
**Hydraulic fluid power — Sequence
of tests for verifying performance
characteristics of filter elements**

*Transmissions hydrauliques — Ordre des essais pour la vérification
des caractéristiques de performance des éléments filtrants*

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 11170 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 6, *Contamination control*.

This third edition cancels and replaces the second edition (ISO 11170:2003), which has been technically revised.

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Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within a closed circuit. The liquid is both a lubricant and power-transmitting medium. The presence of solid contaminant particles in the liquid interferes with the ability of the hydraulic fluid to lubricate and causes wear to the components. The extent of contamination in the fluid has a direct bearing on the performance and reliability of the system, and needs to be controlled to levels that are considered appropriate for the system concerned. Filters are used to control the contamination level of the fluid by removing solid contaminant particles.

Different principles are used for this purpose; one of these uses a filter element enclosed in a filter housing. The filter element is the porous device that performs the actual process of filtration. The complete assembly is designated as a filter.

The performance of filter elements is measured by testing, and a series of International Standards has been developed to determine performance under specified conditions (see [Clause 2](#)). To give a greater level of assurance for a filter element's fitness for duty, most if not all of these tests should be used in a verification programme.

This International Standard provides an approval or verification protocol that features all of the current International Standards for filter testing.

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Hydraulic fluid power — Sequence of tests for verifying performance characteristics of filter elements

1 Scope

This International Standard defines a sequence of tests for verifying filter elements. It can be used to check their hydraulic, mechanical and separation characteristics.

This International Standard is not intended to qualify a filter for a particular duty or replicate conditions of service. This can only be done by a specific test protocol developed for the purpose, including actual conditions of use (e.g. the operating fluid).

The procedure in this International Standard is applicable to individual fluids or types of fluids that have similar chemistry.

2 Normative references

The following referenced documents are indispensable for the application 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 2941, *Hydraulic fluid power — Filter elements — Verification of collapse/burst pressure rating*

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

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

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

ISO 3724, *Hydraulic fluid power — Filter elements — Determination of resistance to flow fatigue using particulate contaminant*

ISO 3968, *Hydraulic fluid power — Filters — Evaluation of differential pressure versus flow characteristics*

ISO 4406, *Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles*

ISO 5598, *Fluid power systems and components — Vocabulary*

ISO 16889, *Hydraulic fluid power — Filters — Multi-pass method for evaluating filtration performance of a filter element*

ISO 23181, *Hydraulic fluid power — Filter elements — Determination of resistance to flow fatigue using high viscosity fluid*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

4 Test elements

The filter elements selected for verification testing shall be representative of normal product stock 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, because at least three elements shall be tested.

5 Test procedure

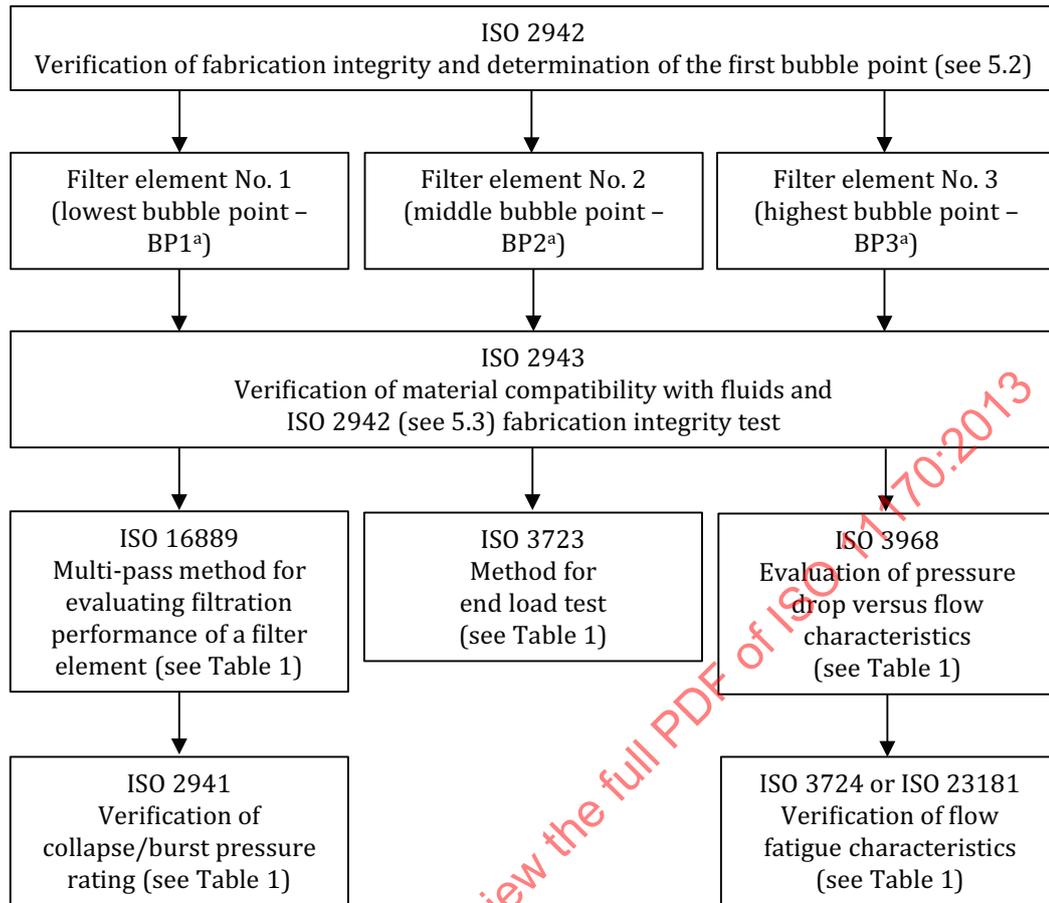
5.1 General

5.1.1 Completion of the procedure specified in this International Standard provides data on the following filter element characteristics:

- a) fabrication integrity (see ISO 2942);
- b) material compatibility with fluids (see ISO 2943);
- c) filtration efficiency (see ISO 16889);
- d) contaminant retention capacity (see ISO 16889);
- e) collapse/burst pressure rating (see ISO 2941);
- f) pressure drop versus flow characteristics (see ISO 3968);
- g) flow fatigue characteristics (see ISO 3724 or ISO 23181); and
- h) end load rating (see ISO 3723); if it can be demonstrated that this test is not relevant to the design of the filter element being tested, then the tests on element no. 2 shall be omitted.

5.1.2 Tests shall be run in accordance with the sequence given in [Figure 1](#) (see [5.2.4](#) for the numbering of the filter elements) and in accordance with the requirements given in [Table 1](#).

NOTE The purpose of the sequence of the tests is to minimize the number of tests and to ensure that the verification is complete.



a See 5.2.4.

Figure 1 — Sequence of testing