IS : 911 - 1968
(Superseding IS : 912 - 1963)

Indian Standard

SPECIFICATION FOR AIR HOSE OF RUBBER WITH BRAIDED TEXTILE REINFORCEMENT

(Second Revision)

UDC 621·643·3·02 : 678·4

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

Price Rs 3·50

January 1969

IS : 911 - 1968
(Superseding IS : 912 - 1963)

Indian Standard

SPECIFICATION FOR AIR HOSE OF RUBBER WITH BRAIDED TEXTILE REINFORCEMENT

(Second Revision)

Rubber Products Sectional Committee, CDC 6

Chairman	*Representing*
DR D. BANERJEE	National Rubber Manufacturers Ltd, Calcutta; *and* Association of Rubber Manufacturers of India, Calcutta
Members	
DR B. B. BHATIA	I.C.I. (India) Private Ltd, Calcutta
SHRI D. K. CHATERJI (*Alternate*)	
SHRI DALIP KUMAR	Railway Board (Ministry of Railways)
SHRI R. C. DASGUPTA	National Test House, Calcutta; *and* Directorate General of Supplies & Disposals, New Delhi
SHRI S. P. MULLICK (*Alternate*)	
SHRI G. C. DE	Export Inspection Council of India, Calcutta
SHRI P. K. CHATTERJEE (*Alternate*)	
SHRI S. L. GANDHI	Ministry of Defence (DGI)
SHRI B. H. DALAL (*Alternate*)	
SHRI K. K. GANGULY	Ministry of Defence (R & D)
SHRI N. S. BANKER (*Alternate*)	
SHRI G. C. JAIN	Hindustan Steel Ltd, Ranchi
DR P. JOHN JACOB	Rubber Board, Kottayam
SHRI S. R. KOCHHAR	Inspection Wing, Directorate General of Supplies & Disposals, New Delhi
SHRI LALIT MOHAN JAMNADAS	The Cosmos India Rubber Works Private Ltd, Bombay
SHRI PULIN L. KINARIWALA (*Alternate*)	
DR K. N. MODAK	Indian Rubber Manufacturers Research Association, Bombay; *and* Indian Rubber Industries Association, Bombay
SHRI K. R. SENGUPTA (*Alternate*)	Indian Rubber Industries Association, Bombay
SHRI S. MUKHERJEE	Dunlop India Ltd, Calcutta
SHRI G. P. DUTTA (*Alternate*)	
SHRI S. C. NANDY	Bata Shoe Co Private Ltd, Calcutta
SHRI M. M. PATEL	Synthetics and Chemicals Ltd, Bombay
DR G. S. KRISHNAMURTHY (*Alternate*)	

(*Continued on page* 2)

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

(*Continued from page 1*)

Members	*Representing*
SHRI S. S. SAXENA	Indian Oil Corporation Ltd (Marketing Division), Bombay
SHRI M. K. JAIN (*Alternate*)	
DR A. SEETHARAMIAH	Directorate General of Technical Development, New Delhi
DR N. V. C. RAO (*Alternate*)	
SHRI D. D. TALWALKAR	All India Automobile & Ancillary Industries Association, Bombay
SHRI R. M. KHALADKAR (*Alternate*)	
SHRI D. DAS GUPTA, Director (Chem)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI N. R. SRINIVASAN
Deputy Director (Chem), ISI

Hoses Subcommittee, CDC 6 : 3

Convener	
DR D. BANERJEE	National Rubber Manufacturers Ltd, Calcutta
Members	
SHRI S. L. GANDHI	Ministry of Defence (DGI)
SHRI B. H. DALAL (*Alternate*)	
SHRI M. S. KRISHNASWAMY	Esso Standard Eastern Inc, Bombay
SHRI A. V. SUNDERARAMAN (*Alternate*)	
SHRI K. LAL	Dunlop India Ltd, Calcutta
SHRI C. S. MANI (*Alternate*)	
SHRI LALIT MOHAN JAMNADAS	The Cosmos India Rubber Works Private Ltd, Bombay
SHRI S. G. JAMBHEKAR (*Alternate*)	
SHRI V. N. MAKER	Indian Rubber Industries Association, Bombay
SHRI LALIT MOHAN JAMNADAS (*Alternate*)	
SHRI S. P. MULLICK	National Test House, Calcutta
SHRI R. NAGCHAUDHURI	Goodyear India Ltd, Calcutta
SHRI S. R. GANGULI (*Alternate*)	
SHRI M. M. PATEL	Synthetics and Chemicals Ltd, Bombay
SHRI V. D. PENDSE	Swastik Rubber Products Ltd, Poona
SHRI D. D. TALWALKAR (*Alternate*)	
DR N. V. C. RAO	Directorate General of Technical Development, New Delhi
SHRI G. R. INAMDAR (*Alternate*)	
SHRI B. ROY	East India Rubber Works Private Ltd, Calcutta
SHRI S. V. SAMBAMURTI	Indian Oxygen Ltd, Calcutta
SHRI S. S. MAZUMDAR (*Alternate*)	
SHRI S. S. SAXENA	Indian Oil Corporation Ltd (Marketing Division), Bombay
SHRI C. S. R. ULLAL	Burmah-Shell Oil Storage & Distributing Co of India Ltd, Bombay
SHRI H. C. KINRA (*Alternate*)	

Indian Standard

SPECIFICATION FOR AIR HOSE OF RUBBER WITH BRAIDED TEXTILE REINFORCEMENT

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 9 October 1968, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard is an amalgamated revision of IS : 911-1963* and IS : 912-1963†. In the revised standard outside diameters have been specified as only recommendatory and have been given in Appendix A. Physical requirements have been revised, a range of working pressures has been specified and hydraulic test requirements have been added. These changes have been felt necessary in view of the present line of thinking of 'ISO/TC 45 Rubber' on hoses. The committee, however, decided in favour of having two separate specifications, contrary to the views held by ISO/TC 45 Rubber, depending on the nature of reinforcement—one for braided reinforcement and the other for woven reinforcement, in view of the distinct marketing practices in this country even though both types of hoses are often put to the same end use. The requirements for hoses with woven reinforcement are given in IS : 446-1968‡. These hoses could be of mandrel, moulded or spiral construction.

0.3 In preparing this standard, considerable assistance has been derived from the following publications:

Draft ISO Recommendation No. 1307 Hose (Bore sizes, test pressures and tolerances on length). International Organization for Standardization.

Draft ISO Recommendation No. 1404 Rubber air hose light duty. International Organization for Standardization.

---

*Specification for braided air hose of rubber, heavy duty (*revised*).

†Specification for braided air hose of rubber, light duty (*revised*).

‡Specification for air hose of rubber with woven textile reinforcement (*second revision*).

0.4 This standard contains clauses **4.3.3.1** and **7.1** which call for agreement between the purchaser and the supplier.

0.5 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.

1. SCOPE

1.1 This standard prescribes the requirements, methods of sampling and test for air hose of rubber with braided textile reinforcement.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in **2** of IS : 443-1963† shall apply.

3. TYPES

3.1 This standard covers the following three types of hoses:

Type 1 for a working pressure up to 7 kgf/cm^2,

Type 2 for a working pressure up to 10 kgf/cm^2, and

Type 3 for a working pressure up to 14 kgf/cm^2.

4. REQUIREMENTS

4.1 Materials

4.1.1 *Lining* — The lining shall consist of a rubber compound. The lining for hose Type 3 for bore sizes 12·5 to 38 mm shall be also resistant to oil mist.

4.1.2 *Reinforcement* — The textile reinforcement shall consist of yarn of natural or synthetic fibre.

4.1.3 *Cover* — The cover shall consist of a rubber compound.

4.2 Construction

4.2.1 *Lining* — The lining shall be reasonably uniform in thickness, concentric and free from air blisters, porosity and other visible defects. It

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

†Methods of sampling and test for rubber hoses (*revised*).

shall be seamless and as smooth in the bore as is consistent with good manufacturing practice.

4.2.2 *Reinforcement* — The textile yarn reinforcement shall be firmly and evenly braided over the lining. The plies of reinforcement shall be impregnated with a rubber compound.

4.2.3 *Cover* — The cover shall be reasonably uniform in thickness, concentric and free from air blisters, porosity and splits. The cover of the moulded hose shall be smooth or fluted as required. The cover of the braided hose manufactured on mandrels may have a cloth marked finish and the whole shall be consolidated by wrapping and uniformly vulcanized.

4.3 Dimensions

4.3.1 *Diameter and Reinforcement Plies* — The bore size when measured according to the method prescribed in **9.2** of IS : 443-1963* and the number of reinforcement plies of the hose, shall be as given in Table 1.

TABLE 1 BORE SIZE AND NUMBER OF REINFORCEMENT PLIES

Nominal Bore Size	Tolerance on Nominal Bore Size	Number of Reinforcement Plies for Types		
		1	2	3
(1)	(2)	(3)	(4)	(5)
mm	mm			
5	±0·75	1	1	1
6·3	±0·75	1	1	1
8	±0·75	1	1	1
10	±0·75	1	1	1
12·5	±0·75	1	2	2
16	±0·75	1	2	2
20	$\begin{cases}+0·75\\-1·25\end{cases}$	1	2	2
25	±1·25	2	2	3
31·5	±1·25	2	3	3
38	±1·50	2	3	3
50	±1·50	—	3	—

Note 1 — Other sizes within this range may be supplied by agreement. The tolerances should be those of the previous smaller size.

Note 2 — For hoses having 2 plies and more, plies mentioned above may vary by 1 ply, provided the hose meets with the requirements of this specification.

*Methods of sampling and test for rubber hoses (*revised*).

4.3.2 *Lining and Cover Thickness* — The thickness of lining and cover of the hose when measured according to the method prescribed in **8** of IS : 443-1963*, shall be not less than that specified in Table 2.

TABLE 2 MINIMUM LINING AND COVER THICKNESS

(All dimensions in millimetres)

Nominal Bore Size	Lining Thickness, *Min*, for All Types	Cover Thickness, *Min*, for Types		
		1	2	3
(1)	(2)	(3)	(4)	(5)
Up to and including 20	1·5	1·0	1·0	1·0
Over 20 up to and including 38	2·0	1·0	1·0	2·0
50	2·5	1·0	1·5	2·0

Note — In the case of fluted hose, the cover thickness shall correspond to the measurement made at a point where the thickness of fluting is included therein.

4.3.2.1 Type 2 hoses of bore sizes 31·5 and 38·0 mm when intended for rock drilling purposes shall have the cover thickness not less than 2 mm.

4.3.3 *Length* — The standard length of the wrapped type hose shall be 15 metres.

4.3.3.1 The long length moulded hose shall be supplied in coils as agreed to between the purchaser and the supplier.

4.3.3.2 The tolerance on hose length shall be ± 1 percent.

4.4 Requirements of Physical Tests on Finished Hose

4.4.1 *Tensile Strength and Elongation at Break of Lining and Cover* — The tensile strength and elongation at break of the rubber used for the lining and cover of the hose when tested according to the method prescribed in **4** of IS : 443-1963* shall be as specified in Table 3.

TABLE 3 TENSILE STRENGTH AND ELONGATION AT BREAK OF LINING AND COVER

Characteristic	Requirements					
	Lining for Types			Cover for Types		
	1	2	3	1	2	3
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tensile strength, kgf/cm^2, *Min*	40	50	70	40	70	100
Elongation at break, percent, *Min*	200	250	300	200	300	350

*Methods of sampling and test for rubber hoses (*revised*).

4.4.2 *Accelerated Ageing Test Requirement* — After ageing at 70° ± 1°C for a period of 72 h, in accordance with the method prescribed in **7** of IS : 443-1963*, the rubber used for the lining and cover of hose shall not vary by more than ±25 percent for tensile strength and $^{+10}_{-30}$ percent for elongation at break of the corresponding values obtained before ageing, when tested according to the method prescribed in **4** of IS : 443-1963*.

4.4.3 *Oil Absorption Test Requirement* — The increase in weight of the lining after immersion in axle oil (conforming to IS : 1628-1960†) at 27° ± 2°C for 72 h shall not exceed 15 percent of the original weight for type 3 hose for bore sizes 12·5 to 38·0 mm (inclusive), when tested according to the method prescribed in **10** of IS : 443-1963*.

4.4.4 *Adhesion Strength* — The strength of adhesion when tested according to the method prescribed in **6** of IS : 443-1963*, shall be such that the rate of separation does not exceed 25 mm per minute under the specified load as follows:

	Load for Types	
	1 and 2 kg	3 kg
a) Between reinforcement plies	4	4·5
b) Between lining and reinforcement plies	4	4·5
c) Between cover and reinforcement plies	4	4·5

4.4.5 *Hydraulic Test Requirement* — The hose when tested according to the method prescribed in **11** of IS : 443-1963* shall comply with the requirements specified in Table 4.

TABLE 4 REQUIREMENTS OF HYDRAULIC TEST FOR HOSES

Type	Minimum Bursting Pressure	Maximum Increase in Outside Diameter at Working Pressure	
		Up to 25·0 mm Bore Size	Over 25·0 mm Bore Size
(1)	(2) kgf/cm²	(3)	(4)
1	28	No test	No test
2	40	7 percent	9 percent
3	56	7 percent	9 percent

NOTE — Where it is indicated, 'no test', measuring the diameter as prescribed in **11** of IS : 443 - 1963* is not necessary.

*Methods of sampling and test for rubber hoses (*revised*).

*Methods of sampling and test for rubber hoses (*revised*).

†Specification for oil, lubricating, axle, regular and premium.

4.4.6 *Proof Pressure Test Requirement* — Samples of production lengths of hoses when subjected to internal hydraulic pressure, 1·5 times that of working pressure for one minute, should not show any rupture, leakage or porosity.

NOTE — The test should be carried out at the factory. If the hose is offered at places other than the factory, manufacturer's certificate should be accepted.

5. MARKING

5.1 Each length of the wrapped type hose shall be indelibly marked adjacent to each end with:

a) the manufacturer's name or trade-mark, if any, and hose denomination, and

b) month and year of manufacture, if required by the purchaser.

5.1.1 For long length moulded type of hose, the above markings shall be made at intervals of 15 metres approximately.

5.1.2 Each length of hose 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 CRITERIA FOR CONFORMITY

6.1 For the purpose of ascertaining the conformity of the hose in a consignment to this specification, the scale of sampling and the criteria for conformity shall be as prescribed in **3** of IS : 443-1963*.

7. TESTS

7.1 Unless otherwise agreed to between the purchaser and the supplier, all tests shall be carried out within three months from the date of receipt of the material by the purchaser.

*Methods of sampling and test for rubber hoses (*revised*).

APPENDIX A

(*Clause* 0.2)

RECOMMENDED MINIMUM OUTSIDE DIAMETER

A-1. OUTSIDE DIAMETER

A-1.1 The recommended minimum outside diameter should be as given in Table 5.

TABLE 5 RECOMMENDED MINIMUM OUTSIDE DIAMETER

(All dimensions in millimetres)

Nominal Bore Size	Recommended Minimum Outside Diameter* For Types		
	1	2	3
(1)	(2)	(3)	(4)
5	10·5	10·5	11·0
6·3	12·0	12·0	12·5
8	13·5	13·5	14·0
10	15·5	15·5	16·0
12·5	18·0	20·0	22·0
16	21·5	23·5	25·5
20	25·0	27·0	29·0
25	33·0	34·0	37·0
31·5	40·0	43·0	44·0
38	47·0	49·5	50·5
50	—	62·5	—

*In the case of fluted hose this measurement shall be taken on the top of the flute and the depth of flute shall not exceed 0·5 mm.

A-1.1.1 Type 2 hose of bore sizes 31·5 and 38·0 mm for rock drilling purposes should have the outside diameter as 44·0 and 50·5 mm respectively.

INDIAN STANDARDS

ON

Hoses

IS:		Rs
443-1963	Methods of sampling and test for rubber hoses (*revised*) ...	3·50
444-1968	Water hose of rubber with woven textile reinforcement (*second revision*) (*superseding* IS : 445-1964)	3·50
446-1968	Air hose of rubber with woven textile reinforcement (*second revision*) (*superseding* IS : 3557-1965)	3·50
447-1968	Welding hose of rubber with woven textile reinforcement (*second revision*)	3·50
635-1968	Oil and solvent resistant hose of rubber with woven textile reinforcement (*second revision*)	2·50
636-1962	Fire fighting hose (rubber lined woven-jacketed) (*revised*) ...	2·50
911-1968	Air hose of rubber with braided textile reinforcement (*second revision*) (*superseding* IS : 912-1963)	3·50
913-1968	Water hose of rubber with braided textile reinforcement (*second revision*) (*superseding* IS : 914-1963)	3·50
1677-1968	Agricultural spray hose of rubber with braided textile reinforcement (*second revision*)	3·50
2396-1968	Rubber hose for petrol and diesel fuels with braided textile reinforcement (*first revision*)	2·50
2410-1963	Suction hose of rubber for fire services	1·50
2482-1963	Water suction hose of rubber, light duty	1·50
2765-1964	Radiator hose	2·50
3418-1968	Oil and solvent resistant hose of rubber with braided textile reinforcement (*first revision*)	2·50
3549-1965	Water suction and discharge hose of rubber, heavy duty ...	1·50
3572-1968	Welding hose of rubber with braided textile reinforcement (*first revision*)	2·50