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Hydraulic fluid power — Multi-pass method of evaluating filtration performance of a filter element under cyclic flow conditions

Transmissions hydrauliques — Évaluation des performances d'un élément filtrant par la méthode de filtration multi-passe sous débit cyclique

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Foreword

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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).

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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 23369:2021), which has been technically revised.

The main changes are as follows:

— calculation of ramp time.

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

In hydraulic fluid power systems, one of the functions of the hydraulic fluid is to separate and lubricate the moving parts of 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 contaminants and the level of reliability required by the users.

Test procedures enable the comparison of the relative performance of filters so that the most appropriate filter can be selected. 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 of 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, a realistic laboratory test establishes the relative performance of a filter by providing the test filter with a continuous supply of ingressed contaminant and allowing the periodic monitoring of the filtration performance characteristics of the filter. A standard multi-pass method for evaluating the performance of hydraulic fluid power filter elements under steady-state flow conditions has been developed as ISO 16889. That test procedure provides a basis for the comparison of the relative performance characteristics of various filter elements. The results from such a test, however, might not be directly applicable to most actual operating conditions.

In actual operation, a hydraulic fluid power filter is generally not subjected to steady-state flow but to varying degrees of cyclic flow. Tests have shown that, in many instances, the filtration capabilities of an element are severely reduced when subjected to varying cyclic flow conditions. It is therefore important to evaluate the filtration performance of a filter for applications under cyclic flow conditions.

The cyclic flow multi-pass test procedure for hydraulic filters specified in this document has been developed to supplement the basic steady-state flow test (ISO 16889) for filter elements that are expected to be placed in service with cyclic flow. The recommended flow cycle rate of 0,1 Hz is a result of an industry survey and a broad range of test results. If much higher cycle rates are expected in actual service, the test should be conducted at that frequency to produce more meaningful results. The procedure specified in this document may be applied at a cycle rate other than 0,1 Hz, if agreed upon between the supplier and user. However, only values resulting from testing at the 0,1 Hz cycle rate may be reported as having been determined in accordance with this document.

Fluid samples are extracted from the test system to evaluate the filter element's particulate removal characteristics. To prevent this sampling from adversely affecting the test results, a lower limit is placed upon the rated flow rate of filter elements that should be tested with this procedure.

The current maximum flow rate specified in this document is based upon the maximum gravimetric level of injection systems that have been qualified to date.