



U.S. Department
of Transportation
**Federal Aviation
Administration**

Memorandum

Subject: Action: Review and Concurrence, Equivalent Level of Safety Finding for Embraer S.A. 's project on a Model EMB-145XR
FAA Project Number No. AT0057IB-T

Date: October 21, 2002

Reg Ref: 25.721(b) and 25.963(d).

From: Manager, Airframe & Cabin Safety Branch, ANM-115

Reply to: Bob Breneman
Attn of: ANM-116

To: Manager, International Branch, ANM-116

ELOS Memo #: AT0057IB-T-A-8

Background

Embraer proposed for the EMB-145XR, to demonstrate compliance to the new harmonized minor crash condition requirements that were recommended by the Loads and Dynamics Harmonization Working Group, instead of demonstrating compliance to 14 CFR part 25.721(b) and 25.963(d). In issue paper A-8, the FAA proposed modified criteria from that recommended by the Loads and Dynamics Harmonization Working. The following describes the alternative standard that was accepted by the FAA as an ELOS to 14 CFR part 25.721(b) and 25.963(d).

Applicable regulation(s)
25.721(b) and 25.963(d).

Regulation(s) requiring an ELOS
25.721(b) and 25.963(d).

Description of compensating design features or alternative standards which allow the granting of the ELOS

In lieu of the requirements of 14 CFR 25.721(b) (Amendment 25-32), the following apply:

The airplane must be designed to avoid any rupture leading to the spillage of enough fuel to constitute a fire hazard as a result of a wheels-up landing on a paved runway, under the following minor crash landing conditions:

(1) Impact at 5 fps vertical velocity, with the airplane under control, at Maximum Design Landing Weight, all gears retracted and in any other combination of gear legs not extended. It should be demonstrated for the entire landing sequence assuming a coefficient of friction of up to 0.8, or lesser value substantiated by test, between the shoe of the keel beam skid or areas of the fuselage contacting the ground, and the prepared runway surface;

a. that the fuselage structure is capable of protecting the ventral fuel tank from contact with the ground over the entire range of landing attitudes, from impact with only the keel beam skid to full tail-down landing where the aft fuselage or tail cone is the initial point of ground contact, and;

b. that the aft fuselage is capable of remaining intact during the initial ground contact and subsequent landing sequence without failure or deformations of the fuselage that would damage the ventral fuel tank by permitting contact with the ground or by developing failures that would propagate into the ventral fuel tank.

(2) Sliding on the ground, all gears retracted up to a 20° yaw angle and as a separate condition, sliding with any other combination of gear legs not extended with 0° yaw.

In lieu of the requirements of the second sentence of 14 CFR 25.963(d) (Amendment 25-69), the following apply:

For each fuel tank and surrounding airframe structure, the effects of crushing and scraping actions with the ground should not cause either the spillage of enough fuel, or generate temperatures that would constitute a fire hazard under the gear up conditions described above.

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

The alternative standards listed above provide a more objective performance standard than what is provided in the identified regulations.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding in Issue Paper A-8. This memorandum provides standardized documentation of the ELOS 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 on page 3 of the STC Certificate.

[E.g. Equivalent Safety Findings have been made for the following regulation(s):

25.721(b) and 25.963(d). FAR Section Title (documented in TAD ELOS Memo No. AT0057IB-T-A-8)

Note that the alternative standards accepted by this ELOS are not applicable to that specified in 14 CFR 25.721(a).

Signed by Franklin Tiangsing
Manager, Airframe & Cabin Safety Branch, ANM-115

November 19, 2002
Date

ELOS Originated by: Bob Breneman	Program Manager: Bob Breneman	Routing Symbol: ANM-116
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