



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

Memorandum

Subject: **ACTION**: Request for Review and Concurrence with
Associated Equivalent Level of Safety (ELOS) ACE-02-10,
For the Extra Flugzeugbau EA400 for 14 CFR § 23.1419(a).

Date: **SEP 18 2002**

From: Extra Project Officer, Project Support Branch, ACE-112

Reply to Karl Schletzbaum
Attn. of: (816) 329-4146

To: Manager, Small Airplane Directorate, ACE-100

This memorandum documents concurrence for the subject ELOS. We request your office review and concur with the proposed ELOS findings to the 14 CFR part 23, § 23.1419(a) Ice Protection.

Background: The Extra EA400 airplane is a T-tail empennage, high wing airplane with retractable landing gear, fabricated almost completely of composite materials. The airplane has a basic certification basis of 14 CFR part 23 at Amendment 45. The airplane is now being certificated to the provisions of 14 CFR part 23, § 23.1419 at Amendment level 54 for icing operations.

14 CFR part 23, § 23.1419(a) requires that the airplane must be capable of operating safely in icing conditions as characterized by Appendix C of 14 CFR part 25. The airplane's performance, controllability, maneuverability, and stability must be within the limits of 14 CFR part 23, Subpart B. The airplane is satisfactory with respect to these requirements except that with ice shapes installed on protected and unprotected surfaces (which were determined by analysis and flight testing in natural icing), the airplane exceeds the 61 knot stall speed requirement of 14 CFR part 23, § 23.49(d). The EA400 stall speed with full flaps (30°) and with simulated, critical ice accretions is 65 KCAS, (knots calibrated airspeed). To preclude susceptibility to Ice Contaminated Tail Stall (ICTS) the EA400 will restrict flaps to approach deflection (15°) in icing conditions. In this configuration with critical ice accretions, the stall speed is 73 KCAS.

Applicable Regulations: The applicable regulations are 14 CFR part 23, § 23.1419, which states:

§ 23.1419(a) Ice protection.

If certification with ice protect provisions is desired, compliance with the requirements of this section and other applicable sections of this part must be shown:

(a) An analysis must be performed to establish, on the basis of the airplane's operational needs, the adequacy of the ice protection system for the various components of the airplane. In addition, tests of the ice protection system must be conducted to demonstrate that the airplane is capable of operating safely in continuous maximum and intermittent maximum icing conditions, as described in appendix C part 25 of this chapter. As used in this section, "Capable of operating safely" means that airplane performance, controllability, maneuverability, and stability must not be less than that required in part 23, subpart B.

FAA Position: The FAA has evaluated the airplane's ice protection system design and analysis, and has performed flight tests that evaluated the susceptibility to ICTS, stall warning, maneuver margin, and stall characteristics with ice shapes installed. Since the airplane has adequate stall warning and maneuver margin capability and acceptable handling through the stall event, the ELOS is justified.

After the EA400 icing approval program was initiated, the FAA has determined that an exemption is more appropriate to address non-compliance with the 61-knot stall speed rule in icing, and this policy will be reflected in Advisory Circular 23.1419-2B. Since the compensating features would be the same and the LBA has accepted an ELOS, the FAA decided to accept an ELOS.

Compensating Features: The airplane exceeds the 61-knot stall speed requirement, to compensate for this condition, the following is proposed.

- (i) The airplane with no ice accretions meets the 61-knot stall speed requirement of § 23.49(c);
- (ii) The airplane with critical ice accretions complies with the stall warning requirements of § 23.207. The stall warning margins with ice accretion were shown to be approximately 2 knots lower, on average, than those obtained with no ice accretions, and the production stall warning margin tolerances were subsequently tightened;
- (iii) The airplane with and without ice accretions complies with the maneuver margin requirements of § 23.207(d).
- (iv) The AFM performance data in icing conditions reflects the higher stall and operating speeds;
- (v) The airplane with critical ice accretions has acceptable stall characteristics and is safely controllable with normal piloting skill as required by §§ 23.201 and 23.203;

(vi) The tire requirements of § 23.733 and brake requirements of § 23.735 are met with the higher stall and operating speeds;

(vii) The ground handling requirements of §§ 23.231, 23.233 and 23.235 are met with the higher landing speeds;

(viii) All other airplane system or testing requirements that are affected by higher operating speeds, such as autopilot and flight director gains, have been evaluated;

(x) The airplane known icing certification basis includes § 23.1091 at Amendment 23-51 and § 23.1093 at Amendment 23-51 to provide the latest regulations for engine operation in icing conditions.

Recommendation: We concur that the design of the Extra EA400 as equipped for flight in icing conditions provides an Equivalent Level of Safety (ELOS) as envisioned in paragraph 14 CFR part 23, § 23.1419(a) and § 23.49.

Concurred by:



 Manager, Project Support Branch, ACE-112

9/17/02
 Date



 Pur Manager, Standards Office, ACE-110

9-17-02
 Date



 Manager, Small Airplane Directorate, ACE-100

9/18/02
 Date