



# Federal Aviation Administration

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## Memorandum

Date: February 11, 2009

To: Manager, Ft. Worth Aircraft Certification Office, ASW-150

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: Rob Romero, Airplane Certification Office, ASW-150

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Air Tractor's Project on a Model AT-504, FAA Project # AT2089AC-A

ELOS Memo#: ACE-09-02

Regulatory Ref: 14 CFR, part 23, § 23.562

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of an equivalent level of safety finding for the Air Tractor AT-504.

### **Background:**

The Air Tractor AT-504 is an 8,000 pound, single-engine, two-place airplane powered by a Pratt and Whitney PT-6 engine. The AT-504 is nearly identical to the certified AT-502B. The AT-504 will accommodate two pilots and is intended to be used as a training airplane. Differences include a wider fuselage overturn structure, addition of a second seat, and dual flight and engine controls. The gross weight will be the same as the AT-502B. The certification basis defined in the G-1 Issue Paper (IP) identifies § 23.562 as an applicable regulation. Air Tractor requests an equivalent safety finding similar to the one granted for the AT-602 and AT-802 airplanes for § 23.562, Emergency Landing Dynamic Conditions.

### **Applicable regulation:**

Section 23.562 requires that the airplane be designed to protect each occupant during an emergency landing. Compliance to this regulation is typically shown through dynamic testing of the seat and restraint system in conjunction with an evaluation of the surrounding structure. Any items that may affect the results of the test must be included in the test set-up.

**Regulation requiring an ELOS finding:**

In considering the current design, the applicant has requested an ELOS for their current seat and restraint design and the Federal Aviation Administration (FAA) has determined that an appropriate level of safety can be provided by the issuance of an ELOS, in accordance with the provisions of 14 CFR, part 21, § 21.21(b)(1).

**Description of compensating features which allow the granting of the ELOS:**

The design includes an ag industry standard seat constructed of tubular steel and fabric diaphragms. It also includes a 4-point, 5,000 pound rated military type lap belt and dual shoulder harness. Any cockpit protuberances or hard surfaces that could cause injury are eliminated. Additionally, the pilot and co-pilot are required to wear DOT or Mil-Spec protective headgear.

**Explanation of how design features provide an equivalent level of safety to the level of safety intended by the regulation:**

The seat and restraint system design is intended to protect the occupant in an emergency landing condition. The seat is constructed to absorb energy while the 4-point restraint limits occupant motion. The elimination of protuberances or hard surfaces serves to limit the occupant from exposure to structure that might cause severe injuries. Occupant safety is further enhanced by the mandatory requirement for the pilot/co-pilot to wear protective headgear. Further, the airplane incorporates several feet of collapsible structure under the pilot's feet allowing for additional energy absorption.

Paragraph (e) of § 23.562 specifically allows for an alternate approach that achieves an equivalent, or greater, level of occupant protection to that required by this section if substantiated on a rational basis. In September 1992, the FAA issued an ELOS to Air Tractor for their Model AT-802 airplane. This ELOS was subsequently applied to the AT-802A and AT-602 model airplanes as well. With their 1992 request, Air Tractor submitted data that supported their request. Among that data was a review of actual crashes of airplanes. This review concluded, and the FAA concurred, that the extensive service history of the Air Tractor airplanes (AT-300, AT-400, AT-500 series) showed adequate occupant protection in the event of an emergency landing condition. These airplanes were certificated prior to the promulgation of § 23.562, however the design of their seats and restraint systems are very similar. Since the granting of the initial ELOS, the service history of these airplanes continues to support this action.

The ACO recommends a grant of this ELOS with the following limitations:

1. The hopper shall be located forward of the cockpit seats.
2. Any cockpit protuberances or hard surfaces that could cause injury in the event of an emergency landing should be eliminated.
3. The pilot and co-pilot are required to wear DOT or Mil-Spec protective headgear.
4. Both seats must be equipped with a minimum 5,000 pound rating military-type lap-belt and shoulder harness (or equivalent).

5. The co-pilot seat must provide the same level of protection as the pilot seat.

**FAA approval and documentation of the ELOS finding:**

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper A-1. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Small Airplane 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 in the Limitations and Conditions Section of the STC. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings has been made for the following regulation(s):

14 CFR, part 23, § 23.562, Emergency Landing Dynamic Conditions (documented in ELOS Memo ACE-09-02)

Kim Smith  
 Kim Smith, Manager, Small Airplane Directorate  
 Aircraft Certification Service

2-11-09  
 Date

ELOS Originated by Ft. Worth ACO:	Michele M. Owsley, Manager (/s/ Michele M. Owsley)	Routing Symbol ASW-150
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