International Standard

ISO 13511

First edition
2025-03

Petroleum products and lubricants — Rheological properties of lubricating greases — Determination of the consistency of greases with metal soap thickener by an oscillatory rheometer with a cone/plate measuring system

Produits pétroliers et lubrifiants — Propriétés rhéologiques des graisses lubrifiantes — Détermination de la consistance des graisses avec épaississant à base de savon métallique au moyen d'un rhéomètre oscillant de type cône/plan

Reference number
ISO 13511:2025(en)

© ISO 2025



COPYRIGHT PROTECTED DOCUMENT

© ISO 2025
All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ..... **iv**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Symbols **2**
5 Principle **2**
6 Reagents and materials **2**
7 Apparatus **2**
8 Sampling **3**
9 Procedure **3**
9.1 Cleaning of the measuring system 3
9.2 Tempering 3
9.3 Setting the measuring gap and filling the measuring system cone/plate 3
9.4 Measurement 3
10 Evaluation **4**
11 Expression of results **7**
12 Precision **8**
12.1 General 8
12.2 Repeatability, *r* 8
12.3 Reproducibility, *R* 8
13 Test report **8**
Annex A (informative) **Explanation and the derivation of the factor 0,071** **9**
Bibliography **14**

© ISO 2025 – All rights reserved

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

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

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.

© ISO 2025 – All rights reserved

Petroleum products and lubricants — Rheological properties of lubricating greases — Determination of the consistency of greases with metal soap thickener by an oscillatory rheometer with a cone/plate measuring system

1 Scope

This document specifies a procedure to determine the consistency of a metal-saponified lubricating grease by an oscillatory rheometer.

This test method is applicable for fresh, as well as used, lubricating greases where only small quantities of the grease are present and the worked penetration that is usually used cannot be determined due to the small quantity.

The determined calibration is only valid for metal-saponified lubricating greases like lithium, lithium-calcium and, also, lithium- and calcium complex.

The method described in this document is applicable for lubricating greases with NLGI grades 00, 0, 1, 2 and 3 according to ISO 6743-99.

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 23572, *Petroleum products — Lubricating greases — Sampling of greases*

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/

3.1
shear deformation
shear strain
γ
deformation of the sample generated by tangential deflection

Note 1 to entry: The shear deformation is dimensionless. It is often given in per cent (%), where 100 % = 1.

3.2
loss modulus
G''
component of *shear stress* (3.3) which exhibits a phase shift of $\delta = \pi/2 = 90°$ to the *shear strain* (3.1)

Note 1 to entry: The loss modulus represents the viscous part of the viscoelastic behaviour of the sample and is given in pascals (Pa).

© ISO 2025 – All rights reserved