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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 3797A

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Superseding AMS 3797

WEBBING, NYLON, INTEGRAL LOCKING SLOTS

1. SCOPE:

1.1 Form: This specification covers nylon webbing with integral locking slots.

1.2 Application: Primarily for use in construction of parachutes.

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 latest issue of Aerospace Material Specifications 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.

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
ASTM D3774 - Width of Woven Fabric

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 Fabric 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 Standards:

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

2.3.4 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 the requirements specified herein in addition to the requirements specified in the applicable detail specification. In case of conflict between the requirements of this basic specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material: The 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 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: The 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): The 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 defects defined in FED-STD-4 and as specified in Table I, herein.

3.7.2 Yard-by-Yard Examination: The required continuous length of each piece shall be inspected and visual defects classified as listed in Table I. The defects found 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 warpwise 9 inches (229 mm) or fraction thereof in which it occurs. The acceptable quality level (AQL) shall be 0.10 critical defects and 10 minor defects per 100 units of minimum continuous length. Definitions of terms used herein are covered in ASTM D123.

TABLE I

CLASSIFICATION OF DEFECTS

Defect	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 (25.4 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

TABLE I (Cont'd.)

CLASSIFICATION OF DEFECTS

Defect	Description	Classification
Broken or missing pick	Two or more regardless of extent. The filling tie-in or joining shall not be construed as a defect 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 2 ends within same length and extending over 9 linear inches (229 mm) or more.	Critical
	Clearly visible on 1 or 2 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

TABLE I (Cont'd.)

CLASSIFICATION OF DEFECTS

Defect	Description	Classification
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 (25.4 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 (25.4 mm) if in warp, or more than 0.25 inch (6.4 mm) in the width direction, but not over 1 inch (25.4 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
Jerked-in filling, slough-off, slug	A clearly visible loop of filling pulled in at the edges.	Minor
Kinks	More than 3 kinks in any 9 linear inches (229 mm).	Critical
Knots	More than 1 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
	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

TABLE I (Cont'd.)

CLASSIFICATION OF DEFECTS

Defect	Description	Classification
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 defect listed below 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 II.

Defects

Objectionable odor
Unclean throughout
Uneven weaving throughout

3.8 Sizes and Tolerances: Shall be as specified in the applicable detail specification.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the 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.

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 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: Shall be as follows:

4.3.1 For Acceptance Tests: Each lot of webbing shall be visually examined as required below 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, the yarn shall be sampled for test as specified below, using 1 cone, 1 tube, or 1 spool as the sample unit. The lot shall be unacceptable if one or more units fail to meet any requirement specified.

Lot Size		Number of Sample Units
Yards	Metres	
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 1 linear yard (0.9 linear m). The sample size shall be in accordance with Inspection Level III of MIL-STD-105.

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 II. If a lot contains less than 3 rolls, each roll in the lot shall be examined.

TABLE II

SAMPLING FOR OVERALL EXAMINATION

Lot Size		Sample Size, Rolls	Maximum Number of Defects Accepted in Sample
Yards	Metres		
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

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 II. The lot shall be unacceptable if one or more samples fail to meet any requirement specified.

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 vendor's inspection at one time. For mechanical property testing, an inspection lot shall not exceed 5000 yards (4572 m). A lot may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained. 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 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.

4.4 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 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 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 specified below. Melting point requirement may be accepted on basis of yarn manufacturer's statement of compliance.

Requirement	Test Method	Number of Determinations per Test
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.

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 millimetre.

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) as follows:

Denier = weight in grams of 9000 m = weight in grams of 900-mm sample x 10,000.

4.5.2 Webbing Tests: Shall be as follows:

Requirement	Test Method	Number of Determinations per Test
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 D3774, using an Ø apparatus with adjustable caliper jaws having a length not less than 1.0 inch (25.4 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 D1777, using a 6 ounces 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 FED-STD-191, Method 5804. The specimens shall be placed side by side on the rack in such a manner that only the center portion of each specimen is exposed. Filters and sunshine carbons shall be used. The exposure time shall be 50 hours. 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 as follows:

$$\frac{\text{Original B.S.} - \text{B.S. after aging}}{\text{Original B.S.}} \times 100 = \text{percent of B.S. loss}$$

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 a defect 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 II.

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 a defect. The lot shall be unacceptable if two or more of these defects occur.

4.6 Reports:

4.6.1 The vendor of the 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 3797A and its applicable detail specification number and revision letter, if any, vendor's material designation, repeat length for radial seam, lot number, quantity, width, and specified webbing strength.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3797A and its applicable detail specification number and revision letter, if any, contractor or other direct supplier of webbing, supplier's product 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 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 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 on rolls of the size specified in the applicable detail specification.

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

WEBBING, NYLON, INTEGRAL LOCKING SLOTS
AMS 3797A/*
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

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

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

5.1.5 Each exterior shipping container shall be legibly marked with not less than the following information in such a manner that the markings will not smear or be obliterated during normal handling or use:

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

*Insert applicable detail specification number

5.1.6 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. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.