*भारतीय मानक*

***Indian Standard***

**IS 13098 : 2024**

# स्वचल वाहन — वायवीय टायरों के लिए ट्यूब — विशिष्टि

*( दूसरा पुनरीक्षण )*

# Automotive Vehicles — Tubes for Pneumatic Tyres — Specification

*( Second Revision )*

ICS 83.160.01



भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

**July 2024** **Price Group 5**

Automotive Tyres, Tubes and Rims Sectional Committee, TED 07

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Tyres, Tubes and Rims Sectional Committee had been approved by the Transport Engineering Division Council.

This standard was first published in 1991. The standard was first revised in 2012 after due consideration of the practices prevalent in the industry and also to keep pace with the latest technological advancement in the field of tubes for automotive vehicles.

In the first revision, following were some of the salient features:

a) Requirement of rubber content in the raw polymer has been done away with;
b) Requirements of tensile strength of body of tube and air permeability test have been done away with;
c) Requirements of accelerated ageing test have been added; and
d) Marking clause has been made more explicit by adding identification scheme for month and year of manufacturing.

In this revision, marking width has been changed.

In the formulation of this standard, considerable assistance has been derived from JIS D 4231 : 1995 ‘Inner tubes for automobiles tyres’, issued by the Japanese Industrial Standards Committee (JISC).

The composition of the Committee responsible for the formulation of this standard is given in Annex E.

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 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard*

# AUTOMOTIVE VEHICLES — TUBES FOR PNEUMATICTYRES — SPECIFICATION

*( Second Revision )*

## 1 SCOPE

This standard specifies the requirements of tubes for pneumatic tyres for automotive vehicles covered by L1, L2, L5, M, N and T categories of vehicles as defined in IS 14272.

## 2 REFERENCES

The standards given below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards:

| *IS No.* | *Title* |
|---|---|
| IS 3400 | Methods of test for vulcanized rubber: |
| (Part 1) : 2021/ ISO 37 : 2017 | Tensile stress-strain properties (*fourth revision*) |
| (Part 4) : 2012/ ISO 188 : 2011 | Accelerated ageing and heat resistance (*third revision*) |
| IS 9081 : 2017 | Automotive vehicles — Valves and valve accessories for pneumatic tyres — Specification (*fifth revision*) |
| IS 14272 : 2011 | Automotive vehicles — Types — Terminology |

## 3 MATERIALS, FORM AND FIT

**3.1** The tubes shall be manufactured from an appropriate rubber compound and vulcanized to an endless annular ring shape and shall be with a valve or spud conforming to IS 9081.

**3.2** The tubes shall be classified into the following two classes:

a) Class A — Butyl rubber/halo-butyl rubber and its derivative and blends; and

b) Class B — Natural rubber and its derivatives and blends.

**3.2.1** A blend shall be named after prime rubber whose percentage by volume is more than 60 percent in the compound.

**3.3** The tube shall be uniform in thickness, free from flaws and designed to fit in a tyre of the corresponding nominal size.

**3.3.1** *Thickness Uniformity*

Except for the region at or near lap or splice, the thickness of the tube, when measured along the longitudinal direction of the tube, shall not vary from the arithmetic mean of the readings by ± 17.5 percent at any point.

**3.3.2** The arithmetic mean of the tube thickness shall be determined for the points which lie in the same circumferential line or the length of the tube (*see* Fig. 1). The thickness variation shall be determined for each of the four circumferential lines, that is crown centre, base centre, right side wall centre and left side wall centre.

## 4 TEST REQUIREMENTS

**4.1** Each type of tube shall conform to the following requirements.

**4.1.1** *Elongation*

Dumb-bell test pieces punched out in circumferential direction of the tube when tested in accordance with IS 3400 (Part 1) and Annex A shall have elongation at break not less than 450 percent for 'Class A' tubes and not less than 500 percent for 'Class B' tubes.

**4.1.2** *Strength of Splice*

Tensile strength of splice determined on dumb-bell in accordance with IS 3400 (Part 1) and Annex A shall not be less than 35 kgf/cm² for Class A tubes and 85 kgf/cm² for Class B tubes.

**4.1.3** *Set After Ageing*

Dumb-bell test pieces punched out in circumferential direction of the tube when subjected to test conditions and test procedure in accordance with Annex B shall have set after aging not more than 35 percent for Class A tubes and not more than 25 percent for Class B tubes.

**4.1.4** *Accelerated Ageing*

Dumb-bell test pieces punched out in circumferential direction of the tube body when subjected to accelerated ageing test as (100 ± 2) °C for 48 h and tested in accordance with IS 3400 (Part 1), IS 3400 (Part 4) and Annex C shall not have drop in elongation at break more than 35 percent from original, for both Class A and Class B tubes.

## 5 AIR TIGHTNESS

Each type of tube with valves attached shall be inflated to just round out and tested in water for the evidence of any leakage. Alternatively, vacuum leak or pressure-less detection method may be used as per the manufacturers' practice in lieu of the water test method. The tube shall not show any leakage.

## 6 MARKING

**6.1** Tubes shall be permanently and legibly marked on the outside with the following:

a) Manufacturer's name or trade-name;

b) Tyre size designation or designations for which the tube is applicable. The size designation description shall contain:

1) Nominal tyre section width code;
2) Nominal rim diameter code;
3) Nominal aspect ratio, if applicable;
4) 'R' to identify radial tyre application; and
5) Character '–' or the letter 'D' to identify bias tyre application.

c) Indication of month and year of manufacturing as per scheme given in Annex D; and

d) Word 'BUTYL' and or blue line of 2.0 mm *Min* width to identify tube of Class A.

### 6.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

## 7 SAMPLING

The scale of sampling and the criteria of acceptance shall be as agreed to between the manufacturer and the purchaser.

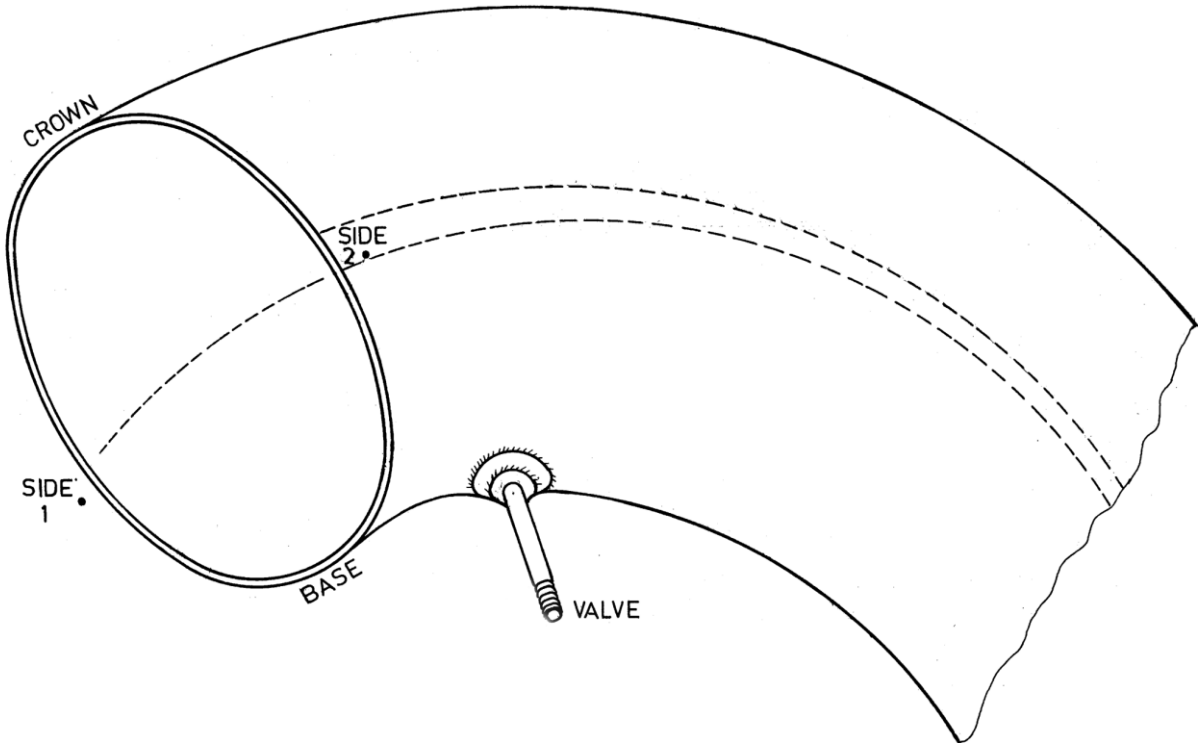



FIG. 1 MEASUREMENT OF TUBE THICKNESS UNIFORMITY

## ANNEX A

(*Clauses* 4.1.1 *and* 4.1.2)

## PREPARATION OF DUMB-BELL TEST SPECIMEN FROM TUBE

### A-1 PREPARATION OF TEST PIECES

**A-1.1** Test pieces shall be dumb-bell shape and to be taken in the circumferential direction of a tube, from portion except the splice joint for the elongation test. For testing strength of joint splice, dumb-bell shall be punched out from the splice joint as the centre as shown in the Fig. 2.

**A-1.2** The number of test pieces shall be 4 each from a tube. Size of test pieces shall be 6 mm (or 13 mm) dumb-bell test pieces, for measurement of tensile strength of splice and elongation of body.

**A-1.3** The mean value of both ends of parallel parts shall be used as the thickness of test pieces for calculating the tensile strength of splice joints.

**A-1.4** For elongation and tensile strength of joints, measured median value of 4 test pieces shall be used.

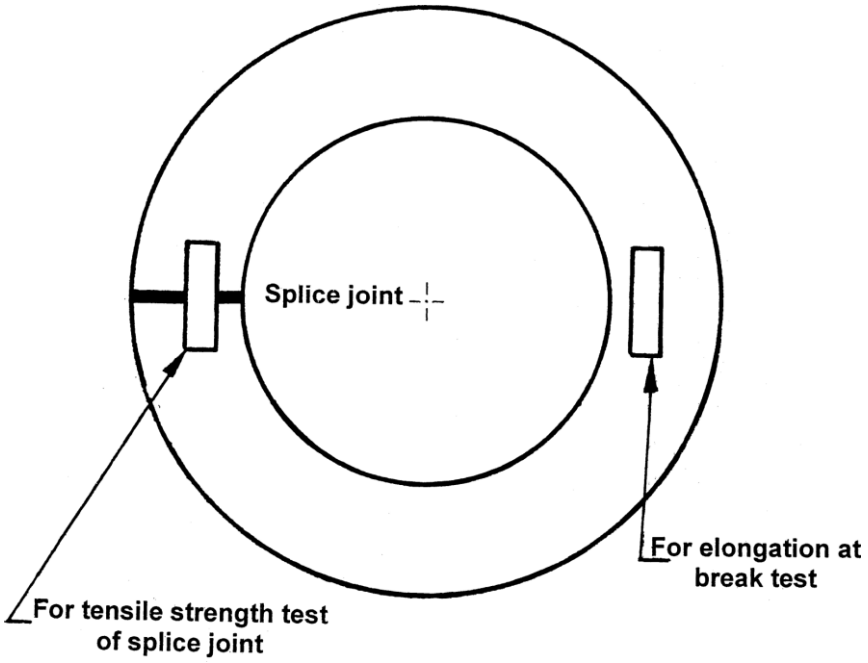



FIG. 2 METHOD OF TAKING TEST PIECES

## ANNEX B

(*Clause* 4.1.3 *and* C-1)

## TEST CONDITIONS AND TEST PROCEDURE FOR SET AFTER AGEING

### B-1 TEST CONDITIONS FOR AGEING

a) Type of oven — Air oven;

b) Temperature — 104 °C to 110 °C;

c) Time to be kept — 5 h in oven;

d) Dimensions of test piece — 6 mm wide 25 mm test piece long measured on 6 mm dumb-bell; and

e) Stretch of test piece — 50 percent during ageing.

### B-2 DETERMINATION OF THE SET

The test piece shall be removed from oven and allowed to cool under tension for 2 h. The tension shall be released and percentage set measured after a rest of not less than 8 h or not more than 24 h.

## ANNEX C

(*Clause* 4.1.4)

## ACCELERATED AGEING TEST

### C-1 PREPARING THE TEST PIECES

Prepare 4 test pieces as specified in Annex B and subject them to the accelerated ageing for (100 ± 2) °C for 48 h.

### C-2 MEASURING THE ELONGATION AT BREAK AND CALCULATION OF PERCENTAGE DROP IN ELONGATION

Measure the elongation at break in accordance with IS 3400 (Part 1) and then calculate the percentage drop in elongation at break compared with respective un-aged elongation at break from the following formula:

$$PDEB = \frac{(L_a - L_o)}{L_o} \times 100$$

where

*PDEB* = percent drop in elongation at break after ageing;

*La* = median value of elongation at break percentage after ageing test; and

*Lo* = median value of elongation at break percentage before ageing test.

## ANNEX D

[*Clause* 6.1(c)]

## IDENTIFICATION SCHEME FOR MONTH AND YEAR OF MANUFACTURING

### D-1 IDENTIFICATION SCHEME

**D-1.1** Manufacturing month and year are engraved as per scheme depicted in Fig. 3 or printed as per **D-1.6**.

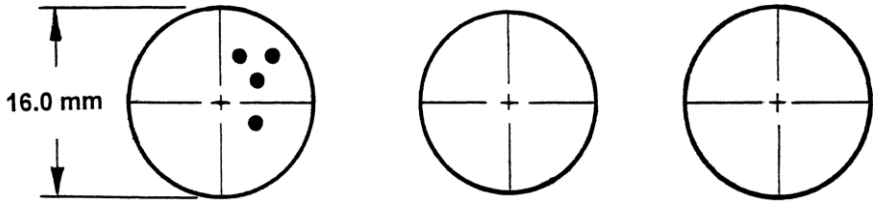
**D-1.2** Month code circle and year to be engraved not more than 100 mm away from the valve.

**D-1.3** Each month should be identified by a punch marking of at least 0.5 mm diameter in the respective quarter.

**D-1.4** After completing one-year, fresh identification shall be started again for the next year with next circle.

**D-1.5** After completing all three circles, re-engraving can be done after masking the previous engraving/punch marking.

**D-1.6** Alternative method which clearly indicates the week and year or month and year of manufacturing is also acceptable.




NOTE — Identification for April 2022 depicted in the drawing above. However, the four dots can be in any quadrant.

FIG. 3 SCHEME OF MARKING MONTH AND YEAR ON TUBE

## ANNEX E

(*Foreword*)

## COMMITTEE COMPOSITION

Automotive Tyres, Tubes and Rims Sectional Committee, TED 07

| *Organization* | *Representative(s)* |
|---|---|
| In Personal Capacity (*302, Celestina Apts. S N 1841, Rambhu Kambale Path Shivajinagar, Pune 411005*) | SHRI D. P. SASTE **(*Chairperson*)** |
| All India Motor Transport Congress, New Delhi | SHRI CHARAN SINGH<br>SHRI M. MURLI (*Alternate*) |
| Ashok Leyland Limited, Chennai | SHRI V. P. GAUTAM<br>SHRI MUTHU KUMAR N. (*Alternate*) |
| Association of State Road Transport Undertaking, New Delhi | SHRI R. CHANDRABABU<br>SHRI ULLAS BABU (*Alternate*) |
| Automotive Components Manufacturers Association (ACMA), New Delhi | SHRI UDAY HARITE<br>MS SEEMA BABAL (*Alternate*) |
| Automotive Research Association of India, Pune | SHRI A. AKBAR BADUSHA<br>SHRI V. S. KHARIRATKAR (*Alternate*) |
| Automotive Tyre Manufacturers Association, New Delhi | SHRI RAJIV BUDHIRAJA<br>SHRI T. C. KAMATH (*Alternate*) |
| Bajaj Auto Limited, Pune | SHRI R. NARASIMHAN<br>SHRI ARVIND V. KUMBHAR (*Alternate*) |
| Central Institute of Road Transport, Pune | SHRI N. R. TIWARI<br>SHRI V. D. CHAVAN (*Alternate*) |
| Directorate General of Quality Assurance, Ministry of Defence, New Delhi | SHRI P. J. WANJARI<br>SHRI R. K. TOLAMBIYA (*Alternate*) |
| Hero MotoCorp Limited, New Delhi | SHRI PIYUSH CHOWDHRY<br>SHRI FEROZ ALI KHAN (*Alternate*) |
| Indian Foundation of Transport Research and Training, New Delhi | SHRI S. P. SINGH<br>SHRI J. S. WALIA (*Alternate*) |
| Indian Rubber Manufacturers Research Association, Mumbai | DR K. RAJ KUMAR |
| Indian Tyre Technical Advisory Committee, New Delhi | SHRI V. K. MISRA<br>SHRI NITEESH SHUKLA (*Alternate*) |
| International Centre of Automotive Technology, Manesar | SHRI AMIT KUMAR KARWAL<br>SHRI VIJAYANTA AHUJA (*Alternate*) |
| Kalyani Maxion Wheels Chakan Private Limited, Pune | SHRI SUNIL BHATAMBREKAR |
| Mahindra & Mahindra Limited, Mumbai | SHRI RAM SINGH<br>SHRI VISHWANATHAN T. (*Alternate*) |
| Maruti Suzuki India Limited, Gurugram | SHRI GURURAJ RAVI<br>SHRI RAJ KUMAR DWIVEDI (*Alternate*) |

| *Organization* | *Representative(s)* |
|---|---|
| Minda Kosei Aluminum Wheels Private Limited, Bawal | SHRI HEMANT PARKHI<br>SHRI NARAYAN GIRI (*Alternate*) |
| Ministry of Commerce and Industry, Department for Promotion of Industry and Internal Trade, New Delhi | SHRI A. P. SINGH<br>SHRI S. S. GUPTA |
| Ministry of Road Transport & Highways, New Delhi | DIRECTOR (TECHNICAL) |
| National Automotive Testing and R and D Infrastructure Project, Indore | DR P. P. CHATTARAJ |
| Renault India Private Limited, Mumbai | SHRI RAJENDRA KHILE |
| Society of Indian Automobile Manufactures (SIAM), Delhi | SHRI P. K. BANERJEE<br>SHRI AMIT KUMAR (*Alternate*) |
| Steel Strips Wheels Limited, Chandigarh | SHRI VIMAL P. ANAND |
| Skoda Auto Volkswagen India Private Limited, Mumbai | SHRI MAKARAND BRAHME<br>SHRI MILIND JAGATP (*Alternate*) |
| Tata Motors Limited, Pune | SHRI P. S. GOWRISHANKAR<br>SHRI AMIT JAIN (*Alternate*) |
| Toyota Kirloskar Motor Private Limited, Bidadi | SHRI RAJU M.<br>SHRI VIJETH R. GATTY (*Alternate*) |
| Tractor Manufacturer`s Association, New Delhi | SHRI PHILIP KOSHI<br>SHRI MADHAV BHADE (*Alternate*) |
| Triton Valves Limited, Bengaluru | SHRI BHARATH CHANDRASHEKAR<br>SHRI DEEPAK H. V. (*Alternate*) |
| Vehicles Research & Development Establishment, Ahmednagar | SHRI S. PAL<br>SHRI P. P. MAHAJAN (*Alternate*) |
| Volvo Group India Private Limited, Bangalore | SHRI KARTHIK SARMA<br>SHRI PRAMOD KUMAR HUGAR (*Alternate*) |
| Wheels India Limited, Chennai | SHRI SUNDARARAJAN T. |
| BIS Directorate General | SHRI R. R. SINGH, SCIENTIST 'F'/SENIOR DIRECTOR AND HEAD (TRANSPORT ENGINEERING) [REPRESENTING DIRECTOR GENERAL (*Ex-officio*)] |

*Member Secretary*
SHRI AUGUST DUBEY
SCIENTIST 'B'/ASSISTANT DIRECTOR
(TRANSPORT ENGINEERING), BIS

**Bureau of Indian Standards**

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

**Copyright**



**Review of Indian Standards**

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

This Indian Standard has been developed from Doc No.: TED 07 (19699).

## Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

**BUREAU OF INDIAN STANDARDS**

**Headquarters:**

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
*Telephones*: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

| **Regional Offices:** | | *Telephones* |
|---|---|---|
| Central | : 601/A, Konnectus Tower -1, 6th Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002 | 2323 7617 |
| Eastern | : 8th Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091 | 2367 0012<br>2320 9474 |
| Northern | : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019 | 265 9930 |
| Southern | : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113 | 2254 1442<br>2254 1216 |
| Western | : Manakalya, 4th Floor, NTH Complex (W Sector), F-10, MIDC, Andheri (East), Mumbai 400093 | 283 25838 |

**Branches** : AHMEDABAD, BENGALURU, BHOPAL, BHUBANESHWAR, CHANDIGARH, CHENNAI, COIMBATORE, DEHRADUN, DELHI, FARIDABAD, GHAZIABAD, GUWAHATI, HARYANA (CHANDIGARH), HUBLI, HYDERABAD, JAIPUR, JAMMU, JAMSHEDPUR, KOCHI, KOLKATA, LUCKNOW, MADURAI, MUMBAI, NAGPUR, NOIDA, PARWANOO, PATNA, PUNE, RAIPUR, RAJKOT, SURAT, VIJAYAWADA.

Published by BIS, New Delhi