change in material or processing, 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.

4.5 Test Methods: Shall be in accordance with Table I or II, as applicable, and the following:

TABLE I

TEST METHODS FOR BASE CLOTH

Requirement	FED-STD-191 Method
Material Identification	1530 1534
Chloroform Soluble Material	2611
Permanence of Finish:	
Air Permeability	5450
Thickness	5030
Thread count	5050
Ply 1/	4054
Twist, plied yarns	4052
Thickness, initial	5030
Weight	5041
Breaking Strength	5104
Tearing Strength	5134
Air Permeability, initial	5450
Width	5020

1/ The twist shall be removed and the number of plies shall be counted.

TABLE II

TEST METHODS FOR METALLIZED CLOTH

Requirement	FED-STD-191 Method
Thickness	5030
Weight	5041
Breaking Strength	5104
Tearing Strength	5134
Air Permeability	5450
Nonfibrous Materials	2611

4.5.1 Yard-by-Yard (Metre-by-Metre) Examination: The required length of each piece of base cloth and metallized cloth shall be inspected and visual defects classified as listed in Table III or IV, as applicable. 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 defect shall be counted. A continuous defect shall be counted as one defect for each warpwise yard (metre), or fraction thereof, in which it occurs.

4.5.2 Permanence of Finish (Base Cloth):

4.5.2.1 An 18-in. (450-mm) square shall be marked on a 20 in. (500 mm) square specimen, using a template and indelible ink. Air permeability and thickness tests shall be made on this specimen.

4.5.2.2 A container of adequate size to accommodate the specimen shall be prepared as described below, and shall be filled to within 3 in. (75 mm) of the top with water, which shall then be heated to a boil.

4.5.2.3 The specimen shall be placed in the boiling water in a loop or skein form prepared by stapling two opposite sides of the specimen together. This loop or skein shall be placed over a glass rod 1/4 in. (6 mm) in diameter and 21 in. (525 mm) in length.

4.5.2.4 A glass rod 1/4 in. (6 mm) in diameter, 21 in. (525 mm) long, and weighing approximately 100 g, shall be placed inside the loop or skein at the bottom.

4.5.2.5 The loop or skein shall then be suspended in the boiling water by attaching it to another glass rod 24 in. (600 mm) long and 1/4 in. (6 mm) in diameter by means of twine or wire. The 24 in. (600 mm) glass rods shall rest on the top of the container, allowing the specimen to hang freely in the bath.

4.5.2.6 The specimen shall be subjected to the action of the boiling bath for 15 min. ± 1, removed from the container, and allowed to drain for a few minutes. The staples shall be removed from the specimen and the specimen placed flat on a horizontal screen to dry.

4.5.2.7 After the specimen is thoroughly dry, it shall be exposed for at least 4 hr to a standard atmosphere of 65% relative humidity at 21°C ± 1 (70°F ± 2).

4.5.2.8 The 18-in. (450 mm) square shall be measured in three places in both the warp and filling directions and the percent shrinkage from the original dimensions shall be reported.

4.5.2.9 Air permeability and thickness tests shall again be conducted on the specimen to determine any change due to the action of the boiling water.

4.5.3 Low-Temperature Flexibility (Metallized Cloth):

4.5.3.1 A 1 x 4 in. (25 x 100 mm) specimen, with the long dimension warpwise, and a 1 x 4 in. (25 x 100 mm) specimen, with the long dimension fillingwise, shall be placed in a test jig as shown in Fig. 2, and stored in a low temperature chamber at -55°C ± 3 (-65°F ± 5) for not less than 4 hours. The temperature shall be recorded at the lowest point in the chamber and the test jig shall be placed at the same level in the chamber as the thermometer.

4.5.3.2 The test jig shall then be removed from the chamber and bent sharply over a 1/8 in. (3 mm) diameter steel rod.

4.5.3.3 The specimens shall be removed from the test jig and examined for signs of cracking or flaking. Cracking or flaking shall be recorded.

4.5.4 Electrical Conductivity of Metallized Cloth:

4.5.4.1 Six 15-in. (375-mm) square specimens shall be cut from the finished cloth. The resistance shall be measured for each specimen in both the warp and filling directions and both the face and back, using a precision type of ohmmeter and a test jig as shown in Fig. 3.

4.5.4.2 The test jig shall consist of two copper rods, 3/8 in. (10 mm) in diameter and 12 in. (300 mm) in length, placed 12 in. (300 mm) apart in a plastic holder.

4.5.4.3 For the water repellent treated material, the specimen shall be removed from the bus bars and washed for 60 min. ± 5 in a wash wheel, such as described in FED-STD-191, Method 5556. The water temperature shall be 75°C ± 3 (165°F ± 5) and the soap shall be as specified in FED-STD-191, Method 5556.

4.5.4.4 The specimen shall be removed from the wash wheel, laid on a smooth surface, and exposed for not less than 24 hr to 5% salt solution, in accordance with the procedures outlined in ASTM B117. The cloth shall be measured for resistance as described in 4.5.4.1.

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 test requirements and stating that the cloth conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3848 and the applicable detail specification number, vendor's material designation, lot number, specified cloth 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 3848 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 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.

4.7 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the cloth may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the cloth represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Length and Put-Up: The finished cloth shall be furnished on rolls. Each roll shall contain 80 to 200 yd (75 to 180 mm). Each roll of 80 yd (75 m) shall contain not more than two pieces and no piece shall be under 40 yd (37 m) in length.

5.1.2 Each roll shall have a durable label or tag legibly marked with not less than the following information and attached in such a manner as to remain in place until all cloth has been removed:

CLOTH, NYLON, METALLIZED
AMS 3848/*
MANUFACTURER'S IDENTIFICATION _____
WIDTH _____
WEIGHT PER YD (m) _____
LOT NUMBER _____
ROLL NUMBER (If used) _____
DATE OF MANUFACTURE _____
QUANTITY _____

*Insert applicable detail specification number.

5.1.3 Each roll shall also be labeled, ticketed, or invoiced for fiber content in accordance with Textile Fiber Products Identification Act.

5.1.4 Individual rolls shall be wrapped in a suitable protective film and packaged in an exterior shipping container in such a manner that the cloth, during shipment and storage, will be protected from exposure to moisture, weather, or any other normal hazard.

5.1.5 Each shipping container shall be legibly marked with not less than the following information in such a manner that the markings will not smear or be obliterated during normal handling or use:

CLOTH, NYLON, METALLIZED
AMS 3848/*
PURCHASE ORDER NUMBER _____
MANUFACTURER'S IDENTIFICATION _____
LOT NUMBER _____
NET WEIGHT _____

*Insert applicable detail specification number.

5.1.6 Packages of cloth shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the cloth to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.7 For direct U.S. Military procurement, packaging shall be in accordance with PPP-P-1133. Commercial packaging, as in 5.1.1, 5.1.4, and 5.1.6 will be acceptable if it meets the requirements of Level C.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and the applicable detail specification number in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Cloth not conforming to this specification and the applicable detail specification or to modifications authorized by purchaser will be subject to rejection.

8. NOTES:

8.1 Dimensions and properties in inch/pound units and the Celsius temperatures are primary; dimensions and properties in SI units and the Fahrenheit temperatures are shown as the approximate equivalents of the primary units and are presented only for information.

8.2 For direct U.S. Military procurement, purchase documents should specify not less than the following:

Title, number, and date of this specification and the applicable detail specification
Quantity of cloth desired
Width of cloth desired
Applicable level of packaging (See 5.1.7)

8.3 Similar Specifications: This specification is the equivalent of MIL-C-25694B, dated 24 September 1979.

8.4 Cloth meeting the requirements of this specification has been classified under Federal Supply Classification (FSC) 8305.

TABLE III

CLASSIFICATION OF DEFECTS FOR BASE CLOTH

Characteristic	Defect	Major	Minor
Abrasion mark	Any abrasion mark showing fuzziness.	X	
Biased Filling	Over 2 in. (50 mm) from horizontal at the greatest point of bias for 36-1/2 in. (912 m) of cloth.	X	
	Over 4 in. (100 mm) from horizontal at the greatest point of bias for 72 in. (1.8 m) of cloth.	X	
Broken or missing	Two or more contiguous regardless of length.	X	
	Single, over 18 in. (450 mm) missing.	X	
	Single, 18 in. (450 mm) or under missing.		X
Broken or missing pick	Two or more contiguous regardless of length.	X	
	Single, regardless of length.		X
Coarse filling bar	Clearly noticeable and extending over 1 in. (25 mm) in the length direction of the cloth.	X	
	Clearly noticeable and extending 1 in. (25 mm) or under in length direction of the cloth.	X	
Crease	Any hard, embedded crease.	X	
Cut, hole, or tear	Three or more warp or filling threads ruptured at adjoining points.	X	
Distortion or slippage of threads	Any distortion or slippage of the warp or the filling threads that cannot readily be reset by hand.	X	
Filling bow	Over 2 in. (50 mm) in height (measured from a straight line chord to the highest point of arc) for 36-1/2 in. (912 mm) of the cloth.	X	

TABLE III (Cont'd.)

Characteristic	Defect	Major	Minor
Filling bow (Cont'd)	Over 4 in. (100 mm) in height (measured from a straight line chord to the highest point of arc) for 72 in. (1.8 m) of the cloth.	X	
Fine filling bar	Any clearly noticeable fine filling bar.	X	
Floats or skips	Any multiple float over 3/16 in. (5 mm) in either warp or filling direction.	X	
	Single floats over 1/4 in. (6 mm) in length.	X	
	Pin floats, sequence over 1 in. (25 mm), contiguous, in length.	X	
	Two or more multiple floats in any linear yd (linear m) over 1/8 in. (3 mm) but not over 5/16 in. (8 mm) in either the warp or the filling direction.		X
	Single floats over 1/8 in. (3 mm) but not over 1/4 in. (6 mm) in length. Single floats 1/8 in. (3 mm) and under in lengths shall not be considered as a defect.		X
Heavy filling bar or heavy place	Clearly noticeable and extending over 1 in. (25 mm) in the length direction of the cloth.	X	
	Clearly noticeable and extending 1 in. (25 mm) or under in the length direction of the cloth.		X
Hitchback (warp catch)	Resulting in a thin place 3/8 in. (10 mm) or more in combined warp and filling directions.	X	
Jerked-in filling	Two or more additional yarns in the shed. Jerked-in filling 1/2 in. (12.5 mm) and under in length shall not be considered as a defect.	X	
	One additional yarn in the shed.		X