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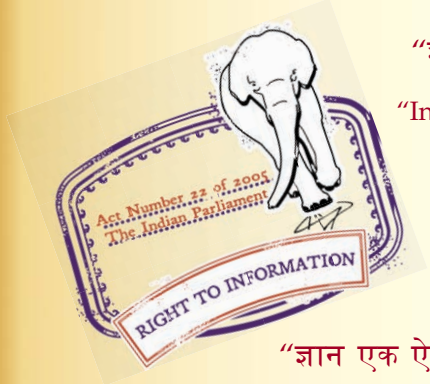
IS 12092 (1987): Method of test for hose assemblies used in hydraulic fluid power systems [PGD 17: Fluid Power Fittings, Hoses and Hose Assemblies]



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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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UDC 621·643·3·002·72 : 621·22 : 620·1

Indian Standard

(Reaffirmed 2002)

METHOD OF TEST FOR HOSE ASSEMBLIES USED IN HYDRAULIC FLUID POWER SYSTEMS

[Ref : Doc : EDC 73 (4514)]
Fluid Power Systems and Components Sectional Committee, EDC 73; Components Testing Subcommittee, EDC 73 : 4

1. Scope — Specifies the method of test and evaluating performance of hose and/or hose assemblies (hose and attached end fittings) used in hydraulic fluid power systems.

2. Terminology — For terminology and definition of terms used in this standard reference shall be made to IS : 10416-1982 ' Glossary of terms related to fluid power '.

3. Tests — It is recommended that all the tests should be conducted in the order as given in **3.2** to **3.9**.

3.1 *Classification of Tests*

3.1.1 *Routine tests* — The tests mentioned at **3.2.1** and **3.4** shall be considered as routine tests.

3.1.2 *Type test* — Shall constitute all the tests mentioned in **3.2** to **3.9**.

3.2 *Visual and Dimensional Check Test*

3.2.1 Each hose assembly shall be visually examined to determine that the correct fittings are properly installed.

3.2.2 Inspect the hose for conformity to all dimensions according to the relevant standards.

3.2.3 Determine finished outside diameters and reinforcement diameters where required by calculation from measurement of the respective circumference.

3.2.4 Measure inside diameter by means of a suitable expending ball or telescopic gauge or any other suitable instrument.

3.2.5 Measure concentricity over both the reinforcement and the finished outside diameters using either a dial indicator gauge or a micrometer.

3.2.6 Take the readings at 90° intervals around the hose.

3.2.7 Take inside and outside diameter measurements at a minimum of 25 mm and concentricity measurement at 13 mm from the hose ends.

3.3 *Change in Length*

3.3.1 Conduct measurements for the determination of elongation or contraction on a previously untested, unaged hose assembly having at least 300 mm free length between couplings when laid straight.

3.3.2 Attach the hose assembly to the pressure source and pressurize to the specified working pressure for a period of 30 seconds, the pressure is then released.

3.3.3 Place accurate reference marks 250 mm apart on the outer cover of the hose, midway between the couplings after allowing the hose assembly to stabilize for a period of 30 seconds after pressure release.

3.3.4 Repressurize the hose assembly to the specified working pressure for a period of 30 seconds.

3.3.5 Measure the final length which is the distance between reference marks while the hose is pressurized.

3.3.6 Determine the change in length using the formula:

$$V_L = \frac{L_1 - L_0}{L_0} \times 100$$

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where

L_0 = distance between the reference marks when the hose was not pressurized following the initial pressurization;

L_1 = distance between the reference marks under pressure; and

V_L = percentage change in length, which will be positive in case of increase and negative in case of a decrease in length.

3.4 *Proof Test*

3.4.1 The hose assemblies shall be hydrostatically tested at the proof pressure which is twice the working pressure of the hose for a period of 1 minute.

3.4.2 Reject assemblies indicating failure or leakage.

3.5 *Leakage Test*

3.5.1 Subject the unaged hose assemblies on which the end fittings have been attached for not over 30 days to a hydrostatic pressure of 70 percent of the specified minimum burst pressure for a period of 5·0 to 5·5 minutes.

3.5.2 Reduce the fluid pressure to zero bar gauge.

3.5.3 Re-apply the 70 percent of minimum burst hydrostatic pressure for another 5·0 to 5·5 minutes.

3.5.4 Reject assemblies showing leakage or failure.

Note — Since this test is normally destructive, the samples used for this test shall not be used for any other test.

3.6 *Resistance to Vacuum Test* — The hose shall not blister nor show any other indication of failure when subjected to the specified vacuum for a period of 5 minutes.

3.7 *Cold Bend Test*

3.7.1 Subject the hose assemblies to a temperature of -40 ± 3°C in a straight position for 24 hours.

3.7.2 While still at −40°C, bend the samples once over a mandrel having a diameter equal to twice the specified minimum bend radius, taking a time of 8 to 12 seconds. Hoses up to and including 22 mm nominal inside diameter shall be bent through 180° over the mandrel and hoses larger than 22 mm nominal inside diameter shall be bent through 90° over the mandrel.

3.7.3 After flexing, allow the sample to warm to room temperature and visually examine for cover cracks. Then the sample shall be subjected to proof pressure test in accordance with **3.4**.

3.7.4 Reject any sample with visual cracks or leakage.

Note — Being a destructive test, the samples subjected to this test shall be destroyed.

3.8 *Burst Test*

3.8.1 Subject the unaged hose assemblies on which the end fittings have been attached for not more than 30 days to the specified hydrostatic burst pressure which shall be four times the working pressure. Rate of pressure during the test shall be:

a) between 0·075 and 0·175 mPa/s for hose assemblies having burst pressure up to 12·5 mPa, and

b) between 0·35 and 1·0 mPa/s for hose assemblies having burst pressure greater than 12·5 mPa.

3.8.2 Reject assemblies showing leakage, hose burst as indication of failure below the specified minimum burst pressure.

Note — This being a destructive test, hose assemblies subjected to this test shall be destroyed.

3.9 *Impulse Test*

3.9.1 Test four unaged hose assemblies with end fittings which have been attached for not more than 30 days.

3.9.2 Apply a pulsating pressure internally to the hose assemblies at a rate between 0·5 and 1·25 Hz and record the frequency used.

3.9.3 Ensure that the pressure cycle falls within the shaded area as shown in Fig. 1 and conforms as closely as possible to the curve as shown.

Note — It is desirable that the rate of pressure rise during the first part of the pressure impulse cycle be between 1 000 and 3 500 bar/sec.

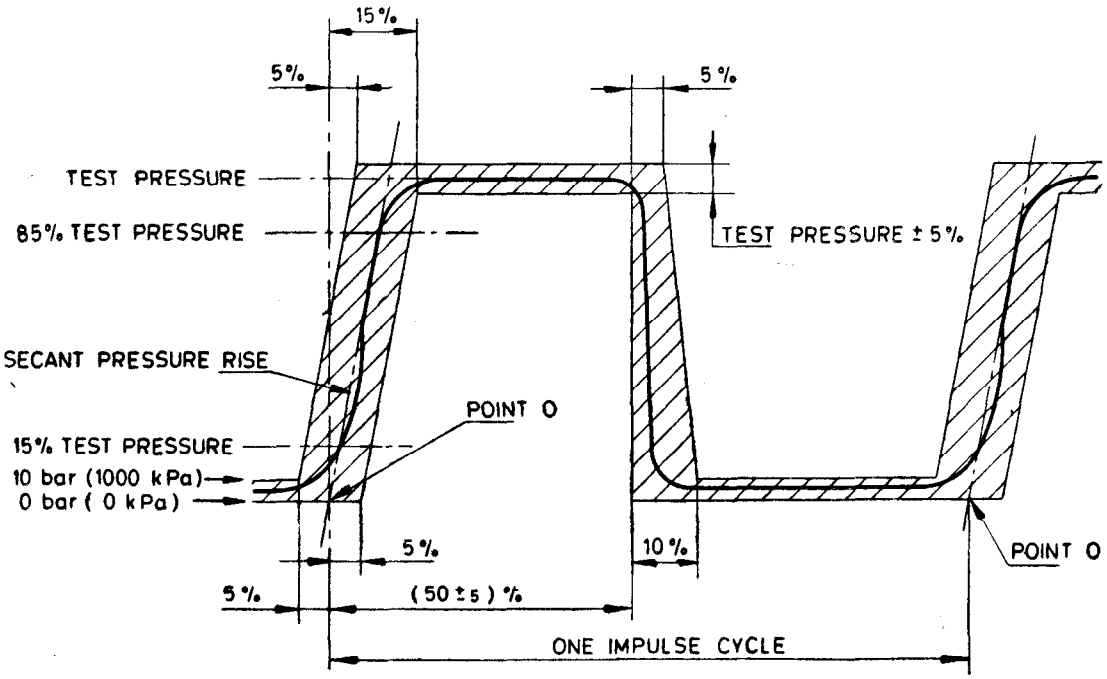


FIG. 1 PRESSURE-IMPULSE CYCLE

3.9.4 Select a test fluid which complies with the following requirements and circulate it at a rate sufficient to maintain a uniform fluid temperature of 93 ± 3°C within the hose assemblies.

3.9.4.1 Use a mineral oil having the following characteristics as the test fluid:

a) Viscosity at 100°C	:	4·0 to 9·0 cSt*
b) Viscosity at 40°C	:	32·0 to 76·0 cSt*
c) Pour point, *Max*	:	−28°C
d) Flash point, closed, *Min*	:	190°C
e) Aniline point	:	100 ± 10°C

3.9.5 Calculate the full exposed length of the test hose as follows:

a) Sizes up to 22 mm nominal bore −180° bend exposed length = [3·14 × (hose minimum bend radius)] + [2 × (hose outside diameter)]

b) Sizes over 22 mm nominal bore −90° bend exposed length = $\frac{[3{\cdot}14 \times (\text{hose minimum bend radius})]}{2}$ + [2 × (hose outside diameter)]

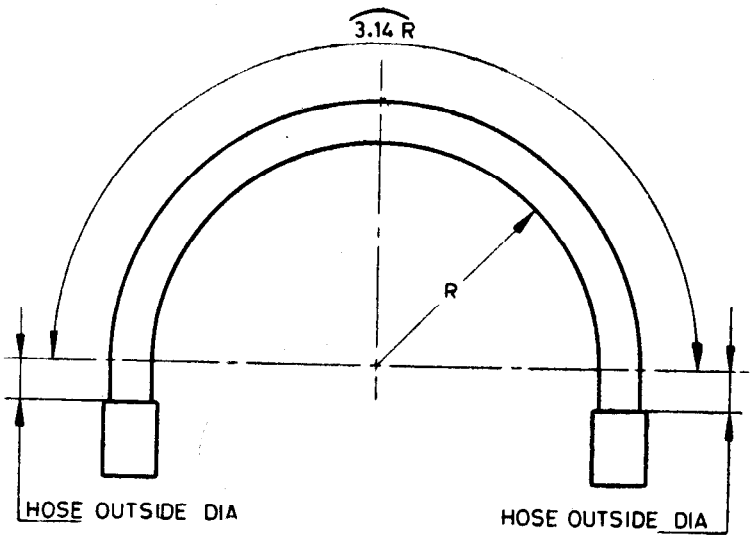
3.9.6 Connect the hose assemblies to the testing unit. In case of hose up to 22 mm nominal bore, it shall be bent through 180° and in case of hose over 22 mm nominal bore, it shall be bent through 90° at the minimum bend radius as given in Fig. 2.

3.9.7 The hose shall be tested at either 125 percent or 133 percent of working pressure or otherwise indicated in the individual specification.

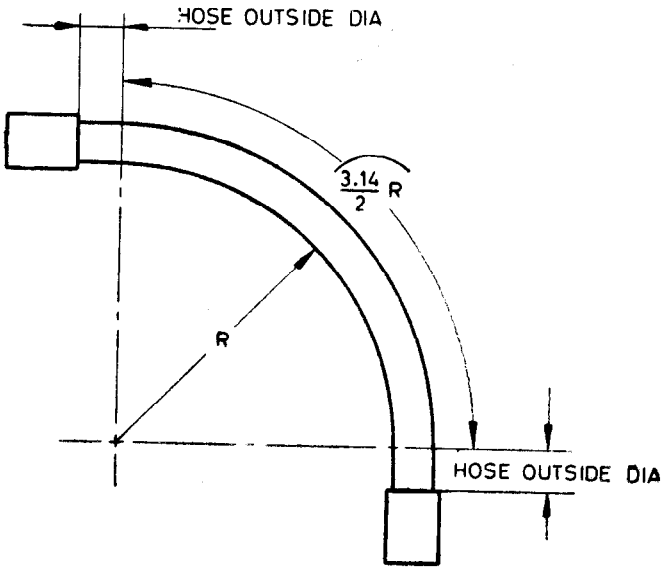
3.9.8 The duration of the impulse test shall be 100 000 cycles.

Note — This being a destructive test, samples subjected to this test shall be destroyed.

*1 cSt = 1 mm^2/sec.



2A Hose Sizes up to and Including 22 mm Nominal Inside Dia



2B Hose Sizes Larger than 22 mm Nominal Inside Dia

FIG. 2 TEST SPECIMEN FOR PRESSURE-IMPULSE TEST

EXPLANATORY NOTE

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure. Hose assemblies are flexible fluid conductors.

In the preparation of this standard, considerable assistance has been drawn from ISO 6605-1986 'Hydraulic fluid power—Hose assemblies—Method of test' issued by the International Organization for Standardization (ISO).

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