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Indian Standard

SPECIFICATION FOR CYCLE TYRES

(First Revision)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 1

Price Rs 4·00

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Indian Standard

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(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 15 December 1969, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Chemical Division Council.

0.2 This specification was originally published in 1963 to cover only cycle tyres. In this revision, the requirements for tyres intended for heavy duty purposes such as cycle rickshaw tyres have been included. The requirement for crown thickness has been introduced, and the methods of test have been brought in line with the various methods of tests on vulcanized rubbers published by ISI.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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1. SCOPE

1.1 This standard prescribes the requirements, methods of sampling and test for four sizes of cycle tyres intended for heavy and light duty purposes.

2. TYPES

2.1 This standard covers two grades of cycle tyres as follows:

Grade 1 — Heavy duty, and

Grade 2 — Light duty.

*Rules for rounding off numerical values (*revised*).

3. CONSTRUCTION

3.1 Cycle tyre shall consist of a rubberized cord fabric casing enclosing two single steel wire bead rings or two multiple steel wire bead rings and a tread strip of suitably compounded rubber (*see* Fig. 1).

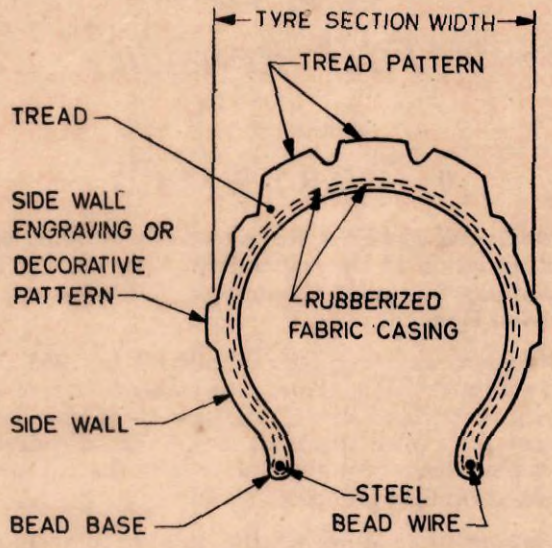


FIG. 1 TYPICAL SECTION OF A BICYCLE TYRE, SHOWING COMPONENTS

3.2 The dimensions of cycle tyres shall be compatible with the appropriate rims specified in IS : 624-1961*. The essential dimensions of the rims as given in IS : 624-1961* are given in Appendix A, for guidance.

4. REQUIREMENTS

4.1 Requirements for Grade 1 Cycle Tyres

4.1.1 *Dimensions* — The dimensions of tyres, when inflated and measured in accordance with the conditions given in **7.1**, shall be as follows:

Size	*Circumference*	*Section Width*
28 × 1½	2 250 ± 20 mm	38·0 ± 3·0 mm

*Specification for bicycle rims (*revised*).

4.1.2 *Crown Thickness* — Total thickness at crown shall be minimum 5·5 mm, when measured by a micrometer gauge.

4.1.3 *Cord Strength* — Cords from the casing shall show an average breaking load not below 2·0 kg when tested according to **7.2.**

4.1.4 *Casing Strength* — The material shall give a casing strength of not less than 225 kg per 25 mm width when calculated according to **7.3.**

4.1.5 *Breaking Load of Bead Wires* — The minimum ultimate breaking load of each bead wire comprising of a single or multiple coils shall be 350 kg when tested at any point, including at the joint of the bead wire.

4.1.6 *Bending Strength for Bead Wire* — The wire excluding the portion containing the welded and/or nippled joint shall withstand at least 10 right angle bends when tested according to **7.4.**

4.1.7 *Requirements for the Rubber Compound* — Compound removed from the tread or side wall portion of the tyre shall be tested for tensile strength, elongation at break, tension set and ageing.

4.1.7.1 *Tensile strength and elongation at break* — When tested according to **7.5**, the tensile strength and elongation at break of the rubber used for cycle tyre shall be as follows:

Tensile strength, kgf/cm^2, *Min*	100
Elongation at break, percent, *Min*	300

4.1.7.2 *Tension set* — The tension set of the rubber used for cycle tyres when tested according to **7.6** shall not be more than 20 percent.

4.1.7.3 *Accelerated ageing* — The tensile strength of the rubber used for cycle tyres shall not vary by more than $\pm$ 20 percent and its elongation at break shall not vary by more than $^{+10}_{-30}$ percent from the original values when tested according to **7.7.**

4.2 Requirements for Grade 2 Cycle Tyres

4.2.1 *Dimensions* — The dimensions of tyres, when inflated and measured in accordance with **7.1** shall be as given in Table 1.

4.2.2 *Crown Thickness* — Total thickness at crown shall be minimum 4·8 mm, when measured by a micrometer gauge.

4.2.3 *Cord Strength* — Cords from the casing shall show an average breaking load not below 2·0 kg when tested according to **7.2.**

TABLE 1 DIMENSIONS FOR TYRES

(*Clause* 4.2.1)

NOMINAL SIZE (1)	CIRCUMFERENCE (2)	SECTION WIDTH (3)
	mm	mm
28 × 1½	2 250 ± 20	38·0 ± 3·0
28 × 1¾	2 225 ± 20	43·0 ± 3·0
26 × 1½	2 090 ± 20	38·0 ± 3·0
26 × 1¾	2 070 ± 20	43·0 ± 3·0

4.2.4 *Casing Strength* — The material shall have a casing strength of not less than 120 kg per 25 mm width when calculated according to **7.3.**

4.2.5 *Breaking Load of Bead Wires* — The ultimate breaking load of each bead wire comprising of a single or multiple coils shall be minimum 250 kg when tested at any point including at the joint of the bead wire.

4.2.6 *Bending Strength for Bead Wire* — The wire excluding the portion having welded and/or nippled joint shall withstand at least 10 right angle bends when tested according to **7.4.**

4.2.7 *Requirements for the Rubber Compound* — Compound removed from the tread or side wall portion of the tyre shall be tested for tensile strength, elongation at break, tension set and ageing.

4.2.7.1 When tested according to **7.5,** the tensile strength and elongation at break of the rubber used for cycle tyre shall be as follows:

Tensile strength, kgf/cm², *Min*	80
Elongation at break, percent, *Min*	300

4.2.7.2 *Tension set* — The tension set of the rubber used for cycle tyres when tested according to **7.6** shall not be more than 20 percent.

4.2.7.3 *Accelerated ageing* — The tensile strength of the rubber used for cycle tyres shall not vary more than ± 20 percent and elongation at break shall not vary by more than $^{+\ 10}_{-\ 35}$ percent from the original values when tested according to **7.7.**

5. MARKING

5.1 The tyres shall be marked with nominal size, grade, the name of the manufacturer or abbreviations or trade-mark, and the country of origin on the side wall.

5.1.1 The tyres may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system, which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. SAMPLING AND TEST FOR CONFORMITY

6.1 For the purpose of ascertaining the conformity of cycle tyres in a consignment to this specification, the scale of sampling and the criterion for conformity shall be subject to agreement between the supplier and the purchaser. A recommended sampling procedure is given in Appendix B for guidance.

7. TEST METHODS

7.1 Dimensions

7.1.1 Take all measurements with the tyre inflated to 3·2 kgf/cm^2 on a rim conforming to IS : 624 - *1961**, with wheel unloaded.

7.1.2 Measure the tyre circumference on the surface of tread pattern at the crown of the cover (*see* Fig. 1).

7.1.3 Measure the tyre section width (*see* Fig. 1) avoiding any engraving or decorative pattern on the side wall of the tyre. The addition of such engraving or decorative pattern shall not increase the maximum tyre section width by more than 1·0 mm.

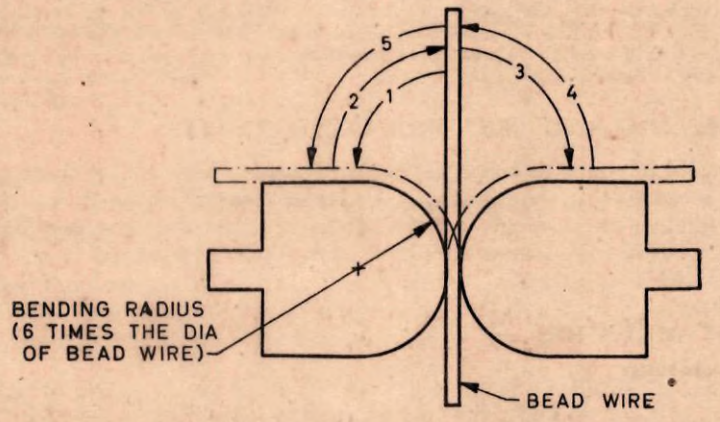
7.2 Cord Strength — Strip 20 cords from the finished cover and test for strength on a pendulum type single cord testing machine whose rate of traverse of the moving jaw is 300 mm/min. Condition the cords for 24 hours at a temperature of 27° ± 2°C and relative humidity 65 ± 5 percent prior to testing (*see* IS : 196-1966†) and test for breaking load, if possible, in that atmosphere or immediately after removal from the

*Specification for bicycle rims (*revised*).
†Atmospheric conditions for testing (*revised*).

atmosphere. The length of cords between jaws should be normally 25 cm. Where not possible, the length of cords between jaws may be 10 cm.

7.3 Casing Strength — Multiply the average breaking load of cord obtained in **7.2** by the number of cords per 25 mm at the crown of the tyre measured at right angles to the cord layers. Take the average of four readings equally spaced round the tyre for the measurement of the number of cords per 25 cm.

7.4 Denison Bend Test for the Wires — Subject the wire to at least 10 right-angle bends at the rate of 2 bends (90°) per second with a bending radius of six times the diameter of the wire (*see* Fig. 2).



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

FIG. 2 DENISON BEND TEST

7.5 Tensile Strength and Elongation at Break — Determine tensile strength and elongation at break on Type 1 dumb bell test pieces, prepared by stripping off portion of tread or side wall rubber, in accordance with IS : 3400 (Part I)-1965*.

7.6 Tension Set — Strip off portion of tread or side wall rubber. Remove tread or side wall design by lifting and then cut therefrom a dumb bell test piece conforming to type 1 of IS : 3400 (Part I)-1965*. Mark on the parallel-sided test piece, $6{\cdot}0\ ^{+0{\cdot}4}_{-0{\cdot}0}$ mm wide, reference lines 25 mm apart, and stretch it on a suitable apparatus to the elongation figure of 150 percent. Keep it in this position for 15 minutes. Then remove the

*Methods of test for vulcanized rubbers: Part I Tensile stress-strain properties.

test piece and measure the length between the two difference lines after one hour. Calculate the percentage increase in length from the initial length of 25 mm.

7.7 Ageing Test — Prepare dumb bell test pieces conforming to Type 1 IS : 3400 (Part I)-1965* by stripping off portion of tread or side wall rubber. Age them at 70° ± 1°C for 7 days in an air oven in accordance with IS : 3400 (Part IV)-1965† and subject them to tests for determining tensile strength and elongation at break after conditioning them, in accordance with IS : 3400 (Part I)-1965*.

APPENDIX A

(*Clause* 3.2)

DIMENSIONS OF RIMS

A-1. DIMENSIONS

A-1.1 The dimensions of appropriate rims, with which cycle tyres prescribed in this standard are to be compatible are given in Table 2.

TABLE 2 DIMENSIONS OF RIMS

Nominal Size of Tyre Fitting to Rim	Circumference at Bead Seat	Tolerance on Circumference
(1)	(2)	(3)
	mm	mm
26 × 1½	1 835	+ 0·50
28 × 1½	1 994	− 0·75
26 × 1¾	1 794	
28 × 1¾	1 956	

*Methods of test for vulcanized rubbers: Part I Tensile stress-strain properties.
†Methods of test for vulcanized rubbers: Part IV Accelerated ageing.

APPENDIX B

(*Clause* 6.1)

SAMPLING OF CYCLE TYRES AND CRITERIA FOR CONFORMITY

B-1. SCALE OF SAMPLING

B-1.1 Lot — In any consignment, all the cycle tyres of the same grade and nominal size manufactured by the same firm under relatively similar conditions of manufacture shall be separated in groups of 5 000 tyres or less and each such group shall constitute a lot.

B-1.2 Test 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 for this purpose shall be in accordance with col 1 and 2 of Table 3.

TABLE 3 SCALE OF SAMPLING

Lot Size	No. of Tyres to be Selected	Permissible Number of Defective Tyres
N	*n*	
(1)	(2)	(3)
Up to 500	10	Nil
501 to 1 000	15	1
1 001 to 3 000	30	1
3 001 to 5 000	50	3

B-1.3 Required number of tyres shall be selected at random. In the case of lots where the tyres are stacked, the following procedure is recommended for use:

Starting from any tyre, count them in any order 1, 2, 3, ..., etc, up to *r* and so on, where *r* is the integral part of N/n. Every *r*th tyre thus counted shall be withdrawn to constitute the sample.

B-2. NON-DESTRUCTIVE TESTS

B-2.1 Each of the tyres selected according to **B-1.3** shall be tested for circumference, section width as specified in **4.1** and **4.2** and crown thickness. Any tyre whose circumference, section width, or crown thickness fails to meet the specified requirements shall be considered as a defective.

B-2.1.1 If the number of defective tyres found is not greater than corresponding number of permissible defectives given in col 3 of Table 3, the lot shall be declared as conforming to the requirements of the dimensions. Only such a lot shall be further examined for defective type of characteristics according to **B-3.**

B-3. DESTRUCTIVE TESTS

B-3.1 From each of the lot of tyres that are found to conform in **B-2.1.1,** one tyre shall be chosen at random. The required test pieces for all destructive tests for requirements in **4.1** and **4.2** shall be taken out from the tyre in the prescribed manner. The test pieces so obtained shall be subjected to the various destructive tests described in **7.2** to **7.7.**

B-3.1.1 The lot shall be declared as conforming to the requirements of this specification if the test results for different characteristics (*see* **B-3.1**) are all found satisfactory. In case the test results for any characteristic fail to meet the specified requirements, two more tests shall be conducted for that characteristic on test pieces obtained from two different randomly chosen tyres in the lot and only on finding these two tests satisfactory the lot shall be considered as conforming to the requirements of that characteristic.

INDIAN STANDARDS

ON

Rubber Products

IS:		Rs
637-1965	Rubber tubings for general purposes (*revised*)	2·0
638-1965	Sheet rubber jointing and insertion rubber jointings (*revised*)	2·5
1685-1960	Whiting for rubber industry	2·0
1741-1960	Latex foam rubber products	4·0
1867-1961	Rubber hot-water bottles	2·5
2414-1969	Cycle tyres (*revised*)	4·0
*2415-1969	Cycle rubber tubes (*revised*)	—
3565-1966	Rubber teats for feeding bottles	2·5
3692-1965	Rubber closures (pharmaceutical)	3·0
3701-1966	Rubber protective sheaths (condoms)	2·5
3867-1966	Rubber ice bags	3·5
4135-1967	Hospital rubber sheetings	5·0
4148-1967	Surgical rubber gloves	3·5
4149-1967	Post-mortem rubber gloves	3·5
4770-1968	Rubber gloves for electrical purposes	6·0
5079-1969	Rubber valve-tubing for cycle tube valves	2·0
*5192-1969	Vulcanized rubber compounds	—
*5193-1969	Rubber sealing rings for domestic fruit and vegetable preserving jars	—
*5270-1969	Rubber grommets for general purposes	—
*5382-1969	Rubber sealing rings for gas mains, water mains and sewers ...	—
*5424-1969	Rubber mats for electrical purposes	—

*Under print.