U.S. Department of Transportation

Federal Aviation Administration

Memorandum

Subject:	Information: Equivalent Level of Safety Finding for the Airbus A380-800, Project No CP-101	Date:	December 4, 2006
		Reg Ref:	§§ 21.21(b)(2) and 25.841(b)(6)
From:	Manager, Transport Standards Staff, Propulsion/Mechanical Systems Branch, ANM-112	Reply to Attn of:	Steve Happenny ANM-112
To:	Manager, Transport Standards Staff, International Branch, ANM-116	ELOS Memo #:	CP-101-S-27

Background

In accordance with the provisions of § 21.21(b)(1), Airbus requested an equivalent level of safety to the requirements of § 25.841(b)(6) for the Airbus Model A380-800 during take-off and landing operations at airports with field elevations between 8,000 feet and 13,500 feet. Section 25.841(b)(6) requires crew warning indication when the cabin pressure altitude exceeds 10,000 feet, and direct compliance would result in casusing nuisance altitude warnings. Therefore, Airbus plans to install a Cabin Pressurization Control System (CPCS) they believe will provide an equivalent level of safety to the requirements of § 25.841(b)(6).
The CPCS alters the cabin pressure altitude warnings' operating point under specific conditions for these high altitude airport operations.

Applicable regulation(s)
§ 25.841(b)(6): "Warning indication at the pilot or flight engineer station to indicate when the safe or preset pressure differential and cabin pressure altitude limits are exceeded. Appropriate warning markings on the cabin pressure differential indicator meet the warning requirement for pressure differential limits and an aural or visual signal (in addition to cabin altitude indicating means) meets the warning requirement for cabin pressure altitude limits if it warns the flight crew when the cabin pressure altitude exceeds 10,000 feet."
Regulation(s) requiring an ELOS
§ 25.841(b)(6)

Description of compensating design features or alternative standards that allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

The A380 **Cabin Pressurization Control System** (CPCS) automatically provides a shift in the threshold altitude (i.e., trigger point for an excess cabin altitude/high cabin altitude warning), thus avoiding nuisance warnings. The AFM procedure instructs the flight crew that at least one pilot must wear and use an oxygen mask during this operation. The manufacturer has evaluated hardware and software failures to ensure that for all normal and probable failure conditions that

the cabin pressure altitude will not exceed 15,000 feet. In addition, Airbus has incorporated design features to prevent an overpressurized landing.

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

While conducting takeoff and landings at high altitude aorports above 10,000 feet the flight crew may encounter fatigue and related symtoms if supplemental oxygen is not used. Therefore, as part of the compensating factors to provide an equivalent level of safety, there should be:

a) an indicator to alert the flight crew that the cabin high altitude warning has shifted,
b) an airplane operational procedure for operations in the high altitude landing or takeoff mode, and
c) at least one pilot wearing and using an oxygen mask during this operation.

With respect to an indication system, there should be a visual means (light or CAS message) to inform the flight deck crewmembers when the shift to the higher altitude-warning mode occurs and the reversion back to the 10,000 foot warning mode occurs, so they are aware that they may be exposed to cabin altitudes up to 14,000 feet without warning. Also, where the shift of altitude warning is automatic, there should be an aural or visual annunciation to alert crews to take action should the automatic function fail.

The FAA has previously granted an equivalent level of safety for other airplanes with similar operating characteristics and features.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned Equivalent Level of Safety Finding in project issue paper S-27. Airbus submitted a memo regarding "High Airfield Operation", dated 6/15/06 (Ref. L2130ME0617952), which further describes the operation of the CPCS. The FAA, EASA and Airbus concurred that with respect to 14 CFR Part 25.841 (b)(6), the compensating system features and operating procedures as described in the Airbus applicant position and in subsequent information provided by Airbus, are deemed to meet this intent. FAA found that in accordance with § 21.21(b)(1) the system design features and associated procedures provide an equivalent level of safety to § 25.841(b)(6).

The altitude warning setting procedures should be described in the AFM such that passenger and crew safety are assured. In addition, the applicant must assess the consequences for the airplane and its occupants of the flight crews not applying the correct procedures (i.e., landing at high altitude airport in normal mode or at a normal altitude airport in high altitude mode). Procedures must be such that the high altitude mode is set for the shortest time as possible in order to have a minimum change in protections. Except when the airplane is landing at or departing from a high altitude airport, the cabin follows the normal profile.

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 in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s):
§ 25.841(b)(6) "Cabin Pressurization - High Altitude Airfield Operations" (Documented in TAD ELOS Memo CP-101-S-27)]

Neil D. Schalekamp 12/14/06

Manager, Propulsion/Mechanical Systems Branch, ANM-112 — Date

ELOS Originated by: Standards Staff, Mechanical Systems Branch	Project Engineer Stephen M Happenny	Routing Symbol ANM-112