



# Federal Aviation Administration

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## Memorandum

Date: January 15, 2013

To: Manager, Transport Standards Staff, International Branch, ANM-116

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Todd Martin, ANM-115

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Checked Pitch Maneuver Loads on Airbus Model A350 series airplanes, FAA Project Number TC0544IB-T.

ELOS Memo #: TC0544IB-T-A-7

Reg. Ref.: § 25.331(c)(2)

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Airbus Model A350 aircraft.

### Background

Title 14, Code of Federal Regulations (14 CFR) section 25.331 prescribes symmetric maneuvering load conditions. A proposal to harmonize the requirements of § 25.331(c)(2) with the requirements of European Aviation Safety Agency (EASA) Certification Specification (CS) 25.331(c)(2) was developed by the Aviation Rulemaking Advisory Committee (ARAC). This activity is part of a general FAA program to harmonize FAA and EASA requirements.

Airbus has requested an ELOS finding to the existing requirements of § 25.331(c)(2). Airbus has proposed to use the design criteria for the checked maneuver design load requirement recommended by ARAC and adopted in CS-25. FAA accepts the Airbus proposal as equivalently safe.

### Applicable regulation

§ 25.331(c)(2)

**Regulation requiring an ELOS finding**

§ 25.331(c)(2)

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

The current 14 CFR requirement specifies pitching accelerations without regard to the size, configuration or characteristics of the airplane. In fact, the same pitching accelerations are applied to the smallest personal airplanes as to the largest jet transports. The CS-25 requirement, on the other hand, relates the frequency of the control motion to the frequency of the short-period rigid body mode of the airplane, thereby accounting for the characteristics of the particular airplane. The design criteria for the checked maneuver design load requirement recommended by ARAC, and adopted in CS-25, provide adequate criteria to account for the characteristics of advanced electronic flight control systems in which the achievable maneuvering load factors are governed by computer control laws.

**Explanation of how design features or alternative standards provide an ELOS to that intended by the regulation**

The criteria in CS 25.331(c)(2) specifies a control input in the form of a sine wave as a baseline control motion. In addition, it is required that the sine wave input be modified to achieve as closely as possible the specified airplane load factors.

In cases where the load factors are not achievable with a simple sine wave using an amplitude that fits within the limits of the control stops or the pilot effort limits, a modified sine wave within these limits would be required with a dwell at the maximum control displacement. The time delay would be varied to the extent necessary to achieve the specified load factors up to a maximum time beyond which the maneuver would no longer be considered rational.

The FAA considers the ARAC proposal as adopted in CS-25 to be equivalently safe to the currently effective § 25.331(c)(2).

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

The FAA has approved the aforementioned ELOS finding in project issue paper A-7, titled Checked Pitch Maneuver. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The TAD has assigned a unique ELOS memorandum number (see front page) to facilitate archiving and retrieval of this ELOS finding. This ELOS memorandum number should be listed in the type certificate data sheet under the Certification Basis section in accordance with the statement below:

Equivalent Safety Findings have been made for the following regulation:  
§ 25.331(c)(2), Symmetric Maneuvering Conditions (documented in TAD ELOS Memo TC0544IB-T-A-7).

Original signed by

*Suzanne Masterson*

Transport Airplane Directorate,  
Aircraft Certification Service

January 15, 2013

Date

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| ELOS Originated by<br>Transport Standards Staff | Project Engineer<br>Todd Martin | Routing Symbol<br>ANM-115 |
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