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பொதுசனக் கருத்துரைக்கான கட்டளை வரைவு
DRAFT STANDARD FOR PUBLIC COMMENT

(වෙනස්වීමට ඉඩ ඇත. திருத்தத்திற்குட்படக்கூடியது. Liable to alteration)

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வெளியீட்டுத் திகதி
Date of Issue } 2023-03-03

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அபிப்பிராயங்களை தெரிவிப்பதற்கான இறுதித்திகதி
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Draft Sri Lanka Standard
SPECIFICATION FOR STRETCHABLE BANDAGES
PART 1 : WOVEN AND WARP KNITTED BANDAGE-ADHESIVE FREE
(DSLS ..... : .....)

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මෙම කෙටුම්පත ශ්‍රී ලංකා ප්‍රමිතියක් ලෙස නොසැලකිය යුතු මෙන් ම භාවිතා නොකළ යුතු ද වේ.
இவ்வரைவு இலங்கைக் கட்டளையெனக் கருதப்படவோ அன்றிப் பிரயோகிக்கப்படவோ கூடாது
This draft should not be regarded or used as a Sri Lanka Standard.

අදහස් එවිය යුත්තේ : ශ්‍රී ලංකා ප්‍රමිති ආයතනය, 17, වික්ටෝරියා පෙදෙස, ඇල්විටිගල මාවත, කොළඹ 08.

Comments to be sent to: SRI LANKA STANDARDS INSTITUTION, 17, VICTORIA PLACE, ELVITIGALA MAWATHA, COLOMBO 08.

හැඳින්වීම

මෙම ශ්‍රී ලංකා ප්‍රමිති කෙටුම්පත , ශ්‍රී ලංකා ප්‍රමිති ආයතනය විසින් සකසන ලදුව, සියලුම උද්‍යෝගී අංශ වලට තාක්ෂණික විවේචනය සඳහා යවනු ලැබේ.

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කොළඹ 08.

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Introduction

This Draft Sri Lanka Standard has been prepared by the Sri Lanka Standards Institution and is now being circulated for technical comments to all interested parties.

All comments received will be considered by the SLSI and the draft if necessary, before submission to the Council of the Institution through the relevant Divisional Committee for final approval.

The Institution would appreciate any views on this draft which should be sent before the specified date. It would also be helpful if those who find the draft generally acceptable could kindly notify us accordingly.

All Communications should be addressed to:

The Director General
Sri Lanka Standards Institution,
17, Victoria Place,
Elvitigala Mawatha,
Colombo 08.

Draft Sri Lanka Standard

SPECIFICATION FOR STRETCHABLE BANDAGES
Part 1 : Woven and warp knitted bandage – adhesive free

DSLS …..:……

Gr. 4

SRI LANKA STANDARDS INSTITUTION
No, 17 , Victoria Place
ElvitigalaMawatha,
Colombo 08.
Sri Lanka.
Draft Sri Lanka Standard

SPECIFICATION FOR STRETCHABLE BANDAGES
Part 1 : Woven and warp knitted bandage – Adhesive free

FOREWORD

This standard was approved by the Sectoral Committee on Textiles, Clothing and Leather and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on .....

Part 1 of this Standard covers woven and warp knitted adhesive free stretchable bandages for general purposes.

Guidelines for the determination of a compliance of a lot with the requirements of this standard based on statistical sampling is given in Appendix **A.**

For the purpose of deciding whether a particular requirement of this specification is complied with the final value, observed or calculated, expressing the result of a test or an analysis, shall be rounded off in accordance with **SLS 102.** The number of significant places retained in the rounded off value shall be the same as that of the specified value in this specification.

1 SCOPE

This specification prescribes the requirements and methods of tests for stretchable bandages to be used to keep surgical dressings in place and/ or for compression therapy.

2 REFERENCES

SLS 16	Atmospheres for conditioning and testing of textiles
SLS 42	Determination of mass per unit length and per unit area of woven or knitted fabrics
SLS 86	Determination of pH value of aqueous extracts of textile materials
SLS 87	Determination of scouring loss in grey and finish cotton textile materials
SLS 102	Presentation of numerical values
SLS 395	Specification for cotton gauze
SLS 428	Random sampling method
SLS 1356	Method for determination of width and length of textile fabrics
SLS 1388	Quantitative Chemical analysis of textiles Part 11- Determination of proportion of cellulose fibre in textiles made of mixtures of cellulose and polyester fibres (using sulfuric acid)

3 TERMS AND DEFINITIONS

3.1 elasticity: Ability to recover original size and shape immediately after the removal of the force causing deformation

3.2 Lock-out point: The point at which physical structure of the bandage prevents further noticeable extension with increasing load

3.3 slack mounting: Insertion of a strip test specimen in the line clamps of the upper jaw, allowing it to hang freely under its own weight, guided by the hand to ensure perpendicular alignment to the line of pulling force, without any force being applied.

4 REQUIREMENTS

4.1 The bandage cloth shall be of woven or knitted textile material with elastic properties having a minimum of 80% cotton. The elastomeric or other fibre materials shall be limited to a maximum of 20%. The yarns may be selected as required in achieving the level of performance required by different bandage categories specified in this Standard.

4.2 For the purpose of providing elasticity, non-harmful suitable textile material shall be used. All the yarns having elasticated properties shall be covered by another non-harmful textile material.

4.3 The bandage shall be in one continuous length with secured selvedges having no joints and any weaving or knitting defects.

4.4 The bandage cloth shall conform to the requirements given in Table **1** when tested in accordance with the methods given in column **4** of the Table **1**.

Table 1 - Requirements of cloth of the elastic bandage

Sl No. (1)	**Characteristic (2)**	**Requirement (3)**	**Method of test (4)**
i	Composition – Cotton, min.	80%	**SLS 1388 Part 11**
ii	Mass per unit area, min. (relax), g/m^2	115	**SLS 42**
iii	Stretchability, min., per cent,(Load and Extension at the Lock-out point)	As per the Table 2	Appendix **C**
iv	Stretch and recovery (min. recovery %), number of cycles 05	90	
v	pH	5.5 - 8	**SLS 86**
vi	Scouring loss, max.	1.5%	**SLS 87**
vii	Water soluble substances and Ether soluble substances, max.	1%	Appendix **D** and **E**

4.5 Type

Bandages are categorized into nine different types based on the load and extension at the Lock-out point as per the method given in Appendix **B**.

Table 2 – Types of Bandages

Sl No. (1)	Extension at the Lock-out point (%) (2)	Load at the Lock-out point (N force)			Method of test (6)
		below 7 (3)	7 to 12 (4)	Over 12 (5)	
i	**below 100**	Type 1	Type 2	Type 3	Appendix **B**
ii	**100-180**	Type 4	Type 5	Type 6	
iii	**Over 180**	Type 7	Type 8	Type 9	

4.6 The breaking force shall conform to the requirements given in Table **3** when tested in accordance with the methods given in column **4** of the Table **3**.

Table 3 – Breaking force

Sl No. (1)	Bandage types (2)	Breaking force, N, min. (3)	Method of test (4)
i	Type 1, Type 4 and Type 7	14	**SLS 43 Part 1**
ii	Type 2, Type 5 and Type 8	24	
iii	Type 3, Type 6 and Type 9	Doubled the Lock-out point load	

4.7 Length

4.7.1 Relax length

The relaxed length of the bandage is determined in accordance with the method given in **SLS 1356**.

4.7.2 Stretched length

Unless otherwise specified by the purchaser, the length of the bandage stretched to Lock-out point, shall be not less than 4.5 m. The stretched length of the bandage shall be calculated from the equation below:

$$\text{Length of the bandage (m)} = \left(1 + \frac{\text{percentage extension at Lock out point}}{100}\right) \text{X relaxed length (m)}$$

4.8 Width

Unless otherwise specified by the purchaser, the width of the bandage shall be not less than 25 mm when determined in accordance with the method given in **SLS 1356.** A tolerance of ± 5% shall be permitted on the specified width of the bandage.

4.9 Accessories

The bandage shall be provided with adhesive free suitable means to secure the end of wrapping.

5 PACKAGING AND MARKING

5.1 Packaging

The bandage cloth rolls shall be neatly and securely wrapped around its circumference. Individual rolls shall be wrapped with a polythene material and securely sealed at each end, so as to protect against soiling and contamination.

Unless otherwise specified by the purchaser, the individual packages so wrapped and of same type, width and length, may be packed in suitable master/ retail containers.

5.2 Marking and Labelling

5.2.1 Master packages

Each package shall be legibly and indelibly marked or labelled with the following:

a) Name and type of bandage (as specified in Table 2);
b) Length and width of the bandage;
c) Total number of bandages (number of bandages in a retail pack X number of retail packs);
d) Name and address of the manufacturer;
e) Batch number or code number; and
f) dates of manufacturing and expiry date (three years from manufacturing date).

5.2.2 Retail packages

Each package shall be legibly and indelibly marked or labelled with the following:

a) Name and type of bandage (as specified in Table 2);
b) Length and width of the bandage;
c) Number of bandages;
d) Manufacturer's name and address;
e) Batch number or code number;
f) Brand name or trade mark, if any; and
g) dates of manufacturing and expiry date (three years from manufacturing date).

5.2.3 Individual product packaging

a) Name and type of bandage (as specified in Table 2);
b) Length and width of the bandage;
c) Stretched length;
d) Manufacturer's name and address;
e) whether sterilized, state the method
f) Batch number or code number; and
g) Brand name or trade mark, if any.
h) dates of manufacturing and expiry date (three years from manufacturing date)
i) instruction for use
j) declaration of none use of harmful/ banned dyes used (if any)

APPENDIX A

COMPLIANCE OF A LOT

The sampling scheme given in Appendix **A** shall be applied where compliance of a lot to the requirements of this standard is to be assessed based on statistical sampling and inspection.

Where compliance with this standard is to be assured based on manufacturer's control systems coupled with type testing and check tests or any other procedure, appropriate schemes of sampling and inspection should be adopted.

A.1 LOT

A.1.1 In any consignment, all individual product packages of bandages of same type and same construction belonging to same batch of manufacture or supply shall constitute a lot.

A.2 SCALE OF SAMPLING

A.2.1 The samples shall be inspected and tested from each lot for ascertaining conformity of the lot to the requirements of this standard.

A.2.2 The number of master packages to be selected as the primary sample from a lot shall be in accordance with Column **(1)** and Column **(2)** of Table **4**.

A.2.3 The number of retail packages to be selected as the secondary sample from the primary sample (master packages) selected as in **A.2.2** shall be in accordance with Column **(1)** and Column **(3)** of Table **4**.

A.2.4 The number of individual product packages to be selected as the tertiary sample from the secondary sample selected as in **A.2.3** shall be in accordance with Column **(1)** and Column **(4)** of Table **4**.

TABLE 4 – Scale of sampling

No. of individual product packages in the lot (1)	**No. of master packages to be selected for primary sample** (2) S-1	**No. of retail packages to be selected for secondary sample** (3) S-2	**No. of individual product packages to be selected for tertiary sample** (4) S-3	**No. of individual product packages to be selected for sub sample** (5) S-1
Up to 10 000	5	8	20	5
10 001 to 35 000	5	8	20	5
35 001 to 150 000	8	13	32	8
150 001 to 500 000	8	13	32	8
500 001 and above	8	13	50	8

A.2.5 Minimum of one retail package/ individual product package shall be taken from each master package/ retail package to form a secondary/ tertiary sample of respective size as given in Table **4**.

A.2.6 The number of bandages to be selected as the sub sample from the sample selected as in **A.2.4** shall be in accordance with Column **(1)** and Column **(5)** of Table **4**.

A.2.7 The master, retail and individual product packages shall be selected at random. In order to ensure randomness of selection, random number tables as given in **SLS 428** shall be used.

A.3 NUMBER OF TESTS

A.3.1 Each master and/or retail package selected as in **A.2.2** and/or **A.2.3** shall be inspected for packaging, marking and labelling requirements specified in Clauses **5.1**, **5.2.1** and/or **5.2.2**.

A.3.2 Each individual product package selected as in **A.2.4** shall be inspected for packaging, marking and labelling requirements specified in Clauses **5.1** and **5.2.3**.

A.3.3 Specimens extracted from the individual product packages selected as in **A.2.6** shall be tested for the requirements specified in Clause **4.2**. (Covering of elasticated yarn)

A.3.4 Individual product packages selected as in **A.2.6** shall be tested for the requirements specified in Clause **4.3**. (Continuous length, secured selvedges, no joints/ defects)

A.3.5 Composite specimens extracted from the individual product packages selected as in **A.2.4** shall be tested for the requirements specified in Sl. no. **i**, to Sl. no. **vii** specified in Table **1** of Clause **4.4**. (Composition, mass per unit area, stretchability, stretch & recovery, pH, scouring loss, ether soluble and water soluble substances)

A.3.6 Specimens extracted from the individual product packages selected as in **A.2.4** shall be tested for the requirements specified in Table **2** in Clause **4.5**. (Type – based on load & extension at the lock-out point)

A.3.7 Specimens extracted from the individual product packages selected as in **A.2.4** shall be tested for the requirements specified in Table **3** in Clause **4.6**. (Breaking force)

A.3.8 Each individual product package selected as in **A.2.6** shall be tested for the requirements specified in Clauses **4.7**, **4.8** and **4.9**. (Length, width, accessories)

A.4 CRITERIA FOR CONFORMITY

A lot shall be declared as conforming to the requirements of this specification if the following conditions are satisfied.

A.4.1 Each package examined as in **A.3.1** and **A.3.2** shall satisfy the relevant and applicable requirements.

A.4.2 Specimens examined as in **A.3.3** shall satisfy the relevant requirements.

A.4.3 Each bandage examined as in **A.3.4** shall satisfy the relevant requirements.

A.4.4 Composite specimens tested as in **A.3.5** shall satisfy the relevant requirements.

A.4.5 Each bandage examined as in in **A.3.6**, **A.3.7** and **A.3.8** shall satisfy the relevant requirements.

APPENDIX B

Determination of the Lock-out point and stretchability (normative)

B.1 Principle

A bandage specimen of a specified length is extended at a constant rate to a specified load to determine the Lock-out point of the bandage specimen.

B.2 Settings of the test equipment for load-extension curve

B.2.1 ***Apparatus***

CRE machine

Line clamps
Calibrated rule, graduated in mm

B.2.2 ***Setting the apparats***

Width of the clamps - 50 mm, 75mm or 100 mm as determined by the width of the bandage. Width of the clamps shall be equal or wider than the width of the bandage sample.
Gauge length – 100 mm
Rate of extension – 100 mm/ min

Maximum Load set on CRE machine – 80 N.

i. When the load at the Lock-out point is very low, the maximum load less than 80N may be set to achieve a magnified chart for more accurate determination of the Lock-out point.
ii. When the load at the Lock-out point is more than 20 N, the maximum load set on the CRE machine shall be more than four times the load at the Lock-out point.

B.3 Atmospheric conditions

The atmosphere for pre-conditioning, conditioning and testing shall be as specified in SLS 16.
The bandage sample shall be conditioned for a minimum of 20 hours in a tension free condition.

B.4 Test Samples

Bandage construction – Woven or warp knitted stretchable bandage
Bandage width – any width between 25 - 100 mm as agreed between supplier and the purchaser
Relaxed length of the test specimen, min. – 150 mm.
If sufficient length of the bandage samples is available, discard the first 500 mm.

Test five specimens from each sample.

B.5 Procedure

Locate the line clamps in the jaws of the CRE machine and set the gauge length to 100±1 mm. The distance between the clamps is measured with the calibrated metal rule.

Mount the test specimen centrally on the upper clamp of the CRE machine allowing it to hang freely under its own weight guided by the hand to ensure perpendicular alignment to the CRE machine. Close the bottom clamp without applying tension on the specimen. Put the cross-head in motion and record the load-extension using the chart recorder connected to the CRE machine.

Follow the same procedure for remaining specimens. Record all five graphs.

B.6 Determination of load and extension at the Lock-out point

B.6.1 *Construction of point A*

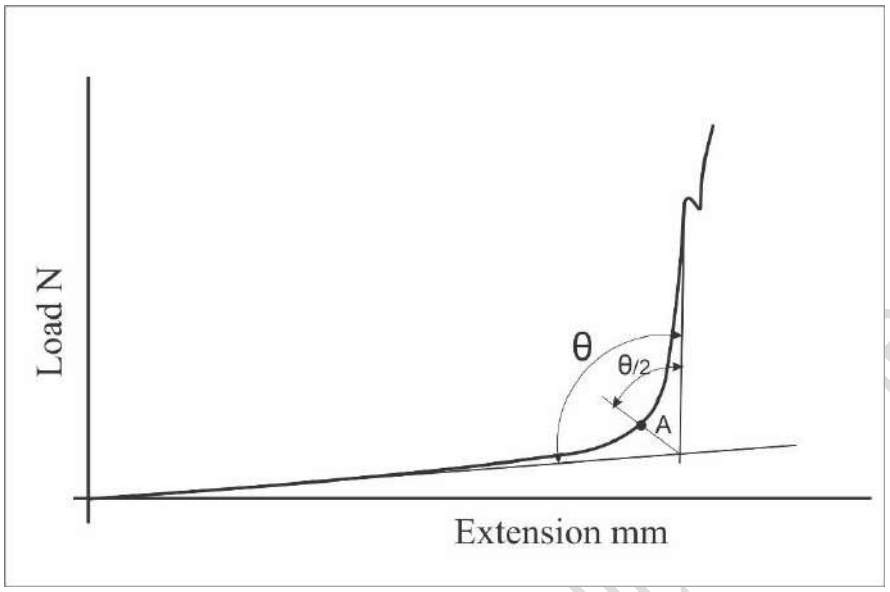

Figure 1 – Constructions to determine approximate Lock-out point

1. Construct approximately two tangents as per the Figure **1** (considering the change of the rate of increasing the load).
2. Construct the angular bisector of Θ.
3. Mark the point A on the curve.

B.6.2 *Determination of the exact Lock-out point*

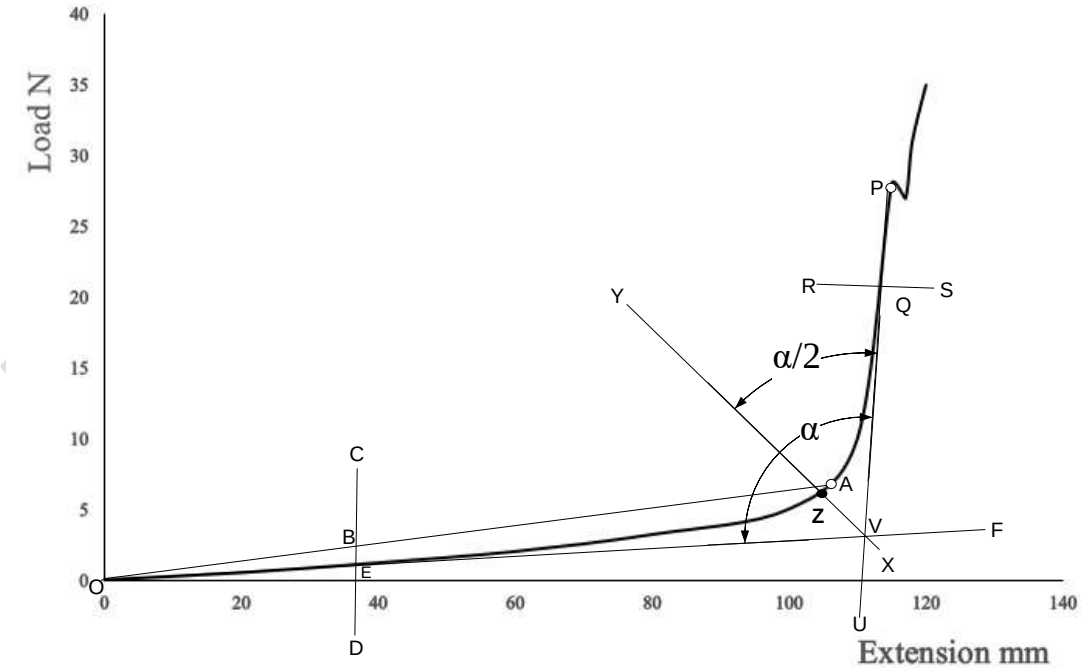

Figure 2 – Constructions to determine the exact Lock-out point

B.6.2.1 *Construct tangent 1 (OF) to the load-extension curve*

1. Measure the distance OA
2. Divide the distance OA by 3, and mark point B on OA (OB=OA/3)
3. Draw the line CD parallel to the y-axis across B, and mark the point E where CD and the curve intersect.
4. Draw the line OE extending to an arbitrary point F (tangent 1 to the curve)

B.6.2.2 *Construct tangent 2 (PU) to the load-extension curve*

1. Mark the point P on the graph. The load (y-axis value) of point P is determined as four times the load at point A.
   Note: Determining point P may be ambiguous in some graphs. Due to breakage of few yarns, variations in the fabric structure of the bandage and due to some other reasons, irregularities in the load- extension curve may be observed especially after the locking-out point. Only in such instances, determine the most suitable positions for tangent 2 to minimize errors.
2. Draw the short line RS parallel to the x-axis and mark point Q on the graph (load at Q is 3 times the load at point A).
3. Draw the line PQ extending to an arbitrary point U.

B.6.2.3 *Determination of the angle at the Lock-out point and the exact Lock-out point*

1. Measure the angle PVO (α); V is the point where two tangents OF and PU intersect.
2. Construct the angular bisector XY.
3. Mark the Lock-out point Z, where line XY and the curve intersect.
4. Determine the load and extension corresponding to the point Z.
5. Calculate the average load and extension of Lock-out point using graphs of all five specimens.
6. Determine the bandage Type as specified in Table **2**.

Few typical shapes of load-extension curves of stretch bandages show in Figure **3**.

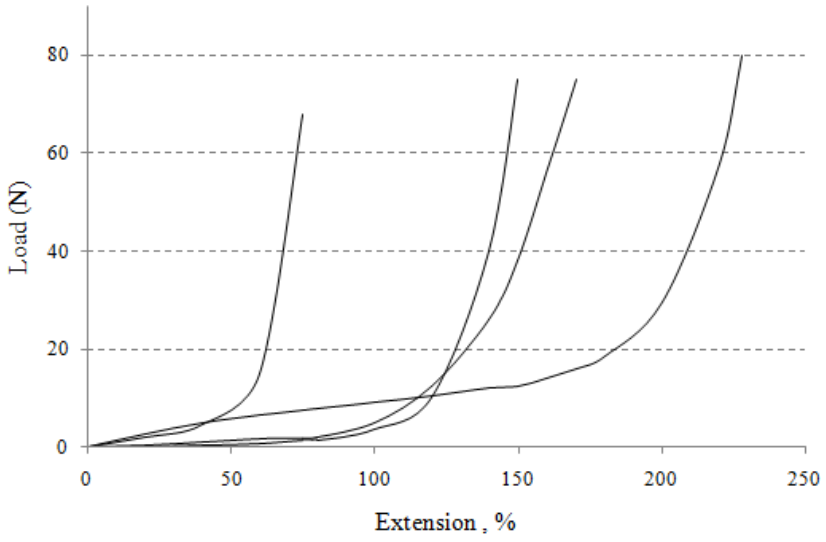

Figure 3- Typical shapes of load-extension curves of different stretch bandage constructions

B.6.3 *Determination of the Bandage Type*

Bandage Types are categorized in Table 2 of this standard as per the load and extension of the bandage at the Lock-out point.

Determine the Bandage Type from the average load and average extension at the Lock-out point calculated in B.6.2.3.

APPENDIX C

Determination of stretch and recovery properties

(normative/ informative)

C.1 Principle

A bandage specimen of a specified length is extended at a constant rate to a specified load for a prescribed number of cycles and allowed to relax for a prescribed time.

C.2 Settings of the test equipment for stretch and recovery properties

C2.1 Apparatus

CRE machine
Line clamps
Calibrated metal rule, graduated in mm

C.2.2 setting the apparatus

Width of the clamp - 50 mm, 75mm or 100 mm as determined by the width of the bandage. Width of the clamp shall be equal or wider than the width of the bandage sample.

Gauge length – 100 mm
Rate of extension and retraction – 100 mm/ min
Maximum Load set on CRE machine – 80 N (see **B.2.2**)

C.3 Atmospheric conditions

The atmosphere for pre-conditioning, conditioning and testing shall be as specified in SLSI 16.
The bandage sample shall be conditioned for a minimum of 20 hours in a tension free condition.

C.4 Preparation of test specimens

Bandage construction – Woven or warp knitted stretchable bandage
Bandage width – any width between 25 - 100 mm as agreed between suppler and the purchaser
Length of test specimen min. – 150 mm, cut along the length of the bandage.

If sufficient length of the bandage samples is available, discard the first 500 mm. Mark two reference lines, one on each side, centrally and perpendicular to the length of the specimen; the distance between the two lines is 100mm.

Minimum of five specimens from each sample.

C.5 Procedure

Locate the line clamps in the jaws of the CRE machine and set the gauge length to 100±1 mm, The distance between the clamps is measured with the calibrated metal rule.

Set the extension and retraction rate of the specimen at 100 mm/min.

Set the cycling limits to between gauge length and the appropriate load as determined by the bandage type in Table 2 of this standard. The load limit for cycling is calculated as 5% less than the load at the Lock-out point.

Mount the specimen centrally between the two clamps (align the lines marked on the specimens to the edges of the clamps).

C.6 Operation

The stretch and recovery behavior of the bandage specimens are determined using graphs plotted by a chart recorder connected to the CRE machine.

Connect the device for recording the force and elongation behavior. Put the cross-head in motion and cycle the test specimen between gauge length and load in C.5 for five cycles.

Remove the test specimen carefully from the CRE testing machine and lay on a flat surface for a period of 1 minute and 30 seconds. Measure the distance between the reference marks previously made on the specimen using the calibrated steel rule. Handling of the test specimen shall be kept to a minimum to avoid errors.

Repeat the same procedure for the remaining four (or more) specimens.

C.7 Expressions and calculations of test results

Calculate the recovery percentage of individual bandage specimens from the equation below.

$$\text{Recovery percentage} = 100 - (a - b)$$

a - Distance between the two reference marks on specimen before the test
b - Distance between the two reference marks on after the test

Calculate the average recovery percentage of five (or more) specimens.

APPENDIX D

Determination of water soluble substances

(Normative)

Dry 5 g to constant weight at 105^0 C and determine the loss of weight. Heat slowly with 400 ml of water and boil for 1 minute, cool by adding about the same quantity of water and decant the liquid through a sieve with a nominal mesh aperture of 106 µm, wringing the material by hand to remove as much of the liquid as possible; return the material to the vessel and repeat the washing process with five 400-ml quantities of water. Place the washed material and any loose threads or fibres from the sieve in a beaker, cover with a 0.5% solution of diastase and maintain at 70^0, or if the material being examined contains wool, 45^0 to 50^0, until free from starch. Decant the liquid through the sieve, return any loose fibres or threads retained on the sieve to the bulk material in the vessel, repeat the washing process with boiling water and again return any loose fibres or threads retained on the sieve to the bulk material. Dry the material and determine the loss in weight.

For cotton crêpe, cotton stretch, cotton and rubber elastic, heavy cotton and rubber elastic and elastic net bandages, and unbleached calico that has not been dyed, subtract from the loss in weight 3% of the weight of the final dry sample; if the materials have been dyed, subtract 1%; with crêpe bandage and domette bandage, subtract 2%.

Calculate the percentage of water-soluble substances with reference to the material dried to constant weight at 105^0 C.

APPENDIX D

Determination of ether soluble substances

(Normative)

Extract 5 g with ether in a Soxhlet apparatus for 4 hours, operating the apparatus in such a manner that the rate is at least four extractions per hour. Evaporate the ether extract and dry the residue to constant weight at 100^0 to 105^0 C, unless otherwise specified in the monograph.