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Petroleum products and lubricants — Determination of roll stability of lubricating grease —

Part 1: Dry condition test

Produits pétroliers et lubrifiants — Détermination de la stabilité au laminage des graisses lubrifiantes —

Partie 1: Essai en condition sèche

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Foreword

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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*.

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Introduction

Mechanical stability is one of the most important properties of grease. As a matter of fact, grease must withstand mechanical churning in a bearing or in a gear box. The most commonly used method at the time of publication of this document is to submit grease to mechanical working in a grease worker, whereby the grease is extruded through holes drilled in a work plate for a certain number of strokes. This is the method described in ISO 2137 with the option of 100 000 double strokes.

Another method to assess the mechanical stability of grease is specified in ASTM D1263.[1] This method is performed on a wheel hub and tests the leakage tendency of the grease from tapered roller bearings.

Instead of extruding the grease through holes or centrifuging it from a non-sealed tapered roller bearing, the method specified in this document (see also ASTM D1831[2] and NF T60-190[3] laminates the grease between a roller weight and a hollow cylinder. This is closer to the stresses that a grease encounters in a bearing.

Mechanical stability of a grease depends on the type of thickener, the manufacturing procedure, and its consistency grade. Nevertheless, any grease in a bearing suffers rolling, with the effect of destroying the thickener and its structure.

It is not necessary for grease to be in the rolling/sliding contact in a bearing, but the base oil bleeding out from the grease is needed to lubricate the rolling/sliding contact. There should be enough grease in the vicinity of the tribological contact that the debleeding oil can flow into the contact. The thickener of the grease creates additional friction and can also create noise. When the soap structure of the grease is milled down by over rolling, there can be positive long-term effects when the soap elements form a layer on the raceways. However, this can also have negative effects, depending on the composition and additives.

Furthermore, the ideal operating clearance in a (rolling) bearing is just a few microns, while the soap structure easily has a factor 10 larger dimension. As long as the capillary flow of lubricant remains, the bearing is lubricated. Once this capillary flow ceases, there is a high risk of seizures.

It is therefore important to check the mechanical stability of grease by rolling at laboratory scale.

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Petroleum products and lubricants — Determination of roll stability of lubricating grease —

Part 1:
Dry condition test

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1 Scope

This document specifies a method for evaluating the change of consistency, as measured by cone penetration, of lubricating grease when worked in the roll stability test apparatus. The method described in this document only applies to grease with cone penetration in the range of 175 × 0,1 mm to 385 × 0,1 mm, as measured using ISO 2137.

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 2137:2020, *Petroleum products and lubricants — Determination of cone penetration of lubricating greases and petrolatum*

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

3 Terms and definitions

No terms and definitions are listed in this document.

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/

4 Principle

A specified mass of grease is introduced in the roll stability apparatus and subjected to low shear at a specified temperature during a specified time. The difference between the worked penetration before test and the penetration after test is used as a measure of the effect of the low shear working on the grease consistency.

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