

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

Part 3: Use of the filter blockage technique

ICS 23.100.60

National foreword

This British Standard is the UK implementation of ISO 21018-3:2008. It supersedes BS 3406-9:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/18/-/6, Contamination control.

A list of organizations represented on this committee can be obtained on request to its secretary.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2008

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ISBN 978 0 580 53995 4

Amendments/corrigenda issued since publication

Date	Comments

INTERNATIONAL STANDARD

ISO
21018-3

First edition
2008-04-15

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

Part 3: Use of the filter blockage technique

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

Partie 3: Technique de colmatage de filtre



Reference number
ISO 21018-3:2008(E)

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Published in Switzerland

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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 21018-3 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 6, *Contamination control*.

ISO 21018 consists of the following parts, under the general title *Hydraulic fluid power — Monitoring the level of particulate contamination of the fluid*:

- *Part 1: General principles*
- *Part 3: Use of the filter blockage technique*

A Part 2, dealing with the calibration and verification procedure for field contamination monitoring, and a Part 4, dealing with the use of the light extinction technique, are under development.

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 power-transmitting medium. The presence of solid contaminant particles in the liquid interferes with the ability of the hydraulic liquid to lubricate and causes wear. The extent of contamination in the liquid has a direct bearing on the performance and reliability of the system and should be controlled to an appropriate level.

Quantitative determination of particulate contamination requires precision both in obtaining a representative sample of the liquid and the measurement of the contamination. The awareness of the benefits of cleanliness monitoring has led to the development of instruments that operate on-line (i.e. directly connected to a system) in an attempt to reduce measurement errors that are inherent with bottle samples. Automatic particle counters (APC) and monitors have been developed and are extensively used. Unfortunately, the hydraulic liquids in many systems might not be suitable for this method of measurement as the optical interfaces created by two-phase liquids (emulsions), immiscible liquids (water in oil and vice versa) and air in all liquids, interfere with the operation of the APC and give incorrect data.

Instruments using the filter blockage principle were developed specifically to provide an alternative on-line instrument in applications where light extinction or scattering techniques are not suitable. The principle used is that the rate of filter blockage is related to the number of captured particles whose size is larger than the pore size of the filters. The filter blockage technique does not directly measure the size of individual particles and so the principle of direct traceability does not apply.

Instruments using this technique are becoming widely used in industry and an International Standard is required in order to standardize operating procedures. This part of this ISO 21018 defines procedures for the use of filter blockage instruments in evaluating the cleanliness level of a hydraulic liquid. It also includes procedures for calibrating and verifying that the instruments are operating correctly to ensure consistent results and also closer correlation with on-line or in-line instruments using the light extinction principle.

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

Part 3: Use of the filter blockage technique

1 Scope

This part of ISO 21018 specifies a method for the semi-quantitative determination of the particulate contamination level using the filter blockage technique (also known as the mesh-obscuration method or the pore-blockage technique) either on-line or off-line in containers. It also defines procedures for calibrating the instruments and verifying their correct operation both in the laboratory and in service.

In general, the techniques described in this part of ISO 21018 are suitable for monitoring

- a) the general cleanliness level in hydraulic systems,
- b) the progress in flushing operations,
- c) support equipment and test rigs.

The use of this method is applicable to all single- or multi-phase liquid systems.

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

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

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

ISO 11171, *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*

ISO 21018-1, *Hydraulic fluid power — Monitoring the level of particulate contamination of the fluid — Part 1: General principles*