SRI LANKA STANDARD 224 : 2007
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SPECIFICATION FOR
BICYCLE TYRES
(SECOND REVISION)

SRI LANKA STANDARDS INSTITUTION

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SLS 224 : 2007

Gr. 7

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SRI LANKA.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This standard does not purport to include all the necessary provisions of a contract.

SRI LANKA STANDARD
SPECIFICATION FOR BICYCLE TYRES
(SECOND REVISION)

FOREWORD

This standard was approved by the Sectoral Committee on Chemical and Polymer Technology and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2007-10- 24.

This standard was first published in 1973 and first revised in 1981. This specification is the Second Revision of SLS 224 : 1981 for Bicycle Tyres. In this Revision, the requirements for rubber compound and tolerance of dimensions have been changed. The amendments issued to the First Revision have been incorporated in to this Second Revision. Composition of the tyre material has been excluded since the composition is not analyzed.

As laboratory facilities are not available in Sri Lanka to carry out the running durability test and the plunger test for bicycle tyres, it is proposed to consider these test methods at a subsequent revision to this specification.

For the purpose of deciding whether a particular requirement of this specification is complied with the final value observed or calculated, expressing a 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. All standard values are given in SI units.

In the preparation of this specification guidance obtained from the following publication is gratefully acknowledged.

IS 2414 : 2005 Cycle and rickshaw pneumatic tyres

1 SCOPE

This specification prescribes the requirements, methods of sampling and tests for bicycle tyres intended for light and heavy duty purposes.

2 REFERENCES

CS 102 Presentation of numerical values
SLS 83 SI units and recommendations for use of their multiples and of certain other units.
SLS 297 Methods of testing vulcanized rubber
Part 2 Determination of tensile stress-strain properties

SLS 428 Random sampling method
SLS 900 Definitions of some terms and nomenclature of automobile tyres and rims
Part 1 Definitions of some terms used in the tyre industry pneumatic – tyres.
SLS 978 Tensile testing of metallic materials
Part 1 Method of test at ambient temperature
SLS 1064 Bicycle tyres and rims
Part 1 Tyre designations and dimensions
SLS 1323 Specification for temperatures, humidities and times for the conditioning and testing of rubber.
Part 1 General procedures for preparing and conditioning test pieces of rubber for physical test methods.

3 DEFINITIONS

For the purpose of this specification the following definitions shall apply : (See Figure **1**)

3.1 bead : The part of a tyre which is shaped to fit the rim. It has a core made of one or several essentially inextensible strands with plies wrapped around the core.

3.2 carcass : The rubber-bonded cord structure of a tyre integral with the bead which contains the inflation pressure.

3.3 cord : Textile or non-textile strands (threads) used in various components of the tyre carcass, plies etc.

3.4 overall diameter : The diameter of an inflated tyre at the outermost surface of the tread.

3.5 overall width : The linear distance between the outside of the sidewalls of an inflated tyre including elevations due to labelling (markings), decorations or protective bands or ribs

3.6 ply : A layer of rubber-coated parallel cords

3.7 section height : Half the difference between the overall diameter and the nominal rim diameter.

3.8 section width : The linear distance between the outside of the sidewalls of an inflated tyre excluding elevations due to labelling (markings), decorations or protective bands or ribs

3.9 sidewall : The part of a tyre between the tread and the bead.

3.10 tread : The part of a tyre which normally comes in contact with the ground.

4 TYPES

The bicycle tyres shall be of following two types

a) Type 1 - Light duty bicycle tyres
b) Type 2 - Heavy duty bicycle tyres

5 TYRE DESIGNATION

5.1 Tyre size designation

The tyre size designation for bicycle tyres shall be as given in **SLS 1064 : Part 1**.

5.2 Old marking

In the old system of marking, the following characteristics are indicated in the given order :

Nominal tyre diameter in inches	Tyre construction code indicated by "X"	Nominal section width in inches

For example :

A tyre having a nominal tyre diameter 28 inches and nominal section width 1 ½ inches will be marked as 28 x 1 ½ .

6 CONSTRUCTION

6.1 Bicycle tyres shall consist of a carcass enclosing two single steel wire bead rings or two multiple steel wire bead rings and a tread strip of suitable compounded rubber (see Figure **1**). In the case of ply method of building a tyre, the plies shall overlap at the crown.

6.2 The dimensions of bicycle tyres shall be compatible with the appropriate rim sizes (see **7.1**).

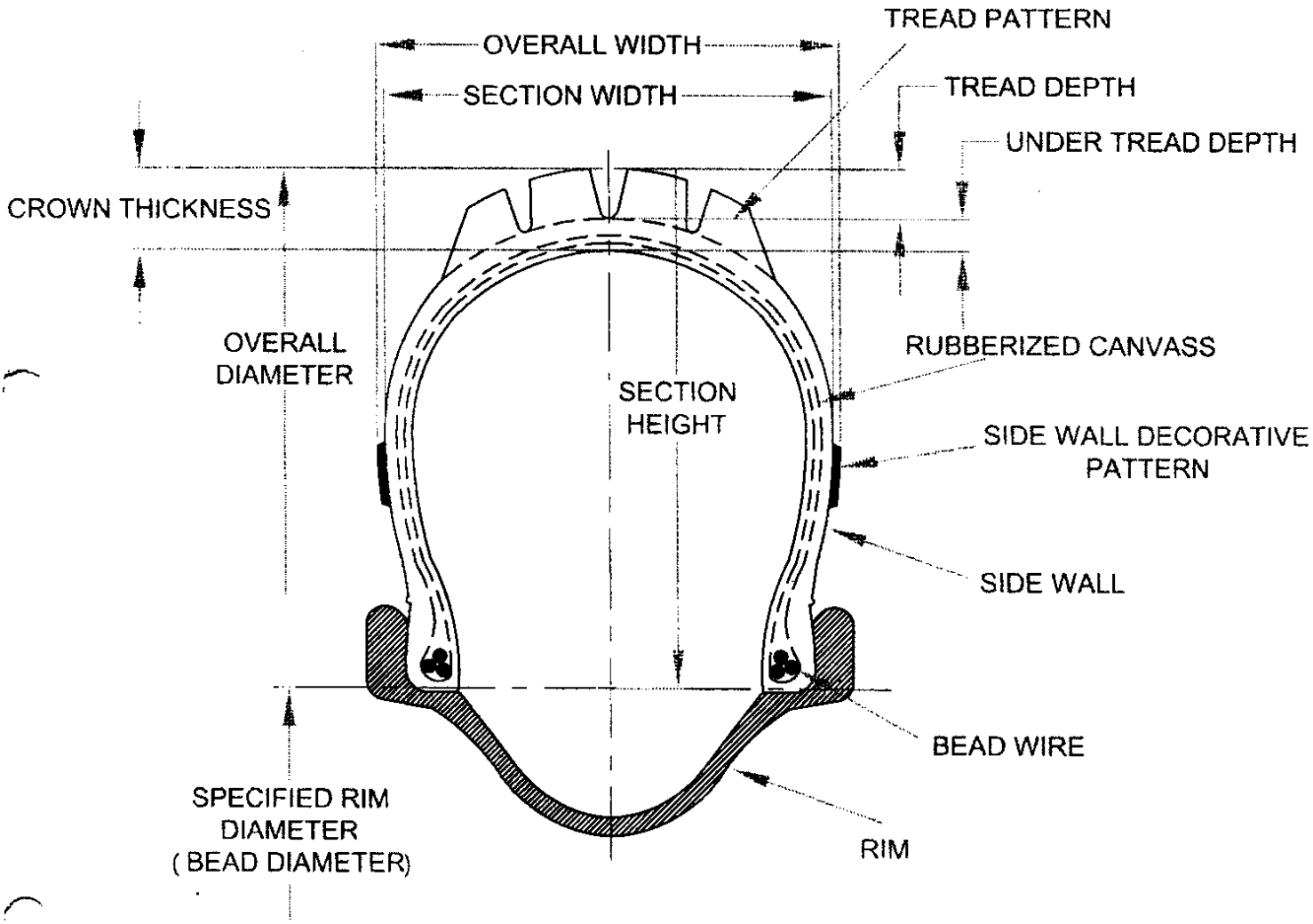

FIGURE 1 – Typical section of a bicycle tyre

7 REQUIREMENTS

7.1 Dimensions

Dimensions of the light duty and heavy duty tyres, when inflated and measured in accordance with the conditions given in **B.1** shall comply with the section width and the overall diameter calculated as given in **SLS 1064 :Part 1**.

A tolerance of ± 3.0 mm shall be permitted on the section width.

A tolerance of ± 3.0 mm shall be permitted on the overall diameter.

7.2 Other requirements

The tyres shall comply with the requirements specified in Table **1** when tested in accordance with the method specified in Column **5** of Table **1**.

TABLE 1 – Requirements of bicycle tyre

Sl. No. (1)	Characteristic (2)	Light duty bicycle tyres (3)	Heavy duty bicycle tyres (4)	Method of test (5)
i)	Crown thickness, mm, min.	4.8	5.5	B.2
ii)	Cord strength, N, min.	20	20	B.3
iii)	Casing strength per 25 mm width, kN, min.	1.20	2.20	B.4
iv)	Breaking load of each bead wire comprising of a single coil or multiple coils, kN, min.	2.50	3.50	SLS 978: Part 1
v)	Bending strength for bead wire, right angle bends, min.	10	10	B.5

7.3 Rubber compound

The rubber compound removed from the tread or sidewall portion of the tyre shall satisfy the requirements specified in Table **2** when tested in accordance with the method specified in Column **4** of Table **2**.

TABLE 2 – Requirements of rubber compound

Sl. No. (1)	Characteristic (2)	Requirements of rubber compound (3)	Method of test (4)
i)	Tensile strength, MPa		
	a) before ageing, min.	12.0	B.6
	b) change after ageing at $70 \pm 1\ ^0$C for 168 ± 2 h, max	± 20 %	B.7
ii)	Elongation at break		
	a) before ageing, min.	300 %	B.6
	b) change after ageing at $70 \pm 1\ ^0$C for 168 ± 2 h, max.	+ 10 % - 30 %	B.7

8 MARKING

The tyres shall be marked legibly and indelibly with the following on the side wall :

a) Tyre size designation. Old marking may be added in parentheses "(…….)" after the tyre size designation (see **5.2** and **SLS 1064:Part 1**) ;

b) Type (see Note) in the case of heavy duty tyres ;

c) Name of manufacturer and country of origin ;

d) Batch or lot or code number. ; and

e) Brand name or trade name or registered trade mark.

NOTE : *All unmarked tyres are categorized as light duty tyres.*

9 METHODS OF TEST

The methods of test for the determination and calculation of various characteristics specified in this specification are given in Appendix **B**.

NOTE : *Attention is drawn to certification marking facilities offered by the Sri Lanka Standards Institution. See the inside back cover of the standard.*

APPENDIX A
COMPLIANCE OF A LOT

The sampling scheme given in this Appendix should 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

In any consignment, all the bicycle tyres of the same type and same tyre size designation and manufactured by the same organization under relatively similar conditions of manufacture shall be separated in groups of 5 000 tyres or less and each group shall constitute a lot.

A.2 SCALE OF SAMPLING

A.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 tyres to be selected from each lot shall depend on the size of the lot and shall be in accordance with Columns **1** and **2** of Table **3**.

A.2.2 The required number of tyres shall be chosen at random. In order to ensure randomness of selection, a random number table specified in **SLS 428** shall be used.

TABLE 3 – Scale of sampling

Lot size (1)	No. of tyres to be selected (2)	Permissible No. of defective tyres (3)	Sub sample (4)
Up to 500	10	0	3
501 to 1 000	15	1	3
1 001 to 3 000	32	2	5
3 001 to 5 000	50	3	5

A.3 TESTING OF SAMPLES

A.3.1 Non – destructive tests

Each of the tyres selected according to **A.2.2** shall be tested for dimensions specified in **7.1** and crown thickness specified in i) of Column **1** of Table **1**. The tyre whose dimensions or crown thickness fails to meet the specified requirements, shall be considered as defective.

A.3.2 Destructive tests

From each lot of tyres that are found to conform to conditions specified in **A.4.1**, a sub-sample of size as given in Column **4** of Table **3** shall be drawn at random. Each tyre of the sub-sample shall be tested for requirement specified in ii) to v) of Column **1** of Table **1** and **7.3**. The required test pieces shall be taken out of the tyres in the prescribed manner.

A.4 CRITERIA FOR CONFORMITY

A.4.1 Non-destructive tests

The lot shall be declared as conforming to the requirements of dimensions and crown thickness, if the number of defective tyres is not greater than the corresponding permissible number of defectives given in Column **3** of Table **3,** when tested according to **A.3.1.** Only such a lot shall be subjected to destructive testing as given in **A.3.2**.

A.4.2 Destructive tests

The lot shall be declared as conforming to all the requirements of this specification, if the test results for different characteristics specified in ii) to v) of Column **1** of Table **1** and **7.3** are all found satisfactory, when tested according to **A.3.2.**

APPENDIX B
METHODS OF TEST

B.1 DIMENSIONS

B.1.1 All measurements are taken with the tyre inflated to 315 kPa on the appropriate rim, with wheel unloaded.

B.1.2 The tyre circumference is measured on the surface of tread pattern at the crown of the cover (see Figure **1**) to the nearest millimeter and overall diameter shall be calculated.

B.1.3 The section width (see Figure **1**) is measured at five different points chosen at random, avoiding any engraving or decorative pattern on the side of the wall of the tyre. The addition of such engraving or decorative pattern shall not increase the maximum section width by more than 1.0 mm.

B.1.4 The mean of the five values shall be reported as the section width.

B.2 CROWN THICKNESS

B.2.1 The total crown thickness of the tyre shall be measured by means of a micrometer screw gauge at five randomly chosen points.

B.2.2 The mean of the five values shall be reported as the crown thickness.

B.3 CORD STRENGTH

B.3.1 20 cords from the finished cover are stripped and tested for strength on a pendulum type single cord testing machine, whose rate of traverse of the moving jaw is 300 ± 25 mm/min.

B.3.2 The cords are conditioned for 24 h at a temperature of 27 ± 2 ^{0} C and relative humidity 65 ± 5 per cent prior to testing and test for breaking load, if possible, in that atmosphere or immediately after removal from the atmosphere. The length of cords between jaws shall be 100 mm.

B.3.3 The mean breaking load of cords from the casing, in N, shall be reported.

B.4 CASING STRENGTH

At four equally spaced distance around the tyre, the number of cords per 25 mm at the crown of the tyre are measured at right angles to the cord layers and the mean calculated.
Multiply this value by the number of plies. The mean thus obtained is multiplied by the mean breaking load obtained in **B.3.3** and this value shall be reported as the casing strength.

B.5 DENISON BEND TEST FOR THE BEAD WIRES

The wire excluding the portion containing the welded and/or nippled joint is subjected to at least 10 right-angle bends at the rate of 2 bends (90 degree) per second with a bending radius of six times the diameter of the wire (see Figure **2**). Observe the wire for any cracks or material failure.

NOTE : *1, 2, 3, etc., in the figure show each right--angle bend.*

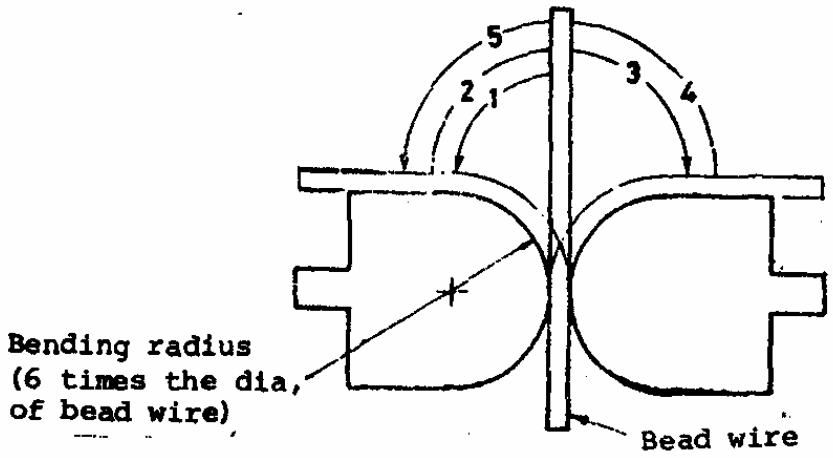

FIGURE 2 – Denison bend test

B.6 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 three dumb-bell test pieces prepared by stripping off portion of tread or side wall rubber. 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.

B.7 ACCELERATED AGEING

Three dumb-bell test pieces shall be prepared as indicated in **B.6** and aged in a normal oven in accordance with **SLS 1323** at **70 ± 1** ^{0}**C** for **168 ± 2 h.** Remove them from the oven and condition at a temperature of 27 ± 2 ^{0} C for at least 16 h and subject them to test for determination of tensile strength and elongation at break in accordance with **B.6** and the mean shall be calculated. The change after ageing shall be reported as a percentage.

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI *which includes surveillance inspection of the factory, testing of both factory and market samples.*

Further particulars of the terms and conditions of the permit may be obtained from the Sri *Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.*

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SRI LANKA STANDARDS INSTITUTION

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The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.

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