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METHODS OF SAMPLING AND TEST FOR RUBBER HOSES

(Second Revision)

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Indian Standard

METHODS OF SAMPLING AND TEST FOR RUBBER HOSES

(Second Revision)

0. FOREWORD

0.1 This Indian Standard (Second Revision) was adopted by the Indian Standards Institution on 10 April 1975, 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 1953 and was revised in 1963. Since its revision 17 parts of methods of test for vulcanized rubbers covering, among others, tensile stress-strain properties, accelerated ageing, ply adhesion and resistance to oil have been published. Consequently in this revision only reference to the relevant parts has been made instead of reproducing them. Further the scope of hydraulic tests has been enlarged to cover hydrostatic burst pressure, proof pressure, change in dimensions and distortion test. Tests for resistance to steam, vacuum and electrical conductivity have also been added.

0.3 In preparation of this standard considerable assistance has been taken from AS 1180-1972 ' Methods of test for hose made from elastomeric materials ' published by Standards Association of Australia.

0.4 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard prescribes the methods of sampling and test for rubber hoses.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS : 7503 (Part I)-1974† shall apply.

*Rules for rounding off numerical values (*revised*).
†Glossary of terms used in the rubber industry: Part I.

3. SAMPLING AND CRITERIA FOR CONFORMITY

3.0 The object of testing hoses by the purchaser is to ensure conformity of the supply to the agreed material specification whereas testing by manufacturer during production is to ensure the conformity by reducing the quality fluctuations to the minimum and thus ensure the conformity of the lot to the specified requirements. A useful guidance can be obtained from IS : 397 (Part I)-1972* for the purpose of ensuring the homogeneity of the lot.

3.0.1 A sample of sufficient length for proper performance of the required tests shall be cut from the hose when possible without impairing its use and the pieces of hose from which sample have thus been cut shall be accepted by the purchaser as full length, provided the hose meets the specified requirements.

3.1 Scale of Sampling

3.1.1 *Lot* — In any consignment all the lengths of rubber hoses of the same type, grade, size and diameter having the same number of plies and produced under essentially similar conditions of manufacture (such as those from single batch of raw materials 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 300 lengths or less and each such group shall constitute a lot.

3.1.2 Tests for determining the conformity of the lot to the requirements of the relevant material specification shall be carried out on the sample taken from each lot separately. The number of lengths of hoses to be selected for this purpose shall depend on the lot size and shall be in accordance with Table 1.

TABLE 1 SCALE OF SAMPLING

Lot Size (in Lengths)	Sample Size for Visual, Dimensional and Proof Pressure Tests	Permissible Number of Defective Lengths
(1)	(2)	(3)
Up to 50	8	0
51 „ 100	13	1
101 „ 150	20	2
151 „ 300	32	3

*Methods for statistical quality control during production: Part I Control charts for variables (*first revision*).

3.1.2.1 The required number of lengths of hoses shall be selected at random and in order to ensure randomness of selection random sampling procedures given in IS : 4905-1968* may be followed.

4. MEASUREMENT OF DIMENSIONS

4.1 Apparatus

4.1.1 *Steel Calipers*

4.1.2 *Plug Gauge* — ' Go ' and ' No Go ' type.

4.1.3 *Steel Tape*

4.1.4 *Micrometer*

4.2 Procedure

4.2.1 *Diameter and Bore*

4.2.1.1 The outside diameter shall be determined as the mean of two measurements taken at right angles to each other in one plane across the hose. If a vernier scale and caliper is used, the caliper shall be adjusted by light finger pressure until no further looseness is apparent, the sliding member then locked, the caliper removed and the reading observed. In the case of fluted hose this measurement shall be taken on top of the flute and the depth of the flute shall not exceed 0·5 mm.

4.2.1.2 The inside diameter shall be determined as the mean of two measurements taken at right angles to each other in one plane across the hose, measured at least 25 mm from the end. For bulk inspection the internal diameter of the hose shall be checked with a plug gauge of ' Go ' and ' No Go ' type to see that it is within the specified tolerance.

4.2.1.3 The uniformity of the bore shall be assessed by passing a steel ball having a diameter equal to the minimum allowable bore less one half of the minus tolerance, through the hose under a pressure of 100 kN/m² (approx 1 kgf/cm²).

4.2.2 *Thickness* — For measuring the thickness of the components, cut off specimen of length approximately 50 mm from a sample section of the hose. Mark a diameter at each end of the specimen at right angles to each other. Bisect the specimen by cutting it at right angles to its length and then each half longitudinally along its marked diameters. Separate the lining and cover. Place the unbuffed test piece on the anvil of the micrometer and then lower the presser foot gently until it contacts the surface of the test piece. The foot of the micrometer gauge shall exert a pressure of 200 g/cm² on the surface of the test piece. Read the thickness from the dial to the nearest 0·01 mm. Repeat the test on the test piece

*Methods for random sampling.

after buffing only to the extent necessary to remove the braid or woven fabric impressions and record the average of four measurements. During buffing avoid undue heating of the rubber.

4.3.2 *Length* — Hose supplied in nominal lengths shall be measured with a suitable steel tape. Any fittings shall be excluded in the measurement.

4.3 Report — The report shall state the following:

a) The mean outside diameter,

b) The mean inside diameter,

c) The uniformity of the bore,

d) Average thickness of the part of the hose measured,

e) The depth of fluting, and

f) The length.

5. TENSILE STRESS-STRAIN PROPERTIES

5.1 The method given in IS : 3400 (Part I)-1965* shall be followed.

NOTE — If the thickness of the lining and/or cover sample obtainable after buffing is less than 1 mm but more than 0·8 mm, then a tolerance of — 20 percent shall be permitted on the specified tensile strength and elongation in the appropriate standard. Should it be impossible to obtain test specimens having a buffed thickness of minimum 0·8 mm, the manufacturer may be requested to furnish a sheet 30 cm × 30 cm × 0·25 cm in size made from rubber compound of the same quality from which the hose was made and having a cure equivalent to that to which the hose was subjected.

6. ACCELERATED AGEING

6.1 The method given in IS : 3400 (Part IV)-1965† shall be followed.

7. DETERMINATION OF PLY ADHESION

7.1 The Method A given in IS : 3400 (Part V)-1965‡ shall be followed.

8. HYDROSTATIC PRESSURE TESTING

8.0 General

8.0.1 This method describes the procedure to be adopted for determining:

a) hydrostatic burst pressure,

b) hydrostatic proof pressure,

c) change in dimensions under pressure, and

d) hydrostatic distortion.

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*Methods of test for vulcanized rubbers: Part I Tensile stress-strain properties.
†Methods of test for vulcanized rubbers: Part IV Accelerated ageing.
‡Methods of test for vulcanized rubbers: Part V Adhesion of rubber to textile fabrics.

8.1 Test Specimen — The hydrostatic burst test, the change in dimensions test, and the hydrostatic distortion test shall be carried out on test specimens having a free length of not less than 450 mm after attaching fittings. The hydrostatic proof test shall be carried out on a full length of manufactured hose.

8.2 Hydrostatic Burst Test

8.2.0 *Principle* — In this test a steadily increasing hydrostatic pressure is applied to a length of hose until rupture occurs and the pressure recorded.

8.2.1 *Procedure* — Connect the test specimen to the hydraulic pressure line and completely fill with water by bleeding all air from the free end of the hose through a petcock or valve. The hydrostatic pressure shall be applied at a uniform rate of increase by means of a hand pump, hydraulic pump or accumulator. Raise the pressure to the minimum required burst pressure in not less than 15 seconds and not more than 30 seconds. Inspect the hose during pressurization and record the maximum pressure reached.

NOTE — Individual standards may specify the rate of increase of pressure.

8.2.2 *Report* — The report shall state the maximum pressure reached and whether any indication of failure, leakage or hose burst was noted below the specified minimum burst pressure.

8.3 Hydrostatic Proof Pressure Test

8.3.0 *Principle* — In this test a steady hydrostatic pressure is applied to a length of hose for a period of time and the hose inspected while under this pressure.

8.3.1 *Procedure* — Connect the test specimen to the hydraulic line and raise the pressure in the hose at the same uniform rate as specified in **8.2.1** until the specified minimum proof pressure for the particular hose is attained. Maintain the proof pressure in the hose for about 5 minutes and thoroughly inspect the hose, while at the specified proof pressure.

NOTE — Individual standards may specify the rate of increase of pressure.

8.3.2 *Report* — The report shall state whether or not any sign of leakage, uneven expansion, air bubbles on cover due to entrapped air or other indication of failure was observed during inspection at proof pressure.

8.4 Change in Length Test

8.4.0 *Principle* — In this test the change in length between the two marks on the hose is measured before and after the hose is pressurised.

8.4.1 *Procedure* — Measurements for the determination of change in length shall be conducted on a previously untested hose assembly.

Connect the test specimen to the hydraulic line and raise the pressure uniformly in the hose as specified in **8.2.1** to the specified value. Maintain the pressure in the hose for 30 seconds and then release the pressure. Allow the test specimen to restabilize for 30 seconds. During this time a gauge length of 250 mm shall be marked on the specimen, midway between the couplings (initial length).

8.4.1.1 Repressurize the hose to the same specified pressure, and after fter 30 seconds at this pressure, remeasure the distance between the gauge marks (final length) while the hose is still under pressure.

8.4.2 *Calculation* — Calculate the change in length of the hose under :r pressure, as a percentage of the initial length as shown below:

$$\text{Percentage change in length} = \frac{L - L_o}{L_o} \times 100$$

where

L = final length between the gauge marks under pressure, and

L_o = initial length between the gauge marks.

8.5 Hydrostatic Distortion Test

8.5.0 *Principle* — In this test the diameter of the hose is measured before and after the hose is pressurized.

8.5.1 *Procedure* — Connect the test specimen to the hydraulic line (*see* **8.2.1**) and pressurize the hose to an initial pressure of 100 kN/m² (approx 1 kgf/cm²). While the hose is under this pressure make three crayon or pencil marks at points equally spaced along its length. Measure the outside diameter at these points using the procedure described in **4.2.1.1** and obtain the average value. Raise the pressure in the hose at the rate of 100 kN/m² (approx 1 kgf/cm²) per second until the pressure within the hose has reached the specified value. While at this pressure remeasure the diameter as quickly as possible at the same three positions on the hose and obtain the average value. Examine the hose for any indication of uneven expansion.

8.5.2 *Calculation* — Calculate the change in diameter of the hose under pressure as a percentage of the diameter measured under a pressure of 100 kN/m² (approx 1 kgf/cm²) as shown below:

$$\text{Distortion percentage} = \frac{D - D_o}{D_o} \times 100$$

where

D = diameter of hose at the specified test pressure, and

D_o = diameter of hose under a pressure of 100 kN/m².

NOTE — This test may be carried out in conjunction with the hydrostatic proof pressure test.

8.6 Precautions — The following precautions shall be observed while performing these tests.

8.6.1 It is important that all air be expelled from the hose because expansion of air compressed in the hose, when suddenly released by bursting or other failure may result in a serious accident.

8.6.2 Calibrated pressure gauges should be frequently checked and fitted with a restrictor or other damping device to minimize pulsation or shock load changes.

8.6.3 The free end of the hose be allowed unrestricted movement during the test.

9. EFFECT OF CHEMICALS ON HOSE LINING AND COVER

9.0 Principle — Samples of the lining or cover are immersed in the chemical to be tested for 24 hours. At the end of this period the change in volume, tensile strength and elongation at break are determined.

9.1 Apparatus — Two vessels of size and shape adequate to contain the test pieces are required. The vessels shall be capable of being effectively sealed to prevent the escape of chemical. In addition the vessels and lids shall be inert to the chemical substance used.

9.2 Test Specimen — Three test pieces, 25 × 25 mm shall be prepared from the sample of the hose as given in **9.2.1** to **9.2.3**.

9.2.1 The cover and lining shall be carefully removed from the sample of the hose, using if necessary, very small amounts of suitable solvent. Where a solvent is used, the cover and lining shall be allowed to dry for a period not exceeding 36 hours. The surfaces of the samples of cover and lining shall be buffed only to the extent necessary to ensure smooth faces, except when the material is too thick.

9.2.2 The thickness of the samples of cover and lining shall be the thickness of the material undergoing test, but shall not exceed 1·5 mm, and shall be uniform to within ± 0·25 mm. Test specimens prepared from the same sample shall be of the same thickness within ± 0·25 mm.

9.2.3 Three test specimens of both the lining and cover shall be cut with die to the required dimensions in one stroke, from the prepared samples.

9.3 Procedure

9.3.1 Determine the volume of the test specimen, by measuring their dimensions by the procedure described in **4** or by immersion in a suitable liquid. Obtain the mean volume of the test specimens for both the cover and lining.

9.3.2 Determine the tensile strength and elongation at break of all the test specimens and note the mean values for both the cover and the lining.

9.3.3 Completely immerse all test specimens in separate vessels containing sufficient quantity of the specified chemical substances and seal the vessels. Allow the vessels to stand at a temperature of $27 \pm 2°C$ for 24 hours. Remove the test specimens from the vessels after expiry of the specified period.

NOTE — In case of solid chemicals, saturated solution in suitable solvent is to be used.

9.3.4 Immediately determine the volume of the test specimens after immersion by suitable means. Calculate the mean volume for both cover and lining.

9.3.5 Allow the test specimens to air-dry at a temperature of $27 \pm 2°C$ for 24 hours and determine their tensile strength and elongation at break. Calculate the mean values for both the cover and lining.

9.4 Calculation — The average change in volume, tensile strength and elongation at break of the test specimens shall be determined and the percent change calculated as follows:

$$\text{Change, percent} = \frac{B - A}{A} \times 100$$

where

B = mean value after immersion, and

A = original mean value.

10. EFFECT OF LIQUIDS ON HOSE — CHANGE IN PHYSICAL PROPERTIES

10.1 Test Specimen — A piece of hose 300 to 350 mm long, excluding hose connections.

10.2 Procedure — Set up test specimen as shown in Fig. 1 and fill with the appropriate chemical. Seal both ends of the test specimen and allow to stand at a temperature of $27 \pm 2°C$ and a relative humidity of 65 ± 5 percent for 24 hours. Drain the hose and immediately subject it to the specified physical test and compare the results obtained from fresh samples not subjected to the treatment of the chemicals.

11. RESISTANCE TO OIL

11.1 The method given in IS : 3400 (Part VI)-1967* shall be followed.

*Methods of test for vulcanized rubbers: Part VI Resistance to liquids.

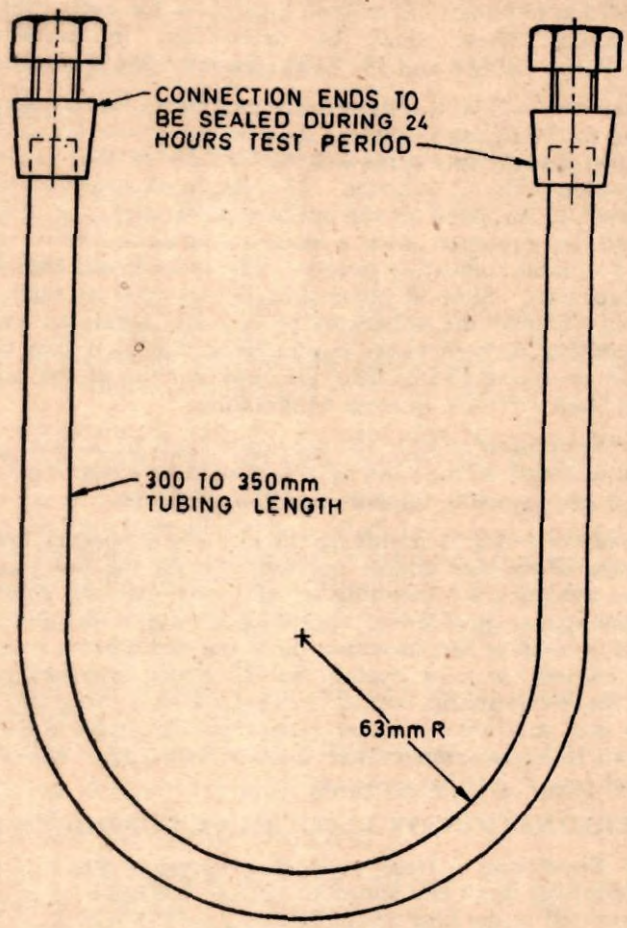


FIG. 1 APPARATUS FOR FINDING THE EFFECT OF LIQUID ON HOSE

12. RESISTANCE TO STEAM

12.0 General — Steam test of hose consists of subjecting test specimens having previously determined physical properties, to the action of steam under controlled conditions for known periods, after which the physical properties are again measured and the changes noted. Tensile strength, elongation at break and strength of adhesion are the physical properties

used in addition to visual and manual inspection, for evaluating the effect of the steam. These shall be determined in accordance with IS : 3400 (Part I)-1965* and IS : 3400 (Part V)-1965†.

12.1 Apparatus — The two fixed horizontal steam heaters having suitable connections for attaching specimens shall be placed one above the other at such distance that the specimens will just fit between the connections in a vertical position without distortion. Dry saturated steam at the required pressure shall be supplied to the specimens through the upper heater, which shall be equipped with a pressure-regulating valve, a recording gauge, and suitable indicating gauges. The lower heater shall be connected to a steam trap. Shut-off valves shall be provided at each opening in each heater. Should the apparatus be confined within an enclosure as a safety precaution, such enclosure should be so designed that the ambient temperature measured 25 mm from the outer surface of the hose shall be not greater than 11°C above room temperature.

12.2 Test Specimen — The test specimen shall be a piece of the hose sample cut to length as required by the apparatus except that the length shall be not less than 400 mm nor more than 600 mm.

12.3 Procedure — For determining the physical properties before steaming, a portion of the hose sample not required for the test shall be used. Mount the specimen for steaming in the apparatus and subject it to an internal steam pressure of 500 ± 15 kN/m^2 (5·0 ± 0·15 kgf/cm^2 approx) for 7 hours on each of two successive days, the steam being turned off and the hose allowed to cool during the 17 hours intermediate interval. After the second steaming period, remove the hose from the apparatus, allow it to cool and hold it under laboratory atmospheric conditions for not less than 16 hours and not more than 94 hours, after which determine the physical properties after steaming.

13. DETERMINATION OF ELECTRICAL CONDUCTIVITY

13.1 Test Specimen — Hose assemblies having a 600 mm free length between couplings, shall be capped to prevent the entry of moisture. No fluid is permitted in the hose assemblies used for this test.

13.2 Conditioning — The test specimens shall be conditioned for 24 hours at 27 ± 2°C and a relative humidity of 65 ± 5 percent.

13.3 Procedure — Remove the surface moisture from the conditioned hose assemblies. Connect one end of the fittings to a high voltage electrical source and connect the other end fitting to the ground. Apply a potential difference of 150 kV across the test assembly for 5 minutes, and measure the leakage current in microamperes.

*Methods of test for vulcanized rubbers: Part I Tensile stress-strain properties.
†Methods of test for vulcanized rubbers: Part V Adhesion of rubber to textile fabrics.

13.4 Report — The report shall state the maximum leakage current over the free length of the test assembly.

14. RESISTANCE TO VACUUM

14.1 Apparatus

14.1.1 An apparatus capable of maintaining a vacuum of 640 mm Hg.

14.1.2 A transparent plastics cap and a suitable source of light for inspecting the lining of the hose.

14.2 Procedure

14.2.1 Mount the test specimen in a straight position with one end connected to the vacuum source. Cover the other end with the transparent cap and apply a vacuum as specified in the material specification. Visually examine the lining and cover for blistering or collapse.

14.2.2 If the length or size of hose precludes visual examination, the performance of the hose under test shall be assessed as follows:

For hose size of 12·5 mm and larger, a ball or cylinder 6 mm less in diameter than the bore of the hose, shall be passed through the hose. For hose sizes under 12·5 mm a ball or cylinder 3 mm less in diameter than the bore of the hose, shall be passed through the hose.

14.3 Report — The report shall state the performance of the hose as follows:

a) Whether the lining shows any signs of blistering under visual examination,

b) Whether the cover collapses under vacuum, and

c) Whether the ball or cylinder passes through the hose.

15. RESISTANCE TO COLD FLEXING

15.0 General — This method describes two tests for determining the effect of cold flexing on hose. In the first method (Method A), a hose specimen is cold flexed and the effect on the hose is assessed by examination and proof pressure testing. In the second method (Method B), specimen of the hose tube and cover are cold flexed and examined for cracks or fractures.

15.1 Method A — By Testing the Hose

15.1.1 *Apparatus*

15.1.1.1 A cold chamber maintained at $-40 \pm 1°C$ of suitable size ize to contain the test specimen, and a means of handling the test specimen while at this temperature.

15.1.1.2 A mandrel whose diameter is equal to twice the minimum specified bend radius of the hose being tested.

15.1.2 *Test Specimen* — Hose assembly having a free length of at least four times the specified minimum bend radius shall be used.

15.1.3 *Procedure* — The test specimen shall be held at a temperature of — 40°C for 24 hours. After this time, while still at — 40°C, the specimen shall be evenly and uniformly bent over the appropriate mandrel in not less than 8 seconds nor more than 12 seconds. The test specimen is then allowed to warm to room temperature and visually examined for cover cracks and then subjected to the proof test described in **8.3**. The hose shall be inspected for cover cracks and signs of leakage.

NOTE — Hose less than 25 mm internal diameter shall be bent through 180° over the mandrel, while hose with an internal diameter 25 mm and over shall be bent through 90° over the mandrel.

15.1.4 Report — The appearance of cover cracks after bending and after proof testing, as well as any sign of leakage during the proof test, shall be reported.

15.2 Method B — By Testing the Tube and Cover

15.2.1 *Apparatus*

15.2.1.1 A cold chamber maintained at — 40 ± 1°C of suitable size to contain the flexing fixture when loaded with specimen and designed to permit operation of the flexing fixture within the chamber.

15.2.1.2 The flexing fixture shall consist of two parallel plates each having a width of at least 50 mm so supported in guides that they may be rapidly moved from a position 63 mm apart until they are separated by a distance of 25 mm. Suitable clamping bars or devices shall be provided for holding the ends of the specimen for a distance of 6·3 mm at the corresponding edge of each plate so that, when mounted, the specimen forms similar bent loops between the plates. A satisfactory flexing fixture is shown in Fig. 2.

15.2.2 *Test Specimen* — Two specimens of the tube and cover shall be taken from the hose sample so as to provide longitudinal tension test specimens from hose 30 mm and under in nominal diameter and transverse test specimens on larger sizes.

15.2.2.1 The elastomer portions shall be obtained from the hose without the use of a solvent, if practicable, by gripping the rubber near the point of separation and separating each portion a little at a time without excessive stretching of the rubber. If it is necessary to use a solvent (commercial *iso* octane is satisfactory) ensure that the specimens obtained are placed so as to permit free evaporation of the solvent from all surfaces and allow to rest for at least one hour before being tested.

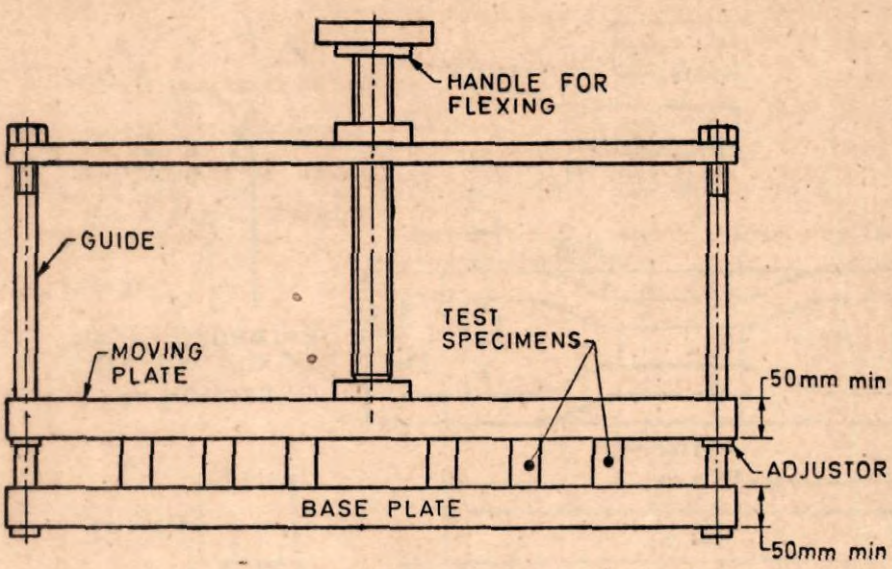


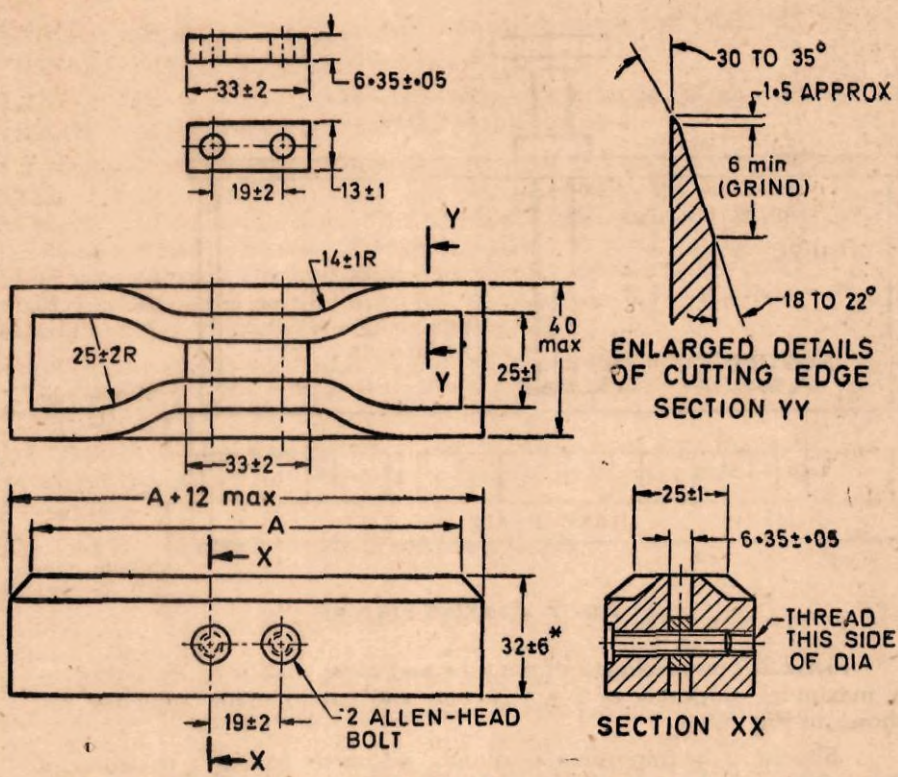
FIG. 2 FLEXING FIXTURE

15.2.2.2 The specimens of the tube and cover shall then be buffed to a maximum thickness of $2 \pm 0{\cdot}25$ mm and cut to shape using the die shown in Fig. 3.

Should it be impossible to obtain specimens having a thickness of $2{\cdot}0 \pm 0{\cdot}25$ mm the manufacturer may be requested to furnish a sample of the cured rubber taken from the same quality of rubber from which the hose was made and having a cure equivalent to that to which the hose was made.

15.2.3 *Procedure* — Mount the test specimens in loop position between the plates of flexing fixture, with the enlarged ends spaced at least 3 mm apart and held in the clamps for a distance of 6·3 mm. Place the fixture containing the specimens with the plates 63 mm apart, into the cold chamber and expose for 5 hours. At the end of this period, and while still in the cold chamber, move the plates of the flexing fixture as rapidly as possible from the 63 mm distance of separation to a position where they are 25 mm apart.

15.2.4 *Interpretation of Results* — If both test specimens of the tube or of the cover show neither cracks nor fractures after testing, the compound shall be considered as having passed the brittleness test. If both specimens crack, the compound shall be considered to have failed. If only one test specimen of the tube of the cover cracks, the



NOTE — For dies used in clicking machines, it is preferable that this tolerance be ± 0·5 mm.

$A = 115$, *Min*

All dimensions in millimetres.

FIG. 3 DIE FOR STAMPING SPECIMENS OF TUBE AND COVER FOR COLD FLEXIBILITY TESTNG

result is inconclusive and two additional specimens of that part of the hose shall be tested. If either one of these cracks, the compound shall then be considered to have failed.

15.2.5 *Report* — The report shall state the following:

a) The result of the test, expressed as ' passed ' or ' failed ';

b) Identification of the material tested, including description of any special treatment prior to test; and

c) Date of manufacture of the material, if known, and the date of test.

(*Continued from page* 2)

Members	*Representing*
SHRI V. D. PENDSE	Swastik Rubber Products Ltd, Poona
SHRI R. M. KHALADKAR (*Alternate*)	
SHRI V. R. RAO	Sundaran Industries Pvt Ltd, Madurai
SHRI K. C. MADHUSUDHANAN (*Alternate*)	
SHRI B. ROY	National Rubber Manufacturers Ltd, Calcutta
SHRI AMITABHA SEN (*Alternate*)	
SHRI M. SALIM VOHRA	Premier Rubber & Cable Industries, Thana
SHRI A. D'COSTA (*Alternate*)	
SHRI K. S. SUBBANNA	Burmah-Shell Oil Storage & Distributing Co of India Ltd, Bombay

INDIAN STANDARDS

ON

RUBBER HOSES

IS:

443-1975	Methods of sampling and test for rubber hoses (*second revision*)
444-1968	Water hose of rubber with woven textile reinforcement (*second revision*)
446-1968	Air hose of rubber with woven textile reinforcement (*second revision*)
447-1968	Welding hose of rubber with woven textile reinforcement (*second revision*)
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*)
911-1968	Air hose of rubber with braided textile reinforcement (*second revision*)
913-1968	Water hose of rubber with braided textile reinforcement (*second revision*)
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
2482-1963	Water suction hose of rubber, light duty
2765-1964	Radiator hose
3418-1968	Oil and solvent resistant hose of rubber with braided textile reinforcement (*first revision*)
3549-1965	Water suction and discharge hose of rubber, heavy duty
3572-1968	Welding hose of rubber with braided textile reinforcement (*first revision*)
5797-1970	Electrically bonded aircraft fuelling rubber hose
5821-1970	Hot water hose of rubber with woven textile reinforcement
5894-1970	Rubber sand blast hose with braided textile reinforcement
5937-1970	Hot water hose of rubber with braided textile reinforcement
6417-1971	Rubber sand blast hose with woven textile reinforcement
7079-1973	Automotive hydraulic brake hose