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MILITARY SPECIFICATION

FASTENER TAPES, HOOK AND LOOP, SYNTHETIC

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

1. SCOPE

1.1 Scope. This specification covers the requirements for synthetic tape fasteners consisting of a hook tape and a loop pile tape.

1.2 Classification. The hook and loop pile fastener tapes shall be of the following types, classes, widths, and colors (see 6.1 and 6.2).

* 1.2.1 Types.

- I - 6.5 mil hook (220 denier)
- IA - 8.0 mil hook (330 denier)
- II - 8.0 mil hook (330 denier)
- III - 8.0 mil hook (330 denier)
- IV - 8.0 mil hook (330 denier) center selvage

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760-2490 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 8315

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* 1.2.2 Classes.Hook Tapes

Class 1 - Nylon Hook; Nylon Ground
 Class 2 - Nylon Hook; Non-melting
 Aramid Ground
 Class 3 - Polyester Hook; Polyester
 Ground
 Class 5 - Polyester Hook; Polyester
 Ground

Loop Tapes

all Nylon
 all non-melting Aramid
 all Polyester
 all Nylon

1.2.3 Widths.

5/8 inch (16mm), 3/4 inch (19mm), 1 inch (25mm), 1-1/2 inches (38mm),
 2 inches (50mm), and 4 inches (100mm)

* 1.2.4 Colors. The hook and loop tape shall be in the following colors for
 the different types and classes:

Types I, IA, II, III, and IVClass 1

Brown 3753
 Black 3230
 Gray 3123
 Gray 3124
 Orange 3602
 White 3054
 Red 3852
 Green OG 106
 Green 1565
 Green 3453
 Blue 3364
 Lt. Navy Blue 3368

Type IClass 2

Green 3421
 White 3055

Type IIClasses 3 and 5

Green 3422
 White 3056
 Black 3230
 Lt. Navy Blue 3368

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.

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SPECIFICATIONS

FEDERAL

- NN-P-71 - Pallet, Material Handling, Wood, Stringer Construction, 2 Way and 4 Way (partial)
- PPP-B-636 - Boxes, Shipping, Fiberboard

MILITARY

- MIL-P-15011 - Pallet, Material Handling, Wood, Post Construction, 4 Way Entry

STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads

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

2.1.2 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.

LAWS AND REGULATIONS

U.S. POSTAL SERVICE MANUAL

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402).

2.2 Other publications. The following document(s) 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 issue of the nongovernment documents which is current on the date of the solicitation.

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NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Applications for copies should be addressed to the American Trucking Association, ATTN: Traffic Department, 1616 P Street, N.W., Washington, DC 20036).

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

(Applications for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606).

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. When a standard sample is available, the finished tape shall be equal to or better than the sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

3.2 First Article. When specified the contractor shall furnish the specified sample unit(s) to the procuring activity for the first article approval (see 4.3 and 6.2).

3.3 Materials. The hook and pile tapes shall be fabricated of synthetic yarns suitable for the purpose intended as specified (see 1.2.1 and 1.2.2). In addition, the non-melting aramid yarns shall have a carbonizing temperature of not less than 675 degrees F (357°C). Testing shall be as specified in 4.4.1.

3.4 Construction.

3.4.1 Construction of hook tape. The hook tapes shall be of woven, warp pile, narrow fabric construction, with multifilament ground ends (including selvages) and picks. Monofilament auxiliary warp ends shall be woven in the form of raised loops which can be heat set to retain their shape and cut near the top of the loop in order to form a free hook engaging section. The hooks shall be leno woven in a staggered order. The hook tapes shall conform to the minimum requirements listed in Table I when tested as specified in 4.4. Recommended use of hook tape shall be as indicated in 6.1.

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* Table I - Construction requirements for hook tapes (minimum)

		Width - inches (mm)					
		4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Hooks per linear inch of tape:							
Type I							
Class 1	1400	790	599	382	268	216	
Class 2	-	589	446	285	200	161	
Type IA							
Class 1	1400	790	599	382	268	216	
Type II							
Class 1	750	341	258	191	134	108	
Classes 3 and 5	-	325	-	191	-	-	
Type III							
Class 1	1000	454	344	255	178	144	
Type IV							
Class 1	-	277	-	146	-	-	
Picks per linear inch of tape:							
Type I							
Class 1	51	51	51	51	51	51	
Class 2	-	38	38	38	38	38	
Type IA							
Class 1	51	51	51	51	51	51	
Type II							
Class 1	44	44	44	51	51	51	
Classes 3 and 5	-	42	-	51	-	-	
Type III							
Class 1	44	44	44	51	51	51	
Type IV							
Class 1	-	44	-	51	-	-	
Ground ends per tape (including selvages):							
Type I							
Class 1	700	344	259	174	129	109	
Class 2	-	270	205	137	104	86	

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Table I (Cont'd)

		Width - inches (mm)					
		4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Type IA							
Class 1	700	344	259	174	129	109	
Type II							
Class 1	680	344	259	174	129	109	
Classes 3 and 5	-	344	-	174	-	-	
Type III							
Class 1	583	298	224	150	115	94	
Type IV							
Class 1	-	298	-	150	-	-	
Hook ends per tape:							
Type I							
Classes 1 and 2	124	62	47	30	21	17	
Type IA							
Class 1	124	62	47	30	21	17	
Type II							
Class 1	124	62	47	30	21	17	
Classes 3 and 5	-	62	-	30	-	-	
Type III							
Class 1	124	62	47	30	21	17	
Type IV							
Class 1	-	50	-	23	-	-	

3.4.2 Construction of loop pile tape. The loop pile tapes shall be of woven, warp pile, narrow fabric construction, with multifilament ground ends (including selvages) and picks, with leno woven loop ends. The loops of classes 1 and 5 tapes shall be suitably napped to form a uniformly disoriented surface of uncut loops capable of being engaged by the hooks of the hook tape component; or, as an alternate, shall be woven of specially treated loop pile yarns that provide a uniformly disoriented surface without being napped. The loops of classes 2 and 3 tapes shall remain unnapped. The tapes shall conform to the minimum requirements listed in Table II when tested as specified in 4.5. Recommended use of loop pile tapes shall be as indicated in 6.1.

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* Table II - Construction requirements for the loop ox tapes (minimum)

Width - inches (mm)						
	4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Picks per inch:						
Class 1						
for use with						
types I, IA,						
II, III & IV						
hook tapes	51	51	51	51	51	51
Class 2						
for use with						
type I						
hook tape	45	45	45	45	45	45
Class 3						
for use with						
type II						
hook tape	-	51	-	51	-	-
Class 5						
for use with						
type II						
hook tape	-	51	51	51	51	51
Ground ends per tape (including selvages):						
Class 1						
for use with						
types I, IA,						
II, III						
and IV tapes	590	298	228	149	110	94
Class 2						
for use with						
type I hook						
tape	-	263	205	137	104	86
Classes 3						
and 5						
for use with						
type II						
hook tape	-	298	-	149	-	-

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Table II (Cont'd)

	Width - inches (mm)					
	4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Loop pile ends per tape:						
Class 1						
for use with						
types I, IA,						
II and III						
hook	120	65	47	28	19	15
for use with						
type IV						
hook tape	-	49	-	21	-	-
Class 2						
for use with						
type I						
hook tape	-	60	46	30	22	17
Classes 3						
and 5						
for use with						
type II						
hook tape	-	65	-	28	-	-

3.5 Color. The color shall be as specified (see 1.2.4 and 6.2).

3.5.1 Colorfastness. The dyed tape fasteners shall show colorfastness to laundering, dry cleaning (when required, see 6.2), and crocking equal to or better than the standard sample when tested as specified in 4.5. When no standard sample is available or referenced for colorfastness, the dyed tape fasteners shall show good colorfastness to laundering, dry cleaning (when required, see 6.2), and crocking when tested as specified in 4.5.

3.5.2 Matching. The color shall match the standard sample when viewed under filtered tungsten lamp which approximates artificial daylight having a correlated color temperature of 7000 (+ 500) Kelvin, with illumination of 100 (+ 20) foot candles, and shall be a good match to the standard sample under incandescent lamplight at 2300 (+ 100) Kelvin.

3.6 Special marking. For identification purposes, type I, class 2 hook and loop pile tapes, in color 3055, may be furnished with multifilament non-melting aramid yarns, in color O.G. 106, woven into one or both selvages of each tape. Not more than two such yarns per selvage are permitted. A colorless identification marking of sufficient permanence to withstand a minimum of 3 washings or 3 dry cleanings may be used on the backs of fastener tapes. Infra-red reflective markings are not permissible. Testing shall be as specified in 4.4.1.

* 3.7 Physical requirements. The physical requirements for the tape fasteners shall be shown in Table III when tested as specified in 4.5.

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Table III - Physical requirements

		Width - inches (mm)					
		4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Weight (minimum)							
(grams per liner yard)							
Type I hook							
Class 1	18.0	11.2	8.6	5.6	4.3	3.5	
Class 2	-	13.2	9.7	6.6	4.8	4.4	
Type IA hook							
Class 1	-	12.0	9.2	6.0	4.6	3.8	
Type II, III, and IV hooks							
Class 1	19.0	11.7	8.6	5.9	4.4	3.5	
Classes 3 and 5	-	13.2	-	7.0	-	-	
Loop pile 1/							
Class 1	28.0	15.7	11.7	7.4	5.1	4.3	
Class 2	-	19.8	15.0	10.1	7.5	6.2	
Class 3	-	13.0	-	6.6	-	-	
Class 5	-	15.7	-	7.4	-	-	
Breaking strength (lbs) (minimum)							
Type I hook							
Class 1	400	215	145	115	85	80	
Class 2	-	285	195	155	115	105	
Type IA hook							
Class 1	-	215	145	115	85	80	
Type II hook							
Class 1	400	215	170	125	100	80	
Classes 3 and 5	-	285	-	160	-	-	
Type III hook							
Class 1	-	215	170	125	100	80	
Type IV hook							
Class 1	-	205	-	120	-	-	
Loop Pile							
Class 1	350	205	150	95	65	60	
Class 2	-	285	200	144	85	76	
Class 3	-	220	-	120	-	-	
Class 5	-	205	-	95	-	-	

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Table 3 - Cont'd)

	Width - inches (mm)					
	4 (100)	2 (50)	1-1/2 (38)	1 (25)	3/4 (19)	5/8 (16)
Shear strength <u>2/</u> <u>3/</u> <u>4/</u> (lbs) (minimum)						
Type I						
Class 1	30.0	16.0	12.0	7.5	7.0	6.5
Class 2	-	17.0	16.0	15.0	10.0	7.5
Type IA						
Class 1	-	16.0	12.0	7.5	7.0	6.5
Type II & III						
Class 1	32.0	17.0	16.0	15.0	10.0	7.5
Classes 3 and 5	-	42.0	-	24.0	-	-
Type IV						
Class 1	-	16.0	-	12.5	-	-

- 1/ The weight requirement for loop pile tape used with type IV hook tape shall be 15.0 for the 2 inch wide tape and 7.5 for the 1 inch wide tape.
- 2/ After 3 launderings.
- 3/ After 1 dry cleaning. (When applicable, see 6.2).
- 4/ For a inch lineal overlap.

3.7.1 Finish. All hook and loop pile tapes shall be stabilized as necessary to allow for maximum flatness and dimensional stability. In addition, the back of each class 1, 3, and 5 hook and loop tapes shall be coated with a suitable polymeric or elastomeric undercoating. The class 2 hook and loop tapes shall be coated with a flame retardant coating (see 6.4). The coatings shall be properly cured as necessary. Testing shall be specified in 4.4.1.

3.7.1.1 Special adhesive backings. When a special adhesive backing is specified (see 6.2), the fastener tapes covered by this specification shall be coated with an adhesive backing (except for selvages) to provide an easy and reliable method of attachment. Adhesive backings are available which are designed to secure the tapes to many diverse materials such as wool, glass, metal, textiles, etc. In addition, adhesive backings are available which vary in the mode of application to these materials; i.e., they may be water activated, solvent activated, heat activated, or pressure sensitive (see 6.4). Testing shall be as specified in 4.4.1.

3.7.2 Shrinkage. All hook tapes shall not exceed 3.0 percent shrinkage in the length direction and all loop pile tapes shall not exceed 4.0 percent shrinkage in the length direction when tested as specified in 4.5.

3.7.3 Thickness. All hook tapes shall have a minimum thickness of 0.050 inch and all loop pile tapes shall have a minimum thickness of 0.095 inch when tested as specified in 4.5.

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3.7.4 Fray resistance. The hook and loop pile tapes shall show no more than 1/32 inch fraying after laundering or dry cleaning (when applicable) when tested as specified in 4.5. In addition, ultrasonically slit edges as specified in 3.7.5 shall be tested for fraying as specified in 4.5.

3.7.5 Slitting. When multiple widths are woven as a single unit, the tapes may be ultrasonically slit to width leaving selvages as specified in 3.9 on the edges of each tape. The edges shall be tested for fraying as specified in 3.7.4.

3.8 Length and put-up. Unless otherwise specified, the hook and loop pile tapes shall be put-up on flanged spools (see 6.2). The flanges shall be fabricated from paperboard with at least one side smooth finished, or natural kraft having a minimum thickness of 0.028 inch when tested as specified in 4.4.1. The height of the flanges shall be sufficient to accommodate the height of the wound tape. An overlap of not more than 1/4 inch of the wound tape beyond the flange edge is permitted. Each spool shall contain 25 yards, 50 yards or 100 yards, (+ 1/2 yard), as specified (see 6.2). Each 25 yard spool shall contain no more than 3 splices or 4 pieces; each 50 yard spool shall contain no more than 5 splices or 6 pieces and each 100 yard spool shall contain no more than 10 splices or eleven pieces. The minimum length of any given piece shall be not less than three feet and there shall be no more than one, three foot length in any spool. The end of each spool shall be secured with a strip of its opposite component which shall be marked to indicate the number of pieces contained on the spool or marked as indicated in 5.4.2.

3.8.1 Splicing. When spliced tape is furnished, the splices may be produced by applied heat, dielectric sealing or ultrasonic heat sealing methods. Care shall be taken to assure that splices are properly aligned with edges smooth to allow free passage through automatic sewing equipment. The spliced area shall not affect the functional characteristics of the hook and loop pile tapes. The sealed splices shall have no loose edges. The breaking strength of the splice shall be not less than 30 percent of the minimum specified for the unspliced tape (see Table III), when tested as specified in 4.4.1 and 4.4.5. The length of the overlap of the splices shall be 5/16 to 5/8 inch for heat sealed, dielectric, or ultrasonically produced splices. (See 6.1).

* 3.9 Width (tapes and selvages). The width of the tapes shall be as specified (see 1.2.3 and 6.2). The tolerance shall be (+) 1/16 inch including the selvages. Each selvage shall not exceed 3/32 inch, except for type IV, class 1 hook and loop pile tapes which require a 1/8 to 3/16 inch wide selvage on each edge and the two inch tape will have an area 1/8 to 3/16 inch located in the center of tape, running the length of the tape, that is free of hook or loop pile.

3.10 Quality. The finished tapes shall conform to the quality established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

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4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification 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 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

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

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. The first article submitted in accordance with 3.2 shall be inspected as specified in 4.4.2 for compliance with design, construction, workmanship, and dimensional requirements.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable procurement documents. In addition, a certificate of compliance shall be submitted for the yarn requirements and carbonizing requirements of 3.3, special marking of 3.6, the finish of 3.7.1, special backing specified in 3.7.1.1, the paperboard and put-up requirements of 3.8, and splicing requirements of 3.8.1.

4.4.2 Examination of the end item. Examination of the end item shall be in accordance with 4.4.2.1 through 4.4.2.2.2.

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4.4.2.1 Yard-by-yard examination. The required yardage of each roll shall be inspected on the hook or loop pile side only, as applicable, and the defects classified as listed below. All defects found shall be counted regardless of their proximity to one another except where two or more defects represent a single local condition of the tape, in which case only the more serious defect shall be counted. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. The sample unit for this examination shall be one linear yard. The sample size shall be in accordance with general inspection level I. The acceptable quality levels shall be 4.0 major and 10.0 total (major and minor combined) defects per 100 units. The lot size shall be expressed in units of one linear yard. An approximate equal number of yards shall be examined from each roll selected. The sample size in rolls from which the sample is to be selected shall be in accordance with Table IV.

Defects	Classification	
	Major	Minor
Any cut, hole or tear	X	
Any missing yarn	X	
Any broken yarn		X
Hooks or loops flattened	X	
Width of tape or selvage not as specified		X
Any spot, stain or streak		X
Color not as specified		X
More than 2 identification yarns per selvage (applicable to class 2 only)		X
Splices not sealed as specified		X
Slit edges not as specified		X

4.4.2.2 Length examination.

4.4.2.2.1 Examination for length of individual roll. Each roll in the sample shall be examined for the defects listed below. The sample unit for this examination shall be one roll. The sample size and acceptance number shall be as shown in Table IV. The lot size shall be expressed in units of 1 linear yard each.

Defects

Gross length less than specified minimum length.

Any piece less than the allowable minimum length of piece.

Any roll containing more than the allowable number of pieces permitted for the applicable length of roll.

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Table IV - Sample size and acceptance number

Lot size in yards	Sample size in rolls	Maximum number of defects acceptable in sample
Up to 1200 ^{1/}	3	0
1201 thru 3200	5	0
3201 thru 10,000	8	0
10,001 thru 35,000	13	0
35,001 thru 150,000	20	1
150,001 and over	32	2

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

4.4.2.2.2 Examination for total yardage in sample. The lot shall be unacceptable if the total of the actual gross lengths of rolls in the sample is less than the total of the gross lengths marked on rolls.

4.4.3 Examination of packaging requirements. An examination shall be made to determine that packaging, packing, and marking comply with Section 5 requirements of this specification. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery with the exception that it need not be closed. Defects of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot size shall be on the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the AQL shall be 2.5 defects per hundred units.

<u>Examine</u>	<u>Defect</u>
Marking (exterior and interior)	Omitted, incorrect, illegible, of improper size, location, sequence, or method of application.
Materials	Any component missing, damaged, or not as specified.
Workmanship	Inadequate application of components, such as: incomplete closure of container flaps, loose strapping, improper taping, inadequate stapling, bulged or distorted container.
Content	Number of items per shipping container is more or less than required. Size shown on one or more items not as specified on shipping container. ^{1/}

^{1/} For this defect, one item from each shipping container in sample shall be examined.

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4.4.4 Palletization examination. An examination shall be made to determine that the palletization complies with the section 5 requirements. Defects shall be scored in accordance with the list below. The sample unit shall be one palletized unit load fully packaged. The lot size shall be the number of palletized unit loads in the end item inspection lot. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5 in accordance with MIL-STD-105.

<u>Examine</u>	<u>Defect</u>
Finished dimensions	Length, width, or height exceeds specified maximum requirements.
Palletization	Pallet pattern not as specified. Interlocking of loads not as specified. Load not bonded with required straps as specified.
Weight	Exceeds maximum load limits.
Marking	Omitted, incorrect, illegible, of improper size, location, sequence, or method of application.

4.5 Testing of the end item. The methods of testing specified in FED-STD-191 wherever applicable, and as listed in Table VI shall be followed. The physical and chemical values specified in Section 3, except where otherwise specified, apply to the average of the determinations made on the sample unit for test purposes as specified in the applicable test methods. All test reports shall contain the individual values utilized in expressing the final results. The sample unit for test purposes shall be 8 continuous yards of the finished tape. The lot size shall be expressed in units of one yard. The lot shall be unacceptable if one or more sample units fail to meet any of the test requirements specified. The sample size shall be as indicated in Table V.

Table V - Sample size

<u>Lot size (yards)</u>	<u>Sample size</u>
800 or less	2
801 thru 22,000	3
22,001 and over	5

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Table VI - Instructions for testing

Characteristics	Requirement Reference	Test Method
<u>Hook tape</u>		
Construction	3.4.1	Visual <u>1/</u> <u>2/</u>
Hooks per linear inch of tape	Table I	Visual <u>1/</u> <u>2/</u>
Picks per linear inch of tape	Table I	Visual <u>1/</u> <u>2/</u>
Ground ends per tape (including selvages)	Table I	Visual <u>1/</u> <u>2/</u>
Hook ends per tape	Table I	Visual <u>1/</u> <u>2/</u>
<u>Loop pile tape</u>		
Construction	3.4.2	Visual <u>1/</u> <u>2/</u>
Picks per inch of tape	Table II	Visual <u>1/</u> <u>2/</u>
Ground ends per tape (including selvages)	Table II	Visual <u>1/</u> <u>2/</u>
Loop pile ends per tape	Table II	Visual <u>1/</u> <u>2/</u>
<u>Hook and loop pile tapes</u>		
Colorfastness:		
Laundering	3.5.1	5610
Drycleaning	3.5.1	5621
Crocking	3.5.1	5651
Weight	Table III	5041 <u>3/</u>
Breaking strength	Table III	5100 <u>4/</u>
Shear strength		
After 3 launderings	Table III	5610, 5100 and 4.5.1
After 1 dry cleaning <u>8/</u>	Table III	5621, 5100 and 4.5.1
Shrinkage	3.7.2	5556 <u>5/</u>
Thickness	3.7.3	5030 <u>6/</u>
Breaking strength of splices	3.8.1	5100 <u>2/</u> <u>4/</u>
Fray resistance:		
After 3 launderings	3.7.4	5556 <u>7/</u> and 4.5.2
After 1 dry cleaning <u>8/</u>	3.7.4	5621 and 4.5.2

- 1/ One determination per sample unit and the results reported as "pass" or "fail."
- 2/ A certificate of compliance may be submitted for this characteristic.
- 3/ Test specimens shall be full width and 3 feet in length.
- 4/ The contractor may exercise the option to use either the jaws specified, except that the jaws shall be 1 inch by 3 inches, or an approved commercial cam type clamp. When splices are tested for breaking strength, the splice shall be centered between the jaws.
- 5/ The procedure to be followed shall be the cotton laundering procedure. Only the shrinkage in the length direction shall be determined.

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- 6/ The diameter of the pressure foot shall be a minimum of 2 inches and shall exert a 0.01 pound per square inch load. The specimens shall be tested with the hook or loop side up.
- 7/ The procedure to be followed shall be the cotton laundering procedure.
- 8/ When applicable see 6.2.

* 4.5.1 Shear strength. The hook and loop pile to be tested for shear strength shall use its opposite component, of the same class, that meets the requirements of this specification. Ten test specimens of the hook and loop pile tape shall be cut to a minimum length of 4 inches. The outer end of each test specimen shall be numbered as they are cut off the roll. Five test specimens shall have the numbered ends meshed together and five test specimens shall have the unnumbered ends meshed together. The hook tape shall be placed (hook side down) evenly and without pressure on top of a corresponding equal width loop pile tape (pile side up), so that a 3 inch overlap is formed. The two tapes shall then be meshed together by traversing a smooth steel roller approximately 4-3/4 inches in diameter, 2-1/4 inches wide, and weighing 11 (+1/4) pounds, back and forth across the overlap a total of 3 times (6 single passes). Care shall be taken that the load is applied evenly across the full width of the combined tapes in a smooth, continuous back and forth motion exerting no additional hand or downward pressure. The combined sample shall then be placed in the clamps spaced 3 inches apart so that the top jaws shall grab the free loop pile tape end, and the bottom jaws the free hook tape end. The entire 3 inch overlap shall be disengaged by the machine during the test and the resultant readings recorded on an autographic recording device. The shearing strength of the specimens shall be the highest load registered for 3 inches of disengagement. The pawls of a pendulum type testing machine shall be engaged during the test. Ten specimens from each sample unit shall be tested and the average shearing strength reported to the nearest 1.0 pound. Samples containing splices (see 3.8.1) shall not be used for the shear strength test.

4.5.2 Fray resistance. Five specimens each of the hook and loop pile tapes shall be tested. Specimens shall be 10 inches long and full width and shall be prepared for testing by slitting lengthwise up the middle for a distance of 8 inches. After laundering or dry cleaning, as applicable, the specimens shall be examined for evidence of fraying along the slit edges. When tape with slit selvage edges are furnished (see 3.7.5) the slit edges shall also be examined for fraying.

5. PACKAGING

5.1 Preservation-packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

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5.1.1 Level A. One or more rolls of tape of the same type, class and identity (hook or loop), put-up as specified in 3.8, shall be inserted into a snug-fitting clear polyolefin film bag of 0.00125 inch thickness (+ 25 percent tolerance). The bag shall be formed with heat sealed seams that are straight, continuous and parallel to each other and the formed edges of the bag, or shall conform snugly to the circular configuration of the roll. The final closure of the bag shall be heat sealed with the seam made as close as possible to the open end.

5.1.2 Level C. The tape, put-up as specified in 3.8, shall be packaged to afford adequate protection against physical damage during shipment from the contractor to the first receiving activity. The contractor may use his standard practice when it meets this requirement.

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

* 5.2.1 Level A. Tape of the same type, class, and identify (hook or pile), packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, type CF, class weather-resistant, variety DW, grade V15c of PPP-B-636. The inside of each shipping container shall be fitted with a box liner conforming to type CF, class domestic, variety SW or DW, grade 200 or 275 of PPP-B-636. Each shipping container shall be closed in accordance with Method III as specified in the appendix of PPP-B-636. The weight of the contents of each shipping container shall not exceed 65 pounds.

* 5.2.2 Level B. Tape of the same type, class and identity (hook or loop), packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC-L, type CF, class domestic, variety DW, grade 275 of PPP-B-636. The inside of each shipping container shall be fitted with a box liner conforming to type CF, class domestic, variety SW or DW, grade 200 or 275 of PPP-B-636. Each shipping container shall be closed in accordance with method II as specified in the appendix of PPP-B-636. The weight of the contents of each shipping container shall not exceed 65 pounds.

5.2.3 Level C. Tape of the same type, class and identity (hook or loop), packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. Containers shall comply with the U.S. Postal Service Manual, Uniform Freight Classification Rules, or National Motor Freight Classification Rules, as applicable.

5.3 Palletization. When specified (see 6.2) item packed as specified shall be palletized on a 4-way entry pallet in accordance with load type 1A of MIL-STD-147. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means C, K, and L or O or P. Pallet pattern shall be in accordance with the appendix of MIL-STD-147.

The pallet shall be 4-way, Type IV, V, or VIII, Class 1, Style A, Size 2, wood group I, II, III or IV, Grade A of NN-P-71, or 4-way, Style 1, Size A, Type I, Class 1 of wood group I, II, III, or IV, Grade A of MIL-P-15011. Interlocking of loads shall be effected by reversing the pattern of each course. If the container is of a size which does not conform to any of the patterns specified in MIL-STD-147, the pallet pattern used shall be approved by the contracting officer.

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5.4 Marking.

5.4.1 Containers. In addition to any special marking required by the contract or order, shipping containers shall be marked in accordance with MIL-STD-129.

5.4.2 Spools. The outside surface of one flange of each spool shall be legibly marked with: stock number, description of the item, color, gross length, width, the number of pieces per spool and the contract number. As an exception the number of pieces per spool may be marked as indicated in 3.8.

6. NOTES

* 6.1 Intended use. The woven tape fasteners covered by this specification are intended to be used as closures for equipment and clothing items. Based on the following information, users should determine which type and class of hook and loop pile tape meet their requirements:

a. Type IA, II, III, and IV hook tapes generally have slightly higher shear strength than type I hook tape when tested with classes 1 and 5 loop pile tapes.

b. Class 1 hook and loop pile tapes are intended for general purpose applications.

c. Class 2 hook and loop pile tapes are intended for those applications where flame retardancy is desired.

d. Class 3 hook and loop pile tapes are intended for applications where higher shear strengths than class 1 are desired, and/or resistance to wetting or high humidity is needed and limited number of cycles is acceptable; or where resistance to UV radiation is required.

e. Class 5 hook and loop pile tapes are intended for applications where higher dry and wet shear strengths than class 1 are desired and a limited number of cycles is acceptable.

f. When spliced tape is furnished for use as a component in an end item, the limits of its application shall be outlined in the end item specification.

g. Type IA, class 1 hook and loop pile tape is interchangeable with type I, class 1 and type II, class 1 hook and loop pile tape.

h. Type III, class 1 hook and pile tape is interchangeable with type II, class 1 hook and loop pile tape.

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i. Type IV, class 1 hook and pile tapes are intended for applications where sewing through the hook and loop pile areas create stitching problems such as thread breaks, loose stitch tension or "ballooning" when two inch wide tape is used.

j. The user shall determine whether or not the hook tape of one manufacturer should be mated with the loop pile tape of another manufacturer.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Type, class, width and color required (see 1.2 and 3.9).
- c. When first article inspection is required (see 3.2), the item will be tested and should be a first article sample. The contracting officer shall include specific instructions in acquisition documents regarding arrangement for examinations, quantity, and testing and approval of the first article.
- d. Special coating requirements (see 3.7.1.1 and 6.4).
- e. When flanges are not required (see 3.8).
- f. Length on spools required (see 3.8).
- g. Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- h. When the dry cleaning testing is required (see 3.5.1, 3.7, and 4.5).
- i. When palletization is required (see 5.3).

6.3 Samples. For access to samples, address the procuring office issuing the invitation for bids.

6.4 Coatings.

6.4.1 Adhesive backings. Information regarding these adhesive bonding characteristics may be obtained from the following suppliers: Velcro USA, Inc., P.O. Box 5218, 406 Brown Avenue, Manchester, NH 03108; 3M Company, 3M Center, St. Paul, MN 55101; OUI-LOK Corp., 230 Elliot Street, Brockton, MA 02403; and APLIX, Inc., 12300 Steel Creek Road, P.O. Box 7505, Charlotte, NC 28217.

6.4.2 Flame-retardant coating. When specified, fastener tape treated with a flame retardant coating is available from the suppliers listed in 6.4.1.

6.5 Metric conversion. The following multiplying factors are supplied for the purpose of converting expressions of measurements given by numbers and miscellaneous units found within this specification to their metric equivalents:

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Inches to millimeters - Multiply inches by 25.4 (mm)
Inches to centimeters - Multiply inches by 2.54 (cm)
Pounds force to newtons - Multiply pounds by 4.45 (N)
Yards to meters - Multiply yards by 0.91 (m)
Feet to centimeters - Multiply feet by 30.48 (cm)

6.6 Subject term (key word) listing.

Hook and pile
Closure, hook and loop
Closure, hook and pile

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

Custodians:

Army - GL
Navy - NU
Air Force - 11

Review activities:

Army - MD
Air Force - 99, 82
DLA - CT

User activities:

Army - AR, EA
Navy - OS, AS, MC
Air Force - 45

Preparing activity:

Navy - NU

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