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Aerospace series — Test methods for hydraulic filter elements —

Part 3: Filtration efficiency and retention capacity

Série aérospatiale — Méthodes d'essais pour les éléments filtrants hydrauliques —

Partie 3: Efficacité de filtration et capacité de rétention

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This second edition cancels and replaces the first edition (ISO 14085-3:2015), which has been technically revised.

The main changes are as follows:

— Table 3 has been revised;

— 10.3.2 has been revised;

— Figure 4 has been converted to Table 4 and Table 5.

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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 should 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 filter 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. The relative performance of hydraulic filters is compared in order to select the most appropriate filter. To ensure the reliability of such comparisons, it is necessary to perform testing with the same standard operating conditions.

This document 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 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 the actual performance in an operating system.