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भारतीय मानक

संश्लेषिक (प्लास्टिक) सरकवां फास्टनर — विशेष प्रयोजन
भाग 1 उत्पाद के लिए विशिष्टि, चयन एवं ऑर्डर दिशानिर्देश

(IS 14181-1 *का दूसरा पुनरीक्षण)*

Draft Indian Standard

Synthetic (Plastic) Slide Fasteners — Special Purpose
Part 1 Specification, Selection and Ordering Guideline of the Product

[*Second Revision of* (IS 14181-1)]

ICS 61.040;83.140.01

Consumer Products and Allied Equipment Sectional Committee, PGD 14	Last date for receipt of comment is **28 November 2024**

FOREWORD

(*Formal Clause will be added later on*)

Slide fastener is a fastening device consisting of two textile tapes with interlocking elements on the edge of each tape (called textile stringer), so arranged that by moving the slider along these textile stringers in one direction an opening is formed and it is closed by moving it in the opposite direction. The construction of chain differs depending upon technology adopted.

The L-type slide fasteners have been chosen due to their superior design and safety features, which make them suitable for rough/tough use, typical Indian conditions such as crude method of washing and ironing, long and repetitive usage of clothing, and extreme climatic conditions and habits of people in different regions, etc.

This standard was first published in the year 1994, laying the requirements of plastic slide fasteners, intended for use in garments/equipment likely to be subjected to long and severe repeated usage conditions. The objective of preparing this standard was to lay down quality and performance requirements of slide fasteners required for industrial garments, defence and occupational clothing/equipment. Since IS 3148 : 1991 'Slide fasteners (general purpose) (*fourth revision*)' covered the performance requirements of slide fasteners for general purpose, there was a need for a new standard of synthetic (plastic) slide fasteners which would meet the requirements of clothing and equipment having long life subjected to rough and tough use, and also having certain functional parameters/jobs to perform.

The first revision of this standard was published since the standard did not lay down the basic/constructional parameters of monofilament used for formed coil and textile tape and lace. The first revision of the standard was carried out to incorporate the same, including ordering pattern, format for QA along with other changes and improvements. The revision also bifurcated the standard into three parts, for making this standard user friendly.

This standard (Part 1) specifies the terminology, fasteners systems/operating arrangements, fastener designation/designation code, materials, dimensions, surface treatment and finish, test requirements, design, selection, ordering, sampling and packing of slide fasteners. The other parts in this series are:

Part 2 Test and measurement methods; and
Part 3 Test report formats

This revision has been brought out to include the material and testing requirements of fire-retardant slide fasteners. Following changes have been made in the standard:

a) Amendment 1 and Amendment 2 have been incorporated;
b) Table on dimensions has been modified;
c) Table on constructional parameters of textile tape and lace has been deleted. This table on construction of tape and lace is removed as the yarns both in polyester and intrinsic fire retardant are available in different deniers and counts and further once the specification of dimensions of tape and chain and performance parameters given in the standard are achieved it becomes redundant; and
d) Figures for different types of sliders have been changed.

While preparing this standard assistance has been derived from the following:

a) Schedule No.CQA, T & C/TC-15/7 for Plastic Slide Fasteners issued by Controllerate of Quality Assurance (Textile and Clothing), Government of India (DGQA, Ministry of Defence).

b) Schedule No.DMSRDE/TEX-2/89/1 for Plastic Slide Fasteners issued by Defence Materials and Stores Research and Development Establishment, Kanpur (DRDO, Ministry of Defence).

c) IS 3148 : 1991 'Slide fasteners (general purpose) (*fourth revision*)' was also referred.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Draft Indian Standard

Synthetic (Plastic) Slide Fasteners — Special Purpose Part 1 Specification, Selection and Ordering Guideline of the Product

[*Second Revision of* (IS 14181-1)]

1 SCOPE

1.1 This standard (Part 1) specifies terminology, materials, fastener systems/operating arrangements, designations, texts, dimensions, special treatments/ finishes including design, selection and ordering of products.

1.2 This standard applies to the slide fasteners made from polyester in ladder formed coil type (L-type) and the performance requirements/tests laid down in the standard can be met in the ladder formed coil type (L-type).

2 REFERENCES

The following Indian Standards contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below:

IS No.	*Title*
IS 196 : 2024	Atmospheric conditions for testing (*second revision*)
IS 4905 : 2015/ ISO 24153: 2009	Random sampling and randomization procedures (*first revision)*
IS 14181 (Part 2) : 2022	Synthetic (Plastic) slide fasteners — Special purpose: Part 2 Test and measurement methods (*first revision*)
IS 11871 : 1986	Methods for determination of flammability and flame resistance of textile fabric

3 NOMENCLATURE

For the purpose of this standard, the nomenclature for various parts of the fasteners shall be as given in Fig. 1 to Fig**.** 3**.**

4 TERMINOLOGY

For the purpose of this standard, the following definitions for the synthetic slide fasteners and parts/components thereof shall apply:

4.1 *Tape* — A narrow woven fabric with special selvedge on one side to which the interlocking formed coil is sewn.

4.2 *Protective Tape/Lace* — A very narrow width crochet knitted textile fabric, sewn over the interlocking formed coil of the slide fastener. Crochet knitted tape has uniform width and selvedges allowing stitching threads to pass through the tape. It protects interlocking elements from abrasion/hot objects, etc.

4.3 *Formed Coil* — A continuous polyester monofilament coil is formed and shaped through a forming wheel/die in such a way. That it looks symmetrical on both obverse and reverse faces, after it is sewn around the edge of a continuous tape. After sewing, the interlocking elements of such formed coil will engage or disengage from each other under the action of slider(s).

4.4 *Textile Stringer* — A textile tape with a formed coil sewn on one edge of the tape and the coil designed to interlock with a similar sewn tape. The sewing of the formed coil with the tape must be with double row of stitching (two needle and two looper) and the interlocking elements of the formed coil must be covered by protective tapes on both the faces for safety and strength (*see* Fig. 1). The textile stringer of L-type fasteners looks symmetrical on both obverse and reverse faces.

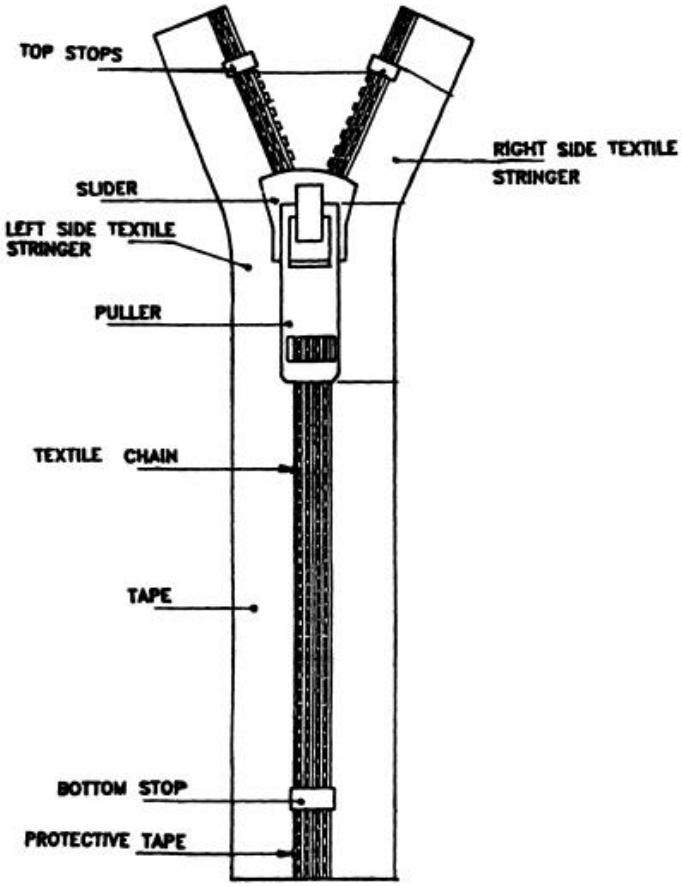


FIG. 1(A) CLOSED END FASTENERS

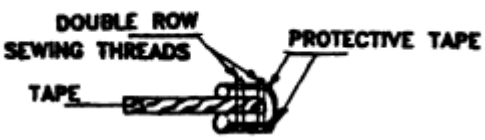


FIG. (1B) FORMED COIL (SPIRAL FILAMENT) (L-TYPE)

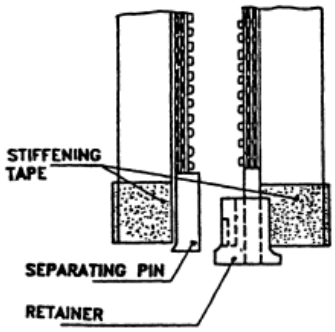


FIG. (1C) OPEN END FASTERNERS

FIG. 1 SLIDE FASTENER AND ITS PARTS

4.5 *Textile Chain/Fastening Tape* — It is of continuous length formed by joining/interlocking the two compatible textile stringers. It is further processed and dyed to the required shade. The textile chain of L-type fasteners looks symmetrical on both obverse and reverse faces (*see* Fig. 1).

4.6 *Chain/Zipper Faces* — The face of textile chain or zipper having puller and needle marks on the protective tape is called obverse face (front) and the other face as reverse face (back).

4.7 *Slider* — A movable part consisting essentially of a slider body, puller and spring for locking (wherever applicable), which is used for opening or closing the fastener by separating or engaging the two textile stringers, is called slider. The slider is generally incorporated with a locking device. Slider without any type of locking device is called non-lock slider. The slider shall be made of industrial grade plastic.

4.7.1 *Locking types* — A device incorporated in the slider which restricts undesirable free movement of the slider along the fastener length in an opening direction.

4.7.1.1 *Flat lock/snap lock* — Most of the applications of special purpose slide fasteners (L-type) are with flat autolock sliders for use in uniforms and occupational clothing's/equipments etc. The flat autolock type slider is made of 3 pieces; body, puller and spring (*see* Fig. 2A). The locking device operates automatically by virtue of a spring mechanism placed flat at the top of the slider. The flat autolock sliders are sturdy with minimum number of components and due to its flatness at the top, unique design, mechanism and shape; the flat autolock sliders are stronger, durable and extremely safe. These are therefore most ideal for occupational clothing's and equipments, service uniforms, trousers etc.

4.7.1.2 *Auto lock* — Conventional auto lock type with 4 to 5 pieces (*see* Fig. 2B) is lesser in strength and durability and hence not reliable and safe. Therefore this type is not suitable for occupational clothing's and equipments, uniforms etc.

4.7.1.3 *Pin lock* — Pin lock type (*see* Fig. 2C), which work manually and can get unlocked accidentally. It also causes damage to chain and hurts the user, and hence not safe and reliable. Therefore this type is not suitable for occupational clothing's and equipments, uniforms etc.

4.7.1.4 *Non lock single puller* — For applications that require non-locking in fasteners, for single puller requirement, like bag kits, type 2D (*see* Fig. 2D) slider design is recommended.

4.7.1.5 *Non lock reversible/double puller* — For double puller application like sleeping bags, type 2E (*see* Fig. 2E) slider design is recommended.

4.7.1.6 A*uto lock reversible puller* — For applications that require autolocking function and at the same time puller has to be operated from the both the faces of the fastener; like reversible jackets, type 2F (*see* Fig. 2F); slider design is recommended.

4.7.2 *Puller/pull-tab* — The fitting attached to the slider to facilitate manipulation of slider (*see* Fig 1). The length of the puller has been specified to ensure proper holding of puller while operating the slide fasteners.

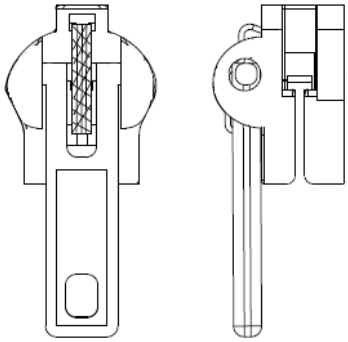


FIG. 2(A) FLAT LOCK/SNAP LOCK

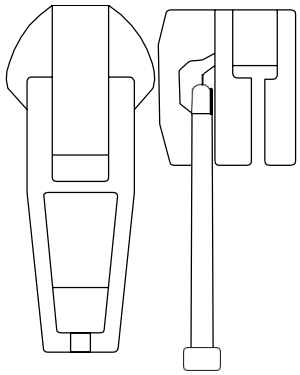


FIG. 2(B) AUTO LOCK

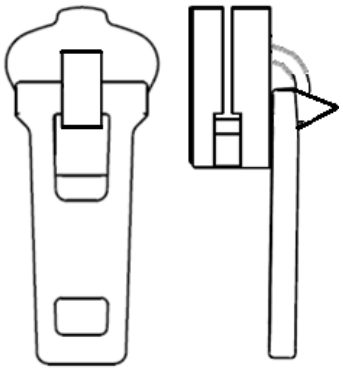


FIG. 2(C) PIN LOCK SLIDER

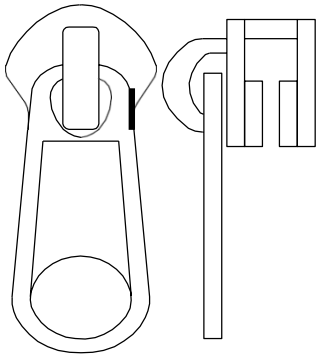


FIG. 2(D) NON LOCK SINGLE PULLER

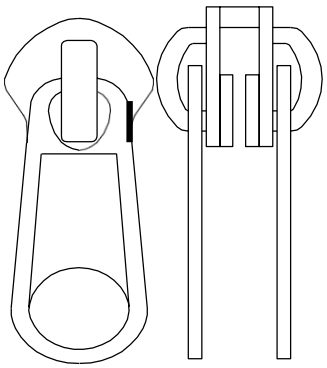


FIG. 2(E) NON LOCK REVERSIBLE / DOUBLE PULLER

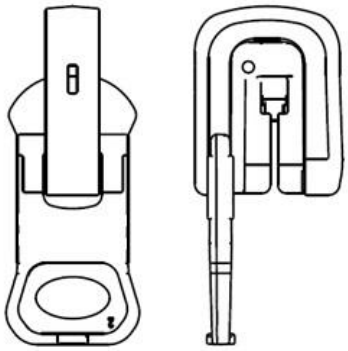


FIG. 2(F) AUTO LOCK REVERSIBLE PULLER

Note — The shape of body and puller could vary as per manufacturer's design.

FIG. 2 SLIDERS

4.8 *Stoppers (Top and Bottom)* — The stoppers are the end parts of the slide fasteners which restrict the movement of slider on the textile chain. The stoppers at the top end of the textile chain that check(s) the extreme closing movement of the slider is called top stop. The stopper at the bottom end of the textile chain that checks the extreme opening movement of the slider is called bottom stop (*see* Fig. 1).

4.9 *Separator Parts* — These are end parts of the open end slide fastener which permit the two textile stringers of the fastener to be completely separated and re-assembled when the fastener is in full open position (see Fig. 3).

4.10 *Slide Fastener* — The processed and dyed textile chain/fastening tape is cut/pinked in between the two lengths of continuous chain fitted with the required type of slider(s) and stoppers/separator parts, etc. While making the textile chain, it shall be auto gapped (while sewing) to obtain the desired length of slide fastener. This way the tape beyond the stoppers/slide fastener length at both the ends (*see* Fig.1), called tape extensions, shall be free from any formed coil (or) cut elements and the lace at the extension shall be tightly stitched to the tape. After fitting of all these parts, the slider shall be able to move smoothly by pulling the puller with least force both ways (opening and closing directions) along the full length of the chain. The finished product is called slide fastener and also zip fastener/zip/zipper, etc.

5 FASTENER SYSTEMS/OPERATING ARRANGEMENTS

5.1 There are two types of fastener operating systems. "One-Way" having one slider and "Two-Way" having two sliders operating in a slide fastener. In each type, sliders, stoppers, and separating unit shall be arranged differently. Each arrangement for both one-way and two-way fastener is illustrated in Fig. 4. In each system there are closed end, open end and reversible fasteners as described in **5.2**, **5.3** and **5.4**. The purchaser shall specify the type of operating systems/arrangements which is required.

NOTE — All types of one-way and two-way fasteners described above when fitted with reversible type sliders are called one-way reversible or two-way reversible fastener respectively.

5.2 Closed End Fastener

A slide fastener which does not permit the complete separation of its two textile stringers (*see* Fig. 1) is called closed end fastener. Various types of one-way and two-way closed end fasteners are shown in Fig. 4. If the slider/locking type is different for each slider in a two-way fastener, it shall be specified by the purchaser

5.3 Open End Fastener

A slide fastener which permits the complete separation of its two textile stringers by means of separator parts fitted on it (*see* Fig. 3) is called open end fastener. The two-way open end fastener is fitted with two sliders as shown in Fig. 4 (Type D). If the slider/ locking type is different for each slider in a two-way fastener it shall be specified by the purchaser.

The open end fasteners are also called either left open end or right open end depending upon the left or right textile stringer to which the separating part (pin) is fixed. Right open end fastener is most commonly used and shall be supplied when the purchaser has not specified either left or right. Left open end type shall be supplied only when specifically asked for by the purchaser.

5.4 Reversible Fastener

A slide fastener capable of being operated from both obverse and reverse faces. It can either have pullers on both faces of the slider or a single puller which would move either face of the slider.

These are called as double puller reversible and single puller reversible sliders respectively (*see* Fig. 5). Double puller reversible fasteners are always with non-lock type slider.

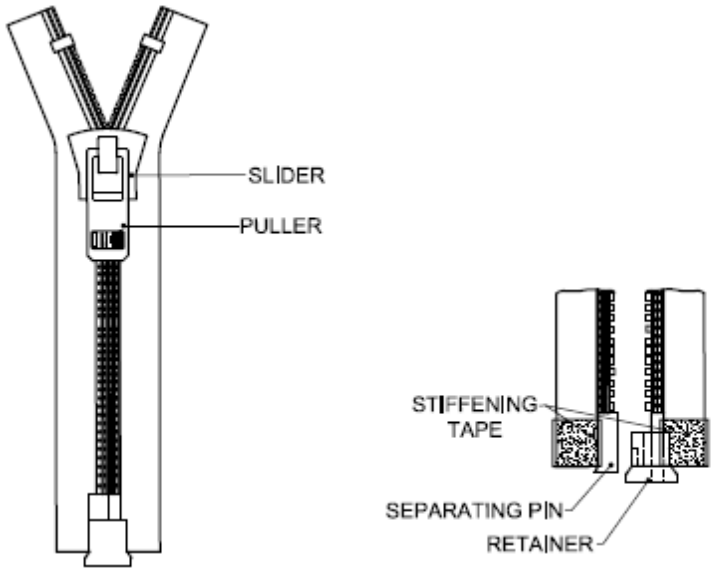
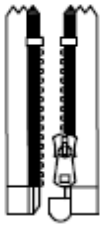


FIG. 3 OPEN END FASTENER

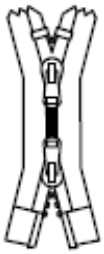
CLOSED END-NORMAL
TYPE A

CLOSED END ALTERNATIVE
TYPE B



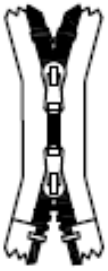
NORMAL OPEN END
TYPE C

ONE-WAY FASTENERS



TWO WAY
OPEN END

TYPE D



END CLOSING
CLOSED END

TYPE E

CENTRE CLOSING
CLOSED END

TYPE F

END CLOSING
ALTERNATIVE
CLOSED END

TYPE G

TWO-WAY FASTENERS

FIG. 4 SLIDE FASTENERS OPERATING ARRANGEMENTS

6 FASTENER DESIGNATION/DESIGNATION CODE

6.1 The synthetic slide fasteners (Special purpose) shall have the following five designations and designation codes according to its textile chain width as given in Table 1. The method of measurement is given in IS 14181 (Part 2).

Table 1 Fastener Designation
(*Clause* 6.1)

Sl No.	Designation	Designation Code	Textile Chain Width, mm	Textile Chain Thickness, *Min* mm
(1)	(2)	(3)	(4)	(5)
i)	Light Special	LS	5.00 ± 0.2	2.50
ii)	Medium	M	6.00 ± 0.3	2.60
iii)	Medium Special	MS	7.00 ± 0.3	2.90
iv)	Heavy	H	8.50 ± 0.3	3.70
v)	Heavy Special	HS	9.50 ± 0.3	3.70

7 MATERIALS

7.1 Tape, Protective Tape, Thread, Formed Coil, Textile Chain

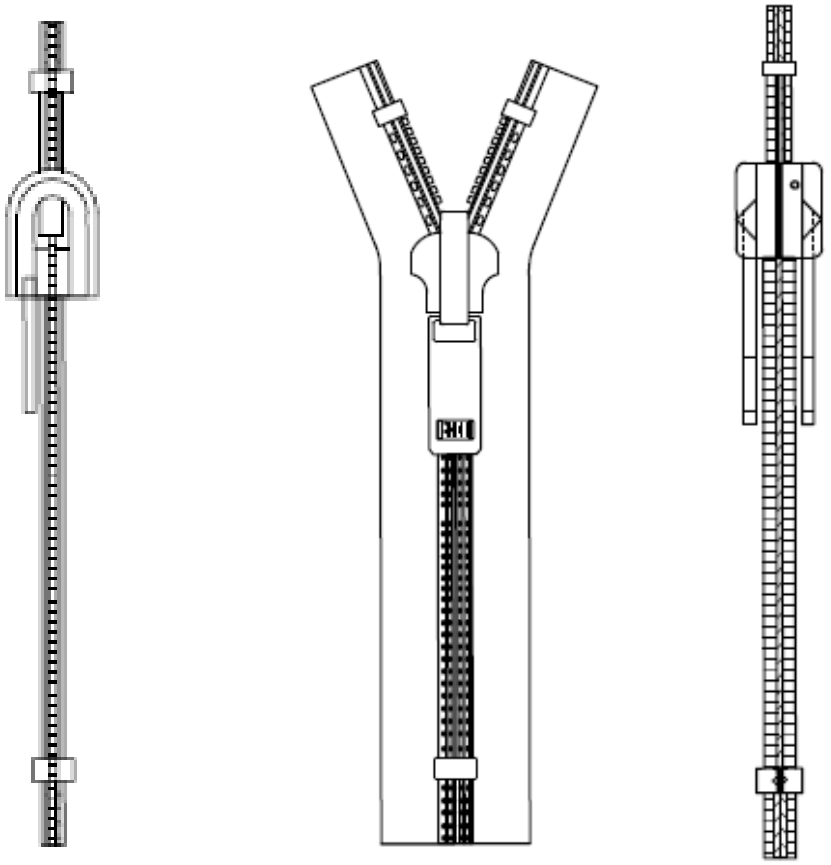
All these textile parts shall be made of 100 percent polyester yarn/filament/thread unless specified otherwise. The tape and lace shall be of continuous length without any splice along the full length of a fastener, including its tape extension(s). The tape shall be woven and the lace of crochet knitted type.

7.1.1 For fire retardant application, the yarn should be of inherent flame-retardant material for the woven fabric tape with one side selvedge and the knitted fabric for protective tape/lace. The sewing thread shall also be of inherent flame-retardant material.

7.2 Sliders

The sliders, except for spring, shall be made from suitable industrial grade plastics to withstand rigorous and long life of fasteners. The spring shall be made of spring steel or non-corrosive material. If required by the purchaser, the slider can be either painted or provided with special coatings/finish.

7.2.1 For fire retardant application, the slider material shall be flame retardant plastic resin. If desired by the end purchaser, a certificate of conformity of fire retardancy shall be obtained from raw material supplier.



SINGLE PULLER TYPE DOUBLE PULLER TYPE

FIG. 5 REVERSIBLE FASTENER

7.3 Stoppers (Top, Bottom), Separator Parts (Separating Pin/Retainer)

The stopper and separator parts of the slide fasteners shall be made of suitable industrial grade plastics to withstand rigorous and long life of the fastener.

7.3.1 For fire retardant application, the slider material shall be flame retardant plastic resin. If desired by the end purchaser, a certificate of conformity of fire retardancy shall be obtained from raw material supplier.

7.4 Colour

The colour of the slide fastener/textile chain shall be as specified by the purchaser.

8 DIMENSIONS

8.1 The dimensions of textile chain width, textile chain thickness, lace width, tape width, tape extension, puller length and diameter of monofilament against each designation of the slide fastener shall be as specified in Table 2. The methods of measurements shall be as given in Annex A of IS

14181 (Part 2). If special length and/or shape of pullers are required, it shall be specified by the purchaser.

8.2 Length of Slide Fastener

8.2.1 The length of the slide fastener, shall be as specified by the purchaser. Preferably in multiples of 10 mm. Method of measurement of the length of slide fastener and its tolerance is given in Annex A of IS 14181 (Part 2).

9 SPECIAL TREATMENT AND FINISH

9.1 Synthetic slide fasteners exposed to corrosive influence such as sea water, strong/concentrated acids/alkalis and/or extreme temperature etc. can be made of special textile materials and/(or), may also be provided with protective coatings/finish over yarn, tapes, textile chain, slider/components etc. as per agreement between the purchaser and the manufacturer.

9.2 Owing to different applications, slide fasteners requiring special characteristics for its textile chain and/ (or) slider/components etc. such as special colour fastness, infra-red/ultraviolet protection, fire resistance etc. shall be specified as per agreement between the purchaser and the manufacturer.

Table 2 Dimensions
(*Clauses* 7.1 *and* 8.1)

All dimensions are in mm.

Sl No.	**Parameter**	**LS**	**M**	**MS**	**H**	**HS**
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Textile chain width	5.00 ± 0.2	6.00 ± 0.3	7.00 ± 0.3	8.50 ± 0.3	9.50 ± 0.3
ii)	Textile chain thickness, *Min*	2.50	2.60	2.90	3.70	3.70
iii)	Lace width, *Min*	1.9	2.1	2.3	3.0	3.0
iv)	Tape width	16 ± 1.00	21 ± 1.00	21 ± 1.00	25 ± 1.00	25 ± 1.00
v)	Tape extension	15.00 ± 2.0	20.00 ± 2.0	20.00 ± 2.0	25.00 ± 2.0	25.00 ± 2.0
vi)	Puller length	15 to 18	18 to 30	18 to 30	25 to 40	25 to 40
vii)	Diameter of monofilament, *Min*	0.65	0.65	0.85	1.00	1.00

10 TEST REQUIREMENTS

10.1 The test specimens are conditioned under standard atmospheric condition in accordance with the requirement of IS 196. The fastener shall comply with all the requirements as stated in **10.2, 10.3** and **10.4**. If the fasteners are fire-retardant, they shall also comply with the requirements as given in **10.5**.

10.2 Security Requirements

The functioning of the slide fasteners shall be unimpaired after being subjected to the security tests requirements as described in Table 3. The security tests shall be performed as per **7.1** of IS 14181 (Part 2). These tests are performed to ensure the ability of fastener to withstand the operational loads, it may be subjected to, while in usage. Further these tests would ensure that the fastener does not tear or become unserviceable when subjected to excessive lateral load accidentally or while in usage.

10.3 Performance Requirements

The functioning of the slide fasteners shall be unimpaired after being subjected to the performance test requirements described in Table 4. The performance tests shall be performed as per **7.2** of IS 14181 (Part 2). These tests are extremely important to ensure total safety, reliability, durability (life cycle) and the self repairability of the fastener. Performance tests are carried out to check if the slide fastener can withstand fatigue, stress and strain during its long usage. These tests will also confirm if the operability of fasteners will be impaired during its life cycle when subjected to frequent contact with hot surfaces/ironing, and exposure of its interlocking elements to the rough surfaces and abrasion (while crawling, stone washing, etc). Further, if the slide fastener is able to remesh and become serviceable even after its chain pop-opens/disengages accidentally (or) for any reason, the fastener is tested for its self-repairability.

10.4 Colour Fastness Requirements

The colour fastness as specified in Table 5, shall be complied with in respect of textile chain of the fastener unless otherwise a separate agreement is reached between the purchaser and the manufacturer. The tests for various colour requirements shall be performed as per **7.3.1** of IS 14181 (Part 2).

Table 3 Security Requirements
(*Clause* 10.2)

SI No.	Security Tests	Test Load, N				
		LS	M	MS	H	HS
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Security of interlocking of textile chain to lateral load or cross-wise strength of textile chain with 25 mm length in grip	650	650	750	950	1100
ii)	Fold over security of textile chain (for both obverse and reverse fold)	150	250	250	300	300
iii)	Security of attachment of top stop (all types)	120	120	140	170	200
iv)	Security of attachment of bottom stop	120	120	140	170	200
v)	Security of attachment of retainer to longitudinal load (open-end fasteners)	60	80	100	140	180
vi)	Security of attachment of retainer to lateral load (open end fasteners)	50	70	90	120	150
vii)	Security of attachment of puller to slider	250	250	300	350	350
viii)	Security of slider lock holding	25	40	40	60	60

Table 4 Performance Requirements

(*Clause* 10.3)

Sl No.	Performance Tests	Requirements: Test Cycle				
		LS	M	MS	H	HS
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Reciprocating movement of slider under load	←	←	1000	→	→
ii)	Resistance to abrasion under load (cycles)	150	200	200	250	250
iii)	Resistance to heat under load	←	←	250	→	→
iv)	Remeshability of fastener	←	←	Remeshable with slider movement over disengaged chain	→	→

Table 5 Colour Fastness Requirements

(*Clause* 10.4)

Sl No.	Colour Fastness to	Rating
(1)	(2)	(3)
i)	Light	4 or Better
ii)	Perspiration	4 or Better
iii)	Sea water	4 or Better
iv)	Washing	4 or Better
v)	Organic solvents	4 or Better

10.5 Flame Resistance

All the fire-retardant zippers shall meet the flame resistance requirements as mentioned in Table 6 when tested by the vertical flame test method **(**Method A**)** as prescribed in IS 11871. Since the zipper chains of different designations have different width, the test specimen shall be the actual width of the zipper, and the length of the specimen shall be 315 mm.

Table 6 Flame Resistance Requirements
(*Clause* 10.5)

Sl No.	Parameter	Requirements				
		LS	M	MS	H	HS
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Flashing occurs over the surface of the specimen	No flashing shall be observed				
ii)	Duration of flame (after flame time), *s*, *Max*	6	4	4	4	4
iii)	Duration of afterglow, *s*, *Max*	7	6	6	5	5
vi)	Extent of after glow	No damage shall be observed				
v)	Char length, mm, *Max*	100	95	95	90	90

vi)	Any abnormal behaviour	
	Melting	No abnormal
	Dripping	
	Shrinking	
	Charring	
NOTE — There is no standard method for the determination of flame-retardant properties of the zipper on the presence or absence of melt and drip characteristic. So, on withdrawal of the flame, observe for the melt and drip, if any. The zipper shall not show melting or dripping.		

11 DESIGNS OF SLIDE FASTENER—TEXTILE CHAINS

11.1 Synthetic (plastic) slide fasteners are made of various design and construction, using different technologies; plant and machinery; materials and components. For users information, various designs of slide fasteners/textile chain are described below (*see* Fig. 6). This comparative study will make the user understand the superiority and suitability of L-type fastener for specific end uses. It would not be appropriate to consider just one or two security/performance test characteristic of a fastener [such as lateral chain strength, Sl No. (i) of Table 3; reciprocative movement, Sl No. (i) of Table 4; etc] while comparing and selecting the design of the synthetic slide fasteners. Hence, after taking into account all the features and safety aspects as described below, only L-type of synthetic fasteners/zippers have been found suitable and therefore selected in this standard.

11.2 Plastic moulded type fasteners are made by casting individual elements with the tape (or) by stitching/fixing rows of moulded (or) extruded elements with the tape. Such fasteners by their very construction would become unserviceable even if one of their elements loosens or gets damaged. These fasteners are neither resistant to heat nor they can withstand impact loads. Their durability and strength is poor. They are not safe and reliable for end use applications for which this standard is prepared.

11.3 Offset coil type fasteners have interlocking elements only on one face of the tape which are exposed (without protective tape covering the elements), such fasteners are called C-type or S-type by the trade. Its fixing techniques (stitching /woven) with the tape is asymmetrical. Due to their design and weaker construction, such fasteners cannot withstand prolonged usage and are unable to withstand lateral pulls and pressures when folded either sides. They also break apart when subjected to sudden impacts (burst) accidentally and their threads can break with sharp objects during usage. Due to their open design, these fasteners have poor abrasion resistance. Also if any foreign particles (or) loose threads/frayed yarns of fabric gets into the chain/slider, the zipper gets jammed and becomes un-operable.

11.4 L-type slide fasteners with protective tapes have been primarily designed to overcome the shortcomings of the other two designs mentioned above, namely, plastic moulded and offset coil type slide fasteners. L-type also retains the advantages associated with the metallic slide fasteners.

The fastener elements and threads are protected by a protective tape and has double looper sewing technique which gives additional security. This protective tape also safeguards against sand particles getting easily into the elements. Also loose/frayed yarns of the fabric to which the slide fastener is stitched, will not get entangled with the chain (or) slider. The ladder type forming of coil is designed in such a way that even if an element or two gets damaged the functioning of the fasteners as a whole is not impaired. The L-type fastener does not pop open when subjected to lateral pull when folded on either side of the fastener. It can withstand sudden impacts. Even under extreme impact/lateral load, the fastener elements do not break but just opens up and which could be remeshed and its usage restored. These features of L-type fastener make it ideally suited for working uniforms, combat clothing and equipment, tents, reversible applications, sleeping bags, overalls, flying suits and boots, life jackets, extreme cold clothings (ECC), mountaineering equipment's, ruck sack and soft bags, and all such types of clothing and equipments subjected to rough, tough, prolong and repeated uses.

11.5 The ladder or L-type slide fasteners may be chosen in this standard due to their superior design and construction, safety features, and also taking into account typical Indian conditions such as crude method of washing and ironing, long and repetitive usage of clothing, extreme climatic conditions, living habits of people in different regions, etc.

11.6 The special purpose (L-Type) plastic slide fasteners having all the parts and components made of industrial plastics, are light weight, resistant to acid/alkali, corrosion free, environmental friendly (as all materials are recyclable) and are safe and durable. Also it is extremely comfortable in hot/cold weather and high altitudes. Plastic sliders (compared with metal) exert much less abrasion over the polyester chain /tape and therefore ensure improvement in life and durability of product /garment /end stores. The 'Flat auto lock sliders' (made of plastics) are sturdy and have minimum number of components and therefore very reliable and hence ideally suitable for synthetic (plastic) slide fasteners (special purpose) described in this standard.

12 SELECTION OF SLIDE FASTENERS

12.1 Special purpose synthetic slide fasteners are made in different designations. Several factors shall be taken into consideration while choosing a correct designation of the fastener for a particular end use. However, keeping in mind the long life and safety of the end store, a higher designation is generally chosen as a measure of utmost precaution.

12.2 Some of the factors taken into account for selection of slide fasteners particularly its designation and slider locking type are as follows:

a) End use item to which slide fastener is attached;

b) Expected life cycle of end use item;

c) Stresses and strain, the fastener may be subjected to when the item is in use;

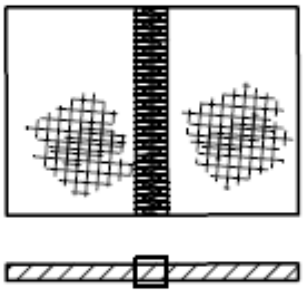
d) Based on the features and requirements of the end use item, suitable operating system is chosen (see 7 and Fig. 6);

e) How the fastener will be operated during its actual use, that is, in a straight line, at round corners (90°), and when folded (360°) or angular operation;

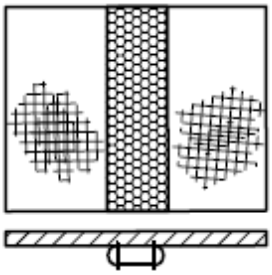
f) Type of material / fabric used in the making of the item to which fastener is attached, such as, thickness, flexibility, strength, surface finish, weight, layers of fabric, etc;

g) Characteristics of user as the same end use item when handled by civilian or industrial worker or by a military jawan will have different life cycle. Hence user's characteristics requirements such as robustness, ruggedness, rough and tough etc., may also be considered while selecting fastener; and

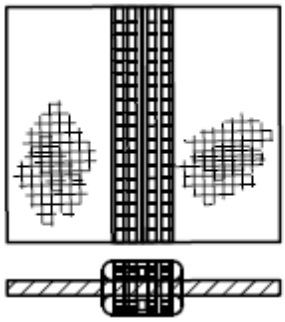
h) Special environmental and working conditions under which slide fastener is expected to operate may also be considered such as, under sea water, when fastener covered with slush, possible contact with abrading rough surfaces (say, while crawling, combat operations, etc.), and special climatic conditions like high altitude, extreme cold, etc.



PLASTIC MOULDED



OFFSET COIL
C-TYPE OR S-TYPE



LADDER OR L-TYPE

FIG. 6 DESIGNS OF TEXTILE CHAINS

12.3 Light special duty fastener with flat autolock is to be used in the fly of trousers/ shorts (of occupational/military and industrial uniforms, etc.) since it will stand the strain and stress (which is maximum at this point of the garment) even after repeated usage. This type of slider and locking is very strong and will not get damaged due to its flat design even with crude method of washing and use of heavy ironing throughout the life of the garment.

12.4 Table 6 gives recommendations with regard to selection of the designation and slider locking type of the slide fastener for some typical end uses, such as, garments and personal equipment. These have been arrived at after prolonged usage and feedback from users including all the three defence services, para-military, police, railways, aviation, etc.

Table 6 Selection of Fastener
(*Clause* 12.4)

Sl No.	**Typical End Uses/Stores**	**Some of the Factors Considered In Selection**	**Recommended Fastener**	
			Designation Code	**Slider Lock Type**
(1)	(2)	(3)	(4)	(5)
i)	Fly of trouser / shorts	High life cycle, high stress and strain	LS	Flat auto lock
ii)	a) Pockets b) Side opening-Leg hand cuff, overalls, etc	High life cycle Straight line operations, small length	LS LS/M	Non-lock or flat autolock
iii)	Front openings for: (a) Overalls (Two-way fastener) (b) Jackets (Open end fastener)	Medium fabric, higher life cycle, work clothing, high abrasion Heavy or multilayer fabric, special working environment, high abrasion.	MS MS or H	Flat autotock
iv)	Boots, working shoes	a) Made of thick leather, rugged use, fastener may be covered with slush, contact with sharp/rough surfaces	H	Autolock or flat autolock

		b) Made of canvas/soft leather, and other factors same as above.	M or MS	
v)	Coveralls, sleeping bag, holdalls, stuffed overalls, tents.	Heavy canvas/multi-layer fabric, extreme climatic conditions, higher life cycle, safety, high stress and strain	H or HS	Non-lock or reversible non-lock
vi)	Kit bag, functional bags	Medium fabric, rough and tough usage, high stress and strain, higher life cycle, high abrasion.		Non-lock
		a) Main openings	H	
		b) Outer-side compartments	M	
		c) Inside pockets	M/LS	
vii)	Mountaineering gears/equipments	High stress and strain, rugged use, rough and tough handling, fastener operating at corners/ when folded and under tight safety conditions, high altitude, contact with abrading rough surfaces	MS or H or HS	Non-lock
viii)	Pressure suits, life jackets	High stress and strain, utmost safety	H or HS	Flat autolock

13 ORDERING OF SLIDE FASTENER

13.1 The purchaser shall include the following information and also select preferred options permitted in this standard while specifying the nomenclature for each of the slide fastener ordered as per the following sequence.

Designation	*Operating arrangements*	*If reversible*	*Slider and locking type*	*Colour*	*Length, cm*	*Additional Specification, if any*	*Addtional requirements, if any*
Synthetic/ plastic slide fasteners (Special purpose) [(IS 14181 Part 1)]	Light special or medium or medium special or heavy or heavy special	Closed end : Type A/B/E/F/G Open end: Type C/D (To specify, if two-way)	Single puller or double Puller			*see* **13.2**	*see* **13.3**

For Example :

a) Synthetic (or) Plastic Slide Fasteners — Special Purpose — [(IS 14181 Part 1)]– Light Special, Closed End-Type A, Flat Autolock Slider, White, 20 cm

b) Synthetic (or) Plastic Slide Fasteners — Special Purpose — [(IS 14181 Part 1)]— Heavy Open End — Type C, Reversible, Non-Lock Double Puller Slider, OG, 90 cm

c) Synthetic (or) Plastic, Slide Fasteners — Special purpose — [(IS 14181 Part 2)]— Medium Special, Two-way Closed End-Type E, Flat Autolock, OG, 75 cm.

13.2 Additional specifications for specific end use if any, such as; special characteristics of the fastener, special materials (or) protective coatings/finish of textile chain and/(or) slider, special shape and length of puller, left type open end. Type of locking (if different) for each slider in two-way fastener, etc. may be specified as per the agreement between the purchaser and the manufacturer

13.3 The following additional requirements shall also be mentioned, as applicable, while placing the order.

a) Buyer's mark/brand to be put on the puller of the slider, if required;
b) To specify special type of packing, if required; and
c) Advance sample against each enquiry may be asked, for preliminary test and approval of the purchaser before placement of order.

14 MARKING

14.1 The following shall be marked on each package:

a) Manufacturer's code name or trade-mark;
b) Designation, fastener system, length and colour (or shade number) of the fastener; and
c) Quantity in the package.

14.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the standard mark.

15 PACKING

15.1 Normally slide fastener are packed in sealed poly bags containing (10**,** 25**,** 50, 75 or 100 pieces) depending upon its length. A label containing the information given in **14.1**, shall be inserted in to

the poly bags and these bags shall be suitably packed in a carton or wooden box, each weighing not more than 40 kg. The carton box shall be securely tied with band(s). Slide fasteners may also be supplied in special packing as agreed to between the purchaser and the manufacturer.

16 SAMPLING

Sampling and acceptance criteria for slide fastener shall be as follows:

16.1 Scale of Sampling

16.1.1 *Lot*

All the slide fasteners of the same designation and manufactured from the same raw materials, under essentially similar condition of manufacture, shall constitute a lot.

16.1.2 The conformity of a lot to the requirements of this standard shall be determined on the basis of tests carried out on the samples selected from the lot.

16.1.3 The number of slide fasteners to be selected from a lot for testing shall depend upon the size of the lot (see Tables 7 and 8) and shall be selected at random from the lot. To ensure the randomness of selection, procedures given in IS 4905 may be followed.

16.1.4 The number of fasteners in the first sample (*see* col 2 and 3 of Table 7) shall be first selected and subjected to all the dimensional tests and the performance tests except the test for reciprocating movement of slider.

Table 7 Sample Size and Criteria for Conformity
(*Clause* 16.1.3)

Sl No.	Lot Size	Sample	Sample Size	Cumulative Sample	Acceptance Number	Rejection Number
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Up to 1000	First	13	13	0	2
		Second	13	26	1	2
ii)	1001 to	First	20	20	0	2
	3000	Second	20	40	1	2
iii)	3001 and	First	32	32	0	3
	above	Second	32	64	3	4

16.1.4.1 If in the first sample the number of fastener failing in any of these tests is less than or equal to the corresponding acceptance number (*see* col 6 of Table 7) the lot shall be considered as conforming to the requirements mentioned above.

16.1.4.2 If the number of defective fasteners in the first sample is greater than or equal to the corresponding rejection number (col **7** of Table 7**)** the lot shall be rejected.

16.1.4.3 If the number of defective fasteners in the first sample lies between the corresponding a and r, a second sample (col **2** and **3** of Table 7) shall be selected at random from the lot and subjected to all the dimensional and performance tests except the test for reciprocating movement of slider. If in the combined sample (col **5** of Table 7) the number of defective fasteners is less than or equal to the corresponding acceptance number (col **6** of Table 7), the lot shall be considered as conforming to the above mentioned requirements.

16.1.5 In the case of these lots which have been found satisfactory according to **16.1.4** a number of fasteners selected according to col **1** and **2** of Table 8 shall be subjected to test for reciprocating movement of slider. The lot shall be declared as conforming to the above requirement if all the selected fasteners satisfy this requirement.

Table 8 Sample Size and Criteria for Conformity
(*Clauses* 16.1.3 *and* 16.1.5)

Sl No.	**Lot Size**	**Sample Size**
(1)	(2)	(3)
i)	Upto 1 000	3
ii)	1 001 to 3 000	4
iii)	3 001 and above	5

16.1.6 The lot shall be declared conforming to the requirements of this standard if it is found satisfactory according to **16.1.4** and **16.1.5.**