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## **Aerospace series — Hydraulic filter elements — Test methods —**

### **Part 3: Filtration efficiency and retention capacity**

*Série aérospatiale — Eléments filtrants hydrauliques — Méthode d'essais —*

*Partie 3: Efficacité de filtration et capacité de rétention*



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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](http://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](http://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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 10, *Aerospace fluid systems and components*.

ISO 14085 consists of the following parts, under the general title *Aerospace series — Hydraulic filter elements — Test methods*:

- *Part 1: Test sequence*
- *Part 2: Conditioning*
- *Part 3: Filtration efficiency and retention capacity*
- *Part 4: Verification of collapse/burst pressure rating*
- *Part 5: Resistance to flow fatigue*
- *Part 6: Initial cleanliness level*

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## Introduction

In aerospace hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure. The liquid is both a lubricant and power-transmitting medium. The presence of solid contaminant particles in the liquid interferes with the ability of the hydraulic fluid to lubricate, and causes wear and malfunction of the components. The extent of contamination in the fluid has a direct bearing on the performance, reliability, and safety of the system, and needs to be controlled to levels that are considered appropriate for the system concerned.

Different principles are used to control the contamination level of the fluid by removing solid contaminant particles; one of them uses a filter element enclosed in a filter housing. The filter element is the porous device that performs the actual process of filtration. The complete assembly is designated as a filter.

The performance characteristics of a filter are a function of the element (its medium and geometry) and the housing (its general configuration and seal design). For a given filter, the actual performance is a function of the characteristics of the liquid (viscosity, temperature, conductivity, etc.), the particles in suspension (size, shape, hardness, etc.), and the flow conditions.

A standard multi-pass method for evaluating the performance of hydraulic fluid filter elements under steady state conditions has been developed and used for several years, and is referred to in several aircraft hydraulic systems specifications.

Most aircraft hydraulic systems are subjected to unsteady flow with flow cycles caused by such conditions as actuator movement. Such flow variations can have a significant impact on filter performance. To enable the relative performance of hydraulic filters to be reliably compared so that the most appropriate filter can be selected, it is necessary to perform testing with the same standard operating conditions.

This part of ISO 14085 describes two test methods and the equipment required to measure hydraulic filter element performance with multi-pass flow in both steady and cyclic conditions.

The influence of other stressful operating conditions, such as heat, cold, and vibration, are not measured with this procedure alone. The influence of such conditions is determined with pre-conditioning being performed on the test filter element prior to efficiency testing (refer to ISO 14085-1 for descriptions of such tests and when they are applied).

The stabilized contamination level measured while testing with cyclic flow gives an indication of the average contamination level maintained by the filter in a dynamic operating system. The average system contamination level is important in establishing wear rates and reliability levels.

The measurements are made with precise control over the operating conditions in particular the test fluid and test contaminant, to ensure repeatability and reproducibility. However, because the test parameters and test contaminant do not exactly replicate actual operating conditions which significantly differ from one system to another, the measurements cannot be expected to duplicate actual performance in an operating system.