INCH POUND

MIL-W-4088K
21 November 1988
SUPERSEDING
MIL-W-4088J
22 December 1981

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 II and III as applicable for the class specified.

Class 1	- Critical use (shuttle loom, nylon 6,6)
Class 1A	- Critical use (shuttleless 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. When class 2 webbing is specified, classes 1 and 1A are acceptable alternates.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 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

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks 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.

SPECIFICATION

MILITARY

MIL-P-43334 - Packaging of Textile Webbing and Tape

STANDARDS

FEDERAL

FED-STD-191 - Textile Test Methods

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-1480 - Color Codes for Webbing, Textile; Manufacturers' Identification

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies may be obtained from the Federal Trade Commission, Pennsylvania Avenue at Sixth Street, N.W., Washington, DC 20580.)

(Copies of drawings, publications, 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 documents form 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 issues of the nongovernment documents which are current on the date of the solicitation.

American Association of Textile Chemists and Colorists (AATCC)

Chromatic Transference Scale

(Application for copies should be addressed to the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709.)

COLOR ASSOCIATION OF THE UNITED STATES

Standard Color Card of America

(Color cards may be available from the Color Association of the United States, Inc., 343 Lexington Avenue, New York, NY 10016. If color cards are not available from the Color Association, individual color samples may be obtained from the contracting activity or as directed by the contracting activity.)

(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, 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 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 in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3, 6.2, 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 classes 1 and 1A 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 4.4.1.1.

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. Camouflage Green 483
e. Air Force Sage Green 1531
f. Air Force Yellow 1365

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

3.4.2 Matching. The color of the dyed and finished webbing shall match the standard sample when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of 7500 ± 200K, with illumination of 100 ± 20 foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 ± 200K.

3.4.3 Colorfastness. The finished webbing shall show fastness to light and laundering equal to or better than the standard sample or equal to or better than a rating of "good" for fastness to light and a rating of "fair" for fastness to laundering. The finished webbing shall show fastness to crocking equal to or better than the standard sample or shall have an AATCC Chromatic Transference Scale rating of not lower than 3.5. The webbing shall not be bleached. Testing shall be as specified in 4.4.3.

3.4.4 Spectral reflectance for Camouflage Green 483. Finished Camouflage Green 483 webbing greater than 1 1/4 inches in width conforming to types VIII, VIIIa, VIIIb, VIIIc, XII and XIII shall meet the spectral reflectance factors (in percent) for the visible/near infrared wavelength range 600 to 860 nanometers (nm) as specified below when tested as specified in 4.4.3.

Spectral Reflectance Requirements for Camouflage Green 483

Wavelength (nm)	Reflectance (%)		Wavelength (nm)	Reflectance (%)	
	Min	Max		Min	Max
600	3	10	740	7	52
620	3	10	760	11	60
640	3	10	780	17	64
660	3	11	800	24	67
680	3	13	820	32	70
700	4	28	840	37	71
720	5	40	860	40	73

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 6, or 6,6, color-sealed black or 70, 90, or 150 denier polyester, color-sealed black (see table I).

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 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	Cable No.	Yarns and location
VI	Red	70081	2 at center of warp
VII 1/	Yellow	70068	2 at each selvage
VIII	Black		2 at center of warp
XII	Red	70081	1 at each selvage
XIII 1/	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 classes 1A and 2, the catch-cord shall be 70 or 210 or 400 denier nylon, color-sealed black. Alternatively, the catch cord shall be 70, 90 or 150 denier polyester 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.

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.

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

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) Face and back	Ends in warp (min) Binder	Picks per in. (min)	No. of single yarns for final plied yarn (min) Warp	Binder	Filling	Yarn denier and filament before dyeing 1/
IX	3 ± 3/32	.065-.100	4.00	9,000	257	31	28	3	2	2	840/140 W B F
X	1-23/32 ± 3/32	.105-.140	3.70	9,500	257	31	22	3	1	2	840/140 W B F
YII	1-23/32 ± 1/16	.025-.040	0.85	1,200	266	-	34	1	-	1	420/68 W 840/140 F
YIII	1-23/32 ± 3/32	.080-.120	2.90	7,000	281	34	24	2	1	2	840/140 W B F
XIV	1/2 ± 1/32	.070-.100	0.80	1,200	91	-	36	7	-	7	210/34 W F
XV	2 ± 1/16	.035-.050	1.25	1,500	88	-	15	2	-	2	840/140 W F
XVI	1-23/32 ± 1/16	.045-.080	2.00	4,500	198	-	17	2	-	2	840/140 W F
XVII	1 ± 1/16	.045-.070	1.15	2,500	114	-	15	2	-	2	840/140 W F
XVIII	1 ± 1/16	.100-.160	2.05	6,000	260	-	18	2	-	2	840/140 W F
XIX	1-3/4 ± 3/32	.100-.130	4.10	10,000	280	-	18	3	-	2	840/140 W F

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) Face and back	Ends in warp (min) Binder	Picks per in. (min)	No. of single yarns for final plied yarn (min) Warp	Binder	Filling	Yarn denier and filament before dyeing
XX	1 ± 3/32	.170-.210	3.25	9,000	162	26	19	5	1	3	840/140 W B F
XXI	1-1/4 ± 1/16	.065-.085	1.70	3,600	260	-	25	5	-	10	210/34 W F
XXII	1-23/32 ± 3/32	.090-.120	3.50	9,500	259	-	18	3	-	2	840/140 W F
XXIII	1-1/8 ± 3/32	.200-.300	3.70	12,000	324	27	15	3	2	3	840/140 W B F
XXIV	1-15/16 ± 3/32	.055-.075	2.25	5,500	244	-	17	2	-	3	840/140 W F
XXV	1 ± 1/16	.080-.125	1.50	4,500	169	20	22	2	1	2	840/140 W B F
XXVI	1-3/4 ± 1/16	.150-.180	4.90	15,000	236	-	16	5	-	3	840/140 W F
XXVII	1-23/32 ± 1/16	.085-.110	2.90	6,500	215	-	24	3	-	2	840/140 W F
XXVIII	2-1/4 ± 3/32	.080-.110	3.80	8,700	257	31	22	3	1	2	840/140 W B F

TABLE III. Physical requirements - classes 1A and 2

Type	Width Inches	Thickness Inch	Weight ounces max.	Breaking strength pounds min.	Yarns (minimum) Total warp	Yarns (minimum) Per inch Binder	Yarns (minimum) Per inch filling 1/	Yarn ply (minimum) Warp	Yarn ply (minimum) Binder	Yarn ply (minimum) Filling	Yarn denier 2/ 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	27	52	2	1	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

TABLE III. Physical requirements - classes 1A and 2 (cont'd)

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

TABLE III. Physical requirements - classes 1A and 2 (cont'd)

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

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

3.7 Weave. The weaves shall be as specified in 3.7.1 through 3.7.8. The filling yarn of classes 1A and 2 webbing shall traverse the full width of the webbing and 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. Both the body and the selvage warp shall weave 1 end as 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 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 X VII 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 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 this document 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 sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirement in the document 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.

4.1.2 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

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 documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

4.4.1.1 Component testing. 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:

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

TABLE IV. Component tests

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

4.4.2.1 Yard-by-yard examination. The webbing shall be examined on both sides for the defects listed in table VI. All defects found shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition, 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 lot size shall be expressed in yards. The sample unit shall be 1 yard of webbing. The

inspection level shall be III and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 0.40 for major and 1.5 for total defects. The number of rolls from which the sample is to be selected shall be in accordance with table V. The sample yardage shall be apportioned equally among the selected rolls.

TABLE V. Sampling plan

Lot size in yards	Sample size in rolls	Acceptance number (applicable to 4.4.2.2 and 4.4.2.3)
Up to 1200 1/	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. Webbing 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	

TABLE VI. Webbing visual defects (cont'd)

Examine	Defect	Classification Major	Minor
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.		
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 1/		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 2/	X	
	Clearly visible on 1 or 2 ends within same length and extending over 9 linear inches or more 2/		X

TABLE VI. Webbing visual defects (cont'd)

Examine	Defect	Classification Major	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 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
Hitchback crack	Clearly visible opening between adjoining picks, or warpwise tension area over part of the width resulting in visible light and heavy places 2/		X
Jerked-in filling, slough-off, slug	A clearly visible loop of filling pulled in at edges 2/		X
Kinks	More than 3 in any linear inches	X	
Knots	More than 1 knot in any 9 linear inches		X
	One knot every 2 yards with untrimmed ends extending from surface of webbing		X
Mispick, double pick	Two or more across the full width	X	
	Single across the full width		X

TABLE VI. Webbing visual defects (cont'd)

Examine	Defect	Classification Major	Minor
Slack end	Two or more in the same length, jerked in between picks, or forming clearly visible loops on the surface	X	
	Single jerked in between picks or forming clearly visible loops on the surface		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 3/	Any clearly visible 2/		X
Tight end	Clearly visible up to 12 inches in length 2/	X	
Wrong draw	Extending for more than 9 inches	X	
Applicable to shuttleless looms only (classes 1A and 2)	Dropped knitted stitch on edge	X	
	Catch-cord missing	X	
Width	Beyond specified tolerances		X

1/ A 3-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 ridgy, 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. The webbing shall be examined for the defects listed below. Each defect listed shall be counted not more than once in each roll examined. The sample shall consist of the applicable number of rolls indicated in table V. The lot shall be rejected if the total number of defects in the sample exceeds the applicable acceptance number specified 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.

4.4.2.3.1 Individual rolls. The webbing shall be examined for the defects listed below. The sample shall consist of the applicable number of rolls indicated in table V. The lot shall be rejected if the total number of defects in the sample exceeds the applicable acceptance number specified 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 XVIII 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:

Lot size (yards)	Sample size
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

Characteristic	Requirement reference	Test method	Number determinations per sample unit	Results reported as
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	1/	-	-
Colorfastness to:				
Light	3.4.3 and 3.5.1	5660	-	-
Laundering	3.4.3 and 3.5.1	5614 2/	-	-
Crocking	3.4.3	5651	-	-

TABLE VII. End item tests (cont'd)

Characteristic	Requirement reference	Test method	Number determinations per sample unit	Results reported as
Spectral reflectance	3.4.4	4.5.2	-	-
Breaking strength:				
Original	3.6.1 and Tables II and III	4108	-	-
After abrasion (type 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 of 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.

4.4.4 Packaging examination. An examination shall be made in accordance with the provisions of MIL-P-43334 to determine that packaging and marking comply with section 5.

4.4.5 Palletization examination. An examination shall be made for palletization in accordance with MIL-P-43334.

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 recorded.

4.5.2 Spectral reflectance measurements in the visible/near infrared. Spectral reflectance data shall be obtained from 600 to 860 nanometers (nm), at 20 nm intervals on a spectrophotometer (see 6.7) relative to a barium sulfate standard, the prefered white standard. Other white reference materials may be used, provided they are calibrated to absolute white; e.g. Halon, magnesium oxide, or vitrolite tiles (see 6.8). The spectral band width shall be less than 26 nm at 860 nm. Reflectance measurements may be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a source that simulates either CIE Source A or CIE Source D65. The specimen shall be measured as a single layer, backed with two layers of the same webbing and shade. Measurements will be taken on a minimum of two different areas and the data averaged. The specimen shall be viewed at an angle no greater than 10 from normal, with the specular component included. Photometric accuracy of the spectrophotometer shall be within 1 percent and wavelength accuracy within 2 nm. The standard aperture size used in the color measurement device shall be 1.0 to 1.25 inches in diameter. When the measured reflectance values for any color at four or more wavelengths do not meet the limits specified in 3.4.4, it shall be a test failure.

5. PACKAGING

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

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

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

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

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

5.4 Marking. In addition to any special marking required by the contract or purchase order, shipments shall be marked in accordance with MIL-P-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. Acquisition documents should specify the following:

a. Title, number and date of this document.
b. Type required (see 1.2 and table II 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).
k. When palletization is required (see 5.4).

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

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, Development, and Engineering Center, 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, Development, and Engineering Center, 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 FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for selection, 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 Spectrophotometers. Suitable spectrophotometers for measuring spectral reflectance in the visible/near infrared are the Diano Hardy, Diano Match Scan, Hunter D54P-IR, Hunter VIS/NIR spectrocolorimeter, and Macbeth 1500 with IR option.

6.8 White standard. Barium sulfate of suitable quality for use as a white reference standard is available from the Eastman Kodak Company. The same source has available magnesium reagent (ribbon) and Halon. Suitable tiles can be obtained from the National Bureau of Standards or the instrument manufacturers.

6.9 Dye combinations for Camouflage Green 483. A suggested but not mandatory dye combination for Camouflage Green 483 is as follows:

Acid Orange - 162
Acid Blue - 171

6.10 Subject term (key word) listing.

Webbing
Woven
Nylon

6.11 Changes from previous issue. Asterisks 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

Review activities:

Army - MD
Navy - NU
Air Force - 82

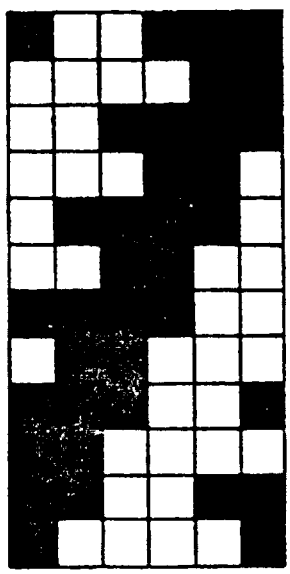
User activities:

Army - AT, MI
Navy - MC
Air Force - 45

Preparing activity:

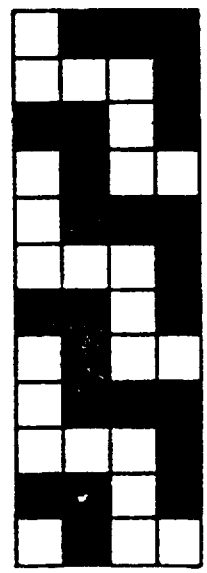
Army - GL

Project No. 8305-0215



BODY

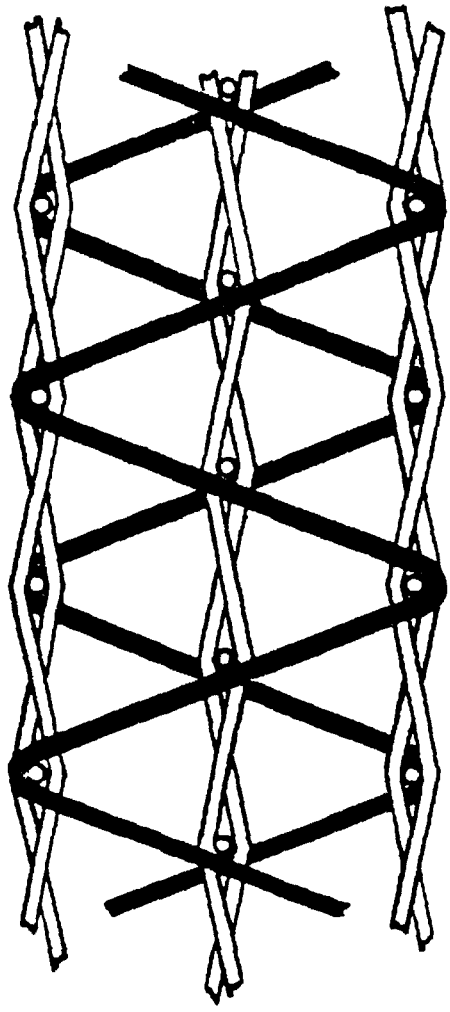
ONE REPEAT WARP
ONE REPEAT FILLING



SELVAGE

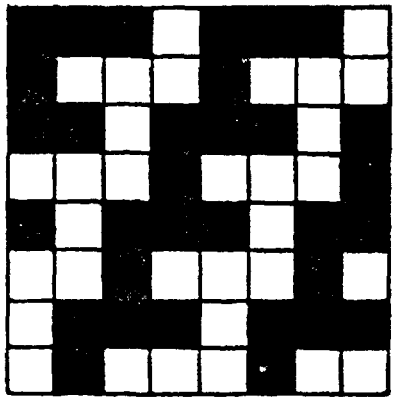
ONE REPEAT WARP
THREE REPEATS FILLING

FIGURE 1. WEAVE DIAGRAM TYPES XIV, XVIII, XIX, AND XXI

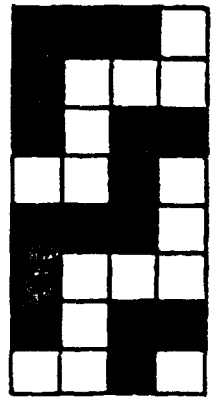


TYPE XX WARP YARNS WEAVING ONE END AS ONE
TYPE XXIII WARP YARNS WEAVING TWO ENDS AS ONE
BINDER YARNS BOTH TYPES WEAVE ONE END AS ONE

FIGURE 2. CROSS SECTION FILLING FOR TYPES XX AND XXIII



BODY



SELVAGE

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.

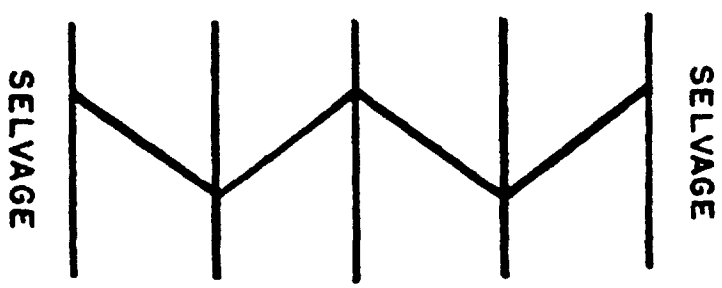
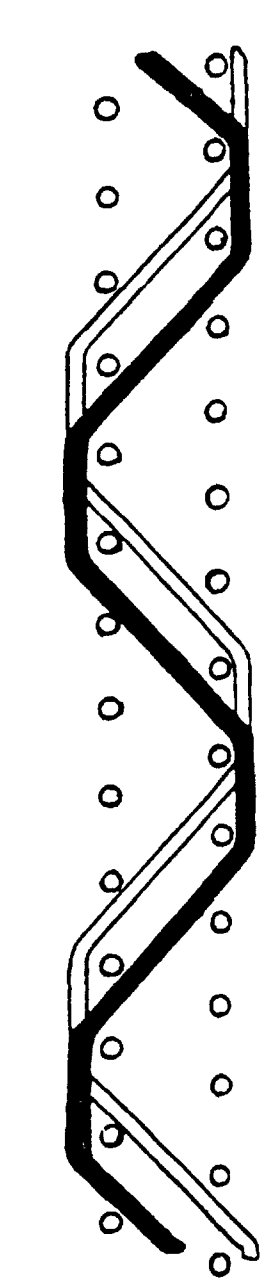
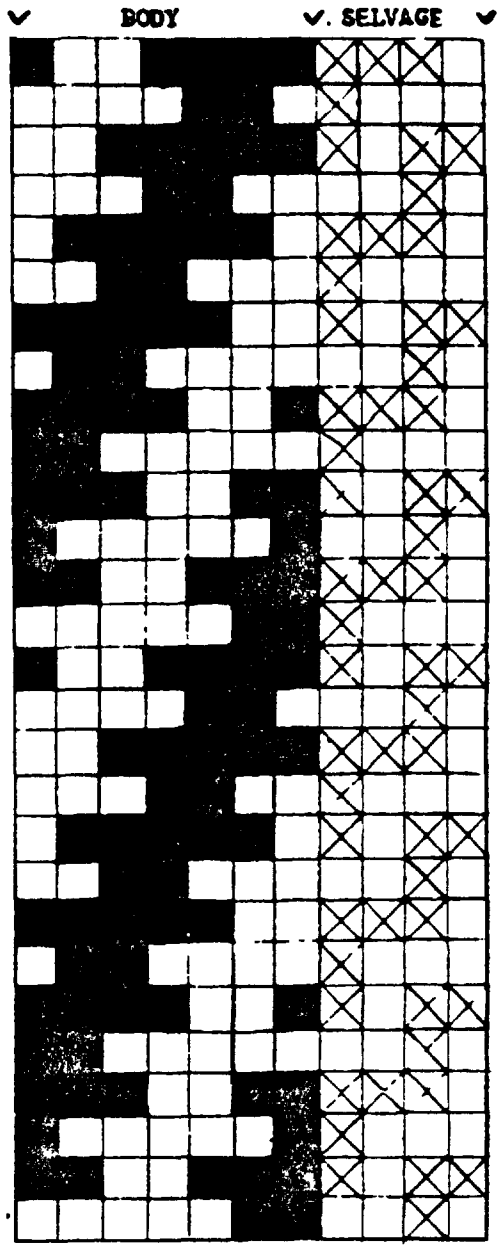
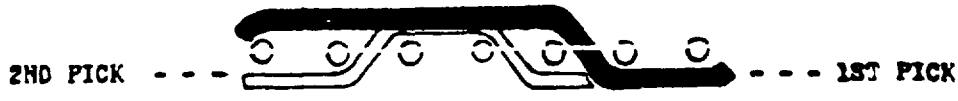


FIGURE 4. WEAVE DIAGRAM TYPE XXIV.



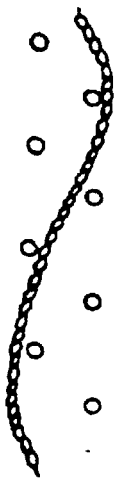
FILLING CROSS SECTION





WARP CROSS SECTION

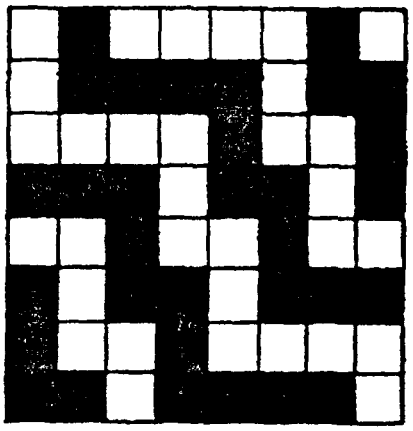
FIGURE 5 WEAVE DIAGRAM TYPE XXVI



FIRST END OF
TWO YARNS

FILLING - CROSS SECTION

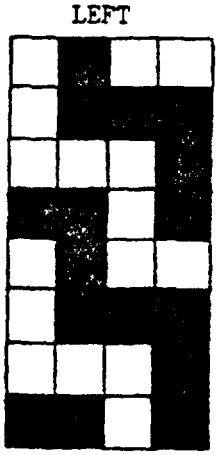
BODY - TWO ENDS WEAVING AS ONE



WARP - CROSS SECTION

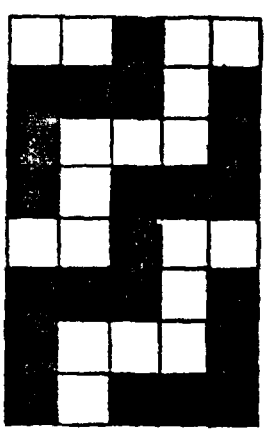
SELVAGE

LEFT



FOUR ADJACENT
BODY ENDS
WOVEN SINGLE

RIGHT

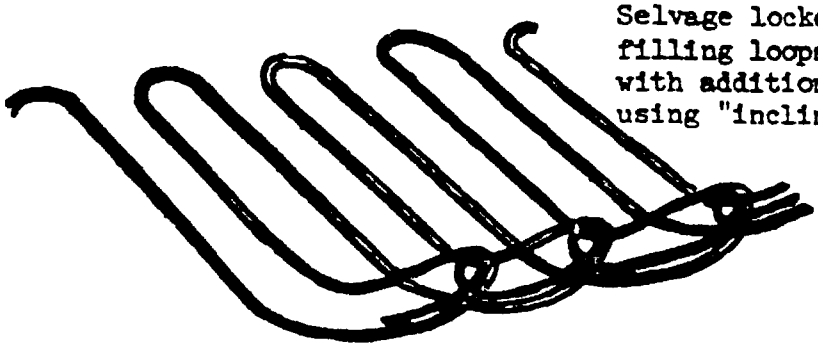


TWO ADJACENT
BODY ENDS
WOVEN SINGLE

FIGURE 6 WEAVE PATTERN TYPE XXVII

FIGURE 7 (classes 1A and 2)

Catch-Cord Diagram



Selvage locked by knitting filling loops simultaneously with additional catch thread using "inclined" latch needle

FIGURE 8 (classes 1A and 2)

Catch-Cord Diagram

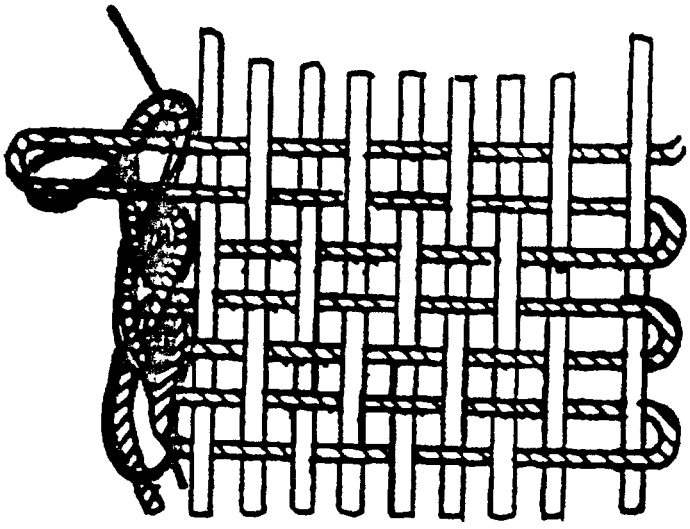
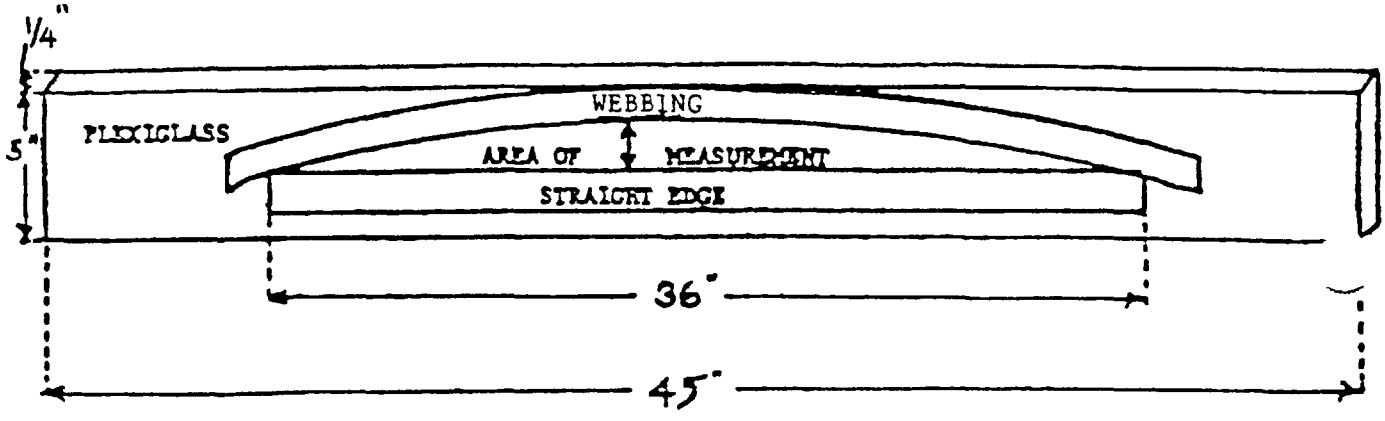


FIGURE 9

Diagram Curvature Measurement



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(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE

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b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
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	☐ OTHER *(Specify)* _____

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a. Paragraph Number and Wording:

b. Recommended Wording

c. Reason/Rationale for Recommendation

6. REMARKS

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c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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