



Federal Aviation Administration

Memorandum

Date: December 17, 2015

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

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Linh Le, ANM-117

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Equipment Systems, and Installations Requirements: Use of ARAC Recommendations on Embraer Model ERJ 190-300 airplane, FAA Project # AT10219IB-T

ELOS Memo #: AT10219IB-T-S-1

Regulatory Ref: §§ 25.1301, 25.1309

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 Model ERJ 190-300 airplane.

Background

Embraer submitted a request for an equivalent safety finding to incorporate within the Model ERJ 190-300 FAA certification basis the Aviation Rulemaking Advisory Committee (ARAC) recommended changes to Title 14, Code of Federal Regulations (14 CFR) part 25 section 25.1301 and 25.1309 as submitted to the FAA in August 2002.

Applicable regulation(s)

§§ 25.1301, 25.1309

Regulation(s) requiring an ELOS finding

§§ 25.1301, 25.1309

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

On April 29, 2003, the FAA published in the Federal Register a notice of availability

of the ARAC recommendations regarding proposed changes to §§ 25.1301, 25.1309, the creation of a new § 25.1310, and the revision of relevant advisory material. The alternate standards used for this ELOS finding on the Model ERJ 190-300 consist of the ARAC recommended revisions and post-14 CFR Amendment 25-123 changes and are listed below:

§ 25.1301 Function and installation.

(a) Each item of installed equipment must

- (1) Be of a kind and design appropriate to its intended function;
- (2) Be labeled as to its identification, function, or operating limitations, or any applicable combination of these factors; and
- (3) Be installed according to limitations specified for that equipment.

(b) EWIS must meet the requirements of subpart H of this part.

§ 25.1309 Equipment, systems, and installations.

The requirements of this section, except as identified below, are applicable, in addition to specific design requirements of Part 25, to any equipment or system as installed in the airplane. Although this section does not apply to the performance and flight characteristic requirements of Subpart B and the structural requirements of Subparts C and D, it does apply to any system on which compliance with any of those requirements is dependent. Jams of flight control surfaces or pilot controls covered by § 25.671(c)(3) are excepted from the requirements of 25.1309(b)(1)(ii). Single failures covered by 25.735(b)(1) are excepted from the requirements of 25.1309(b). The failure effects covered by 25.810(a)(1)(v) and 25.812 are excepted from the requirements of 25.1309(b). The requirements of 25.1309(b) apply to powerplant installations as covered by 25.901(c).

(a) The airplane equipment and systems must be designed and installed so that:

(1) Those required for type certification or by operating rules, or whose improper functioning would reduce safety, perform as intended under the airplane operating and environmental conditions.

(2) Other equipment and systems do not adversely affect the safety of the airplane or its occupants, or the proper functioning of those covered by sub-paragraph (a)(1) of this paragraph.

(b) The airplane systems and associated components, considered separately and in relation to other systems, must be designed and installed so that:

- (1) Each catastrophic failure condition
 - (i) is extremely improbable; and
 - (ii) does not result from a single failure; and

(2) Each hazardous failure condition is extremely remote; and

(3) Each major failure condition is remote.

(c) Information concerning unsafe system operating conditions must be provided to the crew to enable them to take appropriate corrective action. A warning indication must be provided if immediate corrective action is required. Systems and controls, including indications and annunciations must be designed to minimize crew errors which could create additional hazards.

(d) Not used.

(e) Not used.

(f) EWIS must be assessed in accordance with the requirements of Sec. 25.1709.

Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation

The ARAC recommendations for §§ 25.1301 and 25.1309 are considered an improvement of the existing §§ 25.1301 and 25.1309 without significant additional compliance costs for the applicant, and with the benefit of clearer FAA and European Aviation Safety Agency (EASA) harmonized regulations. Embraer's demonstration of compliance with the ARAC recommended §§ 25.1301 and 25.1309, on the Model ERJ 190-300 provides an equivalent or possibly increased level of safety compared to direct compliance with the existing §§ 25.1301 and 25.1309.

Because the ARAC recommendation was developed prior to the adoption of the Electrical Wiring Interconnection Systems (EWIS), the recommendations did not address § 25.1309(f) as shown in Amendment 25-123 (December 10, 2007). However, compliance to § 25.1309(f) at Amendment 25-123, and § 25.1709 is included in the Model ERJ 190-300 certification basis. Therefore, it needs not be included in this ELOS finding.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS as documented in Issue Paper S-1, titled Equipment, Systems, and Installations Requirements: Use of ARAC Recommendations. 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 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(s):

§§ 25.1301 Function and Installation, and 25.1309 Equipment, Systems and Installations (documented in TAD ELOS Memorandum AT10219IB-T-S-1)

Original signed by Tom Groves

December 17, 2015

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by: Safety Management Branch	Project Engineer: Linh Le	Routing Symbol: ANM-117
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