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400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-3788 REV A

Issued 1986-04-01
Revised 1990-10-01
Superseding AMS-3788

Submitted for recognition as an American National Standard

CLOTH, NYLON TWILL

1. SCOPE:

1.1 Form: This specification and its supplemental detail specifications cover continuous filament nylon cloth of differing weights and finishes.

1.2 Application: Primarily for use in aviation ground clothing.

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

1.4 Safety - Hazardous Materials: While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The applicable issue of referenced publications shall be the issue in effect on the date of the purchase order.

2.1 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.1.1 Federal Specifications:

PPP-P-1133 - Packaging of Synthetic Fabric

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2.1.2 Federal Standards:

FED-STD-4 - Glossary of Fabric Imperfections
FED-STD-191 - Textile Test Methods

2.1.3 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 detail specification. In case of conflict between requirements of this specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material: Shall be a bright luster polyamide prepared from hexamethylene diamine and adipic acid or its derivatives. It shall have a melting point not lower than 244°C (471°F).

3.3 Color: Shall be Sage Green, Shade No. 1511 (Manufacturer's designation).

3.3.1 Matching: Color shall match the approved standard shade when viewed under artificial daylight having a color temperature of 7500°K and shall be a good approximation of the standard shade under incandescent lamp light at 2800° Kelvin.

3.3.2 Colorfastness: Finished cloth shall show fastness to laundering, light, dry cleaning, and perspiration equal to, or better than, the standard sample. When a standard sample is not available, the cloth shall show a rating of "good" for each characteristic.

3.4 Properties: Shall conform to requirements specified in the applicable detail specification; tests shall be performed on the cloth supplied and in accordance with test methods specified in 4.5.

3.5 Quality: Cloth, as received by purchaser, shall be 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 Ø for vendor's tests and shall be responsible for performing all required tests. 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.

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4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each lot:

Requirement	Reference
Breaking Strength	See Detail Specification
Tear Strength	See Detail Specification
Elongation	See Detail Specification
Quality	3.5

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of cloth to a purchaser, when a change in ingredients and/or processing 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, contracting officer, or request for procurement.

4.3 Sampling and Testing: Shall be as follows:
Ø

4.3.1 For Acceptance Tests: Sufficient cloth shall be taken at random 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 specified in Table I.

4.3.1.1 A lot shall be all cloth of a single weight produced in a single production run under the same fixed conditions and presented for vendor's inspection at one time.

4.3.1.2 The sample unit shall be 4 continuous yards (3.7 continuous metres), full width of the finished cloth. The sample size shall be as shown below. Lot size shall be expressed in units of 1 yard (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 732, incl	2
Over 800 to 22,000, incl	Over 732 to 20,117, incl	3
Over 22,000	Over 20,117	5

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4.3.1.3 Yard-by-Yard (Metre-by-Metre) Examination: The sample size shall be 20 rolls selected from 20 containers. Each roll in the sample shall be examined on the face side only. When the total length in the roll does not exceed 100 yards (91 m), the entire length in the roll shall be examined. When the total length in the roll exceeds 100 yards (91 m), only 100 yards (91 m) shall be examined. All imperfections, as defined in FED-STD-4, Section III, which are visible at normal inspection distance of 3 feet (1 m), shall be scored and assigned demerit points as listed in 4.3.1.3.1, except that only those slubs and knots which exceed the maximum limit shown in FED-STD-4, Fig. 3, shall be scored. No linear yard (linear metre) from any one roll within the sample shall be penalized more than four points. The lot shall be unacceptable if the points per 100 square yards (84 m^2) of the total length examined exceeds 30. The lot shall be unacceptable if the points per 100 square yards (84 m^2) of two or more individual rolls exceed 40. If one roll exceeds 30 points per 100 square yards (84 m^2), a second sample of 20 rolls shall be examined for individual roll quality. The lot shall be unacceptable if one or more rolls in the second sample exceeds 30 points per 100 square yards (84 m^2). Points shall be computed as follows:

In inch/pound units:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Width of cloth, inch} \times \text{total length, yard, inspected}} = \text{Points per 100 square yards}$$

In SI units:

$$\frac{\text{Total points scored in sample} \times 100{,}000}{\text{Width of cloth, mm,} \times \text{total length, m, inspected}} = \text{Points per 100 } m^2$$

4.3.1.3.1 Demerit Points: Shall be assigned as follows:

Imperfections	Points
Imperfections up to 3 inches (76 mm) in any dimension	1
Imperfections over 3 to 6 inches (76 to 152 mm), incl, in any dimension	2
Imperfections over 6 to 9 inches (152 to 229 mm), incl, in any dimension	3
Imperfections over 9 inches (229 mm) in any dimension	4
Any of the following imperfections per each yard (metre):	
Baggy, ridgy, or wavy cloth	4
Width less than specified	4
Poor dye penetration, mottled, streaky, or cloudy	4
Holes, cuts, tears, open places	4

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4.3.1.4 Ø When a statistical sampling plan has 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 shall state that such plan was used.

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 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 change in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing 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 and the following:

TABLE I

Properties and Test Methods

Property	Test Method FED-STD-191, Method or Paragraph Number	No. of Tests per Individual Unit	Results Reported as
Thread Count	5050	5	Average of 5 to nearest whole number
Twist per inch (25.4 mm)	4052	10	Average of 10 to nearest whole number
Weight	5041	5	Average of 5 to nearest 0.1 ounce (3 grams)
Breaking Strength	5104	5	Average of 5 to nearest pound force (4.4 N)
Tear Strength	5134	5	Average of 5 to nearest pound force (4.4 N)

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TABLE I (Continued)

Properties and Test Methods

Property	Test Method FED-STD-191, Method or Paragraph Number	No. of Tests per Individual Unit	Results Reported as
Elongation	5104	5	Average of 5 to nearest 1.0%
Air Permeability	5450	5	Average of 5 to nearest 0.1 cubic foot (0.03 m^3)
Nonfibrous Materials	2611	2	Average of 2 to nearest 0.1%
pH	2810 or 2811	2	Average of 2 to nearest 0.1 or 0.2 pH as designated by method
Spray Rating	4.5.1	3	No individual value shall fall below the value specified
Color Fastness to:			
Light	5660	1	Excellent, good, fair, or poor
Laundering	5614	1	
Dry Cleaning	5620	1	
Perspiration	5680	1	
Residual Shrinkage	4.5.2	3	Average of 3 to nearest 0.1%

4.5.1 Spray Rating: Tests shall be performed in accordance with FED-STD-191, Method 5526. After determination of original spray rating, the same specimens, prepared by cutting 8-inch (203-mm) squares of the cloth, shall be tested for spray rating after being subjected to three dry cleanings, conducted in accordance with FED-STD-191, Method 5508, and also tested for spray rating after being subjected to three launderings, conducted in accordance with FED-STD-191, Method 5614, except that the color transfer cloth shall be omitted.

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4.5.2 Residual Shrinkage:

4.5.2.1 After conditioning at 20°C ± 2 (68°F ± 4) and 50% ± 5 relative humidity for not less than 4 hours, an 18-inch (457-mm) square shall be marked on a 20-inch (508-mm) square specimen by means of a template, using indelible ink.

4.5.2.2 A metal tub of adequate size to hold the test specimen, prepared as described below, shall be filled to within 3 inches (76 mm) of the top with water, which shall then be heated to a boil.

4.5.2.3 The cloth sample shall be prepared by joining the two sides, cut filling-wise so as to form a loop, which is threaded over a glass rod or tube 1/4 inch (6.4 mm) in diameter by 21 inches (533 mm) long.

4.5.2.4 A hold-down weight formed of a 1/4 inch (6.4 mm) diameter glass tube or rod approximately 21 inches (533 mm) long and having a weight of 50 grams ± 5 shall be introduced into the cloth loop.

4.5.2.5 A glass tube or rod, resting across the tub top, shall support the cloth loop entirely below the surface of the water by wires connecting to the ends of the upper 21-inch (533 mm) long tube or rod.

4.5.2.6 The sample shall be supported so that the slight tension of the hold-down weight shall apply in the warp direction and the cloth loop shall hang freely in the bath.

4.5.2.7 The sample shall then be subjected to the action of the boiling water bath for 15 minutes ± 2, removed from the tub, allowed to drain for at least 5 minutes, opened out, and placed flat on a horizontal screen to dry.

4.5.2.8 After the specimen is thoroughly dry, the specimen shall be exposed for at least 4 hours to standard atmosphere and then measured in three places in the warp direction and three places in the filling direction, and the amount of shrinkage recorded.

4.5.3 Examination for Shade: During the yard-by-yard (metre-by-metre) examination, each roll in the sample shall be examined for shade. Any roll in the sample found to be off shade, shaded side to side, side to center, or end to end shall be cause for rejection of the entire lot represented by the sample.

4.5.4 Examination for Compliance with the Textile Fiber Products Identification Act: During the yard-by-yard (metre-by-metre) examination, each roll in the sample shall be examined for compliance with the rules and regulations under the Textile Fiber Products Identification Act. Each roll not labeled in accordance with this act shall be an imperfection. The lot shall be unacceptable if two or more of these imperfections occur.

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4.6 Reports: 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. This report shall include the purchase order number, lot number, AMS-3788A and the applicable detail specification number, vendor's material designation, quantity, and specified cloth weight.

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 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: Shall be as follows:

5.1.1 Cloth shall be furnished in continuous lengths, each not less than 50 yards (46 m), put up on full width rolls.

5.1.2 Each roll shall have a 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 from the roll:

CLOTH, NYLON TWILL
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WIDTH _____ WEAVE _____
WEIGHT PER YARD (METRE) _____
MANUFACTURER'S IDENTIFICATION _____
PRODUCT DESIGNATION _____
QUANTITY _____
LOT NUMBER _____
ROLL NUMBER (if used) _____
DATE OF MANUFACTURE _____

* Insert applicable detail specification number.

5.1.3 Each roll of cloth shall be labeled or ticketed 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 rolls, during shipment and storage, will be protected from exposure to moisture, weather, or any other normal hazard.

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