



AEROSPACE MATERIAL

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

SPECIFICATION

AMS 1775

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Revised

FABRIC, NYLON UPHOLSTERY Fire Retardant

1. SCOPE:

1.1 Form: This specification covers upholstery fabrics woven from nylon and treated for fire retardation.

1.2 Application: Primarily for aircraft seat upholstery.

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

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

AMS 4041 - Aluminum Alloy Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (Alclad 2024 and 1-1/2% Alclad 2024-T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate)

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D1175 - Abrasion Resistance of Textile Fabrics

ASTM D1682 - Breaking Load and Elongation of Textile Fabrics

ASTM D1683 - Seam Breaking Strength (Load) of Woven Textile Fabrics

ASTM D1910 - Construction Characteristics of Woven Fabrics

ASTM D3512 - Pilling Resistance and Other Related Surface Changes of Textile Fabrics; Random Tumble Pilling Tester Method

ASTM F501 - Aerospace Materials Response to Flame with Vertical Test Specimens (for Aerospace Vehicles Standard Conditions)

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.3.3.

2.3.1 Federal Standards:

Federal Test Method Standard No. 191 - Textile Test Methods

2.3.2 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

SAE Technical Board rules provide that: "All technical reports, including standards approved and issued, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

- 2.3.3 Federal Aviation Administration Regulations: Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

FAR Part 25 - Airworthiness Standards: Transport Category Airplanes

- 2.4 AATCC Methods: Available from American Association of Textile Chemists and Colorists, P. O. Box 1-215, Research Triangle Park, NC 27709.

Method 8 - Colorfastness to Crocking, Wet and Dry

3. TECHNICAL REQUIREMENTS:

- 3.1 Material: Shall be woven from 100% nylon yarns and shall be treated to be fire retardant. It shall be non-toxic and shall not cause skin rash or dermatitis when in contact with human skin. Emission of toxic gases and smoke shall be no greater than permitted by Federal Aviation Regulations.
- 3.2 Properties: Fabric shall conform to the following requirements; tests shall be performed on the fabric supplied and in accordance with specified test methods:
- 3.2.1 Fabric Weight: Shall be as specified by the purchaser according to the style and construction of the fabric, determined in accordance with ASTM D1910.
- 3.2.2 Breaking Strength: Shall be not lower than 370 lb (1650 N) in both the warp and fill directions, determined in accordance with ASTM D1682, Grab Test G.
- 3.2.3 Tearing Strength: Shall be not lower than 95 lb (422 N) in both the warp and fill directions, determined in accordance with Federal Test Method Standard No. 191, Method 5136.
- 3.2.4 Pilling Resistance: Fabric shall show no pilling (0 - 2 pills) after a 60 min. ± 1 run under 9.0 psi (62 kPa) pressure, determined in accordance with ASTM D3512.
- 3.2.5 Colorfastness to Crocking: Fabric shall show no color transfer after 50 strokes, determined both wet and dry in accordance with AATCC Method 8.
- 3.2.6 Colorfastness to Light: Fabric shall show no color change after 50 hr ± 0.5 in fadeometer, determined in accordance with Federal Test Method Standard No. 191, Method 5660.
- 3.2.7 Seam Strength: Shall be not lower than 90 lb (400 N) in the warp direction and not lower than 100 lb (445 N) in the fill direction, determined in accordance with ASTM D1683 on seams made with a No. 24 needle using a No. 10 or higher thread and having at least 10 chain stitches per in. (25 mm).
- 3.2.8 Abrasion Resistance: Unless otherwise specified, fabric shall show no appreciable wear after 500 cycles, determined in accordance with ASTM D1175, Rotary Platform, Double Head Method, using CS #10 wheels and 1000 g load.
- 3.2.9 Flammability: Fabric both as received and after 10 dry cleanings in accordance with 4.5.1, shall meet the requirements of FAA Regulations, Part 25, Paragraph 25.853(b), when tested in accordance with ASTM F501, vertical flame test.
- 3.2.10 Stain Resistance: Fabric, stained as in 4.5.2 and dry cleaned as in 4.5.1, shall appear free from stain when viewed at a distance of 30 in. (760 mm) using artificial light of 7500° K.

- 3.2.11 Corrosion Resistance: Panels of AMS 4041 aluminum alloy shall show no more than slight discoloration after exposure as in 4.5.3.
- 3.2.12 Permanent Stretch: Shall be not greater than 2% after 24 and 72 hr, determined in accordance with 4.5.4.
- 3.2.13 Shrinkage: Shall be not greater than 2% after ten dry cleanings, determined in both warp and fill directions in accordance with 4.5.5.
- 3.3 Quality: Fabric, as received by purchaser, shall be uniform in quality and condition, true to color and pattern, and free from foreign materials and from imperfections detrimental to usage of the fabric, determined by visual inspection.
- 3.4 Tolerances: Width of fabric shall vary not more than $\pm 1/2$ in. (± 12 mm) from the width ordered.

4. QUALITY ASSURANCE PROVISIONS:

- 4.1 Responsibility for Inspection: The vendor of fabric shall supply all samples 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 perform such confirmatory testing as he deems necessary to ensure that the fabric conforms to the requirements of this specification.
- 4.2 Classification of Tests:
- 4.2.1 Acceptance Tests: Tests to determine conformance to requirements for weight (3.2.1), pilling resistance (3.2.4), colorfastness to crocking (3.2.5), colorfastness to light (3.2.6), abrasion resistance (3.2.8), flammability (vertical burn only) (3.2.9), shrinkage (3.2.13), and tolerances (3.4) are classified as acceptance tests and shall be performed on each lot.
- 4.2.2 Periodic Tests: Tests to determine conformance to requirements for breaking strength (3.2.2), tearing strength (3.2.3), seam strength (3.2.7), stain resistance (3.2.10), corrosion resistance (3.2.11), and permanent stretch (3.2.12) are classified as periodic tests and shall be performed at a frequency selected by vendor unless frequency of testing is specified by purchaser.
- 4.2.3 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed on the initial shipment of a fabric to a purchaser, when a change in material or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.3.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test fabric shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the request for procurement.
- 4.3 Sampling: Vendor shall select at random a sufficient number of samples from pieces comprising the lot to meet the following requirements; a lot shall be all fabric produced from one finishing lot in a single production run under the same fixed conditions and presented for vendor's inspection at one time:
- 4.3.1 Acceptance Tests:
- 4.3.1.1 Tests Other Than Flammability and Quality: One sample from each lot.
- 4.3.1.2 Flammability: Not less than three adequate size samples from the first, middle, and last piece in the lot or from 20% of the pieces in the lot, randomly selected from beginning to end of the lot, if that be a larger number of samples.

4.3.1.3 Quality: 100% of each lot.

4.3.2 Periodic Tests and Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

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

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

4.5 Test Methods:

4.5.1 Dry Cleaning:

4.5.1.1 Equipment: Shall be a cylinder, preferably of metal, approximately 13 in. (330 mm) high by 8-3/4 in. (220 mm) in diameter with a capacity of approximately 3.5 gal (13 L) (See 8.1). The cylinder shall be mounted in a vertical position on an axis which is inclined at an angle of approximately 50 deg to the axis of the cylinder and shall be rotated at a speed of 45 - 50 rpm.

4.5.1.2 Procedure: Specimens for flammability, shrinkage, and stain resistance tests shall be placed in the cylinder with a fabric-liquor ratio of 200 g of fabric to 3 L of perchloroethylene to which is added 15 mL of Street's Detergent 886 and 1 mL of water per litre of perchloroethylene. Each specimen shall be dry cleaned for 25 min. $\pm$ 0.5 per cycle for a total of 10 cycles and shall be dried after each cycle at not higher than 60°C (140°F). The dry cleaning liquor shall be replenished to its original volume after each cycle and shall be discarded after 20 cycles.

4.5.2 Stain Resistance: Specimens, approximately 12 in. (300 mm) square, of each type and color of fabric shall be stained by pouring 1 oz (28 g) of each of the products listed in 4.5.2.1 onto a separate specimen for each product and allowing the stained specimens to dry for not less than 24 hours. The specimens shall be dry cleaned as in 4.5.1 and examined for residual staining.

4.5.2.1 Each specimen shall be stained with one of the following:

Black coffee (brewed from ground)	Mixture of 1.5 oz (44 mL) of ethyl
Coffee with sugar and cream	alcohol and 5 oz (148 mL) of
Cola beverage	Cola beverage
Tea	Red wine
Homogenized milk	White wine
Orange juice	Ketchup
Tomato juice	Salad dressing containing vinegar
Mustard	Unsaturated corn oil
Newsprint ink	Ethyl alcohol
Lipstick	

4.5.3 Corrosion Resistance:

4.5.3.1 Test Specimens: Shall be three pieces of each color and type of fabric, approximately 2 x 4 in. (50 x 100 mm), and two panels of AMS 4041 aluminum alloy of the same size, nominally 0.040 in. (1 mm) thick, for each piece of fabric.

- 4.5.3.2 Procedure: Wet each piece of fabric with 20 mL of distilled or deionized water. Clamp each piece of wetted fabric between two aluminum plates to ensure contact between fabric and metal. Place the sandwich specimens in a humidity cabinet maintained at $38^{\circ}\text{C} \pm 3$ ($100^{\circ}\text{F} \pm 5$) with an atmosphere of 95 - 100% relative humidity for $168 \text{ hr} \pm 0.5$. Remove the sandwich specimens, separate the metal plates, rinse the plates in warm distilled water, and examine under 10X magnification for evidence of staining and corrosion. When specified by purchaser, compare to panels of AMS 4041 aluminum alloy exposed to distilled water.
- 4.5.4 Permanent Stretch:
- 4.5.4.1 Apparatus: A tensometer (draw bench) suitable for the application of a permanent load.
- 4.5.4.2 Specimens: Shall be 4 strips approximately 2 in. (50 mm) wide by 12 in. (300 mm) long (warp direction) and 4 strips approximately 2 in. (50 mm) wide by 12 in. (300 mm) long (filling direction)
- 4.5.4.3 Procedure: The strip shall be placed in the apparatus so that a strip-length of 8 in. (200 mm) is present between jaws.
- 4.5.4.3.1 A permanent load of 100 lb (445 N) shall be applied for 60 min. ± 1 . The length of fabric between jaws shall be measured at the completion of the 60 min. test while still under load, immediately after release of load, 24 hr after release of load, and 72 hr after release of load.
- 4.5.4.4 The permanent stretch shall be considered the average elongation of the 4 strips in, respectively, the warp and filling directions.
- 4.5.4.5 The test strips used in 4.5.4.3 shall be remeasured, reloaded in the apparatus, and a permanent load of 100 lb (445 N) applied for $24 \text{ hr} \pm 0.25$. The length of the fabric shall be remeasured at the completion of the 24 hr test while still under load, immediately after release of load, 24 hr after release of load, and 72 hr after release of the load.
- 4.5.4.5.1 Determine permanent elongation as in 4.5.4.4.
- 4.5.5 Shrinkage: Condition the sample at $20^{\circ}\text{C} \pm 1$ ($70^{\circ}\text{F} \pm 2$) and $65\% \pm 2$ relative humidity for not less than 24 hr to allow for moisture equilibrium. Prepare a test specimen approximately 24 in. (600 mm) square. Serge the edges of the specimen to prevent raveling during dry cleaning. Make three measurements approximately 20 in. (500 mm) apart in the warp and filling directions. Sew fine threads to mark the measurements. Send specimen to an approved commercial cleaner to be dry cleaned ten times as in 4.5.1, condition the specimen at $20^{\circ}\text{C} \pm 1$ ($70^{\circ}\text{F} \pm 2$) and $65\% \pm 2$ relative humidity for 24 hours. Measure the marked warp and filling lengths. Calculate the change in length using the following formula:

$$\% \text{ Change} = \frac{\text{Original Warp (Fill)} - \text{Final Warp (Fill)}}{\text{Original Warp (Fill)}} \times 100$$

- 4.5.5.1 Report the average of the three calculations as the percentage change.

4.6 Reports:

- 4.6.1 The vendor of fabric shall furnish with each shipment three copies of a report showing the results of tests to determine conformance to the acceptance test requirements and, when performed, the results of tests to determine conformance to the periodic test requirements and stating that the fabric conforms to the other technical requirements of this specification. This report shall include the purchase order number, material specification number, fabric style number, vendor's material and finish designation, date of finishing, lot number(s), and quantity of each lot and of the total shipment.