



# Federal Aviation Administration

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## Memorandum

Date: June 20, 2011

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 Airbus Model A350 Airplane (FAA Project Number TC0544IB-T)

ELOS Memo#: TC0544IB-T-P-30

Reg. Ref.: § 25.981(b) (Amendment 25-125) and 14 CFR part 25 Appendices M & N

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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 A350 airplane.

### Background

Title 14 Code of Federal Regulations (14 CFR) 25.981(b)(2) requires that any fuel tank other than a main fuel tank meet the flammability exposure criteria of Appendix M to part 25 if any portion of the tank is located within the fuselage contour. Paragraph M25.1 of Appendix M requires the fleet average flammability exposure of each fuel tank, as determined in accordance with Appendix N of part 25, not exceed 3 percent of the flammability exposure evaluation time (FEET), as defined in Appendix N. It also requires, if flammability reduction means (FRM) are used, each of the following time periods of that 3 percent may not exceed 1.8 percent of the FEET; (1) when any FRM is operational but the fuel tank is not inert and the tank is flammable; and (2) when any FRM is inoperative and the tank is flammable. Paragraph M25.1 requires the fleet average flammability exposure, as defined in Appendix N, of each fuel tank not exceed 3 percent of the portion of the FEET occurring during either ground or takeoff/climb phases of flight during warm days. Paragraph N25.3(a) requires the analysis be done in accordance with the FAA Fuel Tank Flammability Assessment Method User's Manual, dated May 2008, document number DOT/FAA/AR-05/8. Paragraph N25.3(a) requires the parameters specified in §§ N25.3(b) and (c) be used in the fuel tank flammability

exposure ‘‘Monte Carlo’’ analysis. Paragraph N25.3(e) requires the applicant submit to the FAA Oversight Office for approval the fuel tank flammability analysis, including the airplane specific parameters identified under paragraph N25.3(c) and any deviations from the parameters identified in paragraph N25.3(b) that affect flammability exposure, substantiating data, and any airworthiness limitations and other conditions assumed in the analysis.

In accordance with the Appendix N25.3(e), the Applicant requested using an airplane descent profile different than the one contained in the FAA User’s Manual (2500ft/min down to 4000ft and 500ft/min from 4000ft down to touchdown).

**Applicable regulation(s)**

§ 25.981(b) (Amendment 25-125), 14 CFR part 25 Appendices M & N

**Regulation(s) requiring an ELOS finding**

§ 25.981(b) (Amendment 25-125) and 14 CFR part 25 Appendices M & N

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

A survey of descent rates for the A320 and A330/A340 aircraft families was performed. This survey showed that the 2500 ft/min rate above 4000 ft actually represents less than 1% of the descents. The use of a more realistic descent profile derived from fleet statistical data was proposed including factors which take into account the critical items relating to inerting performance during descent, namely:

- Descent times, and
- Bleed pressures.

The proposed descent profile for the A350 fuel tank flammability exposure analysis is as follows:

- a straight, continuous 1585 ft/min descent down to 4000 ft followed by a straight, continuous approach at 500 ft/min from 4000 ft to touchdown.

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

The 1585 ft/min descent rate has been derived from the A330/A340 fleet data, which is representative of the planned use of the A350, by excluding the 50% slowest rate from the statistical samples and taking the mean of the remaining descents. The proposed profile does not include holds. This is a conservative value compared to the current typical fleet operations. The compliance demonstration to Appendix M25.1(a) has been conducted with engine bleed pressures input to the flammability reduction system corresponding to engine minimum idle thrust during the descent to 4000 ft. This value is

again providing margin compared to the current descent operations that include altitude holds due to current typical air traffic operations. The use of a 39,000 ft cruise level (instead of the more frequently used 36,000 ft per the fleet survey) also provides margin on system performance.

Based on the aforementioned factors the proposed alternate descent rate:

- is a more realistic representation of the current A330/A340 (and planned A350) fleet descent operations than the FAA User's Manual rate, and
- maintains conservative margins in the flammability exposure analysis and system performance as intended by the FAA rules.

Conditions of the ELOS require Airbus to monitor the descent rates of a representative fleet of U.S. and international operators to determine if changes to the air traffic system implemented to improve fuel efficiency and reduce greenhouse gas emissions result in increased fuel tank flammability. Based on this monitoring, Airbus is required to develop design modifications if necessary to maintain the fuel tank flammability within the limits required by the regulations discussed above.

As a condition of this ELOS, the airworthiness limitations section of the maintenance manual will include a critical design configuration control limitation that requires operators to install any future modifications required to maintain fuel tank flammability within these limits as indicated by Airbus.

Neither owners/operators nor inspectors are required to monitor or report descent rates as part of this airworthiness limitation.

### **FAA approval and documentation of the ELOS finding**

The FAA has approved the aforementioned equivalent level of safety finding in the Model A350 project issue paper P-30, titled "Aircraft Descent Rate for Fuel Tank Flammability Reduction Assessment." 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 (TC's & ATC's) or in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below:

An equivalent level of safety finding has been made for the following regulation:  
§ 25.981(b), Fuel tank ignition prevention (documented in TAD ELOS Memo  
TC0544IB-T-P-30)

Original signed by

*Victor Wicklund*

June 21, 2011

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Manager, Transport Airplane Directorate,  
Aircraft Certification Service

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Date

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