



Federal Aviation Administration

Memorandum

Date: November 20, 2015

To: Manager, Boeing Aviation Safety Oversight Office, ANM-106B

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Ken Schroer, ANM-100S

Subject: INFORMATION: Equivalent Level of Safety Finding for High Intensity Radiated Field (HIRF) for Boeing Models 787-8, 787-9 and 787-10 (FAA Project Numbers TC6918SE-T, PS06-0496, PS06-0467, PS13-0546, and PS14-1031)

Memo No.: PS06-0496-T-SE-15

Reg. Ref.: § 25.1317(b), Amendment 25-122

The purpose of this memorandum is to inform the 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 Model 787-8/-9 aircraft.

This memo is being revised to define this ELOS as being applicable to the Boeing 787-10.

Background

Title 14, Code of Federal Regulations (14 CFR) 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 flight crew 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 high intensity radiated fields (HIRF) test level 1 or 2, as described in appendix L. Boeing proposes certification of applicable 787-9 and 787-10 electrical and electronic systems be allowed to use either the test levels and modulations of § 25.1317(b) or equivalent test levels and modulations specified in RTCA DO-160D. Section 25.1317 provides system functional requirements during airplane and/or system exposure to HIRF, for systems whose failure would be Catastrophic, Hazardous or Major. This ELOS is limited to the § 25.1317(b) test levels and modulations defining the system HIRF exposure for systems whose failure would be Hazardous. There were no FAA HIRF requirements for such equipment on the 787-8.

Applicable regulation(s)

§ 25.1317, Amendment 25-122

Regulation(s) requiring an ELOS

§ 25.1317(b), Amendment 25-122

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

Boeing is proposing alternate test levels and modulations to those referenced in § 25.1317(b). The alternate test levels and modulations have been historically accepted by industry as equivalent – though not identical – to the test levels and modulations referenced in § 25.1317(b) and are acceptable in meeting 787-8 EASA HIRF requirements that are similar to those of § 25.1317(b). The functional requirements (i.e., system performance during HIRF exposure) of § 25.1317(b) are acceptable as written, and no deviation from the functional requirement is requested by this ELOS.

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

In showing compliance with the EASA HIRF requirements, 787-8/-9/-10 DAL B equipment was qualified in accordance with RTCA Special Committee 135, Test Standard DO-160D, Section 20, Category R. DO-160D, Section 20, Category R contains two options for conducting RF radiated testing from 400 MHz to 8 GHz. Only one of these options is explicitly identified by § 25.1317(b). This ELOS proposes that either of the options is acceptable in meeting the intent of § 25.1317(b).

The two test options provide for both peak and average HIRF energy delivered to the equipment under test. The first test option uses a 150V/m, 0.1% duty cycle, pulse modulated signal, along with a 28V/m square wave modulated signal. The second option uses a 150V/m, 4% duty cycle, pulse modulated signal.

The two test options are identified as alternative test methods to each other within DO-160C/D/E. As noted in the preamble to § 25.1317, RTCA SC-135 elected to eliminate one of the test options (the first option) to help standardize equipment tests and minimize confusion in selecting appropriate equipment test levels. The remaining option (second option identified above) is the test level/modulations retained in DO-160F and adopted by § 25.1317(b). The reason for eliminating this test option from DO-160 does not indicate that the test option is deficient and does not warrant re-testing of equipment previously qualified to this first test option.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned ELOS finding in project Issue Paper SE-15 or Administrative Collector Issue Paper G-6. This memorandum provides standardized documentation of the ELOS 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. This ELOS memorandum number should be listed in the type certificate data sheet under the certification basis section. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s): § 25.1317(b), ‘High-intensity Radiated Fields (HIRF) Protection’ (documented in TAD ELOS Memo PS06-0496-T-SE-15).



Transport Airplane Directorate
Aircraft Certification Service

11/24/05

Date

ELOS Originated by Seattle ACO:	Ken Schroer	ANM-100S
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