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Petroleum products — Determination of the filterability of lubricating oils —

Part 2: Procedure for dry oils

Produits pétroliers — Détermination de la filtrabilité des huiles lubrifiantes —

Partie 2: Méthode pour les huiles non polluées par de l'eau

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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principle **2**
5 Reagents and materials **2**
6 Apparatus **2**
7 Samples and sampling **4**
8 Preparation of apparatus **4**
9 Procedure **5**
10 Calculations **6**
10.1 Stage I filterability 6
10.2 Stage II filterability 6
11 Acceptance and expression of results **7**
12 Precision **7**
12.1 General 7
12.2 Determinability 7
12.3 Repeatability 8
12.4 Reproducibility 8
13 Test report **8**
Annex A (informative) **Suitable procedure for the addition of graduations to a measuring cylinder** **9**
Annex B (normative) **Procedure for carrying out the tests using gravimetric techniques** **11**
Bibliography **14**

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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 document 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).

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This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*.

This fourth edition cancels and replaces the third edition (ISO 13357-2:2017), which has been technically revised.

The main changes are as follows:

— included the use of gravimetric measurement techniques;

— included alternative membranes when testing higher viscosity oils;

— updated Clause 12 on precision.

A list of all parts in the ISO 13357 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.

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Introduction

To minimize wear on the components of an oil-lubricated system, it is important to reduce the concentrations of circulating hard contaminant particles. This is particularly important for hydraulic power systems, for systems whose performance and reliability rely on the maintenance of small clearances and orifices, or for systems that include rolling element bearings as components. These contaminants are removed by the use of filters. The ability of an oil to pass through fine filters, without plugging them, is called its filterability. This document describes a laboratory test procedure for assessing the filterability of mineral oils in a dry state. Filterability so determined is not a physical characteristic of the oil, but represents an estimation of its behaviour in service.

This document describes two measurements, referred to as “stages”. The stage I determination is based on a comparison of the mean flow rate of a fluid through a test membrane with its initial flow rate. Oils having good stage I filterability, but a poor stage II performance (see below), are unlikely to have performance problems in use, unless extremely fine system filters are utilized.

The stage II determination is based upon the ratio between the initial flow rate of the fluid through the test membrane and the rate at the end of the test. This part of the procedure is a more severe test and is more sensitive to the presence of gels and fine silts in the oil. Silts and gels can be present in an oil when it is produced, or can be formed as an oil ages, especially when hot. An oil with good stage II filterability is unlikely to have filtration problems even in extreme conditions and with fine (less than 5 µm) filtration present. It is thus suitable for use in more critical hydraulic and lubrication systems.

This procedure was developed primarily for hydraulic oils having ISO viscosity grades up to 100, and, apart from the filtration apparatus, was designed to be implemented using mainly standard laboratory apparatus. A modified procedure that includes gravimetric measurements rather than volumetric ones is provided in Annex B. Further, the method has been adapted to test oils of higher viscosity grade than 100 using a coarser membrane filter.

The test procedure can be extended to fluids other than mineral oils. However, some fluids, for example, fire-resistant fluids, are not compatible with the specified test membranes; and the test can only be used for comparison purposes even when suitable membranes, with similar pore size or pore density characteristics to those specified in this procedure, have been identified.

This document defines a method for assessing the filterability of dry oils only. Some oils exhibit poorer filterability characteristics in the presence of contaminating water. ISO 13357-1 applies to the investigation of the effect of water and high temperature on filterability, if an oil is used in applications where the presence of water in the oil is likely.

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Petroleum products — Determination of the filterability of lubricating oils —

Part 2: Procedure for dry oils

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this document to take appropriate measures to ensure the safety and health of personnel prior to application of the document, and fulfil statutory and regulatory requirements for this purpose.

1 Scope

This document specifies a procedure for the evaluation of the filterability of dry lubricating oils. The procedure only applies to mineral-based oils, since fluids manufactured from other materials (e.g. fire-resistant fluids) can be incompatible with the specified test membranes. This document is applicable to oils of viscosity up to ISO viscosity grade (VG) 100, as defined in ISO 3448. These oils are widely used as hydraulic fluids, and within the range described, the variation in filterability due to viscosity is included within the precision range of this document. The procedure is not suitable for some hydraulic oils on which specific properties are conferred by the use of insoluble or partially soluble additives, or by particularly large molecular species. These additives include some viscosity index modifiers and some friction modifying additives.

This document can also be applied to oils of ISO viscosity grades (VG) 150, 220 and 320, as defined in ISO 3448, using the specified 3,0 µm rated membranes. These oils are widely used as heavy-duty lubricants in equipment such as paper making machines and rolling mills. Within the range described, the filterability as defined is not dependent on the viscosity of the oil.

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 3170, *Petroleum liquids — Manual sampling*

ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 4788, *Laboratory glassware — Graduated measuring cylinders*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

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