

Evaluating particulate contamination of hydraulic fluids —

Part 5: Method of reporting contamination analysis data —

[ISO title: Hydraulic fluid power — Contamination analysis — Method for reporting analysis data]

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Machinery and Components Standards Committee (MCE/-) to Technical Committee MCE/18 upon which the following bodies were represented:

- Association of British Mining Equipment Companies
- British Compressed Air Society
- British Fluid Power Association
- British Hydromechanics Research Association
- British Steel Corporation
- British Telecommunications plc
- Department of Trade and Industry (National Engineering Laboratory)
- Electricity Supply Industry in England and Wales
- Federation of Manufacturers of Construction Equipment and Cranes
- Institution of Mechanical Engineers
- Machine Tool Industry Research Association
- Ministry of Defence

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Bath University Library
- British Railways Board
- Institution of Production Engineers
- Society of Motor Manufacturers and Traders Ltd

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National foreword

This Part of BS 5540 has been prepared under the direction of the Machinery and Components Standards Committee. It is identical with ISO 3938:1986 “*Hydraulic fluid power — Contamination analysis — Method for reporting analysis data*”, published by the International Organization for Standardization (ISO).

Terminology and conventions. The text of the international standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

In British Standards, it is current practice to use the symbol “L” for litre (and its submultiples), rather than “l”.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “Part of BS 5540”.

Cross-references

International standard	Corresponding British Standard
	BS 5540 Evaluating particulate contamination of hydraulic fluids
ISO 3722:1976	Part 1:1978 Qualifying and controlling of cleaning methods for sample containers (Identical)
ISO 4402:1977	Part 2:1978 Method of calibrating liquid automatic particle-count instruments (using AC Fine Test Dust contaminant) (Identical)
ISO 4406 ^a	Part 4:1981 Method of defining levels of contamination (solid contaminant code) (Technically equivalent)

^a At present at the draft stage.

The Technical Committee has reviewed the provisions of ISO 4021, ISO 4405¹⁾, ISO 4407¹⁾, ISO 4408¹⁾ and ISO 5598 to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard. Reference may be made to BS 5540-3:1978 “*Methods of bottling fluid samples*” which is closely related to ISO 4021. ISO 5598 is referred to only for information.

Additional information. For the purposes of this Part of BS 5540 the identification statement required by clause 7 should be replaced by the following: “Method of reporting contamination analysis data in accordance with BS 5540-5”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ At present at draft stage.

0 Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit. Hydraulic fluids all contain a certain amount of solid particle contaminants.

Reliable system performance requires control of the contaminant level. One element of this control is an accurate and uniform method for reporting contamination analysis data.

1 Scope and field of application

This International Standard specifies methods for reporting data relative to contamination levels of hydraulic fluids used in industrial, mobile and marine applications for the following types of contamination analysis techniques:

- a) microscopic particle counting;
- b) automatic particle counter;
- c) gravimetric.

This International Standard is intended to establish the minimum information required to allow valid comparison and interpretation of contamination level data.

2 References

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 4402, *Hydraulic fluid power — Calibration of liquid automatic particle-count instruments — Method using Air Cleaner Fine Test Dust contaminant*.

ISO 4405, *Hydraulic fluid power — Fluid contamination — Determination of particulate contaminants by the gravimetric method²⁾*.

ISO 4406, *Hydraulic fluid power — Fluids — Solid contaminant code²⁾*.

ISO 4407, *Hydraulic fluid power — Fluids — Determination of solid particle contamination — Counting method using a microscope under transmitted light²⁾*.

ISO 4408, *Hydraulic fluid power — Fluids — Determination of solid particle contamination — Counting method using a microscope under incident light²⁾*.

ISO 5598, *Hydraulic and pneumatic fluid power — Vocabulary*.

²⁾ At present at the stage of draft.

3 Definitions

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

4 Representative fluid samples

4.1 It shall be confirmed that fluid samples for particulate contamination analysis were extracted in accordance with ISO 4021.

4.2 It shall be confirmed that sample containers have a required cleanliness level (RCL) at least two decades lower than the expected samples as qualified in accordance with ISO 3722.

5 Information to be reported

When reporting hydraulic fluid particulate contamination data, the information described in **5.1** to **5.3** shall be included.

5.1 Microscopic particle count

The microscopic particle count data shall be in accordance with ISO 4407 or ISO 4408.

Data shall be recorded in accordance with Figure 1.

The particle count data shall be plotted graphically using Figure 3.

The contaminant level shall be reported in accordance with the ISO solid contaminant code (see Figure 4).

5.2 Automatic particle count

It shall be confirmed that the automatic particle counter was calibrated in accordance with ISO 4402.

Data shall be recorded in accordance with Figure 2.

The particle count data shall be plotted graphically using Figure 3.

The contaminant level shall be reported in accordance with the ISO solid contaminant code (see Figure 4).

5.3 Gravimetric analysis

Gravimetric analysis data shall be in accordance with ISO 4405.

Data shall be recorded in accordance with Figure 5.

NOTE No attempt should be made to report a particle size distribution from a gravimetric level.

6 Limitations of data

6.1 One particle size range shall only be converted to another by interpolation.