



Federal Aviation Administration

Memorandum

Date: July 22, 2008

To: Manager, Small Airplane Directorate, ACE-100

From: Manager, Project Support Branch, ACE-112, Small Airplane Directorate

Prepared by: Karl Schletzbaum, Aerospace Engineer, ACE-112

Subject: Equivalent Level of Safety to § 23.807(e)(2); Embraer S.A., EMB 500; Finding No. ACE-08-14

This memorandum requests your office to review and provide concurrence with the proposed finding of equivalent level of safety for the emergency egress provision during ditching of 14 CFR, part 23, § 23.807(e)(2).

BACKGROUND:

The Embraer S.A. Model EMB-500 is a normal 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 9,965 pounds, the VMO/MMO is 275 KIAS/M 0.70 and maximum altitude is 41,000 feet.

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, § 23.807 and specifically § 23.807(e)(2). 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 for and accepted for Equivalent Levels of Safety (ELOS) by the Federal Aviation Administration (FAA) on other airplane projects.

Embraer S.A. requests the FAA to grant an ELOS to 14 CFR, part 23, § 23.807(e)(2) 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)(2).

APPLICABLE REGULATIONS:

14 CFR, part 23, § 23.807(e)(2).

REGULATIONS REQUIRING AN ELOS:

The applicable regulation is:

14 CFR part 23, § 23.807(e)(2) [Emergency exits]:

"....

(e) For multiengine airplanes, ditching emergency exits must be provided in accordance with the following requirements, unless the emergency exits required by paragraph (a) or (d) of this section already comply with them:

(1) One exit above the waterline on each side of the airplane having the dimensions specified in paragraph (b) or (d) of this section, as applicable; and

(2) If side exits cannot be above the waterline, there must be a readily accessible overhead hatch emergency exit that has a rectangular opening measuring not less than 20 inches wide by 36 inches long, with corner radii not greater than one-third the width of the exit."

DESCRIPTION OF COMPENSATING FEATURES:

It can be seen that the applicable regulation is an alternate requirement to 14 CFR, part 23, § 23.807(e)(1). The FAA has previously accepted ELOS for § 23.807(e)(2) 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.

EXPLANATION OF 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 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 barriers 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.

ACE-112 RECOMMENDATION:

The Project Support Branch, ACE-112, Small Airplane Directorate concurs with Embraer that the water barrier installation and design provides an equivalent level of safety to the requirements of 14 CFR, part 23, § 23.807(e)(2).

RECOMMENDATION:

The Small Airplane Directorate concurs with and grants ELOS ACE-08-14 for the Embraer Model EMB-500.

Concurred by:

<u><i>William J. Timberlake</i></u>	<u>7-17-08</u>
Manager, Project Support Branch, ACE-112	Date
<u><i>Patrick R. Mullen for</i></u>	<u>7-7-08</u>
Manager, Standards Office, ACE-110	Date
<u><i>Kim Smith</i></u>	<u>7-18-08</u>
Manager, Small Airplane Directorate, Aircraft Certification Service, ACE-100	Date