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

**Part 4:
Use of the light extinction technique**

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

Partie 4: Technique d'absorption de lumière



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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 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: 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 21018-4:2016), which has been technically revised. The main changes compared to the previous edition are as follows:

- simplification of calibration procedure in [Clause 7](#);
- moving the equipment for the calibration and validation procedure from [Clause 5](#) to [Clause 7](#) after the Operating Procedures.

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

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, 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 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 online (i.e. directly connected to a system) in an attempt to reduce measurement errors that are inherent with bottle samples. Particle contamination monitors (PCM) have been developed for this purpose and are extensively used.

Instruments using this technique have become widely used in the industry and an international standard is required in order to standardize operating procedures. This document defines procedures for the use of light extinction 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.

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

Part 4: Use of the light extinction technique

1 Scope

This document specifies a method for the determination of the particulate contamination level using the light extinction technique (also known as light blockage or light obscuration) either online or offline 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 document are suitable for monitoring:

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

The use of this method is applicable to single-phase liquid systems only.

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 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 11171:2016, *Hydraulic fluid power — Calibration of automatic particle counters for liquids*

ISO 11500:2008, *Hydraulic fluid power — Determination of the particulate contamination level of a liquid sample by automatic particle counting using the light-extinction principles*

ISO 11943:2018, *Hydraulic fluid power — On-line automatic particle-counting systems for liquids — Methods of calibration and validation*

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 terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>