



Federal Aviation Administration

Memorandum

Date: April 30, 2014

To: Manager, Transport Standards Staff, International Branch, ANM-116

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Douglas Bryant, ANM-112

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Fuel Filter Location on the Airbus Single Aisle New Engine Option Model Airplanes (FAA Project Number AT00949IB-T)

ELOS Memo#: AT00949IB-T-P-13

Reg. Ref.: §§ 25.997(d) and 25.1305(c)(6)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Airbus Single Aisle (SA) New Engine Option (NEO) Model airplanes.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.997, "Fuel strainer or filter" provides requirements for filtering fuel delivered from the airplane fuel tanks to each engine. Section 25.997 requires "a fuel strainer or filter between the fuel tank outlet and the inlet of either the fuel metering device or an engine driven positive displacement pump, whichever is nearer the fuel tank outlet." Section 25.997(d) requires the fuel strainer or filter to "have the capacity (with respect to operating limitations established for the engine) to ensure that engine fuel system functioning is not impaired, with the fuel contaminated to a degree (with respect to particle size and density) that is greater than that established for the engine in part 33 of this chapter."

Section 25.1305(c)(6) requires "an indicator for the fuel strainer or filter required by § 25.997 to indicate the occurrence of contamination of the strainer or filter before it reaches the capacity established in accordance with § 25.997(d)."

The engine fuel feed system of the Airbus SA NEO model airplanes equipped with CFM International LEAP-1A engines incorporates a two-filter system, a main filter and a strainer. The strainer is a large-micron filter and is located downstream of the low pressure (LP) pump and the integrated drive generator fuel-oil cooler and upstream of the high pressure (HP) positive displacement pump. The strainer has a feature to bypass when clogged and flightcrew alert of impending bypass. The main filter is a small-micron high-capacity filter and is located downstream of the engine fuel-oil heat exchanger and the HP positive displacement pump to protect the fuel system components further downstream. The main filter has a bypass and flightcrew alert of impending bypass.

The proposed two-fuel filter system was not envisioned at the time the referenced regulatory provisions were promulgated. Therefore, the proposed fuel filtration system does not directly comply with § 25.997(d) because the strainer upstream of the HP positive displacement pump does not meet the required capacity. Additionally, the bypass indication of two-filter system does not directly comply with § 25.1305(c)(6) because the filter in the location specified by § 25.997 does not provide an indication before it reaches the capacity specified by § 25.997(d).

Applicable regulation(s)

§§ 21.21(b)(1), 25.997 and 25.1305(c)(6)

Regulation(s) requiring an ELOS finding

§§ 25.997(d) and 25.1305(c)(6)

Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency)

The design of the LEAP-1A engine fuel feed system is a two-filter system, incorporating a strainer upstream of the main filter. The strainer is installed in the location required by § 25.997, between the LP pump and HP positive displacement pump, but does not meet the filter capacity requirements of § 25.997(d). The strainer protects the HP positive displacement pump from contamination coming from the fuel tank or LP pump degradation. The main filter is installed downstream of the HP positive displacement pump and upstream of the fuel metering device, fuel nozzles and servo controls. The main filter meets the filter capacity requirements of § 25.997(d). Both the strainer and the main filter are bypassed and monitored to provide bypass indications to the flightcrew.

The LEAP-1A two-filter system will be tested to demonstrate it meets the requirements of part 33.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

Although noncompliant with § 25.997(d), the two-filter system, each with a bypass and flightcrew alert of impending bypass is considered to provide adequate compensation for the lack of a single filter at the location specified by § 25.997 that meets the capacity requirements of § 25.997(d). In addition, the two-filter system has the added benefit of protecting downstream fuel system components from a deteriorating HP positive displacement pump.

Although noncompliant with § 25.1305(c)(6), the combination of the main fuel filter with a bypass and associated indication that meets the capacity requirements of § 25.997(d) and the strainer with a bypass indication provide an equivalent level of safety to the requirement in § 25.1305(c)(6) because it will provide the necessary indication to the flightcrew of impending bypass of the fuel filtration system.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in the SA NEO model airplanes project issue paper P-13, titled “LEAP-1A Fuel Filter Location.” This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

The FAA has made an ELOS Findings for the following regulation(s):
 14 CFR 25.997(d) and 25.1305(c)(6), Fuel strainer or filter (documented in TAD ELOS Memo AT00949IB-T-P-13)

Original Signed by Victor Wicklund

April 30, 2014

 Manager, Transport Airplane Directorate,
 Aircraft Certification Service

 Date

ELOS Originated by: Propulsion and Mechanical Systems Branch	Project Engineer: Douglas Bryant	Routing Symbol: ANM-112
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