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Diesel fuel — Assessment of lubricity using the high-frequency reciprocating rig (HFRR) —

Part 1: Test method

Carburant diesel — Évaluation du pouvoir lubrifiant au banc alternatif à haute fréquence (HFRR) —

Partie 1: Méthode d'essai

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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

This document was prepared by ISO/TC 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain, and powertrain fluids*, in collaboration with 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.

This fourth edition of ISO 12156-1 cancels and replaces the third edition (ISO 12156-1:2016), which has been technically revised after a user feedback survey. This revision includes the following changes:

— lessening of the requirements on reagents and correction of the ambient test conditions (Figure 2) to reflect the actual conditions met by participants in the inter-laboratory test program;

— the Annex containing details of the major changes (adding the camera and deletion of the humidity correction factor) between the second and third edition of this document has been removed; and

— Annex A has been populated with updated photographs of typical wear scars.

A list of all parts in the ISO 12156 series can be found on the ISO website.

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Introduction

All diesel fuel injection equipment has some reliance on diesel fuel as a lubricant. Wear due to excessive friction resulting in shortened life of engine components, such as diesel fuel injection pumps and injectors, has sometimes been ascribed to lack of lubricity in the fuel.

The relationship of test results to diesel injection equipment component distress due to wear has been demonstrated for some fuel/hardware combinations where boundary lubrication is a factor in the operation of the component[1)].

Test results from fuels tested to this procedure have been found to correlate with many fuel/hardware combinations and provide an adequate prediction of the lubricating quality of the fuel. The correlation of biodiesel blends has been validated through 15 years of field experience and anecdotal data.

This document includes content and data, with permission of ASTM International, from ASTM Research Report RR:D02-1718[3] that is cited in ASTM D6079[1] and ASTM D7688[2].

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1) NIKANJAM. Manuch, Teri CROSBY, Paul HENDERSON, Chris GRAY, Klaus MEYER, and Nick DAVENPORT, "ISO Diesel Fuel Round Robin Program," SAE Technical Paper No. 952372, 1995, ISSN 0148- 7191, doi: 10.4271/952372

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Diesel fuel — Assessment of lubricity using the high-frequency reciprocating rig (HFRR) —

Part 1: Test method

WARNING — Application of this document may involve the use of hazardous materials, operations, and equipment. This document does not purport to address all 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 to determine the applicability of any other restrictions for this purpose.

1 Scope

This document specifies a test method using the high-frequency reciprocating rig (HFRR), for assessing the lubricating property of diesel fuels, including those fuels which could contain a lubricity-enhancing additive. It defines two methods for measurement of the wear scar; Method "A" — Digital camera, and Method "B" — Visual observation.

This test method applies to fuels used in diesel engines.

NOTE It is not known if this test method will predict the performance of all additive/fuel combinations, including paraffinic fuels for which no additional correlation testing has been performed. Nevertheless, no data has been presented to suggest that such fuels are not within scope.

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 683-17, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels*

ISO 3170, *Petroleum liquids — Manual sampling*

ISO 3171, *Petroleum liquids — Automatic pipeline sampling*

ISO 3290-1, *Rolling bearings — Balls — Part 1: Steel balls*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ISO 5272, *Toluene for industrial use — Specifications*

ISO 6507-1, *Metallic materials — Vickers hardness test — Part 1: Test method*

ISO 6508-1, *Metallic materials — Rockwell hardness test — Part 1: Test method*

ASTM D4306, *Practice for Aviation Fuel Sample Containers for Tests Affected by Trace Contamination*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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