

AEROSPACE MATERIAL SPECIFICATION

Issued JAN 1946
Revised JUL 1993
Reaffirmed JAN 2006

Superseding AMS 3806D

Cloth, Airplane, Mercerized Cotton
80 Pounds Force (356 N) Breaking Strength

1. SCOPE:

1.1 Form:

This specification covers one strength and one weave of mercerized cotton cloth known as "airplane cloth."

1.2 Application:

This cloth has been used typically for covering aircraft surfaces, such as wings, fuselage, ailerons, elevators, and other airfoil surfaces, but usage is not limited to such applications.

1.3 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.

SAE Technical Standards Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2006 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: <http://www.sae.org>

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 629 Quantitative Analysis of Textiles
ASTM D 3775 Fabric Count of Woven Fabric
ASTM D 3776 Mass per Unit Area (Weight) of Woven Fabric
ASTM D 5034 Breaking Force and Elongation of Textile Fabrics (Grab Test)
ASTM D 5035 Breaking Force and Elongation of Textile Fabrics (Strip Test)

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 Material:

- 3.1.1 Mercerization: The cloth shall be piece mercerized, or the yarn may be mercerized under tension.
- 3.1.2 Yarn: The cloth shall be woven from 2-ply, combed cotton yarn.
- 3.1.3 Weave: The weave shall be plain (one up and one down).
- 3.1.4 Finishing: The cloth shall be uniformly finished in accordance with the best practice for high-grade airplane cloth. Finishing shall consist of washing, framing, and calendering. The calendering shall be sufficient to lay any nap present and shall provide a smooth, even surface. Nap may be removed by singeing.

3.2 Properties:

The cloth shall conform to requirements shown in Table 1; tests shall be performed on the cloth supplied and in accordance with specified test methods.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Weight:		ASTM D 3776
3.2.1.1	Ounces per square yard, maximum		
	Nominal width: 36 inches	4.0	
	42 inches	4.0	
	60 inches and over	4.5	
3.2.1.2	g/m ² , maximum		
	Nominal width: 914 mm	136	
	1067 mm	136	
	1524 mm and over	153	
3.2.2	Thread Count, ends per inch (25.4 mm):		ASTM D 3775
	Warp and Fill, each	80 to 84	
3.2.3	Breaking Strength, each direction:		ASTM D 5035,
	Pounds force per inch width, minimum	80	
	(kN/m width), minimum	(14.0)	
3.2.4	Elongation:	Warp	Fill
	At 70 pounds force (311 N) load, (All Widths), maximum	16%	11%
3.2.5	Burst Strength: Mullen, minimum	170 points	4.5.2
3.2.6	Sizing, Finishing, and Other Non-Fibrous Materials, maximum	3.5%	ASTM D 629, Equation 3
3.2.6.1	A desizing operation may be performed to reduce the sizing content to the maximum specified.		

3.3 Quality:

The cotton fibers shall be evenly spun into yarns of proper and uniform yarn count, twist, and diameter to produce the texture and weight required. The yarn shall be reasonably free from nap breaks, broken ends, uneven threads, and knots. Yarns shall be closely woven into fabric, uniform in body and appearance, and which shall be reasonably free from striations due to variable weaving operations.

3.4 Tolerances:

Shall be as shown in Table 2.

3.4.1 Width:

TABLE 2A - Width Tolerances, Inch/Pound Units

Nominal Width Inches	Tolerances plus and minus Inches
36	1/2
42	5/8
60	1
69	1
90	1 1/2

TABLE 2B - Width Tolerances, SI Units

Nominal Width Millimeters	Tolerances plus and minus Millimeters
914	12.7
1067	15.9
1524	25.4
1753	25.4
2286	38.1

3.4.2 Length of Cut: The length of a single cut shall be not less than 40 yards (36.6 m) except that 10% of the total yardage of one width under any contract or order may be in short lengths of 10 to 25 yards (9 to 23 m). However, short lengths shall be rolled together and the roll properly labeled to indicate that it is composed of short lengths.

3.4.3 Length of Roll: The cloth shall be furnished on rolls containing the lengths shown in Table 3.

TABLE 3A - Roll Lengths, Inch/Pound Units

Nominal Width Inches	Roll Length Yards
36 and 42	500 to 600
60 and 69	250 to 300
90	175 to 200

TABLE 3B - Roll Lengths, SI Units

Nominal Width Millimeters	Roll Length Meters
914 and 1067	457 to 549
1524 and 1753	229 to 274
2286	160 to 183

4. QUALITY ASSURANCE PROVISIONS:

- 4.1 The vendor of cloth shall supply all samples 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.
- 4.2 Classification of Tests:
- 4.2.1 Acceptance Tests: Tests for weight (3.2.1), thread count (3.2.2), breaking strength (3.2.3), elongation (3.2.4), quality (3.3), and tolerances (3.4) are acceptance tests and shall be performed on each lot.
- 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:

4.3.1 For Acceptance Tests: Each lot of cloth shall be 100% examined visually for quality (3.3). Sufficient cloth shall be taken at random from each lot to perform all other 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, taken from the full width of cloth.

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. A lot shall not exceed 5000 yards (4572 m).

4.3.1.2 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.

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. 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:

4.5.1 Elongation: Shall be determined in accordance with ASTM D 5035, at 70 pounds force (311 N) with elongation measured from a base line on the chart to a point at which the curve intersects 70 pounds force (311 N) load ordinate with the base line passing through the point where the curve leaves the zero ordinate.

4.5.2 Bursting Strength: Shall be determined with a hydraulic-type machine in which the cloth is firmly clamped against a rubber diaphragm, through which the pressure is applied to a circular area of approximately 1 square inch (645 mm²). The pressure required to burst the cloth is registered on an accurate Bourdon tube-type gage, calibrated in pounds per square inch (kPa), the readings of which are designated as points. The bursting strength shall be ascertained by taking the average of not less than 10 tests. No less than 20 tests shall be made before a delivery of cloth is rejected.