भारतीय मानक

Indian Standard

IS 637 : 2024

सामान्य प्रयोजनों के लिए रबर ट्यूबिंग — विशिष्टि

(तीसरा पुनरीक्षण)

Rubber Tubings for General Purposes — Specification

(Third Revision)

ICS 83.140.40

भारतीय मानक ब्यूरो
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Rubber and Rubber Products Sectional Committee, PCD 13

FOREWORD

This Indian Standard (Third Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Rubber and Rubber Products Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

This standard was first published in 1955 and subsequently revised in 1965 and 1994.

In the first revision, test methods of tensile strength, elongation at break and accelerated ageing were aligned by the methods published by ISO. The preparation of test pieces for physical testing from the slabs of identical rubber mix as the sample as well as the sample itself, where feasible, were permitted. It was also decided not to include the requirements for rubber tubing for hospital use, that come in intimate contact with such as blood plasma, injectives and medicines, where chances of contamination might occur which calls for stricter quality control.

During the second revision, only one type of tubing namely plain rubber tubing was covered deleting the pressure tubing type. The requirements for pressure tubing was included in IS 5680 : 1969 'Specification for rubber tubing for medical use'. Sizes up to 50 mm diameter for plain rubber tubing was also included. Only one grade of material was retained.

Third revision of this standard has been undertaken to incorporate various editorial corrections, updation of references to ensure accuracy and relevance in the revised standard.

This standard contains **4.1.2**, **5.1**, **7.1** and **A-1.3** which permits the purchaser to use his option for selection to suit his requirements, which calls for agreement between the purchaser and the supplier.

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

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

RUBBER TUBINGS FOR GENERAL PURPOSES — SPECIFICATION

(Third Revision)

1 SCOPE

This standard prescribes the requirements and the methods of sampling and test for plain rubber tubing for general purposes.

2 REFERENCES

The standards given below contain provision which through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated were valid. All standards are subjected to revision, and parties to agreements based on the standard are encouraged to investigate the possibility of applying the most recent edition 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 443 (Part 8) : 2023/ISO 4671 : 2022	Methods of test for rubber and plastics — Tubing, hoses and hose assemblies: Part 8 Rubber and plastics hoses and hose assemblies — Methods of measurement of the dimensions of hoses and the lengths of hose assemblies
IS 7503 : 2018/ ISO 1382 : 2012	Glossary of terms used in rubber industry

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 7503 shall apply.

4 REQUIREMENTS

4.1 Materials

4.1.1 The tubing shall be manufactured by extrusion from suitable compounded rubber and properly vulcanized. It shall be uniformly circular in section within reasonable manufacturing limits and shall be non-porous, of homogeneous character throughout, and free from grit, pitting and other visible defects.

4.1.2 The colour of the tubing shall be subject to agreement between the purchaser and the supplier.

4.2 Dimension

4.2.1 The internal diameter and wall thickness of plain rubber tubings, when tested in accordance with the test method prescribed in IS 443 (Part 8), shall be as specified in Table 1.

4.2.2 *Length*

Unless specified otherwise, the tubing shall be not less than 10 m long. The measurement of the length shall be done in accordance with the method prescribed in IS 443 (Part 8). The tolerance on any specified length of tubing shall be ± 1 percent.

4.3 Tensile Strength and Elongation

The tensile strength and elongation of plain rubber tubing, when tested in accordance with the test method prescribed in IS 3400 (Part 1), shall comply with the requirements as given in Table 2.

4.4 Tension Set

The tension set of the material for plain rubber tubing, when tested in accordance with **4.4.1**, shall not exceed the corresponding figures as given in Table 3.

4.4.1 *Test for Tension Set*

4.4.1.1 *Apparatus*

Any suitable apparatus capable of subjecting test pieces to constant elongation may be used. Care is needed to ensure that the test piece does not slowly creep out of the grips.

4.4.1.2 *Temperature*

The test shall be carried out at 27 °C ± 2 °C.

Table 1 Dimensions of Plain Rubber Tubings for General Purposes

(*Clause* 4.2.1)

Sl No.	Internal Diameter, in mm	Tolerance on Internal Diameter, in mm	Wall Thickness, in mm	Tolerance, in mm
(1)	(2)	(3)	(4)	(5)
i)	2.0	± 0.3	-	-
ii)	3.0	± 0.3	1.5	± 0.2
iii)	3.0	± 0.3	2.0	± 0.2
iv)	5.0	± 0.3	1.5	± 0.2
v)	5.0	± 0.3	2.0	± 0.2
vi)	6.3	± 0.3	2.0	± 0.2
vii)	6.3	± 0.3	2.5	± 0.2
viii)	8.0	± 0.3	2.0	± 0.2
ix)	8.0	± 0.3	2.5	± 0.2
x)	10.0	± 0.3	2.5	± 0.2
xi)	10.0	± 0.3	3.0	± 0.2
xii)	12.5	± 0.5	2.5	± 0.2
xiii)	12.5	± 0.5	3.5	± 0.5
xiv)	16.0	± 0.5	2.5	± 0.2
xv)	16.0	± 0.5	3.5	± 0.5
xvi)	20.0	± 0.5	3.0	± 0.2
xvii)	20.0	± 0.5	4.0	± 0.5
xviii)	22.0	± 0.5	3.0	± 0.2
xix)	22.0	± 0.5	4.0	± 0.5
xx)	25.0	± 0.5	4.0	± 0.2
xxi)	25.0	± 0.5	5.0	± 0.5
xxii)	32.0	± 0.5	4.0	± 0.2
xxiii)	32.0	± 0.5	5.0	± 0.5
xxiv)	38.0	± 0.5	5.0	± 0.5
xxv)	38.0	± 0.5	6.0	± 0.5
xxvi)	45.0	± 0.5	5.0	± 0.5
xxvii)	45.0	± 0.5	6.0	± 0.5
xxviii)	50.0	± 0.5	6.0	± 0.5
xxix)	50.0	± 0.5	7.0	± 0.5

Delete this straight line below ii).

Table 2 Requirements of Tensile Strength and Elongation of Plain Rubber Tubing

(*Clause* 4.3)

Sl No.	Characteristics	Requirement
(1)	(2)	(3)
i)	Tensile strength, kg/cm^2, *Min*	70
ii)	Elongation at break, percent, *Min*	300

Table 3 Requirements of Tension Set of the Material for Plain Rubber Tubing

(*Clause* 4.4)

Sl No.	Characteristics	Requirement
(1)	(2)	(3)
i)	Stretch, percent, *Max*	200
ii)	Tension set, percent, *Max*	15

4.4.1.3 *Procedure*

Stamp reference marks 50 mm apart on a parallel sided test pieces 6 mm wide, cut longitudinally and buffed smooth on both sides to uniform thickness. Fix it in the apparatus and stretch it 200 percent for plain rubber tubing for 10 min. Allow to recover on a smooth flat surface for 30 min and then measure the distance between the reference lines. Note the increase in this distance and calculate it as a percentage on the original length.

4.5 Accelerated Ageing Test

After ageing at (70 ± 1) °C for a period of 168 h, in accordance with the method prescribed in IS 3400 (Part 4), the tensile strength and elongation at break of the material for plain rubber tubings shall not vary by more than - 25 percent and $\frac{+0}{-30}$ percent respectively of the corresponding values obtained before ageing, when tested in accordance with the method prescribed in IS 3400 (Part 1).

NOTE — Dumb bell test pieces shall be used for the testing.

4.6 Resistance to Ageing Under Tension

After ageing, in accordance with below, material shall show no signs of cracking or other evidence of failure of the stretched part.

Take a glass rod or tubing or any other suitable device with smooth surface of diameter greater than the diameter of the rubber tubing by 20 percent for plain rubber tubing. Insert 2.5 cm long tubing into it. Subject the assembly to ageing at (70 ± 1) °C for seven days as prescribed in IS 3400 (Part 4).

4.7 Leakage

The material shall show no leakage when tested as below.

A 300 cm length of tubing is subjected to internal air pressure of 0.5 kg/cm^2 for at least 2 min and shall be kept immersed in water for detection of air leakage, if any.

5 PACKING AND MARKING

5.1 Packing

The material shall be packed as agreed to between the purchaser and the supplier.

5.2 Marking

5.2.1 Each length of the tubing shall be plainly, clearly and indelibly marked adjacent to each end with the following:

a) Name of the material;

b) Indication of the source of manufacture;

c) Net mass of the material;

d) Internal diameter;

e) Lot or batch number; and

f) Month and year of the manufacture.

5.2.2 *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.

6 SAMPLING AND CRITERIA FOR CONFORMITY

For the purpose of ascertaining the conformity of tubing in a consignment to this specification, the scale of sampling and the criteria for conformity shall be as prescribed in Annex A.

7 TIME LAPSE BETWEEN RECEIPT OF MATERIAL AND TESTING

7.1 For all test purposes, the minimum time between vulcanization and testing shall be 16 h. Unless otherwise agreed to between the purchaser and the supplier, all tests shall be carried out within three months of the date of receipt of the material by the purchaser.

7.2 Test Pieces

Wherever possible, the specified test pieces shall be cut from the finished article. Where this is impracticable, the manufacturer shall supply two sheets of vulcanizates respectively of dimensions 300 mm × 300 mm × 3 mm and 150 mm × 150 mm × 6.5 mm (prepared from the same batch and vulcanized to the same degree and in the same manner as the consignment concerned) from which the necessary test pieces shall be prepared.

ANNEX A

(*Clause* 6)

SCALE OF PLAIN RUBBER TUBING AND CRITERIA FOR CONFORMITY

A-1 SCALE OF SAMPLING

A-1.1 Lot

In any consignment, all tubings of the same type and grade and manufactured by the same firm under similar conditions of manufacture shall be separated in groups of 5 000 tubings or less and each shall constitute a lot.

A-l.2 Tests for determination of the conformity of the lot to the requirements of this specification shall be carried out for each lot separately. The number of tubings to be selected for carrying out the tests for visual and dimensional characteristics shall be in accordance with col (2) and (3) of Table 4.

A-1.3 These tubings shall be selected at random from the lot. In order to ensure the randomness of selection, a random number table as agreed to between the purchaser and the supplier shall be used. In case such a table is not available, the following procedure shall be adopted:

Starting from any tubing in the lot, count them as 1, 2, 3, ... up to *r* and so on in one order, where *r* is the integral part of *N*/n. Every r^{th} tubing thus counted shall be withdrawn to give the sample for test.

A-2 TEST FOR DIMENSIONAL CHARACTERISTICS

Each of the tubings selected according to **A-1.2** shall be tested for all the dimensions and visual characteristics specified under **4.1**, **4.2.1** and **4.2.2**. Any tubing failing to satisfy any of the requirements for dimensions and visual characteristics shall be considered as defective.

If the number of defective tubings found in the sample is not more than the corresponding number of permissible defective given in co1 (4) of Table 4, the lot shall be declared as conforming to the visual and dimensional requirements. Only such lots shall be further examined for the destructive type of characteristics as given in **A-3**.

A-3 TESTS FOR DESTRUCTIVE TYPE OF CHARACTERISTICS

A-3.1 The number of tubings to be selected for testing all the requirements given under **4.3** to **4.7** shall be in accordance with col (2) and (4) of Table 4.

Replace (4) with (5)in A-3.1, line 3.

These tubings shall be selected from among those already chosen for the non-destructive tests as in co1 (3) of Table 4 and found satisfactory as in **A-2.** From each of the selected tubings, one test piece shall be taken for testing each of these requirements. In case it is not possible to get the test pieces of required size from the tubing, for testing the requirements under **4.3** to **4.5**, the tests shall be carried out on the prepared sheets of rubber (*see* **7.2**). At least two tests shall be carried out for each of these requirements.

A-3.2 The lot shall be considered as having satisfied the requirements for these characteristics if all the test pieces satisfy the relevant requirement.

A-4 CRITERIA FOR CONFORMITY

A lot shall be considered as having satisfied all the requirements of this specification if it is found satisfactory in **A-2** and **A-3.2** otherwise not.

Table 4 Scale of Sampling

(*Clauses* A-l.2, A-2 *and* A-3.1)

Sl No.	Lot Size (N)	Number of Tubings to be selected for Non-Destructive Tests (n)	Permissible Number of Defective Tubings	Number of Tubings to be Selected for Destructive Tests
(1)	(2)	(3)	(4)	(5)
i)	Up to 500	10	0	2
ii)	501 to 1 000	15	1	3
iii)	1 001 to 3 000	30	1	4
iv)	3 001 to 5 000	50	2	5

ANNEX B

(*Foreword*)

COMMITTEE COMPOSITION

Rubber and Rubber Products Sectional Committee, PCD 13

Organization	*Representative(s)*
Rubber Research Institute of India, Rubber Board, Kottayam	DR SIBY VARGHESE **(*Chairperson*)**
All India Rubber Industries Association, Mumbai	SHRI SRIKANTH KRISHNAMURTHY SHRI CHINMOY RAY (*Alternate*)
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Research, Designs & Standards Organization (RDSO), Lucknow	SHRI P. K. BALA SHRI MANOJ MINZ (*Alternate*)
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Member Secretary
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SCIENTIST 'B'/ASSISTANT DIRECTOR
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