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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3833A

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Submitted for recognition as an American National Standard

CLOTH, BROADCLOTH, POLYESTER/COTTON
Polyester Filament, End to End, (Durable Press)

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of July, 1992. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to the initial issue of the subject specification.

"NONCURRENT" refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "NONCURRENT" specifications is available from SAE upon request.

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The Engineering Resource For Advancing Mobility ®

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Polyester Filament, End to End, (Durable Press)

1. SCOPE:

1.1 Form: This specification covers a polyester and cotton blended broadcloth, chemically treated with a durable press finish and cured.

1.2 Application: Primarily for use in the manufacture of shirts.

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 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.2.3.

2.2.1 Federal Specifications:

V-T-285 - Thread, Polyester
PPP-P-1134 - Packaging and Packing of Cotton and Cotton-Synthetic Fiber Blend Fabrics (Excluding Duck Fabrics)

2.2.2 Federal Standards:

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

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

Textile Fiber Products Identification Act, Rules and Regulations

2.3 AATCC Publications: Available from American Association of Textile Chemists and Colorists, Research Triangle Park, P.O. Box 886, Durham, NC 27709,

Technical Manual of the AATCC

3. TECHNICAL REQUIREMENTS:

3.1 Material:

3.1.1 Fibers:

3.1.1.1 Polyester Fiber: The fiber shall be polyethylene glycol teraphthalate.

3.1.1.2 Cotton: Shall be carded and combed.

3.1.2 Yarns:

3.1.2.1 Warp: One warp yarn shall be 150 denier, 100% continuous filament polyester. One warp yarn shall be a blend of 65% ± 3 polyester and 35% ± 3 cotton, drawn and spun into single yarns.

3.1.2.2 Filling: Shall be a blend of 65% ± 3 polyester and 35 ± 3 cotton, drawn and spun into single yarns.

3.2 Cloth: Shall conform to the following:

3.2.1 Construction: The cloth shall be of an end to end construction with alternating warp ends of 100% continuous filament polyester yarn and a blend of 65% polyester and 35% cotton spun yarn. The finished cloth shall contain 75% ± 3 polyester fiber and not less than 22% cotton based on the dry weight of the desired specimen before treatment and finishing. The "finished cloth" is the standard sample.

3.2.1.1 Sulfur Content: The use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is prohibited. The dyestuff shall be chosen and so applied that the dyed and finished cloth shall contain no more labile sulfur than shown by the standard sample when tested as specified in 4.5. When a standard sample is not available, the dyed and finished cloth shall show no more than a slight trace of labile sulfur as defined in FED-STD.191) Method 2020.

3.2.2 Width: Shall be as specified and shall be the minimum width inclusive of selvage when fly shuttle looms are used, and exclusive of selvages and fringe when shuttleless machines are used.

3.2.3 Cloth Preparation: The dyed and untreated cloth shall be scoured, singed, stabilized, and mercerized, when required, to result in a smooth and lustrous finish equal in character to that of the standard sample and to meet the requirments of this specification.

3.2.4 Treatment: The dyed cloth shall be given an approved (See 8.3) durable press treatment consisting of a suitable catalyzed resin or reactant system and hand modifiers. A wetting agent may be used to facilitate processing. Durable press resins other than those approved for use are prohibited. The cloth shall be so processed that the finished cloth shall meet the applicable requirements of this specification.

3.3 Properties: Finished cloth shall have the following properties:

3.3.1	Weight	3.7 to 4.2 oz per sq yd (125 - 140 g/m^2)
3.3.2	Yarns per in (25.4 mm), min	
	Warp	85
	Filling	54
3.3.3	Breaking Strength, min	
	Warp	100 lb (445 N)
	Filling	80 lb (355 N)
3.3.4	Weave	Plain
3.3.5	Tearing Strength, min	
	Warp and Filling, each	5 lb (20 N)

3.3.6 Nonfibrous Material: The starch and protein content, including chloroform-soluble and water-soluble material, of the dyed and untreated cloth shall not exceed 1.5%.

3.3.7 Shrinkage: The cloth shall be preshrunk and shall not shrink more than 2.0% in either the warp or the filling direction. The preshrinking process used shall not be identified by name or trademark either on the cloth, ticket, or package.

3.3.8 pH: The pH value of the water extract of the dyed, treated, and cured (finished) cloth shall be not less than 5.0 nor more than 8.5.

3.3.9 Seam Efficiency: The treated and finished cloth shall have a seam efficiency of not less than 85%.

3.3.10 Appearance: The cured cloth shall show a minimum average appearance rating per sample unit of not less than 3.0 after 5 launderings.

3.3.11 Color: Shall be Air Force Blue 1580 and shall match the standard sample (See 3.2.1). The cloth shall be cross (piece) dyed in such a manner that the 100% continuous filament polyester yarns are dyed solid blue and the blended polyester/cotton warp and filling yarns are white.

3.3.11.1 Matching: The treated and finished cloth shall match the standard sample under artificial daylight having a color temperature of 7,000°K ± 100 and shall be a good approximation to the standard sample under incandescent lamp light at 2,850° Kelvin ± 100.

3.3.11.2 Colorfastness: The finished cloth shall show fastness to combined laundering and bleaching, cracking, perspiration, and light equal to or better than the standard sample. When no standard sample has been established or designated as applicable to colorfastness, the finished cloth shall show good fastness to combined laundering and bleaching, perspiration, and light and shall show a Munsel value for cracking not lower than 8.5.

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 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.

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
Polyester Identification	3.1.1.1
Cotton Identification	3.1.1.2
Weight of Finished Cloth	3.3.1
Yarns per in. (25.4 mm)	3.3.2
Breaking Strength of Finished Cloth	3.3.3
Weave	3.3.4
Tearing Strength of Finished Cloth	3.3.5
Quality	3.4

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this 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: 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 three.

4.3.1.1 A lot shall be all cloth of a single size and configuration produced in a single production run under the same fixed conditions and presented for vendor's inspection at one time. For mechanical testing, an inspection lot shall not exceed 5,000 yd (4,570 m), 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 The sample unit for finished cloth shall be 4 continuous yd (3.5 continuous m), full width. For untreated cloth, the sample unit shall be 0.5 yd (0.5 m), full width. The lot 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 test requirement specified. Sample size shall be in accordance with Table I.

TABLE I

Sample Size

Lot Size		Sample Size
Yards	Metres	
up to 800, incl	up to 730, incl	2
Over 800 to 27,000, incl	Over 730 to 20,115, incl	3
Over 27,000	Over 20,115	5

4.3.1.4 Yard-by-Yard (Metre-by-Metre) Examination: Each roll in the sample shall be examined on the face side only. When the total length in the roll does not exceed 100 yd (90 m), the entire length of the roll shall be examined. When the total length in the roll exceeds 100 yd (90 m), only 100 yd (90 m) shall be examined. All defects as defined in FED-STD-4, Section I, shall be scored and assigned demerit points as listed in 4.3.1.4.1, except that only those slubs and knots which exceed the limits shown in Sears Fabric Defect Scales (See 8.5), F for slubs and D for knots, shall be scored. No linear yd (linear m) [increments of 1 yd (1 m) on the measuring device of the inspection machine] from any roll within the sample shall be penalized more than 4 points. The sample size shall be in accordance with the following:

Lot Size		Sample Size 1/
Yards	Metres	
Up to 3,200, incl	Up to 2,925, incl	8
Over 3,200 to 10,000, incl	Over 2,925 to 9,145, incl	13
Over 10,000	Over 9,145	20

1/ No more than 1 roll shall be taken from any shipping container unless the number of shipping containers in the lot is less than the required number of rolls, in which case, all shipping containers shall be present in the sample.

4.3.1.4.1 The lot shall be unacceptable if the points per 100 sq yd (85m^2) of the total length examined exceeds 40. The lot shall. be unacceptable if the points per 100 sq yd (85 m^2) of two or more individual rolls exceeds 55. If no individual roll exceeds the point level, the lot shall be acceptable with respect to this characteristic. If one roll exceeds the point level, a second sample, equal in size to the first, shall be examined only for individual roll quality, The lot shall be unacceptable if one or more rolls in the second sample exceed the point level. Point computation for lot quality and individual roll quality shall be as follows:

4.3.1.4.1.1 In inch/pound units:

$$\frac{\text{Total points scored in sample} \times 3600}{\text{Contracted width of cloth, in., x total yd inspected}} = \text{Points per 100 sq yd}$$

4.3.1.4.1.2 In SI units:

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

4.3.1.4.2 Demerit Points: Demerit points shall be assigned as follows:

	Points
For defects 3 in. (75 mm) and under in any dimension	1
For defects over 3 to 6 in. (75 to 150 mm), incl, in any dimension	2
For defects over 6 to 9 in. (150 to 225 mm), incl, in any dimension	3
For defects over 9 in. (225 mm) in any dimension	4
Baggy, ridgy, or wavy cloth	4
Objectionable odor	4
Width less than minimum specified	4
Poor dye penetration, mottled, streaky, or cloudy	4
Character of finish not equal to standard smaple	4

4.3.1.5 Examination for Length:

4.3.1.5.1 Individual Rolls: During the yard-by-yard (metre-by-metre) examination, each roll in the sample shall be examined for length. Any length found to be less than the minimum specified or more than 2 yd (1.8 m) less than the length marked on the ticket, shall be considered a defect with respect to length. The lot shall be unacceptable if two or more rolls in the sample are defective in respect to length.

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

4.3.1.6 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 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.

4.3.1.7 Examination for Identification of Preshrinkage Process and Noncompliance with the Textile Fiber Products Identification Act and Marking: During the yard-by-yard (metre-by-metre) examination, each roll in the sample shall be examined for identification of preshrinkage process and noncompliance with the Textile Fiber Products Identification Act. The lot shall be unacceptable if two or more rolls in the sample contain

4.3.1.7 (Cont'd.)

identification of a preshrinkage process by name or trademark on the cloth or ticket, or are not labeled or ticketed in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act or the FACE stamp missing from either or both ends, or the FACE stamp on the wrong side.

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 chnage 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.

4.5 Test Methods: Shall be as specified in Table II and as in 4.5.1 through 4.5.3.3.1.

TABLE II

Test Methods

Characteristic	Visual, FED-STD-191, Method or Paragraph No.
Dyed Untreated Cloth:	
Fiber Content	
Polyester (%)	2100
Cotton	2100
Yarn (Single)	
Warp	Visual 1/
Filling	Visual 1
Weave	Visual 1/
Nonfibrous Materials	2611
Mercerization	2/

TABLE II (Cont'd.)

Test Methods

Treated and Finished Cloth:

Yarns per in. (25.4 mm)	
Warp	5050
Filling	5050
Breaking Strength	
Warp	5100
Filling	5100
Tearing Strength	
Warp	5132
Filling	5132
Sulfur Content	2020
Colorfastness to:	
Combined Laundering and Bleaching	5605
Crocking	5651
Perspiration	5680
Light	5660 3/
Weight	5041
Appearance after 5 Launderings	4.5.3
Shrinkage	
Warp	5552
Filling	5552
Seam Efficiency	5110 4/
pH	2811

1/ One determination per sample unit and the result reported as "pass" or "fail". (See 4.5.3).

2/ Microscopic examination for swelling of the cloth fibers. One determination per sample unit and the result reported as "pass" or "fail".

3/ Method 5660 shall be used except that exposure of the specimen and standard sample shall be for 20 standard fading hours. Any specimen showing discoloration less than or equal to that of the standard sample shall be rated "satisfactory". Any specimen showing discoloration greater than that of the standard sample shall be rated "unsatisfactory"$_m$ One determination shall be made for each sample unit and the result reported as "pass" or "fail".

4/ The needle shall measure 0.036 in. ± 0.001 (0.91 mm ± 0.02) across the blade at the eye. The polyester thread shall conform to V-T-285, Type I, Class I. The needle thread shall be size AA and the looper thread shall be size A.

4.5.1 Fiber: The polyester filament shall be insoluble in each of the following solvents: acetone (boiling); 70% sulfuric acid; 5.0% sodium hydroxide (boiling); and methylene chloride (boiling). The methylene chloride shall be prepared by mixing 9 parts methylene chloride with 1 part U.S.P. (95%) ethyl alcohol. The methylene chloride solution is extremely toxic and adequate ventilation should be provided; use of a fume hood is recommended. Unless otherwise specified, the above solvents shall be used at room temperature, using 100 times as much solvent as fiber. The fiber shall remain in the solvent for 10 min. ± 1 with intermittent stirring. This is a visual qualitative test,

4.5.2 Test for Polyester Fiber and Cotton Content: The general procedures of FED-STD-191, Method 2100, shall be followed and the fiber content percentage shall be calculated as follows:

$$\frac{\text{Weight of Dry Residual Fiber} \times 100}{\text{Weight of Dry Desized Specimen}} = \% \text{ Polyester}$$

100 - % polyester = % Cotton

4.5.2.1 Report: Two specimens shall be tested from each sample unit and the average percent polyester and the average percent cotton of the two specimens shall be reported to the nearest 1.0%.

4.5.3 Appearance of Cloth: Apparatus and material shall be as specified in AATCC 124-169.

4.5.3.1 Apparatus and Material:

4.5.3.1.1 The following apparatus and materials are required for laundering:

4.5.3.1.1.1 Kenmore automatic washing machine, Model 600, or equivalent.

4.5.1.1.1.2 Kenmore automatic dryer, Model 600, or equivalent.

4.5.3.1.1.3 AATCC standard detergent, or equivalent.

4.5.3.1.1.4 Mineral oil, Nujol, Plough Inc., Memphis, TN, or equivalent.

4.5.3.1.1.5 AATCC standard blotting paper, or equivalent.

4.5.3.1.1.6 Five lb (2.25 kg) cylindrical weight, 2.5 in. (65 mm) in diameter.

4.5.3.1.1.7 Dummy pieces for ballast, 36 x 36 in. (1 x 1 m) hemmed of type 128 sheeting, or similar fabric, added to test specimens to make an approximate 4 lb (1.8 kg) load.

4.5.3.1.1.8 AATCC glassine paper, or equivalent.

4.5.3.2 Preparation of Specimen for Evaluating Appearance: Three specimens 15 x 15 in. (375 x 375 mm), measured parallel to the warp and filling, shall be cut from a portion of the treated and finished cloth sample.