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SPECIFICATION FOR RUBBER HOSE FOR PETROL AND DIESEL FUELS WITH BRAIDED TEXTILE REINFORCEMENT

(First Revision)

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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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SPECIFICATION FOR RUBBER HOSE FOR PETROL AND DIESEL FUELS WITH BRAIDED TEXTILE REINFORCEMENT

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First 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 first published in 1963 and amendment No. 1 was issued to it in January 1966. In the revised standard, the tolerances on nominal bore sizes have been brought in line with the corresponding recommendations of ISO/TC 45 Rubber of International Organization for Standardization. The amendment No. 1 regarding the accelerated ageing test requirement at 100°C has been included, minimum limits for swelling for lining rubber have been prescribed and the maximum limit for fuel soluble matter has been increased to 6 percent from 3 percent. The proof-pressure test has also been included. These changes have been necessitated by the present line of thinking at the level of ISO/TC 45 Rubber and the difficulties experienced by the manufacturers of hoses for petrol and diesel fuels in complying with the requirement for fuel soluble matter.

0.3 In preparing this standard considerable assistance has been derived from draft ISO Recommendation No. 1307 Hose (Bore sizes, test pressures and tolerances on length).

0.4 This standard contains clauses **3.3.3** and **6.1** 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.

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

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for rubber hose with braided textile reinforcement, manufactured either by the mandrel or long length moulded process for use in dispensing pumps for petrol and diesel fuels.

2. TERMINOLOGY

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

3. REQUIREMENTS

3.1 Materials

3.1.1 *Lining* — The lining shall consist of a rubber compound resistant to petrol and diesel fuels.

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

3.1.3 *Cover* — The cover shall consist of a rubber compound resistant to weather and sunlight in addition to petrol and diesel fuels.

3.2 Construction

3.2.1 *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.

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

3.2.3 *Braided Copper Wire* — One copper wire of braided construction comprising a number of strands and of minimum breaking load of 9 kg shall be incorporated in any one of the braid ply to provide electrical continuity along the whole hose length. In case two copper wires are used, the minimum composite breaking load shall be 9 kg.

NOTE — When fitting couplings to the hose ends, the copper wire at each end shall be freed approximately 25·0 mm turned inside and attached to the couplings to provide electrical continuity throughout the hose length.

3.2.4 *Cover* — The cover shall be reasonably uniform in thickness, concentric and free from air blisters, porosity and splits. The cover of the

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

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.

3.3 Dimensions and Tolerances

3.3.1 *Diameters and Reinforcement Plies* — The bore size and outside diameter when measured according to the methods prescribed in **9.2** and **9.1** respectively of IS : 443-1963*, and the number of reinforcement plies of the hose shall be as given in Table 1.

TABLE 1 BORE SIZE, NUMBER OF REINFORCEMENT PLIES AND OUTSIDE DIAMETER

Nominal Bore Size	Tolerance on Nominal Bore Size	Number of Reinforcement Plies	Outside Diameter	Tolerance on Outside Diameter
(1)	(2)	(3)	(4)	(5)
mm	mm		mm	mm
20	$+0{\cdot}75$ $-1{\cdot}25$	2	32·0	$+1{\cdot}0$ $-1{\cdot}5$
25	$\pm 1{\cdot}25$	2	38·0	$\pm 1{\cdot}5$
31·5	$\pm 1{\cdot}25$	2	45·0	$\pm 1{\cdot}5$

3.3.2 *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 3·0 mm and 1·5 mm respectively.

3.3.3 *Length* — The length of the hose shall be as agreed to between the purchaser and the supplier.

3.3.3.1 The tolerance on any specified hose length shall be ± 1 percent.

3.4 Requirements of Physical Tests on Finished Hose

3.4.1 *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 **4** of IS : 443-1963* shall be as specified in Table 2.

3.4.2 *Accelerated Ageing Test Requirement* — After ageing at 100° ± 1°C for 72 hours, the rubber used for the lining and cover of the hose shall not vary by more than ± 25 percent for tensile strength, and $^{+10}_{-45}$ percent for

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

elongation at break of the corresponding values obtained before ageing, when tested according to **4** of IS : 443-1663*.

TABLE 2 TENSILE STRENGTH AND ELONGATION AT BREAK OF LINING AND COVER

(*Clause* 3.4.1)

CHARACTERISTIC	*REQUIREMENT FOR	
	Lining	Cover
(1)	(2)	(3)
Tensile strength kgf/cm², *Min*	70	70
Elongation at break, percent, *Min*	250	300

3.4.3 *Swelling Test Requirement*

3.4.3.1 *Lining* — The lining of the hose after immersion in the test liquid shall not change in volume by more than $\begin{matrix}-5\\+35\end{matrix}$ percent, when tested according to **13** of IS : 443-1963*.

3.4.3.2 *Cover* — The cover of the hose after immersion in the test liquid shall not change in volume by more than + 100 percent, when tested according to IS : 443-1963*.

3.4.4 *Adhesion Strength* — The strength of adhesion when tested according to IS : 443-1963* shall be such that the rate of separation does not exceed 25 mm per minute under a load of 4 kg for the following:

a) Between requirement plies,

b) Between lining and reinforcement plies, and

c) Between cover and reinforcement plies.

3.4.5 *Fuel Soluble Matter* — When tested according to the method prescribed in Appendix A, the fuel soluble matter of inner rubber lining shall not be more than six percent by weight.

3.4.6 *Hydraulic Test Requirement* — The hose shall comply with the requirements specified in Table 3 when tested according to **11** of IS : 443-1963*.

3.4.7 *Proof Pressure Test Requirement* — Each length of the hose when subjected to internal hydraulic pressure of 10 kgf/cm² for one minute, shall not show any rupture, leakage or porosity.

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

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

TABLE 3 REQUIREMENTS OF HYDRAULIC TEST

(*Clause* 3.4.6)

Minimum Bursting Pressure	Maximum Increase in Outside Diameter at a Pressure of 3·5 kgf/cm²
(1)	(2)
30 kgf/cm²	4 percent

3.4.8 *Electrical Continuity Test* — Each length of hose shall be tested to show evidence of electrical continuity.

NOTE — A 4·5 V battery or transformer and a 3·5 V, 0·3A test bulb may be used for this test.

4. MARKING

4.1 Each length of hose shall be indelibly marked at intervals of approximately three metres with:

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

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

4.1.1 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 licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

5. SAMPLING AND CRITERIA FOR CONFORMITY

5.1 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*.

6. TESTS

6.1 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* 3.4.5)

DETERMINATION OF FUEL SOLUBLE MATTER

A-1. REAGENT

A-1.1 Toluene — Reagent grade (*see* IS : 1839-1961*).

A-1.2 Iso-octane

A-1.3 Solvent Mixture — a mixture of 30 volumes of toluene and 70 volumes of iso-octane.

A-2. PROCEDURE

A-2.1 Cut the sample into pieces approximately 3 mm square and extract 5 g of the comminuted sample with 100 ml of solvent mixture in a glass flask for 96 h at 27° ± 2°C, suitable precautions being taken to prevent loss by evaporation.

A-2.2 Filter the contents, while still hot, into a hemispherical glass dish of suitable size, washing both the residue in the flask and the filter with a further quantity of the solvent mixture. Evaporate the contents of the dish on a boiling water bath and heat the residue in a ventilated air-oven for 2 hours at 150° ± 3°C.

A-2.3 Calculate the weight of residual fuel soluble matter as a precentage of the original weight of the comminuted sample. Carry out a blank determination on the solvent mixture and correct the result as necessary.

*Specification for toluene, reagent grade.