

INTERNATIONAL STANDARD

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Hydraulic fluid power — Particulate contamination analysis — Extraction of fluid samples from lines of an operating system

*Transmissions hydrauliques — Analyse de la pollution par particules —
Prélèvement des échantillons de fluide dans les circuits en
fonctionnement*

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ISO 4021:1992(E)

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.

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.

International Standard ISO 4021 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Sub-Committee SC 8, *Product testing and contamination control*.

This second edition cancels and replaces the first edition (ISO 4021:1977), which has been technically revised.

Annex A of this International Standard is for information only.

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Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a fluid under pressure within an enclosed circuit. This fluid is both a lubricant and a power-transmitting medium.

Reliable system performance requires control of the fluid medium. Qualitative and quantitative determination of particulate contamination in the fluid medium requires precision in obtaining the sample and determining the nature and extent of contamination.

The most representative sample is obtained using a sampler installed in a main flowline where the fluid is flowing in a turbulent manner. If such a sampler is unavailable, then fluid samples may be extracted from the system reservoir.

This International Standard describes procedures for obtaining both dynamic and static samples from an operating system.

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1 Scope

This International Standard specifies procedures for extracting fluid samples from a hydraulic fluid power system under operation.

The preferred method is to extract fluid samples from a main flowline of an operating hydraulic system in such a manner that the particulate contaminant in the sample is representative of the fluid flowing at the point of sampling.

An alternative method is to extract a sample from the reservoir of an operating hydraulic system, but this method should only be used if a suitable sampler is not fitted.

The samples taken are used for particulate contamination analysis.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3722:1976, *Hydraulic fluid power — Fluid sample containers — Qualifying and controlling cleaning methods*.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 5598 and the following definitions apply.

3.1 clean sample bottle: Sample bottle which has been thoroughly cleaned and verified in accordance with ISO 3722.

3.2 fluid sampling, line: The extraction of a sample of fluid from a turbulent section of a flow stream.

3.3 fluid sampling, reservoir: The extraction of a sample of fluid from the reservoir of an operating system.

3.4 sampler: A device which allows the extraction of a quantity of representative fluid from the hydraulic system. (See figures 1 and 2.)

3.5 turbulent flow: Fluid flow in which particle movement, anywhere in the flow, varies rapidly in velocity and direction. Flow may be turbulent when the Reynolds number (Re) is greater than 2 300 and can be assumed to be turbulent when $Re \geq 4\,000$. See annex A.

4 Principles of fluid extraction

4.1 Sampling from fluid lines

4.1.1 Extract samples from main fluid lines in a section where turbulent flow conditions exist, using a sampler having the following characteristics (see example in figure 1):

- a) being compatible with the fluid and the system operating pressure;
- b) permitting on/off valving of sample flow;