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Aerospace series — Hydraulic filter elements — Test methods —

Part 2: **Conditioning**

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

Partie 2: Vieillissement accéléré

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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 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.

Filter elements are designed to withstand a range of thermal stresses, such as low and high temperature extremes, and system demands at low temperature (cold starts) whereby hydraulic fluid passes through the element at a greatly increased viscosity. These thermal stresses test both the chemical and thermal stability of the filter element. These cold starts test the ability of the filter element to withstand the high differential pressures and potential weakness at low temperatures without subsequent loss of integrity or performance.

These stresses will be encountered within the lifetime of any filter element fitted in an aerospace hydraulic system. It is, therefore, necessary to check that having been subjected to such conditions; the filter element continues to provide adequate filtration, while also maintaining structural integrity.

This part of ISO 14085 provides a procedure by which to introduce such thermal stresses and to condition a filter element prior to any subsequent qualification testing. This enables the purchaser of the filter element to be secure in the knowledge that the product will withstand such thermal stresses in addition to other qualification requirements without failure.

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Aerospace series — Hydraulic filter elements — Test methods —

Part 2: Conditioning

1 Scope

This part of ISO 14085 specifies

— a procedure to thermally condition a hydraulic filter element to presumed aerospace hydraulic system stresses,

— a test procedure to complete cold soaks, hot soaks, and temperature variation in a combined manner, and

— a test procedure to simulate cold starts.

This part of ISO 14085 is not intended to qualify a filter element under replicate conditions of service; this can only be done by a specific test protocol developed for the purpose, including actual conditions of use, for example the operating fluid or contamination.

This part of ISO 14085 is intended to provide a test procedure that yields reproducible thermal test conditioning of a hydraulic filter element, for simulation of the thermal stresses typically encountered in an aerospace hydraulic system.

The conditioning test procedures defined in this part of ISO 14085 are intended to be used prior to performance tests as specified in other parts of this International Standard.

The tests data resulting from application of this part of ISO 14085 can be used to compare the performance of aerospace hydraulic filter elements.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO 2942, *Hydraulic fluid power — Filter elements — Verification of fabrication integrity and determination of the first bubble point*

ISO 4021, *Hydraulic fluid power — Particulate contamination analysis — Extraction of fluid samples from lines of an operating system*

ISO 5598, *Fluid power systems and components — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 and the following apply.

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3.1
cold soak
prolonged immersion of a filter element in stationary fluid at the lowest expected system fluid temperature

3.2
cold start
application of a rapid increase in flow and *differential pressure* (3.3), followed by a brief maintaining of the *differential pressure* (3.3), with cold fluid at a high viscosity

3.3
differential pressure
Δ*p*
difference between the inlet and outlet pressures of the component under test, as measured under specified conditions

3.4
fabrication integrity
physical acceptability of a filter element to meet the specification designated by the filter supplier

3.5
hot soak
prolonged immersion of a filter element in stationary fluid at the highest expected system fluid temperature

3.6
material safety data sheet
MSDS
specification sheet defining physical aspects, characteristics, and health and safety data for a substance

4 Symbols

The graphical symbols used in this part of ISO 14085 are in accordance with ISO 1219-1.

5 Test equipment and materials

5.1 Hot and cold soak test fluid, shall be the same as the system operating fluid, or shall be another compatible fluid agreed upon between the supplier and purchaser.

5.2 Cold start test fluid, may be the same as the cold soak test fluid, but an alternative may also be selected with a higher cold temperature viscosity, if agreed upon between the supplier and purchaser.

Using a higher viscosity can reduce the volume of fluid required to conduct the cold start test because a lower flow is required to achieve the required differential pressure. If an alternative fluid is chosen, it shall be fully compatible with the filter element and all materials to which it is exposed.

5.3 Differential pressure transducer shall be

a) positioned such that the upstream and downstream connections conform to ISO 3968, with no bends or restrictions included in the measurement. Pressure taps in accordance with ISO 3968, and

b) connected to a data recording system.

5.4 Temperature transducer shall be

a) located such that the sensing part is located in the internal fluid volume,

b) positioned so that it measures the temperature of the test fluid as close as possible to the upstream part of the test element,

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