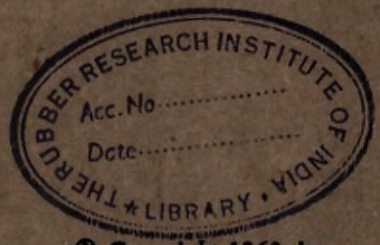
IS : 636 - 1962

Indian Standard

SPECIFICATION FOR FIRE FIGHTING HOSE (RUBBER LINED WOVEN-JACKETED)

(Revised)

UDC 614·843·22 : 621·643·33



INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 MATHURA ROAD
NEW DELHI 1

Price Rs 2·50

March 1963

Indian Standard

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(Revised)

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Indian Standard

SPECIFICATION FOR FIRE FIGHTING HOSE (RUBBER LINED WOVEN-JACKETED)

(Revised)

0. FOREWORD

0.1 This revised Indian Standard was adopted by the Indian Standards Institution on 15 December 1962, after the draft finalized by the Rubber Products Sectional Committee had been approved by the Chemical Division Council.

0.2 This standard was first published in 1958. In view of adoption of metric system in the country the question of metricization of this standard was discussed by the Sectional Committee responsible for the preparation of this standard. Besides this question, the Committee also considered a proposal to include fabric reinforced rubber lined type of fire hoses in the specification since this type of fire hose is already under production in the country. It was further agreed that hydraulic pressure test and proof pressure test requirements should be the same for all sizes of fire hoses. The Committee, therefore, thought it advisable to revise the standard.

0.3 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.4 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, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.5 This standard is intended chiefly to cover the technical provisions relating to fire fighting hose (rubber lined woven-jacketed), and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard prescribes the requirements and the methods of test for 50-mm, 63-mm and 70-mm size fire fighting hose (rubber lined woven-jacketed).

2. TYPES

2.1 The hose shall be of the following types:

a) *Type* 1 — Rubber lined woven-jacketed, and

b) *Type* 2 — Fabric reinforced rubber lined woven-jacketed.

3. SAMPLING AND CRITERION FOR ACCEPTANCE

3.1 Samples — Representative samples of the material for various tests shall be drawn as prescribed in Appendix A.

NOTE — 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.

4. CONSTRUCTION

4.1 Type 1 — The hose of Type 1 shall be constructed of a jacket made of cotton or flax or synthetic fibre or their combinations. The jacket shall be lined internally with a properly vulcanized rubber compound.

4.1.1 The jacket shall be compactly woven and seamless and of good quality cotton of staple length not less than 20 mm or good quality flax (long line) properly spun and boiled to an alkali solubility of not more than 10 percent (*see* Appendix B) or any suitable synthetic fibre of the polyamide and polyester types. The jacket shall be free from visible defects, such as dirt, knots, lumps and irregularities of twist. The minimum of warp yarn weight at 65 ± 5 percent relative humidity and 27° ± 2°C shall be at least 50 percent of the weight of the jacket.

4.1.2 The lining shall consist of a properly vulcanized rubber compound made either from rubber sheets or from suitably compounded rubber latex and shall comply with the requirements prescribed in **8**, **9**, **10** and **12**. The lining shall be smooth and practically free from pitting and other imperfections. The thickness of the lining shall be reasonably uniform and shall neither be less than 1·2 mm nor more than 2 mm.

4.1.3 In the case of sheet lining, the lining shall be made from either calendered sheets, lap-jointed and vulcanized in one solid body or from a single ply extruded tube.

4.1.4 The backing rubber, if used, as an intermediate layer between the lining and the jacket, may not be of the same composition as the lining, but the adhesion between the backing and the cotton jacket shall meet the requirements specified under **11**.

4.2 Type 2 — The hose of Type 2 shall be constructed of a jacket of a cotton or flax or synthetic fibre of polyamide or polyester types or any combination of these fibres. The jacket shall be lined internally with cotton fabric suitably rubberized on both sides and vulcanized.

4.2.1 The lining shall consist of a cotton fabric of minimum weight of 75 g/m² and minimum breaking load (strength) of 5 kg per centimetre width of strip in warp and weft directions. It shall be suitably rubberized on both sides and applied in a manner providing adequate adhesion with the jacket.

NOTE — For test purposes samples of unrubberized fabric shall be provided if required by the purchaser.

4.2.2 *Rot-Proofness* — The carcass of hose of Type 2 shall be treated with suitable and effective rot-proofing agent.

5. INTERNAL DIAMETERS OF VARIOUS SIZES OF HOSE

5.1 The internal diameters of the hose shall be measured by a suitable conical plug gauge, and shall conform to the specified diameter within a tolerance of plus 2·5 mm and minus 0·0 mm.

6. LENGTH

6.1 Unless otherwise specified, the hose shall be supplied in minimum length of 15 m each. It shall be sufficiently flexible to be capable of being rolled to a diameter not exceeding 50 cm for each size.

7. WEIGHT OF ROLL

7.1 The weight of each roll of various sizes of hose in 15 m length shall be as prescribed in Table I.

TABLE I WEIGHT OF EACH ROLL OF VARIOUS SIZES OF FIRE FIGHTING HOSE

SIZE	WEIGHT, *Max*
mm	kg
50	9·5
63	12
70	13

8. THICKNESS OF INNER RUBBER COATING AND LINING OF TYPE 2

8.1 The thickness of inner rubber coating shall not be less than 0·25 mm and the total thickness of the complete lining shall not be less than 0·40 mm.

8.1.1 Measure the thickness by dial micrometer which exerts a load of 80 to 85 g applied through a flat contact foot 6·5 mm diameter.

9. TENSILE STRENGTH AND ELONGATION AT BREAK OF RUBBER LINING

9.1 When tested according to the method prescribed in **2** of IS : 443-1953 Methods of Test for Rubber Hoses (*see* Note), the tensile characteristics of the rubber lining of Type 1 and inner rubber coating of Type 2 shall be as follows:

	Type 1 (For rubber lining)	*Type* 2 (For inner rubber coating)
Tensile Strength, kg/cm², *Min*	100	120
Elongation, percent, *Min*	400	700

NOTE — In the case of inner rubber coating of Type 2, the fabric shall be removed from the test pieces and the test pieces shall not be subjected to buffing. The thickness of the test pieces shall be measured in accordance with **8.1.1**.

10. PERMANENT SET

10.1 A 50-mm length of a test piece of the rubber lining of Type 1 and inner rubber coating of Type 2, when stretched to 200 mm and held in this stretched position for 10 minutes and then released and allowed to lie on a flat surface for a period of 10 minutes, shall show a permanent set not exceeding 25 percent when tested according to the method prescribed in 3 of IS : 443-1953 Methods of Test for Rubber Hoses.

11. ADHESION

11.1 When tested according to the method prescribed under **4** of IS : 443-1953 Methods of Test for Rubber Hoses, the adhesion shall be such that the rate of separation does not exceed 25 mm per minute under a load of 2 kg.

12. ACCELERATED AGEING TEST

12.1 For Type 1 — After ageing as prescribed in **5** of IS : 443-1953 Methods of Test for Rubber Hoses, the tensile strength shall not vary

by more than ±20 percent and elongation at break shall not vary by more than plus 10 percent and minus 25 percent of the corresponding value before ageing.

12.2 For Type 2 — When tested according to the method prescribed in Appendix C the tensile strength and elongation at break shall be not less than 60 percent of the corresponding value before ageing.

13. HYDRAULIC BURST PRESSURE

13.1 When tested according to the method prescribed in **6** of IS : 443-1953 Methods of Test for Rubber Hoses, the minimum bursting pressure of all sizes of hose shall be 32 kg/cm².

14. PROOF PRESSURE TEST

14.1 Each length of the hose shall be subjected to a hydraulic pressure of 18 kg/cm² for at least one minute. The pressure shall be built up gradually at a rate not exceeding 10 kg/cm² per minute. Under these conditions of test, the hose shall not develop any leakage nor any thread in the jacket shall break.

15. KINK TEST

15.1 After subjecting the hose to proof pressure test as prescribed in **14**, release the water pressure and bend the hose flat on itself 50 cm away from the coupling. Tie the hose flat so as to form a sharp kink. Apply pressure by means of a suitable pump at a rate of 2 to 3·5 kg/cm² per second up to 18 kg/cm². Under the conditions of test, the hose shall not develop any leakage nor any thread in the jacket shall break.

16. PACKING AND MARKING

16.1 The inside of the hose shall be thoroughly dusted with French chalk (conforming to IS : 380-1952 Specification for French Chalk, Technical) and then the hose shall be packed and delivered in specified lengths in neat, clean and dry condition.

16.2 Beginning at a point not less than one metre from each end, each length of the hose shall be marked with indelible letters at least 2 cm in height indicating:

a) Type of hose;

b) Size of the hose;

c) Manufacturer's name or his trade-mark or both, nomenclature; and

d) Month and year of manufacture, if specified by the purchaser.

16.2.1 Each length of the 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.

APPENDIX A

(*Clause* 3.1)

SAMPLING AND CRITERIA FOR CONFORMITY

A-0. GENERAL

A-0.1 The object of testing hoses by the purchaser is to ensure conformity to the specification whereas testing by the manufacturer during production is to ensure uniformity by reducing the quality fluctuations to the minimum so that the products are according to the specification requirements. When adequate production control is maintained by the manufacturer, the past record on test data for the different characteristics of hoses will be readily available for scrutiny and only small samples need be tested by the purchaser as a re-check for his purpose. Tests for destructive type of characteristics can be carried out as in **A-3**.

When such information is not available to the purchaser, the following sampling scheme is recommended for ascertaining the conformity of a lot of hoses to the requirements of this specification.

A-1. SCALE OF SAMPLING

A-1.1 Lot — In any consignment, all the lengths of fire fighting hoses of the same type and size produced under essentially similar conditions of manufacture (such as those from a single batch of raw materials or from components obtained from a single source or from a single production method or undergoing a single curing process, etc) shall be separated into groups of 50 lengths or less and each such group shall constitute a lot.

A-1.2 Tests for the determination of the conformity of a lot to the requirements of this specification shall be carried out for each lot

separately. The number of lengths of hoses to be selected for this purpose shall be in accordance with col 1 and 2 of Table II.

TABLE II SCALE OF SAMPLING

Lot Size (In Lengths)	Sample Size (In Lengths)	Permissible Number of Defective Lengths
(1)	(2)	(3)
Up to 15	All	0
16 ,, 40	15	0
41 ,, 50	25	1

A-1.3 The required number of lengths of hoses shall be selected at random from the lengths in the lot. For this purpose, a suitable number of bundles (containing one or more lengths of hoses) not less than 10 percent of the bundles in the lot shall be chosen first and from each of the bundles so chosen equal number of lengths shall be taken out at random so as to obtain the desired number of lengths indicated in col 2 of Table II.

A-2. TESTS FOR NON-DESTRUCTIVE TYPE OF CHARACTERISTICS

A-2.1 The lengths of hoses selected according to **A-1.3** shall be inspected for such constructional details which can be done visually. The lengths shall also be subjected to the dimensional measurements (such as internal diameter, length, etc) which do not require any cutting up of the hoses. Any length found to be unsatisfactory with regard to one or more of these characteristics shall be considered as a defective length.

A-2.1.1 If the number of defective lengths found is not greater than the corresponding number of defectives given in col 3 of Table II, the lot shall be declared as conforming to the requirements of these characteristics. 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 From each of such lots that are found to be satisfactory according to **A-2.1.1,** a length of hose shall be chosen at random and test pieces of required dimensions shall be cut from either end and shall be subjected to the tests given in **8** to **13.**

A-3.1.1 The lot shall be declared as conforming to the requirements of this specification if the test results for the determination of different

characteristics (*see* **A-3.1**) are all found satisfactory. In case the test results for any characteristic fail to meet the specified requirement, two more tests shall be conducted for that characteristic on two other different lengths of hoses chosen from the lot, and only on finding these two tests satisfactory, the lot shall be considered as conforming to the requirements of that characteristic.

APPENDIX B

(*Clause* 4.1.1)

DETERMINATION OF ALKALI SOLUBILITY OF FLAX MATERIALS BEFORE RUBBERIZING

B-1. QUALITY OF REAGENTS

B-1.1 Unless specified otherwise, pure chemicals and distilled water [*see* IS : 1070-1960 Specification for Water, Distilled Quality (*Revised*)] shall be employed in tests.

NOTE — ' Pure chemicals ' shall mean chemicals that do not contain impurities which affect the result of analysis.

B-2. METHOD

B-2.1 The alkali solubility is a measure of the amount of non-cellulosic constituents (readily available as food for micro-organisms) which are left in commercially boiled flax materials. It is determined by giving the material a further boil in a relatively strong solution of sodium carbonate. The percentage loss in weight in the carbonate boil minus that which occurs on boiling in water alone, is the alkali solubility of the material.

B-3. REAGENT

B-3.1 Sodium Carbonate Solution — approximately 5 percent (*w/v*).

B-4. PROCEDURE

B-4.1 Separate about 10 g of the yarn into three approximately equal portions. Condition them together at 65 $\pm$ 5 percent relative humidity and 27° $\pm$ 2°C and then separately weigh them in dry stoppered weighing bottles.

B-4.2 Transfer 250 ml of sodium carbonate solution to a 500-ml conical flask fitted with a reflux condenser. Heat the sodium carbonate solution to boil. Add one of the three portions of yarn (*see* **B-4.1**) to the boiling sodium carbonate solution and then gently boil for 2½ hours. Pour the liquid from the yarn and replace by 200 ml of hot water (above 70°C). Filter the contents of the conical flask through a hardened filter paper on a Buchner funnel of about 15 cm in diameter. Wash the yarn four times by decantation with 200 ml of distilled water at about 70°C, the washings being passed through the filter. Transfer the yarn to the filter, wash three times with 200 ml of hot distilled water and dry on a water-bath at about 98°C for one hour. Transfer the yarn along with any fragments of fibre detachable from the filter paper and dry to constant weight at 105°C. Record this weight. Let this weight be w_1.

B-4.3 Take another portion of the remaining two portions of the yarn (*see* **B-4.1**) and determine its moisture content by drying to constant weight at 105°C. Record this weight. Let the percentage of moisture be 'X'.

B-4.4 Add the third portion of the yarn (*see* **B-4.1**) to 250 ml of boiling distilled water contained in a 500-ml conical flask fitted with a reflux condenser and gently boil for 2½ hours. Then proceed as prescribed under **B-4.2**. Record this weight. Let this weight be w_2.

B-5. CALCULATION

B-5.1 Calculate as follows:

$$\text{Alkali solubility, percent by weight} = 100 \frac{100A - AX - 100w_1}{A - AX} - \frac{100C - CX - 100w_2}{C - CX}$$

where

A = weight in g of the yarn taken for the test under **B-4.2**,

X = percentage of moisture as obtained under **B-4.3**,

w_1 = weight in g of the yarn after boiling with sodium carbonate solution (*see* **B-4.2**),

C = weight in g of the yarn taken for the test under **B-4.4**, and

w_2 = weight in g of the yarn after boiling with distilled water (*see* **B-4.4**).

APPENDIX C

(*Clause* 12.2)

ACCELERATING AGEING TEST FOR TYPE 2

C-1. PROCEDURE

C-1.1 Subject the inner rubber coating to the action of oxygen at a pressure of 20 kg/cm² at a temperature of 70° ± 1°C for a period of 96 hours. Then determine the tensile strength and elongation at break of the sample according to the method prescribed in **2** of IS : 443-1953 Methods of Test For Rubber Hoses.