SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS3792 REV. C

Issued 1983-10
Revised 1994-10
Stabilized 2015-04

Superseding AMS3792B

Tape, Low Modulus Aramid
300 (1334), 1000 (4448) and 8000 (13,345) Breaking Strength

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

STABILIZED NOTICE

This document has been declared "Stabilized" by SAE AMS P, Polymeric Materials Committee, and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

SAENORM.COM : Click to view the full PDF of ams3792c

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 © 2015 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: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS3792C

1. SCOPE:

1.1 Form:

This specification covers a low-modulus aramid in the form of tape.

1.2 Application:

This tape has been used typically in construction of parachutes, but usage is not limited to such applications.

1.3 Classification:

This tape is classified by breaking strength as follows:

Class 1 - 300 pounds force (1334 N)
Class 2 - 1000 pounds force (4448 N)
Class 3 - 3000 pounds force (13,345 N)

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.

SAENORM.COM : Click to view the full PDF of ams3792c

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 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 123 Terminology Relating to Textile Materials
ASTM D 737 Air Permeability of Textile Fabrics
ASTM D 1682 Breaking Load and Elongation of Textile Fabrics
ASTM D 3774 Width 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.

FED-STD-4 Glossary of Fabric Imperfections
FED-STD-191 Textile Test Methods
FED-STD-595 Color

MIL-W-43334 Webbing and Tape, Textile, Packaging and Packing of

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

2.3 Other Publications:

Available from Federal Trade Commission, Washington, DC 20580.

Rules and Regulations Under the Textile Fiber Products Identification Act

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Tape shall be woven from low-modulus aramid fibers.

3.2 Properties:

Shall be as shown in Table 1.

SAENORM.COM : Click to view the full PDF of ams3792c

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Yarn		
3.2.1.1	Twist		FED-STD-191, Method 4054
3.2.1.1.1	Class 1	7.5 ± 1 turns per inch (25 mm)	
3.2.1.1.2	Class 2	5.0 ± 1 turns per inch (25 mm)	
3.2.1.1.3	Class 3	3.0 ± 0.5 turns per inch (25 mm)	
3.2.1.2	Warp Yarn		
3.2.1.2.1	Denier All Classes	200 ± 15	4.5.1.1
3.2.1.2.2	Filaments All Classes	100 ± 10	Visual
3.2.1.2.3	Ply		Visual
3.2.1.2.3.1	Class 1 and Class 2	One	
3.2.1.2.3.2	Class 3	Four	
3.2.1.3	Filling Yarn		
3.2.1.3.1	Denier		4.5.1.1
3.2.1.3.1.1	Class 1	100 ± 10	
3.2.1.3.1.2	Class 2 and Class 3	200 ± 15	
3.2.1.3.2	Filaments		Visual
3.2.1.3.2.1	Class 1	50 ± 10	
3.2.1.3.2.2	Class 2 and Class 3	100 ± 10	
3.2.1.3.3	Ply		Visual
3.2.1.3.3.1	Class 1	One	
3.2.1.3.3.2	Class 2	Two	
3.2.1.3.3.3	Class 3	Four	
3.2.1.4	Char Temperature	355 °C (671 °F)	4.5.1.2
3.2.2	Tape		
3.2.2.1	Weave	The body weave shall be a 2-up and 2-down right-hand twill. The selvage shall be a double plain weave of conventional hatband type.	FED-STD-191 Method 5050
3.2.2.2	Width	Shall be 2.00 inches ± 0.06 (50.8 mm ± 1.5)	ASTM D 3774
3.2.2.3	Color	Shall be olive green 106. The color shall be obtained by use of melt spun solution dyed yarn.	FED-STD-595

SAENORM.COM : Click to view the full PDF of ams3792c

TABLE 1 - (Continued)

Paragraph	Property	Requirement	Test Method
3.2.2.4	Weight		ASTM D 3776
3.2.2.4.1	Class 1	Shall be not less than 100 yards/pound (202 m/kg)	
3.2.2.4.2	Class 2	Shall be not less than 30 yards/pound (60 m/kg)	
3.2.2.4.3	Class 3	Shall be not less than 12 yards/pound (24 m/kg)	
3.2.2.5	Breaking Strength		
3.2.2.5.1	Class 1	Shall be not less than 300 pounds force (1334 N) unaged, and not less than 85% of the unaged value after heat aging.	4.5.2.1 4.5.2.2
3.2.2.5.2	Class 2	Shall be not less than 1000 pounds force (4448 N) unaged, and not less than 85% of the unaged value after heat aging.	4.5.2.1 4.5.2.2
3.2.2.5.3	Class 3	Shall be not less than 3000 pounds force (13,345 N) unaged, and not less than 85% of the unaged value after heat aging.	4.5.2.1 4.5.2.2
3.2.2.6	Elongation	Shall be not less than 12.0%	4.5.2.1
3.2.2.7	Air Permeability, Class 1 only	Shall be 75 cubic feet (m^3) ± 20/minute for each square foot (23 m^3 ± 6/minute for each m^2).	4.5.2.3
3.2.2.8	Count		FED-STD-191, Method 5050
3.2.2.8.1	Class 1	Total warp ends shall be not less than 150, with not less than 16 warp ends in the selvage, determined on full width of tape. Filling shall be not less than 70 picks per inch (25 mm).	
3.2.2.8.2	Class 2	Total warp ends shall be not less than 480, determined on full width. Filling shall be not less than 34 picks per inch (25 mm).	
3.2.2.8.3	Class 3	Total warp ends shall be not less than 358, determined on full width. Filling shall be not less than 24 picks per inch (25 mm).	
3.2.2.9	Length and Put-up	Tape shall be put up on spools of 120 to 150 yards (110 to 137 m). No spool shall contain more than three pieces and no piece shall be less than 40 yards (37 m) in length.	

SAENORM.COM : Click to view the full PDF of ams3792c

3.4 Quality:

Tape, as received by purchaser, shall be clean, evenly woven, and free from foreign materials and from imperfections detrimental to usage of the tape.

3.4.1 Imperfections: Acceptability of each lot of tape shall be based on imperfections defined in FED-STD-4 and as specified in Table 2 herein,

3.4.2 Yard-by Yard Examination: The required length of each spool shall be inspected and visual imperfections classified as listed in Table 2. The imperfections found shall be counted regardless of their proximity to each other, except where two or more imperfections represent a single local condition of the tape, in which case only the more serious imperfection shall be counted. A continuous imperfection shall be counted as one imperfection for each warpwise yard (0.9 m), or fraction thereof, in which it occurs. Acceptable shall be based on 0.40 major imperfections and 1.50 total imperfections per 100 yards (91 m). The lot size shall be expressed in units of 1 linear yard (0.9 m) each. An approximately equal number of yards (meters) shall be examined from each spool selected. The number of spools from which the sample is to be selected shall be in accordance with Table 3. The terms "clearly noticeable" and "noticeable" shall be interpreted to mean visible at normal inspection distance of approximately 3 feet or 0.9 meters. Definitions of terms used herein are covered in ASTM D 123.

TABLE 2 - Classification of Imperfections

Imperfection	Description	Classification
Abrasion Marks	Resulting in rupture of yarns or in nap sufficient to obscure the identity of any yarn over 10% of width or 1 inch (25 mm) in length.	Major
Broken or missing end	Two or more regardless of length or a single end over 6 inches (152 mm) in length.	Major
	Single end from 0.25 to 6.0 inches (6.4 to 152 mm), inclusive, in length.	Minor
Broken or missing pick	Two or more regardless of extent.	Major
Coarse or light filling bar	Resulting in noticeable difference in stiffness or thickness of tape and extending over 0.25 inch (6.4 mm) in the length direction.	Major
	Resulting in noticeable difference in stiffness or thickness of tape and extending 0.25 inch (6.4 mm) or under in length direction.	Minor
Cut, hole, or tear	Any cut, hole, or tear.	Major
Drop ply	Clearly noticeable on more than two ends within same length and extending over 9 linear inches (229 linear mm) or more.	Major
	Clearly noticeable on one or two ends within same length and extending over 9 linear inches (229 linear mm) or more.	Minor
Edges	Frayed, slack, or otherwise poorly constructed and over 0.25 inch (6.4 mm) in length.	Major
Fine or light filling bar, light place	Clearly noticeable	Major

SAENORM.COM : Click to view the full PDF of ams3792c

TABLE 2 - (Continued)

Imperfection	Description	Classification
Floats or skips	Multiple, Ø.5 inch (13 mm) or over in combined warp and filling direction, or single float or skip over more than 1 inch (25 mm).	Major
	Multiple, under Ø.5 inch (13 mm) in combined warp and filling direction, or single float or skip over Ø.5 inch (12.7 mm), but not over 1 inch (25 mm) if in warp, or over Ø.25 inch (6.4 mm) of the width but not over 1 inch (25 mm) if in the filling.	Minor
Hitchback crack	Clearly noticeable opening between adjoining picks, or warpwise tension area over part of the width resulting in noticeable light or heavy places.	Minor
Jerked-in filling, slough-off, slug	More than twice the thickness of the normal yarn.	Minor
Kinks	More than three kinks in any 9 linear inches (229 linear mm).	Major
Knots	More than two knots in any 9 linear inches (229 mm).	Major
	Single knot with untrimmed ends extending over Ø.06 inch (1.5 mm)from surface of tape.	Minor
Mispick, double pick	Two or more across the full width.	Major
	Single across the full width.	Minor
Slack end	Two or more in the same length, jerked-in between picks, or forming clearly noticeable loops on the surface of tape.	Major
	Single jerked-in between picks or forming clearly noticeable loops on surface of tape.	Minor
Slub (slug) or gout	More than twice the thickness of the yarn (or ply, if plied).	Minor
Smash	Any smash	Major
Spot, stain, or streak	Any clearly noticeable dirt, rust, grease, oil spot, stain, or streak.	Minor
Tight end	Clearly noticeable	Major
Tight pick or tight filling	Resulting in rolling of tape	Major
Twist or distortion	Twisted or distorted. Will not lay flat upon application of manual pressure.	Minor
Weak, soft, or tender spot	Any weak, soft or tender spot.	Major
Width	Beyond specified tolerance.	Minor
Wrong draw	Extending for more than 9 inches (229 mm).	Minor

SAENORM.COM : Click to view the full PDF of ams3792c

3.4.3 Overall Examination: Objectional odor, overall uncleanliness, and uneven weaving throughout shall be counted no more than once in each spool examined. The sample unit for this examination shall be one spool. The sample size and acceptance number shall be as shown in Table 4.

3.5 Sizes and Tolerances:

Shall be as specified in Table 1 for width, weight, and length.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The manufacturer of the tape shall supply all samples for required tests and shall be responsible for all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

All technical requirements are acceptance tests and preproduction tests and shall be performed prior to or on the initial shipment of tape to a purchaser, on each lot, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 For direct U.S. Military procurement, substantiating test data, and, when requested, preproduction test tape 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 tape shall be visually examined as required 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, as specified in Table 5, taken from three linear yards (2.7 linear m) of tape.

4.3.1.1 Yarn Tests: Prior to weaving the tape, the yarn shall be sampled as shown in Table 3, using one cone, one tube, or one spool as the sample unit. The lot shall be unacceptable if one or more units fail to meet any requirement specified.

SAENORM.COM : Click to view the full PDF of ams3792c

TABLE 3 - Yarn Sampling

Lot Size Yards	Lot Size Meters	Number of Sample Units
Up to 800, incl	Up to 732, incl	2
Over 800 to 10,000, incl	Over 732 to 9,144, incl	3
Over 10,000	Over 9,144	5

4.3.1.2 Yard-by-Yard Examination of Tape: The unit of tape for this examination shall be one linear yard (0.9 linear meter). The sample size shall be in accordance with Inspection Level III of MIL-STD-105.

4.3.1.3 Overall Examination: The sample unit for this examination shall be one spool. The sample size and acceptance number shall be as shown in Table 4. If a lot contains less than five spools, each spool in the lot shall be examined.

TABLE 4 - Sampling for Overall Examination and Properties

Lot Size Yards	Lot Size Meters	Sample Size Rolls	Max Number of Imperfections Accepted in Sample
Up to 1,200, incl	Up to 1,097, incl	5	0
Over 1,200 to 3,200, incl	Over 1,097 to 2,926, incl	7	0
Over 3,200 to 10,000, incl	Over 2,926 to 9,144, incl	10	0
Over 10,000 to 35,000, incl	Over 9,144 to 32,004, incl	15	0
Over 35,000 to 150,000, incl	Over 32,004 to 137,160, incl	25	1
Over 150,000	Over 137,160	35	1

4.3.1.4 Property Examination: The sample unit shall be not less than eight linear yards (7.3 linear m). The specified values apply to the average of the determinations made on a sample unit. The sample size shall be as specified in Table 5. The lot shall be unacceptable if one or more samples fail to meet any requirement specified.

TABLE 5 - Sampling for Tape Tests

Requirement	Number of Determinations per Requirement
Width	3
Weight	3
Yarn Count	3
Weave	1
Breaking Strength Unaged	5
Breaking Strength Aged	5
Elongation	5
Air Permeability	3

SAENORM.COM : Click to view the full PDF of ams3792c

4.3.1.5 A lot shall be all tape of a single size and configuration produced in a single run under the same fixed conditions and presented for manufacturer's inspection at one time. For breaking strength and elongation testing (4.5.2.1 and 4.5.2.2), a lot shall not exceed 5000 yards (4572 meters).

4.3.1.6 A statistical sampling plan, acceptable to purchaser, may be used in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.

4.4 Approval:

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

4.4.2 Manufacturer shall use ingredients, manufacturing procedures, processes, and methods of inspection on production tape 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, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample tape. Production tape made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

Shall be as follows:

4.5.1 Yarn Tests:

4.5.1.1 Denier: Shall be determined in accordance with FED-STD-191, Method 4021, and as follows:

4.5.1.1.1 Measure a 900-mm length of yarn to the nearest millimeter.

4.5.1.1.2 Weigh the yarn sample to the nearest milligram.

4.5.1.1.3 Calculate the denier (weight per length) using Equation 1.

$$\text{Denier} = \text{weight in grams of 9000 m} = \text{weight of 900-mm sample} \times 10{,}000 \qquad \text{(Eq. 1)}$$

4.5.1.2 Carbonization: Shall be determined in accordance with FED-STD-191, Method 1534, and as follows:

4.5.1.2.1 Apparatus: A suitable melting point apparatus shall be used.

SAENORM.COM : Click to view the full PDF of ams3792c

4.5.1.2.2 Procedure: A sufficient number of fibers shall be removed from the yarn or tape sample for evidence of carbonization. The temperature at which the yarn begins to stiffen or char shall be considered the end point of the test.

4.5.2 Tape Tests:

4.5.2.1 Breaking Strength and Elongation (Unaged): Breaking strength and elongation of the unaged tape shall be determined in accordance with ASTM D 5034 or ASTM D 5035, except as given below. The strength and elongation shall be reported as the average of five tests made on each sample. The test report shall list any optional exception to ASTM D 5034 or ASTM D 5035 test conditions used.

4.5.2.1.1 The following exceptions are permitted for Class 1 and Class 2 tapes.

4.5.2.1.1.1 The test specimen shall be full width and warp tests only shall be performed.

4.5.2.1.1.2 The jaws of the clamp shall be at least 0.5 inch (13 mm) wider than the full specimen width.

4.5.2.1.2 The following optional exceptions are permitted for Class 3 tape:

4.5.2.1.2.1 Split drum jaws may be used.

4.5.2.1.2.2 The no-load rate of jaw separation may be 4 inches/minute (1.7 mm/s).

4.5.2.1.2.3 The distance between centers of jaws or drums may be 10.5 inches (267 mm) at the beginning of test.

4.5.2.1.2.4 In lieu of an elongation recording device on the testing machine, elongation may be measured using a minimum distance of 5 inches (127 mm) on test specimens and measuring the maximum extension at 90% of breaking load.

4.5.2.2 Breaking Strength (Aged): The size of the specimen for oven aging shall be the same as for unaged breaking strength specimens. The specimens shall be placed in an oven at 260 °C ± 6 (500 °F ± 11) for four hours ± 0.25. Upon removal, the specimens shall be conditioned at 20 °C ± 1 (68 °F ± 2) and 65% ± 2 relative humidity for not less than four hours and then tested for breaking strength as specified in 4.5.2.1. The loss in breaking strength due to the aging treatment shall be reported as percent loss from that of the unaged specimens.

4.5.2.3 Air Permeability: Shall be determined in accordance with ASTM D 737, except that the fabric orifice shall have an area of 1 square inch (645 mm^2). Report value as the average of three specimens for each determination.

SAENORM.COM : Click to view the full PDF of ams3792c