INTERNATIONAL STANDARD

ISO 4548-2

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

Part 2:
Element by-pass valve characteristics

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

Partie 2: Caractérisques de l'organe de dérivation du filtre

Reference number
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Contents

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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.

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 4548-2 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC 7, *Tests for lubricating oil filters.*

This second edition cancels and replaces the first edition (ISO 4548-2:1982), which has been technically revised.

ISO 4548 consists of the following parts, under the general title *Methods of test for full-flow lubricating oil filters for internal combustion engines*:

— *Part 1: Differential pressure/flow characteristics*

— *Part 2: Element by-pass valve characteristics*

— *Part 3: Resistance to high differential pressure and to elevated temperature*

— *Part 4: Initial particle retention efficiency, life and cumulative efficiency (gravimetric method)*

— *Part 5: Cold start simulation and hydraulic pulse durability test*

— *Part 6: Static burst pressure test*

— *Part 7: Vibration fatigue test*

— *Part 9: Inlet and outlet anti-drain valve tests*

— *Part 10: Life and cumulative efficiency in the presence of water in oil*

— *Part 11: Self-cleaning filters*

— *Part 12: Particle retention ability and contaminant holding capacity using particle counting*

Annex A of this part of ISO 4548 is for information only.

Introduction

ISO 4548 establishes standard test procedures for measuring the performance of full-flow lubricating oil filters for internal combustion engines. It has been prepared in separate parts, each part relating to a particular performance characteristic.

Together the tests provide the information necessary to assess the characteristics of a filter, but if agreed between the purchaser and the manufacturer, the tests may be conducted separately.

This revision of this part of ISO 4548 has been undertaken in order to align the presentation with the requirements of the current ISO Directives. The principal changes are editorial, affecting the layout and the text. Minor technical changes comprise the inclusion of ISO VG and SAE oil grades for the test liquids and the addition of a note concerning the specification of the valve opening pressure. In addition, the test rig dimensions have been modified to make them consistent with those specified in ISO 3968 and the flow meter has been repositioned downstream of the throttle valve.

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

Part 2:
Element by-pass valve characteristics

1 Scope

This part of ISO 4548 specifies tests for determining the element by-pass valve characteristics of full-flow lubricating oil filters for internal combustion engines.

Tests are specified with oils at two viscosities, one to assess the performance of an element by-pass valve with a cold oil and the other to assess its performance with an oil at a typical operating temperature.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 4548. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreement based on this part of ISO 4548 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1219-1:1991, *Fluid power systems and components — Graphic symbols and circuit diagrams — Part 1: Graphic symbols.*

ISO 11841-1:—[1], *Road vehicles and internal combustion engines — Filter vocabulary — Part 1: Definitions of filters and filter components.*

ISO 11841-2:—[1], *Road vehicles and internal combustion engines — Filter vocabulary — Part 2: Definitions of characteristics of filters and their components.*

3 Definitions

For the purposes of this part of ISO 4548, the definitions given in ISO 11841-1 and ISO 11841-2 apply.

4 Graphical symbols

The graphical symbols used in this part of ISO 4548 are in accordance with ISO 1219-1.

5 Operational characteristics to be tested

The purpose of the element by-pass valve of a lubricating oil filter is to maintain an adequate supply of oil to the engine when the differential pressure across the filter element is high, even if the oil is not then filtered. Such conditions may occur, for example, when the engine is started from cold or in the event of the element becoming choked.

1) To be published.

To limit the quantity of unfiltered oil passed to the engine when there is no excessive differential pressure across the filter, it is customary for the by-pass valve to be designed not to open below a specified differential pressure and to allow leakage at no more than a specified rate when the differential pressure is not above the value.

To maintain an adequate oil supply to the engine when the filter element is completely choked, it is customary for the by-pass valve to be designed to pass the full oil flow with no more than a specified differential pressure. The tests specified in this part of ISO 4548 measure the differential pressure across the by-pass valve over the whole range of oil flow rates.

These tests include the requirement that a note shall be made of any noise emitted by the by-pass valve for example, due to valve oscillation. This is because there has been found to be a correlation between noise in these components and wear.

The differential pressure is measured across the complete filter assembly as described in 6.1.

6 Filter to be tested

6.1 Filter assembly

The filter element shall be removed from the filter and in its place there shall be installed a non-permeable dummy element of identical dimensions.

In the case of a filter whose element cannot readily be replaced by a non-permeable dummy element, for example a spin-on cartridge filter, the unit shall be opened and the by-pass valve shall be removed for testing in a separate housing, the design of which shall be agreed between the manufacturer and the purchaser of the filter.

6.2 By-pass valve

The filter by-pass valve for test, the test liquid and the test rig shall be clean. For the purpose of this part of ISO 4548, the term "clean" means that there is no detectable increase in differential pressure across a filter of the type under test (not modified in accordance with 6.1) when the test liquid at the test temperature is circulated through the test rig and the filter at the rated flow of the filter for 5 min.

7 Test rig

The test rig is shown diagrammatically in figure 1. It shall include the components described in 7.1 to 7.5, together with the necessary tubing, connectors and supports.

7.1 Sump

The sump shall be capable of holding sufficient oil and shall be equipped with a thermostatically controlled heater and cooler capable of maintaining the test temperature. The heater shall be arranged so that local overheating of the oil is avoided. The by-pass return to the sump and the filter outlet pipe shall terminate below the surface of the oil in the sump when the oil is in circulation. The temperature shall be arranged so that the stipulated viscosity is maintained.

7.2 Regulating valves

The regulating valves, **3** and **11**, shall be used for the purposes of pressure and flow control. Needle valves or diaphragm type valves are recommended.