IS : 444 - 1968
(Superseding IS : 445-1964)

Indian Standard

SPECIFICATION FOR WATER HOSE OF RUBBER WITH WOVEN TEXTILE REINFORCEMENT

(Second Revision)

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

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Indian Standard

SPECIFICATION FOR WATER HOSE OF RUBBER WITH WOVEN 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 : 444-1964* and IS : 445-1964† which were published first in 1953 and subsequently revised in 1964. On the lines of recent thinking of ISO/TC 45 'Rubber' of International Organization for Standardization, a range of hoses for various working pressures has been prescribed including those with oil-resistant cover for car washing and similar uses. Outside diameters given in Appendix A are only recommendatory. In addition to bursting pressure, requirements for hydraulic test at working pressure have been included in this standard. The committee, however, decided in favour of having two separate specifications depending on the mode of reinforcement; one for woven reinforcement and the other for braided reinforcement even though at the level of ISO/TC 45 no such distinction is made, and both types of hoses are often put to the same end use, in view of the distinct marketing practices in this country. The requirements for hoses of braided types of construction are specified in IS : 913-1968‡.

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 tolerance on length). International Organization for Standardization.

Draft ISO Recommendation No. 1403 General purpose rubber water hose. International Organization for Standardization.

*Specification for water hose of rubber, low pressure with woven reinforcement (*revised*).

†Specification for water hose of rubber, high pressure with woven reinforcement (*revised*).

‡Specification for water hose of rubber with braided textile reinforcement.

0.4 This standard contains Table 1 (Note 2) and clause **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.

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1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for water hose of rubber with woven textile reinforcement and built on mandrels.

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 prescribes five types of hoses as follows:

Type 1 for a working pressure of 3·5 kgf/cm²

Type 2 for a working pressure of 6·0 kgf/cm²

Type 3 for a working pressure of 10·0 kgf/cm²

Type 4A for a working pressure of 25·0 kgf/cm²

Type 4B for a working pressure of 25·0 kgf/cm² with oil-resistant cover for car washing and similar purposes

4. REQUIREMENTS

4.1 Materials

4.1.1 *Lining* — The lining shall consist of a suitable rubber compound.

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

NOTE — For reinforcement with cotton textiles, *see* IS : 4388-1967‡.

4.1.3 *Cover* — The cover shall consist of a suitable rubber compound. The cover for type 4B shall also be oil-resistant.

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

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

‡Specification for cotton fabrics for reinforcement of rubber hoses.

4.2 Construction

4.2.1 *Lining* — The lining shall be reasonably uniform in thickness, smooth in the bore, concentric and free from air blisters.

4.2.2 *Reinforcement* — The reinforcement shall consist of plies of woven fabric applied on bias at approximately 45° angle. The woven fabric shall be well rubberized on both sides with a rubber compound. The finishing end of the last ply shall overlap the start of the first ply at least by 6·0 mm.

4.2.3 *Cover* — The cover shall be reasonably uniform in thickness, concentric and free from air blisters, porosity and splits. The cover may have a cloth marked finish and the whole shall be consolidated by wrapping and uniformly vulcanized.

4.3 Dimensions and Tolerances

4.3.1 *Diameter and Reinforcement Plies* — The bore sizes when measured according to the method prescribed in **9.2** of IS : 443-1963* and the number of reinforcement plies, 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 Plies for Types			
		1	2	3	4A and 4B
(1)	(2)	(3)	(4)	(5)	(6)
mm	mm				
10	±0·75	1	2	2	4
12·5	±0·75	1	2	2	5
16	±0·75	1	2	2	6
20	$\begin{cases} +0·75 \\ -1·25 \end{cases}$	1	2	3	7
25	±1·25	1	2	4	—
31·5	±1·25	2	3	4	—
38	±1·50	3	4	5	—
45	±1·50	3	4	5	—
50	±1·50	3	4	5	—
63	±1·50	3	5	—	—
75	±2·00	3	5	—	—
100	±2·00	4	—	—	—

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

Note 2 — Other sizes within this range may be supplied by agreement. The tolerance shall be those of the previous smaller size.

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

4.3.2 *Lining and Cover Thickness* — The thickness of the 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.

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

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

TABLE 2 LINING AND COVER THICKNESS

(*Clause* 4.3.2)

Nominal Bore Size	Lining Thickness for Hose for Types			Cover Thickness for Hose for Types		
	1	2 and 3	4A and 4B	1	2 and 3	4A and 4B
	mm	mm	mm	mm	mm	mm
Up to and including 38	1·5	1·5	1·5	1·0	1·0	1·5
Over 38 up to and including 75	2·0	2·0	—	1·0	1·0	—
Above 75	2·5	—	—	1·5	—	—

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 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	Requirement for Lining and Cover for Types		
	1	2 and 3	4A and 4B
Tensile strength kgf/cm², *Min*	35	50	70
Elongation at break, percent, *Min*	200	250	300

4.4.2 *Accelerated Ageing Test* — After ageing at 70 ± 1°C for a period of 72 hours in accordance with the method prescribed in **7** of IS : 443-1963*, the rubber used for the lining of all types of hose and for the cover of types 1, 2, 3 & 4A shall not vary by more than ±25 percent for tensile strength and $^{+10}_{-30}$ percent for elongation at break of the corresponding values obtained

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

before ageing, when tested according to the method prescribed in **4** of IS : 443-1963*.

4.4.2.1 After ageing at 100 ± 1°C for a period of 72 hours in accordance with the method prescribed in **7** of IS : 443-1963*, the rubber used for the cover of the hose, type 4B shall not vary by more than ±25 percent for tensile strength and $^{+10}_{-45}$ 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 *Swelling Test*

4.4.3.1 *Cover* — The cover of the hose, type 4B after immersion in the test liquid when tested according to the method prescribed in **13** of IS : 443-1963* shall not change in volume by more than + 75 percent.

4.4.4 *Adhesion* — The 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 for the following :

	Specified Load For Types			
	1	2 and 3	4A and 4B	
	kg	kg	kg	kg
a) Between reinforcement plies	3	4	4·5	4·5
b) Between lining and reinforcement plies	3	4	4·5	4·5
c) Between cover and reinforcement plies	3	4	4·5	4·0

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

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

NOTE — This 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 hose shall be indelibly marked adjacent to each and with :

a) the manufacturer's name or trade-mark, the type and denomination of hose; and
b) month and year of manufacture, if required by the purchaser.

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

TABLE 4 REQUIREMENTS OF HYDRAULIC TEST FOR HOSES

(*Clause* 4.4.5)

Types	Minimum Bursting Pressure	Maximum Increase in Outside Diameter at Working Pressure		
		Up to 25 mm Bore Sizes	Above 25·0 mm and Up to 63·0 mm Bore Sizes	Above 63·0 mm Bore Sizes
(1)	(2)	(3)	(4)	(5)
	kgf/cm²			
1	9	No test	No test	No test
2	18	No test	No test	No test
3	30	9 percent	12 percent	—
4A and 4B	75	12 percent	—	—

5.1.1 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 lincece 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 material by the purchaser.

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

APPENDIX A

(*Clause* 0.2)

RECOMMENDED MINIMUM OUTSIDE DIAMETER

A-1. The recommended minimum outside diameter of the hose should be as given in Table 5.

TABLE 5 RECOMMENDED MINIMUM OUTSIDE DIAMETER

Nominal Bore Size	Recommended Minimum Outside Diameter for Types			
	1	2	3	4A and 4B
(1)	(2)	(3)	(4)	(5)
mm	mm	mm	mm	mm
10	15·0	16·0	16·5	21·0
12·5	17·5	18·5	19·0	25·0
16	21·0	22·0	22·5	30·0
20	24·5	25·5	27·0	34·0
25	29·5	30·5	33·5	—
31·5	37·5	39·0	40·5	—
38	45·0	47·0	48·5	—
45	53·0	55·0	56·5	—
50	58·0	60·0	61·5	—
63	71·0	74·0	—	—
75	82·5	85·5	—	—
100	110·5	—	—	—

INDIAN STANDARDS

ON

Hoses

IS:		Rs
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 (*first revision*) (*Superseding* IS : 3557-1965)	—
447-1968	Welding hose of rubber with woven textile reinforcement (*second revision*)	2·50
*635-1968	Oil and solvent resistant hose of rubber with woven textile reinforcement (*second revision*)	—
636-1962	Fire fighting hose (rubber lined woven-jacketed) (*revised*) ...	2·50
*911-1968	Air hose of rubber with braided textile reinforcement (*first revision*) (*Superseding* IS : 912-1963)	—
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*)	—
*2396-1968	Rubber hose for petrol and diesel fuels with braided textile reinforcement (*first revision*)	—
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

*Under print.