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METHODS OF TEST FOR THE STRETCH AND RECOVERY PROPERTIES OF FABRICS

SRI LANKA STANDARDS INSTITUTION

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SRI LANKA STANDARDS INSTITUTION
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SRI LANKA STANDARD

METHODS OF TEST FOR THE STRETCH AND RECOVERY PROPERTIES OF FABRICS

FOREWORD

This Sri Lanka Standard was authorized for adoption and publication by the Council of the Sri Lanka Standards Institution on 1986-12-17, after the draft, finalized by the Drafting Committee on Test Methods for Textiles, had been approved by the Textiles Divisional Committee.

Many parameters have been used to characterize the stretch and recovery properties of fabrics; two of the more important of these are the extension under a moderate load, and the recovery from that extension, which can be conveniently measured by the methods of test in this standard.

All values given in this standard are in SI units.

In the preparation of this standard, assistance derived from the publications of the British Standards Institution is gratefully acknowledged.

1 SCOPE

This standard prescribes methods of test for the stretch and recovery properties of woven, warp-knitted and weft-knitted fabrics; they are particularly applicable to *stretch fabrics* such as are obtained by the use of elastometric fibres or bulked yarns, or by a process such as slack mercerization.

2 REFERENCES

CS 16 Standard atmosphere for conditioning and testing.

3 PRINCIPLE

A specimen of standard dimensions is stretched by applying a specified load. The extension is observed and the tension removed. The length of the unstressed specimen is observed after recovery.

4 APPARATUS

4.1 The apparatus shall embody two clamps, each consisting of a pair of straight jaws not less than 75-mm wide, capable of holding the test specimen uniformly across its width, without slippage. The jaws shall be at right angles to the line joining their mid-points and shall be co-planar throughout the test.

4.2 It shall be possible to measure or record the distance between the inner edges of the two clamps with an error not exceeding 1 mm.

4.3 It shall be possible to apply loads of 3 kg ± 5 g or 6 kg ± 5 g to the specimen evenly and gently, within a period of 7.5 ± 2.5 s.

5 ATMOSPHERE FOR CONDITIONING AND TESTING

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 ± 2 per cent and a temperature of 27 ± 2 ^{o}C.

6 TEST SPECIMENS

6.1 Dimensions of specimen

6.1.1 *Woven fabrics*

The width of the specimen, excluding any fringe, shall be 75 ± 1 mm. The length of the specimen shall be sufficient to allow a distance of 200 mm between the inner edges of the pair of clamps when the specimen has been inserted.

6.1.2 *Knitted fabrics*

The width of the specimen shall be 75 ± 1 mm. The length of the specimen shall be sufficient to allow a distance of 75 mm between the inner edges of the pair of clamps when the specimen has been inserted.

6.2 Number of specimens

Unless otherwise agreed by the parties interested in the test results, five specimens with their length parallel to the warp direction (woven fabrics), or parallel to the wale direction (knitted fabrics) and five specimens with their length parallel to the weft direction (woven fabrics), or at right angles to the wale direction (knitted fabrics) shall be tested.

6.3 Preparation of specimens

6.3.1 The specimens shall be selected to be as representative as possible of the fabric under test and shall, where possible, exclude fabric within 100 mm of selvedges. In no case shall specimens parallel to the selvedge contain selvedge ends.

6.3.1.1 Woven fabrics

Cut the specimens with its length parallel to the warp or weft direction of the fabric, sufficiently wide to allow the necessary fringe (see below) and remove threads in approximately equal numbers from each side of the long edges of the cut strip until the width of the specimen is 75 ± 1 mm. The width of the fringes shall be such that during testing no longitudinal threads escape from the fringes. For the majority of fabrics, fringes about 5 mm or 15 threads in width are sufficient. Fabrics of very open weave may require wider fringes of up to 10 mm.

For fabrics that cannot be frayed to width, cut warp and weft specimens along lines 75 ± 1 mm apart and parallel to the warp and weft threads, respectively. In some cloths, the thread direction can be determined only by tearing, but do not reduce the specimen to the required width in this way.

6.3.1.2 Knitted fabrics

Cut the specimen with its length parallel or at right angles to the wales of the fabric. This will be facilitated by the use of a template.

6.3.2 Expose the test specimen in the standard atmosphere for testing textiles (see **5**) for not less than 24 h or until the progressive change in mass between successive weighings at intervals of 2 h does not exceed 0.25 per cent.

7 TEST PROCEDURE

7.1 See that the clamps are properly aligned and parallel.

7.1.1 *Woven fabrics*

Set the clamps with their inside edges 200 ± 1 mm apart (L_1).

7.1.2 *Knitted fabrics*

Set the clamps with their inside edges 75 ± 0.5 mm apart (L_1).

7.2 Secure the specimen in the clamps, making sure it is flat and unstrained. Make reference marks (lines) on the fabric against the inside edge of the clamps in the centre of the jaws, approximately 25 mm long.

7.3 Gradually increase the load on the specimen to 3 kg ± 5 g or 6 kg ± 5 g within a period of 7.5 ± 2.5 s. (The load will normally be 3 kg. For certain fabrics, particularly elastic fabrics for which a test at high extension is required, a load of 6 kg may be used). Maintain this load for 10 ± 2 s and then reduce the load gradually within a period of 7.5 ± 2.5 s until the clamps are returned to their original position.

7.4 Immediately begin to re-apply the load to the specimen and measure the length of the specimen (L_2) 1 minute after application of the full load. Within 10 s of making the measurement reduce the load as before returning the clamps to their original position. Remove the specimen from the clamps, immediately place it on a flat, smooth surface, and after a period of

1 minute from the time when the jaws were returned to their original position, measure the distance between the outside edges of the reference marks (L_3).

If the determination of the residual extension after a longer period of relaxation is required, the distance between the reference marks shall be remeasured (L_4) after a total relaxation time of 30 minutes.

L_2, L_3 and L_4 shall be measured to the nearest 1 mm.

NOTE - When tests are made at right angles to the wale direction of weft-knitted fabrics the results are invalid if laddering occurs. When elastometric threads are laid-in, precautions should be taken to prevent slippage of these threads through the fabric.

8 CALCULATION AND EXPRESSION OF RESULTS

8.1 Calculate the arithmetic mean values of L_2, of L_3 and L_4 in each direction separately for the five specimens. These are denoted by $\bar{L}_2$, $\bar{L}_3$ and $\bar{L}_4$ respectively.

8.2 Calculate the mean extension per cent (E) for the fabric in each direction from the equation :

$$E = 100\ (\bar{L}_2 - L_1)/L_1$$

8.3 Calculate the mean residual extension per cent after 1 minute (R_1) for the fabric in each direction from the equation :

$$R_1 = 100\ (\bar{L}_3 - L_1)/L_1$$

8.4 If required, calculate the mean residual extension after 30 minutes (R_{30}) for the fabric in each direction from the equation :

$$R_{30} = 100\ (\bar{L}_4 - L_1)/L_1$$

8.5 The mean values of E, R_1 and R_{30} shall be quoted to the nearest 1 per cent.

9 TEST REPORT

The test report shall include the following particulars:

a) a statement that the test was performed in accordance with this Sri Lanka Standard;

b) the method of test (i.e. for woven or for knitted fabrics) used;

c) the load applied;

d) the value of the mean extension of the fabric in each direction;

e) the value of the mean residual extension of the fabric in each direction after 1 minute relaxation; and

f) if required, the value of the mean residual extension after 30 minutes relaxation.

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