



Federal Aviation Administration

Memorandum

Date: August 30, 2010

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

From: Manager, Transport Standards Staff, Airplane and Flight Crew Interface Branch, ANM-112

Prepared by: Douglas Bryant, Aerospace Engineer, ANM-112

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Airbus Model A300F4-622R airplane, FAA Project # AT0007IB-T

ELOS Memo#: AT0007IB-T-P-102

Regulatory Ref: §§ 25.1019(a) and 25.1305(c)(7)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for the Airbus Model A300F4-622R airplane.

Background

The engine oil filtration system for the Airbus Model A300F4-622R incorporates a two stage filter system. A primary filter stage is bypassed to a secondary stage when the pressure drop across the primary filter stage exceeds a set level. Impending bypass of the primary filter stage is indicated on the airplane flight deck display system by a status message (status messages are used to determine if the airplane can be dispatched and are not normally displayed in flight). The secondary filter stage has no bypass means, and no indication to the flight crew of excessive pressure drop across the filter stage. The oil filtration system does not directly comply with the provisions of Title 14 Code of Federal Regulations section 25.1019(a) and 25.1305(c)(7).

Title 14 Code of Federal Regulations section 25.1305(c)(7) requires "A warning means for the oil strainer or filter required by § 25.1019, if it has no bypass, to warn the pilot of the occurrence of contamination of the strainer or filter screen before it reaches the capacity established in accordance with § 25.1019(a)(2)." No such warning for the secondary filter stage appears to be present on the proposed system, and the filter impending bypass indication for the primary filter cannot be considered a warning means (in the context of § 25.1305(c)(7)) for contamination of the secondary stage because it is not normally displayed to the flight crew. The proposed oil

filter indication scheme for the Model A300F4-622R Airplane engine installation was not envisioned at the time the referenced regulatory provisions were promulgated and the two stage filter design does not comply.

On turbine engine powered transport airplanes, a warning of a contaminated oil filter or strainer is required where no bypass exists so that the pilot will receive warning of an impending oil flow and pressure loss condition. The contaminated filter warning is intended to be an advance warning of possible engine failure, which allows the pilot to take appropriate action - such as diverting on a twin engine airplane before the engine must be shut down due to low oil pressure.

The current procedure for other engine installations equipped with a single stage oil filter with a bypass, following an oil filter impending bypass indication, is to reduce engine power until the indication no longer appears. If the indication remains when the engine is pulled back to idle, the engine is shut down. The proposed configuration lacks any preliminary warning and would allow engine operation until the low oil pressure indication was displayed, and then require immediate shutdown of the engine.

The design of the Model A300F4-622R airplane indication system is intended to preclude unnecessary airplane diversions due to false oil filter impending bypass indications. The status level message provided is intended to be used only for preflight and maintenance actions.

Applicable regulation(s)

§§ 21.21(b)(1), 25.1019(a) and 25.1305(c)(7)

Regulation(s) requiring an ELOS

§§ 25.1019(a) and 25.1305(c)(7)

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

The primary filter fully complies with §§ 25.1019(a) and 25.1305(c)(7) requirements. It is the primary source of protection from debris residing in the oil supply system.

The secondary filter is introduced to improve safety levels by protecting the engine from debris which would typically be bypassed to the downstream turbo-machinery by a typical single stage bypass filtration system when the primary filter is bypassed. It will also reduce the number of unnecessary single engine diversions due to false indications.

The impending bypass of the primary filter is indicated by a warning which puts the aircraft in a no go situation at next landing. The filter must be changed before dispatch.

Tests performed for engine type certification show that even in the case of the primary filter bypass, the secondary filter is not susceptible to blockage. Therefore clogging of the secondary filter, which has the capacity of five times that of the primary filter, is precluded and oil flow will be always sufficient through the secondary filter to complete

the flight in any extended operation under foreseeable contamination levels, except those that may occur as a result of failures of the engine.

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

Although noncompliant with the regulation, the addition of the secondary filter with the engine oil filtration system features are considered to provide adequate compensation for the lack of the required indication. Relevant compensating features include: (1) the impending bypass of the primary filter is indicated by a warning message which puts the aircraft in a no dispatch situation after landing, (2) the large capacity of the secondary filter stage should ensure that a flight will be completed (and the filter replaced) prior to the secondary filter becoming completely plugged and, (3) the demonstrated ability of the oil system to maintain acceptable levels of oil system flow with the secondary filter stage almost completely blocked. In addition, despite the absence of bypass indication of the secondary filter, it is considered that the installation of this oil filter system may improve the level of safety required by direct compliance to § 25.1305(c)(7).

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper (IP) P-102 titled “Warning Means for Engine Oil Filter Contamination.” This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport Airplane Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section (TCs & ATCs) or in the Limitations and Conditions Section of the STC Certificate in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
14 CFR 25.1019(a), Oil strainer or filter, and 25.1305(c)(7), Powerplant instruments (documented in TAD ELOS Memo AT0007IB-T-P-102).

Victor Wicklund, for
Manager, Transport Airplane Directorate,
Aircraft Certification Service

September 20, 2010
Date

ELOS Originated by TAD:	Project Engineer: Douglas Bryant	Routing Symbol ANM-112
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