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SUPERSEDING
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FEDERAL SPECIFICATION

FASTENER, SLIDE, INTERLOCKING

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers interlocking slide fasteners of various types, styles, sizes, lengths, and materials.

1.2 Classification.

1.2.1 Types. The fasteners shall be of the following types, as specified (see 6.2):

- I - Nonseparating, nonreversible (see table I)
- II - Nonseparating, nonreversible, curved, not applicable to continuous element fastener (see table II)
- III - Nonseparating, reversible (see table III)
- IV - Separating, nonreversible (See table IV)
- V - Separating, reversible (see table V)

1.2.2 Styles. The types of fasteners shall be of the following styles, as specified (see 6.2).

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 5325

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TABLE I. Type I, fastener, nonseparating, nonreversible: styles (see 1.2.5)

Style	Lock 1/	Top stop	Bottom stop	Slider and slider arrangement 2/
1	Pin or cam			
1A	Automatic	Without	Without	
2	Without			
3	Automatic			
4	Pin or cam	Open	Closed	Single
5	Flange			
6	Without			
7	Automatic			
8	Pin or cam	Bridge	Closed	
9	Flange			
10	Without			
11	Automatic			
12	Pin or cam	Open	Open	Multiple (mouth to mouth)
13	Flange			
14	Without			
15	Automatic			
16	Pin or cam	Open	Bridge	
17	Flange			
18	Without			
19	Automatic	Closed	Closed	Multiple (throat to throat)
20	Pin or cam			
21	Flange			
22	Without			
23	Automatic	Bridge	Bridge	Multiple (mouth to mouth)
24	Pin or cam			
25	Flange			

TABLE II. Type II, fastener, nonseparating, nonreversible, curved, not applicable to continuous element fastener: styles (see 1.2.5)

Style	Lock 1/	Top stop	Bottom stop	Slider and slider arrangement 2/
1	Without			
2	Automatic	Open	Closed	
3	Pin or cam			
4	Flange			
5	Without			Single
6	Automatic	Bridge	Closed	
7	Pin or cam			
8	Flange			

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TABLE III. Type III, fastener, nonseparating, reversible, 3/
styles (see 1.2.5)

Style	Lock 1/	Top stop	Bottom stop	Slider and slider arrangement 2/
1	Without Automatic			
2	Automatic Flange	Open	Closed	Single
3	Without Automatic	Bridge	Closed	
4	Automatic Flange			
5	Without Automatic	Open	Open	Multiple (mouth to mouth)
6	Without Automatic	Closed	Closed	Multiple (throat to throat)
7	Without Automatic	Bridge	Bridge	Multiple (mouth to mouth)

TABLE IV. Type IV, fastener, separating, nonreversible: styles (see 1.2.5)

Style	Lock 1/	Top stop	Bottom stop	Slider and slider arrangement 2/
1	Without		Right-hand separating unit	
2	Flange			
3	Without	Open	Left-hand separating unit	
4	Flange			
5	Automatic	Right-hand quick release	Right-hand separating unit	
6	Automatic	Left-hand quick release	Left-hand separating unit	Single
7	Automatic		Right-hand separating unit	
*7A				
8	Automatic		Left-hand separating unit	
*8A				
9	Pin or cam	Open	Right-hand separating unit	
10	Pin or cam		Left-hand separating unit	

* To be specified for use in MIL-A-83406 for Anti-G clothing only.

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TABLE IV. Type IV, fastener, separating, nonreversible: styles (see 1.2.5)

Style	Lock <u>1/</u>	Top stop	Bottom stop	Slider and slider arrangement <u>2/</u>
11	Without	Right-hand quick release	Right-hand separating unit	Single
12	Without	Left-hand quick release	Left-hand separating unit	
13	Automatic	Right-hand quick release	Right-hand separating unit	Multiple (mouth to mouth)
14	Automatic	Left-hand quick release	Left-hand separating unit	
15	Automatic	Open	Left-hand separating unit	
16	Automatic	Open	Right-hand separating unit	

TABLE V. Type V, fastener, separating, reversible ^{3/} : styles (see 1.2.5)

Style	Lock <u>1/</u>	Top stop	Bottom stop	Slider and slider arrangement <u>2/</u>
1	Without Automatic Flange	Open	Right-hand separating unit	Single
2			Left-hand separating unit	
3	Without Automatic Flange	Right-hand quick release	Left-hand separating unit	
4			Right-hand separating unit	
5	Without Automatic	Left-hand quick release	Left-hand separating unit	
6	Without Automatic	Right-hand quick release	Right-hand separating unit	

1/ Cam or flange type of locks are not applicable to continuous element fastener. Automatic locks include ratchet type locks (see 1.2.5, 3.2.2.1 and 3.4.8).

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- 2/ Multiple sliders shall be interpreted to mean two sliders; when more than two sliders are required, the number of sliders and their arrangement on the chain shall be stated in the invitation for bids or in the end item specification (see 6.2). When fasteners have two or more sliders with lock combinations other than those indicated in tables I through V, the type of lock or locks and slider arrangement shall be stated in the invitation for bid or in the end item specification (see 6.2). When sliders for styles 1 and 1A and continuous chain are required (see 6.2), it shall be stated in the invitation for bid or in the end item specification.
- 3/ Reversible sliders are those which have a pull on both the front and back of the slider. However, a single pull interchangeable reversible pull between both sides of fastener (figure 4) may be defined in the specification.

1.2.3 Sizes. The fasteners shall be of the following sizes, as specified (see 6.2).

L	Light
LS	Light special
LM	Light medium
LMS	Light medium special
LX	See table VII
M	Medium
MS	Medium special
MH	Medium heavy
MHS	Medium heavy special
H	Heavy

1.2.4 Fastener lengths and continuous chain lengths. The fastener lengths and continuous chain lengths shall be as specified (see 6.2).

TABLE VI. Fastener chain (continuous), lengths in yards 1/

Fastener sizes	Chain length on spool	Chain length on reel (collapsible)
L, LS, and LX	200 min. 250 max.	200 min.. 400 max.
LM, LMS, M, and MS	100 min. 200 max.	100 min. 200 max.

- 1/ Where necessary to complete the lot, the chain length on the last spool may be lessened to not less than 25 yards.

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1.2.5 Availability. All styles of fasteners (see tables I through V), are not available in all sizes (see figure 1 for slider pull, locks and slider size combinations).

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

- | | |
|-----------|---|
| L-P-392 | - Plastic Molding Material, Acetal, Injection and Extrusion |
| PPP-B-566 | - Boxes, Folding, Paperboard |
| PPP-B-636 | - Boxes, Shipping, Fiberboard |
| PPP-T-45 | - Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing |

Federal Standards:

- | | |
|-------------|---|
| FED-STD-123 | - Marking for Shipment (Civil Agencies) |
| FED-STD-151 | - Metals; Test Methods |
| FED-STD-191 | - Textile Test Methods |

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of this specification, and other Federal specifications, standards, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from the General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal Standardization documents and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications:

- | | |
|-----------|--|
| MIL-B-371 | - Braid, Textile, Tubular |
| MIL-F-495 | - Finish, Chemical, Black, for Copper Alloys |

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Military Standards:

- MIL-L-35078 - Loads, Unit: Preparation of Semiperishable Subsistence Items; Clothing, Personal Equipment and Equipage; General Specification For
- 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
- MIL-STD-731 - Quality of Wood Members for Containers and Pallets

(Copies of military specifications, standards and drawings required by contractors in connection with specific procurement functions should be obtained from the procuring 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 a specific issue is identified the issue in effect on date of invitation for bids or request for proposal shall apply:

American Society for Testing and Materials (ASTM)

- D 789 - Nylon Injection Molding and Extrusion Materials
- D 2059 - Resistance of Zippers to Salt Spray (Fog)
- D 2060 - Measuring Zipper Dimensions
- D 2061 - Strength Tests of Zippers
- D 2062 - Operability of Zippers
- D 2133 - Acetal Resin Injection Molding and Extrusion Materials
- D 3220 - Reinforced Thermoplastic Polyester Molding and Extrusion Materials
- D 3221 - Thermoplastic Polyterephthalate Molding and Extrusion Materials
- D 3951 - Standard Practice for Commercial Packaging
- D 4066 - Nylon Injection and Extrusion Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

Color Association of the United States, Inc.

Department of Defense Standard Shades

(Application for copies should be addressed to the Color Association of the United States, Inc., 343 Lexington Avenue, New York, NY 10016.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.2, 6.2 and 6.7).

3.2 Description. A slide fastener, as illustrated in figure 3, consists of interlockable elements each attached to one of the opposing edges of two tapes and a movable part called a "slider" (see figure 4), that spans the interlockable elements, which when moved in one direction causes the elements on one tape to interlock with the elements on the other tape, and when moved in the opposite direction causes the elements to disengage.

a. Based on interlocking elements, there are two kinds of slide fasteners as follows:

- (1) Continuous-element slide fastener - a slide fastener consisting of interlockable elements each attached to opposing edges of two tapes. The elements may be formed as a strand of configured monofilament or elements with integrally formed interconnecting webs or elements individually molded or fused to an interconnecting cord or cords. Unless otherwise specified, the spiral and serpentine element types may either be sewn directly to the tape using a two-needle chain stitch seam intersecting between each element or may be woven directly to the tape. If elements are sewn, the back tape center shall generally show no more than 1/32 inch gap between tape edges. (see figure 3: spiral, serpentine, and scoop type.)
- (2) Individual element slide fastener - a slide fastener consisting of two rows of interlockable separately-formed elements called scoops, each attached to one of the opposing edges of two tapes. (see figure 3: individual-element type.)

b. Fasteners of the various types, styles, sizes, and lengths shall be made up of a combination of the components listed in 3.2.1 through 3.2.4.5, as applicable.

3.2.1 Chain. The chain is a continuous closure, formed by interlocking the elements on one tape alternately with those on the other tape. One separate half of the chain is called a stringer.

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3.2.2 Slider. The slider, as illustrated in figure 3, shall be a movable part which spans the two rows of elements comprising the chain. When moved in one direction, the slider interlocks the elements and when moved in the opposite direction, disengages them. Sliders may be equipped with (or have integral in their design) locking mechanisms called locks. All diecast sliders shall have a smooth appearance with no pitting and irregularities. Unless otherwise specified (see 3.2.2.1 and 6.2), sliders will not be furnished with continuous chain.

3.2.2.1 Locks. The locks (automatic, pin, cam and flange) as illustrated in figure 4, are designed to maintain the position of the slider at any point on the chain and prevent separation of the chain up to the minimum tensions shown in table IX. Ratchet-type locks shall maintain the position of the slider at any point on the chain and prevent separation of the chain up to minimum tensions shown in table IX and shall permit separation of the chain at a maximum operating force tension that will allow the slide fastener to remain operable.

3.2.2.2 Pull. The pulls, as illustrated in figures 1 and 4, shall be attachments to the slider and used to facilitate movement of the slider. The pulls shall swing in either of the directions required for operating the slider. The type pull (or pulls) shall be as specified (see 6.2). The arrangement and number of pulls (if more than one on each side) shall be as specified in the invitation for bid (see 6.2). The chain-type pull may be either link or bead. When a thong is required, the slider pull tab shall have a hole large enough to accommodate a thong.

3.2.3 Thong. Each stirrup pull shall be provided with a thong to further facilitate movement of the slider. Thongs, when required on other than stirrup pulls, shall be as specified (see 6.2).

3.2.4 Stops. The stops, as illustrated in figure 2, shall be elements used to restrict the movement of the slider and shall be of the types described in 3.2.4.1 through 3.2.4.5.

3.2.4.1 Open-top stop. The open-top stop shall consist of an element securely attached to each stringer at the open end of the chain and shall positively limit the travel of the slider. The open-top stop shall be positioned directly above and close to the first element or between the elements, but never lower than the third element from the end of the chain. The open-bottom stop shall be positioned below and close to the last element but never above the third element from the end of the chain. When open-top stops are positioned above the first elements on each tape, they shall be opposite each other and close to the end of the chain but offset not more than the space between two adjacent elements.

3.2.4.2 Closed-end stop. The closed-end stop (folded or staple type), shall be a unit securely attached over and around beads or stringer edges (in the case of a stringer without beads) and joining the element sides of both tapes at the closed end of the chain. The stops shall be positioned directly below and close

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to the first element at the closed end of the chain. The staple stop may be positioned over and span the first few elements. A bridge stop shall not be substituted for a closed-end stop (folded or staple type).

3.2.4.3 Bridge stop. The bridge stop shall consist of a member bridging the open end of the chain to hold the tapes in position and shall be securely attached over and around the beaded edges or stringer edges (in the case of a stringer without beads) of both tapes close to the chain elements. These stops shall hold both sides of the open chain uniformly apart and at a distance substantially equal to the separation of the chain at the throat end of the slider. The slider shall fit closely against the stop when butted against it. A closed-end stop (folded or staple type) shall not be substituted for a bridge stop except in the case of a continuous element slider fastener.

3.2.4.4 Quick-release stop. The quick-release stop is a device securely attached to one tape at or near the top. This device shall temporarily limit the travel of the slider at the open end of the chain under normal closing operation. It shall permit the slider to be forced beyond the stop when added force is exerted against the slider. It shall also permit the two stringers of the chain to be readily separated by pulling the two sides apart after the slider has been forced beyond the stop.

3.2.4.5 Separating unit. The separating unit is constructed in two main parts, one part being a device called a "retainer" attached to one side of the tape, either directly onto or over a tube called a "retainer pin" for better anchoring. This retainer holds or retains the opposite side in position when the fastener is closed, and acts as a stop for the slider when the fastener is open. The other part of the separating unit is a tube called a "separating pin", which is attached to the opposite tape to facilitate separation and engagement of the two sides of the fastener. The retainer, separating pin, and retainer pin for type IV, styles 7A and 8A fasteners shall conform to the design and dimensions shown on figure 6.

3.3 Materials and components. Materials and components shall be as specified herein. Materials not definitely specified shall be of the quality normally used by the manufacturer provided the completed item complies with all the provisions of this specification. All materials other than metals or molded plastics shall be new and unused (see 6.8). When materials referenced in 3.3.1 through 3.3.10 are used for complete fasteners or individual components (see 6.2), they shall be tested for chemical composition in accordance with 4.3.1.1.

3.3.1 Aluminum. The aluminum shall conform to the chemical composition of commercial alloy 5056.

3.3.2 Brass.

3.3.2.1 Chain, brass. The brass for the chain shall be nonleaded and shall conform to chemical composition of commercial copper alloy number 226 or 230.

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3.3.2.2 Components, brass. The brass for components other than the chain shall be nonleaded and shall conform to commercial copper alloy 226, 230, 234, 240 or 413.

3.3.3 Copper-nickel-zinc-alloys. The copper-nickel-zinc-alloys shall conform to commercial copper alloy 752, 757, or 770.

3.3.4 Zinc alloy. The zinc alloy shall conform to commercial alloy AG40 A or AC41 A.

3.3.5 Corrosion-resisting steel. The corrosion-resisting steel shall conform to commercial type 17-7PH, 301, 302, or 430.

3.3.6 Beryllium copper. The beryllium copper shall conform to commercial copper alloy number 172.

3.3.7 Bronze.

3.3.7.1 Phosphor bronze. The phosphor bronze shall conform to commercial copper alloy number 510.

3.3.7.2 Manganese bronze. When specified (see 6.2), the manganese bronze for sliders shall conform to commercial copper alloy number 675.

3.3.8 Hard-drawn copper-alloy wire. The copper wire shall conform to the following chemical composition:

	<u>Percent</u>
Iron	0.75 maximum
Manganese	0.75 maximum
Cadmium	1.50 maximum
Silicon	3.00 maximum
Aluminum	3.50 maximum
Tin	5.00 maximum
Zinc	10.50 maximum
Copper	89.00 minimum
Sum of above elements	99.50 minimum

3.3.9 Plastic. The plastic shall conform to the applicable specifications or methods as specified:

Nylon 6:6	- Type I, grade 2 or type Ib (olefin modified) of ASTM D 789
Nylon 6	- Type II, grade 1 or 2 or type IIa (nucleated), grade 2 of ASTM D 789
Nylon 6:6/6	- Type VII (copolymer), grade 2 of ASTM D 789
Nylon 11	- PA 312 or PA 321, black weather-resistant of ASTM D 4066

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Acetal	- Type I, class 1 or class 2 or class 3 of L-P-392
Acetal	- Type I, class A or class B or class C of ASTM D 2133
Polyterephthalate	- Reinforced (ASTM D 3220) or Unfilled (ASTM D 3221)
Nylon	- Reinforced (ASTM D 4066)

3.3.10 Steel wire. Steel wire shall be commercial grade low carbon steel.

3.3.11 Fabric. The fabric for the fastener tapes, braids and thongs shall be woven from yarns of 100-percent textured polyester, or spun polyester, 100-percent cotton warp with nylon filling, or intimate blends of nylon/cotton, polyester/cotton, polyester/rayon or 100-percent spun aramid.

3.3.11.1 Shrinkage. When shrinkage control of the fasteners is specified (see 6.2), only tapes woven from 100-percent textured polyester, or spun polyester, intimate blends of nylon/cotton, polyester/cotton, or polyester/rayon shall be used and the slide fasteners shall not shrink more than 2 percent when tested as specified in 4.5.19.

3.3.12 Braid. The braid shall be a flat tubular material as specified in 3.3.11 conforming to type VII of MIL-B-371. Braided polyester shall not weigh less than 0.14 ounces per linear yard.

3.3.13 Webbing. The webbing material (selected from 3.3.11) for thong shall conform to webbing weighing 0.15 ounces per linear yard.

3.4 Construction. Unless otherwise specified (see 6.2), when a particular metal or plastic is specified, the specified metal or plastic shall be applicable to the chain. Unless otherwise specified (see 6.2), chains shall be fabricated from any of the materials specified in 3.3.1, 3.3.2.1, 3.3.3, 3.3.4, or 3.3.9. Unless otherwise specified, the components except stirrup pull and slider bodies for sizes MH, MHS and H, used on the fasteners fabricated with metallic chain, shall be constructed from any of the materials specified except those specified in 3.3.9 and 3.3.10. Components except stirrup pulls used on fasteners fabricated with plastic chain, shall be constructed from any of the materials specified, except those specified in 3.3.10. The stirrup pulls shall be fabricated of material specified in 3.3.2.2, 3.3.4, 3.3.5, or 3.3.10. Unless otherwise specified, (see 6.2), the slider bodies for all continuous element, plastic individual element, and metal element (except for black oxidized treated brass element sizes L through MS) fastener sizes shall be fabricated of material in 3.3.4. Slider bodies on black oxidized treated brass element sizes L, LS, LM, LMS, LX, M, and MS shall be brass as specified in 3.3.2.2. Plastic body sliders shall not be substituted unless approved by the U.S. Army Natick Research, Development and Engineering Center (see 6.9). Substitution requests for substituting plastic body sliders for metallic body sliders shall be submitted with 12 each fully assembled slide fasteners with plastic slider bodies of the required size, and 12 each fully assembled metallic slide fasteners of the same size.

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3.4.1 Tape. The tape, unless otherwise specified (see 6.2), shall be fabricated of material specified in 3.3.11 with a selvage on both edges. A bead shall run along one edge and shall be either woven integrally or securely sewn on. Tapes not having a bead woven integrally or sewn onto the selvage edge of the tape may be used provided that the finished fasteners utilizing such a tape construction meet or exceed all of the requirements of table IX. When bead is not woven integrally the bead and thread shall be of the same color as specified for the tape (see 3.4.4), and shall conform to the same treatment (see 3.4.3), and test as specified (see 4.5.16) for the tape. For specified length fasteners, the tape shall be continuous and without splices along the full length of the fastener including tape extensions. For continuous chain, splices will be permitted as specified in 3.4.11.1.1. When specified, the tape shall be water-resistant treated, mildew-resistant treated, or both (see 3.4.3.1, 3.4.3.2, and 6.2).

3.4.1.1 Tape ends. The two bottom tape ends of types IV and V fasteners shall be treated on the tape face side to prevent raveling or fraying, by coated tape bonded reinforcement or impregnation no greater than 1/16 inch or less than 1/8 inch of the tape width and no less than 1/2 inch longitudinally from the bottom tape edges. The top tape ends shall be treated to prevent ravelling or fraying by coated tape, bonded reinforcement, impregnation, hot knife or ultrasonic sealing, or pinking. Reinforcing method shall be flexible to be compatible with standard grade sewing machine needles. In addition, type IV styles 5, 6, 11, 12 13 and 14 and type V, styles 5 and 6 shall be prepared to prevent ravelling or fraying above quick release mechanism by the same methods for bottom tape ends, as stated above.

3.4.2 Thong. Unless otherwise specified (see 6.2), the thong shall be fabricated of either $3/8 \pm 1/16$ inch wide braid specified in 3.3.12, or $3/8 \pm 1/16$ inch wide webbing specified in 3.3.13 with a breaking strength of 100 pounds minimum and weighing 0.20 ounce per linear yard (0.15 ounce per linear yard minimum for polyester thongs) when tested as specified in 4.5.15. Color and treatment of the thong shall be as specified for the slide fastener tape and all thong ends shall be either heat cut or bartack sewn to prevent fraying. The thong shall be formed and assembled to the pull as follows: (1) Fold a length of braid or webbing double lengthwise; (2) insert the loop end through the end of the pull; (3) pass the two free ends through the loop and pull up tight; (4) knot the two free ends together with an overhand knot. Unless otherwise specified (see 6.2), the finished length of the thong after assembly to the pull shall be $6 \pm 3/4$ inch.

3.4.3 Treatment.

3.4.3.1 Water-resistant treatment. When specified, all treated tape shall not absorb more than 9.5 percent water based on the weight of the tape, when tested after one laundering as specified in 4.5.13.

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3.4.3.2 Mildew-resistant treatment. When specified, tapes made of cotton, rayon, or other fibers susceptible to mildew attack shall be made mildew-resistant by one of the following methods as specified (see 6.2): (a) by evenly depositing within the tape a minimum of 0.18 percent to a maximum of 0.27 percent copper as metal, from copper-8-quinolinolate, using the method of application specified in 3.4.3.2.1; (b) by even deposition within the tape of 1.0 to 1.5 percent mixture of zinc salts of dimethyldithiocarbamic acid and 2-mercaptobenzothiazole containing not less than 85 percent of the zinc dimethyldithiocarbamate, using the method of application specified in 3.4.3.2.1. When tapes are made of a combination of fibers which are susceptible to mildew attack (e.g. cotton and nylon), the mildew inhibitor shall be based on the fiber content of the material susceptible to mildew attack. Unless otherwise specified, tapes of 100 percent polyester shall not be mildew resistant treated.

3.4.3.2.1 Application. The copper-8-quinolinolate shall be applied from a solvent solution of such concentration as to deposit the specified concentration on the tape when tested as specified in 4.5.17. The tape shall be dried so that no residual solvent shall be present. The zinc salts shall be applied from a 2-bath aqueous or 1-bath aqueous dispersion, or from a solvent dispersion and tested as specified in 4.5.18.

3.4.4 Color. The specific color (shade) of treated materials, shall be as specified and shall conform to an approved shade standard (see 6.2). The use of dyes and compounds containing elementary sulfur capable of oxidation to sulfuric acid is prohibited. The dyed and finished tape shall show not more than a slight trace of labile sulfur as defined in the test method when tested as specified in 4.3.3.4. Shade and cable numbers are from the Department of Defense Standard Shades.

3.4.4.1 Color matching. The color of the dyed and finished tape shall match the shade standard when viewed under filtered tungsten lamps which approximate artificial daylight having a correlated color temperature of $7500 \pm 200K$, with illumination of 100 ± 20 foot candles, and shall be a good match to the shade standard under incandescent lamplight at $2300 \pm 200K$.

3.4.4.2 Colorfastness. Colorfastness shall be as specified in the applicable end item specification where slide fastener is used or as specified (see 6.2). When the standard sample has been established, the test specimen shall be compared with the standard. When no standard sample has been established, the tape shall be rated in accordance with adjective ratings shown in the applicable test method (see 6.4). Colorfastness properties shall apply only to those specified in the end item specification, contracts or orders (see 6.4). In the absence of specific colorfastness properties in the end item specification, contract or order, good fastness shall be required for all colorfastness properties listed in 3.4.4.2.1, except only light and laundering shall apply for aramid (Nomex) material, for which a fair fastness to light after 6 hours exposure and a good fastness to laundering are required when tested as specified in 4.5.16.4 and

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4.5.16.5. When mildew-resistant treatment, water-repellent treatment or black chemical finish on metal is required, the tests for colorfastness shall be on the treated tape material.

3.4.4.2.1 Colorfastness to other characteristics. When requirements for any of the following characteristics are specified, conformance shall be determined in 4.5.16:

Fastness to: Chlorine bleaching
Weathering
Wet-dry cleaning
Light
Laundering
Dry heat (sublimation)

3.4.5 Width and thickness. The width of the closed chain and the width and thickness of the tape shall be as required in table VII for the corresponding size when tested in accordance with 4.5.1.1, 4.5.1.3, and 4.5.1.4. When special widths and thicknesses of tape are desired, the width and thickness and permissible tolerances shall be as specified (see 6.2).

TABLE VII. Width and thickness

Fastener size	Width (inches)		Thickness of tape (inches) maximum	
	Closed chain	Single tape		
	Minimum	Maximum	Nonseparating fasteners	Separating fasteners
L-LS	0.125	0.180	$7/16 \pm 1/32$ *	$9/16 \pm 1/32$
			or	
LM-LMS	0.180	0.310	$9/16 \pm 1/32$ *	
			or	
			$5/8 \pm 1/32$	
			$7/16 \pm 1/32$	$9/16 \pm 1/32$
			or	or
LX	0.125	0.180	$9/16 \pm 1/32$	$5/8 \pm 1/32$
			or	or
			$3/4 \pm 1/16$ *	$3/4 \pm 1/16$ *
			- $1/32$	- $1/32$
			$9/16 \pm 1/32$	$9/16 \pm 1/32$
			or	or
			$5/8 \pm 1/32$	$5/8 \pm 1/32$
			or	or
M-MS	0.180	0.310	$3/4 \pm 3/32$ *	$3/4 \pm 3/32$ *
			- $1/32$	- $1/32$

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TABLE VII. Width and thickness (cont'd)

Fastener size	Width (inches)				Thickness of tape (inches) maximum
	Closed chain		Single tape		
	Minimum	Maximum	Nonseparating fasteners	Separating fasteners	
MH-MHS	0.310	0.390	3/4 + 1/16 - 1/32	3/4 + 1/16 - 1/32	0.050
H	0.320	0.500	3/4 + 1/32 or 1 + 1/16 *	3/4 + 1/32 or 1 + 1/16 *	0.060

* Unless alternate tape width is otherwise specified (see 6.2), the required tape width shall be as designated by this (*).

3.4.6 Tape extension. The tape extension or portion of tape extending beyond elements or stops when tested in accordance with 4.5.1.5, shall be $3/4$ inch minimum, (see 3.4.11.1). When special extension lengths are desired, they shall be as specified (see 6.2).

3.4.7 Tape tendering. When fasteners have metallic elements electroplated on the tape or that have been otherwise subjected to mineral acids or salts such as dichromate acid treatment (see 6.2), the crosswise breaking strength of the chain shall meet the requirements specified in table IX when tested for crosswise-breaking strength of chain after tape tendering as specified in 4.3.3.4.

3.4.8 Locks. The construction of the common types of locks shall be as described in 3.4.8.1, 3.4.8.2, 3.4.8.3 and 3.4.8.4. For separate element zippers utilizing conventional sliders, the locks shall prevent separation of the chain up to the minimum tension shown in table IX when a pull tending to separate the two stringers of the chain is exerted on the end of a partly opened chain. Flange locks shall partially obstruct separation of the chain. For ratchet-type sliders (either separate or continuous element fasteners), lock strengths shall meet the requirements of table IX when a pull tending to separate the two stringers of the chain is exerted on the ends of a partly opened chain. When the locks are required on sliders, the type of lock shall be as specified (see 6.2).

3.4.8.1 Automatic lock. The locking mechanism for automatic locks shall consist of a pin or pins, cam or cams held in engagement with the elements by means of a spring or lever action. The pin or pins, cam or cams shall be entirely separate from the pull, and locking shall be effected with the pull in any position. The locked position shall be maintained until such time as the

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slider is moved by means of a force applied to the pull parallel to the chain. The pull shall raise the pin or pins, cam or cams out of contact with the elements, thus permitting movement of the slider (see figure 4).

3.4.8.2 Pin and cam locks. Unless otherwise specified (see 6.2), locks shall be either pin, semi-automatic pin or cam. Pin, semi-automatic pin or cam locks shall be used only on sliders having tab pulls. The pin locks shall consist of one or more pins extending through the slider window or windows and fitting between adjacent elements of the chain in the locked position. The cam locks shall consist of a cam or cams extending through the slider window or windows and pressing against the chain in the locked position. Both pin, semi-automatic pin and cam locks shall effectively lock the slider when the pull is manually placed parallel to the chain and shall release the slider when the pull is manually raised lifting the pin or pins or cam or cams out of contact with the chain. Where cam locks are specified, cam actuated pin locks may be used, provided that the pin is not a projection on the pull (see figure 4). The semi-automatic lock slider consists of a standard brass slider body in combination with a stainless steel cover plate with protruding pin. The pin is activated into the chain via slider pull cam action when the pull is parallel to the chain toward slider mouth.

3.4.8.3 Flange lock. The locking mechanism for flange locks shall consist of notches, depressions, or cut out portions in the slider flanges that obstruct the path of the scoops and therefore lock the slider when strain is exerted against the slider flanges (see figure 4).

3.4.8.4 Ratchet lock. The locking mechanism for ratchet locks shall be an automatic type that ratchets above the minimum specified load but allows the slide fastener to remain operable.

3.4.9 Chain assembly.

3.4.9.1 Uniformity (straightness). The chain of all fasteners, except the curved type, shall lie flat on the horizontal surface and any deviation from a straight line, along the centerline of the chain, shall not exceed 1/16 inch in 5 inches when tested as specified in 4.5.1.5.

3.4.9.2 Uniformity of curved fasteners. The chain of the curved fasteners shall lie flat on the horizontal surface; any waving of the tape shall be disregarded. A tolerance of plus or minus 1/4 inch from the specified radii will be permitted when tested as specified in 4.5.1.6. The radii of the curves shall be measured on the centerline of the chain.

3.4.9.3 Waviness of chain for types I, III, IV, and V fasteners. The chain shall be flat without waviness when tested in accordance with 4.5.1.5.

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3.4.10 Length. The length of the closed slide fastener shall be the overall measurement from the bottom of the bottom stop or retainer to the top of the top stop, or top of the slider, or top of last element whichever is the extreme, expressed in inches and fractional inches in 1/2 inch increments when tested in accordance with 4.5.1.2. When continuous chain is ordered, the length of each reel or spool shall be specified to the nearest yard (see 6.2 and table VI).

3.4.10.1 Length tolerances. Unless otherwise specified (see 6.2), the tolerances shall be as specified in table VIII. All interchangeable slide fasteners for each length of a single manufacturer's design must be made according to a uniform element count (see 3.4.14.3) and length tolerance shall be twice those indicated in table VIII, except that the total tolerance shall be equally divided on the plus or minus side. On removable lining applications, the slide fasteners shall be center marked in accordance with commercial practice.

TABLE VIII. Length tolerances

Length of fastener in inches	Sizes							
	Light and light special light X		Light medium, light medium special, medium and medium special		Medium heavy and medium heavy special		Heavy	
	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus
to 12	1/8	1/8	3/16	3/16	1/4	1/4	5/16	5/16
12-1/4 to 18	1/8	3/16	3/16	1/4	1/4	5/16	5/16	3/8
18-1/4 to 24	1/8	1/4	3/16	5/16	1/4	3/8	5/16	7/16
24-1/4 to 30	1/8	5/16	3/16	3/8	1/4	7/16	5/16	1/2
30-1/4 to 36	1/8	3/8	3/16	7/16	1/4	1/2	5/16	9/16
36-1/4 to 42	1/8	7/16	3/16	1/2	1/4	9/16	5/16	5/8
42-1/4 to 48	1/8	1/2	3/16	9/16	1/4	5/8	5/16	11/16
48-1/4 to 54	1/8	9/16	3/16	5/8	1/4	11/16	5/16	3/4
54-1/4 to 60	1/8	5/8	3/16	11/16	1/4	3/4	5/16	13/16
60-1/4 to 66	1/8	11/16	3/16	3/4	1/4	13/16	5/16	7/8
66-1/4 to 72	1/8	3/4	3/16	13/16	1/4	7/8	5/16	15/16
72-1/4 to 78	1/8	13/16	3/16	7/8	1/4	15/16	5/16	1
78-1/4 to 84	1/8	7/8	3/16	15/16	1/4	1	5/16	1-1/16
84-1/4 to 90	1/8	15/16	3/16	1	1/4	1-1/16	5/16	1-1/8
90-1/4 to 96	1/8	1	3/16	1-1/16	1/4	1-1/8	5/16	1-3/16
96-1/4 to 102	1/8	1-1/16	3/16	1-1/8	1/4	1-3/16	5/16	1-1/4
102-1/4 to 108	1/8	1-1/8	3/16	1-3/16	1/4	1-1/4	5/16	1-5/16
108-1/4 to 114	1/8	1-3/16	3/16	1-1/4	1/4	1-5/16	5/16	1-3/8
114-1/4 to 120	1/8	1-1/4	3/16	1-5/16	1/4	1-3/8	5/16	1-7/16
120-1/4 to 126	1/8	1-5/16	3/16	1-3/8	1/4	1-7/16	5/16	1-1/2
126-1/4 to 132	1/8	1-3/8	3/16	1-7/16	1/4	1-1/2	5/16	1-9/16
132-1/4 to 138	1/8	1-7/16	3/16	1-1/2	1/4	1-9/16	5/16	1-5/8

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TABLE VIII. Length tolerances

Length of fastener in inches	Light and light special light X		Sizes					
			Light medium, light medium special, medium and medium special		Medium heavy and medium heavy special		Heavy	
	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus
138-1/4 to 144	1/8	1-1/2	3/16	1-9/16	1/4	1-5/8	5/16	1-11/16
144-1/4 to 150	1/8	1-9/16	3/16	1-5/8	1/4	1-11/16	5/16	1-3/4
150-1/4 and over 1/	1/8		3/16			1/4		5/16

- 1/ For fasteners over 150-1/4 inches long, the minus tolerance shall be 1-13/16 inches plus 1/16 inch for each additional 6 inch increment of length.
 "Plus" tolerances shall be as indicated in table VIII.

3.4.11 Type I fasteners, slide, interlocking, nonseparating, nonreversible.
 The type I fasteners conforming to table I shall be nonseparating, nonreversible with single or multiple sliders. The nonseparating fasteners, except styles 1 and 1A shall be so constructed as to keep the two stringers of the chain from becoming separated by holding them together at one end or both ends. The non-reversible fastener shall be equipped with a slider with a pull or pulls on one side only.

3.4.11.1 Styles 1 and 1A, without top stop, without bottom stop, specific length. The styles 1 and 1A fastener shall be supplied as a length of chain without stops and with a slider having a pin, cam, semi-automatic or automatic-type lock. The top tape extension shall be zero to 5/16 inch and the bottom-tape extension shall be 3/4 to 1 inch. Although there are no stops to prevent disengagement of the chain, these fasteners are classed as being nonseparating in the sense that they become nonseparating when applied to the end item. The stops are omitted for ease of handling in applying the fastener. The slider may be furnished separate from the chain, attached, or not required as stated by the procuring activity (see 6.2). When specified (see 6.2), staple as shown in figure 2 shall be supplied with these style fasteners.

3.4.11.1.1 Styles 1 and 1A, continuous chain. When styles 1 and 1A are ordered in a continuous chain, splices will be allowed. Each splice and defect shall be prominently identified in a permanent manner. There shall be no more than 10 splices or defects in 150 yards of chain. For each increment of 15 yards under 150 yards, one less splice or defect shall be permitted. For each increment of 15 yards over 150 yards, an additional splice or defect shall be permitted. An extra 1/6 yard of material shall be provided for each splice or defect in the spool or reel. However, for continuous defects over 6 inches in

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length, additional material the full length of such defects shall be provided. The tape shall be marked by arrows pointing to the top of the chain except when the elements have no direction. The arrows shall be spaced not more than 12 inches apart and shall be applied in such a manner as to be non-transferable. Unless otherwise specified (see 6.2), sliders will not be furnished with continuous chain.

3.4.11.1.1.1 Continuous chain application. If specified in the end-item document, continuous chain application may be utilized as an alternate to preassembled type I slide fasteners as part of the manufacturing method. The method requires that the entire chain tape and tape extensions be securely stitched with the required seam without any puckering or waviness. The slider shall be indexed into position to provide for a smooth running chain disengagement with its mouth squarely against the bottom staple stop and smooth running chain engagement with its throat evenly against the top stops with no excess chain elements showing. If continuous element plastic chain is used, sewn stops, without gapping, are allowed and all continuous chain using polyester tape shall be heat or ultrasonic cut to prevent fraying of tape.

3.4.12 Type II fastener, slide, interlocking, nonseparating, nonreversible, curved. The type II fastener shall conform to table II and all requirements applicable to type I fastener. The chain shall be so arranged that its center line, as viewed from the front or back, forms a curve or series of curves. The arc of each curve shall run through the centerline of the chain. The radii of the curve shall be based on the centerline of the chain. Length of fastener, radii of curves, and position of curves shall be as specified (see 6.2).

3.4.13 Type III fastener, slide, interlocking, nonseparating, reversible. The type III fastener shall conform to table III and all requirements applicable to type I fastener, except that the fastener shall not be furnished with cam lock. They shall have pulls on each side of the slider and shall be capable of being operated from either side of the fastener as attached (see figure 3).

3.4.14 Type IV fastener, slide, interlocking, separating, nonreversible. The type IV fastener shall conform to table IV and all requirements applicable to type I fastener, except that the fastener shall be equipped with a separating unit so constructed as to permit the separation and rejoining the two stringers of the chain.

3.4.14.1 Separating unit. The separating unit, as described in 3.2.4.5 and illustrated in figure 2 or figure 6 (applicable only to styles 7A and 8A), shall be permanently attached to the tape at the closed end of the chain and shall be designed so that the slider shall be blocked from movement away from the unit when the separating pin is not fully seated in the retainer. The retainer shall be designed to provide an opening sufficiently large to permit the insertion of the separating pin and, in addition, hold that pin in a relatively fixed position when the chain is closed. For quick-release separating fasteners, the retainer shall permit the separating pin to be readily disengaged when the two stringers of the chain are separated by hand after a quick-release is effected.

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3.4.14.2 "Hand" of separating unit. Separating units shall be designated as being either "left-hand" or "right-hand", depending upon the manner in which they are assembled on the fastener. When a separating slide fastener having a single pull is viewed from the pull side with the chain in a vertical position and the separating unit at the upper end of the chain, the separating unit shall be considered "left-hand" if the separating pin is on the observer's left, and "right-hand" if the separating pin is on the observer's right.

3.4.14.3 Interchangeability. An interchangeable slide fastener shall be a separating type which is so constructed that when the two stringers of the chain are separated, each stringer can be joined and operated using the slider provided by the manufacturer with the opposing stringer of other fasteners of the same size and design from a single manufacturer. Neither like size interchangeable fasteners nor sliders from different manufacturers are to be considered interchangeable with each other. When interchangeable fasteners are specified (see 6.2), by the procuring agency, the manufacturer shall submit to the procuring agency a sample slide fastener which shall serve as a master slide fastener to be used to determine the interchangeability of all slide fasteners delivered under the contract.

3.4.15 Type V fasteners, separating reversible. The type V fastener shall conform to table V, and all requirements applicable to type IV fastener, except that the slider shall have a single pull reversible on both side or pulls on each side and shall operate from either side (see figure 4).

3.5 Breaking strength. The crosswise breaking strength of the chain and separating unit shall meet the requirements of table IX when tested in accordance with 4.5.2.1 and 4.5.2.2.

3.6 Endurance.

3.6.1 Quick-release stop. The quick-release stop shall endure without failure when tested in accordance with 4.5.3.1 and table XV.

3.6.2 Chain. When specified (see 6.2), the chain shall endure without failure when tested in accordance with 4.5.3.2 and table XV.

3.7 Holding strength of stops, retainers, and separating pins of separating units. The retainer, separating pin of the separating unit, and all stops (except quick-release stops) shall meet the holding strength requirements specified in table IX when tested in accordance with 4.5.4. However, the single nonreleasing stop used on the side opposite the quick-releasing stop shall be required to meet only one-half of the load specified in table IX, when tested in accordance with 4.5.4.

3.8 Operating force. The force required to operate sliders, quick-releasing stops, and separating units before and after the salt spray test shall meet the requirements specified in table IX, when tested in accordance with 4.5.5.

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3.9 Single element or individual element pull-off (not applicable to continuous element slide fastener). The holding strength of separately-formed elements shall meet the requirements of table IX when tested in accordance with 4.5.6.

3.10 Single element or individual element slippage, lengthwise (not applicable to continuous element slide fastener). The holding strength of separately-formed elements (lengthwise) shall meet the requirements of table IX when tested in accordance with 4.5.7.

3.11 Slider deflection and recovery, pull. The deflection and recovery of sliders shall meet the requirements of table IX, when tested as specified in accordance with 4.5.8.

3.12 Slider, pull, pull-off (angular). The holding strength of the pull, (except wire stirrup pulls) in a pull and slider assembly shall meet the requirements of table IX, when tested as specified in accordance with 4.5.9.

3.13 Slider, pull twist. The twist resistance of the pull, (except wire stirrup pulls) and slider assembly shall meet the requirements of table IX, when tested as specified in accordance with 4.5.10.

3.14 Slider resistance to cushioned compression. The compression resistance of a slider assembled on a slide-fastener chain shall meet the requirements of table IX, when tested as specified in accordance with 4.5.11.

TABLE IX. Physical characteristics

Characteristic	Fastener sizes									
	L	LS	LM	LMS	LX	M	MS	MH	MHS	H
Breaking strength, crosswise of chain (pounds, minimum):										
Individual element fastener:										
Brass, Zinc, and copper-nickel-zinc	60	70	80	100	130	130	190	210	250	275
Aluminum	55	65	75	90	120	120	150	175	225	250
Plastic	60	65	75	85	90	100	110	130	145	160
Continuous element fastener	85	85	175	175	100	175	175	250	250	270
Breaking strength, crosswise of separating unit (pounds, minimum):										
Individual element fastener:										
Brass, zinc, and copper-nickel-zinc	20	20	30	30	30	30	30	75	75	90
Aluminum	20	20	30	30	30	30	30	75	75	90
Plastic	20	20	25	25	20	25	25	50	50	65
Continuous element fastener	20	20	30	30	20	30	30	40	40	50
Holding strength of stops (except quick-releasing stop), retainers and separating units (pounds, minimum):										
Individual element fastener:										
Metal	15	15	25	25	25	25	25	50	50	50
Plastic	10	10	20	20	20	20	25	35	35	35
Continuous element fastener	15	15	25	25	15	25	25	35	35	35

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TABLE IX. Physical characteristics (cont'd)

Characteristic	Fastener sizes									
	L	LS	LM	LMS	LX	M	MS	MH	MHS	H
Operating force tests										
Slider on chain:										
Before testing (pounds, maximum):										
Individual element fastener										
Metal	1.5	1.5	2.5	2.5	1.5	2.5	2.5	3.5	3.5	4.5
Plastic	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.5
Continuous element fastener	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.5	2.5	3.5
After salt spray test (pounds, maximum)										
Individual element fastener										
Metal	3.0	3.0	5.0	5.0	3.0	5.0	5.0	7.0	7.0	9.0
Plastic	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	7.0
Continuous element fastener	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	5.0	7.0
Slider resistance to cushioned compression (applied pounds)										
All fasteners	100	100	200	200	100	200	200	500	500	500
After cushioned compression test (pounds, maximum)										
Individual element fastener										
Metal	1.5	1.5	2.5	2.5	1.5	2.5	2.5	3.5	3.5	4.5
Plastic	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.5	3.5	4.0
Continuous element fastener	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.5	3.5	4.0

TABLE IX. Physical characteristics (cont'd)

Characteristic	Fastener sizes									
	L	LS	LM	LMS	LX	M	MS	MH	MHS	H
Quick-releasing (pounds):										
Before salt spray test, minimum	3.0	3.0	5.0	5.0	3.0	5.0	5.0	8.0	8.0	13.0
Before salt spray test, maximum	5.0	5.0	10.0	10.0	5.0	10.0	10.0	16.0	16.0	23.0
After salt spray test, maximum	10.0	10.0	15.0	15.0	10.0	15.0	15.0	25.0	25.0	35.0
Separating unit (pounds):										
Before salt spray test, maximum	1.5	1.5	2.5	2.5	1.5	2.5	2.5	3.5	3.5	4.5
After salt spray test, maximum	4.5	4.5	7.0	7.0	4.5	7.0	7.0	10.0	10.0	12.0
Single element or individual element (not applicable to continuous element fastener) pull-off (pounds, minimum):										
Brass, zinc, and copper-nickel-zinc	9	9	11	11	12	12	12	24	28	40
Aluminum	7	7	9	9	9	9	9	20	24	30
Plastic	6	6	10	10	10	12	12	20	20	20

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TABLE IX. Physical characteristics (cont'd)

Characteristic	Fastener sizes									
	L	LS	LM	LMS	LX	M	MS	MH	MHS	H
Single element or individual element (not applicable to continuous element fastener) slippage, lengthwise (pounds, minimum):										
Brass, zinc and copper-nickel-zinc	6	6	9	10	10	10	13	17	17	17
Aluminum	6	6	7	7	10	10	10	13	13	13
Plastic	6	6	9	10	10	10	10	17	17	17
Slider deflection and recovery pull: 1/										
Maximum deflection, inch	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
Maximum permanent set, inch	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Slider pull, pull-off (angular) (not applicable to stirrup pulls (pounds, minimum)	25	25	35	35	25	35	35	50	50	50
Slider pull, twist load (inch pounds, minimum) (not applicable to wire stirrup pulls)	1.5	1.5	4	4	1.5	4	4	6	6	6
Slider lock-strength (pounds, minimum)	3	3	5	5	3	7	7	7	7	10

1/ In testing wire stirrup pulls, clamp the wire stirrup pull rather than the thong directly in the tester jaw.

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3.15 Salt spray resistance. Unless otherwise specified (see 6.2), the fastener shall be exposed for 96 hours to the salt spray test as specified in 4.5.12. There shall be no red rust on any metal part, or fabric stains from red rust.

3.16 Finish.

3.16.1 Finish of metallic parts. Metallic fastener chains shall be of a natural finish except that zinc-alloy chains shall be finished in accordance with manufacturer's standard greenish-gray chromate finish. All other metal components shall approximately match the color of the chain and each other except as stated below:

(a) Nickel plate, tinplate, and zinc plate are considered satisfactory color matches for natural finish aluminum and plastic chain. When components are manufactured in continuous roll form, tin plating may be employed.

(b) Zinc-alloy components, when furnished with aluminum chain, shall be finished with zinc, or a clear or olive drab chromate finish.

(c) Zinc-alloy components, when furnished with brass chain, shall be finished with a bronze chromate coating or shall be brass plated.

(d) When specified (see 6.2), fasteners, fabricated with all brass components, shall be finished with a black chemical finish conforming to MIL-F-495 and tested as specified in table XV or may be finished with a chemically blackened zinc plate.

(e) Stirrup pulls, when fabricated of low carbon steel wire, shall be finished to match the color of the slider. Slider components other than pulls and bodies, when made of corrosion-resistant steel, beryllium copper, phosphor bronze, or hard drawn copper alloy wire, shall remain in the color natural to these metals. Unless otherwise specified (see 6.2), aluminum or brass staple type, closed-in stops, supplied with styles 1 and 1A fasteners, shall remain in the color natural to these metals.

(f) When specified (see 6.2), metallic components shall be enameled or anodized and colored to match the shade of tape. When enameled finish is specified, it is required on the outer (top) side of the fastener only, unless a reversible type is designated, in which event both sides shall be enameled. In lieu of enameling, the other metallic components of the slide fastener may be given an anodized or chromate finish, provided the finish approximates a color match with the chain.

(g) At the option of the contractor, a clear lacquer or a fine-bodied lubricant or both may be applied in addition to the required finish.

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3.16.1.1 Colorfastness of enameled parts. When parts are enameled, they shall show no more than a slight dulling of the film when tested for colorfastness to laundering as specified in 4.5.16.5.

3.16.2 Color of plastic chain and components. Unless otherwise specified (see 6.2), all components including chain, sliders, pulls, and bottom stops shall approximate the basic fabric shade of the end item. Use of chromate or anodized finish of sliders or pulls shall be approved by U.S. Army Natick Research, Development and Engineering Center (see 6.9). Unless otherwise specified, top stops and separable components may use a plated finish, alternately black oxidized top stops and separable components may be used with dark tape shades.

3.17 Identification marking. The manufacturer's identification or trademark shall be permanently and legibly marked on either the pull, slider, or retainer as well as on the tape of continuous chain. Marking shall be consistent on all parts.

3.18 Workmanship. All details of workmanship shall be in accordance with commercial practice. Edges and corners of metal parts shall be finished without burrs. The finished slider fastener shall be uniform in dimensions and shall operate smoothly and positively.

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 requirements 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.

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4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

4.2 First article. When a first article is required (see 6.2), it shall be examined for the defects specified in tables XI, XII, and XIII as applicable; and shall be tested for the characteristics specified in table XV, as applicable. The presence of any defect or failure of any test shall be cause for rejection of the first article.

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

4.3.1 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.

4.3.1.1 Material testing. When chemical composition testing is required (see 3.3 and 6.2), the lot shall be all material of one kind offered for examination at one time. Metal material shall be analyzed by the wet chemical method in accordance with Method 111, or the spectrochemical method in accordance with Method 112 of FED-STD-151. In case of dispute, analysis by the wet method (111) shall be the basis for acceptance. The chemical composition of plastic shall be determined in accordance with standard commercial test methods. The inspection level shall be S-1 and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0.

4.3.2 In-process inspection.

4.3.2.1 In-process examination. Examination shall be made of the following operations to establish conformance with specified requirements. Whenever non-conformance is noted, correction shall be made to the process and all items processed.

TABLE X. In-process examination

Requirement	Paragraph
Ascertain whether metallic elements have been electroplated on the tape or whether subjected to mineral acids or salts.	3.4.7

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4.3.3 End item inspection.

4.3.3.1 Visual examination. The end item shall be examined for the defects listed in table XI. The lot size shall be expressed in units of one fastener. The sample unit shall be one fastener. The inspection level shall be level I and the AQL, expressed in terms of defects per hundred units, shall be 1.5 for major defects and 4.0 for total (major and minor combined) defects.

TABLE XI. End item visual defects

Examine	Defect	Classification	
		Major	Minor
Operation of slider and chain, and opening and closing the complete chain length	Cannot close chain the full required distance	X	
	Does not operate freely, smoothly, or positively, i.e., binds, catches, or sticks at any point, or does not function properly	X	
	Any element which is improperly mated or does not mesh with its corresponding elements when chain is in closed position	X	
	Slider lock (when applicable) ineffective; i.e., does not retain slider when pull is in down position and when the open chain above the slider is lightly pulled apart	X	
	Slider pull becomes detached during operation	X	
	Automatic or semi-automatic lock (when applicable), malfunctions or does not operate as intended	X	
	Slider goes completely beyond stop (except at quick-release stop, when applicable)	X	
	Slider disengages from either row of elements when chain is in closed position (except at quick-release stop, when applicable)	X	
	Separable pin cannot be removed from retainer	X	
	Separable pin not seated properly in retainer when in assembled position	X	
Operation of detaching and rejoining separating unit (when applicable)	Separable pin cannot be inserted positively through the slider body when assembling separating unit	X	

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TABLE XI. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Operation of detach- ing and rejoining separating unit (when applicable) (cont'd)	Slider will not close chain after separable pin is seated in retainer	X	
	Defective blocking device; i.e., can close chain without the separable pin being fully seated in the retainer	X	
Operation of quick- releasing stop (when applicable)	Slider cannot be forced beyond quick- release stop	X	
	Any malfunctioning when forcing slider beyond quick-release stop		X
	Rows of elements cannot be completely separated after slider is forced beyond quick-release stop and the open portion of the chain is lightly pulled apart	X	
Finish of metal components	Finish missing, when required	X	
	Type of finish or color of finish not as specified	X	
	Color match between all metal com- ponents not as specified		X
	Red rust	X	
	Mottled, stained, scaly, or not uniform		X
	Organic-coated surface gritty, peeling, blistered, appreciably chipped, or area of no film		X
	Plated surface (when applicable) peel- ing or blistered		X
Color of plastic parts	Not specified color		X
Quality of metal components	Fractured, split, or broken	X	
	Malformed, damaged, bent out of shape, or otherwise impaired	X	
	Sharp burr, splinter, sharp fin, or sharp edge	X	
Quality of tape, bead, and thong (when applicable)	Cut, hole, tear, or other fabric imperfection	X	
	Loose thread ends or loose ends		X
	Selvage missing from any long edge	X	

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TABLE XI. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Quality of tape, bead, and thong (when applicable) (cont'd)	Hard embedded crease or wrinkle that would interfere with sewing or sealing		X
	Color other than specified	X	
	Shade other than specified		X
	Shade not uniform from one fastener to the next		X
	Oily, soiled, stained, spotted, shade bar, or streak		X
	Red rust	X	
Construction and workmanship (general)	Fastener is not type or not style specified	X	
	Any required component missing	X	
	Any required operation omitted or not properly performed	X	
	Component misplaced, loose, or not in proper alignment	X	
Chain, tape, and bead	Closed chain "bumpy" when fastener is laid flat on a flat surface	X	
	Any element not firmly or not securely attached to tape	X	
	Dirt or other foreign matter embedded between elements		X
	Bead detached from tape at any point	X	
	Bead or tape spliced (except continuous length fastener)	X	
	Evidence that raw ends of the tape have not been treated to prevent raveling (when specified)		X
Slider and pulls	Slider type or pull type not as specified	X	
	Pull arrangement not as specified (when more than one pull is specified)	X	
	Type of slider lock (when applicable) not as specified	X	
	Slider arrangement not as specified (when more than one slider is specified)	X	
	Slider reversed or inverted	X	
Stops	Any required stop not type specified	X	
	Stop not in required location or incorrectly placed		X

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TABLE XI. End item visual defects (cont'd)

<u>Examine</u>	<u>Defect</u>	<u>Classification</u>	
		<u>Major</u>	<u>Minor</u>
Stops (cont'd)	Location of stop varies from one slide fastener to the next		X
	Stop not firmly attached		X
Separating unit (when applicable)	Retainer not type specified	X	
	Separable pin or retainer pin not firmly attached over the bead	X	
	Retainer pin does not retain the separable pin in position after the chain has been closed	X	
	Retainer loose on retainer pin	X	
	Incorrect "hand" of separating units; not "left-hand" or "right-hand", as specified	X	
Thong (when applicable)	Not knotted as specified		X
	Missing	X	
Center marking (when applicable)	Omitted or in wrong location		X
	Not neatly accomplished		X
Continuous chain marking (when applicable)	Arrow marking omitted	X	
	Arrows do not point towards top of chain	X	
	Spacing of arrows more than 12 inches apart		X
Identification marking	Missing, where required		X
	Incorrect, illegible, or text incomplete		X

4.3.3.2 Dimensional examination. The end item shall be examined for the defects listed in table XII. The lot size shall be expressed in units of one fastener. The sample unit shall be one fastener. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

TABLE XII. End item dimensional defects

<u>Defect</u>
Overall length not in accordance with 3.4.10 and 3.4.10.1.
Retainer, separating pin, and retaining pin for type IV, styles 7A and 8A fasteners do not conform to the dimensions specified on figure 6.

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TABLE XII. End Item dimensional defects (cont'd)

Defect
Length of thong not as specified in 3.4.2.
Width of thong not as specified in 3.4.2.
Width of closed chain not as specified in 3.4.5. <u>1/</u>
Width of single tape (without tension) not as specified in 3.4.5. <u>2/</u>
Length of extension at both ends (when applicable) not as specified in 3.4.6. <u>3/</u>
Uniformity of chain (except type II) not as specified in 3.4.9.1. <u>3/</u>
Waviness of chain (except type II). <u>3/</u>
Curve radius (type II only) not as specified in 3.4.9.2 and 3.4.12. <u>4/</u>
Length and width of pull not as specified.

1/ Measure in accordance with 4.5.1.1.2/ Measure in accordance with 4.5.1.3.3/ Measure in accordance with 4.5.1.5.4/ Determine radius in accordance with 4.5.1.6.

4.3.3.3 Continuous length chain examination (when applicable). Continuous length chain on reels or spools shall be examined for the defects listed in table XIII. The lot size shall be expressed in units of one reel or one spool as applicable. The sample unit shall be one reel or spool, as applicable. The inspection level shall be S-2 and the presence of any defect shall be cause for rejection of the lot. In addition, one 16 inch minimum length complete slide fastener shall be assembled from the chain and the sliders, pulls, and stops to be furnished with the chain. The sample shall be examined for the "Operation of slider and chain, and opening and closing the complete chain length" defects listed in table XI, and the presence of any defect shall be cause for rejection of the lot.

TABLE XIII. Continuous length chain defects

Defect
Any reel or spool contains more than the maximum permissible combination of splices and defects.
If less than 1/6 yard has been given for any splice or defect.
Extra material less than the length of any continuous defect has been given.
If the total length of any reel or spool examined contains less than the total gross length marked on the spool or reel ticket.

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4.3.3.3.1 Metal components, procured with continuous chain (stop, slider, and pull examination). Stops, sliders, and pulls, when procured with continuous chain, shall be examined for the defects listed in table XI, as applicable. The lot shall be all metal components of one kind offered for examination at one time. The sample unit shall be one stop, slider, and pull. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 0.65 for major defects and 2.5 for total (major and minor combined) defects.

4.3.3.4 End item testing. Testing of completely fabricated slide fastener shall be performed in accordance with table XV for the characteristics shown therein. The lot size shall be expressed in units of one gross of fasteners. The sample unit shall be as specified in table XIV. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

TABLE XIV. Sample unit size for slide fasteners 1/

Fastener length	Sample unit when water-resistance or mildew-resistance is not required	Sample unit when water-resistance is required	Sample unit when both water-resistance and mildew-resistance are required
Up to 14 inches, inclusive	16	18	20
Over 14 inches, to 48 inches, inclusive	12	14	16
Over 48 inches	10	12	14
Continuous chain	12 ^{2/} (16-inch length)	14 ^{2/} (16-inch length)	16 ^{2/} (16-inch length)

1/ The same sample fastener can be used for more than one of the tests indicated in table XV, provided that the portion of the sample of fastener used in the subsequent test will not have its result affected by prior test.

2/ Each submitted slide fastener shall be completely assembled from continuous chains by the contractor. The sliders, pulls, and stops on the assembled sample units shall be identical with those the contractor proposes to furnish.

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TABLE XV. End item tests

Characteristic	Specification reference Require- ment	Test method 1/ 2/	Requirements applicable to			Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age	Lot aver- age		Pass or fail	Numerically to nearest
Webbing for thong (as applicable):								
Weight	3.3.13	4.5.15 as applicable	X	--	--	3	--	Avg. 0.1 oz. per linear yard
Breaking strength	3.4.2	4.5.15 as applicable	X	--	--	2	--	Avg. 0.1 lb.
Water-resistance of thong and tape (when applicable)	3.4.3.1	4.5.13	--	X	--	1	--	1.0 percent
Color of thong and tape (when applicable)	3.4.2 and 3.4.4	Visual	X	--	--	1	X	--
Mildew inhibitor content-copper- 8-quinolinolate 2/	3.4.3.2	4.5.17	--	--	--	--	--	--
Copper content	3.4.3.2	4.5.17	--	X	--	2	--	0.01 percent
Zinc salts contents	3.4.3.2	4.5.18	--	X	--	2	--	0.01 percent
Labile sulfur	3.4.4	2020 of FED-STD-191	--	X	--	1	X	--

TABLE XV. End item tests (cont'd)

Characteristic	Specification reference Require- ment	Test method 1/ unit	Requirements applicable to		Number deter- minations per unit	Results reported as	
			Indi- vidual	Lot aver- age		Pass or fail	Numerically to nearest
Colorfastness to chlorine bleaching of tape and thong, including bead and thread (when appli- cable)	3.4.4.2	4.5.16.1	X	--	1	X	
Colorfastness to weathering of tape and thong, includ- ing bead and thread (when applicable)	3.4.4.2	4.5.16.2	X	--	1	X	
Colorfastness to wet-drycleaning of tape and thong, including bead and thread (when applicable)	3.4.4.2	4.5.16.3	X	--	1	X	
Colorfastness to light of tape and thong, including bead and thread (when applicable)	3.4.4.2	4.5.16.4	X	--	1	X	

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TABLE XV. End item tests (cont'd)

Characteristic	Specification reference Require- ment	Test method 1/ unit	Requirements applicable to			Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age	Lot aver- age		Pass or fail	Numerically to nearest
Colorfastness to laundering of tape and thong, including bead and thread (when applicable)	3.4.4.2	4.5.16.5	X	--	--	1	X	
Colorfastness to dry heat (subli- mation) only ap- plicable for dye and finished tape containing poly- ester used for clothing items which will be pressed	3.4.4.1	4.5.16.6	X	--	--	1	X	
Thickness of tape (except bead)	3.4.5	4.5.1	X	--	--	5	--	0.001 in. average
Crosswise-breaking strength of chain after tape tendering (when applicable)	3.4.7 and table IX	4.5.14	X	--	--	2	--	0.5 lb. average
Crosswise-break- ing strength of separating unit	3.5 and table IX	4.5.2.2	X	--	--	1	--	0.5 lb. (under 50 lbs.) 1 lb. 50 lbs. & over)

TABLE XV. End item tests (cont'd)

Characteristic	Requirement	Specification reference Test method 1/	Requirements applicable to			Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age			Pass or fail	Numerically to nearest
Crosswise-break- ing strength of chain 3/	3.5 and table IX	4.5.2.1	X	--		2	--	0.5 lb. average
Endurance of quick release stop	3.6.1	4.5.3.1	X	--		1	X	(Indicate fail- ing cycle)
Endurance of chain	3.6.2	4.5.3.2	X	--		1	X	(Indicate fail- ing cycle)
Holding strength of stops (except quick-releasing stop), as applicable	3.7 and table IX	4.5.4.1 and 4.5.4.2	X	--		1 for ea. type stop	--	0.5 lb. (under 50 lbs.) 1.0 lb. (50 lbs. and over)
Holding strength of separating pins of separating unit	3.7 and table IX	4.5.4.3	X	--		1	--	0.5 lb. (under 50 lbs.) 1.0 lb. (50 lbs. and over)
Holding strength of fixed retainer	3.7 and table IX	4.5.4.4	X	--		1	--	0.5 lb. (under 50 lbs.) 1.0 lb. (50 lbs. and over)

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TABLE XV. End item tests (cont'd)

Characteristic	Specification Requirement	Test method 1/ reference	Requirements applicable to		Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age		Pass or fail	Numerically to nearest
Operating force of slider before salt spray	3.8 and table IX	4.5.5.1 or 4.5.5.1.1 (as appli- cable and 4.5.12	X	--	3 for ea. slider	X	0.1 lb. average
Operating force of slider after salt spray (96 hours)	3.8 and table IX	4.5.5.1 or 4.5.5.1.1 (as appli- cable)	X	--	3 for ea. slider	X	0.1 lb. average
No red rust (after each of the three (3) salt spray tests)	3.15	Visual	X	--	1	X	--
Operating force of quick- releasing stop before salt spray	3.8 and table IX	4.5.5.2	X	--	3	--	1.0 lb. average
Operating force of quick-releasing stop after salt spray (96 hours)	3.8 and table IX	4.5.5.2 and 4.5.12	X	--	3	X	1.0 lb. average

TABLE XV. End item tests (cont'd)

Characteristic	Specification reference Requirement	Test method 1/ unit	Requirements applicable to		Number deter- minations per unit	Results reported as	
			Indi- vidual	Lot aver- age		Pass or fail	Numerically to nearest
Operating force of separating unit before salt spray	3.8 and table IX	4.5.5.3	X	--	3	--	0.1 lb. average
Operating force of separating unit after salt spray (96 hours)	3.8 and table IX	4.5.5.3 and 4.5.12	X	--	3	--	0.1 lb. average
Single element pulloff	3.9 and table IX	4.5.6	X	--	1	--	0.1 lb.
Single element, slippage, length- wise	3.10 and table IX	4.5.7	X	--	1	--	0.1 lb.
Slider deflection and recovery, pull	3.11 and table IX	4.5.8	X	--	1 for ea. slider	X No. break- age, rup- ture or de- for- mation	(a) Max. de- flection to nearest 0.001 in. (b) Max. permanent set to nearest 0.001 in.

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TABLE XV. End item tests (cont'd)

Characteristic	Specification Require- ment	reference Test method 1/ unit	Requirements applicable to		Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age		Pass or fail	Numerically to nearest
Slider, pull, pull-off (angular) 4/	3.12 and table IX	4.5.9	X	--	1 for each slider pull	X	--
Slider, pull twist 4/	3.13 and table IX	4.5.10	X	--	2 1-clock- wise 1-counter- clockwise	X	--
Slider, resistance to cushioned compression	3.14 and table IX	4.5.11	X	--	1 (Pull in normal flat position) 1 (Pull in reverse position 180°)	X	--
Black chemical finish:							
Color and gloss	3.16.1 (d)	MIL-F-495	X	--	1	X	--
Resistance to hot soap solution	3.16.1 (d)	MIL-F-495	X	--	1	X	--
Resistance to accelerated weathering	3.16.1 (d)	MIL-F-495	X	--	1	X	--

TABLE XV. End item tests (cont'd)

Characteristic	Specification Require- ment	reference Test method 1/ 2	Requirements applicable to		Number deter- minations per unit	Results reported as	
			Indi- vidual unit	Lot aver- age		Pass or fail	Numerically to nearest
Flexibility and adhesion	3.16.1(d)	MIL-P-495	X	--	1	X	--
Shrinkage of complete fastener	3.3.11.1	4.5.19	--	--	1	X	--

1/ Tensile test machine, when used for a given specimen, shall be of such capacity that the maximum load required to break the specimen is not greater than 85 percent or less than 15 percent of the rated capacity.

2/ The contractor shall certify that only copper-8-quinolinolate was used in the treatment.

3/ Plastic chain fasteners shall be preconditioned conforming to the section 4 atmospheric conditions FED-STD-191.

4/ Not applicable to wire stirrup pulls.

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4.3.4 Packaging examination. The fully packaged end items shall be examined for the defects listed in table XVI. The lot size shall be expressed in units of shipping containers. The sample unit shall be one shipping container fully packaged. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

TABLE XVI. Packaging defects

<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 sealing or closure of container flap, improper taping, loose strapping, or inadequate stapling. Bulged or distorted container.
Content and weight (exterior)	Net weight more than specified.

4.3.4.1 Examination for count in intermediate containers. Intermediate containers shall be examined to determine conformance with package markings and specified quantity. The sample unit for this examination shall be one container (interior pack). Any container with less than the specified or marked quantity of fasteners or component parts when applicable, shall be classified as a defect. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units shall be 2.5. The lot shall be the number of intermediate containers submitted for inspection.

4.4 Palletization examination. The fully packaged and palletized end items shall be examined for the defects listed below. The lot size shall be expressed in units of palletized unit loads. The sample unit shall be one palletized unit load, fully packaged. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

<u>Examine</u>	<u>Defect</u>
Finished dimensions	Length, width, or height exceeds specified maximum requirement.
Palletization	Pallet pattern not as specified. Interlocking of loads not as specified. Load not bonded with required straps or film as specified.

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<u>Examine</u>	<u>Defect</u>
Weight	Exceeds maximum load limits.
Marking	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application.

4.5 Methods of inspection.

4.5.1 Dimension measurement.

4.5.1.1 Chain width. The closed chain width shall be measured to determine conformance with 3.4.5 in accordance with the following procedure: Place the closed slide fastener or slide fastener chain on a horizontal working surface. Position the identification gage with the outside faces of the anvils in flat contact with the tape. Close the jaws of the gage slowly until they are in firm contact with the shoulders of the elements and parallel to them on both stringers. Make five measurements on each specimen not less than 1 inch apart, reading the dial of the gage to the nearest 0.001 inch.

4.5.1.2 Length. The length of the fastener shall be measured in accordance with ASTM D 2060 to determine conformance with 3.4.10 and table VIII, except that the measurement shall be to the nearest 1/16 of an inch.

4.5.1.3 Tape width. The tape shall be measured in accordance with ASTM D 2060 to determine conformance with 3.4.5 and table VII, except that the measurement shall be to the nearest 1/32 of an inch.

4.5.1.4 Tape thickness. The thickness of the tape shall be measured in accordance with Method 5030 of FED-STD-191, except that the diameter of the pressure foot and anvil shall be 0.375 ± 0.001 inches and the total load 6 ± 0.1 ounces. The tape shall not be under tension while the thickness is being determined. Thickness shall be in conformance with 3.4.5 and table VII.

4.5.1.5 Tape extension uniformity (straightness), and waviness of chain. To determine extension conformance to 3.4.6, uniformity of chain requirements to 3.4.9.1, and waviness of chain requirements to 3.4.9.3, examination shall be in accordance with the applicable procedures of ASTM D 2060.

4.5.1.6 Curved radius. Curved fasteners shall be laid flat on a flat horizontal surface without tension with the arc of the curve passing through the chain centerline, and the radius shall be determined to the nearest 1/16 inch to determine conformance with 3.4.9.2. Templates having limiting radii inscribed may be used.

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4.5.2 Breaking strength tests.

4.5.2.1 Chain crosswise. The chain shall be tested in accordance with ASTM D 2061 to determine conformance with 3.5 and table IX.

4.5.2.2 Separating unit, crosswise. The separating unit shall be tested in accordance with ASTM D 2061 to determine conformance with 3.5 and table IX.

4.5.3 Endurance tests.

4.5.3.1 Quick release stop. The slider of the fastener shall be pulled manually or mechanically 200 times beyond the quick release stop to determine conformance with 3.6.1.

4.5.3.2 Chain. The slider of the fastener shall be pulled back and forth mechanically in a reciprocating motion (see figure 5) as follows, to determine conformance with 3.6.2.

- a. The reciprocating stroke shall be 3 inches.
- b. The number of cycles back and forth shall not be less than 500.
- c. The lateral and longitudinal forces applied shall be in accordance with table XVII for the different fastener sizes.
- d. The fastener shall be opened and closed at a uniform rate of 30 cycles per minute.
- e. The slider shall move approximately 3 inches for opening and 3 inches for closing.
- f. There shall be no interference by any locking device on the slider during the opening and closing of the fastener.
- g. In the case of two sliders with a fastener, each shall be tested separately.

TABLE XVII. Chain forces

Fastener size	Force lateral lbs. (kilograms)	Force, longitudinal lbs. (kilograms)
L	1.5 (0.7)	1.1 (0.5)
LS, LX	2.2 (1.0)	1.5 (0.7)
LM, LMS, M	3.5 (1.6)	3.1 (1.4)
MH, MS, MHS	5.3 (2.4)	4.0 (1.8)
H	6.6 (3.0)	5.1 (2.3)

4.5.4 Holding strength tests.

4.5.4.1 Top stop. The top stops shall be tested in accordance with ASTM D 2061 to determine conformance with 3.7 and table IX.

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4.5.4.2 Bottom stop. The bottom stop shall be tested in accordance with the bottom stop holding stringer separation method of ASTM D 2061 to determine conformance with 3.7 and table IX.

4.5.4.3 Separable pin. The separating pin of the separating unit shall be tested in accordance with ASTM D 2061 to determine conformance with 3.7 and table IX.

4.5.4.4 Fixed retainer. The fixed retainer shall be tested in accordance with the fixed retainer pull-off method of ASTM D 2061 to determine conformance with 3.7 and table IX.

4.5.5 Operating force tests.

4.5.5.1 Slider. The sliders shall be tested in accordance with ASTM D 2062, both before and after salt spray application to determine conformance with 3.8 and table IX.

4.5.5.1.1 Multiple sliders. Multiple sliders shall be tested as above, except that a reading shall be made on each of any two sliders positioned opposite each other on the chain.

4.5.5.2 Quick-release stop. Fasteners with quick-releasing stops shall be tested in accordance with ASTM D 2062, both before and after salt spray application, to determine conformance with 3.8 and table IX.

4.5.5.3 Separating unit. Separating units on fasteners shall be tested in accordance with ASTM D 2062, both before and after salt spray application, to determine conformance with 3.8 and table IX.

4.5.6 Single element (or individual element) pull-off. Separately-formed elements shall be tested in accordance with ASTM D 2061 to determine conformance with 3.9 and table IX.

4.5.7 Single element (or individual element) slippage, lengthwise. Separately-formed elements shall be tested in accordance with ASTM D 2061 for conformance with 3.10 and table IX.

4.5.8 Slider deflection and recovery, pull. Slider deflection and recovery, pull shall be tested in accordance with ASTM D 2061 to determine conformance with 3.11 and table IX, except for the following loads:

<u>Sizes</u>	<u>Load, pounds</u>
L, LS and LX	20
LM, LMS, M and MS	30
MH, MHS and H	50

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4.5.9 Slider, pull, pulloff (angular). Sliders shall be tested for pulloff (angular) in accordance with ASTM D 2061 to determine conformance with 3.12 and table IX.

4.5.10 Slider, pull, twist resistance. Sliders and pulls shall be tested for twist resistance in accordance with ASTM D 2061 to determine conformance with 3.13 and table IX.

4.5.11 Slider resistance to cushioned compression. Sliders shall be tested for resistance to cushioned compression in accordance with ASTM D 2061 to determine conformance with 3.14 and table IX.

4.5.12 Salt spray resistance. Fasteners shall be tested in accordance with ASTM D 2059 for salt spray resistance to determine conformance with 3.15.

4.5.13 Water resistance of tape. The length of tape cut away from the chain after laundering with Optional Procedure 1 under Longitudinal Dimensional Change of ASTM D 2060. The tape shall then be subjected to the immersion absorption test described in Method 5502 of FED-STD-191, for compliance to the requirements of 3.4.3.1 and table XV.

4.5.14 Crosswise breaking strength of chain after tape tendering. The specimens of the chain and tape shall be suspended without contact, other than to the suspending clips, and shall be tendered by exposure to a constant temperature of $300^{\circ}\text{F} \pm 2^{\circ}$ for 1 hour. The tendered specimens shall then be tested for crosswise breaking strength as specified in 4.5.2.1 to determine conformance with 3.4.7 and table IX.

4.5.15 Breaking strength and weight of webbing for thong. The breaking strength and weight of a 6 inch length of full width webbing for thong shall be determined in accordance with Methods 5100 and 5040 of FED-STD-191 for compliance with 3.3.13, 3.4.2, and table XV. The width of the webbing shall not be greater than the length of the jaws.

4.5.16 Tape and thong colorfastness tests.

4.5.16.1 Chlorine bleaching. Tapes and thong shall be tested for colorfastness, when bleached, in accordance with Method 5600 of FED-STD-191 for compliance with 3.4.4.2 and table XV.

4.5.16.2 Weathering. A full width of tapes exposed to weathering for 40 hours and thongs shall be tested for colorfastness to weathering, in accordance with Method 5671 of FED-STD-191, for compliance with 3.4.4.2 and table XV.

4.5.16.3 Wet drycleaning. A full width of tapes and thongs shall be tested for colorfastness to wet-drycleaning, in accordance with Method 5622 of FED-STD-191 for compliance with 3.4.4.2 and table XV.

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4.5.16.4 Light. Tapes and thongs shall be tested for colorfastness to light, in accordance with Method 5660 of FED-STD-191 for compliance with 3.4.4.2 and table XV. Time of exposure shall be 40 standard fading hours, except for aramid (Nomex) material, for which the time of exposure shall be 6 standard fading hours.

4.5.16.5 Laundrying. A full width of tapes and thongs shall be tested for colorfastness to laundrying in accordance with Method 5610 of FED-STD-191 for compliance with 3.4.4.2, 3.16.1.1, and table XV.

4.5.16.6 Dry heat (sublimation). Dyed and finished tapes containing polyester and used for clothing items which will be pressed, shall be tested for colorfastness to dry heat in accordance with Method 5642 of FED-STD-191, at $376 \pm 6^{\circ}\text{F}$, for compliance with 3.4.4.2 and table XV.

4.5.17 Copper content. Copper content shall be determined in accordance with Method 2060 of FED-STD-191 for compliance with 3.4.3.2.

4.5.18 Mildew inhibitor content (zinc salts).

4.5.18.1 Zinc salts. The analysis of the treated material shall be obtained using either the colorimetric or electrolytic method as follows:

4.5.18.1.1 Colorimetric method.

- (a) Reagents and apparatus
 - Soxhlet extraction apparatus with thimbles
 - Benzene (water white)
 - Concentrated ammonium hydroxide
 - Copper sulfate solution, 2 percent
 - Standard methyl cumate solution (copper salt of dimethyldithiocarbamate)

(b) Preparation for standard methyl cumate. Weigh 0.1 g of methyl cumate in a glass stoppered weighing bottle. Transfer the cumate to a 1,000 mL volumetric flask rinsing with repeated portions of benzene. Dilute with benzene to 1,000 mL. Warm the solution and let stand overnight to insure completeness of solution. Prepare several Nessler tubes containing varying amounts of standard methyl cumate solution diluted to exactly 50 mL in volumetric flask (e.g., 1, 5, 10, 15, 20, 25, and 50 mL of standard) with benzene. These Nessler tubes form a color range for comparison of the unknown.

(c) Procedure. Cut the fabric sample into pieces about 1/4-inch square. Weigh 5 g of sample accurately to the nearest mg and place in an extraction thimble. Extract in the Soxhlet apparatus with 100 mL benzene for at least 4 hours or until the recycling solvent is no longer colored. Add 5 mL of concentrated ammonium hydroxide to the solvent, let stand for 15 minutes, and filter by suction through a Buchner funnel. Transfer the benzene-water mixture

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to a 250 mL separatory funnel, rinse the flask with benzene, add 10 mL of copper sulfate, and shake thoroughly. After separation is complete, draw off the bottom water layer into a 150 mL beaker. Filter the top colored benzene layer by gravity into a 250 mL graduated flask. Extract the water layer again with about 50 mL of benzene and repeat the separation as before, collecting the colored benzene layer in the same flask. Continue the extraction until there is no color in the benzene layer. Add sufficient benzene to the flask until final volume is 250 mL. Transfer an aliquot portion into a Nessler tube, and add a sufficient quantity of benzene to give a total volume of 50 mL. The aliquot shall be such that the resulting color shall fall within the range of the color standards. By comparison with the matching standard, determine the number of mL of standard equivalent to the diluted 25 mL of unknown. The absorbance of the final solutions of aliquots may also be measured on a suitable colorimeter at a wave length of 440 mm and compared to a previously prepared standard curve.

$$\text{Percent inhibitor (n)} = \frac{\text{mL standard solution} \times 2.55}{G \times D}$$

G = Sample weight (g)

D = aliquot (mL) of colored benzene (prior to being diluted to 50 mL) from cloth sample

(d) Calculations.

4.5.18.2 Electrolytic method.

(a) Reagents.

Concentrated sulfuric acid
Concentrated hydrochloric acid
Sodium hydroxide, 4 normal
Ethyl alcohol, 95 percent
Phenolphthalein indicator

(b) Apparatus.

Electroanalyzer (see apparatus described in Method 2050 of FED-STD-191)
Injury to the platinum electrode can be prevented by first coating it with copper and then depositing the zinc on the surface
180 mL electrolytic beaker
Analytical balance
Muffle furnace
Bunsen burner
Desiccator

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(c) Procedure. Weigh to the nearest mg a sample of approximately 5 g which has previously been cut into 1/4-inch squares. Place the sample in a porcelain crucible and ash in a muffle furnace at a temperature not exceeding 450°C. Cool and add 2-4 mL of hydrochloric acid and 4-6 mL of sulfuric acid. Evaporate until SO₃ fumes are liberated, cool, transfer to 180 mL electrolytic beaker, and wash with distilled water. To this solution of zinc sulfate, add phenolphthalein indicator and sodium hydroxide solution until a permanent pink color is obtained. Then add 20-25 mL of 4 normal sodium hydroxide and dilute to 150mL. Filter if necessary.

(d) Zinc-content determination. Accurately weigh the cathode. Insert the cathode and anode in their respective holders and place the beaker containing the zinc solution under the electrodes so that the cathode is almost completely immersed. Cover the beaker with a split watchglass. Apply a current of 0.8 to 1.0 ampere and 3-4 volt electrode potential. After 3 hours, the electrolysis is complete, provided no more than 0.5 g of zinc was present. Without breaking the current, lower the beaker while placing a stream of water over the cathode to wash it free from electrolyte. Remove and dip the cathode in 95 percent alcohol. Flip to remove the excess alcohol. Dry in an oven at 105°C for five minutes, cool in air, and weigh accurately to the nearest mg. This increase in weight represents the weight of zinc in the sample taken.

(e) Calculations.

$$\text{Percent inhibitor (h)} = \frac{\text{Weight of zinc} \times 481}{\text{Weight of sample}}$$

4.5.19 Longitudinal wet dimensional change (shrinkage) of slide fasteners. The completed slide fasteners shall be tested for longitudinal wet dimensional change (shrinkage) in accordance with ASTM D 2060, using Optional Procedure 1 and one laundering and one dry cycle. The slide fasteners shall conform to the requirements of 3.3.11.1.

5. PACKAGING

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

5.1.1 Level A.

5.1.1.1 Fasteners 16-inches and under. A maximum of one hundred fasteners of one type, style, composition, finish, color, size, and length only, shall be unit packed flat in a snug-fitting paperboard or fiberboard box conforming to style IV, class i of PPP-B-566, or class domestic of PPP-B-636, respectively. Unless otherwise specified (see 6.2), fasteners shall be completely assembled. When unit packed unassembled, the required number of sliders and stops shall be unit packed separately in two cotton cloth bags, kraft paper bags, or envelopes.

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The bags or envelopes shall be securely closed and placed in the box with the mating chain. Each box shall be closed in accordance with the appendix of the applicable box specification.

5.1.1.2 Fasteners over 16-inches, except continuous chain. Slide fasteners of one type, style, composition, finish, color, size, and length only shall be folded to prevent excessive wrinkling of the tape or damage to the chain and parts, and unit packed in a snug-fitting box as specified in 5.1.1.1. The contents shall be arranged to form a compact load. The maximum box dimension shall not exceed 18 inches in length. Weight of contents of fiberboard boxes shall not exceed 25 pounds. Weight of contents of paperboard boxes shall not exceed the weight limitation of PPP-B-566.

5.1.1.3 Continuous chain. Each length shall be wound on a spool or corrugated fiberboard collapsible reel (see table VI), that can be used on a dispensing spindle and allow the chain to be unwound and fed into a machine at such speeds as required to cut predetermined lengths. The circumference of the spool flanges shall extend slightly beyond the outer edge of the chain and shall be of sufficient strength to withstand the rigors of shipping. The spindle hole shall be 1 inch in diameter. The chain shall be covered with one layer of kraft paper with edge overlapped and secured with 2-inch minimum width tape conforming to class 1 of PPP-T-45 or placed in a plastic bag and the bag securely closed. The corrugated fiberboard collapsible reel, when opened, shall be able to fit over a 7-inch reel cone. The wrap-around flaps shall be closed over the chain and secured with tape as specified herein.

5.1.1.3.1 Sliders and bottom stops. Sliders and bottom stops (when furnished), shall be preserved to afford adequate protection against damage during shipment from the supply source to the first receiving activity. The supplier may use his standard practice when it meets this requirement.

5.1.2 Commercial. Fasteners and continuous chain, and (when furnished) sliders, and bottom stops shall be preserved in accordance with ASTM D 3951.

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

5.2.1 Level A packing.

5.2.1.1 Slide fasteners or continuous chain. Slide fasteners or continuous chain of one type, style, composition, finish, color, size, and length only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, V2s of PPP-B-636. Weight of contents shall not exceed 65 pounds. Each shipping container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2). Strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

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5.2.1.2 Sliders and bottom stops. Sliders and bottom stops, preserved as specified in 5.1 shall be packed in shipping containers as specified in 5.2.1.1 except when specified (see 6.2), the sliders and bottom stops shall be packed in the shipping container containing the mating chain.

5.2.2 Level B packing.

5.2.2.1 Slide fasteners or continuous chain. Fasteners or continuous chain of one type, style, composition, finish, color and size only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, type CF (variety SW) or SP, class domestic of PPP-B-636. Weight of contents shall not exceed 65 pounds. Closure shall be in accordance with method II as specified in the appendix of PPP-B-636.

5.2.2.2 Sliders and bottom stops. Sliders and bottom stops preserved as specified in 5.1 shall be packed in shipping containers as specified in 5.2.2.1 except, when specified (see 6.2), the sliders and bottom stops (when furnished) shall be packed in the containers containing the continuous chain.

5.2.2.3 Weather-resistant fiberboard containers. When specified (see 6.2), the shipping container shall be grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of the container specification.

5.2.3 Commercial packing. Fasteners and continuous chain, and (when furnished) sliders, and bottom stops, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

5.3 Palletization. When specified (see 6.2), slide fasteners packed as specified in 5.2.1 or 5.2.2 shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Pallets shall be fabricated from wood groups I, II, III, or IV, of MIL-STD-731. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means K and L or film bonding means O or P. Pallet pattern shall be in accordance with the appendix of MIL-STD-147. 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 first be approved by the contracting officer

5.4 Marking.

5.4.1 Civil agencies. In addition to any special marking required by the contract, unit packs, spools, reels, shipping containers and palletized unit loads shall be marked in accordance with FED-STD-123 or ASTM D 3951, as applicable.

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5.4.2 Military requirements. In addition to any special marking required by the contract, unit packs, spools, reels, shipping containers and palletized unit loads shall be marked in accordance with MIL-STD-129 or ASTM D 3951, as applicable.

6. NOTES

6.1 Intended use. The fasteners are used on equipage, tentage, and general wearing apparel.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- a. Title, number, and date of this specification.
- b. Type, style, size, fastener length, chain length, as applicable, as required (see 1.2).
- c. When a first article is required (see 3.1, 4.2, and 6.7).
- d. Slider arrangement when more than two required (see note 2/ at end of table V).
- e. Type locks and slider arrangement required (see notes 1/ and 2/ at end of table V and 3.4.8).
- f. When sliders for styles 1 and 1A and for continuous chain are required (see note 2/ at end of table V).
- g. Type of pull required (see 3.2.2.2) and arrangement and number of pulls (if more than one on each side) required (see 3.2.2.2).
- h. Thong when required on other than stirrup pulls (see 3.2.3), if other material is required (see 3.4.2) and length of thong (see 3.4.2).
- i. When tests for chemical composition are required (see 3.3 and 4.3.1.1).
- j. When slider is to be fabricated of manganese bronze (see 3.3.7.2).
- k. Whether shrinkage control is required (see 3.3.11.1).
- l. When a particular chain material is required (see 3.4), or when all metal components are to be of the same material (see 3.4). When other than brass slider bodies are required for sizes, L, LS, LM, LMS, LX and M,MS (see 3.4).
- m. Material for tape and bead if other than specified (see 3.4.1).
- n. Tape:
 1. When tape requires water-resistance (see 3.4.1 and 3.4.3.1) or mildew-resistance with inhibitor (see 3.4.1 and 3.4.3.2) or both.
 2. When tape ends are to be coated tape, have bonded reinforcement, be impregnated or pinked (see 3.4.1.1).
 3. Color (shade) required (see 3.4.4).
 4. Colorfastness required (see 3.4.4.2).
 5. When special width and thickness are required (see 3.4.5). When alternate tape width is required (see table VII).

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6. When special tape extension lengths are required (see 3.4.6).
7. Specify when metallic elements are to be electroplated on the tape or otherwise subjected to mineral acids or salts (see 3.2 and 3.4.7).
- o. When pin or cam lock is required (see 3.4.8.2).
- p. Specify length of chain required and tolerance if necessary (see 3.4.10 and 3.4.10.1).
- q. When sliders for type I, styles 1 and 1A are to be furnished separately, attached to chain, or not required (see 3.4.11.1).
- r. Staple if required as bottom stop (see 3.4.11.1).
- s. When sliders for continuous chain are required (see 3.4.11.1.1).
- t. Length of fastener and radii and position of curves required (see 3.4.12).
- u. If interchangeability is required (see 3.4.14.3).
- v. Whether salt-spray resistance is waived (see 3.15).
- w. When endurance testing of chain is required (see 3.6.2).
- aa. Finish:
 1. Whether black chemical finish is required on brass components (see 3.16.1(d)).
 2. Whether metallic components are to be enameled, anodized, or pigmented to match the shade of tape (see 3.16.1(f)).
 3. Plastic color, if other than natural color is required (see 3.16.2).
 4. When aluminum or brass, staple type, closed ends stops for styles 1 and 1A are to be finished other than their natural color (see 3.16.1(e)).
- bb. Selection of the applicable levels of preservation and packing (see 5.1 and 5.2).
- cc. Whether the fasteners should be preserved unassembled (see 5.1.1.1).
- dd. Whether the sliders and stops should be packed with the chain (see 5.2.1.2 and 5.2.2.2).
- ee. If weather-resistant fiberboard shall be required for level B packing (see 5.2.2.3).
- ff. Type and class of unit load required (see 5.2.1.1).
- gg. When palletization is required (See 5.3).

6.3 Toxicity clearance. Any questions raised regarding toxicity should be referred by the procuring agency to the Department Medical Authority. In the case of Army procurement, the Surgeon General will act as advisor to the procuring agency.

6.4 Colorfastness requirements. In procuring slide fasteners for a specific use, consideration should be given to specify only those colorfastness requirements for the tapes required of the end item to which the slide fastener will be applied. Typical examples might be:

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<u>End item</u>	<u>Colorfastness requirement</u>
Wool clothing which is dry-cleaned.	Good fastness to wet-dry-cleaning and light.
Wool clothing which is laundered.	Good fastness to laundering and light.
Cotton clothing which is laundered.	Good fastness to laundering, chlorine bleaching and light.
Tentage and equipage.	Good fastness to weathering.
Aramid (Nomex) clothing which is laundered.	Fair fastness to light and good fastness to laundering.

6.5 Civil agency procurements. When level B preservation is specified for civil agency procurement the requirements in 5.1.1 shall apply.

6.6 Apparatus. The recommended apparatus for test procedure in 4.5.19 is:

- a. Kenmore Automatic Washing Model 600, or similar washing machine.
In case of dispute, the Kenmore Model 600 shall be used.
- b. Kenmore Automatic Dryer Model 600, or equivalent.

6.7 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.

6.8 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification (see 3.3).

6.9 Submittal for approval. Request for approval should be submitted to the U.S. Army Natick Research, Development, and Engineering Center, Attention: STRNC-ITFT, Natick, MA 01760-5014.

MILITARY INTERESTS:

Custodians

Army - GL
Navy - AS
Air Force - 99

Review Activities

Army - MI
Air Force - 82
DLA - IS

User Activities

Navy - MC, SA, OS, NU

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS
VA - OSS
USDA - AFS

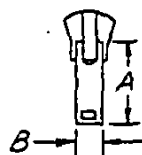
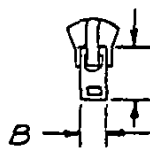
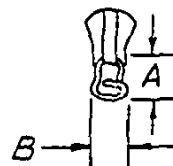
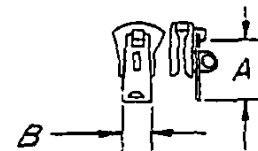
PREPARING ACTIVITY:

Army - GL

Project No. 5325-0259



CHAIN PULL

LONG TAB
PULLSHORT TAB
PULLSTIRRUP
PULL

PADLOCK PULL

PULL DIMENSIONS		
PULL TYPE	A	B
	OVERALL LENGTH	OVERALL WIDTH
CHAIN	AS SPECIFIED	NOT MORE THAN 1/8 WIDER THAN SLIDER
LONG TAB	1 1/2" (NOMINAL)	
SHORT TAB	1" (MAXIMUM)	
STIRRUP	MFG STANDARD PRACTICE	
PADLOCK	AS SPECIFIED	

COMBINATIONS OF SLIDER PULLS, LOCKS AND SIZES		
TYPE LOCK	TYPE PULL	SIZES
AUTOMATIC	CHAIN	L, LS, LM, LMS, M AND MS
	LONG TAB	ALL EXCEPT L AND LS
	SHORT TAB	ALL
	STIRRUP	MH, MHS AND H
FLANGE	CHAIN	L, LS, LM, LMS, M AND MS
	LONG TAB *	ALL
	SHORT TAB *	ALL
	STIRRUP *	MH, MHS AND H
PIN OR CAM	LONG TAB	ALL EXCEPT L AND LS
	PADLOCK	LM, LMS, M AND MS
	SHORT TAB	ALL EXCEPT MHS AND H
WITHOUT LOCK	CHAIN	L, LS, LM, LMS, M AND MS
	LONG TAB	ALL
	SHORT TAB	ALL
	STIRRUP *	MH, MHS AND H
* SINGLE OR MULTIPLE PULLS AS SPECIFIED		

NOTE:

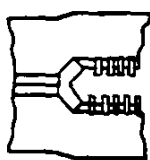
ILLUSTRATIONS ARE DESCRIPTIVE
AND NOT RESTRICTIVE.

FIGURE 1. PULL TYPES AND COMBINATIONS

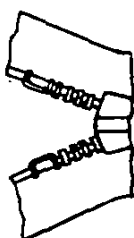
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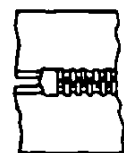
END STOPS



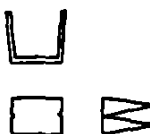
BRIDGE STOP



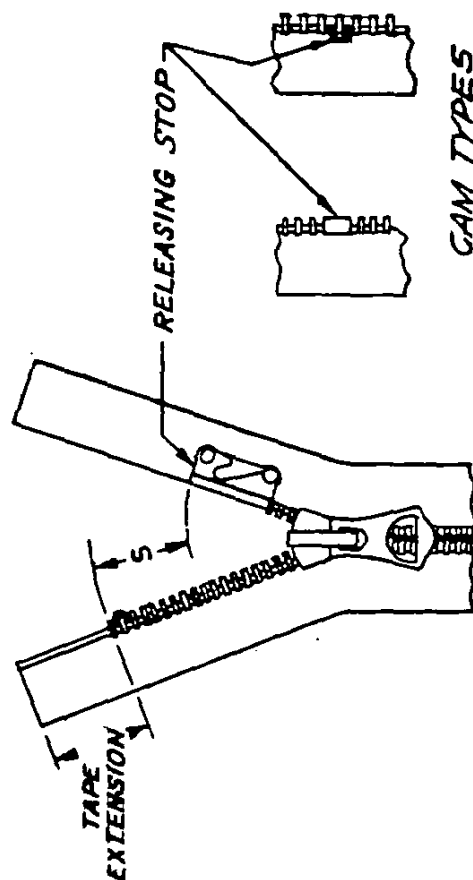
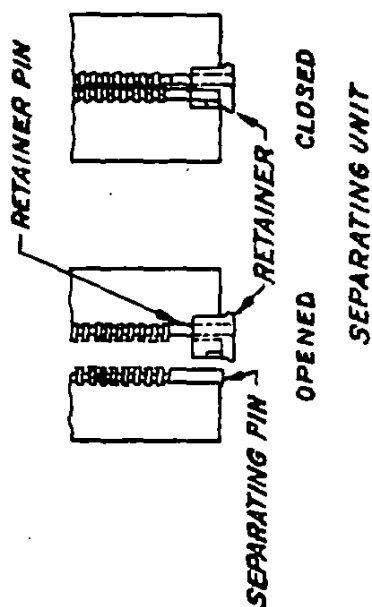
OPEN TOP STOPS



CLOSED END STOP
FOLDED TYPE



CLOSED END STOP
STAPLE TYPE



SPRING TYPE

S-LENGTH OF SLIDER (NOT INCLUDING PULL) $+ \frac{1}{16}$ MIN
 $\frac{1}{4}$ MAX

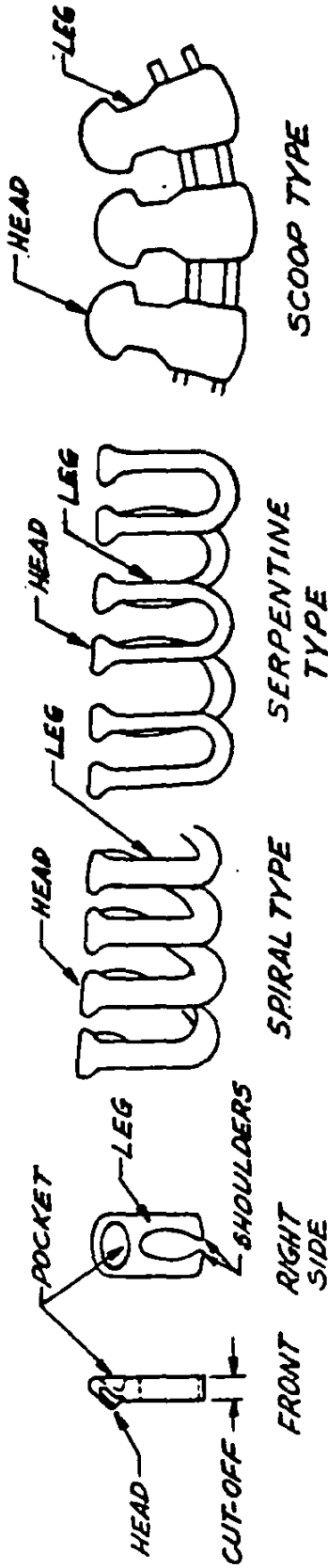
QUICK RELEASE STOPS

FIG-2 STOP TYPES

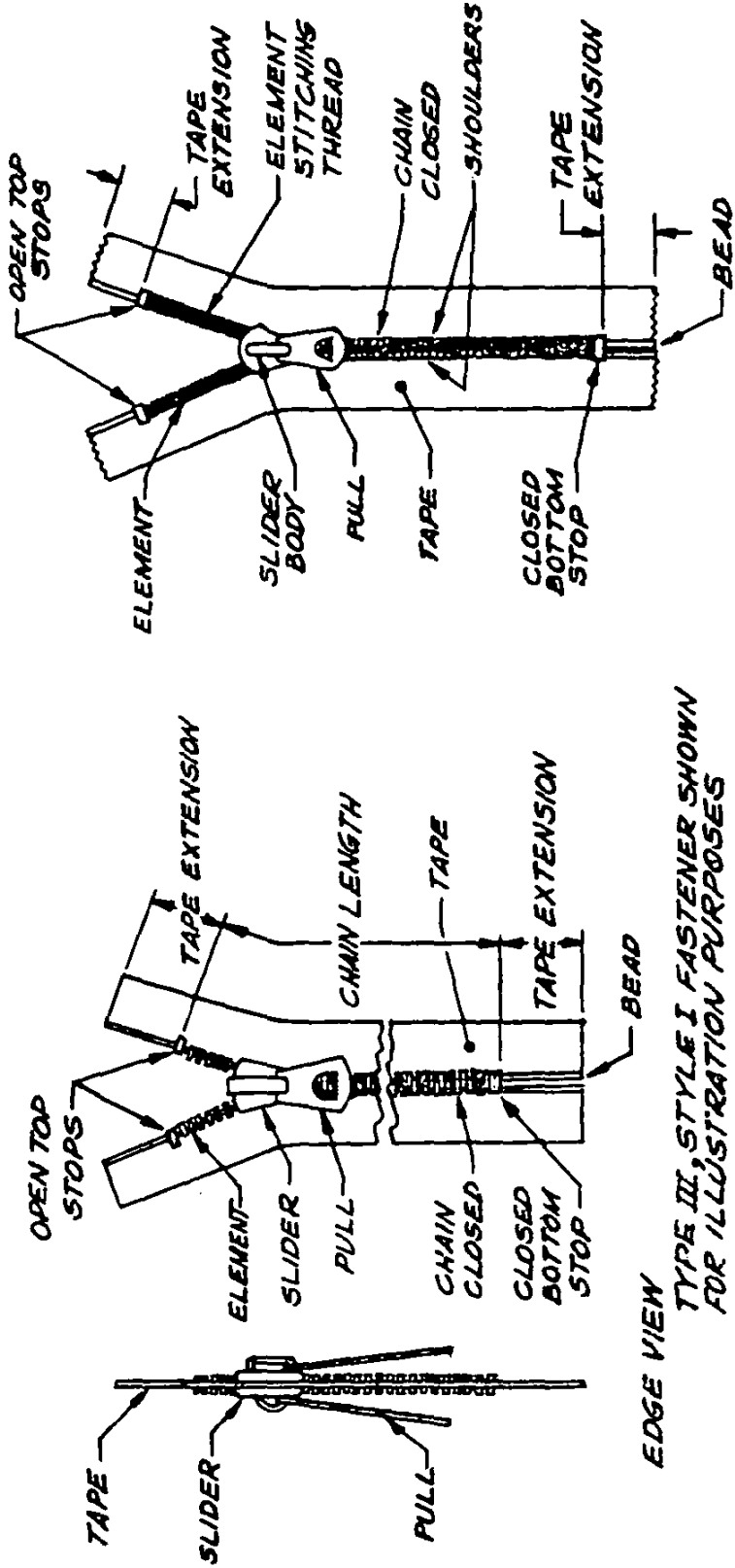
ILLUSTRATIONS DESCRIPTIVE AND NOT RESTRICTIVE

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CONTINUOUS ELEMENT



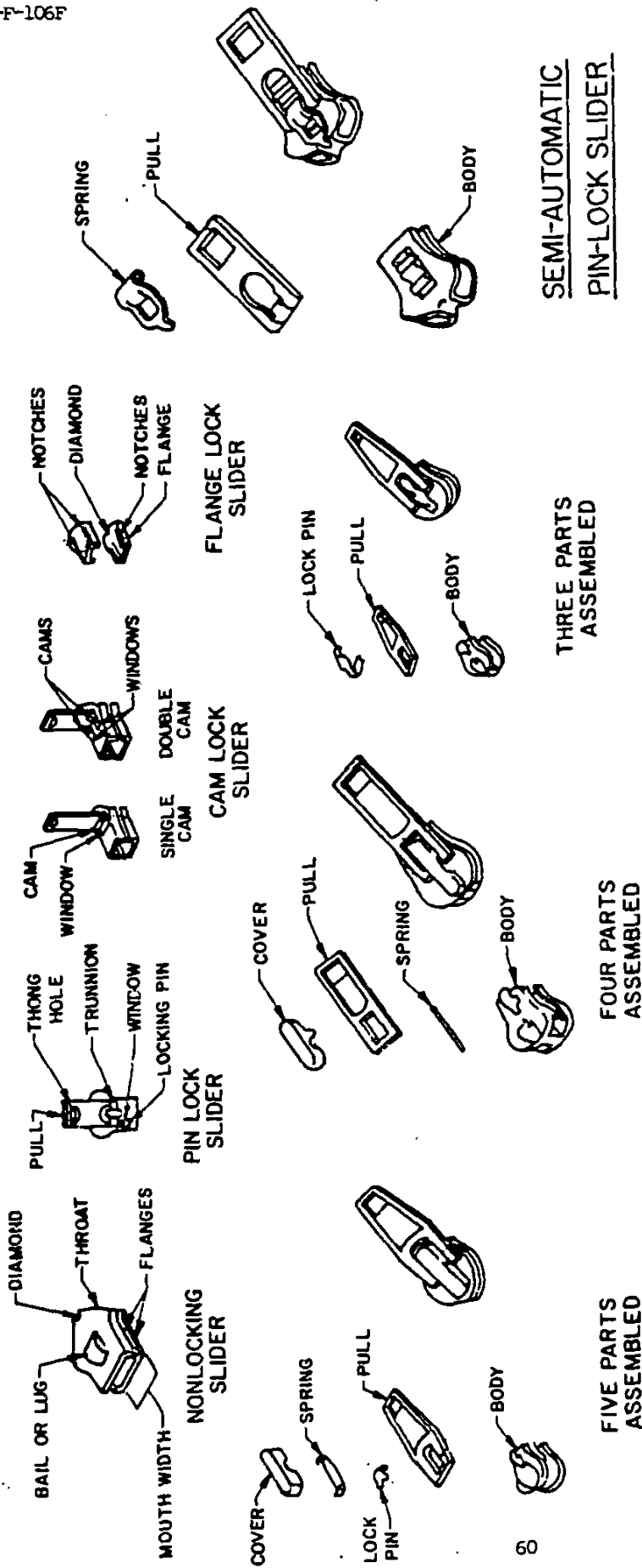
CONTINUOUS ELEMENT SLIDE FASTENER

INDIVIDUAL ELEMENT SLIDE FASTENER

FIG. 3 GENERAL CONSTRUCTION OF SLIDE FASTENER

4-1-629

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AUTOMATIC LOCK SLIDER

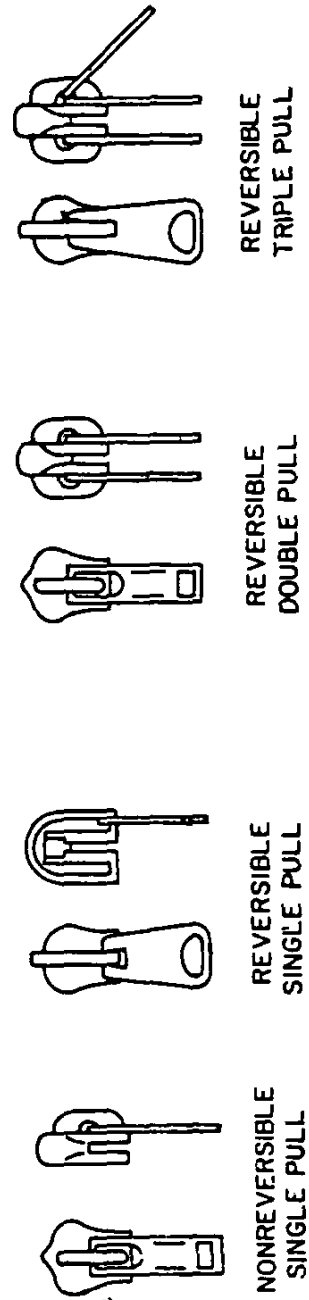
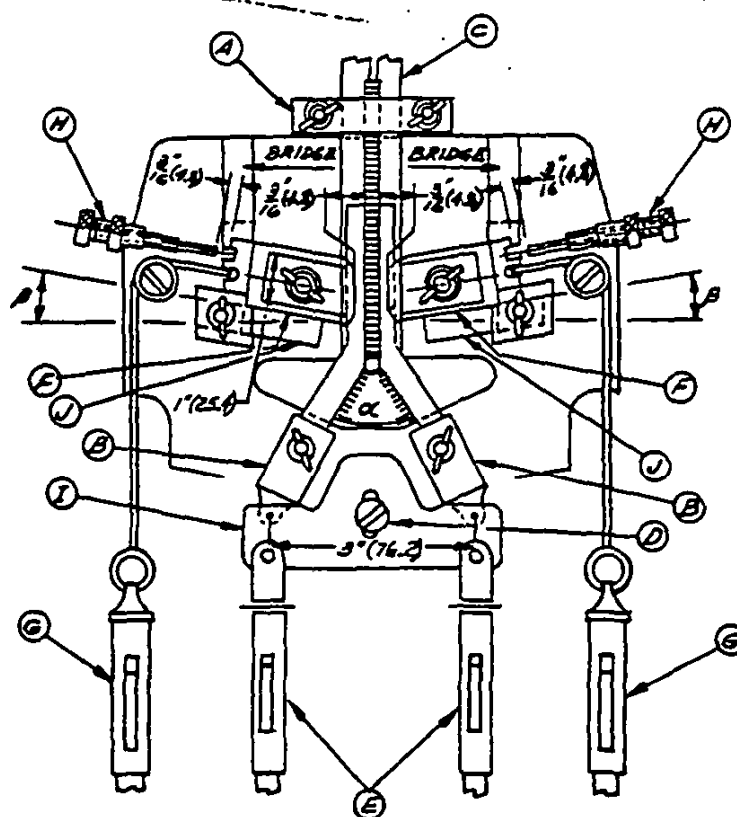


FIG. 4 SLIDER TYPES AND NOMENCLATURE

4-1-630

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- THIS APPARATUS IS AN ENDURANCE TESTING MACHINE WHICH ATTEMPTS TO SIMULATE VARIOUS APPLICATIONS FOR DIFFERENT SIZE SLIDE FASTENERS BY APPLYING A RANGE OF LATERAL AND LONGITUDINAL FORCES TO THE CHAIN.
- A-CLAMP FOR CLOSED END OF SLIDE FASTENER
- B-CLAMP FOR OPEN END OF SLIDE FASTENER
- C-SAMPLE SLIDE FASTENER
- D-HOLDING PIN
- E-SPRING BALANCE FOR LONGITUDINAL DIRECTION
- F-CLAMP FOR HOLDING LATERAL SIDE OF SLIDE FASTENER
- G-SPRING BALANCE FOR LATERAL DIRECTION
- H-ADJUSTING SCREW FOR MOVING DISTANCE OF LATERAL CLAMP
- I-ROTARY PLATE WHICH ACTS AS MEDIUM OF FORCES BETWEEN SLIDE FASTENER AND BALANCE
- J-SUPPORTING PLATE FOR LATERAL HOLDING CLAMP
- TWO LATERAL CLAMPS ARE LOCATED IN THE MIDST OF RECIPROCATING STROKE ON BOTH SIDES OF SLIDE FASTENER.
- GROSS WEIGHT OF LONGITUDINAL CLAMPS INCLUDING B AND I IS 300 GRAMS.
- SAMPLE POSITION
 - 3 INCHES DISTANCE BETWEEN THE PIVOT OF B
 - ANGLE α OPEN (30°)
 - ANGLE α CLOSED (60°)
- LATERAL CLAMPS ARE INCLINED TO β (10°) AT THE RIGHT ANGLE TO THE CHAIN.

FIG. 5 ENDURANCE TESTING MACHINE FOR CHAIN

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER V-F-106F		2. DOCUMENT TITLE Fastener, Slide, Interlocking	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one)	
b. ADDRESS (Street, City, State, ZIP Code)		<input type="checkbox"/> VENDOR	
		<input type="checkbox"/> USER	
		<input type="checkbox"/> MANUFACTURER	
		<input type="checkbox"/> OTHER (Specify): _____	
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation:			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	