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INCH-POUND

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DETAIL SPECIFICATION

TAPE, TEXTILE AND WEBBING, TEXTILE, REINFORCING, NYLON

This document is approved for use by all Departments and Agencies of the Department of Defense (DoD).

1. SCOPE

1.1 Scope. This specification covers nylon reinforcing tape and webbing.

1.2 Classification.

1.2.1 Types.

Type I	Deleted
Type II	Tape – Herringbone Twill Weave
Type III	Tape – Plain Weave
Type IV	Webbing – Double Plain Weave
Type V	Tape – Herringbone Twill Weave
Type VI	Tape – Herringbone Twill Weave
Type VII	Tape – Plain Weave (Preshrunk)

1.2.2 Classes.

Class 1	Shuttle loom, nylon 6,6
Class 1A	Shuttleless loom, nylon 6,6
Class 2	Shuttle or shuttleless loom, nylon 6 or nylon 6,6

Comments, suggestions, or questions on this document should be addressed: ATTN: DLA Troop Support, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Since contact information can change, you may want to verify the currency of the address information using Acquisition streamlining and Standardization Information System (ASSIST) online database https://assist.dla.mil.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

DRAWINGS

U.S. ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER

2-1-2592 - Operational Camouflage Pattern (OCP)

(Copies of drawings are available from the U.S. Army Natick Research, Development, and Engineering Center, ATTN: RDNS-SEW-EWC, 10 General Greene Avenue Natick, MA 01760-5019).

FEDERAL TRADE COMMISSION (FTC)

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available online at http://www.ftc.gov/ or from the Federal Trade Commission, 600 Pennsylvania Avenue, N.W. Washington, DC 20580-001.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Test Method 8 - Colorfastness to Crocking: AATCC Crockmeter Method

AATCC Test Method 16.2- Colorfastness to Light: Carbon-Arc
AATCC Test Method 16.3 - Colorfastness to Light: Xenon-Arc
AATCC Test Method 20 - Fiber Analysis: Qualitative
AATCC Test Method 61 - Colorfastness to Laundering: Accelerated
AATCC Test Method 81 - pH of Water-Extract from Wet Processed Textiles
AATCC Test Method 169- Weather Resistance of Textiles: Xenon Lamp Exposure
AATCC Evaluation Procedure 1, Gray Scale for Color Change
AATCC Evaluation Procedure 2, Gray Scale for Staining
AATCC Evaluation Procedure 8, AATCC 9 Step Chromatic Transference Scale Rating
AATCC Evaluation Procedure 9, Visual Assessment of Color Difference of Textiles

(Copies are available online at http://www.aatcc.org/ or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

AMERICAN SOCIETY FOR QUALITY (ASQ)

ANSI/ASQ Z1.4 – Sampling Procedures and Tables for Inspection by Attributes

(Copies are available online at http://www.asq.org/ or from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

ASTM INTERNATIONAL

ASTM D1776/D1776M	- Standard Practice for Conditioning and Testing Textiles
ASTM D1777	- Standard Test Method for Thickness of Textile Materials
ASTM D1907/D1907M	- Standard Test Method for Linear Density of Yarn (Yarn Number) by Skein Method
ASTM D3774	- Standard Test Method for Width of Textile Fabric
ASTM D3775	- Standard Test Method for Warp (End) and Filling (Pick) Count of Woven Fabrics
ASTM D3776/D3776M	- Standard Test Method for Mass per Unit Area (Weight) of Fabrics

(Copies of documents area available online at http://www.astm.org or from the ASTM INTERNATIONAL, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.)

PARACHUTE INDUSTRY ASSOCIATION (PIA)

PIA-Test Method-4108 - Strength and Elongation, Breaking; Textile Webbing, Tape and Braided Items

(Copies of this document are available online at http://www.pia.com or The Parachute Industry Association, 3833 West Oakton St, Skokie, IL 60076.)

OTHER PUBLICATIONS

Repeat Insult Patch Test - Modified Draize Procedure -
Principles and Methods of Toxicology, (fourth edition) A Wallace Hayes (editor),
pp 1057 – 1060, 2001.

(Copies are available online at http://www.taylorandfrancis.com/ or from Taylor and Francis,

270 Madison Ave., New York, NY 10016.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Class reference. When procurement documents referencing this specification do not specify the class of webbing, the requirements for Class 1 webbing shall apply. When Class 2 webbing is specified, Class 1 or 1A are acceptable alternates.

3.2 Inspections.

3.2.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2.2 Conformance inspection. When specified (see 6.2), a sample shall be subjected to conformance inspection in accordance with 4.3.

3.3 Standard sample. The finished tape and webbing shall match the standard sample for shade and appearance, and shall, unless otherwise indicated, be equal to or better than the standard sample with respect to all characteristics for which the standard sample is referenced (see 6.4).

3.4 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.5 Material.

3.5.1 Yarn. The nylon yarn used in the manufacture of the tape and webbing shall be nylon 6 or nylon 6,6. Nylon 6,6 shall be used for Class 1 and 1A. Nylon 6 or 6,6 shall be used for Class 2. The yarn shall not be bleached.

3.5.2 Denier. The nominal denier of the warp, filling, and binder yarns, prior to dyeing, shall be as specified in Tables II and III. The catch-cord for the shuttleless loom tapes or webbing shall be 30 to 210 denier nylon or 70, 90 or 150 denier polyester.

3.6 Color. The color shall be as specified by the procuring activity.

3.6.1 Visual shade matching. The color and appearance of the tape and webbing shall match to the standard sample when tested as specified in 4.7.4.

3.6.2 Colorfastness. The finished tape and webbing shall conform to the colorfastness requirements listed below in Table I when tested as specified in Table V.

TABLE I. Colorfastness requirements

Color Evaluation	Laundering (4 cycles) (min.)	Light (40 hrs or 170 kJ/(m^2nm)@420nm) (min.)	Crocking, wet/dry (min.)
OCP 1/: Tan 499, Dk. Green 528, Brown 529	3-4	3-4	3.5
Olive 527	3-4	3	3.5
All other colors	3-4	3-4	3.5

1/ Operational Camouflage Pattern (OCP) - 4 color webbing.

3.6.3 Nylon 6 identification. When nylon 6 is utilized for Class 2 tape or webbing, it shall be identified by using a color sealed black yarn on the woven edge.

3.6.4 Shuttleless loom identification. When shuttleless looms are utilized, the catch-cord yarn shall match the color of the tape or webbing.

3.6.5 Spectral reflectance . The reflectance values for all types and classes with widths of one (1) inch or greater shall conform to the requirements listed below, in Table IA, when tested as specified in 4.7.6.

TABLE IA. Spectral reflectance requirements (all types and classes with widths of one inch or greater).

Reflectance Values (percent)						
Wavelength, Nanometers (nm)	Tan 499		Olive 527 Brown 529		Dark Green 528	
	Min.	Max.	Min.	Max.	Min.	Max.
600	8	26	10	30	3	12
620	8	26	11	30	3	12
640	8	30	11	32	4	12
660	8	34	12	32	4	13
680	12	38	14	35	4	18
700	12	40	19	40	6	25
720	16	46	22	43	6	27
740	22	50	25	46	10	29
760	30	50	27	48	14	33
780	34	54	28	50	18	36
800	36	56	29	50	20	37
820	38	58	30	51	20	38
840	38	58	32	51	21	39
860	40	60	33	52	21	40

3.7 Physical requirements. The finished tape and webbing shall conform to the construction and requirements, listed below in Table II and III, when tested as specified in Table V.

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TABLE II. Physical requirements for Class 1 and shuttle loom woven Class 2.

						Yarns (minimum)			Yarn denier		
Type	**Width inches**	**Thickness inch**	**Weight oz./ lin.yd. (max.)**	**Breaking Strength lbs. (min.) 1/**	**Elongation (min.) 2/**	**Total warp**	**Binder**	**Per inch filling**	**Warp**	**Binder**	**Filling**
II	1 (± 1/32)	0.025-0.035	0.40	900	18	96	--	40	840	--	210
II	1-1/2 (± 1/32)	0.025-0.035	0.60	1300	18	144	--	40	840	--	210
II	2 (± 1/32)	0.025-0.035	0.80	1700	18	192	--	40	840	--	210
III	3/8 (± 1/32)	0.015-0.025	0.12	200	18	74	--	33	210	--	420
III	1/2 (± 1/32)	0.015-0.025	0.15	250	18	100	--	33	210	--	420
III	3/4 (± 1/32)	0.015-0.025	0.20	400	18	150	--	33	210	--	420
III	1 (± 1/32)	0.015-0.025	0.30	525	18	200	--	33	210	--	420
III	1-1/2 (± 1/32)	0.015-0.025	0.40	850	18	300	--	33	210	--	420
IV	1/2 (+1/32, -1/16)	0.030-0.040	0.35	550	18	99	8	48	420	420	420
IV	5/8 (+1/32, -1/16)	0.030-0.040	0.40	625	18	123	10	48	420	420	420
IV	1 (+1/32, -1/16)	0.030-0.040	0.50	1000	18	197	16	48	420	420	420
IV	1-1/8 (+1/32, -1/16)	0.030-0.040	0.60	1100	18	221	18	48	420	420	420
IV	1-1/2 (+1/32, -1/16)	0.030-0.040	0.75	1500	18	293	24	48	420	420	420
V	9/16 (± 1/32)	0.020-0.030	0.20	500	18	42	--	32	840	--	420
VI	3/4 (± 1/32)	0.020-0.030	0.20	425	18	150	--	38	210	--	420
VII	1 (± 1/16)	0.012-0.020	0.14 (±.05)	325	18	124	--	46	210	--	210
VII	2 (± 3/32)	0.012-0.020	0.30 (±.05)	550	18	240	--	46	210	--	210
VII	3 (± 3/32)	0.012-0.020	0.42 (±.05)	1000	18	365	--	46	210	--	210

1/ No individual determination shall fall below the minimum specified.

2/ Minimum elongation measured at 90 percent or more of the minimum rated breaking strength requirement.

TABLE III. Physical requirements for Class IA and shuttleless woven Class 2.

						Yarns (minimum)			Yarn denier		
Type	**Width inches**	**Thickness inch**	**Weight oz./lin. yd. (max.)**	**Breaking Strength lbs. (min.)1/**	**Elongation (min.) 2/**	**Total warp**	**Binder**	**Per inch filling 3/**	**Warp**	**Binder**	**Filling**
II	1 (± 1/32)	0.025-0.035	0.40	900	18	96	--	80	840	--	100
II	1-1/2 (± 1/32)	0.025-0.035	0.60	1300	18	144	--	80	840	--	100
II	2 (± 1/32)	0.025-0.035	0.80	1700	18	192	--	80	840	--	100
III	3/8 (± 1/32)	0.015-0.025	0.12	200	18	74	--	66	210	--	210
III	1/2 (± 1/32)	0.015-0.025	0.15	250	18	100	--	66	210	--	210
III	3/4 (± 1/32)	0.015-0.025	0.20	400	18	150	--	66	210	--	210
III	1 (± 1/32)	0.015-0.025	0.30	525	18	200	--	66	210	--	210
III	1-1/2 (± 1/32)	0.015-0.025	0.40	850	18	300	--	66	210	--	210
IV	1/2 (+1/32, -1/16)	0.030-0.040	0.35	550	18	99	8	96	420	420	210
IV	5/8 (+1/32, -1/16)	0.030-0.040	0.40	625	18	123	10	96	420	420	210
IV	1 (+1/32, -1/16)	0.030-0.040	0.50	1000	18	197	16	96	420	420	210
IV	1-1/8 (+1/32, -1/16)	0.030-0.040	0.60	1100	18	221	18	96	420	420	210
IV	1-1/2 (+1/32, -1/16)	0.030-0.040	0.75	1500	18	293	24	96	420	420	210
V	9/16 (± 1/32)	0.020-0.030	0.20	500	18	42	--	64	840	--	210
VI	3/4 (± 1/32)	0.020-0.030	0.20	425	18	150	--	76	210	--	210

1/ No individual determination shall fall below the minimum specified.

2/ Minimum elongation measured at 90 percent or more of the minimum rated breaking strength requirement.

3/ Two (2) picks per shed.

3.7.1 Resistance to weather and heat. The nylon tape and webbing shall not lose more than 25 percent of the original breaking strength upon exposure to light and heat when tested as specified in Table V.

3.7.2 Lateral curvature. All classes of tapes and webbings shall show no more lateral curvature than 1/4-inch within a yard when tested as specified in 4.7.2 (see FIGURE 2. Lateral curvature diagram).

3.7.3 Breaking strength. The initial breaking strength of any individual specimen shall not be any lower than the minimum requirement in Tables II and III when tested as specified in Table V.

3.7.4 Residual shrinkage. For Type VII only, the residual shrinkage shall not be higher than 2.0 percent when tested as specified in Table V.

3.7.5 Weave. The weave of the tape and webbing shall be as specified in 3.7.5.1 through 3.7.5.5. The filling yarn for Class 1 and shuttle loom woven Class 2 shall traverse the full width of the tape or webbing with one filling yarn per shed. The filling yarn of Class 1A and shutteless woven Class 2 shall traverse the full width of tape or webbing and shall be held at the edge by a catch-cord yarn interlaced with the filling yarn in a method depicted in FIGURE 1. Catch-cord diagram.

3.7.5.1 Type II. The weave shall be a 2-up and 2-down herringbone twill with three (3) reversals of the twill across the width of the tape.

3.7.5.2 Types III and VII. The weave shall be a plain weave.

3.7.5.3 Type IV. The weave shall be composed of two (2) ground warps (face and back), one (1) binder warp and one (1) filling. The face warp shall weave plain with the picks that show on the face, and the back warp shall weave plain with the picks that show on the back. The binder warp shall weave plain throughout.

3.7.5.4 Type V. The weave shall be a 2-up and 2-down herringbone twill with one (1) reversal pf twill at the center.

3.7.5.5 Type VI. The weave shall be a 2-up and 2-down herringbone twill with one (1) reversal pf twill at the center and two (2) ends woven as one (1).

3.8 pH. The pH value of the water extract of the finished tape or webbing shall not be less than 5.5 or more than 9.0 when tested as specified in Table V.

3.9 Toxicity. The finished webbing shall not present a health hazard and shall show compatibility with prolonged, direct skin contact when tested as specified in 4.7.7. Chemicals recognized by the Environmental Protection Agency (EPA) as human carcinogens shall not be used.

3.10 Length and put-up. For Government procurements only, unless otherwise specified (see 6.2), the tape and webbing shall be furnished in continuous lengths, each not less than 40 yards. Each length shall be put-up full width on a roll as specified in 5.1.

3.11 Roll fiber identification. Each roll of finished tape or webbing shall be labeled or ticked for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act (see 2.2.2).

3.12 Workmanship. The finished tape and webbing shall conform to the quality of product established by this specification (see Table IV).

4. VERIFICATION

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

a. First article inspection (see 4.2).
b. Conformance inspection (see 4.3).

4.2 First article inspection. A first article, submitted in accordance with 3.2.1, shall be inspected as specified in 4.3 through 4.7 for compliance to appearance, color, finished defects, and physical characteristics.

4.3 Conformance inspection. Conformance inspection (see 3.2.2) shall include the visual examination and the tests of 4.4 through 4.7 as applicable. Sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4 and with acceptance quality limits as specified in the contract and/or order, except where otherwise indicated (see 6.2).

4.4 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with all the requirements of referenced documents, unless otherwise excluded, amended, modified or qualified in this specification or applicable procurement documents (see 6.2).

4.5 Visual examination. The tape and webbing shall be examined for the defects listed in Table IV.

TABLE IV. Visual defects.

Examine	Defect	Classification	
		Major	Minor
Abrasion marks	Resulting in rupture of yarns or in nap sufficient to obscure to identity of any yarns exceeding 10 percent of width or 1-inch in length	101	
Yarns (filling)	Two (2) yarns per shed (except where permitted)	102	
Broken or missing end	Two (2) or more regardless of length or a single end exceeding 6-inches in length	103	
	Single end, 1/4-inch up to and including 6-inches		201
Broken or missing pick	Two (2) or more regardless of length Note: the filling tie-in or joining in shall not be construed as a defect of any nature.	104	
Coarse or light filling bar	Resulting in noticeable difference in stiffness or thickness of tape or webbing and extending for more than 1/4-inch in the length direction	105	
	Resulting in noticeable difference in stiffness or thickness of tape or webbing and extending for 1/4-inch or less in the length direction		202
Twist or distortion	Tape or webbing will not lay flat upon application of manual pressure due to twist or distortion 2/		203
Cut, hole or tear	Any cut, hole, or tear	106	
Edges	Frayed, slack, tight, or otherwise poorly constructed and exceeding 1/4-inch in length	107	
Scalloped edges	Indentation of 1/8-inch or more regardless of length	108	
Floats or skips	Multiple, 1/2-inch or more warp and filling directions	109	
	Single float or skip, over 1-inch	110	
	Multiple, less than 1/2-inch in combined warp and filling directions		204
	Single float or skip over 1/2-inch but not exceeding 1-inch if in the warp		205
	Single float or skip over 1/4-inch but not exceeding 1-inch if in the filling		206
Hitchback crack	Opening between adjoining picks, or warp-wise tension area over part of the width resulting in light and heavy places 1/		207
Jerked-in filling slough-off, slug	More than twice the thickness of the normal yarn 1/		208
Kinks	More than three (3) kinks in any 9-linear inches	111	
Knots	More than one (1) knot in any 9-linear inches	112	
	One (1) knot with untrimmed ends extending more than 1/16-inch from surface of tape or webbing		209

TABLE IV. Visual defects - Continued

Examine	Defect	Classification	
		Major	Minor
Mispick, double pick	Two (2) or more across the full width	113	
	Single across the full width		210
Slack end	Two (2) or more in the same area, jerked in between picks, or forming clearly visible loops on the surface of tape or webbing 1/	114	
	Single jerked in between picks or forming clearly visible loops on surface of tape or webbing 1/		211
Slub or slug, gout	More than twice the thickness of the normal yarn		212
Smash	Any smash	115	
Spot, stain, or streak	Any clearly visible 1/		213
Tight end	Clearly visible up to 12-inches in length 1/		214
Wrong draw	Extending for more than 9-inches	116	
Shaft mark	Yarn slippage resulting in open place or clearly visible heavy and light yarn density 1/		215
Uneven width	Tight or loose filling resulting in variations of (±1/16)-inch in width	117	
Applicable to shuttles loom tape	Catch-cord missing	118	

1/ Clearly visible at normal inspection distance (approximately 3-feet).
2/ A 3-yard length of tape/webbing shall be laid on a flat and smooth surface without tension. If the tape does not lie flat, or if the tape is still wavy or ridgy after applying manual pressure, it shall be counted as a defect.

4.5.1 Roll identification examination. During the yard-by-yard examination, each roll in the sample it shall be verified that each roll is labeled or ticketed for fiber content in accordance with the Rules and Regulations under the Textile Fiber Products Identification Act (see 3.11).

4.6 End item testing. The tape and webbing shall be tested for the characteristics listed in Section 3. The methods of testing as specified in Table V shall be followed. Except for initial breaking strength and elongation, the physical and chemical values specified in Section 3 apply to the average of the determinations made on a sample unit as specified in the applicable test methods. For initial breaking strength and elongation, the requirement applies to the individual values utilized in expressing the final result. Except as otherwise specified, all testing shall be performed under standard conditions in accordance with ASTM D1776/D1776M. All test reports shall contain the individual values utilized in expressing the final results. The sample size shall be in accordance with the following:

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

The lot size shall be expressed in units of one (1) linear yard. Sample yardage shall be apportioned equally among the selected rolls, tubes or spools. The lot shall be unacceptable if one or more units fail to meet any requirement specified. The sample unit for testing shall be as follows:

Type II, 1-1/2-inches and 2-inches - 30 yards
Type IV, 1-1/2-inches - 30 yards
Type VII, 1 and 2-inches - 30 yards
All others - 15 yards

TABLE V. End item tests.

Characteristic	**Requirement reference**	**Test method**
Fiber analysis	3.5.1	AATCC 20 (see 6.5)
Unbleached	3.5.1	Visual (see 6.5)
Denier	3.5.2, Table II & III	ASTM D1907/D1907M
Colorfastness:		
Crocking, wet/dry	3.6.2, Table I	AATCC 8 2/
Laundering, after 4 cycles	3.6.2, Table I	AATCC 61, Test 1A 3/, 4/
Light (40 hrs or 170 kJ/(m^2nm)@420nm)	3.6.2, Table I	AATCC 16.2 or 16.3 5/
Nylon 6 identification	3.6.3	Visual
Shuttleless loom identification	3.6.4	Visual
Spectral reflectance	3.6.5, Table IA	4.7.6
Thickness	3.7, Table II & III	ASTM D1777, Opt 2 1/
Width	3.7, Table II & III	ASTM D3774, Opt B
Weight	3.7, Table II & III	ASTM D3776/D3776M, Opt D
Warp Ends: Face & back warp Binder warp (Type IV)	 3.7, Table II & III 3.7, Table II & III	 ASTM D3775 ASTM D3775
Filling: Picks per inch	 3.7, Table II & III	 ASTM D3775
Elongation	3.7, Table II & III	PIA-Test Method-4108
Curvature	3.7.2	4.7.2
Breaking Strength Initial Weather resistance Resistance to heat	 3.7.3, Table II & III 3.7.1 3.7.1	 PIA-Test Method-4108 AATCC 169, Option 3 and 4.7.3 4.7.1

TABLE V. End item tests – Continued

Characteristic	Requirement reference	Test method
Residual shrinkage (Type VII)	3.7.4	4.7.5
Weave	3.7.5	Visual
pH	3.8	AATCC 81
Toxicity	3.9	4.7.7

1/ The anvil shall be not less than 0.250-inch in diameter.
2/ Rated using the AATCC Evaluation Procedure 8, AATCC 9 Step Chromatic Transference Scale Rating
3/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change and AATCC Evaluation Procedure 2, Gray Scale for Staining.
4/ Only the stain on the nylon fibers of the color transfer cloth shall be evaluated.
5/ Rated using the AATCC Evaluation Procedure 1, Gray Scale for Color Change.

4.7 Method of inspection.

4.7.1 Resistance to heat. Five (5) tests shall be conducted on each sample unit of the tape or webbing. The test specimens shall be suspended in a circulating air oven at a temperature of 356 (±5)°F for one (1) hour. After removal from the oven, the specimen shall be brought to equilibrium under standard conditions as defined in ASTM D1776/D1776M. The specimens shall then be tested for breaking strength as specified in Table V and the percent of breaking strength loss shall be calculated as follows:

$$\frac{\text{(Initial Average Breaking Strength (B.S)–Average B.S After Aging)}}{\text{Initial Average B.S}} \times 100 = \text{Percent of B.S loss}$$

4.7.2 Measurement of lateral curvature.

4.7.2.1 Test specimen. The test shall be a length of tape or 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.

4.7.2.2 Number of determinations. Five (5) specimens shall be tested from each sample unit.

4.7.2.3 Apparatus.

Plexiglass or equal - A sheet of Polymethyl-Methacrylate (PMMA) weighing approximately 35-ounces with dimensions of 45-inches by 5-inches by 1/4-inch.

Straight edge	- A rigid roller-straight edge measuring 36-inches in length. - A roller 1-inch in diameter, weighing 1-1/2 -pounds.

4.7.2.4 Procedure. The specimens shall be placed flat on a smooth, horizontal, flat surface without tension and allowed to reach moisture equilibrium as defined in ASTM D1776/D1776M, Section 4. After equilibrium is reached a weight shall be placed at one end of the tape. The roller shall be placed on the specimen at the end of the tape where the weight is located. The specimen shall be approximately in the center of the roller. The roller shall be 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 tape, the PMMA shall then be placed on the specimen for a period of one (1) hour. Without moving the PMMA on the specimen, the straight edge shall be placed on the PMMA so that both ends of the straight edge are aligned perpendicularly with the outermost edge of the specimen from the straight edge by measuring to the nearest 1/32-inch perpendicularly from the straight edge. Record the highest measurement (see FIGURE 2. Lateral curvature diagram).

4.7.2.5 Report. The average of five (5) determinations from each sample unit shall be recorded.

4.7.3 Weather resistance.

4.7.3.1 Xenon Arc Test Procedure. Test specimens shall be the appropriate specimen size and shall be tested in accordance with AATCC 169, Option 3 with the following exceptions:

a. The specimens shall be attached to an “open rack” by weaving in the specimens and letting the excess material hang below the rack. Thicker samples can be attached directly to the rotating rack by attaching the corners with wooden or non-rusting clamps. Thinner tapes and webbings can be folded and laid flat or wrapped around panels and attached with appropriate clamps. Care must be taken to assure that the middle 6 to 8-inches of the tape or webbing is exposed.
b. The exposure time shall be 50 continuous hours.
c. The spray heads shall be turned off during the entire exposure period.
d. The relative humidity conditions shall be 55 (±5) percent throughout the test cycle.
e. At the end of the exposure period the specimens shall be brought to equilibrium at least four (4) hours in accordance with ASTM D1776/D1776M.
f. The specimens shall the be tested for breaking strength in accordance with PIA Test Method 4108 and the percent of breaking strength loss shall be calculated as follows:

(Initial Average Breaking Strength (B.S)–After exposure average B.S) x 100 = Percent B.S loss

4.7.4 Visual shade matching. The color and appearance of the tape or webbing shall match the standard sample when viewed using the AATCC Evaluation Procedure 9, Option A, with

sources simulating artificial daylight D75 illuminant with a color temperature of 7500 (±200) K illumination of 100 (±20) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2856 (±200)K.

4.7.5 Residual shrinkage. Three 24-inch full width specimens shall be selected from the sample unit. The specimens shall be conditioned in accordance with ASTM D1776/D1776M. Eighteen inch gage marks shall then be placed on the specimens with an indelible marking medium. The specimens shall then be placed in a container of water maintained at 100 (±2)^{o}F and kept submerged at that temperature for 60 to 70 minutes. (Note: Using weights on top of specimens may be necessary to ensure specimens are submerged fully during the exposure period.) At the end of the exposure period, the specimens shall be removed and air dried without tension at a temperature not to exceed 105^{o}F. After drying, the specimens shall be conditioned in accordance with ASTM D1776/D1776M. The distance between the gage marks shall be measured and percent shrinkage calculated as follows:

$$\frac{\text{(Initial Length – Final Length)}}{\text{Initial Length}} \times 100 = \text{Percent Shrinkage}$$

4.7.6 Spectral reflectance test. Spectral reflectance data shall be obtained from 600 to 860 nanometers (nm) for all types and classes with widths of one (1) inch or greater in OCP and most solids at 20 nm intervals on a spectrophotometer relative to the polytetrafluoroethylene (PTFE) family of compounds, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white or vitrolite tiles. The spectral band width shall be less than 20 nm at 860 nm. Reflectance measurements shall be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer shall operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65. Measurements shall be taken on a minimum of two (2) different areas and the data averaged. The specimen shall be measured as a single layer backed with two (2) layers of the same webbing and shade. The specimen shall be viewed at an angle no greater than 10° from normal, with the specular component included. Specimens shall be oriented in different directions during testing. Camouflage materials should be measured with the appropriate aperture size to ensure that only one (1) color is measured at a time. (**NOTE**: The diameter for standard aperture size used in the color measurement device shall be 1.0 to 1.25-inches for most solid colors and 0.3725-inches for the OCP (always use the largest aperture possible). Photometric accuracy of the spectrophotometer shall be within one (1) percent and wavelength accuracy within two (2) nm. Any color having spectral reflectance values falling outside the limits at four (4) or more of the wavelengths specified shall be considered a test failure.

4.7.7 Toxicity test. When required, (see 6.2), an acute dermal irritation study and a skin sensitization study shall be conducted on laboratory animals. When the results of these studies indicate the (item) is not a sensitizer or irritant, a Repeat Insult Patch Test shall be performed in accordance with the Modified Draize Procedure (See 2.3). If the toxicity requirement (see 3.9) can be demonstrated with historical use data, toxicity testing may not be required (see 6.2).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory or contractually binding.)

6.1 Intended use. The tape and webbing is intended for binding and reinforcing applications in equipage and parachute packs.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and Class required (see 1.2).
c. The specific issue of individual documents referenced (see 2.2).
d. When first article is required (see 3.2.1, 4.2, and 6.3).
e. Conformance inspection acceptance quality limits (AQL) (see 3.2.2 and 4.3).
f. Length required if other than specified (see 3.9).
g. Inspection conditions (see 4.3).
h. When toxicity testing is required (see 4.7.6)
i. Packaging (see 5.1)

6.3 First article. When a first article inspection is required (see 3.2.1), it will be inspected and approved under the appropriate provisions of FAR 52.209-4. 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 acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Standard sample. For access to standard samples, address the contracting activity issuing the invitation for bids or request for proposal.

6.5 Certificate of Completion. The contracting activity may select to accept a certificate of compliance for stated requirement.

6.6 Supersession data. This document supersedes MIL-PRF-5038J, dated 05 November 1996.

6.7 Subject term (key word) listing.

Binding and reinforcement
Equipage
High tenacity
Light and heat resistant polyamide
Packs

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issues, due to the extensiveness of the changes.

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

CATCH CORD DIAGRAM

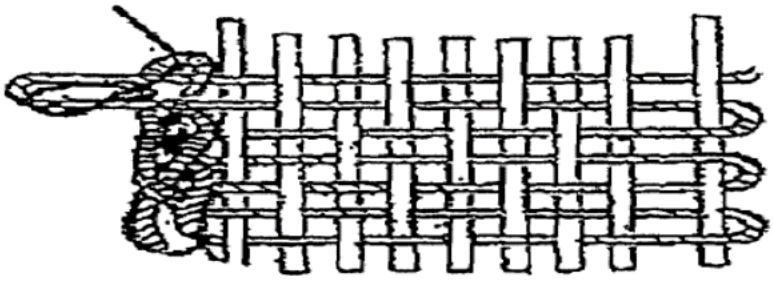

FIGURE 1. Catch cord diagram

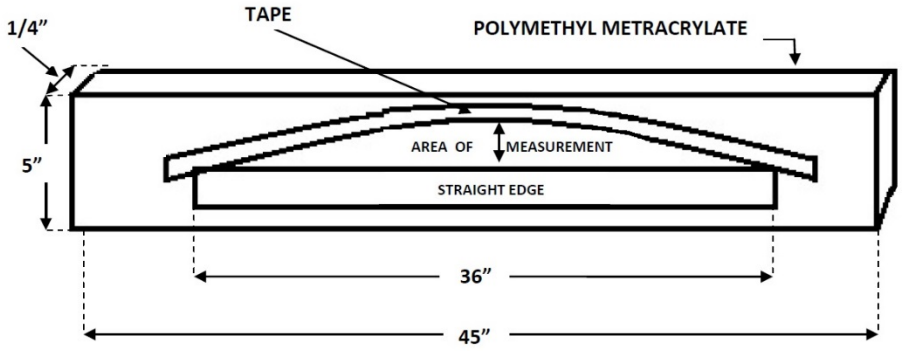

FIGURE 2. Curve measurement.

Custodians:
Army – GL
Navy – NU
Air Force – 11

Preparing Activity
DLA-CT

Project Number: 8305-2016-005

Review Activities:
Army – MD

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at https://assist.dla.mil.

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