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# Hydraulic spin-on filters with finite lives — Method for verifying the rated fatigue life and the rated static burst pressure of the pressure-containing envelope

*Filtres hydrauliques à visser ayant une durée de vie spécifiée — Méthode de vérification de la durée de vie nominale en fatigue et de la pression statique d'éclatement nominale de l'enveloppe sous pression*

Reference number
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: 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.

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 document 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).

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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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 12829:2016), of which has been technically revised.

The main changes are as follows:

— a key was added to Figure 1;

— test fluid was revised;

— Figure 2 was revised.

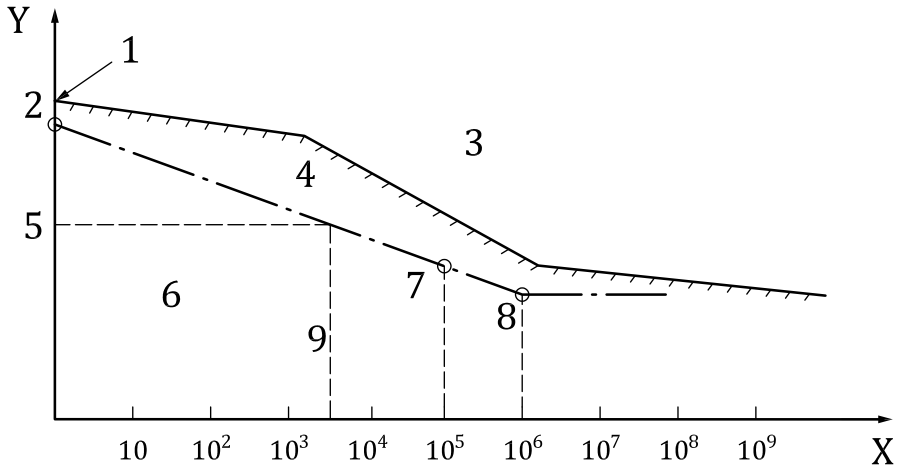
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# Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. A basic requirement of hydraulic fluid power components is that they should be capable of adequately containing the pressurized fluid.

The pressure to which an individual component can normally be subjected has a relationship with the rated fatigue pressure and minimum burst pressure. This relationship can be estimated and used as a basis of total life expectancy for the component in an individual application. Such an estimate is applied by the user. Factors such as shock, heat, misuse, etc., are to be judged by the user in each application. Selection of a specific pressure and life expectancy for a component in a particular application can be based upon the rated fatigue pressure and burst pressure as described in Figure 1. This finite life pressure rating test procedure differs from the (NFPA)T2.6.1 R2 infinite life pressure rating document (which is referred to in ISO/TR 10771-2) and can be visualized from the S-N diagram in Figure 1. (NFPA) T2.6.1 R2 is a rating system along the vertical axis, with its fatigue strength distribution and assurance level in the vertical direction at a defined life. The finite life method described in this document is a rating system along the horizontal axis, with its fatigue life distribution and assurance level in the horizontal direction at a defined stress (pressure).




**Key**

| | | | |
|---|---|---|---|
| X | cycles | 5 | applied pressure |
| Y | pressure | 6 | verified safe range |
| 1 | burst point | 7 | fatigue life/rated fatigue pressure |
| 2 | rated static burst pressure | 8 | rated fatigue pressure |
| 3 | fatigue failure range | 9 | life expectancy |
| 4 | unverified safe range | | |

**Figure 1 — Possible S-N curve method for estimating finite life rating**

Because the service life of the element container for a finite life spin-on hydraulic filter is relatively short, a fatigue life of 100 000 cycles is judged sufficient for common industrial ratings. Ratings at levels other than 100 000 cycles are permitted; this document may be applied for those cases. The method of rating includes both pressure and minimum life. The pressure rating of the filter head or mounting base can be subjected to the full $10^6$ fatigue cycles established by (NFPA)T2.6.1 R2.

The spin-on housing, because of its construction, can be tested and evaluated as an elastic body with specific pressure cycle test times and pressure rise rate conditions.

This document deals only with verifying the pressure ratings of spin-on filters. Separate from this verification procedure, manufacturers have the continuing responsibility to use managerial controls necessary to test spin-on filters that are representative of production.

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# Hydraulic spin-on filters with finite lives — Method for verifying the rated fatigue life and the rated static burst pressure of the pressure-containing envelope

**WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety concerns associated with its use. The user of this document is responsible, prior to its use, to establish appropriate safety and health practices and to determine the applicability of regulatory limitations.**

## 1 Scope

This document specifies methods for verifying the rated fatigue life and the rated static burst pressure of the pressure-containing envelope (i.e. the filter housing) of a spin-on hydraulic filter with a disposable filter element and a finite life.

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

ISO/TR 19972-1, *Hydraulic fluid power — Methods to assess the reliability of hydraulic components — Part 1: General procedures and calculation method*

## 3 Terms and definitions

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

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

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

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

**3.1**
**rated fatigue life**
$N_f$
minimum expected life, expressed in cycles, with a specified assurance level, that a filter housing can sustain at a rated pressure

**3.2**
**rated fatigue pressure**
$p_{fr}$
pressure that a filter housing can sustain for a specific number of cycles without failure

**3.3**
**rated static burst pressure**
$p_{Br}$
maximum pressure that a component pressure containing envelope, selected at random, has been verified to sustain upon application of the first pressure load, with a known probability

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