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 3797B

Issued OCT 1983
Revised MAR 1994

Submitted for recognition as an American National Standard

Superseding AMS 3797A

WEBBING, NYLON, INTEGRAL LOCKING SLOTS

1. SCOPE:

1.1 Form:

This specification covers a nylon in the form of webbing with integral locking slots.

1.2 Application:

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

1.3 Classification:

Nylon webbing with integral locking slots shall be as specified in the applicable detail specification, classified by width and breaking strength. An example is shown in 8.2. The webbing covered by each detail specification appears as part of the title.

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.

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 1777 Measuring Thickness of Textile Materials
ASTM D 3774 Width of Woven Fabric

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

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 Detail Specifications:

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

3.2 Material:

Webbing shall be woven from bright, high tenacity, light and heat resistant nylon yarn, prepared from hexamethylene diamine and adipic acid or its derivatives. It shall have a minimum melting point of 244 °C (471 °F), determined in accordance with 4.5.1. The yarn shall not be bleached in any manner or by any process. The yarn shall be of the filament count, denier, ply, twist, and color, and the weave of webbing shall be as specified in the applicable detail specification.

3.3 Properties of Yarn:

Shall be as specified in the applicable detail specification, determined in accordance with 4.5.1.

3.4 Properties of Webbing:

Shall be as specified in the applicable detail specification, determined in accordance with 4.5.2.

3.5 Repeats Per Radial Seam Length:

Purchaser shall specify a minimum and a maximum length requirement for enclosing a specified number of repeats (solid + slot; see Figure 1). The number of repeats specified shall be equal to the number of slots required for the radial seam construction of the intended parachute. This requirement shall apply throughout the continuous package length or pieces of whole number multiples in a package unit in 3.6. The number of repeats per radial seam length shall be measured as specified in 4.5.3.

3.6 Length of Package Unit (Box or Roll):

Purchaser shall specify the minimum continuous length of webbing for the particular parachute configuration. No piece within the package unit shall be shorter than this minimum length. Longer pieces within the package unit shall be in whole multiples of this specified length. The number of multiple lengths per package unit shall be designated by purchaser.

3.7 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.

3.7.1 Imperfections: Acceptability of each lot of webbing shall be based on imperfections defined in FED-STD-4 and as specified in Table 1, herein.

3.7.1.1 The terms "clearly noticeable" and "noticeable" contained in the imperfection descriptions of Table 1 shall be interpreted to mean clearly visible at normal inspection distance of approximately one yard (0.9 m).

3.7.2 Yard-by-Yard Examination: The required continuous length of each piece shall be inspected and visual imperfections classified as listed in Table 1. 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 webbing, in which case, only the more serious imperfections shall be counted. A continuous imperfection shall be counted as one imperfection for each warpwise 9 inches (229 mm) or fraction thereof in which it occurs. Acceptance shall be based on 0.10 critical imperfections and 10 minor imperfections per 100 units of minimum continuous length. Definitions of terms used herein are covered in ASTM D 123.

TABLE 1 - Classification of Imperfections

Imperfection	Description (See 3.7.1.1)	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.	Critical
Broken or missing end	Two or more regardless of length or a single end over 6 inches (152 mm) in length.	Critical
	Single end under 6 inches (152 mm) but over 0.25 inch (6.4 mm).	Minor
Broken or missing pick	Two or more regardless of extent. The filling tie-in or joining shall not be construed as an imperfection of any nature.	Critical
Coarse or light filling bar	Resulting in visible difference in stiffness or thickness of webbing and extending over 0.25 inch (6.4 mm) in the length direction.	Critical
	Resulting in visible difference in thickness of webbing and extending 0.25 inch (6.4 mm) or under in the length direction.	Minor
Twist or distortion	Due to twist or distortion, webbing will not lay flat upon application of manual pressure.	Minor
Cut, hole, or tear	Any cut, hole, or tear.	Critical
Drop-ply	Clearly visible on more than two ends within same length and extending over 9 linear inches (229 mm) or more.	Critical
	Clearly visible on one or two ends within same length and extending over 9 linear inches (229 mm) or more.	Minor
Edge beaded or corded	Visible increase in edge thickness or misformed edge.	Minor
Edge loopy	Forming clearly visible filling loops or edges tied loosely to body of webbing for 2 linear inches (51 mm) or more.	Critical
Edge loose (slack)	Waviness, distortion, or orientation of filling or looseness of warp end(s) along edge.	Critical
Edge cut, torn, or frayed	Clearly visible along edge.	Critical
Edge tight	Visible tension along edge or waviness that cannot be flattened by manual pressure.	Critical
Edge scalloped	Any indentation of edges above allowable tolerance.	Critical
Floats or skips	Multiple, 0.5 inch (12.7 mm) and over in combined warp and filling directions or single float or skip over more than 1 inch (25 mm).	Critical
	Multiple, under 0.5 inch (12.7 mm) in combined warp and filling directions or a single float or skip over more than 0.5 inch (12.7 mm) but not over 1 inch (25 mm) if in warp, or more than 0.25 inch (6.4 mm) in the width direction, but not over 1 inch (25 mm) if in the filling.	Minor
Hitchback crack	Clearly visible opening between adjoining picks or warpwise tension area over part of the width resulting in visible light and heavy places.	Minor

TABLE 1 - Classification of Imperfections (Continued)

Imperfection	Description (See 3.7.1.1)	Classification
Jerked-in filling, slough-off, slug	A clearly visible loop of filling pulled in at the edges.	Minor
Kinks	More than three kinks in any 9 linear inches (229 mm).	Critical
Knots	More than one knot in any 9 linear inches (229 mm).	Critical
	One knot every 2 yards (1.8 m) with untrimmed ends extending from surface of webbing.	Minor
Mispick, double pick	Two or more across the full width.	Critical
	Single across the full width.	Minor
Slack end	Two or more in the same length jerked in between picks or forming clearly visible loops on the surface.	Critical
Slack end	Single jerked in between picks or forming clearly visible loops on the surface. Single or multiple forming loops on the surface or selvage edge.	Minor
Slub or slug, gout	More than twice the thickness of the yarn (or ply, if plied).	Minor
Smash	Any smash.	Critical
Spot, stain, or streak	Any clearly visible dirt, rust, grease, oil spot, stain, or streak.	Critical
Tight end	Clearly visible up to 12 inches (305 mm) in length.	Critical
Wrong draw	Extending over 9 inches (229 mm).	Critical

3.7.3 Overall Examination: Each imperfection such as objectionable odor, unclean throughout, and uneven weaving throughout shall be counted no more than once in each roll examined. The sample unit for this examination shall be one roll. The sample size and acceptance number shall be as shown in Table 2.

TABLE 2 - Sampling for Overall Examination

Lot Size Yards	Lot Size Meters	Sample Size, Rolls	Maximum Number of Imperfections Accepted in Sample
up to 1,300, incl	Up to 1,189, incl	1	0
Over 1,300 to 3,200, incl	Over 1,189 to 2,926, incl	3	0
Over 3,200 to 8,000, incl	Over 2,926 to 7,315, incl	5	0
Over 8,000 to 22,000, incl	Over 7,315 to 20,117, incl	7	0
Over 22,000 to 110,000, incl	Over 20,117 to 100,584, incl	10	1
Over 110,000	Over 100,584	15	1

3.8 Sizes and Tolerances:

Shall be as specified in the applicable detail specification.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

(R)

Manufacturer of webbing shall supply all samples for required 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 webbing conforms to the requirements.

4.2 Classification of Tests:

Tests for all technical requirements are acceptance tests and 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 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 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:

(R)

Shall be as follows:

4.3.1 For Acceptance Tests: Each lot of webbing shall be visually examined in accordance with Table 2 for quality (3.7) 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 4.5.1 and 4.5.2, taken from 3 linear yards (2.7 linear m) of webbing.

4.3.1.1 Yarn Tests: Prior to weaving the webbing, yarn shall be sampled for test 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 specified requirement.

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 Webbing: The unit of webbing shall be one linear yard (0.9 linear m). The sample size shall be in accordance with MIL-STD-105, Inspection Level III.

4.3.1.3 Webbing - Overall Examination: The sample unit for this examination shall be one roll. The sample size and acceptance number shall be as shown in Table 2. If a lot contains less than three rolls, each roll in the lot shall be examined.

4.3.1.4 Webbing - Property Examination: The sample unit shall be not less than 8 linear yards (7.3 linear m). The values specified apply to the average of the determinations made on a sample unit. The sample size shall be as specified in Table 2. The lot shall be unacceptable if one or more samples fail to meet any specified requirement.

4.3.1.5 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 manufacturer's inspection at one time. The lot size shall be expressed in units of the minimum length repeat (See 3.5 and 3.6).

4.3.1.6 When a statistical sampling plan has been agreed upon by purchaser and (R) manufacturer, 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.

4.4 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.

4.4.2 Manufacturer 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. 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 webbing. Production webbing made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Yarn Tests: Shall be as shown in Table 4.

TABLE 4 - Yarn Tests

Requirement	Test Method	Number of Determinations Per Requirement
Melting Point	4.5.1.1	3
Filament Count	Visual	3
Denier	4.5.1.2	3
Ply	Visual	3
Twist	FED-STD-191, Method 4054	3

4.5.1.1 Melting Point: Shall be determined in accordance with FED-STD-191, Method 1534. The unit of yarn shall be not less than 6 inches (152 mm) of yarn removed from the webbing. May be accepted on the basis of yarn manufacturer's statement of compliance.

4.5.1.2 Denier: Shall be determined as follows:

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

4.5.1.2.2 Weigh the yarn sample to the nearest 10 milligrams.

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

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

4.5.2 Webbing Tests: Shall be as shown in Table 5.

TABLE 5 - Webbing Tests

Requirement	Test Method	Number of Determinations Per Requirement
Width	4.5.2.1	3
Thickness	4.5.2.2	3
Weight	FED-STD-191, Method 5040	3
Yarn Count	FED-STD-191, Method 5050	3
Weave	Visual	3
Breaking Strength	FED-STD-191, Method 4108	5
Resistance to Light	4.5.2.3	5
Resistance to Heat	4.5.2.4	5
Repeats per Radial Seam Length	4.5.3.3	3

4.5.2.1 Width: Shall be determined in accordance with ASTM D 3774, using an apparatus with adjustable caliper jaws having a length not less than 1.0 inch (25 mm) and width not less than 0.125 inch (3.18 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 without compressing or distorting the basic cross-sectional configuration of the solid webbing.

4.5.2.2 Thickness: Shall be determined in accordance with ASTM D 1777, using a 6 ounce force (1.7 N) total load with a pressure foot diameter of 3/8 inch (9.5 mm).

4.5.2.3 Resistance to Light: The test specimens shall be exposed in the accelerated weathering unit as specified in Method 5804. The specimens shall be placed side by side on the rack so that only the center portion of each specimen is exposed. Filters and sunshine carbons shall be used. The exposure time shall be 50 hours 0.5. The spray heads shall be shut off during the entire exposure period. At the end of the exposure period, the specimens shall be conditioned at 20 °C ± 1 (68 °F ± 2) and 65% ± 2 relative humidity for 24 hours ± 0.5 and tested for breaking strength in accordance with FED-STD-191, Method 4108; the percent of breaking strength (B.S.) loss shall be calculated using Equation 2.

$$\frac{\text{Original B.S.} - \text{B.S. after aging}}{\text{Original B.S.}} \times 100 = \text{percent of B.S. loss} \qquad \text{(Eq.2)}$$

4.5.2.4 Resistance to Heat: The test specimens shall be suspended in a circulating-air oven at 180 °C ± 3 (356 °F ± 5) for 1 hour ± 0.1. After removal from the oven, the specimens shall be conditioned at 21 °C ± 1 (70 °F ± 2) and 65% ± 2 relative humidity for 24 hours ± 0.5 and tested for breaking strength in accordance with FTD-STD-191, Method 4108; the percent of breaking strength loss shall be calculated as specified in 4.5.2.3.

4.5.3 Examination for Length:

4.5.3.1 Individual Roll: The roll shall be examined for gross length. Any gross length (roll) found to be more than 2 yards (1.8 m) below the gross length marked on the piece ticket shall be considered as an imperfection with respect to length. The unit of product for this examination shall be one roll. The sample size and acceptance number shall conform to Table 2.

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

4.5.3.3 Repeats Per Radial Seam Length: Webbing length shall be measured under the tension specified in the applicable detail specification. Equipment such as pulleys, guides, or reels, if used, shall not induce false loads or cause uneven load distribution in the webbing. Temperature and humidity conditions shall be controlled at 24 °C ± 3 (75 °F ± 5) and 55% ± 10 relative humidity. The measurement shall be made within 15 seconds after application of the tension load.

4.5.4 Examination for Compliance with Textile Fiber Products Identification Act: During the examination of individual 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 an imperfection. The lot shall be unacceptable if two or more of these imperfections occur.

4.6 Reports:

The supplier of the webbing shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements. This report shall include the purchase order number, lot number, AMS 3797B and its applicable detail specification number and revision letter if any, manufacturer's material designation, repeat length for radial seam, quantity, width, and specified webbing strength.

4.7 Resampling and Retesting:
(R)

If any specimen used in the above tests fails 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. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 A lot of webbing may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.

5.1.2 Webbing shall be supplied on rolls of the size specified in the applicable detail specification.

5.1.3 Each roll shall have a label or tag legibly marked with not less than the following information and attached so as to remain in place until all the webbing has been removed from the roll:

WEBBING, NYLON, INTEGRAL LOCKING SLOTS
AMS 3797B/*
WIDTH _____
BREAKING STRENGTH _____
MINIMUM CONTINUOUS LENGTH _____
REPEATS PER RADIAL SEAM LENGTH: NUMBER _____
MINIMUM LENGTH, INCHES (mm) _____
MAXIMUM LENGTH, INCHES (mm) _____
MANUFACTURER'S IDENTIFICATION _____
QUANTITY _____
LOT NUMBER _____
ROLL NUMBER (If used) _____
STOCK NUMBER _____
DATE OF MANUFACTURE _____

*Insert applicable detail specification number

5.1.4 Each roll shall be also labeled, ticketed, or invoiced for fiber content in accordance with the Textile Fiber Products Identification Act.

5.1.5 Individual rolls shall be wrapped in suitable protective film and packaged in an exterior shipping container to ensure that the rolls, during shipment and storage, will be protected from exposure to moisture, weather, or any other normal hazard.

5.1.6 Each exterior shipping container shall be legibly marked with not less than the following information; markings shall not smear or be obliterated during normal handling or use:

WEBBING, NYLON, INTEGRAL LOCKING SLOTS
AMS 3797B/*
PURCHASE ORDER NUMBER _____
MANUFACTURER'S IDENTIFICATION _____
LOT NUMBER _____
NET WEIGHT _____

*Insert applicable detail specification number

5.1.7 Packages of webbing shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the webbing to ensure carrier acceptance and safe delivery. (R)

5.1.8 For direct U.S. Military procurement, packaging shall be in accordance with MIL-W-43334, Commercial Level, unless Level A is specified in the request for procurement.