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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Rubber and plastics hoses and tubing — Determination of transmission of liquids through hose and tubing walls

Tuyaux et tubes en caoutchouc et en plastique — Détermination de la transmission des liquides à travers les parois d'un tuyau et d'un tube

Reference number
ISO 8308 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8308 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Rubber and plastics hoses and tubing — Determination of transmission of liquids through hose and tubing walls

1 Scope and field of application

This International Standard specifies a method for the determination of transmission of liquids through hose and tubing walls.

The method is applicable to rubber and plastics hoses and tubing of all bore sizes and constructions. The test is a practical comparative test, simulating working conditions.

2 References

ISO 471, *Rubber — Standard temperatures, humidities and times for the conditioning and testing of test pieces.*

ISO 4671, *Rubber and plastics hose and hose assemblies — Methods of measurement of dimensions.*

ISO 4788, *Laboratory glassware — Graduated measuring cylinders.*

3 Principle

The test is carried out on an assembly mounted in a test apparatus fitted with equipment to fill and measure a charged volume of a volatile liquid.

The system can be put under high pressure. The test result is calculated as a change in volume of the test liquid in relation to the inside area of the hose or tubing. A calculation of the average evaporation rate is also included.

The test is a compensation test and does not take into account the effects of non-evaporated test liquid diffused into the hose wall or the change in composition of liquids based on a mixture of components (e.g. gasoline).

4 Test liquid

The test liquid shall be that specified in the appropriate product standard.

5 Apparatus

The apparatus consists of a nitrogen gas source connected to a pipe system. The gas pressure is controlled by means of a regulator and pressure gauge.

It is essential that the system be provided with a safety valve.

The test piece is fixed vertically and is connected to the apparatus at the top via a measuring cylinder conforming to ISO 4788 and at the bottom via a charging pipe (see figure 1).

WARNING — Owing to the presence of potentially hazardous vapours, ensure that this test is carried out in a well-ventilated area.

6 Test pieces

Each test piece shall be either a hose assembly with a free hose length of 250 mm or a sample of tubing in accordance with figure 2, fitted with suitable couplings and adaptors (see figure 2).

Three test pieces shall be tested.

7 Test temperature

The test temperature shall be standard temperature in accordance with ISO 471.

8 Test pressure

The test pressure shall be 50 ± 5 kPa (0,5 ± 0,05 bar).

9 Procedure

9.1 Determine the free length l between the fittings of the test piece, and the internal diameter d, as specified in ISO 4671.

9.2 Connect the test piece to the test apparatus (see figure 1).

9.3 Fill the test piece and the measuring cylinder with test liquid up to the top graduation mark of the measuring cylinder.

9.4 Taking the dilation of the hose or tubing at test pressure into account, stabilize the test piece at the test pressure for 5 min. Release the nitrogen pressure and allow the dissolved gas to escape over a period of 5 min, then record the initial reading, V_i.

9.5 Apply the test pressure.

9.6 Take measurements after 24, 48, 72 and 96 h, using the following method :

Close the main valve, then release the test pressure and wait 5 min before recording the new reading V_t. Close the venting valve, and open the main valve to apply the test pressure.

If the volume loss after 96 h, calculated according to 10.1, does not appear to have stabilized, take another measurement after 120 h and another after 144 h if necessary.

10 Expression of results

10.1 Volume loss related to the exposed area

Calculate the volume loss, ΔV, in cubic centimetres per square metre, after a stated test time t, using the formula

$$\frac{(V_i - V_t) \times 10^6}{\pi d l}$$

where

V_i is the initial volume, in cubic centimetres;

V_t is the volume, in cubic centimetres, after the stated test time t;

d is the internal diameter, in millimetres, of the hose or tubing;

l is the internal free length, in millimetres, of the hose or tubing.

Each separate reading shall be used for calculation according to this method.

10.2 Evaporation rate

To avoid the effect of the diffusion of the test liquid into the hose or tubing wall, the following calculation shall be carried out on the measurements after 72 and 96 h.

Calculate the evaporation rate, VR, in cubic centimetres per square metre per hour, using the formula

$$\frac{(V_{72} - V_{96}) \times 10^6}{\pi d l \times 24}$$

where

V_{72} is the volume, in cubic centimetres, of liquid after 72 h;

V_{96} is the volume, in cubic centimetres, of liquid after 96 h;

d and l are as defined in 10.1.

NOTE — In cases where further measurements have been made after periods longer than 96 h, V_{72} and V_{96} in the above formula should be replaced respectively by the corresponding penultimate and final volume measurements.

11 Test report

The test report shall include the following information :

a) a full description of the hose or tubing tested;

b) a reference to this International Standard;

c) the test liquid;

d) the volume loss of liquid of each test piece;

e) the volume loss calculated by either of the methods;

f) the date of test.

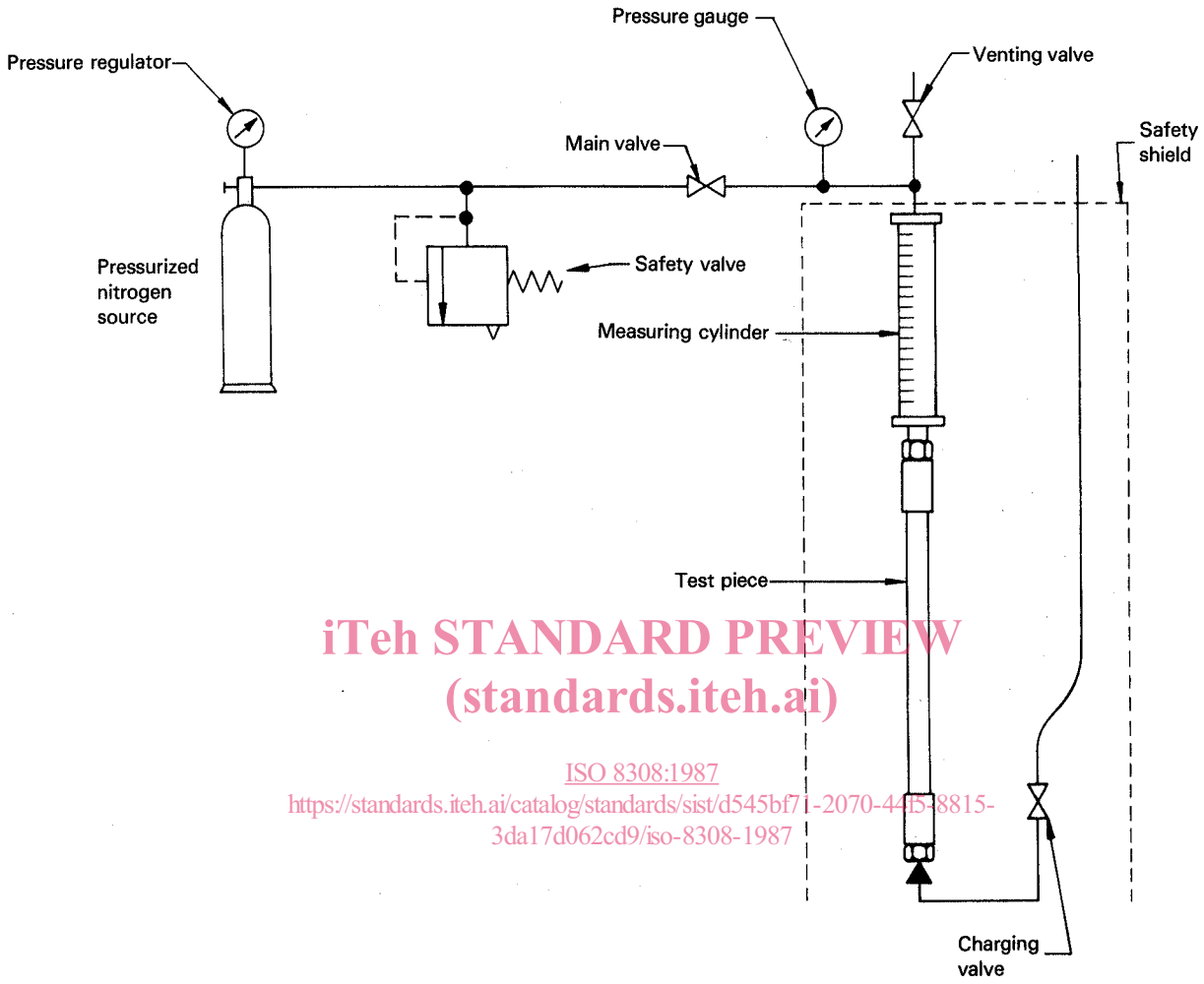

Figure 1 — Apparatus for liquid permeability test

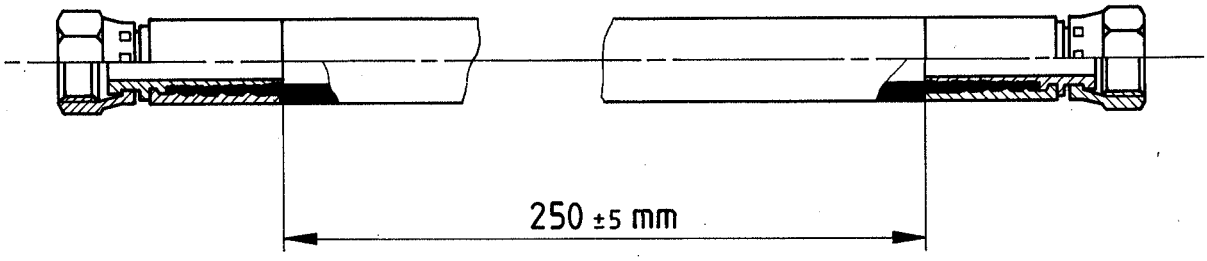

Figure 2 — Size and tolerance of test piece

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