

MIL-W-5664D
 12 January 1987
 SUPERSEDING
 MIL-W-5664C
 17 AUGUST 1971

MILITARY SPECIFICATION
 WEBBING, TEXTILE, ELASTIC

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers requirements for elastic webbings used in aviator and ground combat clothing and equipment.

1.2 Classification. The webbing shall be furnished in the following types as specified (see 6.2). The classes and widths shall be as specified (see 6.2) and as indicated in Table I.

Type I - Cotton fiber
 Type II - Nylon fiber

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

MILITARY

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Systems Engineering and Standardization Department (Code 93), Naval Air Engineering Center, Lakehurst, NJ 08733-5100, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8305

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods
 FED-STD-601 - Rubber, Sampling and Testing

MILITARY

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

2.1.2 Other Government documents. The following other Government document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issue shall be that in effect on the date of the solicitation.

Rules and Regulations Under Textile Fiber Products Identification Act

(Copies of specifications, standards, and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issue of the nongovernment document which is current on the date of the solicitation.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM D 3951 - Standard Practice for Commercial Packaging

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.2 Material.

3.2.1 Cotton yarn. The yarn used in the manufacture of the cotton elastic webbing shall be of a grade and staple length which will meet the requirements of this specification.

3.2.2 Nylon yarn. The yarn used in the manufacture of the nylon elastic webbing shall be a bright, high tenacity, light and heat resistant polyamide prepared from hexamethylene diamine and adipic acid and its derivatives. The yarn shall not be bleached. The yarn shall have a nominal size of 20/2 cotton count. Testing shall be as specified in 4.7.

3.3 Webbing properties. The class, type, width, thickness, weight, and elongation requirements of the webbing shall be as shown in Table I.

TABLE I

TYPE I				
Class	Width (inches)	Thickness range (inches)	Ounces per linear yard (max. weight)	To produce 50% elongation, load range at room temperature (pounds)
1	3/8 ± 1/32	.016-.046	0.28	1.15-3.25
	1/2 ± 1/16	.016-.046	0.38	1.35-3.75
	3/4 ± 1/16	.016-.046	0.53	1.80-5.00
	7/8 ± 1/16	.016-.046	0.55	0.90-4.37
	1 ± 1/16	.016-.046	0.73	3.00-5.50
	1-1/2 ± 1/16	.016-.046	1.00	5.00-7.00
	2 ± 1/16	.031-.061	1.60	6.00-11.00
	2-1/2 ± 1/16	.031-.061	2.00	8.00-12.00
2	1-1/2 ± 1/16	.094-.156	2.30	7.20-17.50
3	1-1/2 ± 1/16	.094-.156	2.35	15.30-31.25
TYPE II				
1	1 ± 1/16	.030-.060	0.80	3.00-6.00
	1-1/2 ± 1/16	.030-.60	1.20	4.00-7.50

3.3.1 Weave construction. Unless otherwise specified by the procuring activity, the weave for all classes except Class 1, 1-inch width and 1-1/2 inch width, for both types, shall be with one filling yarn per shed. Class 1, 1-inch width and 1-1/2 inch width, for both types, may be supplied in a shuttle or shuttleless loom construction. (see 6.2.1)

3.4 Drift. The drift of the load on the webbing, elongated and maintained at 50 percent elongation for 4 hours, shall be not more than 20 percent when the drift test is performed as specified in 4.7.2.

MIL-W-5664D

3.5 Tension set. After the webbing has been elongated and maintained at 50 percent elongation for 10 minutes and then allowed to relax for 10 minutes, the webbing tension set (change in length of the sample) shall be not more than 5 percent.

3.5.1 After heat aging. After the webbing has been heat aged at $70^{\circ} \pm 1^{\circ}\text{C}$ ($158^{\circ} \pm 2^{\circ}\text{F}$) for 7 days, and after at least 3 hours from the time of removal from the aging oven, it shall meet the tension set requirement of 3.5.

3.6 Low temperature elongation resistance. For Class 1 and 2 webbings the load at 50 percent elongation at $21^{\circ} \pm 2.8^{\circ}\text{C}$ ($70^{\circ} \pm 5^{\circ}\text{F}$) shall be not less than 20 percent of the load at 50 percent elongation at $-40^{\circ} \pm 2.8^{\circ}\text{C}$ ($-40^{\circ} \pm 5^{\circ}\text{F}$). For Class 3 webbing the value shall be not less than 40 percent.

3.7 Color. The color of Type I shall be as specified (see 6.2). Type II shall be Olive Green 106.

3.7.1 Color matching. The dyed webbing shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7000 ± 500 K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 100 K.

3.8 Colorfastness. Unless otherwise specified, colored webbing shall show good fastness to 20 standard fading hours of light, water, laundering, perspiration, and crocking. Black webbing shall show fair fastness to wet crocking. (see 4.7).

3.9 pH. The pH value of the water extract of the dyed webbing shall be no less than 5.0 nor more than 8.5 when tested as specified in 4.7.

3.10 Length and put-up. Unless otherwise specified, when the webbing furnished is one inch or less in width, it shall be furnished on fiberboard spools containing 120 to 130 yards with not more than 6 pieces per roll. No piece shall be less than 2 yards in length. When the webbing furnished is over one inch in width, it shall be furnished on fiberboard spools containing 45 to 55 yards with not more than 3 pieces per roll. No piece shall be less than 10 yards in length. All ends shall be joined together either by pinning or sewing.

3.11 Identification label. Each spool of webbing shall have an identification label attached to the head end of the spool in accordance with MIL-W-43334.

3.12 Fiber identification. Each spool of webbing shall be labeled, ticketed, or invoiced for fiber content in accordance with the Textile Fiber Products Identification Act.

3.13 Workmanship. The finished webbing shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

MIL-W-5664D

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of section 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.4)
- b. Quality conformance inspection (see 4.5)

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.4.

4.4 First article inspection. The first article sample specified in 3.1 shall be inspected for all the requirements of this specification except for length (4.6.1.3) and preparation for delivery (4.6.2).

4.5 Quality conformance inspections. The quality conformance inspection shall consist of the examinations described in 4.6.1 through 4.6.3 and the testing of the end item in 4.7.

4.6 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated hereinafter.

4.6.1 End item examination. Defects found during the examination shall be classified in accordance with 4.6.1.1, 4.6.1.2 and 4.6.1.3.

4.6.1.1 Yard-by-yard examination. The required yardage of each piece shall be inspected on both sides and visual defects classified as listed in Table II. All 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 yard or fraction thereof in which it occurs. The sample unit for this

examination shall be one linear yard. The sample size shall be in accordance with level II of MIL-STD-105. The acceptable quality level (AQL) shall be 2.5 major defects and 6.5 minor defects per 100 units (yards). The lot size shall be expressed in units of one linear yard each. An approximately equal number of yards 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 III of this specification.

TABLE II
CLASSIFICATION OF DEFECTS

EXAMINE	DEFECTS	MAJOR	MINOR
Abrasion mark	Resulting in rupture of individual yarns or plies, distortion in the orientation of threads, dimensional distortion, areas visibly thinner than adjoining unaffected areas	X	
Broken or missing end	Any	X	
Broken or missing pick	2 or more within a linear inch, regardless of the size of missing portion Single, missing for more than 1/4 inch	X	X
Coarse filling bars	Yarn larger in diameter than in adjoining unaffected area resulting in increased stiffness or thickness 1/		X
Crease or wrinkle	Twisted or distorted. Will not lay flat upon application of manual pressure		X
Cut, hole, tear	Any cut, hole, or tear	X	
Double end	Resulting from wrong draw (see "Wrong draw")		X
Drop-ply	Clearly visible, or more than 2 ends within same length and extending over 9 linear in. or more 1/	X	
Dropped stitch on knitted edge	Any (shuttleless loom construction)	X	
Edge cut or frayed	Clearly visible 1/	X	
Edge beaded or corded	Visible increase in thickness or mis-formed selvage 1/		X

MIL-W-5664D

TABLE II (continued)
CLASSIFICATION OF DEFECTS

EXAMINE	DEFECTS	MAJOR	MINOR
Edge folded or rolled	(See "Crease")		X
Edge loopy	Forming clearly visible filling loops or edges tied loosely to body for 2 linear inches or more <u>1/</u>		X
Edge loose	Resulting in waviness, distortion in orientation of filling, or looseness		X
Edge tight	Resulting in visible tension along edge, or pucker, waviness, bagginess or slackness that cannot be flattened by manual pressure <u>1/</u>	X	
Edge scalloped	Any visible indentation of edge <u>1/</u>	X	
Fine or light filling bar	Clearly visible <u>1/</u>		X
Float	Multiple, 1/2 inch or more in combined warp and filling directions, or single floating over more than 1 inch Multiple, less than 1/2 inch in combined warp and filling directions, or single, float-over more than 1/2 inch but not more than 1 inch if in warp, over more than 1/4 of the width but not more than 1 inch if in filling		X X
Identification label	Missing, incomplete, incorrect illegible or insecurely attached		X
Heavy filling bar, heavy place	Visibly stiffer or thicker than adjoining unaffected area <u>1/</u>	X	
Hitch-back, crack, open place	Clearly visible opening between adjoining picks, or warpwise tension area over part of the width, resulting in light or heavy places <u>1/</u>		X
Jerked-in filling, slough off	Clearly visible <u>1/</u>		X
Kinks	More than 3 in any 9 linear inches, clearly visible on surface		X

TABLE II (continued)
CLASSIFICATION OF DEFECTS

EXAMINE	DEFECTS	MAJOR	MINOR
Knots	More than 1 knot Untrimmed ends extending from surface	X	X
Mispick, skips	Resulting in width-wise repeated floats more than 1/4 inch long Resulting in abrupt break in sequence of weave, or width-wise repeated floats 1/4 inch or less long	X	X
Mixed filling, shade bar	Clearly visible <u>1/</u>		X
Slack end	2 or more in same length, jerked-in between picks, or forming clearly visible loops on surface <u>1/</u> Single, jerked-in between picks, or forming clearly visible loops on surface <u>1/</u>	X	X
Slub or slug	More than twice the thickness of the yarn (or ply, if plied)		X
Spot, stain, streak (rust, dirt, oil, grease, dye)	Any uncleaned spot, stain, or streak clearly visible <u>1/</u>		X
Smash	Any smash	X	
Tight end	Clearly visible <u>1/</u>		X
Tight pick or filling	Resulting in rolling (see also "Edges scalloped")	X	
Wavy or ridgy	Clearly visible, will not flatten under manual pressure (resulting from uneven tension) <u>1/</u>	X	
Weak or tender spot	Any	X	
Wrong draw	Extending over 9 linear inches or more		X
Yarns (filling)	Two yarns per shed (except shuttleless loom construction)	X	

1/ The term "clearly visible" shall be interpreted as meaning clearly visible at normal examination distance (approximately 3 feet).

MIL-W-5664D

4.6.1.2 Overall examination. Each defect listed below shall be counted no more than once in each spool examined. The sample unit for this examination shall be as shown in Table III.

Defects

Uncleanliness throughout
 Uneven weaving throughout
 Shade (when other than natural):
 Off shade
 Poor penetration
 Mottled; cloudy or streaky throughout
 Not labeled in accordance with Textile Fiber Products
 Identification Act
 Pieces not joined by either being pinned or sewed

TABLE III

SAMPLE SIZE

Lot size (spools)	Sample Size (spools)	Maximum number of overall defects acceptable in sample (see 4.6.2.2 & 4.6.2.3.1)
50 or less	2	0
51 up to and including 500	8	1
501 and over	13	2

4.6.1.3 Length examination.

4.6.1.3.1 Examination for length of individual spool. Each spool in the sample shall be examined for the defects listed below. The sample unit for this examination shall be one spool. The sample size and acceptance number shall be as shown in Table III.

Defects

Gross length less than specified minimum length or more than specified maximum length
 Gross length more than 2 yards less than gross length marked on roll label

4.6.1.3.2 Examination for total yardage in sample. The lot shall be unacceptable if the total of the actual gross length of spools in the sample is less than the total of the gross lengths marked on labels.

4.6.2 Examination of preparation for delivery requirements. An examination shall be made in accordance with the provisions of MIL-W-43334 to determine that packaging, packing and marking comply with the section 5 requirements of this specification.

MIL-W-5664D

4.6.3 Examination for filling yarns per shed. Except for Class 1, 1-inch width and 1-1/2 inch width, the lot shall be unacceptable if any roll in the sample contains more than one filling per shed.

4.7 Testing of the end item. The methods of testing specified in FED-STD-191, wherever applicable and as listed in Table IV shall be followed. The physical and chemical values specified in Section 3 apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test methods. Except as otherwise specified, all tests shall be performed under standard conditions in accordance with FED-STD-191. All test reports shall contain the individual values utilized in expressing the final result. The sample size shall be as follows:

<u>Lot size (yards)</u>	<u>Sample size</u>
800 or less	2
801 up to and including 22,000	3
22,001 and over	5

The lot shall be unacceptable if one or more units fail to meet any requirement specified. The lot size shall be expressed in units of 1 linear yard. The sample unit for testing shall be 5 yards of webbing.

TABLE IV

STANDARD TESTS

Characteristic	FED-STD-191 Method No.	FED-STD-601 Method No.
Width	5020	
Thickness	5030 <u>1/</u>	
Weight	5041	
Tension set		4411 <u>2/</u>
Colorfastness to:		
Light of 20 std fading hrs	5660	
Water	5630	
Laundering	5614	
Perspiration	5680	
Crocking	5651	
pH	2811	
Material identification <u>3/</u>		

- 1/ Except that a 6-ounce total load shall be applied, and the pressure foot diameter shall be 3/8 inch.
- 2/ Specimens shall be full-width. Elongation shall be 50 percent.
- 3/ Unless otherwise specified, a certificate of compliance indicating the nylon yarn complies with the requirements of 3.2.2 shall be submitted and will be acceptable.

4.7.1 Elongation. Specimens for the test shall be full-width at least 6 inches long, and shall be marked with a 2-inch gage length so located that when the specimen is inserted in the jaws of a suitable testing machine, having jaws wider than the webbing, the gage length is centrally located between the jaws. The initial distance between the jaws of the machine shall be 3 inches. The jaws shall separate at a rate of 12 inches per minute under no load. The load required to produce 50-percent elongation of the 2-inch gage length shall be noted.

4.7.2 Drift. The specimen shall be assembled in the testing machine as specified in 4.7. (The jaws shall be disengaged with a pendulum type machine). The jaws shall be separated at the rate of 12 inches per minute until 50-percent elongation is reached. Jaw separation shall be stopped and the load shall be recorded 15 seconds after the instant of stopping. After 4 hours, the load shall be recorded again. The drift shall be determined as follows:

$$\text{Drift, percent} = \frac{a - b}{a} \times 100$$

Where: a = load reading at start of test period

b = load reading at end of test period

4.7.3 Tension set after heat aging. The full-width webbing specimens shall be subjected to a temperature of $70^{\circ} \pm 1^{\circ}\text{C}$ ($158^{\circ} \pm 2^{\circ}\text{F}$) in a circulated dry air oven for 7 days. In not less than 3 hours after removal from the heat aging oven, specimens shall be subjected to an elongation of 50 percent for 10 minutes, allowed to rest for 10 minutes, and then the tension set shall be determined in accordance with Method 4411 of FED-STD-601.

4.7.4 Low temperature elongation resistance. The webbing specimens shall be conditioned in a cold chamber for 5 hours at $-40^{\circ} \pm 2.8^{\circ}\text{C}$ ($-40^{\circ} \pm 5^{\circ}\text{F}$) and the load required to produce 50 percent elongation shall be determined in the same manner as 4.7.1. Tests shall be conducted in triplicate and the results averaged. Low temperature elongation resistance in percent shall be calculated as follows:

$$\text{Low Temperature Elongation Resistance, percent} = \frac{a}{b} \times 100$$

Where : a = load to produce 50 percent elongation at
 $21^{\circ} \pm 1^{\circ}\text{C}$ ($70^{\circ} \pm 2^{\circ}\text{F}$)

b = load to produce 50 percent elongation at
 $-40^{\circ} \pm 2.8^{\circ}\text{C}$ ($-40^{\circ} \pm 5^{\circ}\text{F}$)

4.7.5 Weave. The weave construction shall be determined by visual examination.

5. PACKAGING

5.1 Preservation. Preservation shall be level A, B or Commercial as specified (see 6.2).

5.1.1 Levels A, B. Webbing, put up as specified, shall be preserved in accordance with the applicable requirements of MIL-W-43334.

5.1.2 Commercial. Webbing, put up as specified, shall be preserved in accordance with the applicable requirements of ASTM D 3951.

5.2 Packing. Packing shall be level A, B or Commercial as specified (see 6.2)

5.2.1 Levels A, B. Webbing shall be packed in accordance with the applicable requirements of MIL-W-43334.

5.2.2 Commercial. Webbing shall be packed in accordance with the applicable requirements of ASTM D 3951.

5.3 Palletization. When required, palletization shall be in accordance with the applicable requirements of MIL-W-43334.

5.4 Marking. In addition to any special marking required by the contract or order (see 6.2), shipments shall be marked in accordance with MIL-W-43334.

6. NOTES.

6.1 Intended use. The elastic webbings covered by this specification are intended for the following uses:

<u>Class</u>	<u>Intended Use</u>
1	Headbands for aviators' face masks and goggles, parachute packs and harnesses, service cap covers, gloves, waist bands, and for harness elastic on gas mask face pieces.
2	Suspenders.
3	Parachute packs and rip-cord grip pocket for parachutes.

6.2 Ordering data. Purchasers should exercise any desired options offered herein, and procurement documents should specify the following:

6.2.1 Procurement requirements.

- (a) Title, number and date of this specification.
- (b) Type and Class (see Table I).
- (c) Width (see Table I).

MIL-W-5664D

- (d) Weave construction (see 3.3.1).
- (e) Color (see 3.7).
- (f) Quantity
- (g) Colorfastness requirements, if other than as specified in 3.8.
- (h) Length and put-up, if other than as specified in 3.10.
- (i) Selection of applicable level of packaging and packing (see 5.1 and 5.2).
- (j) When first article is required (see 3.1, 4.4, 6.3).
- (k) When palletization is required (see 5.3).

6.3 First article. When a first article inspection is required, the item should be a first production item. The first article should consist of five yards of the elastic webbing specified in the contract or order. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first articles and disposition of first articles. Invitations for bids should provide that Government reserves the right to waive the requirements for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Subject term (key word) listing.

Aviator clothing and equipment
 Cotton fiber
 Elastic
 First article
 Ground combat clothing and equipment
 Textile
 Webbing

6.5 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
 Army - GL
 Navy - AS
 Air Force - 99

Preparing Activity:
 Navy - AS
 (Project No. 8305-0106)

Review Interests:
 Army - MD
 Air Force - 11, 82

User Interest:
 Army - SM
 Navy - MC