



PIA-W-25361C
08 September 2016

Superseding
PIA-W-25361B
21 May 2012

The following commercial specification is adopted from the military document. Revision A included in all known accepted revisions, amendments, notices, and Department of Defense (DoD) engineering changes previously developed for this item. Revisions B and forward include changes adopted by DoD and Industry to reflect technology and design evolution.

WEBBING, TEXTILE, POLYESTER, LOW ELONGATION

The Parachute Industry Association makes this document available for use by Industry and Government organizations that wish to apply this specification to their products.

1. SCOPE

1.1 Scope. This specification covers low elongation textile webbing composed of a continuous filament polyester warp or continuous filament polyester filling.

1.2 Classification. The webbing shall be of the following Types and Classes as specified (see 6.1).

Type:

- I - 3,600 pound breaking strength
- II - 6,000 pound breaking strength
- III - 7,000 pound breaking strength
- IV - 8,700 pound breaking strength
- V - 10,000 pound breaking strength
- VI - 15,000 pound breaking strength.

Class:

- 1 - Untreated
- 2 - Latex treated (not widely used)
- 3 - Approved Finish.

1.2.1 If Class 2 is required, the use of Class 3 is acceptable.

1.3 Webbing constructions. The polyester/nylon and all polyester webbing Types shall be furnished as either shuttle and/or shuttleless construction. The constructions and physical properties shall conform to the applicable requirements as specified in TABLES I.

1.3.1 Webbing construction reference. When procurement documents referencing this specification do not specify the webbing construction, all webbing constructions are acceptable. When shuttle loom or shuttleless construction is specified, the shuttle construction is an acceptable alternative.

DISTRIBUTION STATEMENT: All Rights Reserved. No Part of this publication may be reproduced without prior written permission from Parachute Industry Association. Additional copies may be purchased online from PIA Specifications and Products at: www.pia.com.

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 documents cited in Sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government publications.

2.2.1 Government publications. The following Government publications form a part of this document.

FEDERAL TRADE COMMISSION (FTC)

16 CFR 303 - Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available online at: www.ftc.gov or from the Federal Trade Commission, 600 Pennsylvania Avenue, N.W. Washington, DC 20580-0001. Electronic copies may be also obtained from www.access.gpo.gov/.)

2.2.2 Non-government publications. The following documents form a part of this document.

AMERICAN SOCIETY FOR QUALITY (ASQ)

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

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

ASTM INTERNATIONAL (ASTM)

ASTM D1388	- Standard Test Method for Stiffness of Fabrics
ASTM D1777	- Standard Test Method for Thickness of Textile Materials
ASTM D3774	- Standard Test Method for Width of Textile Fabric
ASTM D3775	- Standard Test Method for Fabric Count of Woven Fabrics
ASTM D3776	- Standard Test Method for Mass per Unit Area (Weight)
ASTM D5427	- Standard Practice for Accelerated Aging of Inflatable Restraint Fabrics
ASTM D6770	- Standard Test Method for Abrasion Resistance of Textile Webbing (Hex Bar Method)
ASTM G151	- Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources
ASTM G155	- Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials

(Application for copies should be addressed to the ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19426-2959. Electronic copies may be obtained from www.astm.org.)

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

- | | |
|------------|---|
| AATCC 8 | - Colorfastness to Crocking; Crockmeter Method |
| AATCC 16.2 | - Colorfastness to Light: Carbon-Arc |
| AATCC 16.3 | - Colorfastness to Light: Xenon-Arc |
| AATCC 81 | - pH of Water-Extract from Wet Processed Textiles |
| AATCC 192 | - Weather Resistance of Textile: Sunshine-Arc Lamps
Exposure With And Without Wetting. |
- AATCC Evaluation Procedures:

- 1 Gray Scale for Color Change
- 8 AATCC 9 - Step Chromatic Transference Scale
- 9 Visual Assessment of Color Differences of Textiles

(Applications for copies of referenced documents should be addressed to: AATCC National Headquarters, P.O. Box 12215, Research Triangle Park, NJ 27709-2215. Electronic copies may be obtained from www.aatcc.org.)

PARACHUTE INDUSTRY ASSOCIATION

- | | |
|----------------------|--|
| PIA-TEST METHOD-4108 | - STRENGTH AND ELONGATION, BREAKING;
TEXTILE WEBBING, TAPE AND BRAIDED
ITEMS |
| PIA-TEST METHOD-2611 | - NONFIBROUS MATERIALS IN COTTON,
ENZYME METHOD |

(Electronic copies may be obtained from www.pia.com.)

2.3 Order of precedence. Unless otherwise stated 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 First article. When specified (see 6.1), a sample shall be subjected to first article inspection in accordance with 4.2.

3.2 Standard. When applicable the dyed webbing shall match the standard for shade and appearance, unless otherwise indicated, shall be equal to or better than the standard with respect to all characteristics for which the standard is referenced (see 6.1).

3.3 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.

3.4 Material.

3.4.1 Polyester yarns. The warp and the filling yarns for all types shall be semi dull or bright, high tenacity polyester fiber identified as polyethylene glycol terephthalate with a minimum melting point of 472° F (245° C) and shall comply to the denier, ply and twist requirements specified in TABLES I and II.

3.5 Weave.

3.5.1 Type I (shuttle and shuttleless). The weave shall be a two up, two down twill with one reversal at the center of the webbing.

3.5.2 Types II, III, IV and V (shuttle). The weave shall be as shown in FIGURE 1 with one reversal at the center of the webbing.

3.5.3 Type VI (shuttle). The webbing shall be woven in a three-ply (face, middle and back) plain weave with binders weaving three up and three down. The binders pull one face, one middle and one back pick together. Warp ends weave two ends as one, binder and selvage ends weave single. The selvages shall have eight ends on one edge and nine on the other. A cross section of the weave is shown in FIGURE 2.

3.6 Shuttleless identification. When shuttleless loom construction is utilized the catch-cord shall be 300 to 500 denier (nominal) polyester color-sealed black.

3.6.1 Shuttleless loom catch-cord. When shuttleless loom constructions are supplied they shall be manufactured with a latch type needle loom. The shuttleless construction filling yarn shall traverse the full width of the webbing and shall be held by an extra catch-cord end interlacing with the filling yarn in a method depicted in FIGURE 3.

3.7 Physical requirements. The webbing shall conform to the physical requirements specified in TABLES I and II when tested as specified in 4.4.4.

(THIS SPACE LEFT INTENTIONALLY BLANK)

TABLE I Physical Properties - Shuttle and Shuttleless Constructions.

Characteristic	Type I	Type II	Type III	Type IV	Type V		Type VI
Width (inches)	1 23/32 ±1/16	1 23/32 ±1/16	1 23/32 ±1/16	3 ±1/8	1 3/4 ±1/16		1 3/4 ±1/16
Thickness (inches) ^{1/}	0.040-0.065	0.060-0.085	0.070-0.095	0.065-0.090	0.110-0.135		0.215-0.235
Weight (oz./linear yd.) (maximum)	1.80	2.30	2.63	4.25	4.35		7.50
Breaking strength: Initial (lbs.) (minimum)	3600	6000	7000	8700	10,000		15,000
After abrasion (lbs.) (minimum ^{2/})	-	-	-	-	9,000		13,000
After accelerated aging (percentage) loss to initial strength (maximum ^{2/})	-	-	-	-	5.0		5.0
Elongation (percentage): At 2,500 lbs. load (maximum ^{2/})	18.0	-	-	-	-		-
At 3,000 lbs. load (maximum ^{2/})	-	13.0	12.0	12.0	9.0		7.5
At 90 percent of specified minimum tensile (maximum ^{3/})	-	17.5	17.5	18.5	16.0		17.5
Number of warp ends (minimum):					2600 Construction	1000 Construction	
Face and Back	168	238	282	380	298	398	494
Binder	-	-	-	-	-	-	41
Picks per inch (shuttle) minimum	17	23	23	32	22	22	17
Picks per inch, (shuttleless) minimum ^{4/}	34	46	46	64	44	44	34
Denier (nominal):							
Warp, face and back	1000	1000	1000	1000	2600d	1000d	1000
Binder	-	-	-	-	-	-	1000
Filling (shuttle & shuttleless)	1000	1000	1000	1300	1300	1000	1000
Ply:							
Warp, face and back	2	2	2	2	1	2	3
Binder	-	-	-	-	-	-	2
Filling (shuttle)	2	2	2	2	2	2	2
Filling (shuttleless)	1	1	1	1	1	1	1
Ply twist (t.p.i.):							
Filling (shuttle)	2.5 ±1	2.5 ±1	2.5 ±1	2.5 ±1	2.5 -3.0	2.5 -3.0	2.5 -3.0
Filling (shuttleless)	0 ^{5/}	0 ^{5/}	0 ^{5/}	0 ^{5/}	0 ^{5/}	0 ^{5/}	0 ^{5/}
Warp (face and back)	2.5 ±1	2.5 ±1	2.5 ±1	2.5 ±1	2.5 -3.0	2.5 -3.0	2.5 -3.0
Binder	-	-	-	-	-	-	2.5 -3.0

Notes:

^{1/} For Type V, Classes 2 and 3 dyed webbing, the thickness range shall be 0.080-0.1350 inches.^{2/} Pertains to Classes 2 and 3 latex treated webbings.^{3/} Pertains to untreated and treated webbings.^{4/} 2 Picks per shed.^{5/} Producer twist for shuttleless loom Types I, II, III, IV and V.

3.8 Nonfibrous material. The water-soluble and chloroform-soluble materials shall be not greater than 2.0 percent when tested as specified in 4.4.4. For treated webbing, determination shall be made after dyeing and prior to the application of the approved finish.

3.9 Color. The color of the webbing and its referenced standard shall be as specified by their procuring activity or order (see 6.1).

3.10 Visual shade matching. When evaluated in accordance with 4.5.5, the color of the dyed webbing shall match the standard with sources simulating artificial daylight and shall be a good match to the standard under incandescent lamplight.

3.10.1 Colorfastness to light. PIA has adopted AATCC 16.3 as an acceptable alternative test method to AATCC 16.2 for the testing of narrow Fabrics using Xenon (see TABLE IV).

3.11 Colorfastness. When tested as specified in 4.4.4, the dyed webbing shall show fastness to light and crocking as follows:

Characteristic	Rating, minimum
Light (Fade) ^{1/}	3-4
Crocking: Wet and Dry ^{2/}	3.5

Notes:

^{1/} Rated using the AATCC Evaluation Procedure 1, Grey Scale for Color Change.

^{2/} Rated using the AATCC Evaluation Procedure 8, AATCC9 - Step Chromatic Transference Scale.

3.12 pH. The pH value of the water extract of the Class 1, Class 2 and Class 3 webbing, shall be not less than 5.5 and not greater than 9.0 when tested as specified in 4.4.4.

3.13 Gumminess after accelerated aging. Class 2 (latex treated) and Class 3 (alternate latex treated) Types V and VI webbing shall show acceptable resistance to gumminess (stickiness) after accelerated aging when tested as specified in 4.4.4.

3.14 Stiffness at -65°F (-53°C). Types V and VI webbing shall show acceptable initial and after accelerated aging stiffness when exposed to -65°F (-53°C) as tested as specified in 4.4.4.

3.15 Finish.

3.15.1 Class 1, untreated. When Class 1 is specified, the webbing shall be untreated.

3.15.2 Class 2, latex treatment. When Class 2 is specified, the webbing shall be impregnated with a natural rubber latex containing the necessary curatives and antioxidants. The webbing shall be saturated by total immersion in a latex bath for a period of time sufficient to allow penetration to the core of the webbing and the excess then removed to permit conformance to the finished weight requirement. The webbing shall be dried and vulcanized.

3.15.3 Class 3, approved finish. The approved finish is identified in Para 6.3. Class 3 webbing shall meet all the requirements of Class 2 within this specification.