SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 3796A

Issued 1 JAN 1987
Revised 1 JAN 1993

Superseding AMS 3796

Submitted for recognition as an American National Standard

WEBBING, NYLON, AIRCRAFT ARRESTING

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 revision 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.

PREPARED UNDER THE JURISDICTION OF AMS COMMITTEE “CP”.

AN AMERICAN NATIONAL STANDARD

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

AMS 3796

Issued 1-1-87

WEBBING, NYLON, AIRCRAFT ARRESTING

1. SCOPE:

1.1 Form: This specification and its supplementary detail specifications cover two types of nylon and one type of nylon/polyester in the form of webbing.

1.2 Application: Primarily for use in land-based aircraft arresting system.

1.3 Classification: The webbing shall be classified by yarn composition and breaking strength as shown in the title of the detail specification.

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

ASTM D123 - Terminology Relating to Textile Materials
ASTM D1777 - Measuring Thickness of Textile Materials

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120 except as specified in 2.3.4.

2.3.1 Federal Standards:

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

2.3.2 Military Specifications:

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

2.3.3 Military Standard:

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

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

Textile Fiber Products Identification Act, Rules and Regulations

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specification: The requirements for a specific webbing shall consist of all requirements specified herein in addition to the requirements specified in the applicable detail specification. In case of conflict between requirements of this specification and requirements of the applicable detail specification, requirements of the detail specification shall govern.

3.2 Material:

3.2.1 Webbing: Shall be woven from bright, high tenacity, light and heat resistant yarn of material specified in the applicable detail specification.

3.2.2 Resin: The resin used to treat the webbing shall consist of polyvinyl butyral plasticized with butyl ricinoleate and pigmented with fine carbon black. It shall be applied by water dispersion to produce a uniform black color.

3.3 Properties of Yarn: Shall be as specified in the applicable detail specification, determined in accordance with the following test methods:

Fiber Identification	4.5.1.1
Melting Point	4.5.1.2
Denier	4.5.1.3
Ply	Visual
Twist	FED-STD-191, Method 4054

3.4 Properties of Webbing: Shall be as specified in the applicable detail specification, determined in accordance with 4.5.

3.5 Quality: Webbing, as received by purchaser, shall be clean, evenly woven, and free from foreign materials and from imperfections detrimental to usage of the webbing.

3.5.1 Imperfections: Acceptability of each lot of webbing shall be based on defects defined in FED-STD-4 and as specified in Table I herein; the term "clearly visible" shall mean visible at the normal inspection distance of 3 ft (1 m).

3.5.2 Yard-by-Yard (Metre-by-Metre) Examination: The required length of each piece shall be inspected prior to the resin treatment and visual defects classified as listed in Table I. The defects shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the webbing, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each warp-wise yard (metre), or fraction thereof, in which the defect occurs. The lot shall be unacceptable when one or more critical defects are found in the same sample. The acceptance quality level (AQL) shall be 1.0 major and 2.5 total (major and minor defects combined) defects per 100 linear yd (90 linear m). The lot size shall be expressed in units of 1 linear yd (1 linear m) each. There shall be no more than five pieces in any one lot. The sample size shall be in accordance with MIL-STD-105, Inspection Level III.

TABLE I

Classification of Defects

Defects	Description	Critical	Major	Minor
Abrasion marks	Resulting in broken filaments over 1 in. (25 mm) in any direction and sufficient to obscure the identity of an individual yarn.		X	
	Resulting in broken filaments 1 in. (25 mm) and under in any direction and sufficient to obscure the identity of an individual yarn.			X
Broken or missing pick	Occurring separately or in combination for two or more adjacent picks on the same side of the webbing.	X		

TABLE I

Classification of Defects Continued

Defects	Description	Critical	Major	Minor
	Occurring separately or in combination for two or more picks not adjacent in 1 linear yd (1 linear m) on the same side of webbing.		X	
	Single pick regardless of frequency.			X
Broken or missing end(s)	Two or more adjacent ends over 6 in. (150 mm) in length or single end over 12 in. (300 mm) in length.	X		
	Two or more adjacent ends under 6 in. (150 mm) but over 3 in. (75 mm) in length or a single end under 12 in. (300 mm) but over 6 in. (150 mm) in length.		X	
	Two or more adjacent ends under 3 in. (25 mm) in length but over 1 in. (25 mm) or a single end under 6 in. (150 mm) but over 1 in. (25 mm).			X
Coarse or light filling bar	Resulting in visible difference in thickness of webbing extending for over 1/2 in. (12.5 mm) in the length direction for over 50% of the width.	X		
	Resulting in visible differences in thickness of webbing extending for over 1/4 in. (6.2 mm) but under 1/2 in. (12.5 mm) in the length direction for over 50% of the width.		X	

TABLE I

Classification of Defects Continued

Defects	Description	Critical	Major	Minor
Coarse or light filling bar	Resulting in visible differences in thickness of webbing extending under 1/4 in. (6.2 mm) in the length direction for over 25% of the width.			X
Cut, hole (at least 1/8 in. (3 mm) away from edge	Resulting in exposure of stuffer yarns.	X		
Drop ply	Clearly visible on more than two ends and extending over 9 linear in. (22.5 mm).		X	
Edge loops	Forming loops over 1/8 in. (3 mm) diameter within 1/4 in. (6.2 mm) of the edge for 2 linear in. (50 mm) or over.	X		
	Forming loops over 1/8 in. (3 mm) in diameter within 1/4 in. (6.2 mm) of the edge for over 1/2 in. (12.5 mm) but less than 2 linear in. (50 linear mm).		X	
Edge cut, torn, or frayed	Complete separation of two or more yarns within 1/8 in. (3 mm) of the edge.	X		
	Complete separation of one yarn within 1/8 in. (3 mm) of the edge.		X	
Floats or skips	Multiple, 1/2 in. (12.5 mm) or over in combined warp and filling direction or single float or skip over 1 in. (25 mm).		X	
	Multiple, under 1/2 in. (12.5 mm) in combined warp or filling directions or single float or skip over 1/2 in. (12.5 mm) but not over 1 in. (25 mm) if in warp, or over 1/4 in. (6.2 mm) of the width, but not over 1 in. (25 mm) if in filling.			X

TABLE I

Classification of Defects Continued

Defects	Description	Critical	Major	Minor
Jerked in filling, slough-off, slug	A clearly visible loop of filling pulled in at edges.			X
Kinks	More than three kinks in any 9 linear in. (225 linear mm).		X	
Knots	More than one knot in any 5 linear in. (125 linear mm).		X	
Mispick, double pick	Two or more across full width.		X	
	Single across the full width.			X
Slack end	Two or more not less than 1/2 in. (12.5 mm) in length when the tape is laid flat and without loop distortion with the insertion of a 1/8 in. (3 mm) diameter rod.		X	
	Single not less than 1 in. (25 mm) in length when the tape is laid flat and without loop distortion with the insertion of a 1/8 in. (3 mm) diameter rod.			X
Slub or slag	More than twice the thickness of the yarn (or ply, if plied).			X
Smash	Any smash.	X		
Wrong draw	Extending for over 9 in. (225 mm).		X	

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of webbing 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 webbing conforms to the requirements of this specification and the applicable detail specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification and the applicable detail specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the initial shipment of webbing to a purchaser, on each lot, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 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 not less than the following:

4.3.1 For Acceptance Tests: Each lot of webbing shall be visually examined as required for quality (3.5) and sampled at random for all other tests; except as specified in 4.3.1.1 and 4.5.1, 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 Yarn Tests: Prior to weaving the webbing, the yarn shall be sampled for test as specified below, using one roll as the sample unit. The lot shall be unacceptable if one or more units fails to meet any requirement specified.

Lot Size		Sample Size
Yards	Metres	
Up to 800, incl	Up to 730, incl	2
Over 800 to 22,000, incl	Over 730 to 20,000, incl	3
Over 22,000	Over 20,000	5

4.3.1.2 Yard-by-Yard (Metre-by-Metre) Examination: The sample unit shall be 1 linear yd (1 linear m). Sample size shall be in accordance with MIL-STD-105, Level III.

4.3.1.3 A lot shall be all webbing 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.

4.3.1.4 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.

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

4.4 Approval:

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

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production webbing which are essentially the same as those used on the approved sample webbing. 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 material, processing, or both and, when requested, sample webbing. Production webbing 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: Shall be as specified below.

Requirements	Test Method	Number of Determinations per Test
Fiber Identification	4.5.1.1	1
Melting Point	4.5.1.2	1
Denier	4.5.1.3	1
Ply	Visual	1
Twist	FED-STD-191, Method 4054	3

4.5.1.1 Vendor's statement of compliance will be acceptable.

4.5.1.2 Melting Point: Shall be determined in accordance with FED-STD-191, Method 1534. The unit of yarn shall be at least 6 in. (150 mm) of yarn removed from the webbing. Melting point values may be accepted on the yarn manufacturer's statement of compliance.

4.5.1.3 Denier: Shall be determined as follows:

4.5.1.3.1 Measure a 900 mm length of yarn to the nearest millimetre.

4.5.1.3.2 Weigh the yarn sample to the nearest 10 milligrams.

4.5.1.3.3 Calculate the denier (weight per length) as follows:

Denier = wt in g of 9,000 m = wt of 900 mm sample x 10,000.

4.5.2 Webbing Tests: Shall be as specified in Table II and as follows:

4.5.2.1 Width: Shall be determined in accordance with FED-STD-191, Method 5020, using an apparatus with adjustable caliper jaws having a length of not less than 1 in. (25 mm) and a width of not less than 1/8 in. (3 mm). The webbing shall be held under light tension. The calipers shall be held with the jaws parallel to the webbing edges and inclined, if necessary, so that the jaws are against the total thickness of the solid length portion of the webbing. The applied pressure exerted by the caliper jaws shall be sufficient to press protruding loose ends against the edge of the webbing, compressing or distorting the basic cross-sectional configuration of the solid webbing.

4.5.2.2 Thickness: Shall be determined in accordance with ASTM D1777, using a 6 oz (1.7 N) total load with a presser foot diameter of 1 in. (25 mm).

4.5.2.3 Length: The lot shall be unacceptable if the total of the actual gross length of rolls in the sample is less than the total of the gross lengths marked on the ticket.

4.5.2.4 Compliance with Textile Fiber Products Identification Act: During the examination of rolls for length, each roll in the sample shall be examined for conformance to the Textile Fiber Products Identification Act. Each roll not labeled in accordance with this act shall be a defect. The lot shall be unacceptable if two or more of these defects occur.

4.5.3 Breaking Strength: A 30 ft (9 m) sample shall be taken from the lead end of the first roll of the resin treated webbing. Continuous roll lengths shall have a 30 ft (9 m) sample taken from the last end. Each roll length and corresponding 30 ft (9 m) sample shall have the same number and be numbered consecutively. Three 10-ft (3-m) specimens shall be cut from each 30 ft (9 m) sample. Test grips for holding the specimens shall be so designed that the webbing failure will not occur within the grip. The no-load rate of jaw separation shall be 4 to 8 in. (100 to 200 mm) per minute.

4.5.3.1 Breaking Strength, Sewed Loops: Five specimens of webbing shall be taken from the first production roll. The sewed loops shall be tested in a machine with a load capacity high enough that the webbing rated breaking strength is not at the extreme machine limits.

4.5.4 Extractable Matter: The extractable matter, inclusive of the resin coating, shall be determined on one specimen of approximately 10 g of webbing. The sample, after separation of the warp and filling yarns, shall be dried to constant weight in a weighing bottle at 105°C ± 5 (220°F ± 8). The dried specimen shall be placed in a Soxhlet apparatus; after 6 hr extraction with methyl ethyl ketone, the final weight of the extraction sample shall be obtained by repeating the constant-weight drying conditions specified above. The percent of extractable matter shall be calculated as follows:

$$\% \text{ Extractable Matter} = \frac{\text{Loss in weight on extraction}}{\text{Original dry weight of sample}} \times 100$$

4.5.5 Stiffness Test: A 36-in. (900-mm) length of webbing shall be conditioned for 4.0 hr ± 0.1 by placing the webbing on a horizontal surface and placing sufficient weight on the webbing to remove any longitudinal curvature at room temperature and 65 to 70% relative humidity. Immediately after the conditioning period and under the same atmospheric conditions, the sample shall be extended 16.00 in. ± 0.25 (400 mm ± 6) beyond the edge of the horizontal surface. The supported portion of the webbing shall be sufficiently weighted down to keep it flat on the horizontal surface. At the end of 4.0 hr ± 0.1, make measurements to determine the drop angle.

4.6 Reports:

4.6.1 The vendor of webbing shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements of this specification and the applicable detail specification. This report shall include the purchase order number, AMS 3796, vendor's webbing designation, lot number, quantity, and specified webbing weight.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3796, contractor or other direct supplier of webbing, supplier's webbing identification, part number, and quantity. When webbing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of webbing to determine conformance to the requirements of this specification and the applicable detail specification and shall include in the report either a statement that the webbing conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.7 Resampling and Retesting: If any specimen used in the above tests fail to meet the specified requirements, disposition of the webbing may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the webbing represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Webbing shall be supplied in rolls of the size specified by purchaser.