

INTERNATIONAL
STANDARD

ISO
11170

First edition
1995-11-15

Corrected and reprinted
1996-03-15

**Hydraulic fluid power — Filter elements —
Procedure for verifying performance
characteristics**

*Transmissions hydrauliques — Éléments filtrants — Procédure
d'homologation*



Reference number
ISO 11170:1995(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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 11170 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 8, *Product testing and contamination control*.

Annex A of this International Standard is for information only.

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995

© ISO 1995

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Filters maintain fluid cleanliness by removing insoluble contaminants.

The filter element is the porous device which performs the actual process of filtration.

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995

This page intentionally left blank

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995

Hydraulic fluid power — Filter elements — Procedure for verifying performance characteristics

1 Scope

This International Standard defines a procedure for verification of the performance characteristics of filter elements. It can be used to check their hydraulic, mechanical and separation characteristics.

NOTES

1 This procedure includes all or part of the tests defined in the International Standards listed in clause 2. If needed, and after agreement between the customer and manufacturer, the procedure can be repeated on several elements.

2 This procedure differs from an approval or qualification procedure in that standardized materials and apparatus are specified. An approval or qualification procedure may include some of these tests but with materials and test conditions that represent the actual conditions of use (e.g. the operating fluid).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2941:1974, *Hydraulic fluid power — Filter elements — Verification of collapse/burst resistance.*

ISO 2942:1994, *Hydraulic fluid power — Filter elements — Verification of fabrication integrity and determination of the first bubble point.*

ISO 2943:1974, *Hydraulic fluid power — Filter elements — Verification of material compatibility with fluids.*

ISO 3723:1976, *Hydraulic fluid power — Filter elements — Method for end load test.*

ISO 3724:1976, *Hydraulic fluid power — Filter elements — Verification of flow fatigue characteristics.*

ISO 3968:1981, *Hydraulic fluid power — Filters — Evaluation of pressure drop versus flow characteristics.*

ISO 4572:1981, *Hydraulic fluid power — Filters — Multipass method for evaluating filtration performance.*

ISO 5598:1985, *Fluid power systems and components — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5598 apply.

4 Test samples

The filter elements selected for qualification testing shall be representative of the lot and of all subsequently manufactured filter elements of the same model.

Some tests are destructive or make the filter element unsuitable for further tests. It is therefore essential to have available a sufficient number of filter elements.

5 Procedure

Subject three filter elements to the tests specified in 5.1 and 5.2. The qualification tests and their sequence are given for each filter in table 1. The sequence of

tests ensures that qualification is complete while limiting the number of tests.

5.1 Fabrication integrity test

5.1.1 Check filter fabrication integrity in accordance with ISO 2942.

Carry on with the test until the first bubble point.

Record the pressure value at the first bubble point and check that it is greater than or equal to the pressure specified by the supplier.

Dry the filter elements in a ventilated drying oven at 60 °C for at least 1 h.

WARNING — Exercise care when drying filter elements rinsed with solvents which have a low flash point.

5.1.2 Identify the three filter elements in ascending order of the first bubble point pressure, with element 1 having the lowest pressure and element 3 the highest pressure.

5.2 Compatibility test (see ISO 2943)

WARNING — Refer to local safety requirements.

5.2.1 Immerse the filter elements in the operating test fluid for at least 72 h. The fluid shall be maintained at the test temperature for 72 h, either continuously or intermittently. During this period, do not remove the elements from the fluid.

The test temperature is usually 15 °C above the manufacturer's recommended maximum operating temperature, providing it is at least 50 °C below the fluid flashing point.

This test may also be performed at low temperature (5 °C below the expected coldest temperature of use).

5.2.2 There shall be no visual evidence of structural, seal or filter medium failure.

5.2.3 Rinse the filter elements three times by submerging the filters in a reservoir containing filtered heptane or another suitable fluid (contaminated with no more than 20 particles of size 5 µm or larger and no more than 5 particles of size 15 µm or larger, per millilitre of fluid) for a period of 10 min.

Then rinse the filter elements inside and outside with a jet of the same solvent filtered through a 0,8 µm membrane disc. This rinsing operation shall be performed as carefully as possible (so as not to damage the filter element) by covering all of the filter surface with the rinsing jet.

5.2.4 Finally dry the filter elements in a ventilated drying oven at 60 °C for at least 1 h.

WARNING — Exercise care when drying filter elements rinsed with solvents which have a low flash point.

5.2.5 Check again the fabrication integrity of each filter as indicated in 5.1.

It may be possible to conduct the bubble point pressure tests in the same type of solvent used to rinse the filter element. In this case, it is not necessary to dry the elements as specified in 5.2.4.

Check also that this first bubble point pressure and the one found in 5.1 do not differ by more than 25 %.

5.3 Qualification tests

For a given filter element, the test sequence shall be as given in table 1. The order of testing of the filter elements is not important.

6 Qualification test report

Prepare a test report for each test carried out.

The qualification test report shall include all specific test reports and the related test values.

Table 1 — Test sequence

Test	Test procedures and apparatus	Acceptance criteria or approval results
Filter element No. 1 Filtration efficiency Retention capacity Collapse/burst resistance	See ISO 4572 See ISO 2941	Values of β and C_R No visual evidence of structural, seal or filter medium failure No decrease in the slope of the pressure drop versus contaminant added Fabrication integrity shall be verified
Filter element No. 2 End load test rating	See ISO 3723:1976, except for subclause 5.1 See ISO 3723:1976, subclause 6.1	No visual evidence of structural, seal or filter medium failure Fabrication integrity shall be verified
Filter element No. 3 Pressure drop Fatigue due to cyclic flow variation	See ISO 3968 See ISO 3724 See ISO 3724:1976, subclause 7.1	Δp curve No visual evidence of structural, seal or filter medium failure Fabrication integrity shall be verified

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995

Annex A

(informative)

Bibliography

- [1] ISO 4406:—¹⁾, *Hydraulic fluid power — Fluids — Code for defining the level of contamination by solid particles.*
- [2] ISO 7744:1986, *Hydraulic fluid power — Filters — Statement of requirements.*

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995

1) To be published. (Revision of ISO 4406:1987)

This page intentionally left blank

STANDARDSISO.COM : Click to view the full PDF of ISO 11170:1995