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Rubber or plastics hoses and hose assemblies — Hydraulic impulse test with flexing

Tuyaux et flexibles en caoutchouc et en plastique renforcés par des fils métalliques — Essai d'impulsions hydrauliques avec flexions

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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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 1, *Rubber and plastics hoses and hose assemblies*.

This fourth edition cancels and replaces the third edition (ISO 6802:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

— new Clause 6 on test fluid has been added;

— Clause 8 on procedure has been updated to include an option for a cool down test and leakage classification as defined in ISO/TR 11340;

— new Clause 9 on expression of results has been added;

— new Annex A describing optional cool down leakage test has been incorporated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Hydraulic hoses and hose assemblies are frequently flexed in service. As there is a possibility that this needs to be taken into account during testing, this document provides a standard method of flexing during impulse testing.

Rubber or plastics hoses and hose assemblies — Hydraulic impulse test with flexing

1 Scope

This document describes hose impulse testing, with flexing, of rubber or plastics hydraulic hose assemblies at both high and low impulse pressures. The high-pressure testing is carried out at pressures greater than 3 MPa and the low-pressure testing at pressures from 1,5 MPa to 3 MPa. The test procedure is applicable to hydraulic hose assemblies that are subject to pulsating pressures in service which are included in the product requirements.

NOTE Impulse test procedures without flexing can be found in ISO 6803.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

ISO 6803, *Rubber or plastics hoses and hose assemblies — Hydraulic-pressure impulse test without flexing*

ISO 8330, *Rubber and plastics hoses and hose assemblies — Vocabulary*

ISO/TR 11340, *Rubber and rubber products — Hydraulic hose assemblies — External leakage classification for hydraulic systems*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8330 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Test methods

There are two methods of flexing; Method 1 by the use of a revolving manifold as shown in Figure 1, and Method 2, by the use of a horizontally sliding manifold as shown in Figure 2.

Both Method 1 and Method 2 shall follow requirements related to pressure and temperature as specified in ISO 6803.

The above test methods shall have the option to be also run with cool down leakage test (see Clause 8).

5 Apparatus

The apparatus consists of a flex test rig, on which the test pieces can be installed, capable of producing flexing as shown in Figures 1 and 2. The rig comprises a movable manifold and a stationary manifold, and the centreline of the stationary manifold shall be adjusted to the centre of rotation of the revolving

manifold, or to the centre of the horizontally sliding manifold. The movable manifold is geared so that it stays parallel to the stationary manifold at all times. The number of revolving cycles or sliding cycles per minute of the movable manifold shall be within the range of 34 % to 38 % of the number of impulse cycles per minute; thus, the number of flex cycles is proportional to the number of impulse cycles.

The vertical centreline of the stationary manifold is positioned at a distance of l from the centre of rotation or the centre of sliding of the movable manifold. The hose is subjected to a back bending motion with the inside radius being smaller than the minimum bend radius and the radius near each fitting being larger than the minimum bend radius.

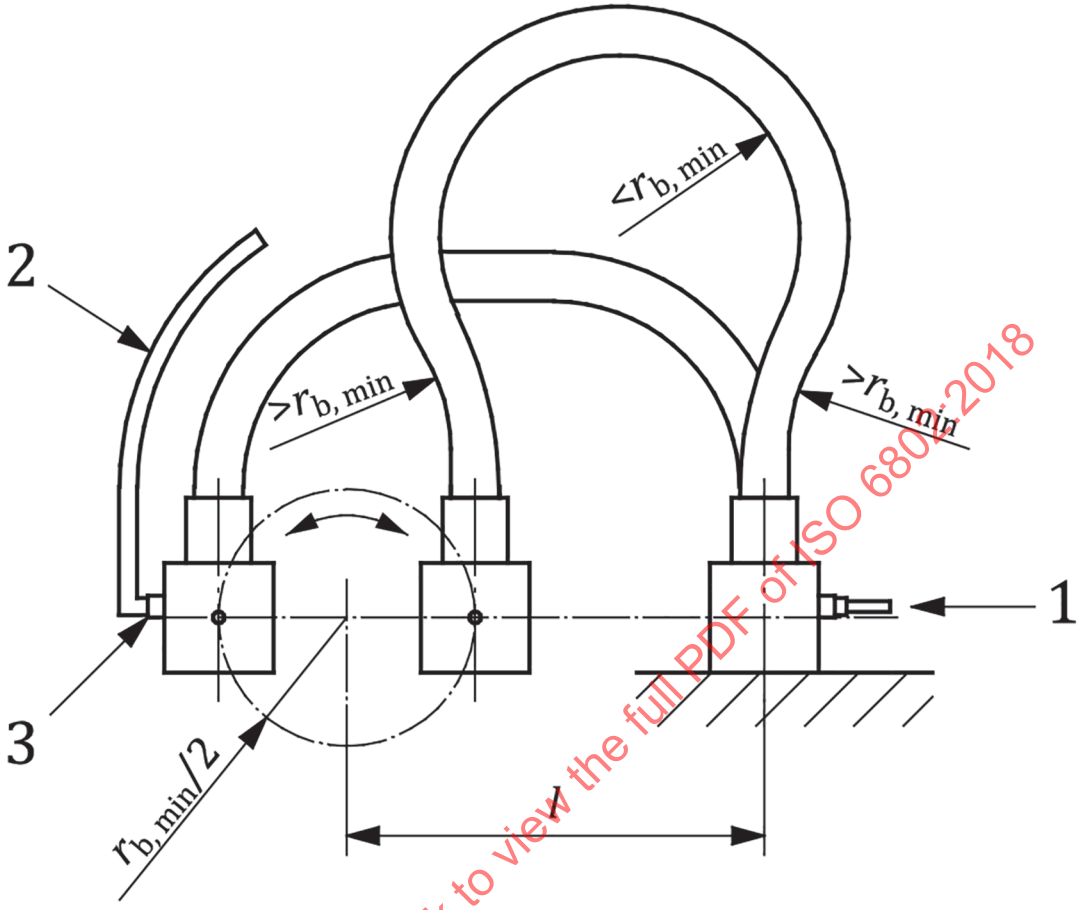
The distance l shall be calculated using the formula:

$$l = 1{,}75 r_{b,min} + d_{ext}$$

with a tolerance of ± 2 mm, where

$r_{b,min}$ is the minimum bend radius;

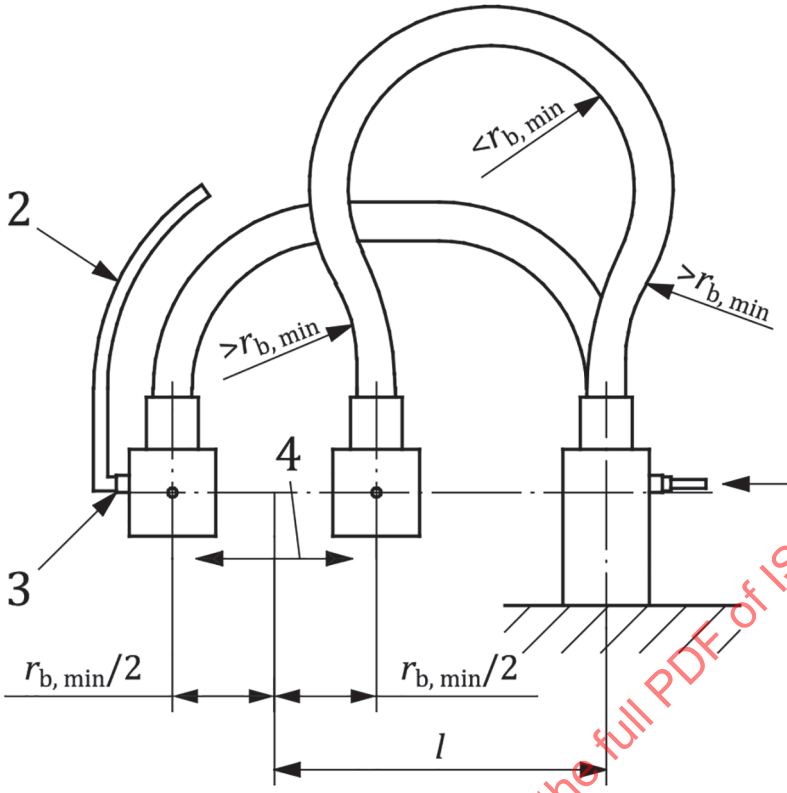
d_{ext} is the external diameter of the hose.



Key

1 test pressure inlet
2 fluid circulation line
3 check valve

Figure 1 — Apparatus for hydraulic impulse test with flexing with a revolving manifold



Key

1 test pressure inlet
2 fluid circulation line
3 check valve
4 manifold sliding direction

Figure 2 — Apparatus for hydraulic impulse test with flexing with a horizontally sliding manifold

6 Test fluid

Select a test fluid preferably with a kinematic viscosity from 32 mm^2/s to 100 mm^2/s at 40 °C (i.e. from grade ISO VG 32 to ISO VG 100 as specified in ISO 3448), and circulate it at a rate sufficient to maintain a uniform fluid temperature within the test pieces. Other fluids may be used as agreed upon between the customer and the manufacturer.

7 Test piece

7.1 Test pieces shall be complete hose assemblies with suitable end fittings attached. Unless otherwise specified, test four unaged hose assemblies with end fittings which have been attached for not more than 30 days. Where the referring standard requires, also test aged hose assemblies.

7.2 The free length of hose, L, measured between the couplings, shall be calculated using the formula;

$$L = 4{,}14r_{b,min} + 3{,}57d_{ext}$$

with a tolerance of ± 15 mm, where $r_{b,min}$ and d_{ext} are as defined in Clause 5. The minimum bend radius is specified in the relevant product specification.

8 Procedure

Attach one end of the test piece assembly to the movable manifold of the apparatus and attach the other end to the stationary manifold. Carry out the pressure impulse test by the method described in ISO 6803.

Start the test and continue until failure or until the number of cycles specified in the relevant product standard has been completed.

If a failure occurs within 25 mm of one of the end fittings, it shall be regarded as a fitting failure and recorded as such. Leakage less than class 4 as defined in ISO/TR 11340 does not constitute a failure of the hose assembly. Any leakage shall be reported in accordance with the classification in ISO/TR 11340.

Determine the duration required for the impulse test, in total number of cycles, from the referring standard. Where agreed samples are required, refer to the relevant hose or hose assembly standard.

It is recommended that the test fluid be changed frequently to prevent breakdown.

If an optional cool down leakage test for the impulse test is required in the individual product standard, carry out the procedure as given in Annex A.

This is a destructive test. Assemblies which have been subjected to this test, should therefore be discarded.

9 Expression of results

Record the number of cycles to failure or, if failure did not occur, the number of cycles completed.

NOTE The test results obtained are only valid for the combination of hose, fitting type and fitting design that was actually tested.

10 Test report

The test report shall include the following information:

a) reference to this document, i.e. ISO 6802:2018;

b) full description of the hose or hose assembly tested; including the fitting identification and attachment details, such as skive length and crimp diameter;

c) test method;

d) test temperature;

e) test pressure;

f) test fluid;

g) rate of pressure rise;

h) impulse cycle rate;

i) flexing frequency;