

MIL-T-87130(USAF)
17 May 1978

MILITARY SPECIFICATION

TAPE AND WEBBING, TEXTILE, PARA-ARAMID,
INTERMEDIATE MODULUS

This specification is approved for use by Air Force Materials Laboratory, Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers eleven types of tapes and webbings made from para-aramid, intermediate modulus yarn.

1.2 Classification. The tapes and webbings shall be of the types and classes as specified in Table I.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents, of the issue in effect on the date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

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

STANDARDS

FEDERAL

FED-STD-191 Textile Test Methods

MILITARY

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: AFML/MXA, WPAFB, O. 45433 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

LAWS AND REGULATIONS

Rules and Regulations under the Textile Fiber Products Identification Act.

(Copies may be obtained from the Federal Trade Commission, Washington, D.C. 20580.)

3. REQUIREMENTS

3.1 First article. When specified the supplier shall furnish a sample for the first article inspection and approval. (See 4.2 and 6.2.)

3.2 Material.

3.2.1 Yarn. The yarn used in the manufacture of all types of webbing shall be a para-aramid, intermediate modulus type (See 6.4.).

3.2.1.1 Denier. The yarn used in manufacturing of the webbing shall be the denier specified in Table I.

3.2.1.2 Twist. The warp yarns shall be nominally 2 turns per inch. Plied yarns shall be made by twisting together the specified number of ends of zero twist singles (as supplied by the producer). Filling yards shall have producer's twist only, nominally zero.

3.3 Physical Requirements. The construction and physical requirements of the finished webbing shall be as specified in Table I.

3.4 Weave. The weave for each class of each type webbing shall be as shown in Table I.

3.5 Length and put-up. Unless otherwise specified (see 6.2), webbing 9/16 inch or less in width shall be furnished on double headed spools or tubes. Webbing 5/8 inch and wider shall be furnished in rolls. No roll shall contain more than 3 pieces, and no piece shall be less than 20 yards in length.

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TABLE I. Construction and physical properties.

TYPE CLASS	WIDTH (INCHES)	MAXIMUM WEIGHT (OZ./YD)	MINIMUM BREAKING STRENGTH(LB)	W A R P			F I L L		W E A V E
				DENIER	PLY	TOTAL ENDS	DENIER	PLY	
I	1	.05	250	200	1	42	200	1	Plain
	2	.09	550	400	1	39	400	1	Plain
	3	.12	800	200	1	122	200	1	1/3 Twill- Center Reversal
II	1	.13	500	400	1	58	400	1	Plain
	1	.10	500	200	1	90	200	1	Plain
IV	4	.50	3000	1500	2	31	1500	1	Plain
	5	.60	4500	1500	2	41	1500	1	Plain
VI	2	.12	525	200	1	90	200	1	Plain
	3	.11	750	200	1	108	200	1	Plain
	4	.23	1000	400	1	102	400	1	Plain
	5	.22	1500	400	1	108	400	1	Plain
	6	.36	2500	1500	2	24	1500	1	Plain
	7	.44	3000	1000	2	48	1000	1	Plain
	8	.55	4000	1500	2	30	1000	1	Plain
	9	1.00	6000	1500	3	44	1500	1	Plain
	10	1.50	9500	1500	3	76	1500	1	2/2 HBT- Center Reversal
	11	1.65	12500	1500	3	89	1500	1	Plain
VII	1	.23	1100	400	1	96	400	1	Plain
	2	.45	2750	1000	2	45	1000	2	Plain
	6	2.00	13500	1500	2	140	1500	2	5/1 HBT- Center Reversal
VIII	1	.23	800	400	1	60	1000	1	Plain

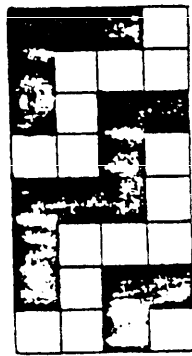
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TABLE I. Construction and physical properties. (Cont)

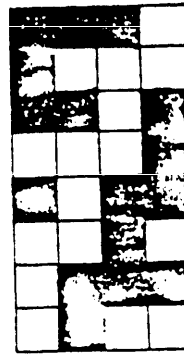
TYPE CLASS	WIDTH (INCHES)	MAXIMUM WEIGHT (OZ/YD)	MINIMUM BREAKING STRENGTH(LB)	W A R P		F I L L		W E A V E
				DENIER	PLY	TOTAL ENDS	DENIER	
IX	1	.12	500	200	1	82	200	Plain
	2		1100	200	1	172	200	Plain
	5		3000	1000	1	96	1000	Plain
X	1	.17	1000	200	1	156	200	Plain
	2	.35	1200	400	1	103	1000	Plain
	3	.45	2500	1000	1	84	1000	Plain
	5	.60	4000	1000	2	55	1000	Plain
	6	.80	4500	1500	2	50	1500	Plain
	7	1.00	6500	1500	1	140	1500	Plain
	8	1.20	8000	1500	2	88	1000	Plain
	9	1.75	10000	1500	2	127	1500	2/2 HBT- Center Reversal
	11	2.40	15000	1500	3	121	1500	Double Plain (See Fig. 1)
	13	2.50	20000	1500	3	137	1500	Double Plain (See Fig. 1)
	3	.121	400	200	1	60	200	Plain 1/
XI	5	.15	600	200	1	96	200	Plain
	7	.16	800	200	1	124	200	Plain
	9	.18	1000	200	1	150	200	Plain
		.23	1000	200	1	164	200	Plain 2/
	11	.26	1500	400	1	108	400	Plain
	13	.32	2000	400	1	142	400	Plain
	14	.37	2500	1000	1	77	400	Plain
	15	.44	3000	1000	1	96	400	Plain
	16	.60	4000	1000	2	58	1000	Plain
	17	.80	5000	1500	1	110	1500	Plain
	19	1.05	8000	1500	1	160	1500	Plain

1/ Coating is needed for seamability.
 2/ 6 turns per inch in warp yard.

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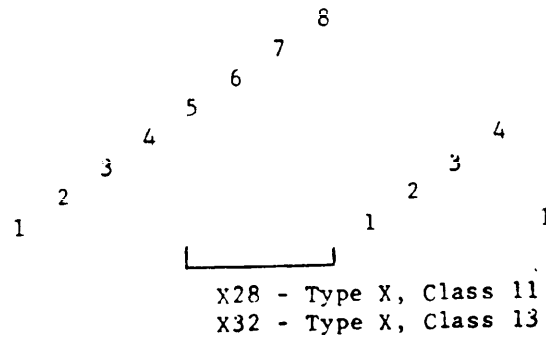


Selvage



Body

CHAIN DRAFT



DRAWING-IN DRAFT

FIGURE 1. Weave patterns for Type X, Classes 11 and 13.

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3.6 Identification of product. Each roll shall have a label or tag marked with the following information and attached in such a manner as to remain in place until all webbing has been removed from the roll.

- a. Webbing, Textile, Para-aramid, Intermediate Modulus
- b. Type, class, and specification number
- c. Width
- d. Gross yardage
- e. Number of pieces in roll
- f. Producer's name
- g. Date of manufacture (month and year).

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

3.8 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.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements, as specified herein. Except as otherwise specified in the contract or order, the supplier 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 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

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4.2 First article inspection. When required (see 6.2), the preproduction sample submitted in accordance with 3.1 shall be visually examined for appearance, and shall be tested in accordance with methods specified in 4.4.

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

4.3.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase documents.

4.3.2 End item examination. Defects found during the examination shall be classified in accordance with 4.3.2.1 through 4.3.2.3.

4.3.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined on both sides and visual defects classified as listed in Table II. All defects found shall be counted regardless of their proximity one to another, 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 III of MIL-STD-105. The acceptable quality level for minor defects shall be 2.5 defects per 100 units (yards) and the lot shall be unacceptable if one or more critical defects appear in the sample. The lot size shall be expressed in units of (1) linear yard each. An approximate equal number of yards shall be examined from each roll selected. The number of rolls from which the sample is to be selected shall be in accordance with Table III of this specification.

TABLE II. Classification of defects.

Defect	Description	Critical	Minor
Abrasion marks	Resulting in rupture of yarns, or in nap sufficient to obscure the identity of any yarn exceeding 10 percent of width or 1 inch in length	X	

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TABLE II. Classification of defects. (Continued)

Defect	Description	Critical	Minor
Yarns (filling)	Two yarns per shed.	X	
Broken or missing end	Two or more regardless of length or a single end exceeding 6 inches in length. Single end under 6 inches but exceeding 1/4 inch.	X	X
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.	X	
Coarse or light filling bar	Resulting in visible difference in stiffness or thickness of webbing and extending for more than 1/4 inch in the length direction. Resulting in visible difference in stiffness or thickness of webbing and extending for 1/4 inch or less in the length direction.	X	X
Twist or distortion	Webbing will not lie flat upon application of manual pressure due to twist or distortion.		X
Cut, hole or tear	Any cut, hole or tear.	X	
Drop-ply	Clearly visible on more than 2 ends within same length and extending over 9 linear inches or more. <u>1/</u> Clearly visible on 1 or 2 ends within same length and extending over 9 linear inches or more. <u>1/</u>	X	X

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TABLE 11. Classification of defects. (Continued)

Defects	Description	Critical	Minor
Edges	Frayed, slack or otherwise poorly constructed and exceeding 1/4 inch in length.	X	
Floats or skips	Three or more, 1/2 inch or more in combined warp and filling directions or single float or skip over more than 1 inch. Three or more, less than 1/2 inch in combined warp or filling directions or single float or skip over more than 1/2 inch but not exceeding 1 inch, if in warp, or more than 1/4 inch of width but not exceeding 1 inch if in filling.	X	X
Hitchback crack	Clearly visible opening between adjoining picks, or warpwise tension area over part of the width resulting in visible light and heavy places. <u>1/</u>		X
Jerked-in filling, slough-off, slug	A clearly visible loop of filling pulled in at edges. <u>1/</u>		X
Kinks	More than 3 in any 9 linear inches.	X	
Knots	More than 1 knot in any 9 linear inches. One knot every 2 yards with untrimmed ends extending from surface of webbing.		X X
Mispick, double pick	Two or more across the full width. Single across the full width,	X	X

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TABLE II. Classification of defects. (Continued)

Defect	Description	Critical	Minor
Slack end	Two or more in the same length, jerked in between picks, or forming clearly visible loops on the surface. Single jerked in between picks or forming clearly visible loops on the surface.	X	X
Slub, or slug, gout	More than twice the thickness of the yarn (or ply, if plied).		X
Smash	Any smash	X	
Spot, stain or streak	Any clearly visible. <u>1/</u>		X
Tight end	Clearly visible up to 12 inches in length. <u>1/</u>	X	
Wrong draw	Extending for more than 9 inches.	X	
Width	Beyond specified tolerances.		X

1/ Clearly visible at normal inspection distance (approx. 3 feet).TABLE III. Sampling Plan.

Lot size in yards	Sample size in rolls	(Maximum number defects) acceptable in sample (see 4.3.2.2 & 4.3.2.3)
Up to 1200 ^{1/}	3	0
1201 up to and including 3,200	5	0
3201 up to and including 10,000	8	0
10,001 up to and including 35,000	13	0
35,001 up to and including 150,000	20	1
150,001 and over	32	2

1/ If a lot contains fewer than 3 rolls, each roll in the lot shall be examined.

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4.3.2.2 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 III.

Defects

Uncleanliness throughout.

Uneven weaving throughout.

Not labeled in accordance with
Textile Fiber Products Identification Act.

4.3.2.3 Length examination.

4.3.2.3.1 Individual rolls. Each roll in the sample shall be examined for the defects listed below. The sample unit for this examination shall be one roll. The sample size and acceptance number shall be as shown in Table III.

Defects

Gross length more than 2 yards less than gross
length marked on piece ticket.

Any piece less than 20 yards in length.

Any spool containing more than 3 pieces.

4.3.2.3.2 Total yardage in sample. The lot shall be unacceptable if the total of the actual gross lengths of rolls or spools in the samples selected in accordance with Table III is less than the total of the gross lengths marked on roll tickets.

4.3.3 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.

4.4 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. Except for breaking strength, 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

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specified in the applicable test methods. For breaking strength, the lot shall be rejected if any single determination is lower than the specified minimum. Except as otherwise specified, all tests shall be performed under standard conditions in accordance with FID-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 to 5,000	3
5,001 to 22,000	5
22,001 and over	7

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

TABLE IV. Test methods

Characteristic	Requirement paragraph	Test method
Material identification	3.2.1	<u>1</u> /
Denier	Table I	4021 <u>1</u> /
Twist	3.2.1.2	4052
Weight	Table I	5041
Texture		
Ends, face and back warp	Table I	5050
Picks per inch	Table I	5050
Breaking strength	Table I	4108 <u>2</u> /
Width	Table I	5020
Weave	3.4	Visual

1/ Unless otherwise specified, a certificate of compliance will be acceptable for the stated requirement.

2/ Speed of the pulling jaw shall be $2 \pm 1/2$ inches per minute.

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5. PACKAGING

5.1 Packaging. Packaging shall be level A, B or C as specified (see 6.2).

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

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

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

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

6. NOTES

6.1 Intended use. The webbing covered by this specification is intended for use in parachutes and their accessories.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. When a first article is required (see 3.1, 4.2 and 6.3).
- c. Type (see Table I).
- d. Length of roll required (if other than specified in 3.6).
- e. Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of ASPR7-104.55. The first article should be a preproduction sample. The first article should consist of 5 yards of finished webbing. The contracting officer should include specific instructions in all procurement instruments regarding arrangements for inspection and approval of the first article.

6.4 Twisting precautions.

- a. Slightly heavier travelers than those used for nylon yarn should be used.
- b. High humidity should be maintained to minimize electrostatic charge between filaments.

6.5 Winding precautions. Anti-wear wide tension gates (Lecsona Corporation), or their equivalent, should be used.

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6.6 Kevlar 29 manufactured by the E. I. duPont de Nemours and Company is an acceptable yarn.

6.7 Weaving precautions.

- a. PTFE coated heddles (Precision Coating Co., Inc., Dedham, Mass), or their equivalent, should be used.
- b. Harness times should be 2 inches front center for 1/2 inch wide webbing when using 400 denier yarn and 3/4 inch before front center for 1 inch and wider webbings.
- c. Warp line should be level.
- d. Loom(s) selected for weaving Kevlar 29 yarns must be in good running condition with minimum wear or "play" in various mechanical components. Loom should be operated at reduced speed (90-100 picks per minute) when weaving 200 or 400 denier yarn into narrow webbing.
- e. Warp beam should not be more than one-half inch wider than required width of finished webbing.
- f. Fine sand rolls should be used for webbing take-up.
- g. Due to the low extensibility of Kevlar 29 yarn it is important that uniform yarn length be maintained at all times across the entire set of warp yarns.
- h. Avoid contact of Kevlar yarn with rough surface or sharp edges wherever possible in order to minimize damage.
- i. High humidity should be maintained during weaving.

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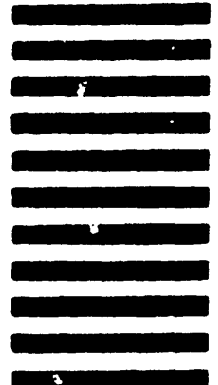
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