

ELGI PUBLICATION

Electronic Handbooks on Oil Separation and Grease Rheology

ELGI Members: 15€

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Project of the ELGI Test Methods & Rheology Working Group:

The ELGI Test Methods and Rheology Working Group have completed a handbook on Oil Separation and a handbook on Grease Rheology. The oil separation handbook reviews the methods available together with the selection of which method is most appropriate for use. The relationship of oil separation to the current theories of grease lubrication within a contact is also covered. The handbook on grease rheology provides practical guide to using rheology as a tool in a day-to-day working environment

The ELGI Rheometry Handbook

Author: Alan Wheatly – Shell

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Introduction

This is a practical guide to rheology as it is applied to lubricating greases. It is not an academic text, there are many of those available which deal with rheology in general. You will find references to them in the last section of this Handbook. There is even a new book, published by ELGI, covering some aspects of grease rheology in detail. What is missing, however, is a simple, " how-to-do-it" text, describing rheometers, where to buy them (necessarily an incomplete and out of date list, but better than nothing), how to use them and where to put the grease! This book fills that gap.

The Rheology Handbook is a " living document" . The science of rheology is still evolving; particularly its application to grease. As theoretical and practical knowledge increases this must be reflected in this Handbook. The Rheology Working Group of the ELGI, in parallel with a few individual companies around the world, is investigating how to use the tool called rheology to characterise greases in a meaningful way. When new findings are substantiated and developed into test methods they will find their way into this document, for the benefit of the grease industry as a whole.

The author would like to express his sincere appreciation to Derek Bell of TA Instruments who provided some of the figures used in this work, as well as much sensible and useful advice on rheology over the years and to Thorsten Oltersdorf/Rosemann of Castrol Industrie GmbH for the theory behind the grease rheology which can be found in the .pdf file included on this CD.

The ELGI Oil Separation Handbook

Author: Dougie Miller – Shell

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 - **ASTM D 6184** - Standard Test Method for Oil Separation from Lubricating Grease (Conical Sieve Method)
 - **Federal Test Method (FTM) 791C Method 321.3** - Oil Separation from Lubricating Grease (Static Technique)
 - **JIS K 2220** - Lubricating grease. Test method for oil separation
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 - **ASTM D 1742** - Standard Test Method for Oil Separation from Lubricating Grease During Storage
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Introduction

Among the many grease properties routinely measured, oil separation tendency is one of the most common. Why do we need to measure it? Early lubrication theory proposed that there was a need for oil to separate from grease to maintain a lubricating film. This is no

longer accepted, as modern analytical techniques have demonstrated that the grease itself can and does enter into the lubricated contact, enhancing the film thickness and improving lubrication. Nevertheless, there are still many reasons why oil separation tendency may be important to the grease user. Over the last 50 years methods have been developed, refined and in several cases adopted by industry committees, e.g., IP, ASTM and DIN. There are now several industry standard methods. In addition, several original equipment manufacturers (OEMs) have either modified/adapted existing standard methods or developed their own.

When selecting an appropriate test method, consideration should be given to the conditions under which the grease is operating. Separation of oil from a grease can occur at several stages in its life cycle including the following:

1. in bulk storage
2. in pre-lubricated bearings in storage
3. in standby or stored equipment under static condition (corrosion protection and on emergency/ancillary equipment)
4. in running equipment, heavy machinery, automotive components, gears , etc.
5. in centralised lubrication systems
6. under high centrifugal forces (constant velocity joints, mechanical couplings)

In addition to standard oil separation test methods, there are several bearing tests in which oil separation or oil loss from the system is or may be included as part of a fuller assessment of grease performance, e.g., IP 168, SKF R2F and SKF V2F tests.