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

**Part 13:
Static burst pressure test for
composite filter housings**

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

*Partie 13: Essai d'éclatement à la pression statique pour les corps de
filtre pressurisés à base de matériaux composites*

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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 document 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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

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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 second edition cancels and replaces the first edition (ISO 4548-13:2013), which has been technically revised.

The main changes are as follows:

- temperature range reduced to more applicable values;
- each incremental pressure changed to the smaller value for more accurate determination;
- Weibull analysis included for getting the statistical data with multiple test samples.

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

The ISO 4548 series establishes standard test procedures for measuring the performance of full-flow lubricating oil filters for internal combustion engines. Each part in the series relates 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 document deals with filter modules made of composite materials for internal combustion engines in terms of static burst pressure.

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

Part 13: Static burst pressure test for composite filter housings

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 at high and low temperatures and to determine their burst pressure and the failure mode.

It applies to all oil filters, for example spin-on oil filters and filters made of temperature-sensitive materials.

It applies to new filters and filters returned from endurance tests.

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 terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Test rig

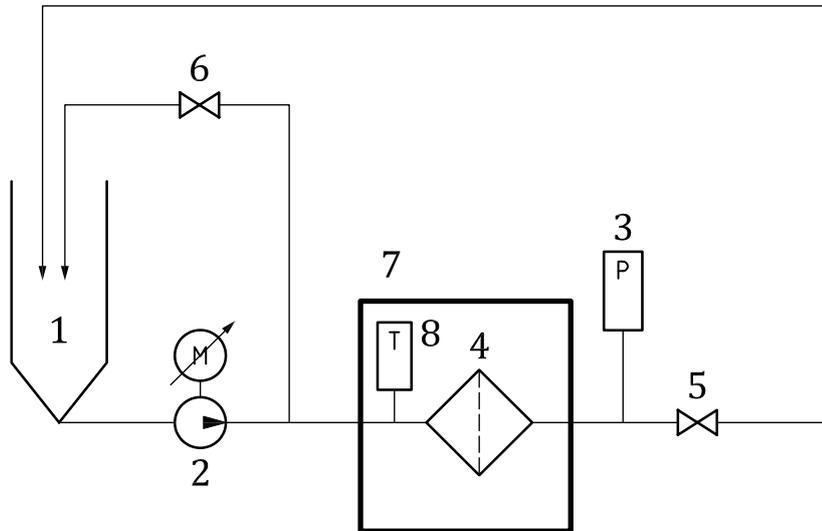
The test rig shall include a hydraulic hand pump or other appropriate technology to generate the required pressure, with high-pressure tubing and valves, a pressure device located downstream of the filter under test with a measuring range of 0 kPa to 3 000 kPa or higher if the specified pressure objective [see 6.1 g)] requires it, and an adaptor to attach the complete filter.

To allow tests at a temperature between -20 °C and $+130\text{ °C}$, an environmental chamber is recommended.

The filter samples will be tested by default at a temperature between -20 °C and $+130\text{ °C}$.

A means of recording pressure or detecting the maximum reached pressure shall be supplied in order to allow the continuous follow-up of the pressure and to detect the pressure at which the leak occurs.

[Figure 1](#) is a schematic of the test rig with measurement range and instrument accuracy outlined in [Table 1](#). The test rig shall be designed such that operators can conduct the test safely.



Key

- 1 oil sump
- 2 pump
- 3 pressure sensor
- 4 filter under test
- 5 closing valve
- 6 pressure-regulating valve
- 7 climatic chamber
- 8 temperature sensor
- M motor
- T temperature
- P pressure

Figure 1 — Hydraulic schematic of the static burst pressure test rig

Table 1 — Instrument accuracy

Test parameters	Unit	Working range	Measurement accuracy
Temperature	°C	From -20 °C to +130 °C	±3 °C
Pressure	kPa	From 0 kPa to 3 000 kPa ^a	±5 %
^a To be adapted if higher pressure is required.			

5 Test liquid

The oil shall be functional between -20 °C and +130 °C (or the temperature range agreed by the manufacturer and the purchaser) to avoid its inflammation or gelling. The viscosity of the oil shall be between 5 mm²/s and 10 000 mm²/s in the temperature range.

NOTE A single oil grade will not cover this viscosity range.

6 Preparation and test procedure

6.1 Verification that filters meet technical requirements

- a) 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 may 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.

- b) 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.
- c) 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.
- d) Close the valve and position the safety shield between observer and filter.
- e) Set the fluid temperature in order to have the filter sample temperature at the specified one and then cool or heat the sample (if possible, put the temperature sensor inside the housing or at its surface).
- f) As soon as the specified test temperature has been reached and maintained for at least 4 h, raise the pressure gradually to 200 kPa, maintain for about 1 min and check the filter and all fittings for leaks. The test laboratory may maintain the specified test temperature for less than 4 h but shall have sufficient reason to justify this shorter amount of time.

Note that the first pressure increment may be 50 % of the specified objective pressure, if it is judged to be safely attainable.

- g) Raise the pressure at a controlled pressure ramp up to approximately 100 kPa per 10 s, maintain for approximately 15 s and check the filter for leaks or distortion.
- h) Continue raising the pressure at approximately 100 kPa per 10 s, with a 15 s check, until a specified [see 7 i)] pressure objective is reached as determined by the customer, or otherwise failure occurs.
- i) Reduce the pressure to 0 kPa. Allow the fluid and environmental chamber temperatures to return to ambient conditions and check the filter for permanent distortion and tightening torque or angle of rotation.
- j) Verify if filter loosening has occurred by taking 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 fails during verification that it meets technical requirements, then filter failing pressure has already been determined.

6.2 Determination of the filter failing pressure

- a) Apply [6.1 a)] to [6.1 e)] with another filter.
- b) 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.
- c) Examine the filter for details of the failure mode.

7 Test report

The test report shall indicate at least the following:

- a) a reference to this document (i.e. ISO 4548-13);
- b) the test establishment;
- c) the filter type (manufacturer model no. and batch no.);
- d) the date of the test;