



Federal Aviation Administration

Memorandum

Date: November 22, 2010

To: Manager, Transport Airplane Directorate, ANM-100

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

Prepared by: Greg Dunn, ANM-111

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for the Airbus Model A350 series High-intensity Radiated Fields (HIRF) Equipment Protection Test Levels (FAA Project Number TC0544IB-T)

ELOS Memo#: TC0544IB-T –SE-11

Reg. Ref.: § 25.1317(b)

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 aircraft.

Background

Title 14 Code of Federal Regulations (14 CFR) Part 25 requirement section 25.1317(b), requires that “Each electrical and electronic system that performs a function whose failure would significantly reduce the capability of the airplane or the ability of the flightcrew to respond to an adverse operating condition must be designed and installed so the system is not adversely affected when the equipment providing these functions is exposed to equipment HIRF test level 1 or 2, as described in appendix L to this part.” Part 25 Appendix L section (c)(5) Equipment HIRF Test Level 1 requires that “From 400 MHz to 8 gigahertz (GHz), use radiated susceptibility tests at a minimum of 150 V/m peak with pulse modulation of 4 percent duty cycle with a 1 kHz pulse repetition frequency. This signal must be switched on and off at a rate of 1 Hz with a duty cycle of 50 percent.”

In lieu of direct compliance to § 25.1317(b) at Amendment 25-122, using the equipment HIRF test levels defined in Part 25 Appendix L section (c)(5), Airbus is proposing compliance to § 25.1317(b) using different equipment test levels for some A350 electrical or electronic systems.

Applicable regulation(s)

§§ 25.1317(b), Appendix L §(c)(5)

Regulation(s) requiring an ELOS finding

§ 25.1317(b)

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

Part 25 Appendix L section (c) provides equipment HIRF Test Level 1 and subparagraph (5) of this section covers the range of test levels from 400 MHz to 8 GHz.

In lieu of direct compliance to § 25.1317(b) using the equipment HIRF test levels defined in Part 25 Appendix L section (c)(5), Airbus proposed the following:

From 400 MHz to 8 GHz, use radiated susceptibility tests at 150 V/m peak with pulse modulation of 4 percent duty cycle with a 1 kHz pulse repetition frequency. This signal should be switched on and off at a rate of 1 Hz with a duty cycle of 50 Percent,

Or,

From 400 MHz to 8 GHz, use radiated susceptibility tests at 150 V/m peak with pulse modulation of 0.1 percent duty cycle with 1 kHz pulse repetition frequency. This signal should be switched on and off at a rate of 1 Hz with a duty cycle of 50 percent.

Also, from 400 MHz to 8 GHz, use radiated susceptibility tests at 28 V/m peak with 1 kHz square wave modulation of depth greater than 90 percent. This signal should be switched on and off at a rate of 1 Hz.”

The FAA accepts the equivalent level of safety request considering as a compensating factor that the HIRF test levels defined in Part 25 Appendix L section (c)(5) are technically equivalent to those proposed by Airbus. The modulations for both test levels were chosen to generate the same RF power and provide equivalent assurance of system RF immunity.

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

Part 25 Appendix L section (c) provides equipment HIRF Test Level 1 and subparagraph (5) of this section covers the range of test levels from 400 MHz to 8 GHz. The FAA accepts the equivalent level of safety request considering as a compensating factor that the HIRF test levels defined in Part 25 Appendix L section (c)(5) are technically equivalent to those proposed by Airbus. The modulations for both test levels were chosen to generate the same RF power and provide equivalent assurance of system RF immunity.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned equivalent level of safety finding in the A350 project issue paper SE-11, titled “HIRF Equipment Protection Test Levels.” This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport 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:

Equivalent Level of Safety Findings have been made for the following regulation(s):
§ 25.1317(b)

(documented in TAD ELOS Memo TC0544IB-T –SE-11)

Original signed by

Steve Boyd

December 14, 2010

Manager, Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by Transport Standards Staff:	Project Engineer Greg Dunn	Routing Symbol ANM-111
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