



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Equivalent Level of Safety to § 23.841
(b)(6); Pilatus PC-12/47, Finding No. ACE-05-18

Date: November 29, 2005

From: Manager, Project Support Office, ACE-112

Reply to
Attn. of: **Doug Rudolph**
(816) 329-4059

To: Acting Manager, Small Airplane Directorate,
ACE-100

This memorandum requests your office to review and provide concurrence with the proposed finding of Equivalent Level of Safety (ELOS) to the Pressurized Cabin requirements of § 23.841(b)(6) of 14 CFR, Part 23.

BACKGROUND

The Pilatus PC-12/47 is a 10,450-pound single-engine, 9 passenger airplane powered by a 1,200 shaft horsepower (SHP) Pratt & Whitney PT6A-67B turboprop engine. The PC-12/47 is an upgrade of the certified PC-12/45 model airplane with the following improvements:

- Maximum Take-Off Weight (MTOW) increase of 5% to 4,740 Kg (10,450 Lbs)
- New seat qualification (67 kts stall speed)
- New component/equipment qualification (67 kts stall speed)
- Aerodynamic improvements:
 1. Modified wingtips
 2. Modified dorsal and ventral fins
 3. Reduction of roll control forces (modified ailerons)

As part of this new model certification, the certification basis for the areas that are not affected by the modification should remain the same, unless an unsafe condition exists. This includes one of the ELOS that was granted for the original PC-12 and PC-12/45 models and concerns regulation § 23.841(b)(6). Pilatus was not able to meet literal compliance with 14 CFR part 23, § 23.841(b)(6), during the original certification and follow on certification of the PC-12 and PC-12/45, respectively. Consequently, they have developed a proposed equivalent Method of Compliance (MOC) to this regulation that will offer the same level of safety as provided by the rule. Pilatus submitted the proposal to the Federal Office of Civil Aviation (FOCA) as a proposed ELOS to this regulation and requested the Federal Aviation Administration (FAA) to give them credit for the system by accepting it as a safety equivalent to § 23.841(b)(6), Cabin Pressurization. The documentation of this is shown on FOCA ELOS document PC-12 CQB 21-03, dated June 4, 1992.

APPLICABLE REGULATIONS

Section 23.841(b)(6) requires: “Warning indication at the pilot station to indicate when the safe or preset pressure differential is exceeded and when a cabin pressure altitude of 10,000 feet is exceeded.”

REGULATIONS REQUIRING AN ELOS

In considering the current design, the applicant has requested an ELOS for one specific condition of the *Pressurized Cabins* Section of 14 CFR, part 23. The 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

Discussion:

APPLICANT POSITION

From the FOCA ELOS document PC-12 CQB 21-03:

“Section 23.841 (b)(6), states that there should be a warning indication at the pilot station when a cabin pressure altitude of 10,000 ft. is exceeded. However, at the aircraft maximum operating altitude of 30,000 ft., the cabin pressure is controlled to 10,000+385 ft. (10.11+0.15 psi). There will therefore, be a warning whenever the aircraft approaches its maximum operating altitude. It is therefore, proposed to reset the cabin pressure warning level to 10,700 ft., which is the lowest level, allowing for tolerance in the warning switch setting, at which spurious warnings during normal operation may be avoided.

The effect of this change is illustrated by the following failure case:

ECS failure during flight at 30,000 ft. Air leaks from aircraft cabin at 102 scfm (Max. permissible cabin leakage rate).

Time for cabin altitude to decay from 10,000 to 12,500 ft. is: 29 sec.

Time for cabin altitude to decay from 10,000 to 10,700 ft. is: 8 sec.

Hence the time between the warning being activated and oxygen being required for the aircrew (Ref. 14 CFR Part 91 § 91.211) is reduced from 29 to 21 sec.”

FOCA POSITION:

“The FOCA has determined that the proposal to reset the cabin altitude warning threshold to 10,700 ft. will provide an equivalent level of safety to the requirements of FAR 23.841(b)(6).

As the FAA comments in the preamble to FAR 23, Amdt.17 indicate, the 10,000 ft. value is more traditional than technical in nature. A warning at no higher than 10,700 ft. will still provide the crew with sufficient time to identify the problem, and take the necessary action.

The Pilatus proposal is therefore accepted.”

FAA POSITION

The FAA granted this ELOS for the original PC-12 and the PC-12/45 models and documented as such on the FAA issued Type Certificate Data Sheet (TCDS) Number A78EU, as part of the certification basis for each model. The office responsible for granting the ELOS omitted issuing an actual ELOS memorandum and corresponding number for this item, and this necessitated the issuance of this ELOS memorandum for the PC-12/47 model.

There have been no unsafe conditions documented to this data that would warrant not issuing this ELOS for this airplane.

RECOMMENDATION

The FAA recommends approval of the applicant's proposal.

CONCURRED BY

<u><i>William J. Timberlake</i></u>	<u><i>11-21-05</i></u>
Manager, Project Support Office, ACE-112	Date
<u><i>Patrick R. Mullen</i></u>	<u><i>11-29-05</i></u>
<i>for</i> Manager, Standards Office, ACE-110	Date
<u><i>Kim Smith</i></u>	<u><i>11-29-05</i></u>
Acting Manager, Small Airplane Directorate, ACE-100	Date