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Methods of test for full-flow lubricating oil filters for internal combustion engines —

Part 14:

Cold start simulation and hydraulic pulse durability for composite filter housings

Méthodes d'essai des filtres à huile de lubrification à passage intégral pour moteurs à combustion interne —

Partie 14: Essais de simulation de démarrage à froid et de résistance aux impulsions hydrauliques pour les corps de filtre pressurisés à base de matériaux composites

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 2.

The main task of technical committees is to prepare International Standards. 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.

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ISO 4548-14 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC SC7, *Test methods for lubricating oil filters*.

This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

ISO 4548 consists of the following parts, under the general title *Method of test for full-flow lubricating oil filters for internal combustion engines — Cold start simulation and hydraulic pulse durability for composite filter housings*:

- *Part 14: Complementary element*
- *Part [n]:*
- *Part [n+1]:*
- *Part 14: Complementary element*
- *Part [n]:*
- *Part [n+1]:*

Introduction

This International Standard establishes standard test procedures for measuring the performance of full flow lubricating oil filter modules made of composite materials for internal combustion engines in tests of cold start simulation and hydraulic pulse durability.

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Full-flow lubricating oil filters for internal combustion engines – Part 14: Method of test for cold start simulation and hydraulic pulse durability for composite pressure vessel materials

1 Scope

This part of ISO 4548 specifies a method of testing the ability of full-flow lubricating oil filters manufactured with composite pressure vessel materials for internal combustion engines to withstand an internal pressure surge and cyclic internal pressure variations experienced in the application at specified operating temperatures.

These tests are intended for application to spin-on type filters and detachable filters with disposable elements constructed of composite materials.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 4548. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 4548 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below.

Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4548-1, Methods of test for full-flow lubricating oil filters for internal combustion engines – Part 1: Pressure drop/flow characteristics.

3 Definitions and graphical symbols

3.1 Definitions

For the purpose of this part of ISO 4548, the definitions given in ISO 4548-1 apply.

3.2 Graphical symbols

The graphical symbols used in this part of ISO 4548 are in accordance with ISO 1219 [1]

4 Operational characteristics to be tested

Filters are subjected to a wide range of temperature and pressure fluctuations in service. The tests specified in Clause 9 verify the ability of the filter canister and seal to withstand these high pressure fluctuations for a given number of start conditions or cyclic pressure variations. These tests can be performed over a range of test temperatures.

5 Test equipment

The test equipment and circuit shall be able to generate and repeat the pressure cycle (figure 1) at the specified test temperature.

6 Test liquid

The test liquid shall be either the same as the system operating fluid or another compatible fluid agreed between the supplier and purchaser. The liquid must be able to operate in test temperature specified in 7.0.

7 Test temperature

In the absence of an engine manufacturer's specification or customer / supplier agreement; test temperature extremes of -20 and 130° C.

8 Accuracy

Instrumentation shall be accurate to within the following limits:

- pressure: ± 1.0 % of the upper cyclic test pressure
- time: ± 0.002 s resolution
- temperature: $\pm 2^\circ\text{C}$

Use pressure transducers, amplifiers, and recording devices with a combined system frequency response such that in the frequency range 0 kHz to 2 kHz, the amplitude ratio is within 0 dB to -3 dB.

Pressure transducer (s) shall be mounted directly into the test component, or as nearly as possible, so as to record the internal conditions applied to the component. Any restrictions between the transducers and the pressure-containing envelope being tested should be avoided.

Instruments and procedure should conform to ISO 9110-1 and ISO 9110-2.

9 Cold start simulation and hydraulic pulse durability test

Fit the filter on an appropriate adaptor and apply the filter manufacturer's recommended tightening torque or angle of rotation for the filter to be tested.

Connect the test adapter to the pipe work system of the test rig.

Start the test system, and allow the rig to run until all air has been purged from the system.

Precondition test assembly at the specified test temperature for 4 hours.

Increase system pressure until the pressure agreed with the engine manufacturer is obtained. In the absence of such an agreement, one of the values given in Annex A shall be used.

Initiate cyclic test at system pressure meeting waveform specified in figure 1. The cycle rate shall be in the range of .5 to 2 cycles per second.

Allow the test to continue, making visual checks for signs of failure at frequent intervals, until failure occurs or until the number of cycles agreed with the engine manufacturer has been applied. In the absence of such an agreement, the value given in Annex A for the test pressure chosen shall be used.

Stop the test. Check and record the tightening torque.

Remove the filter. Allow to drain and visually examine the unit to determine the failure point and type of failure, if any.

10 Test report

The test report shall include at least the following information:

- a) the name of the test establishment;
- b) the filter type (manufacturer, model number and batch number);
- c) the date of the test;
- d) a description of the filter and whether it is new or used; if it is used, the approximate period of service;
- e) the category of filter (see Annex A);
- f) the rated flow, in litres per minute;
- g) the test pressure in kPa;
- h) the test fluid;
- i) the test temperature;
- j) the mode of failure and its location;
- k) the torque applied initially and at the end of the test, in Newton metres;
- l) the number of cycles to failure or the number of cycles completed;
- m) the test cycle rate.