International Standard

ISO 20120

Lubricants — Determination of the coefficient of friction of synchronizer lubricated by manual transmission fluids (MTF) — High-frequency, linear-oscillation (SRV) test machine

Lubrifiants — Détermination du coefficient de frottement d'un synchroniseur lubrifié par des fluides de transmission manuelle (MTF) — Machine d'essai à oscillation linéaire à haute fréquence (SRV)

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Foreword

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Introduction

In recent years, the rapid development of the automobile industry and the increase in engine power have greatly enlarged the test matrices in the market demand for manual transmission oil. All manual transmission fluids must pass the corresponding synchronizer bench tests (e.g. test methods ASTM D5579 and CEC L-66-99) before receiving a homologation. Such bench tests have long durations with associated high costs. A tribometric test method helps to shorten the development time, save costs and can efficiently handle large and greatly enlarged the test matrices (see Figure A.2). The present tribometric test method has been found to be complementary to bench tests in order to filter candidate materials and formulations of mechanical transmission fluids, thus screening useful from useless combinations prior to final component and vehicle tests.

The test method described in this document can be regarded as an evaluation tool. This test method is dedicated to a translatory oscillation apparatus, which is fully computer controlled. This test method aims to quickly determine the lubricating ability of fully-formulated gear lubricants used as mechanical transmission fluids to display a specified frictional behaviour against materials used in synchronizers of mechanical gears in automotive vehicles. The precision is high. This test method is a material and application-oriented approach based on inputs from field experiences for characterizing the frictional behaviour using random, discrete and constant parameter combinations. Users of this test method should determine whether results correlate with field performance or other applications prior to commercialization. Some content within this document has been reprinted with permission from ASTM D8227-20, copyright ASTM International. A copy of the complete standard may be obtained from www.astm.org.

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Lubricants — Determination of the coefficient of friction of synchronizer lubricated by manual transmission fluids (MTF) — High-frequency, linear-oscillation (SRV) test machine

1 Scope

This document specifies a test method for determining the coefficient of friction and its evolution in mechanical transmission fluids tribologically interacting with materials used in synchronizers in manual transmission (MT) gears under high-frequency linear oscillation motion using the linear-oscillation (SRV) test machine. A flat areal contact geometry is applied.

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.

IEC 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

DIN 51631, *Mineral spirits — Special boiling point spirits — Requirements*

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
running-in
initial transition process in tribology occurring in newly established wearing contacts, often accompanied by transients in *coefficient of friction* (3.3) or wear rate, or both, which are uncharacteristic of the given tribological system's long-term behaviour

Note 1 to entry: This is a process by which machine parts improve in conformity, surface topography, and frictional compatibility during the initial stage of use.

3.2
frictional force
F_f
resistive force exerted on an opposing body when bodies in contact move or slide against each other

3.3
coefficient of friction
f
dimensionless ratio of *frictional force* (F_f) (3.2) to the normal force (F_n) applied to two moving bodies

Note 1 to entry: In the context of this document, the coefficient of friction is the average over one oscillation cycle (see Figure A.3).

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