SRI LANKA STANDARD 272 : PART 1 : 1988

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SPECIFICATION FOR

ELASTIC NARROW FABRICS

PART 1 - ELASTIC FLAT BRAIDS

(FIRST REVISION)

SRI LANKA STANDARDS INSTITUTION

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SLS 272 : 1988

Gr. 8

SRI LANKA STANDARDS INSTITUTION
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This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
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FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1988-10-04, after the draft, finalized by the Drafting Committee on Elastic Fabrics, had been approved by the Textiles Divisional Committee.

This is the first revision of SLS 272 : 1974 Elastic braids and webbing. In this revision, the standard has been split into several parts under the common title of "Elastic Narrow Fabrics". This part covers elastic flat braids.

In this revision, the values for relative density of the rubber threads and non-fibrous material of the braid have been amended. The requirement for mineral matter content has been deleted as it is not an important characteristic when relative density is specified. The requirement for colour fastness to bleaching has also been deleted. A method for determining the susceptibility to ageing of the elastic flat braids has been introduced in place of testing the original rubber threads. Further, the sampling clause has been modified and the criteria for conformity to standard has been included.

Several types of elastic flat braids with different constructions are available. Therefore, this revision is mainly based on performance requirements. As such, the requirement for mass per unit length has been deleted. Few commonly used constructional details are given in Appendix E as a guidance to the manufacturers.

Clauses 4.2.2, 4.2.4 and 5 of this part call for agreement between the purchaser and the supplier.

All values in this specification are given in SI units.

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 CS 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.

In the preparation of this specification, the assistance derived from the publications of the British Standards Institution, the South African Bureau of Standards and the Textile Institute, Manchester, United Kingdom is gratefully acknowledged.

1 SCOPE

1.1 This part prescribes the requirements and methods of sampling and test for elastic flat braids manufactured from cotton, rayon or synthetic textile yarns and containing natural rubber as the elastomeric threads.

1.2 It does not cover elastic flat braids intended for mechanical purposes.

2 REFERENCES

CS 16 Standard atmosphere for conditioning and testing textiles.
CS 52 Determination of colour fastness of textile materials to washing at 40 °C.
CS 62 Determination of colour fastness of textile materials to daylight.
CS 67 Determination of colour fastness of textile materials to perspiration.
CS 87 Determination of scouring loss in grey and finished cotton textile materials.
CS 102 Presentation of numerical values.
SLS 428 Random sampling methods.

3 DEFINITION

For the purpose of this part the following definition shall apply:

braid : A product made by interlacing three or more threads in such a way that they cross one another and are laid together in diagonal formation.

NOTE

Flat, tubular or solid constructions may be formed in this way.

4 REQUIREMENTS

4.1 General requirements

4.1.1 The elastomeric threads used to manufacture elastic flat braids shall be made from suitably compounded and vulcanized natural rubber. The relative density of the rubber threads shall be not greater than 1.05. The cross-sectional shape of the rubber threads shall be either round or square.

4.1.2 Materials which are deleterious to the rubber threads or to the yarns used shall not be present in the finished elastic flat braids.

4.2 Other requirements

4.2.1 The elastic flat braids shall be of uniform width and free from defects that impair the appearance and the serviceability of the braid. It shall have reasonably straight and firm edges in the relaxed state.

4.2.2 The elastic flat braids shall be supplied in the natural undyed condition, or bleached, dyed or otherwise finished as agreed to between the purchaser and the supplier.

4.2.3 The nominal width of elastic flat braids shall be 3.0 mm, 6.5 mm, 9.5 mm, 12.5 mm, 19.0 mm or 25.5 mm when tested as prescribed in Appendix A. A tolerance of ± 1 mm or ± 10 per cent, whichever is less shall be permitted on the specified widths.

4.2.4 When measured as prescribed in Appendix A, the unstretched length of elastic flat braids in each package shall be as agreed to between the purchaser and the supplier. A tolerance of ± 5 per cent shall be permitted on the declared lengths.

4.2.5 The elastic flat braids shall also conform to the requirements given in Table 1, when tested by the methods prescribed in Column 4 of the table.

TABLE 1 - Requirements for elastic flat braids

Sl. No. (1)	Characteristic (2)	Requirement (3)	Method of test (4)
(i)	Stretch per cent, min.	100	Appendix B
(ii)	Non fibrous material, per cent by mass, max.	3	CS 87
(iii)	Dimensional changes due to washing, in length direction, per cent, max.	± 7.5	Appendix C
(iv)	Loss in modulus after ageing, per cent, max.	6.0	Appendix D

4.2.6 The colour fastness ratings of dyed elastic flat braids shall also conform to the requirements given in Table 2, when tested by the methods prescribed in Column 4 of the table.

TABLE 2 - Requirements for colour fastness of elastic flat braids

Sl. No. (1)	Fastness to (2)	Numerical rating (3)	Methods of test (4)
i)	Washing	4 or better	CS 52
ii)	Daylight	5 or better	CS 62
iii)	Perspiration	4 or better	CS 67

5 PACKAGING AND MARKING

5.1 Unless otherwise specified by the purchaser, each length of elastic flat braids shall be wound on a paper board or any suitable material which is strong enough to avoid deformation of the package. The outer end of the elastic flat braid shall be so fastened as to prevent the braid from becoming loose or unwinding from the package. The number of joints in one length shall be not greater than the number agreed upon between the purchaser and the supplier.

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

a) Name of the product;
b) Name and address of the manufacturer and/or distributor (including country of origin);
c) Registered trade mark, if any;
d) Brand name, if any;
e) Width of the braid, in millimetres;
f) Length of the braid, in metres; and
g) Batch or code number.

5.3 A number of such packages as agreed to between the purchaser and the supplier shall be packed in a suitable container. Each container shall be legibly and indelibly marked or labelled with the following:

a) Name of the product;
b) Name and address of the manufacturer and/or distributor (including country of origin);
c) Registered trade mark, if any;
d) Brand name, if any;
e) Number of packages;
f) Width of the braid, in millimetres;
g) Length of the braid in one package, in metres; and
h) Batch or code number.

NOTE

Attention is drawn to the certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of this specification.

6 SAMPLING

6.1 Lot

All packages of elastic flat braids of the same nominal width and belonging to one batch of manufacture shall constitute a lot.

6.2 Scale of sampling

6.2.1 Each lot shall be tested separately for ascertaining its conformity to the requirements of this specification.

6.2.2 Five per cent of the containers subject to a minimum of 3 containers shall be selected. As far as possible, an equal number of packages shall be taken from each container so selected to get the required number of packages as given in Table 3.

6.2.3 The number of packages to be selected from a lot shall be in accordance with Table 3.

TABLE 3 - Scale of sampling

Number of packages in a lot (1)	Number of packages to be selected (2)
Up to 100	3
101 to 300	4
301 to 500	5
501 to 1000	7
1001 to 3000	10
3001 and above	15

6.2.4 The containers and packages shall be selected at random. In order to ensure randomness of selection, tables of random numbers as given in SLS 428 shall be used.

6.3 Number of tests

6.3.1 Each container selected as in **6.2.2** shall be inspected for marking requirements.

6.3.2 Each package selected as in **6.2.3** shall be inspected for packaging and marking requirements and the length of braid in each package shall be measured.

6.3.3 Sufficient lengths of elastic flat braids shall be cut from each package selected as in **6.2.3** and shall be tested for the requirements specified in 4.2.1, 4.2.3, 4.2.5 and 4.2.6.

7 METHODS OF TEST

7.1 During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

7.2 Tests for the requirements prescribed in 4 shall be carried out as prescribed in the relevant Sri Lanka Standards given therein and Appendices A to D of this specification.

8 ATMOSPHERE FOR CONDITIONING

8.1 The conditioning and testing atmosphere shall be the standard atmosphere for conditioning and testing textiles as defined in CS 16 i.e. a relative humidity of 65 $\pm$ 2 per cent and a temperature of 27 $\pm$ 2°C.

8.2 The specimens shall be conditioned for a period of not less than 24 hours in a loose unrolled state in the standard atmosphere given in 8.1. Whenever possible, test the specimens without removal from this atmosphere. If it is impracticable to test the specimens in the standard atmosphere, the test may be carried out in an atmosphere having a relative humidity of 65 $\pm$ 5 per cent within 3 minutes of removal of the specimens from the standard atmosphere for testing textiles.

8.3 In case of dispute, precondition the test specimens for 4 hours at a relative humidity not exceeding 10 per cent and at a temperature not greater than 52°C. An oven at 52°C under ordinary room conditions will give the required low humidity. Expose the specimens to the standard atmosphere as specified in 8.1 for at least 24 hours before testing.

9 CRITERIA FOR CONFORMITY

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

9.1 Each container inspected as in 6.3.1 satisfies the relevant requirements.

9.2 Each package inspected as in 6.3.2 satisfies the relevant requirements.

9.3 The value of the expression, $\bar{x} - 1.1\ s$, (see Notes) calculated using the test results on stretch is more than or equal to the corresponding specification limit.

NOTES

1. *Mean* $(\bar{x}) = \dfrac{\text{Sum of the observed values}}{\text{Number of values}}$

2. *Standard deviation (s) = The positive square root of the quotient obtained by dividing the sum of squares of the deviations of the test results from their arithmetic mean, by one less than the number of test results.*

9.4 The values of the expression, $\bar{x} + 1.1\ s$ calculated using the test results on dimensional changes due to washing and loss in modulus after ageing are less than or equal to the corresponding specification limits.

9.5 The test results on width and non fibrous material satisfy the relevant requirements.

9.6 Each sample tested for colour fastness satisfies the relevant requirements.

APPENDIX A
DETERMINATION OF WIDTH AND LENGTH

A.1 PROCEDURE

Lay the elastic flat braid on a smooth flat measuring surface so that it lies straight and flat in the untensioned state. Measure the width and length of the braid using a metal scale graduated in millimetres. Make five determinations of width at random throughout the length of the sample for testing. Report the average width.

APPENDIX B
DETERMINATION OF STRETCH

B.1 PROCEDURE

Cut at least 500-mm long specimens. Lay the specimen on a smooth flat measuring surface so that it lies straight and flat in the untensioned state. Mark a distance of 250 mm on the specimen, leaving hand holds at each end. Grip the specimen with both hands about 25 mm outside the reference marks, with the thumbs uppermost and the clenched fists below. Holding the specimen above a scale and with elbows bent, move the hands slowly apart until considerable resistance is felt. Relax the specimen and repeat the stretching. On the third stretch lower the specimen onto the scale and note the measurement between the reference marks to the nearest 1 mm.

B.2 CALCULATION

$$\text{Stretch, per cent} = \frac{l_2 - l_1}{l_1} \times 100$$

where,

l_1 is the initial measurement, in mm; and
l_2 is the final measurement, in mm.

APPENDIX C
DETERMINATION OF DIMENSIONAL CHANGES DUE TO WASHING

C.1 REAGENTS

C.1.1 *Washing solution,* freshly made solution containing the following, per litre of distilled water.

C.1.1.1 *Dodecyl benzene sulfonate,* 1.0 g.

C.1.1.2 *Anhydrous sodium tripolyphosfate,* 1.5 g.

C.1.1.3 *Anhydrous sodium matasilicate,* 0.5 g.

C.1.1.4 *Anhydrous sodium sulfate,* 1.0 g.

C.1.1.5 *Sodium perborate,* 0.5 g.

Prepare a concentrated solution containing the perborate within one hour of the test and add it to the solution containing the other chemicals, immediately before immersion of the test specimens.

C.2 APPARATUS

C.2.1 *Cubex International Shrinkage Testing Apparatus (see Figure 1),* described below or domestic washing machine.

Cubex International Shrinkage Testing Apparatus consists of an insulated stainless steel hollow cube (368 mm x 368 mm x 368 mm) having a capacity of 50 litres. Upon one corner of the cube is mounted a manually operable drain valve. One face of the container is provided with a water-tight door. Mounted on the frame are a motor incorporating reduction gearing and an electrically controlled timing device.

The apparatus is revolved at 60 revolutions per minute for a given time; the direction of rotation is automatically reversed each 5 minutes with a pause of 5 seconds between reversing cycles.

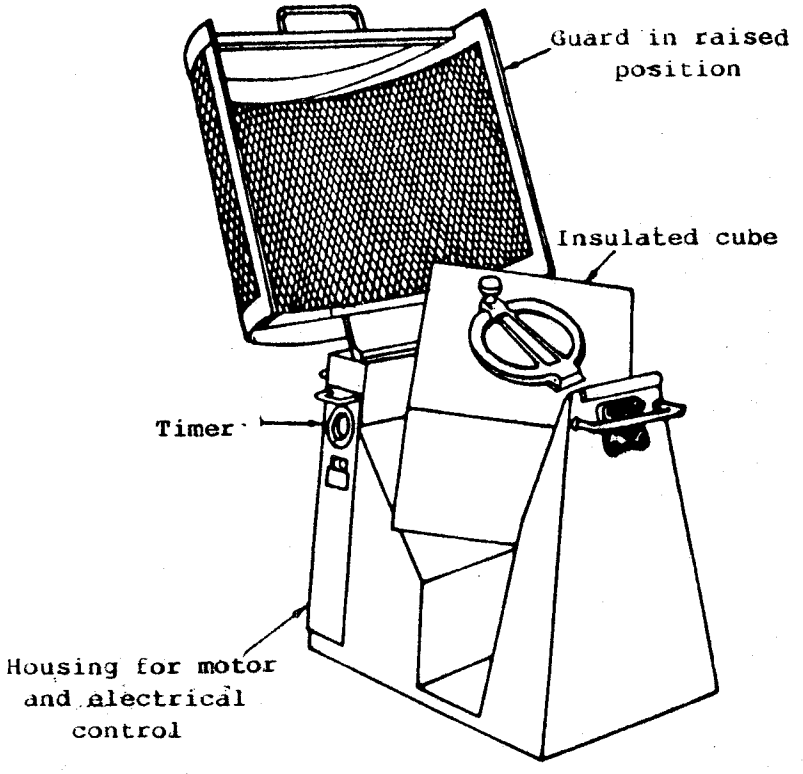

FIGURE 1 - **Cubex International Shrinkage Testing Apparatus**

C.2.2 *Ruler,* graduated in millimetres.

C.2.3 *Laboratory or domestic spin drying apparatus.*

C.2.4 *Air oven,* with forced draught ventilation.

C.3 **PROCEDURE**

C.3.1 Cut three specimens from each test sample, each of full width and of length at least 350 mm. Condition the specimens (see 8), place them on a smooth flat surface and remove wrinkles by placing the ruler (C.2.2) over it and pressing down evenly. Mark a distance of 250 mm using indelible ink or thread.

C.3.2 Place 25 litres of washing solution (C.1) in the washing apparatus (C.2.1), ensure that the temperature of the solution in the apparatus is 60 $\pm$ 2 ^{o}C and add the specimens (see Note). Run the machine for 10 minutes. Remove the specimens and rinse them in clean water at a temperature of 40^{o}C to 48^{o}C, avoiding agitation and distortion of the specimens. Hydroextract the specimens using a laboratory or domestic spin drying apparatus (C.2.3). Lay each specimen flat against the side of the drum to avoid stretching. Continue the hydroextraction until no further water is lost.

Dry each specimen by hanging it vertically with the general direction of the elastomeric threads vertical, in a forced draught ventilated air oven (**C.2.4**) at 105 °C for not more than 1 hour. Adjust the load in the oven so that all specimens are dry within this period. The air velocity shall not be so high as to cause agitation of the specimens during drying. Condition each specimen (see 8). Lay the specimens flat, remove wrinkless and measure the distances between marks using the ruler.

NOTE

The total mass of specimens shall not exceed 250 g.

C.4 CALCULATION

$$\text{Dimensional changes due to washing, per cent} = \frac{l_2 - l_1}{l_1} \times 100$$

where,

l_1 is the initial measurement, in mm, and
l_2 is the final measurement, in mm.

NOTE

Shrinkage shall be preceded by a negative (-) sign and elongation shall be preceded by a positive (+) sign.

APPENDIX D
DETERMINATION OF LOSS IN MODULUS AFTER AGEING

D.1 APPARATUS

D.1.1 *Air oven,* electrically heated having:

a) a slow circulation of fresh air through the oven of not less than three and not more than ten changes in one hour, the incoming air being within ± 1 °C of the temperature of the oven before coming into contact with the test specimens;
b) means for controlling and measuring the rate of air flow;
c) no copper alloy in the ageing chamber;
d) means for suspending test specimens so that they are at least 10 mm away from each other and 50 mm from the sides of the chamber;
e) all light and radiant heat from the heating elements excluded from the test chamber;
f) the temperature of the oven thermostatically controlled so that the test specimens are kept within ± 1 °C of the ageing temperature; and
g) means for measuring the actual temperature amongst the test specimens.

D.1.2 *Autographic constant rate of extension stress/strain apparatus,* equipped with line contact jaws at least 50-mm wide and capable of cycling between zero extension and a pre-determined load.

D.2 **PROCEDURE**

D.2.1 **Conditioning**

Condition the sample, as specified in 8.

D.2.2 **Preparation of the test specimens**

Prepare four specimens of sufficient length from test sample, to provide a gauge length of 100 mm. Test the four specimens, two before ageing and two after ageing. Make gauge marks on the specimen 100 mm apart.

D.2.3 **Ageing**

Preheat the oven (D.1.1) to a temperature of 120 °C. Suspend the test specimens in the ageing chamber, ensuring that the volume of specimens does not exceed 10 per cent of the air space of the oven and that the air circulates freely on both sides of each specimen. Age the specimens at 120 °C for a period of 4 hours.

D.2.4 **Determination of modulus**

D.2.4.1 Condition the aged specimens as in 8. Determine the modulus of aged as well as unaged specimens as given in D.2.4.2 using the gauge marks irrespective of any change in length due to the ageing process.

D.2.4.2 Mount the test specimen in the jaws (**D.1.2**) in such a way that it is straight and untensioned. Cycle twice between zero extension using a load appropriate to the mass of the fabric, as given in Table 4.

TABLE 4 - Loads to be used

Fabric mass, g/m (1)	Load, kg* (2)
Up to 2.00	0.75
2.01 to 3.75	1.20
3.76 to 5.00	1.50
5.01 to 7.50	2.50
7.51 to 11.00	3.50
11.01 to 17.00	4.25
17.01 to 25.00	5.25
25.01 to 36.00	6.25
Above 36.01	7.50

* *A load of 1 kg is equivalent to a force of 9.81 N.*

Determine the modulus at 50 per cent extension on the extension curve of the second cycle.

D.3 **CALCULATION**

$$\text{Loss in modulus, per cent} = \frac{M - m}{M} \times 100$$

where,

M is the average modulus of the unaged specimens; and
m is the average modulus of the aged specimens.

APPENDIX F
FEW COMMONLY USED CONSTRUCTIONAL DETAILS OF ELASTIC FLAT BRAIDS

Sl. No.	Type of textile yarn	Finished width, mm	Linear density of textile yarn, dtex	*Count of rubber thread	Number of rubber threads in full width	Number of textile yarns in full width
i)	Polypropylene	6.5	2 x 200	44/50	6	13
ii)	Polypropylene	9.5	2 x 200	44/50	8	17
iii)	Polypropylene	12.5	320	44/50	16	33
iv)	Polypropylene	2.5	320	44/50	32	65
v)	Polyester	3.0	167	38/43	4	9
vi)	Polyester	6.5	167	38/43	8	17
vii)	Polyester	9.5	167	38/43	12	25
viii)	Rayon	3.0	235	44/50	6	13
ix)	Rayon	6.5	235	44/50	8	17
x)	Rayon	9.5	235	44/50	12	25

* *Count of rubber thread is the number of threads when placed side by side that give a combined width of 25.4 mm. In the case of round rubber thread, the count is represented by two numbers separated by a solidus, the first number being the actual count of the round thread and the second number being the count of the square rubber thread of equivalent cross sectional area i.e. count of the round thread multiplied by 1.13.*

SRI LANKA STANDARDS INSTITUTION

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