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SWEDISH STANDARDS INSTITUTE

Hydraulik – Filter – Flerstegsmetod för utvärdering av filtreringsegenskaper (ISO 16889:2008, IDT)

Hydraulic fluid power – Filters – Multi-pass method for evaluating filtration performance of a filter element (ISO 16889:2008, IDT)

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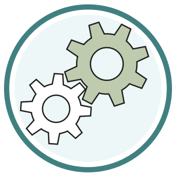

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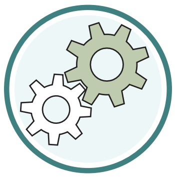

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Den internationella standarden ISO 16889:2008 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 16889:2008.

The International Standard ISO 16889:2008 has the status of a Swedish Standard. This document contains the official version of ISO 16889:2008.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Renhetsteknik, SIS/TK 108.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

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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 16889 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 16889:1999), 6.3 and Annex A of which have been technically revised, Annex A by the deletion of detailed round-robin data.

Introduction

In hydraulic fluid power systems, one of the functions of the hydraulic fluid is to separate and lubricate the moving parts of the components. The presence of solid particulate contamination produces wear, resulting in loss of efficiency, reduced component life and subsequent unreliability.

A hydraulic filter is provided to control the number of particles circulating within the system to a level that is commensurate with the degree of sensitivity of the components to the contaminant and the level of reliability required by the users.

To enable the comparison of the relative performance of filters so that the most appropriate filter can be selected, it is necessary that test procedures be available. The performance characteristics of a filter are a function of the element (its medium and geometry) and the housing (its general configuration and seal design).

In practice, a filter is subjected to a continuous flow of contaminant entrained in the hydraulic fluid until some specified terminal differential pressure (relief-valve cracking pressure or differential-pressure indicator setting) is reached.

Both the length of operating time (prior to reaching terminal pressure) and the contaminant level at any point in the system are functions of the rate of contaminant addition (ingression plus generation rates) and the performance characteristics of the filter.

Therefore, it is necessary that a realistic laboratory test to establish the relative performance of a filter provide the test filter with a continuous supply of ingressed contaminant and allow the periodic monitoring of the filtration performance characteristics of the filter.

It is also necessary that the test provide an acceptable level of repeatability and reproducibility, and a standard test contaminant, the ISO medium test dust (ISO MTD) in accordance with ISO 12103-1, be featured. This product has been shown to have a consistent particle-size distribution and is available worldwide. The filtration performance of the filter is determined by measurement of the upstream and downstream particle-size distributions using automatic particle counters validated to ISO standards.

This test is intended to differentiate filter elements according to their functional performance but is not intended to represent performance under actual field operating conditions. Test conditions are steady-state, and the dynamic characteristics of industrial hydraulic systems are not represented. Other test protocols exist or are in development to evaluate performance with cyclic flow, high viscosity, flow fatigue, etc.

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

1 Scope

This International Standard describes the following:

a) a multi-pass filtration performance test with continuous contaminant injection for hydraulic fluid power filter elements;

b) a procedure for determining the contaminant capacity, particulate removal and differential pressure characteristics;

c) a test currently applicable to hydraulic fluid power filter elements that exhibit an average filtration ratio greater than or equal to 75 for particle sizes $\leqslant$ 25 µm(c), and a final reservoir gravimetric level of less than 200 mg/L;

NOTE It is necessary to determine by validation the range of flow rates and the lower particle size limit that can be used in test facilities.

d) a test using ISO medium test dust contaminant and a test fluid in accordance with Annex A.

This International Standard is intended to provide a test procedure that yields reproducible test data for appraising the filtration performance of a hydraulic fluid power filter element without influence of electrostatic charge.

This International Standard applies to three test conditions:

— test condition 1, with a base upstream gravimetric level of 3 mg/L;

— test condition 2, with a base upstream gravimetric level of 10 mg/L;

— test condition 3, with a base upstream gravimetric level of 15 mg/L.

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 1219-1, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols for conventional use and data-processing applications*

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

ISO 3722, *Hydraulic fluid power — Fluid sample containers — Qualifying and controlling cleaning methods*

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

ISO 4021, *Hydraulic fluid power — Particulate contamination analysis — Extraction of fluid samples from lines of an operating system*

ISO 4405, *Hydraulic fluid power — Fluid contamination — Determination of particulate contamination by the gravimetric method*

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

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 11171:1999, *Hydraulic fluid power — Calibration of automatic particle counters for liquids*

ISO 11943:1999, *Hydraulic fluid power — On-line automatic particle-counting systems for liquids — Methods of calibration and validation*

ISO 12103-1:1997, *Road vehicles — Test dust for filter evaluation — Part 1: Arizona test dust*

3 Terms and definitions

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

3.1
contaminant mass injected
mass of specific particulate contaminant injected into the test circuit to obtain the terminal differential pressure

3.2
differential pressure
Δp
difference between the tested component inlet and outlet pressure as measured under the specified conditions

NOTE See Figure 1 for a graphical depiction of differential pressure terms.

3.2.1
clean assembly differential pressure
difference between the tested component inlet and outlet pressures as measured with a clean filter housing containing a clean filter element

3.2.2
clean element differential pressure
differential pressure of the clean element calculated as the difference between the clean assembly differential pressure and the housing differential pressure

3.2.3
final assembly differential pressure
assembly differential pressure at the end of a test, equal to the sum of the housing plus the terminal element differential pressures

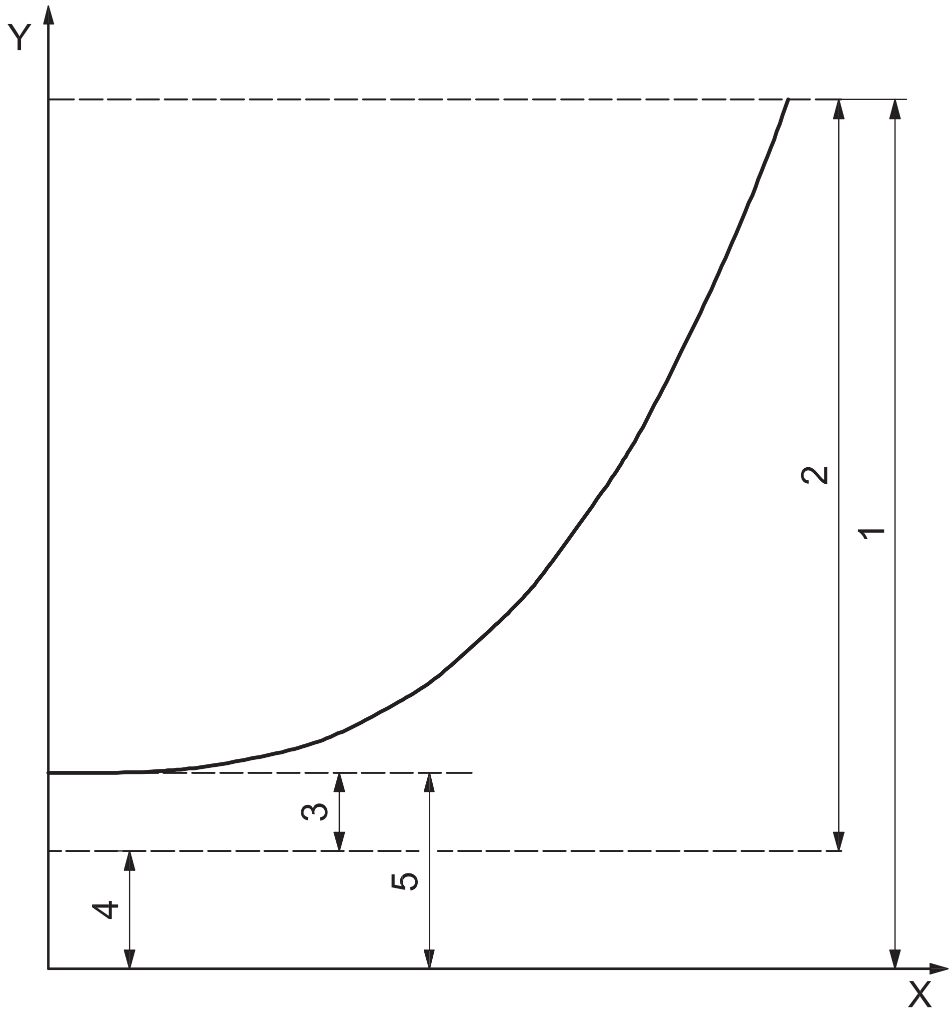
3.2.4
housing differential pressure
differential pressure of the filter housing without an element

3.2.5
terminal element differential pressure
maximum differential pressure across the filter element as designated by the manufacturer to limit useful performance

3.3
rest conductivity
electrical conductivity at the initial instant of current measurement after a d.c. voltage is impressed between electrodes

NOTE It is the reciprocal of the resistance of uncharged fluid in the absence of ionic depletion or polarization.

3.4
retained capacity
mass of the specific particulate contaminant effectively retained by the filter element when the terminal element differential pressure is reached



Key

X test time or mass injected
Y differential pressure
1 final assembly (end of test) differential pressure
2 terminal element differential pressure
3 clean element differential pressure
4 housing differential pressure
5 clean assembly differential pressure

Figure 1 — Differential pressure conventions for multi-pass test

4 Symbols

4.1 The graphic symbols used are in accordance with ISO 1219-1.

4.2 The letter symbols used in this International Standard are shown in Table 1.