

IS : 1677 - 1968

Indian Standard

SPECIFICATION FOR
AGRICULTURAL SPRAY HOSE OF RUBBER
WITH BRAIDED TEXTILE REINFORCEMENT

(Second Revision)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

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(*Second Revision*)

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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 was originally published in 1960 and was revised in 1963. In the present revision, three more types have been introduced. Hoses under Types 1, 2 and 3, both with oil resistant and non-oil-resistant lining have been covered. Outside diameters have been prescribed as recommended in Appendix A. Increase in outside diameter has been specified at working pressure instead of at a specified pressure of 20 kgf/cm². Requirements for proof pressure test have also been added.

0.3 Since India is an exporting country of rubber hoses, newer types have been introduced and these types are popular in overseas market. Other changes have been necessitated by the present line of thinking at the level of ISO/TC 45 'Rubber' of International Organization for Standardization and the current trade practices. Contrary to the present line of thinking at ISO, the Committee felt that for Type 4, the working pressure should be 55 kgf/cm² instead of 63 kgf/cm², and bursting pressure should be three times the working pressure, that is, 165 kgf/cm² instead of 250 kgf/cm². Further, the ageing test for hoses with oil-resistant lining is specified to be carried out at 100° ± 1°C for 72 h instead of 70° ± 1°C for 72 h as recommended by ISO for hoses, as oil resistant rubbers when aged 70° ± 1 °C for 72 h do not always give conclusive results as at 100° ± 1°C for 72 h. The temperature of 100° ± 1 °C and the period of 72 hours are however recommended by ISO for all rubber products in ISO/R 188 'Accelerated ageing or simulated service tests of vulcanized natural or synthetic rubbers'.

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

ISO/DR 1307 Hose (bore sizes, test pressures and tolerances on length). International Organization for Standardization.

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ISO/DR 1401 General purpose rubber agricultural spray hose. International Organization for Standardization.

0.5 This standard contains clauses **4.3.3** and **7.1** which call for agreement between the purchaser and the supplier.

0.6 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 and methods of sampling and test for agricultural spray hose of rubber with braided textile reinforcement for spraying liquid formulations of insecticides, fungicides and weeding.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in 2 of IS : 443-1962†, shall apply.

3. TYPES

3.1 The standard covers the following seven types of hoses:

Type 1A For a working pressure of 10 kgf/cm² having non-oil-resistant lining,

Type 1B For a working pressure of 10 kgf/cm² having oil-resistant lining,

Type 2A For a working pressure of 20 kgf/cm² having non-oil-resistant lining,

Type 2B For a working pressure of 20 kgf/cm² having oil-resistant lining,

Type 3A For a working pressure of 40 kgf/cm² having non-oil-resistant lining,

Type 3B For a working pressure of 40 kgf/cm² having oil-resistant lining, and

Type 4 For a working pressure of 55 kgf/cm² having oil-resistant lining.

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

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

4. REQUIREMENTS

4.1 Materials

4.1.1 Lining — The lining shall consist of a rubber compound. The linings for hoses of types 1B, 2B, 3B and 4 shall consist of oil-resistant rubber compound.

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

4.2.2 Reinforcement — The textile reinforcement shall be firmly and evenly braided over the lining. The plies of textile reinforcement shall be so impregnated with a rubber compound that a distinct layer of rubber is formed between each ply.

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 Diameters 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.

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

4.3.3 Length — The standard length of the wrapped type hose shall be 15 metres. The long length moulded hose shall be supplied in coils as agreed to between the purchaser and the supplier.

4.3.3.1 The tolerance of hose on any specified 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

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

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cover of the hose when tested according to 4 of IS : 443-1963* shall be as specified in Table 3.

TABLE 1 BORE SIZE AND NUMBER OF REINFORCEMENT PLYS

(Clause 4.3.1)

NOMINAL BORE SIZE	TOLERANCE ON NOMINAL BORE SIZE	NUMBER OF REINFORCEMENT PLYs FOR TYPES			
		1A and 1B	2A and 2B	3A and 3B	4
(1)	(2)	(3)	(4)	(5)	(6)
mm	mm				
6.3	± 0.75	1	1	2	2
8	± 0.75	1	1	2	2
10	± 0.75	1	1	2	2
12.5	± 0.75	2	2	2	3
16	± 0.75	2	2	2	3
20	$+0.75$	2	2	3	4
	-1.25				
25	± 1.25	2	3	3	4

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.

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	
	1A, 1B, 2A and 2B	3A, 3B and 4	1A, 1B, 2A and 2B	3A, 3B and 4
(1)	(2)	(3)	(4)	(5)
	mm	mm	mm	mm
Up to and including 10	1.5	2.0	1.0	1.5
Over 10 and up to and including 20	2.0	2.5	1.0	1.5
25	2.5	2.5	1.5	1.5

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.

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

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

(Clause 4.4.1)

CHARACTERISTIC	REQUIREMENTS FOR LINING FOR TYPES		REQUIREMENTS FOR COVER FOR TYPES	
	1A, 1B, 2A and 2B	3A, 3B and 4	1A, 1B, 2A and 2B	3A, 3B and 4
(1)	(2)	(3)	(4)	(5)
Tensile strength, kgf/cm ² , Min	50	60	60	70
Elongation at break, percent, Min	250	250	300	300

4.4.2 Accelerated Ageing Test Requirement

4.4.2.1 After ageing at $70^{\circ} \pm 1^{\circ}\text{C}$ for 72 hours, the rubber used for the lining of hose types 1A, 2A and 3A and the rubber used for the cover of hose of all types 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 4 of IS : 443-1963*.

4.4.2.2 After ageing at a temperature of $100^{\circ} \pm 1^{\circ}\text{C}$ for a period of 72 hours the rubber used for lining of the hose types 1B, 2B, 3 and 4 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 4 of IS : 443-1963*.

4.4.3 Swelling Test Requirement—The lining of the hose types 1B, 2B, 3B and 4 after immersion in the test liquid shall not change in volume by more than +100 percent, when tested according to 13 of IS : 443-1963*.

4.4.4 Adhesion Strength—The adhesion strength shall be such that the rate of separation does not exceed 25 mm per minute under the following specified loads when tested according to 6 IS : 443-1963*.

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

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

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

TABLE 4 REQUIREMENTS OF HYDRAULIC TEST

TYPES	MINIMUM BURSTING PRESSURE ²	MAXIMUM INCREASE IN OUTSIDE DIAMETER AT WORKING PRESSURE
(1)	(2)	(3)
	kgf/cm ²	Percent
1A and 1B	30	7
2A and 2B	60	7
3A and 3B	120	9
4	165	12

4.4.6 Proof Pressure Test Requirement — Samples of production length of hoses when subjected to internal hydraulic pressure 1.5 times that of 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 the wrapped type hose shall be indelibly marked adjacent to each end with:

- a) the manufacturer's name or trade-mark, the 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.

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

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.

APPENDIX A

(Clause 0.2)

RECOMMENDED MINIMUM OUTSIDE DIAMETER

A-1. OUTSIDE DIAMETER

A-1.1 The recommended minimum outside diameter for the various bore sizes 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			
	1A and 1B	2A and 2B	3A and 3B	4
(1)	(2)	(3)	(4)	(5)
mm	mm	mm	mm	mm
6.3	12.0	12.5	16.5	17.0
8	13.5	14.0	18.0	18.5
10	15.5	16.0	20.0	20.0
12.5	21.0	22.0	23.0	26.0
16	24.5	25.5	26.5	29.5
20	28.0	29.0	32.0	35.0
25	35.0	37.5	37.5	40.0

*In the case of fluted hose, this measurement shall be taken on the top of the flute and the depth of the flute shall not exceed 0.5 mm.

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

INDIAN STANDARDS

ON

Hoses

IS:		Rs
443-1963	Methods of sampling and test for rubber hoses (<i>revised</i>) ...	3·50
444-1968	Water hose of rubber with woven textile reinforcement (<i>second revision</i>) (<i>superseding</i> IS : 445-1964)	3·50
446-1968	Air hose of rubber with woven textile reinforcement (<i>second revision</i>) (<i>superseding</i> IS : 3557-1965)	3·50
447-1968	Welding hose of rubber with woven textile reinforcement (<i>second revision</i>)	3·50
635-1968	Oil and solvent resistant hose of rubber with woven textile reinforcement (<i>second revision</i>)	2·50
636-1962	Fire fighting hose (rubber lined woven-jacketed) (<i>revised</i>) ...	2·50
911-1968	Air hose of rubber with braided textile reinforcement (<i>second revision</i>) (<i>superseding</i> IS : 912-1963)	3·50
913-1968	Water hose of rubber with braided textile reinforcement (<i>second revision</i>) (<i>superseding</i> IS : 914-1963)	3·50
1677-1968	Agricultural spray hose of rubber with braided textile reinforcement (<i>second revision</i>)	3·50
2396-1968	Rubber hose for petrol and diesel fuels with braided textile reinforcement (<i>first revision</i>) (<i>under print</i>)	
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 (<i>first revision</i>)	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 (<i>first revision</i>)	2·50