



U.S. Department
of Transportation

Federal Aviation
Administration

KMS
ACE-100
#262,496
1999 JUN 28 PM 12:24

Memorandum

Subject: **ACTION:** Cessna Model 525A Equivalent Level of Safety; Cabin Pressurization - High Altitude Takeoff and Landing Operations; ACE-99-07

Date: June 24, 1999

From: Carlos Blacklock, Program Manager, ACE-117W, Wichita Aircraft Certification Office

Reply to
Attn. of:

To: Manager, Project Support Section, ACE-112, Small Airplane Directorate

BACKGROUND

In accordance with the provisions of § 21.21 (b)(1), Cessna submitted a request for an equivalent level of safety to the requirements of § 23.841 (b) (6) when applied to the Cessna Model 525A take-off and landing operations at airports with field elevations between 8,000 feet and 14,000 feet. Cessna desires to obtain approval for takeoff and landing operations at airports with elevations up to 14,000 feet and to do so without activation of the 10,000 feet cabin altitude warning. Cessna designed a cabin pressure control system that is intended to provide an equivalent level of safety to the requirements of § 23.841 (b)(6). Similar pressurization systems have been previously approved on Transport Category airplanes by grant of equivalent level of safety. This issue was coordinated by means of Issue Paper S-1, and closed. It was signed by Mr. Michael K. Dahl on behalf of the Small Airplane Directorate on June 3, 1999.

DISCUSSION OF DESIGN CONCEPT AND AFFECTED REGULATIONS

The intent of § 23.841 (b)(6) is to warn the crew when the safe or preset cabin pressure altitude limit is exceeded.

The cabin altitude must equal the aircraft altitude when departing or landing. Cessna, in cooperation with the Cabin Pressurization Control System vendor, have designed and have operational a system which will allow takeoffs and landings at elevations above 8,000 feet and up to 14,000 feet for the Model 525A. Dissimilar from previous Cessna aircraft which reset or suppressed pressurization warnings by manual procedures, this system minimizes pilot workload, reduces the probability of human error, and provides automatic warning and safety backups while still providing a comfortable cabin pressurization system.

DISCUSSION OF DESIGN CONCEPT AND AFFECTED REGULATIONS, CONTINUED

The cabin altitude warning system of indications and master caution alerts shift from 10,000 feet to 14,500 ± 500 feet. If a landing field is selected prior to takeoff for a destination field in excess of 10,000 feet, but less than 14,000 feet, and the aircraft holds between 10,000 feet and 14,000 feet, the occupants and crew may be exposed to cabin altitudes of 10,000 feet for duration in excess of that allowed by the operating rules and without cabin altitude warning in the high altitude mode. The operating rules §§ 91.211, 121.329(b), and 135.89(a) address the use of oxygen to prevent hypoxia and related degraded pilot performance.

CESSNA POSITION

With the advent of new higher technology aircraft such as the Model 525A, occasionally a requirement to operate at airports of unusually high elevations arises. In anticipation of such operations, a review of the required altitude warning requirement of § 23.841(b)(6) has been made. In the past such operations have been made by resetting or suppressing warnings and circumventing pressurization system safety features by manual procedures. Recent interpretation of § 23.841 has limited crew action to what would be considered normal procedures (select the altitude and land or take off). The features in the Model 525A pressurization control system have been evaluated in this regard and found to comply with the recent interpretation of §23.841 in all aspects with the exception of warning when the cabin pressure altitude exceeds 10,000 feet [ref. § 23.841(b)(6)] as will occur when operating at airports of unusually high elevations.

FAA POSITION

The intent of § 23.841 (b)(6) is to warn the crew when the safe or preset cabin pressure altitude limit is exceeded. The system features described above are designed to meet this intent. The FAA has previously granted equivalent level of safety to other airplanes with similar operating characteristics and features.

The FAA Approved Airplane Flight Manual (AFM) must include limitations and procedures which are found to be acceptable for all operating modes. When holding or otherwise operating at altitudes below 25,000 feet for extended periods of time with the cabin altitude warning shifted to 14,500 feet, the pilot must be required to use oxygen continuously.

RECOMMENDATION

The intent of § 23.841 (b)(6) is to warn the crew when the safe or preset cabin pressure altitude limit is exceeded. The system features as described are deemed to meet this intent.

The FAA Approved Airplane Flight Manual (AFM) must include limitations and procedures which are found to be acceptable for all operating modes. When holding or otherwise operating at altitudes below 25,000 feet for extended periods of time with the cabin altitude warning shifted to an altitude between 8,000 and 14,500 feet, at least one pilot must be required to use oxygen continuously.

The FAA has previously granted equivalent level of safety to other airplanes with similar operating characteristics and features. Cessna is, therefore, eligible for grant of an equivalent level of safety.

CONCURRENCE

Carlos Blacklock, Program Manager, ACE-117W
Wichita Aircraft Certification Office



Manager, ~~Project Support Section~~, ACE-112 100
Small Airplane Directorate