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

Part 6: Static burst pressure test

Méthodes d'essai des filtres à huile de lubrification à passage intégral pour moteurs à combustion interne —
Partie 6: Essai de pression statique d'éclatement

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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 of 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 www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 4548-6:2012), which has been technically revised. The main changes in the third edition are as follows:

— The verification that filters meet technical requirements and the determination of the filter failing pressure have been separated into 6.1 and 6.2, respectively.

— The first pressure increment in the verification has been specified with a known value.

— Each incremental pressure has been changed to the smaller value for more accurate determination.

A list of all parts in the ISO 4548 series can be found on the ISO website.

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.

Introduction

This document establishes standard test procedures for measuring the performance of full- flow lubricating oil filters manufactured with metal pressure vessel materials 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 can be conducted separately.

This document deals with filter modules in terms of static burst pressure.

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

Part 6: Static burst pressure test

1 Scope

This document specifies a method of testing full-flow lubricating oil filters for internal combustion engines to determine their ability to withstand a static pressure objective and to determine their burst pressure and the failure mode concerned.

It does not apply to filters for use in aeronautical applications or plastic components.

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 4548-1, *Methods of test for full-flow lubricating oil filters for internal combustion engines — Part 1: Differential pressure/flow characteristics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4548-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

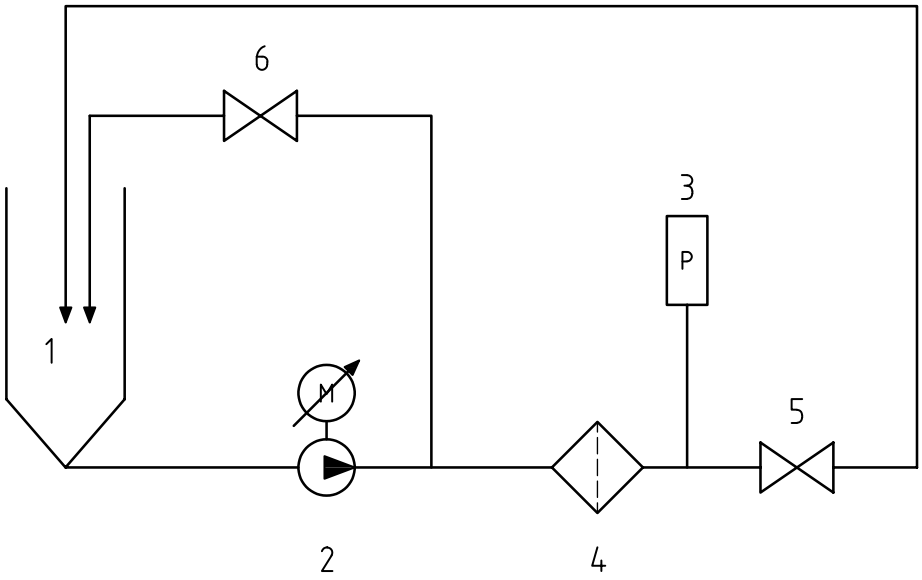
— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

4 Test rig

Figure 1 shows a circuit diagram of a typical hydraulic test stand that can be used for this procedure.

Hydraulic hand pump or other appropriate technology, with high-pressure tubing and valves, pressure gauge with measuring range of 0 kPa to 3 000 kPa or higher. A transparent safety shield shall be used.



Key

1 oil sump
2 pump
3 pressure sensor
4 filter under test
5 valve
6 pressure regulating valve

Figure 1 — Static burst pressure test stand

5 Test fluid

ISO Grade 22 oil with a 96 VI (or SAE 5 W oil) at ambient temperature shall be used. Alternative oil temperatures may be used as agreed upon by the filter manufacturer and customer.

6 Preparation and test procedure

6.1 Verification that filter meets technical requirements

6.1.1 Assemble a filter using the recommended tightening torque or angle of rotation. If a tolerance is given, apply the minimum tightening torque or angle of rotation. The filter to adaptor connection shall be equivalent to the production mounting conditions. When multiple samples are to be tested for statistically meaningful data, the mean and standard deviation should be calculated and reported. The rated static pressure at 95 % confidence level by Weibull analysis can be calculated and reported when tested with more than seven samples.

NOTE Weibull analysis and the rated static pressure at 95 % confidence level are described in ISO 19973-1.

6.1.2 Connect the pump to the inlet of the filter or adaptor, and the outlet of the filter or adaptor to an open valve. The outlet of the valve should be the highest point of the system.

6.1.3 Introduce oil into the system by operating the pump until oil is seen to emerge from the outlet of the valve. This indicates that all the air has been excluded from the system.

6.1.4 Close the valve and position the safety shield between observer and filter.

6.1.5 Raise the pressure gradually to 200 kPa, maintain for about 1 min, and check the filter and all fittings for leaks.

NOTE The first pressure increment can be 50 % of the specified objective pressure, if it is judged to be safely attainable.

6.1.6 Now raise the pressure at a controlled pressure ramp up to approximately 100 kPa per 10 s and maintain for approximately 15 s and check filter for leaks or distortion.

6.1.7 Continue raising the pressure at approximately 100 kPa per 10 s intervals with a 15 s check until a specified [see 7 g)] pressure objective is reached as determined by the customer, or otherwise failure occurs.

6.1.8 Relieve the pressure to zero. Check the filter for permanent distortion and tightening torque or angle of rotation.

6.1.9 Take note of the remaining tightening torque or angle of rotation. If loosening has occurred, restore the initial value prior to determination of the filter failing pressure specified in 6.2. If the filter failed during the verification that filter meets technical requirements, then filter failing pressure has already been determined.

6.2 Determination of the filter failing pressure

6.2.1 Gradually apply pressure until the objective pressure is reached, then proceed gradually in increments of approximately 100 kPa per 10 s and maintain for approximately 15 s until ultimate failure occurs. 5 % of the burst pressure may be used as the pressure rise value in place of 100 kPa.

6.2.2 Examine the filter for details of the failure mode.

7 Report of test results

The test report shall indicate at least the following:

a) a reference to this document, i.e. ISO 4548-6:2021;

b) test establishment;

c) filter type (manufacturer model No. and batch No.);

d) date of test;

e) a description of the filter, whether it is new or used (in the latter case, approximate period of service);

f) the torque or angle of rotation applied initially (see 6.1.1);

g) the specified pressure objective as determined by the customer and whether reached (see 6.1.6);

h) the remaining tightening torque or angle of rotation (see 6.1.7);

i) visible permanent distortion (see 6.1.7);

j) the burst pressure (see 6.1.8);

k) the mode of failure and its location.

Bibliography

[1] ISO 3448, *Industrial liquid lubricants — ISO viscosity classification*

[2] ISO 12829, *Hydraulic spin-on filters with finite lives — Method for verifying the rated fatigue life and the rated static burst pressure of the pressure-containing envelope*

[3] ISO 19973-1, *Pneumatic fluid power — Assessment of component reliability by testing — Part 1: General procedures*

[4] SAE J300c, *Engine oil viscosity classification*

[5] ISO 1219-1, *Fluid power systems and components — Graphical symbols and circuit diagrams — Part 1: Graphical symbols for conventional use and data-processing applications*