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**Hydraulic fluid power — Method for  
determining the required cleanliness  
level (RCL) of a system**

*Transmissions hydrauliques — Méthode de détermination du niveau  
de propreté requis (NPR) d'un système*

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/131, *Fluid power systems*, Subcommittee SC 6, *Contamination control*.

## 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 particulate contamination interferes with the ability of the hydraulic liquid to lubricate and causes wear to the components. The extent of this form of contamination has a direct bearing on the performance and reliability of the system and needs to be controlled to levels that are considered appropriate for the system concerned. This level is called the required cleanliness level (RCL) and the level for an individual system depends upon the contaminant sensitivity of the system and the level of reliability required by the user. It therefore varies from application to application and within common system types.

In the past, the selection of the RCL was arbitrary and based on either the system designer's past experience or on third-party recommendations that were based upon their experience. Rarely did the selection reflect current fluid cleanliness requirements. Furthermore, as the selection was subjective, there was not any consistency in the RCL recommended by the various parties involved in the selection. The end result was that the user of the RCL would be confused and select an incorrect RCL. This fact was recognised by the British Fluid Power Association (BFPA) in 1999<sup>[1]</sup>, and it developed a method for selecting an RCL which was based upon the requirements of an individual system and user (see the Bibliography). The rationale behind the development of this method is given in [Annex A](#). This has since been adopted as Norwegian national standard NS 2085<sup>[2]</sup>.

The emphasis on fluid cleanliness has made the RCL an important parameter in the management of cleanliness in hydraulic systems. The RCL sets the standard for cleanliness throughout the manufacturing process, through the assembly and commissioning stages, and in service. It also is instrumental in ensuring that the correct filtration level is achieved in the operating system. The RCL calculated by this method is used in ISO/TR 15640<sup>[3]</sup> to assist in the selection of filters.

This document has been developed to provide a uniform and consistent procedure for selecting the RCL for a particular system. It takes the user of this procedure through a series of conditions that best describe the system for which the RCL is required and the RCL is selected on this basis.

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# Hydraulic fluid power — Method for determining the required cleanliness level (RCL) of a system

## 1 Scope

This document specifies a method of determining the required cleanliness level of a hydraulic system, that is, the most appropriate fluid cleanliness level for an operating hydraulic system based upon the individual requirements of that system.

It is applicable to systems where the level of fluid cleanliness is expressed in accordance with ISO 4406, although conversion to other contamination coding systems is possible.

It is applicable to both high and low pressure fluid power systems and also lubrication systems.

It does not include the effects of soft deformable particles that can be generated by thermal decomposition of the hydraulic fluid.

## 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 4406, *Hydraulic fluid power — Fluids — Method for coding the level of contamination by solid particles*

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

## 3 Terms and definitions

For 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:

- ISO Online browsing platform: available at [www.iso.org/obp](http://www.iso.org/obp)
- IEC Electropedia: available at [www.electropedia.org](http://www.electropedia.org)

### 3.1

#### **contamination code**

set of numbers used as a shorthand method for describing the particle size distribution of contaminants in hydraulic fluid

[SOURCE: ISO 5598:2008, 3.2.129]

Note 1 to entry: ISO 4406 contamination codes are used throughout this document.

### 3.2

#### **contaminant sensitivity**

extent to which a component is adversely affected by the presence of particulate contamination

### 3.3

#### **duty cycle**

characteristic of a hydraulic system which defines the operational pressure level and the rate of change in pressure