

MIL-W-4088J
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 SUPERSEDING
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MILITARY SPECIFICATION

WEBBING, TEXTILE, WOVEN NYLON

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

1. SCOPE

1.1 Scope. This specification covers untreated nylon webbing.

- * 1.2 Classification. The nylon webbing shall be furnished in the type and class specified (see 1.2-1 and 6.2). The types shall conform to the requirements of tables IT and III s applicable for the class specified.

Class 1	- Critical use (shuttle loom, nylon 6,6)
Class 2	- Non-critical use (shuttle or shuttleless loom, nylon 6 or nylon 6,6)

- * 1.2.1 Class reference When procurement documents referencing this specification do not specify the class of webbing, the requirements for class 1 (critical use) webbing shall apply.

2. APPLICABLE DOCUMENTS

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

SPECIFICATION

MILITARY

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Natick Research and Development Laboratories, Natick, MA 01760 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 8305

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STANDARDS

FEDERAL.

FED-STD-191 - Textile Test Methods

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

MIL-STD-1480 - Color Codes for Webbing, Textile; Manufacturers' Identification

LAWS AND REGULATIONS

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies may be obtained without charge from the Federal Trade Commission, Washington, DC 20580.)

(Copies of specifications, standards, drawings and publications required by contractors 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:

THE COLOR ASSOCIATION OF THE UNITED STATES, INC.

(Information regarding availability of copies of Color Cards or Cable Numbers may be obtained from the Color Association of the United States, Inc., 34 East 38th Street, New York, NY 10016.)

3. REQUIREMENTS

3.1 Standard sample. The dyed webbing shall match the standard sample for shade and shall be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 First article. When specified (see 6.2), the contractors shall furnish a sample for first article inspection and approval (see 4.3 and 6.5).

3.3 Material.

* 3.3.1 Nylon yarn. The nylon yarn used in the manufacture of the webbing shall be bright, high tenacity, light resistant and heat resistant. Nylon 6,6 shall be used for class 1 webbing and nylon 6 or 6,6 shall be used for class 2 webbing. The yarn shall not be bleached. Testing shall be as specified in 4.4.1.

3.3.1.1 Denier and filament. The yarn used in the manufacturing of the webbing shall be of the denier and filament specified in tables II or III, before dyeing, except for the identification yarns (see 3.5).

3.3.1.2 Twist. The warp, binder and filling yarns shall have a minimum of 2-1/2 turns per inch in the final twist whether single or plied, except types XXII and XXVII which shall have a minimum of 1-1/2 turns per inch. The number of single yarns specified in tables II and III shall be twisted together in one operation.

* 3.4 Color. Unless otherwise specified (see 6.2), the webbing shall be furnished in the following colors:

- (a) Natural White
- (b) Natural White (special purpose items)
- (c) Olive Drab 7
- (d) Air Force Sage Green 1531
- (e) Air Force Yellow 1365

3.4.1 Dyeing. When dyed webbing is required, the webbing shall be yarn or piece dyed.

* 3.4.2 Color matching. The dyed webbing shall match the standard sample under artificial daylight having a color temperature of 7000 ± 500 K and shall be a good approximation to the standard sample under incandescent lamplight at 2850 ± 100 K.

* 3.4.3 Colorfastness. The dyed webbing shall show colorfastness to light and laundering equal to or better than the standard sample. The webbing shall not be bleached. When no standard sample is established for colorfastness the dyed webbing shall show "good" fastness to light and "fair" fastness to laundering when tested as specified in 4.4.3.

* 3.5 Identification yarns. Colored warp ends shall be woven into the webbing, as specified herein, to permanently identify the webbing by type and manufacture, and when shuttleless construction and/or nylon 6 is utilized, except that natural white (special purpose items) webbing shall have no colored warp ends (see 6.2). When the webbing is piece dyed, polyester yarn of approximate denier to the nylon body yarns shall be used for all required colored warp ends except that when black is specified, the identification yarn shall be 200 or 210 or 400/2 denier nylon, color-sealed black (see table I).

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3.5.1 Colorfastness of identification yarns* The colorfastness rating of the type identification and manufacturer's marker yarns shall be "good" to light and "fair" to laundering when tested as specified in 4.4.3.

3.5.2 Type identification- The identification of type shall be as specified in table I. The color of the identification yarns shall match the Textile Color Association Cable Numbers of the Color Association of the United States, Inc.

* **3.5.2.1 Other types*** When type identification is required on other types, the identifying yarns shall be as specified in the procurement documents (see 6.2).

TABLE I. Identification of type

Type	Color	TCA cable No.	Yarns and location
VI	Red	70081	2 at center of warp
VII <u>1/</u>	Yellow	70068	2 at each selvage
VIII	Black		2 at center of warp
XII	Red	70081	1 at each selvage
XIII <u>1/</u>	Black		2 at each selvage
XIX	Green	70063	2 at center of warp
XXII	Black		2 at each selvage and 2 at center
XXVI	Yellow	70068	2 at center of warp
XXVII	Black		1 at each selvage

1/ These being double plain weaves the identification yarns shall weave so that one end shall show on the face and one on the back at each selvage.

3.5.3 Manufacturer's identification. Each manufacturer of types VII, IX, X and XIII shall incorporate, as part of the binder warp, 2 ends dyed to match the shade assigned to that manufacturer in accordance with MIL-STD-1480 (see 6.2 and 6.4).

* **3.5.4 Shuttleless loom identification.** When shuttleless loom construction is utilized for class 2, the catch-cord shall be 70 or 210 or 400 denier nylon, color-sealed black.

3.5.5 Nylon 6 identification. When nylon 6 is utilized for class 2, one edge of the webbing shall contain a red marker yarn, cable No. 70081.

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* 3.6 Physical requirements. The construction and physical requirements of the finished webbing shall be as specified in tables II and III when tested as specified in 4.4.3.

3.6.1 Breaking strength. The original breaking strength of any specimen shall be no lower than the minimum specified in tables II and III.

* 3.6.1.1 Breaking strength after abrasion (types XXII and XXVII. The types XXII and XXVII webbing shall retain not less than 90 percent of the applicable minimum breaking strength values specified in table II when tested as specified in 4.4.3 (see 6.6).

3.6.2 Curvature. The finished webbing shall show no more lateral curvature than 1/4 inch within a yard when tested as specified in 4.4.3.

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TABLE II. Physical requirements, class 1

Type	Width (in.)	Thickness (in.)	Weight lin. yd (max) (oz/yd)	Breaking strength (lbs. min)	Ends in warp (min)		Binder Picks per in. (min)	No. of single yarns for final plied yarn (min)	Yarn denier and filament, before dyeing
					Face and back	Warp Binder Filling			
I	$9/16 \pm 1/32$	.025-.040	0.28	500	92	-	34	1 -	420/68 W 840/140 F
Ia	$3/4 \pm 1/32$	.025-.035	0.32	600	108	-	34	1 -	420/68 W 840/140 F
II	$1 \pm 1/32$	.025-.040	0.42	600	134	-	34	1 -	420/68 W 840/140 F
III	$1-1/4 \pm 1/32$	.025-.040	0.52	800	168	-	34	1 -	420/68 W 840/140 F
IV	$3 \pm 1/8$	.025-.040	1.20	1,800	400	-	34	1 -	420/68 W 840/140 F
VI	$1-23/32 \pm 1/16$	.030-.050	1.15	2,500	114	-	21	2 -	840/140 W F
VII	$1-23/32 \pm 1/16$	.060-.100	2.35	6,000	229	27	26	2 1	840/140 W B F
VIII	$1-23/32 \pm 1/16$	.040-.070	1.60	4,000	166	-	18	2 -	840/140 W F
VIIIa	$3 \pm 3/32$	.040-.070	2.80	6,300	280	-	18	2 -	840/140 W F
VIIIb	$2 \pm 1/16$	.040-.070	1.80	4,500	192	-	18	2 -	840/140 W F
VIIIc	$2-1/4 \pm 1/16$	.040-.070	2.10	5,300	222	-	18	2 -	840/140 W F

TABLE II. Physical requirements, class 1 (cont'd)

Type	Width (in.)	Thickness (in.)	Weight lin. yd (max) (oz/yd)	Ends in warp		Face Binder Picks per in. (min)	No. of single yarns for final plied yarn (min)	Yarn denier and filament before dyeing		
				Breaking strength (lbs. min)	Back					
IX	3 ± 3/32	.065-.100	4.00	9,000	257	31	3	2	840/140 W B F	
X	1-23/32 ± 3/32	.105-.140	3.70	9,500	257	31	3	1	2	840/140 W B F
XII	1-23/32 ± 1/16	.025-.040	0.85	1,200	266	-	1	-	1	420/68 W 840/140 F
XIII	1-23/32 ± 3/32	.080-.120	2.90	7,000	281	34	2	1	2	840/140 W B F
XIV	1/2 ± 1/32	.070-.100	0.80	1,200	91	-	7	-	7	210/34 W F
XV	2 ± 1/16	.035-.050	1.25	1,500	88	-	2	-	2	840/140 W F
XVI	1-23/32 ± 1/16	.045-.080	2.00	4,500	198	-	2	-	2	840/140 W F
XVII	1 ± 1/16	.045-.070	1.15	2,500	114	-	2	-	2	840/140 W F
XVIII	1 ± 1/16	.100-.160	2.05	6,000	260	-	2	-	2	840/140 W F
XIX	1-3/4 ± 3/32	.100-.130	4.10	10,000	280	-	3	-	2	840/140 W F

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TABLE II. Physical requirements, class 1 (cont'd)

Type	Width (in.)	Thickness (in.)	Weight lin. yd (max) (oz/yd)	Breaking strength (lbs. min)	Ends in warp (min)		No. of single yarns for Final plied yarn (min)	Yarn denier and filament, before dyeing
					Face and back	Binder Picks per in. (min)		
XX	1 ± 3/32	.170-.210	3.25	9,000	162	26	5 1 3	840/140 W B F
XXI	1-1/4 ± 1/16	.065-.085	1.70	3,600	260	-	5 - 10	210/34 W F
XXII	1-23/32 ± 3/32	.090-.120	3.50	9,500	259	-	3 - 2	840/68 W F
XXIII	1-1/8 ± 3/32	.200-.300	3.70	12,000	324	27	3 2 3	840/140 W B F
XXIV	1-15/16 ± 3/32	.055-.075	2.25	5,500	244	-	2 - 3	840/140 W F
XXV	1 ± 1/16	.080-.125	1.50	4,500	169	20	2 1 2	840/140 W B F
XXVI	1-3/4 ± 1/16	.150-.180	4.90	15,000	236	-	5 - 3	840/140 W F
XXVII	1-23/32 ± 1/16	.085-.110	2.90	6,500	215	-	3 - 2	840/68 W F
XXVIII	2-1/4 ± 3/32	.080-.110	3.80	8,700	257	31	3 1 2	840/140 W B F

1/ Where 840/140 yarns are specified 840/68 may be used as an alternate.

* TABLE III. Physical requirements - class 2

Type	Width Inches	Thickness Inch	Weight ounces max.	Breaking strength pounds min.	Yarns (minimum)		Yarn ply (minimum)		Yarn denier 2/ Warp, binder filling
					Total warp binder	Per inch filling 1/ filling	Warp	Binder Filling	
I	9/16 + 1/32	.025-.040	0.28	500	92	68	1	1	420
Ia	3/4 + 1/32	.025-.035	0.32	600	108	68	1	1	420
II	1 ± 1/32	.025-.040	0.42	600	134	68	1	1	420
III	1-1/4 + 1/32	.025-.040	0.52	800	168	68	1	1	420
IV	3 ± 1/8	.025-.040	1.20	1,800	400	68	1	1	420
VI	1-23/32 ± 1/16	.030-.050	1.15	2,500	114	42	2	1	840
VII	1-23/32 ± 1/16	.060-.100	2.35	6,000	229	52	2	1	840
VIII	1-23/32 ± 1/16	.040-.070	1.60	4,000	166	36	2	1	840
VIIIa	3 ± 3/32	.040-.070	2.80	6,300	280	36	2	1	840

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* TABLE III. Physical requirements - class 2

Type	Width Inches	Thickness Inch	Weight ounces max.	Breaking strength pounds min.	Yarns (minimum)		Yarn ply (minimum)	Yarn denier 2/ Warp binder filling		
					Total warp Binder	Per inch filling 1/ Warp filling				
VIIIb	2 ± 1/16	.040-.070	1.80	4,500	192	-	2	1	840	
VIIIc	2-1/4 ± 1/16	.040-.070	2.10	5,300	222	-	2	1	840	
IX	3 ± 3/32	.065-.100	4.00	9,000	257	31	56	3	2	840
X	1-23/32 ± 3/32	.105-.140	3.70	9,500	257	31	44	3	1	840
XII	1-23/32 ± 1/16	.025-.040	0.85	1,200	266	-	68	1	-	420
XIII	1-23/32 ± 3/32	.080-.120	2.90	7,000	281	34	48	2	1	840
XIV	1/2 ± 1/32	.070-.100	0.80	1,200	91	-	70	7	-	210
XV	2 ± 1/16	.035-.050	1.25	1,500	88	-	30	2	-	840
XVI	1-23/32 ± 1/16	.045-.080	2.00	4,500	198	-	34	2	-	840
XVII	1 ± 1/16	.045-.070	1.15	2,500	114	-	30	2	-	840
XVIII	1 ± 1/16	.100-.160	2.05	6,000	260	-	36	2	-	840
XIX	1-3/4 ± 3/32	.100-.130	4.10	10,000	280	-	36	3	-	840

* TABLE III. Physical requirements - class 2

Type	Width Inches	Thickness Inch	Weight ounces max.	Breaking strength pounds min.	Yarns (minimum)		Total warp Binder	Per inch filling <u>1/</u>	Yarn ply (minimum)		Yarn denier <u>2/</u> Warp, binder filling	
					Warp	Binder			Warp	Binder		Filling
XX	1 + 3/32	.170-.210	3.25	9,000	162	26	162	38	5	1	3	840/420 <u>3/</u>
XXI	1-1/4 + 1/16	.065-.085	1.70	3,600	260	-	260	50	5	-	5	210
XXII	1-23/32 + 3/32	.090-.120	3.50	9,500	259	-	259	36	3	-	1	840
XXIII	1-1/8 + 3/32	.200-.300	3.70	12,000	324	27	324	30	3	2	3	840/420 <u>3/</u>
XXIV	1-15/16 + 3/32	.055-.075	2.25	5,500	244	-	244	34	2	-	3	840/420 <u>3/</u>
XXV	1 + 1/16	.080-.125	1.50	4,500	169	20	169	44	2	1	1	840
XXVI	1-3/4 + 1/16	.150-.180	4.90	15,000	236	-	236	32	5	-	3	840/420 <u>3/</u>
XXVII	1-23/32 + 1/16	.085-.110	2.90	6,500	215	-	215	48	3	-	1	840
XXVIII	2-1/4 + 3/32	.080-.110	3.80	8,700	257	31	257	64	3	1	1	840

1/ Two picks per shed.2/ Nylon 6 or nylon 6,6 is allowed.3/ 840 denier warp and binder, 420 denier filling.

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- * **3.7 Weave.** The weaves shall be as specified in 3.7.1 through 3.7.8. The filling yarn of class 2 webbing shall traverse the full width of the webbing. The filling yarn for class 2 shall be held at the edge by an extra catch-cord end interlaced with the filling yarn in accordance with a method shown in figures 7 or 8.
- * **3.7.1** The weave for types I, Ia, II, III, IV, VI, VIII, VIIIa, VIIIb, VIIIc, XII, XV, XVI, XVII shall be 2 up, 2 down herringbone twill and 1 reversal at the center of the webbing.
- 3.7.2** The weave for types VII, IX, X, XIII, XXV, and XXVIII shall be a double plain weave. Separate binder warp ends shall weave 2 up, 2 down 1 end as 1. All other warp yarns shall weave 2 ends as 1 except that the edge warp yarns shall weave 1 end as 1 not exceeding 8 ends on 1 selvage and 9 on the other.
- 3.7.3** The weave for types XIV, XVIII, XIX, and XXI shall be a 5 up, 1 down, 1 up, 5 down herringbone twill with 1 reversal at the center of the webbing. The weave is shown on figure 1.
- 3.7.4** The weave for types XX and XXIII shall be shown on figure 2.
- 3.7.5** The weave for type XXII shall be shown on figure 3.
- 3.7.6** The weave for type XXIV shall be a 2 up and 2 down herringbone twill with three reversals as shown on figure 4.
- 3.7.7** The weave for type XXVI shall be a 5 up, 1 down, 1 up, 5 down, 1 up, 1 down, (7 harnesses + 4 selvage = 11) twill with no reversal of the weave at the center. The weave is shown on figure 5.
- 3.7.8** The weave for type XXVII shall be as shown on figure 6.
- 3.8 pH.** The pH value of the water extract of the finished webbing shall be no less than 5.0 nor more than 8.5 when tested as specified in 4.4.3.
- 3.9 Length and put-up.** The webbing shall be put up in rolls. Unless otherwise specified (see 6.2), the length of the rolls shall be as follows:
- | | |
|----------------------|--|
| Types XVIII and XXVI | - Not less than 90 yards nor more than 110 yards with not more than one piece per roll. |
| Types XX and XXIII | - Not less than 60 yards nor more than 70 yards per roll. A roll shall contain no more than two pieces and each piece shall be not less than 10 yards in length. |
| All other types | - Not less than 90 yards nor more than 110 yards. A roll shall contain no more than three pieces and each piece shall be not less than 10 yards in length. |

3.10 Identification tickets. Each roll shall have a ticket attached with not finer than 5-ply cotton string doubled to not less than 6 inches long. The tickets shall be made of paperboard not less than 0.015 inch in thickness and the color shall be manila or light in intensity to permit easy reading of printed, stamped or typed markings. The use of handwritten entries is prohibited. The ticket shall have clipped corners at the end where a reinforcing patch (with or without a metal eyelet) is firmly affixed for attaching the tying string. The ticket shall be legibly printed with water insoluble ink with the following information:

Stock number
 Nomenclature
 Specification number
 Yardage
 Contract number and date of manufacture
 (month and year)
 Contractor's name
 Name of contracting agency

When webbing is not procured directly by the Government, the above information shall appear in the container, in which case, roll tickets are not required.

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

3.12 Workmanship. The finished webbing shall conform to the quality 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, the contractor is responsible for the performance of all inspection requirements, as specified herein. Except as otherwise specified in the contract, 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 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 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

* 4.3 First article inspection. When a first article is required (see 6.2), it shall be visually examined for appearance and color defects and shall be tested for the characteristics specified in table VII. The presence of any defect or failure of any test shall be cause for rejection of the first article.

* 4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected 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. In addition to the quality assurance provisions of the subsidiary specifications, component materials listed in table IV shall be tested for the specified characteristics in accordance with the referenced test methods of FED-STD-191. The lot size shall be expressed in pounds, and the sample unit shall be 500 yards of the nylon yarn. The lot shall be unacceptable if one or more units fail to meet any requirement specified. All test reports shall contain the individual values utilized in expressing the final result. The sample size shall be as follows:

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

TABLE IV. Component tests

<u>Characteristic</u>	<u>Requirement reference</u>	<u>Test method</u>
Warp, filling and binder yarn:		
Nylon identification	3.3.1	<u>1/</u>
Denier	3.3.1.1	4021 <u>1/</u>
Tenacity	3.3.1	<u>1/</u>
Luster	3.3.1	<u>1/</u>
Light resistance	3.3.1	<u>1/</u>
Heat resistance	3.3.1	<u>1/</u>
Unbleached	3.3.1	<u>1/</u>
Fly	Tables II and III	Visual <u>2/</u>
Twist	3.3.1.2	4054 <u>2/</u>

TABLE IV. Component tests (cont'd)

Characteristic	Requirement reference	Test method
Identification yarns:		
Fiber identification	3.5	3/
Denier	3.5	3/
Catch-cord yarn denier	3.5.4	3/

1/ A certificate of compliance shall be submitted for these requirements and it shall include: A certified statement that the yarn used is that specified in 3.3.1 along with *the* yarn supplier's type, identification data and melting point (when applicable) and supported by a certified copy of the yarn producer's certification to the tape and webbing manufacturer.

2/ One determination per sample unit and *the* result reported as "pass" or "fail".

3/ A certificate of compliance shall be submitted and will be acceptable for the stated requirements.

4.4.2 End item examination. The end item shall be examined in accordance with 4.4.2.1 through 4.4.2.3.

* 4.4.2.1 Yard-by-yard examination. The required yardage of each roll shall be examined on both sides and visual defects classified as listed in table VI. 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 ~~war~~wise 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. The acceptable quality level (AQL) shall be 0.40 major and 1.5 total (major and minor combined) defects per hundred units. The lot size shall be expressed in units of one 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 V.

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TABLE V. Sampling plan

Lot size in yards	Sample size in rolls	Maximum number of defects acceptable in sample (applicable to 4.4.2.2 and 4.4.2.3)
Up to 1200 <u>1/</u>	3	0
1201 up to and including 3200	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 three rolls, each roll in the lot shall be examined.

TABLE VI. Visual defects

Examine	Defect	Classification	
		Major	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	
Yarns (filling)	Two yarns per shed (class 1 only)	X	
Broken or missing end	Two or more regardless of length or a single end exceeding 6 inches in length	X	
	Single end under 6 inches but exceeding 1/4 inch		X
Broken or missing pick	Two or more regardless of extent	X	

NOTE: The filling tie-in or joining shall not be construed as a defect of any nature.

TABLE VI. Visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
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	X	
	Resulting in visible difference in stiffness or thickness of webbing and extending for 1/4 inch or less in the length direction		X
Twist or distortion	Webbing will not lay flat upon application of manual pressure due to twist or distortion <u>1/</u>		X
Cut, hole, or rear	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>2/</u>	X	
	Clearly visible on 1 or 2 ends within same length and extending over 9 linear inches or more <u>2/</u>		X
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 greater than 1 inch	X	
	Three or more, less than 1/2 inch in combined warp and filling directions; or single float or skip greater 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

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TABLE VI. Visual defects (cont'd)

Examine	Defect	Classification	
		Major	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 <u>2/</u>		X
Jerked-in filling, slough-off, slug	A clearly visible loop of filling pulled in at edges <u>2/</u>		X
Kinks	More than 3 in any 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
Slack end	Two or more in the same length, jerked in between picks, of 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 <u>3/</u>	Any clearly visible <u>2/</u>		X
Tight end	Clearly visible up to 12 inches in length <u>2/</u>	X	

TABLE VI. Visual defects (cont'd)

<u>Examine</u>	<u>Defect</u>	<u>Classification</u>	
		Major	Minor
Wrong draw	Extending for more than 9 inches	X	
Applicable to shuttleless looms only (class 2)	Dropped knitted stitch on edge	X	
	Catch-cord missing	X	
Width	Beyond specified tolerances		X

- 1/ A three-yard length of webbing shall be laid on a flat and smooth surface without tension. If the webbing does **not lie** flat or if the webbing is wavy or ridged, it shall be counted as a defect.
- 2/ Clearly visible at normal inspection distance (approximately 3 feet).
- 3/ When this defect occurs in natural white (special purpose items) webbing (see 3.3 and 6.2), any spot, stain, or streak up to 12 inches in length that can be covered with an approved white spotter shall be minor. Any spot, stain, or streak that cannot be covered or is longer than 12 inches shall be a major defect.

4.4.2.2 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 V.

Defects

Objectionable odor
 Off shade, i.e., not within established tolerance
 Uneven dyeing, shaded, spottiness, poor penetration
 Uneven weaving throughout
 Identification yarns misplaced, missing, or wrong color
 Catch-cord yarn for shuttleless loom webbing other than
 color-sealed black
 Not labeled in accordance with Textile Fiber Products
 Identification Act

4.4.2.3 Length examination.

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4.4.2.3.1 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 V.

Defects

- Gross length less than specified minimum length or more than specified maximum length
- Gross length marked on piece ticket in excess of actual gross length by 2 or more yards
- Any piece less than 10 yards in length (except types XXIII and XXVI)
- Any roll containing more than one piece (types XVIII and XXVI only)
- Any roll containing more than two pieces (types XX and XXIII only)
- Any roll containing more than three pieces (all other types)

4.4.2.3.2 Total yardage in sample. The lot shall be unacceptable if the total of the actual gross lengths of rolls in the samples selected in accordance with table V is less than the total of the gross lengths marked on roll tickets.

4.4.3 End item testing. The methods of testing specified in FED-STD-191, wherever applicable, and as listed in table VII shall be followed. When the data in the "number of determinations" and "results reported as" columns are not specified in the table, they shall be as required by the referenced test method. Except for original breaking strength, the physical and chemical values specified in section 3 apply to the average of the determinations made on the sample unit as specified in the applicable test methods. 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 sample units fail to meet any requirements specified or any specimen fails to meet the requirement for original breaking strength. The lot size shall be expressed in units of 1 linear yard. The sample unit for testing shall be as follows:

Types I, Ia, II and III	10 yards
Types XXII and XXVII	25 yards
All other types	20 yards

TABLE VII. End item tests

<u>Characteristic</u>	<u>Requirement reference</u>	<u>Test method</u>	<u>Number determinations per sample unit</u>	<u>Results reported as</u>
Thickness	Tables II and III	5030	-	-
Weight	Tables II and III	5041	-	To nearest 0.01 ounce
Yarns per inch:				
Ends, face and back warp	Tables II and III	5050	-	-
Ends, binder warp	Tables II and III	5050	-	-
Picks per inch	Tables II and III	5050	-	-
Non-bleaching	3.4.3	<u>1/</u>	-	-
Colorfastness to:				
Light	3.4.3 and 3.5.1	5660	-	-
Laundering	3.4.3 and 3.5.1	5614 <u>2/</u>	-	-
Breaking strength:				
Original	3.6.1 and Tables II and III	4108	-	-
After abrasion (types XXII and XXVII)	3.6.1.1	5309 and 4108	-	-
Curvature	3.6.2	4.5.1	5	To nearest 1/32 inch
Weave	3.7	Visual	-	Pass or fail
pH	3.8	2811	-	-

1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirements.

2/ On the color transfer cloth evaluation, only the stain on the nylon fibers of the color transfer cloth shall be evaluated.

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* 4.4.4 Packaging inspection. 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.

* 4.5 Methods of inspection.

4.5.1 Measurement of lateral curvature.

4.5.1.1 Test specimen. The test specimen shall be a length of webbing, full width, measuring a minimum of 40 inches. The specimen shall not be stretched, smoothed, or otherwise changed from its original condition prior to testing.

4.5.1.2 Number of determinations. Five specimens shall be tested from each sample unit and averaged.

4.5.1.3 Apparatus.

Plexiglass or equal	- Plexiglass weighing approximately 35 ounces with dimensions of 45 inches by 5 inches by 1/4 inch
Straight edge	- A rigid straight edge measuring 36 inches in length
Roller	- A roller 1 inch in diameter and weighing 1-1/2 pounds

4.5.1.4 Procedure. The specimens shall be placed flat, on a smooth, horizontal flat surface without tension and allowed to reach moisture equilibrium as defined in section 4 of FED-STD-191. After equilibrium is reached, a weight shall be placed at one end of the webbing. The roller shall be placed on the specimen at the end of the webbing where the weight is located. The specimen should be approximately in the center of the roller. The roller shall be rolled along the length of the specimen, care being taken to keep the specimen in the center of the roller and not to exert any pressure on the roller. When the roller has passed the length of the webbing, the plexiglass shall then be placed on the specimen for a period of 1 hour. Without moving the plexiglass on the specimen, the straight edge shall be placed on the plexiglass so that both ends of the straight edge are aligned perpendicularly with the outermost edge of the specimen. Determine the highest degree of curvature of the specimen from the straight edge by measuring to the nearest 1/32 of an inch perpendicularly from the straight edge. Record the highest measure (see figure 9).

4.5.1.5 Report. The average of five determinations from each sample unit shall be taken.

5. PREPARATION FOR DELIVERY

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, shipments shall be marked in accordance with MIL-W-43334.

6. NOTES

6.1 Intended use. The webbing is intended for use in parachutes and their accessories, tow target reinforcement, safety belts, bomb hoists and slings, tie-down equipment, and overrun barriers. The type XXVII webbing is intended for use in the manufacture of aeronautical safety equipment. The type XXVIII is used for the cover, water canteen, 2-quart collapsible. Types VIIIb and VIIIc are used in load carrying equipment.

* 6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type required (see 1.2 and table 11 and/or III).
- (c) Class required (see 1.2 and 1.2.1).
- (d) When a first article is required (see 3.2, 4.3 and 6.5).
- (e) Type identification, if other than specified in 3.5.2 and 3.5.2.1.
- (f) Manufacturer's identification if not specified in MIL-STD-1480 (see 3.5.3).
- (g) Color required (see 3.4).
- (h) When natural white (special purpose item) webbing is required (see 3.4 and 3.5).
- (i) Length of roll required (if other than specified in 3.9).
- (j) Selection of applicable levels of packaging and packing (see 5.1 and 5.2).

6.3 Standard sample. For access to the standard sample, address the procuring activity issuing the invitation for bids.

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6.4 Color coding. A producer of *these* types who is not listed in MIL-STD-1480 shall apply to the U.S. Army Natick Research and Development Laboratories, Natick, MA, for assignment of color coding. When manufacturer's identification of other types is required, yarns colored as designated in MIL-STD-1480, or in the procurement documents, shall be incorporated as specified by the U.S. Army Natick Research and Development laboratories, Natick, MA (see 3.5.3).

6.5 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of DAR 7-104.55. The first article should be a preproduction sample. The first article should consist of finished webbing; 10 yards for types I, Ia, II and III, 25 yards for types XXII and XXVII, and 20 yards for all other types. The contracting officer should include specific instructions in all procurement instruments regarding arrangements for inspection and approval of the first article.

6.6 Abrasion resistance- The abrasion resistance requirements are based on the use of hexagonal rods supplied by the Narrow Fabrics Institute, Inc., as noted in Method 5309 of FED-STD-191.

6.7 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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Navy - AS
Air Force - 11

Preparing activity:

Army - GL

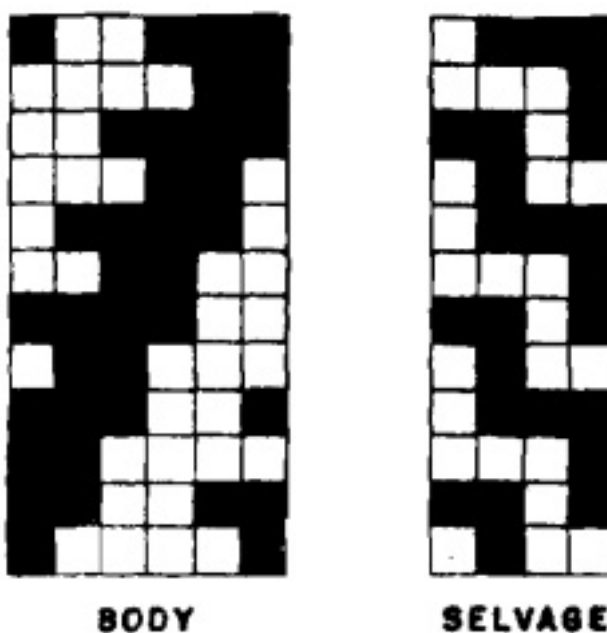
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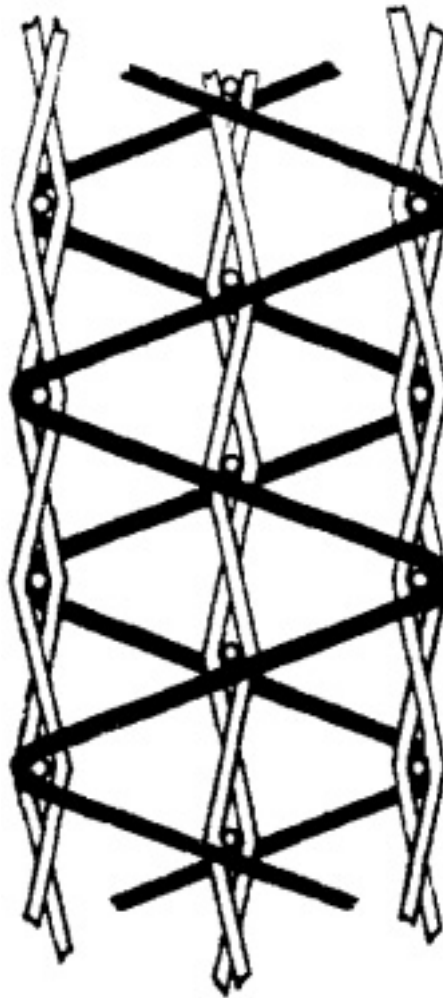
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ONE REPEAT WARP
ONE REPEAT FILLING

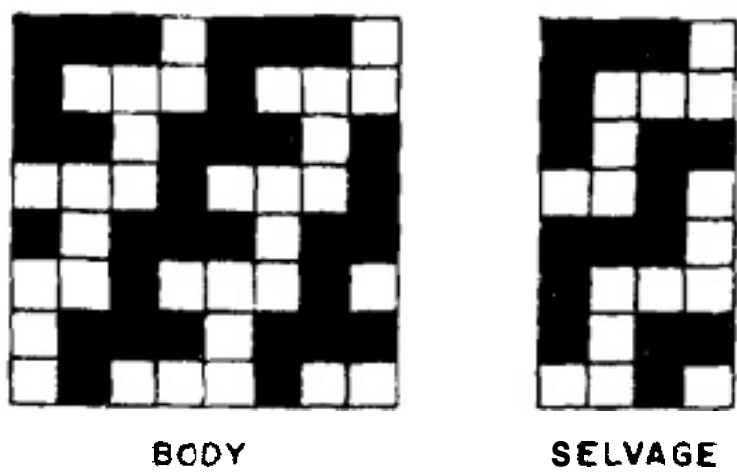
**FIGURE I. WEAVE DIAGRAM TYPES XIV,
XVIII, XIX, AND XXI**

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TYPE XX WARP YARNS WEAVING ONE END AS ONE
TYPE XXIII WARP YARNS WEAVING TWO ENDS AS ONE
BINDER YARNS BOTH TYPES WEAVE ONE END AS ONE

**FIGURE 2. CROSS SECTION FILLING FOR TYPES
XX AND XXIII**



BODY WEAVE: 1/3 TWILL. WITH THE BACK FILLING.
TWO ENDS WEAVING AS ONE

SELVAGE WEAVE: DOUBLE PLAIN WEAVE. FIVE ENDS
ON ONE EDGE; SIX ENDS ON
OTHER EDGE; ONE END WEAVING
AS ONE.

FIGURE 3. WEAVE DIAGRAM TYPE XXII.

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FIGURE 4. WEAVE DIAGRAM TYPE XXIV.

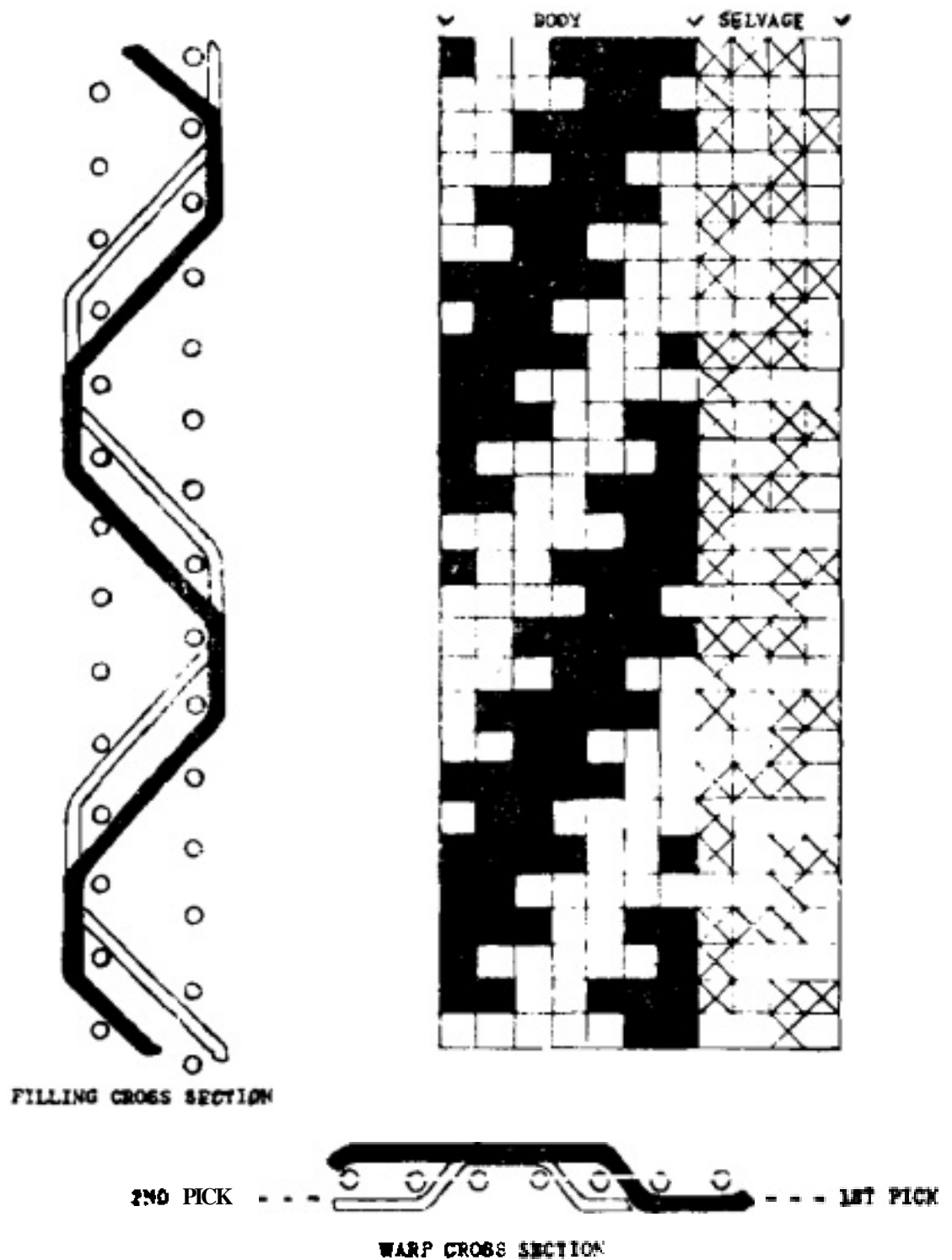


FIGURE 5 WEAVE DIAGRAM TYPE XXVI

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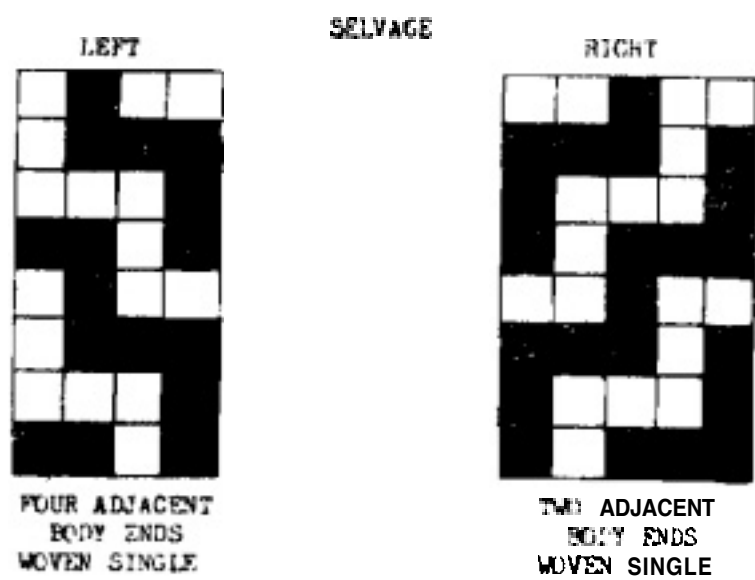
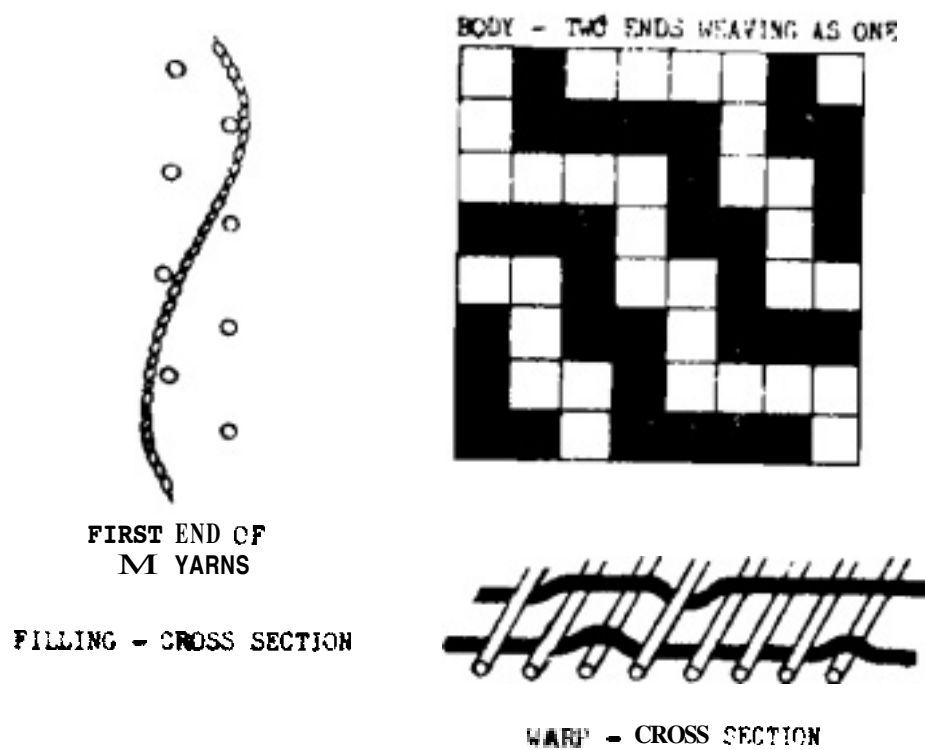


FIGURE 6 WEAVE PATTERN TYPE XIXVII

Figure 7 (class 2)

Side-Over Seam



Sealage locked by hitting
filling loops simultaneously
with additional catch thread
using "inclined" latch needle.

4

Figure 8 (class 2)
Catch-Card Diagram

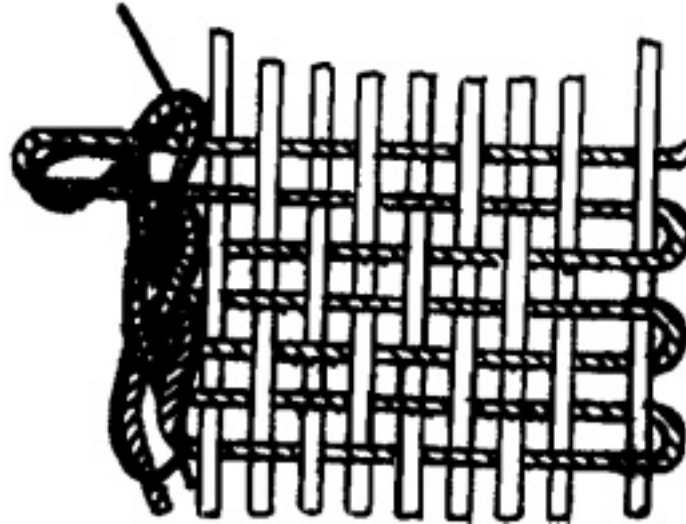
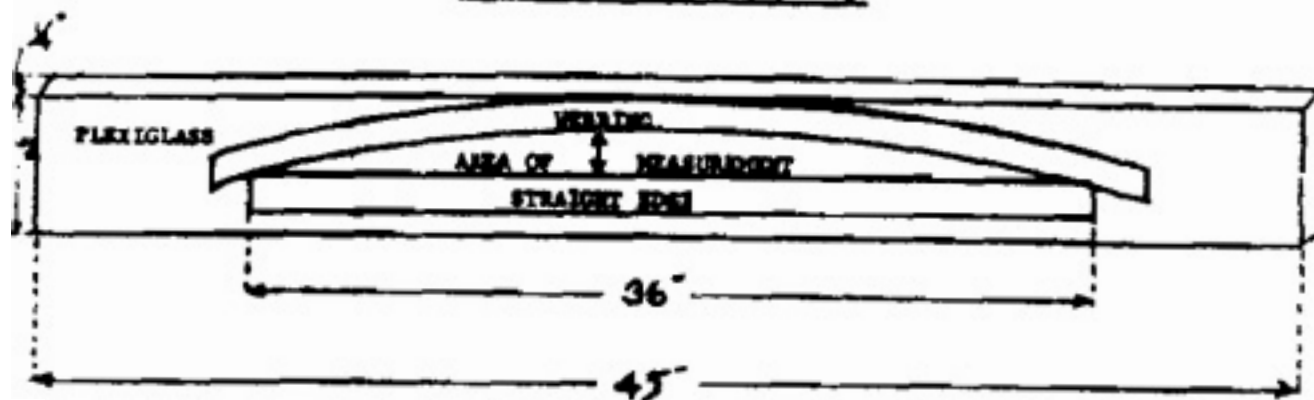


Figure 9

Diagram Curvature Measurement



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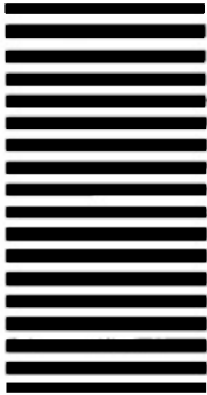
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