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SPECIFICATION FOR BICYCLE TUBES
(FIRST REVISION)

Gr.6

BUREAU OF CEYLON STANDARDS

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SRI LANKA STANDARD
SPECIFICATION FOR BICYCLE TUBES
(FIRST REVISION)

FOREWORD

This Sri Lanka Standard specification was authorized for adoption and publication by the Council of the Bureau of Ceylon Standards on 1982-05-24, after the draft, finalized by the Drafting Committee on Bicycle Tyres and Tubes, had been approved by the Technical Advisory Committee on Rubber and Rubber Products and the Chemicals Divisional Committee.

This specification is the first revision of CS 127:1972 Specification for Bicycle Tubes. This includes all the new sizes of tubes which have recently come into the market. It deletes some of the methods of test for which Sri Lanka Standards are now available, to which cross reference is made. This revision also gives the recommended metric tube designation as specified by the International Organization for Standardization in addition to the commonly used imperial designation.

All standard values 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 results of a test shall be rounded off in accordance with CS 102. The number of significant figures to be 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 valuable assistance derived from the relevant publications of the International Organization for Standardization, Indian Standards Institution and Japanese Standards Association is gratefully acknowledged.

1 SCOPE

This specification prescribes the requirements, methods of sampling and test for bicycle tubes intended for use with light and heavy duty tyres prescribed in SLS **224.**

2 REFERENCES

CS 102 Presentation of numerical values
SLS 224 Bicycle tyres
SLS 297 Methods of,, testing vulcanized rubber
Part 2 Determination of tensile stress-strain properties
Part 5 Accelerated ageing tests SLS 428 Random sampling methods.

3 CONSTRUCTION

3.1 The tubes shall be manufactured from natural or synthetic rubber or mixture of both; suitably compounded and vulcanized (see Note).

3.2 The dimensions of bicycle tubes shall be compatible with the dimensions of the corresponding bicycle tyres specified in SLS **224.**

3.3 Each tube shall be fitted with a suitable air valve.

NOTE - For tubes made of butyl and halogenated butyl rubber, the requirements prescribed in the specification may not be suitable.

4 REQUIREMENTS

4.1 Dimensions

The dimensions of bicycle tubes when deflated and measured in accordance with A.1 shall be as given in Table 1.

4.2 Overlapping of seam

The overlap of seam when tested in accordance with A.2 shall be at least 30 mm.

4.3 Joint strength

4.3.1 *For overlapped seam*

When tested in accordance with **A.3.1,** the joint shall not show any sign of separation and the joint adhesion strength shall be a minimum of 8 N per 10 mm width.

4.3.2 *For jointed seam*

When tested in accordance with **A.3.2,** the mean bond strength of joint shall be a minimum of 4 MPa with none of the test pieces falling below 3 MPa.

TABLE 1 - Dimensions of tubes

Size designation		Flat length of double folded tube	Flat width	Thickness
Tyre size designation	Old markings	mm	mm	mm, min.
40-635	28 x 1 1/2	1015 +15 -25	44.0 ± 2.0	0.80
47-571	26 x 1 3/4	920 +15 -25	48.0 ± 2.0	0.80
37-590	26 x 1 3/8	940 +15 -25	40.0 ± 2.0	0.80
37-540	24 x 1 3/8	865 +15 -25	40.0 ± 2.0	0.80
37-501	22 x 1 3/8	810 +15 -25	40.0 ± 2.0	0.80
54-400	20 x 2 x 1 3/4	690 +10 -20	55.0 ± 2.0	0.80
37-451	20 x 1 3/8	730 +10 -20	40.0 +2.0	0.80
37-400	18 x 1 3/8	660 +10 -20	40.0 ± 2.0	0.80
37-298	14 x 1 3/8	490 +10 -20	40.0 ± 2.0	0.80

4.4 **Tensile strength and elongation at break**

When tested in accordance with A.4, the tensile strength and elongation at break shall be as follows :

Tensile strength, min. 10.0 MPa

Elongation at break, min. 450 per cent.

4.5 Accelerated ageing

When tested in accordance with A.5, the tensile strength and elongation at break shall at least be 80 per cent of the value before ageing.

4.6 Tension set

When tested in accordance with A.6, the tension set shall be a maximum of 20 per cent.

4.7 Leak test

When tested in accordance with **A.7,** the tube shall not show any sign of leakage through the valve, at the joint and over the general surface of the body.

4.8 Aged leak test

When tested in accordance with A.8, the tube shall not show any sign of leakage through the valve, at the joint and over the general surface of the body.

5 MARKING

The tube shall be marked legibly and indelibly with the following:

a) Tyre size designation. Old marking may be added in parenthesis "(...)" after the tyre size designation (see Table 1);

b) Name of manufacturer and/or registered trade mark; and

c) Country of origin.

6 METHODS OF TEST

The methods of test for the determination of various characteristics specified in this specification are given in Appendix A.

7 SAMPLING

7.1 Lot

In any consignment, all the bicycle tubes of the same size designation and manufactured by the same organization under relatively similar conditions of manufacture shall be separated in groups of 5000 tubes or less and each group shall constitute a lot.

7.2 Selection of samples

7.2.1 Tests for the determination of the conformity of the lot to the requirements of this specification shall be carried out for each lot separately. The number of tubes to be selected from each lot shall depend on the size of the lot and shall be in accordance with Column 1 and Column 2 of Table 2.

7.2.2 The required number of tubes shall be chosen at random. In order to ensure randomness of selection, a random number table specified in SLS 428 shall be used.

TABLE 2 - Scale of sampling

Lot size (I)	No. of tubes to be selected (2)	Permissible no. of defective tubes (3)	Sub-sample (4)
Up to 500	10	0	3
501 to 1000	15	1	3
1001 to 3000	32	2	5
3001 to 5000	50	3	5

7.3 Testing of samples

7.3.1 *Non-destructive tests*

Each of the tubes selected according to **7.2.1** shall be tested for dimensions specified in 4.1, length of overlap of seam specified in 4.2 and leak test specified in 4.7. The tube whose dimensions or length of overlap or leak test fails to meet the specified requirements, it shall be considered as defective.

7.3.2 ***Destructive tests***

From each of the lot of tubes that are found to conform to conditions specified in **8.1,** two sub-samples of size as given in Column 4 of Table 2 shall be drawn at random. Each tube taken from one sub-sample shall be tested for requirements specified in **4.3** to **4.6** individually. The required test pieces shall be taken out of the tube in the prescribed manner. Tubes from the Second sub-sample (see Note) shall be subjected to the aged leak test specified **in 4.8.**

NOTE - All tubes of the second sub-sample should have passed the leak test under **7.3.1.**

8 CRITERIA FOR CONFORMITY

8.1 Non-destructive tests

When tested according to 7.3.1, if the number of defective tubes are not greater than the corresponding permissible number of defectives given in Column 3 of Table 2, the lot shall be declared as conforming to the requirements of dimensions, length of overlap of seam and leak test. Only such a lot shall be subjected to destructive testing as given **in 7.3.2.**

8.2 Destructive teats

When tested according **to 7.3.2,** if the test results for different characteristics specified in **4.3** to **4.6** and **4.8** are all found satisfactory, the lot shall be declared as conforming to all the requirements of this specification.

APPENDIX A

METHODS OF TESTS

A.1 DIMENSIONS

A.1.1 The tube is rotated so that the maximum circumferential line and the minimum circumferential line interchange positions, and now the tube-valve will be pointing radially outwards. The tube is vacuum-deflated in this position (see Note); and care is taken to see that the tube-valve position is midway between the longitudinal edges of the deflated tube.

NOTE - For tubes already in a vacuum-deflated condition, a similar interchange of maximum and minimum circumferential lines shall be achieved.

A.1.2 The tube shall now be double folded on a flat surface with the valve uppermost and allowed to lie straight. The double folded length shall now be measured to the nearest millimetre and reported.

A.1.3 The flat width is measured on a vacuum-deflated tube, by pressing down lightly with a ruler (graduated in millimetres) so as to just flatten the tube edges, the length of the ruler scale being perpendicular to the longitudinal tube edges. The measurement shall be made to an accuracy of 0.1 mm at five randomly chosen points of the tube, but not close to the valve or the overlap (joint in the case of seamless tubes). The mean shall be reported.

A.1.4 The thickness of the double wall shall be measured with a micrometer having a flat. measuring face that exert a pressure of 20 ± 3 kPa.

The thickness shall be measured to an accuracy of 0.05 mm at five equidistant points on the tube, but not close to the valve or the overlap (joint in the case of seamless tubes). The measured values shall be divided by two and reported. None of the values shall be less than the appropriate minimum value specified in Table 1.

A.2 LENGTH OF OVERLAP

In tubes jointed by the overlap of seam, the length of the overlap shall be measured to an accuracy of 1 mm at three equidistant points and the mean shall be reported.

A.3 JOINT STRENGTH

A.3.1 For overlapped seam

A. 3.1.1 *Procedure*

The overlapped seam joint shall first **be** visually inspected for any sign of separation. If there is no such separation, perpendicular to the axis of manufacture of the tube, a 25.0 ± 0.2mm wide ring containing the two overlapping layers are cut.

The two layers are cut parallel to the axis of manufacture and the two layers are separated manually to a distance of about 20 nun. The two ends are fixed in the two jaws of a tensile testing machine whose rate of traverse is adjusted to 50 ± 5 mm/min. The machine is started and record graphically the forces required to separate the joint completely. From the graph, note the peak values (a point at which the slope of the graph changes from positive to negative) and arrange them in the increasing order of algebraic magnitude and number them 1 to *n.* The median of these *n* values is determined. If n is odd, the median value will be the $\frac{(n+1)}{2}$ th value, and if n is even, the median value will be the arithmetic mean of the two values of $\frac{(n)}{2}$ th and $\frac{(n+1)}{2}$ th

A.3.1.2 *Calculation*

The joint adhesion strength, N/10 mm = $\frac{F}{\alpha} \times 10$

where

F = median value of the force, in N;

α = width of ring, in mm.

A.3.2 For jointed seam

A. 3.2.1 *Procedure*

From the tube, three dumb-bell test pieces are cut according to SLS **297:Part** 2 keeping the joint in the middle part of the narrow portion of the dumb-bell test piece. The test is carried out in accordance with the procedure given in SLS **297:Part 2** and the load required to cause the separation of the joint is recorded (see Note). The thickness of the test piece at the joint is determined using a dead load micrometer gauge. The breaking strength of the test pieces are calculated as follows. The mean and the individual values shall **be** reported.

NOTE - If separation occur at a place other than the Joints the test shall be disregarded and the test repeated.

A.3.2.2 *Calculation*

The bond strength, of joint, $\text{MPa} = \frac{F}{\alpha}$

where F = Force, in N, required to separate the joint;
α = Area, in mm , of test piece.

A.4 TENSILE STRENGTH AND ELONGATION AT BREAK

The determination of tensile strength and elongation at break shall be done in accordance with SLS 297:Part 2 on five dumb-bell test pieces cut randomly from five different parts of the tube, avoiding the overlap or the joint of seam and area close to the valve. Any test piece that breaks outside the reference lines shall be disregarded and the test repeated. The mean of the test results shall be reported.

A.5 ACCELERATED AGEING

Five dumb-bell test pieces shall be prepared in accordance with SLS 297:Part 2 and aged in a normal oven in accordance with SLS **297 :Part** 5 at 70 ± 2°C for 166 ± 2 h. Remove them from the oven and condition at a temperature of 27 ± 2° C for at least 16 h and subject them to tests for determining tensile strength and elongation at break in accordance with A.4 and the mean shall be calculated. The change after ageing shall be reported as a percentage.

A.6 TENSION SET

Three dumb-bell test pieces are cut as indicated in A.4 and on the narrow part, reference lines 25 ± 1 mm apart are marked. On a suitable apparatus the test piece is stretched to the elongation figure of 300 ± 30 per cent and kept in this position for 15 min. Then remove the test piece and the length between the reference lines are measured to an accuracy of 1 mm after 60 min. The percentage increase in length is calculated. The mean shall be reported.

A.7 LEAK TEST

The tube shall be inflated with air so that the perimeter of the section is 120 ± 5 per cent of the original value. The whole tube including the valve is then immersed in water for a minimum period of 60 s and observation is made for any sign of leakage which will be indicated by the presence of air bubbles. If air bubbles do appear the source from which it originate shall be reported (for example: valve, neck, joint or tube).

A.8 AGED LEAK TEST

The tube which passes the test specified in A.7 shall be aged in a normal-oven in accordance with SLS **297:Part 5** at 70± 2° C for 166^{+2}_{-0} h. Remove it from the oven and condition at a temperature
of 27 ± 2 °C for at least 16 h and again repeat the test specified in A.7. If air bubbles do appear, the source from which it originate shall be reported.

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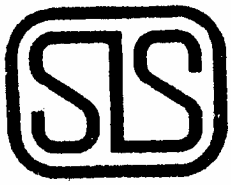

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