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Hydraulic fluid power — Monitoring the level of particulate contamination of the fluid —

Part 1: General principles

Transmissions hydrauliques — Surveillance du niveau de pollution particulaire des fluides —

Partie 1: Principes généraux

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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

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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 21018-1:2008), which has been technically revised. The main changes are as follows:

— 3.1 contains an updated definition for automated particle counter;

— 3.2 contains an updated definition for particle contamination model;

— 3.10 contains an updated definition for mesh;

— 3.11 now contains a note for the particle size definition;

— B.8.1 has been updated to accurately describe the capabilities of image analysis.

A list of all parts in the ISO 21018 series can be found on the ISO website.

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Introduction

In hydraulic fluid power systems, power is transmitted through a liquid under pressure within a closed circuit. The liquid is both a lubricant and a power-transmitting medium. The presence of solid particulate contamination in the liquid interferes with the ability of the hydraulic liquid to lubricate and causes wear to the components. The extent of this form of contamination in the liquid has a direct bearing on the performance and reliability of the system and it is necessary to control this to levels that are considered appropriate for the system concerned. Hydraulic oil filters are used to control the amount of particulate contamination to a level that is suitable for both the contaminant sensitivity of the system and the level of reliability required by the user.

Operators of hydraulic equipment are gradually defining maximum particle concentration levels for components, systems and processes. These are often referred to as the required cleanliness level (RCL). This cleanliness level is obtained by sampling the hydraulic liquid and measuring the particulate contamination level. If the contamination level is above the RCL, then corrective actions are necessary to reduce the contamination level. To avoid taking unnecessary actions, which can often prove costly, precision in sampling and measuring the particulate contamination level is required.

A comprehensive range of measurement equipment is available, but the instruments used are usually laboratory-based. This often requires that the equipment is operated in a special environment by specialist laboratories and this delays delivery of the test result to the user. To overcome this disadvantage, instruments are being continuously developed to determine the particulate contamination level, either using equipment that can be operated in or near the workplace or directly using on-line or in-line techniques. For equipment operated in the workplace, direct traceability to national measurement standards can be inappropriate, or irrelevant, as the instruments are used to monitor the general level of particulate contamination or to inform the user of a significant change in the level. When a significant change in the particulate contamination level is detected, the actual level is then usually qualified by using an approved particle-counting method. Also, these monitors can have simplified circuitry compared to similar laboratory units and this means that they can be less accurate and precise.

In addition, some instruments are designed to work on the “go/no-go” principle and their ability to rapidly evaluate the cleanliness level has resulted in an increase in their usage both in the fluid power industry and other markets. Unfortunately, the lack of a standardized method for their use, recalibration (if applicable) and means of checking the output validity means that the variability in the measurement data is at a level higher than is desirable.

This document has been developed to provide uniform and consistent procedures for instruments that are used for monitoring the contamination levels in hydraulic systems, especially those where direct traceability to national measurement standards is not possible or is not applicable.