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Performance test method for diesel engine soot-removal devices in lubricating oils — Initial filtration efficiency

Essai de performance de filtration pour moteurs diesel — Séparation des impuretés dans l'huile pour lubrification

ICS 27.020

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 23556 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC 7, *Tests for lubricating oil filters*.

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Introduction

ISO/DIS 23556 establishes standard test procedures for measuring the initial filtration soot-removal efficiency of single-, multiple-stage, centrifugal and other soot-removal devices (SRD) for internal combustion engines.

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Performance test method for diesel engine soot-removal devices in lubricating oils – Initial filtration efficiency

1 Scope

This International Standard specifies a multipass soot-filtration test method using batch thermal gravimetric analysis (TGA), continuous online Fourier Transformation Infrared (FTIR), or other approved soot-measuring techniques for evaluating the initial filtration efficiency of single-, multiple-stage, centrifugal and other soot-removal devices (SRD) for internal combustion engines submitted to a constant flow rate of test liquid. The test procedure determines time-weighted average initial soot-removal efficiency for soot-removal devices. This test method is intended for application to SRD having a rated flow between 2 l/min to 75 l/min.

2 Normative references

The following reference documents are indispensable for the application 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.

API SL/ILSAC GF-3, July 2001

ASTM E1131-03, *Standard Test Method for Compositional Analysis by Thermogravimetry*

DHD-1:2001, *Global Performance Specification of Diesel Engine Oil*

ISO 1219-1, *Fluid power systems and components – Graphic symbols and circuit diagrams – Part 1: Graphic symbols*

ISO 3968, *Hydraulic fluid power – Filters – Evaluation of pressure drop versus flow characteristics*

ISO 4405, *Hydraulic fluid power – Fluid contamination – Determination of particulate contamination by the gravimetric method*

ISO 11841-1:2000, *Road vehicles and internal combustion engines – Filter vocabulary – Part 1: Definitions of filters and filter components*

ISO 11841-2:2000, *Road vehicles and internal combustion engines – Filter vocabulary – Part 2: Definitions of characteristics of filters and their components*

SAE J300:2004, *Engine Oil Viscosity Classification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11841-1:2000, ISO 11841-2:2000 and the following apply.

**3.1
soot-removal device (SRD)**

device intended to remove soot from lubricating oil

NOTE SRDs include include single-, multiple-stage, centrifugal and other devices.

**3.2
soot contaminant**

carbon-based contaminant produced to simulate soot generated from a diesel engine

**3.3
multipass test**

test that consists of re-circulating unfiltered fluid through the soot-removal device

**3.4
base upstream gravimetric level**

upstream contaminant concentration if no contaminant is recirculated

**3.5
soot-removal device efficiency**

ability of the soot-removal device to retain particles expressed as the time weighted average

**3.6
total circuit volume**

total volume of the circuit with a straight section of pipe plus the volume contained in soot-removal device

NOTE For installation, see 9.2.

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4 Symbols (and abbreviated terms)

The graphical symbols used in this International Standard are in accordance with ISO 1219-1.

5 Test equipment

5.1 Test rig

A diagram of the test rig is shown Figure 1. It shall comprise a filter test circuit as described in 5.2.

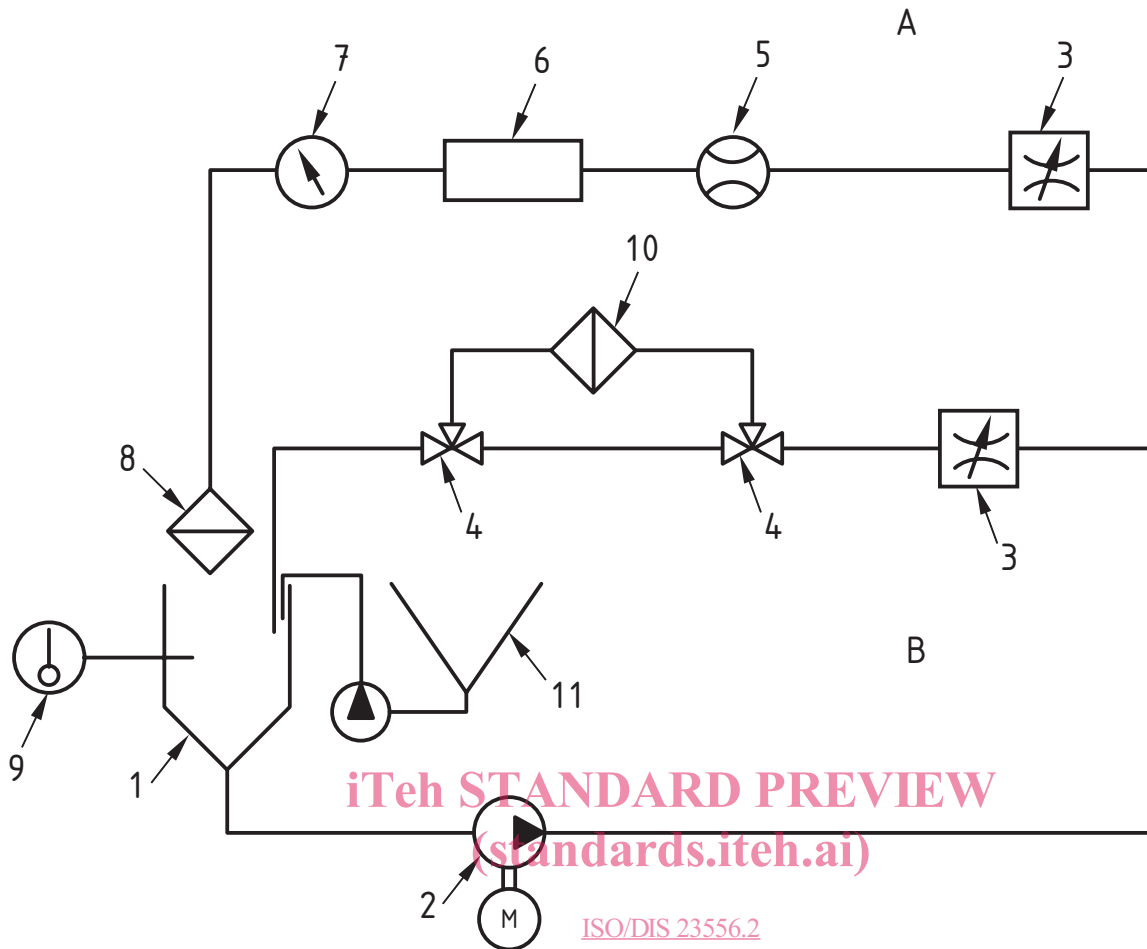


Figure 1 – Diagram arrangement of test rig for centrifugal and bypass filters

Key

- | | |
|---|--------------------------------------|
| 1. Reservoir incorporating a thermostatically controlled heater | 7. Pressure gauge |
| 2. Pump | 8. Soot-removal device (test filter) |
| 3. Throttling valves | 9. Thermocouple |
| 4. Three-way valves | 10. Clean-up filter |
| 5. Flow meter | 11. Contaminant injection system |
| 6. Soot measurement device | |