



Federal Aviation Administration

Memorandum

Date: NOV 24 2009

To: Manager, Small Airplane Directorate, ACE-100

From: Manager, Project Support Office, ACE-112 *plm*

Prepared by: Karl Schletzbaum, Regulations and Policy Office, ACE-112

Subject: Equivalent Level of Safety (ELOS) to 14 CFR, Part 23, § 23.807(e);
Embraer Model 505 airplanes

ELOS Memo#: ACE-09-12

Regulatory Ref: 14 CFR, part 23, § 23.807(e)

This memorandum requests your office to review and provide concurrence with the proposed finding of equivalent level of safety to the *Emergency exits* requirements of 14 CFR, part 23, § 23.807(e).

Background

The Embraer Model EMB-505 is a commuter category, low-winged monoplane with "T" tailed vertical and horizontal stabilizers, retractable tricycle type landing gear and twin turbofan engines mounted on the aircraft fuselage. Its design characteristics include a predominance of metallic construction. The maximum takeoff weight is 18,000 pounds.

The airplane is configured with two emergency exits, the left hand main entry door and a right hand overwing emergency exit. The right hand overwing emergency exit is in full compliance with 14 CFR, part 23, § 23.807. However, use of the left hand main door as an emergency exit does not comply with the provisions of this regulation because the bottom of the door is below the waterline of the airplane. Embraer has proposed to install a deployable water barrier, which will prevent water entering the cabin during the egress period. Such devices have been proposed and accepted for Equivalent Levels of Safety (ELOS) by the Federal Aviation Administration (FAA) on other airplane projects.

Embraer requests the FAA to grant an ELOS to 14 CFR, part 23, § 23.807(e) for the use of the water barrier by accepting it as equivalent to the emergency egress requirements of 14 CFR, part 23, § 23.807(e).

Applicable regulation

Paragraph 23.807(e) requires that all small airplane categories must be demonstrate compliance with § 23.807(e) *Emergency exits*, specifically pertaining to having the side exits above the waterline of the airplane.

Regulation requiring an ELOS Finding

14 CFR, part 23, § 23.807(e)

Description of compensating design features

The FAA has previously accepted ELOS for § 23.807(e) based on the applicant showing the following:

- The water barrier prevents water from flowing into the cabin in the worst expected flotation position long enough to accomplish egress.
- AFM procedures are developed for use and deployment of the water barrier.
- The procedures are validated by test and analysis.
- The exit 19 x 26 inch ellipse egress area is maintained.
- The water barrier is designed to hold against the water loads and for incidental use as a step during egress.

As part of its request, Embraer has described the compensating features:

1. The water barrier prevents water from flowing into the cabin in the worst expected flotation position long enough to accomplish egress.

Embraer has performed a waterline analysis that shows the most adverse waterline. The water barrier has been designed to allow for the most adverse flotation position of the airplane and the sink rate of the airplane.

2. Embraer will include in the AFM procedures an instruction as to when to deploy the water barrier and instructions for doing so. This includes a preflight check to assure that the water barrier is on board the airplane.
3. The procedures are validated by test and analysis.

Embraer will accomplish by test the following:

- a) Verification of the accessibility of the main door;
- b) Verification of deployability by an untrained person;

- c) Verification of the water barrier's functioning;
 - d) Verification of the identification of the water barrier;
 - e) Verification of the water barrier's placards.
4. Embraer has determined that the minimum egress area is still available.
 5. Embraer has analyzed the water barrier for adequate strength with respect to the water loads and for the load imposed by being used as a step.

The FAA notes that it has approved similar ELOS for the same reason on other similar business jet airplane types.

FAA approval

On the basis of the compensating features and the FAA's previous experience with the same subject ELOS, the FAA has determined that an appropriate level of safety can be provided by the issuance of this ELOS in accordance with the provisions of 14 CFR, part 21, § 21.21(b)(1).



 Manager, Small Airplane Directorate
 Aircraft Certification Service



 Date

ELOS Originated by: Project Support Office	Project Support Office Manager: William J. Timberlake	ACE-112
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