International Standard 6801

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Rubber or plastics hoses — Determination of volumetric expansion

Tuyaux en caoutchouc ou en plastique — Détermination de l'expansion volumique

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Foreword

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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.

International Standard ISO 6801 was developed by Technical Committee ISO/TC 45, *Rubber and rubber products*, and was circulated to the member bodies in December 1981.

It has been approved by the member bodies of the following countries:

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Austria	Hungary	Spain
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The member body of the following country expressed disapproval of the document on technical grounds:

USA

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INTERNATIONAL STANDARD ISO 6801-1983 (E)

Rubber or plastics hoses — Determination of volumetric expansion

0 Introduction

When used for dispensing specific volumes of fluids, the volumetric capacity of a hose is often required to vary by only small amounts at the dispensing pressure. This International Standard describes a method of checking that such requirements can be met.

1 Scope and field of application

This International Standard specifies a method for the determination of the volumetric expansion of rubber or plastics hoses under hydrostatic pressure.

This International Standard does not specify the dimensions of the test piece and the test pressure(s) as each of which will be specified in the appropriate specification.

2 Reference

ISO 1402, *Rubber and plastics hoses and hose assemblies — Hydrostatic testing.*[1)]

3 Apparatus (see the figure)

3.1 The apparatus comprises a suitable source of fluid which can be maintained at the required pressure, together with pressure gauges, piping, valves and fittings, so that a vertical length of hose can be subjected to hydraulic pressure.

A graduated burette of sufficient accuracy is also required for measuring the volume of fluid corresponding to the expansion of the hose under pressure.

3.2 The bore of all piping and connections shall be smooth without recesses or off-sets, so that all air may be freely removed from the system before carrying out each test. The valves shall be of such design as to open and close with minimum displacement of fluid. The apparatus shall be capable of increasing the pressure in the test piece in accordance with ISO 1402. The rate of pressure increase shall be

a) between 0,075 and 0,175 MPa/s for test pressures up to 12,5 MPa;

b) between 0,35 and 1,0 MPa/s for higher test pressures.

1) At present at the stage of draft. (Revision of ISO 1402-1974.)

4 Calibration of apparatus

4.1 Prior to testing the hose, the correction factor(s) for the apparatus, to allow for its increased capacity under the test pressure(s), shall be determined as described in 4.2.

4.2 Following the procedure as described in clause 5, using a length of steel hydraulic tubing with external diameter 6,3 mm and minimum wall thickness 1,52 mm in place of the test pieces, determine the correction factor as the mean value of three expansions.

4.3 If the correction factor, determined at a pressure of 10,3 MPa, exceeds 0,08 cm^3, the apparatus is unsuitable.

5 Procedure

5.1 Carefully connect the test piece in position on the apparatus in such a way as to obtain a leak-proof seal, taking care to avoid twisting it. Maintain the test piece in a vertical position without being in tension while under pressure.

The free length of the test piece should be measured.

5.2 Fill the tank with alcohol or distilled water, taking care that it is free of air or dissolved gases. Open valve A and fill the pressure source with liquid. Partially open valve D and allow the liquid to run from the tank through the burette until no air bubbles are seen in the burette.

NOTE — Removal of air bubbles may be facilitated by moving the test piece back and forth.

5.3 Close valves A, C and D and raise the pressure in the test piece to the test pressure for not more than 10 s. Check for leaks at the connections and release the pressure completely in the test piece by opening calve C, which shall then be closed before proceeding as described in 5.4.

5.4 Adjust the liquid level in the burette to the zero mark by means of valve D.

5.5 Increase the pressure at the rate specified in 3.2 until the pressure gauge shows the test pressure. Maintain this pressure

in the test piece by closing valve B. Then determine the expansion immediately by opening valve C and allowing the liquid in the expanded test piece to rise in the burette. As soon as the liquid level has become constant, close valve C and record the volume in the burette.

5.6 Repeat the procedure as described in 5.5 twice, so that the final reading on the burette is the total volume of the three expansions.

5.7 If the pressure in the test piece is inadvertently raised, just prior to reading the expansion, to a value above the test pressure but not exceeding 50 % of the specified minimum burst pressure for the hose, release the pressure completely, allow the test piece to recover for 15 min and repeat the procedure described in 5.4 to 5.6.

If the pressure in the test piece is allowed to exceed 50 % of the specified minimum burst pressure for the hose, discard the test piece and repeat the test using another test piece.

If, at any time during the test, an air bubble flows out of the test piece, repeat the test after allowing the test piece to recover for at least 5 min.

6 Expression of results

The volumetric expansion, E, expressed in cubic centimetres per metre of free length of the test piece, is given by the equation

$$E = \frac{(V/3) - C}{l}$$

where

V is the total volume of the three expansions, in cubic centimetres, read from the burette, rounded to the nearest 0,01 cm^3;

C is the correction factor, in cubic centimetres, rounded to the nearest 0,01 cm^3 (see clause 4);

l is the free length of the test piece in metres.

Report the result in cubic centimetres per metre, rounded to the nearest 0,01 cm^3.

NOTE — The result may be expressed as a percentage, if required, by determining the internal diameter and the free length of the hose assembly, and hence its volume, prior to testing.

7 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) a full description of the hose and its origin;

c) the dimensions of the test piece;

d) the test pressure;

e) the correction factor for the apparatus;

f) the total volume of the three expansions;

g) the calculated hose expansion, in cubic centimetres per metre;

h) the percentage volumetric expansion, if required.

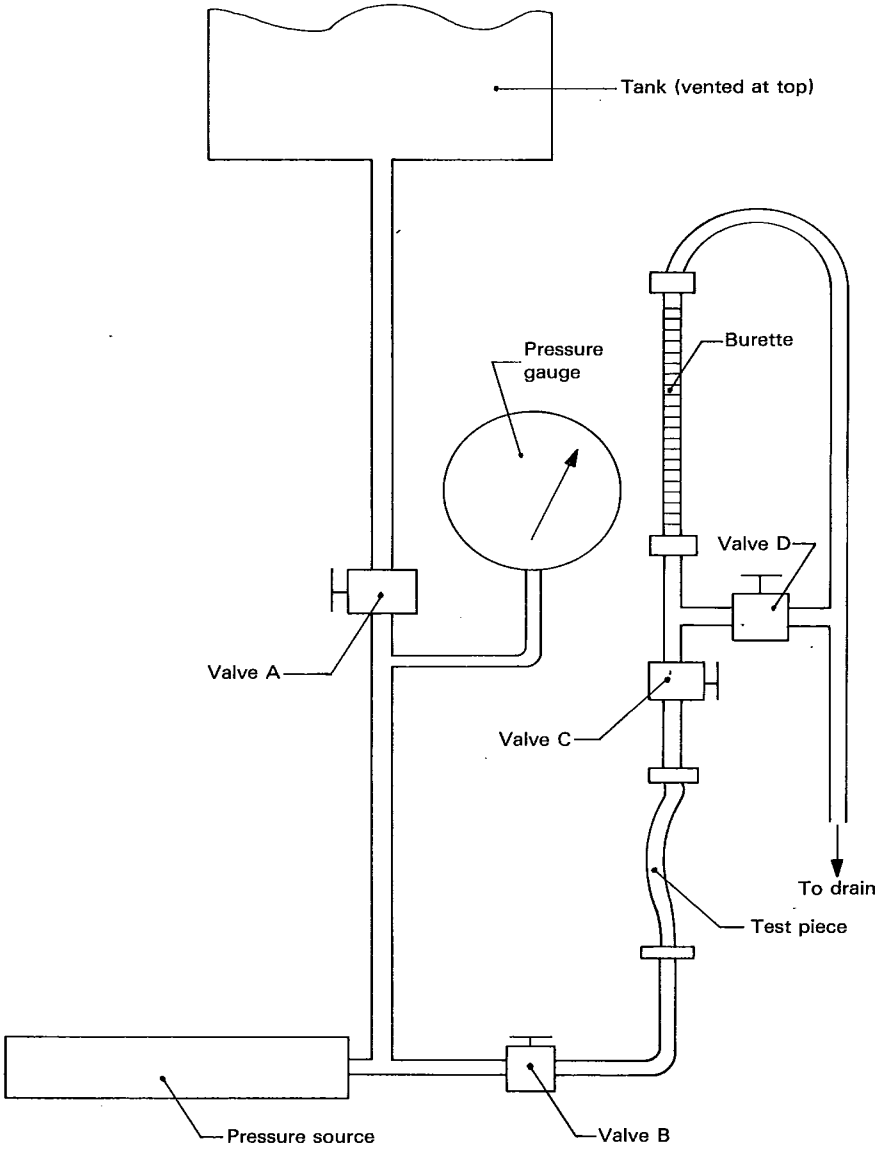

Figure — Schematic arrangement of test apparatus