Federal Aviation Administration

Memorandum

Date: November 21-2012

To: Manager, Los Angeles Aircraft Certification Office (LAACO), ANM-100L

From: Manager, Transport Airplane Directorate (TAD), ANM-100

Prepared by: Simon Leung, ANM-150L

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Dynamic Test Requirements for Single Occupant Side-Facing Seats on Airbus A330-300 Series Aircraft, FAA Project No. ST15100LA-T

ELOS Memo#: ST15100LA-T-C-1

Regulatory Ref: §§ 25.562 and 25.785, and Special Condition No. 25-295-SC

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 A330-300 Series Aircraft.

Background

The seating configuration, proposed by Northwest Aerospace Technologies (NAT) in letter reference number N0387-JJL-002, dated June 1, 2011, will install Weber Cirrus model side-facing business class passenger seats in the Airbus Model A330-300 Series aircraft. These seats will be installed at angles between 20.5° and 26.5° to the aircraft centerline and will include inflatable restraint systems for occupant restraint and injury protection.

Title 14, Code of Federal Regulations (14 CFR) 25.785(d), and Special Condition No. 25-295-SC, require 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.

Amendment 25-15 to part 25, dated October 24, 1967, introduced the subject of side-facing seats and a requirement that each occupant in a side-facing seat must be protected from head injury by a safety belt and a cushioned rest that will support the arms, shoulders, head, and spine.

Subsequently, Amendment 25-20, dated April 23, 1969, clarified the definition of sideward facing seats to require 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. The FAA concluded that an 18° angle would provide an adequate level of safety based on tests that were performed at that time and thus adopted that standard.

Part 25 was amended June 16, 1988, by Amendment 25-64 to revise the emergency landing conditions that must be considered in the design of the airplane. Amendment 25-64 revised the static load conditions in § 25.561, and added a new § 25.562 that required dynamic testing for all seats approved for occupancy during takeoff and landing. The intent of Amendment 25-64 is to provide an improved level of safety for occupants on transport category airplanes. Because most seating is forward-facing on transport category airplanes, the pass/fail criteria developed in Amendment 25-64 focused primarily on these seats.

Applicable regulation(s)

§§ 25.562 and 25.785, and Special Condition No. 25-295-SC.

Regulation(s) requiring an ELOS finding

§§ 25.562 and 25.785, and Special Condition No. 25-295-SC.

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 Weber Cirrus side facing seats are installed without a support wall/structure due to the mitigating factors of a shallow installation angle and that the occupant is free to orient to the longitudinal axis of the airplane during the applications of emergency landing loads. 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. Additionally, there are no aspects of the design which could entrap the occupant’s feet.

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

Because of these unique features, there is nothing to inhibit the occupant from aligning with the longitudinal axis of the airplane during the application of the emergency landing loads nor do the armrests dynamically interact with the moving anthropomorphic test dummy in any manner significantly different than would be expected for a forward-facing seat installation. NAT will show this behavior through tests and demonstrate ELOS as a forward-facing seat.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper C-1. 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. This ELOS memorandum number should be listed in the limitations and conditions section of the supplemental type certificate (STC). An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s):
§§ 25.562 and 25.785, and Special Condition No. 25-295-SC, (documented in TAD ELOS Memo ST15100LA-T-C-1)

Original signed by S. Masterson — *12/4/12*

Transport Airplane Directorate,
Aircraft Certification Service — Date

ELOS Originated by ACO	ACO Manager (or Project Engineer for ANM-116)	Routing Symbol