



Federal Aviation Administration

Memorandum

Date: February 11, 2013

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 the engine oil temperature indication for the Airbus Model A350 airplane (FAA Project Number TC0544IB-T)

ELOS Memo #: TC0544IB-T-P-16

Reg. Ref.: § 25.1549(a)

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 Model A350 airplane.

Background

Title 14, Code of Federal Regulations (14 CFR) part 25 section 25.1549(a) requires that each maximum safe operating limit must be marked with a red radial or a red line, which presumes the use of analog instruments. Airbus has proposed a digital-only presentation of engine oil temperature for the Airbus Model A350 airplane that turns amber if the temperature exceeds a limit threshold for more than a predetermined number of minutes or the maximum oil temperature indicated by the engine manufacturer without delay. The engine oil temperature indication does not directly comply with the marking requirements of § 25.1549(a) which would require the indication to turn red instead of amber when the maximum limit is exceeded.

Applicable regulations

§§ 25.1305 and 25.1549

Regulation requiring an ELOS finding

§ 25.1549(a)

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

The exceedance of the maximum oil temperature limit is annunciated, in addition to the amber indication to the flight crew, by an amber master caution located in each pilot field of view associated with a single aural chime (inhibited during critical flight phases such as take-off). This amber caution triggers a flight crew procedure (reduce power and shut down the engine if it is not possible to maintain the oil temperature below the limit).

If, for any reason, the flight crew does not intervene, sustained operation at a temperature above the limit may lead to an engine shutdown. However, the engine integrity and the aircraft continued safe flight and landing is not jeopardized because the engine manufacturer has concluded that there will not be any risk of propagation to engine failure that could be hazardous to the aircraft. Therefore, there is no expectation for flight crew intervention in order to prevent a potential safety hazard.

Explanation of how design features or alternative Methods of Compliance (MoC) provide an ELOS to that intended by the regulation

Section 25.1549(a) is intended to ensure engine limits are not exceeded and to ensure that engine abnormalities that could lead to engine failure or other undesirable engine behaviors are identified by the flight crew and addressed in a timely manner. At the time this rule was promulgated, the available technology primarily relied on flight crew awareness and direct action to respond to engine abnormalities. Analog instrumentation was required to provide appropriate crew awareness. Since that time, the development of advanced systems has relieved the flight crew of much of the burden of monitoring engine indications, particularly for secondary engine parameters not directly used for power setting.

Although noncompliant with the regulation, the automatic generation of warnings to the cockpit, with associated crew procedures, and the exceedance of the maximum oil temperature does not require an immediate action from the crew to mitigate a potential unsafe condition are considered to provide an ELOS as that established by providing analog displays.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in the Model A350 project issue paper P-16, titled "Engine Oil Temperature Indication." 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:

Equivalent Level of Safety Findings have been made for the following regulation:
14 CFR 25.1549(a), Powerplant and auxiliary power unit instruments (documented in TAD ELOS Memo TC0544IB-T-P-16)

Original signed by

Victor Wicklund

March 11, 2013

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by Transport Standards Staff	Project Engineer Douglas Bryant	Routing Symbol ANM-112
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