



Federal Aviation Administration

Memorandum

Date: April 10, 2015

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

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Vladimir Ulyanov, ANM-116

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Installation of Seats that Make Angle of more than 18° with Aircraft Longitudinal Axis on Airbus Model A330 airplanes, FAA Project Number AT10434IB-T.

ELOS Memo #: AT10434IB-T-CS-1

Reg. Ref.: § 25.785 (d)

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 A330 airplanes.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.785(d) Amendment 25-72 requires that each occupant of a seat that makes more than an 18° angle with the vertical plane containing the airplane centerline must be protected from head injury by a safety belt and an energy absorbing rest that will support the arms, shoulders, head, and spine, or by a safety belt and shoulder harness that will prevent the head from contacting any injurious object.

Applicable regulations

§§ 25.562(b), 25.562(c)(5), 25.785(d)

Regulation requiring an ELOS finding

§ 25.785(d)

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

The design of the Zodiac Cirrus side facing seats maximizes the capability of the occupant to align with the deceleration vector during an emergency landing. Also, this design places one armrest behind the occupant with respect to the longitudinal axis of the airplane and the other armrest aligned with the longitudinal axis of the airplane.

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

The applicant demonstrated, based on a video analysis of 16g dynamic tests, that the anthropomorphic test dummy (ATD) will align with the deceleration vector and that there is no obstruction on the seat or surroundings that either created a risk to the occupant or imposes to the upper dummy body any severe side twisting effect during the impact. ATD internal force and moment measurements in addition to those required by § 25.562 were taken during dynamic testing and compared with values from tests conducted on a seat installed at less than 18 degrees with respect to the aircraft centerline. This approach involved checks that the values observed are of comparable magnitude and range.

FAA approval and documentation of the ELOS finding

The FAA approved the aforementioned equivalent level of safety finding in project issue paper (IP) SC-1 titled "Installation of Seats that Make Angle of more than 18° with Aircraft Longitudinal Axis" for installation of seats that make an angle of 26.5° with aircraft longitudinal axis. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport 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 in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
§ 25.785(d), Installation of seats that make angle of more than 18° with aircraft longitudinal axis (documented in TAD ELOS Memo AT10434IB-T-CS-1).

Original signed by

Suzanne Masterson

Transport Airplane Directorate
Aircraft Certification Service

April 10, 2015

Date

ELOS Originated by: Airframe and Cabin Safety Branch	Project Engineer: Alan Sinclair	Routing Symbol: ANM-115
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