
**Petroleum products — Determination
of the filterability of lubricating oils —
Part 1:
Procedure for oils in the presence of
water**

*Produits pétroliers — Détermination de la filtrabilité des huiles
lubrifiantes —*

Partie 1: Méthode pour les huiles en présence d'eau

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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.

The committee responsible for this document is ISO/TC 28, *Petroleum and related products: fuels and lubricants from natural or synthetic sources*.

This second edition cancels and replaces the first edition (ISO 13357-1:2002), of which it constitutes a minor revision including alternative membranes in order to enable the continued use of this document.

A list of all parts in the ISO 13357 series can be found on the ISO website.

Introduction

As the fluid in a hydraulic system acts as a lubricant to minimize wear of the components, it is important to reduce the concentrations of circulating hard contaminant particles. This is particularly necessary when the performance of the system depends on the maintenance of small clearances and orifices. Removal of these contaminants is effected by the use of filters. The ability of a hydraulic fluid 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 which have been heat-soaked in the presence of water. 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 only a poor Stage II performance (see below), would be unlikely to give 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 fluid through the test membrane and the rate at the end of the test. It is considered that 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 may be present in an oil when it is produced, or could be formed as an oil ages, especially when hot. An oil with good Stage II filterability would be unlikely to give filtration problems even in the most extreme conditions, and with fine (less than 5 µm) filtration present. It would thus be suitable for use in more critical hydraulic and lubrication systems.

The procedure has been evaluated with mineral oils up to ISO viscosity grade 100. There would appear to be no reason why it should not be used with oils of higher viscosity grade (ISO viscosity grade 220 is a practical maximum), but the data obtained could not be claimed to be completely in accordance with this method. Similarly, it should be possible to extend the test procedure to fluids other than mineral oils. However, some fluids, e.g. fire-resistant fluids, will not be compatible with the specified test membranes, and the test could only be used for comparison purposes even when suitable membranes, with similar pore size/pore density characteristics to those specified in this procedure, have been identified.

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Part 1: Procedure for oils in the presence of water

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 the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This document specifies a procedure for the evaluation of the filterability of lubricating oils, particularly those designed for hydraulic applications, in the presence of water. The procedure only applies to mineral-based oils, since fluids manufactured from other materials (e.g. fire-resistant fluids) may not be compatible with the specified test membranes. The range of application has been evaluated with oils of viscosity up to ISO viscosity grade (VG) 100, as defined in ISO 3448. Within the range described, the filterability as defined is not dependent on the viscosity of the oil. The procedure is not suitable for some hydraulic oils on which specific properties have been conferred by the use of insoluble/partially soluble additives, or by particularly large molecular species.

NOTE Filterability is a prime requirement for lubricating oils used in hydraulic systems because of the fine filters used in this application.

This document defines a method for assessing the filterability of oils in the presence of contaminating water. It is noted that some oils will exhibit poorer filterability characteristics in these conditions. ISO 13357-2^[1] is used to investigate the filterability of an oil which is used in applications where the presence of water in the oil is unlikely. An oil which has good filterability in the presence of contaminating water will not necessarily have equally good filterability in dry conditions. An oil having good filterability only when wet is unlikely to be generally acceptable.

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 1219-1, *Fluid power systems and components — Graphical symbols and circuit diagrams — Part 1: Graphical symbols for conventional use and data-processing applications*

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*

ISO 6614:1994, *Petroleum products — Determination of water separability of petroleum oils and synthetic fluids*