



Federal Aviation Administration

Memorandum

Date: July 7, 2015

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

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Sanjay Ralhan, Program Manager, International Branch, ANM-116

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Increase of the Maximum Passenger Capacity on Model A321-211, -212, -213, -231 and -232 series airplanes installed with MODs 160023 (Sharklet) and 157272 (MAX PAX), FAA Project Number AT10407IB-T.

ELOS Memo #: AT10407IB-T -CS-2

Reg. Ref.: §25.807(g)

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 A321-211, -212, -213, -231 and -232 airplanes installed with Modifications 160023 (Sharklet) and 157272 (MAX PAX).

Background:

The regulations have historically established maximum passenger capacity by the combination of the type and number of exits that are installed. There were many inconsistencies in the way the combinations were assigned a passenger limit. Prior to Amendment 25-32, Title 14, Code of Federal Regulations (14 CFR) 25.807 contained an allowance to increase the number of passengers by a maximum of 10 if the airplane included installation of automatically deployed and inflated escape slides. The automatically deployed and inflated slide provision was added as an incentive to improve safety. At Amendment 25-32 of § 25.807, automatically deployed and inflated slides became a requirement and the provision for the extra passengers was withdrawn. The rules have subsequently been amended to provide a passenger credit for each exit pair installed. The total passenger capacity is determined by adding the credit for the different exit types. In an effort to obtain an increased maximum passenger capacity on the Airbus

Model A320 airplane, Airbus performed testing to demonstrate that the Airbus Model A320 exit arrangement is superior to that required by the regulations and therefore justified for an increased passenger capacity. These series of comparative tests demonstrated the evacuation related performance improvements (wider passageway at the inboard portion of the passageway, a wider slide, increased beam strength of the slide and an oversized exit meeting the minimum width and height requirements of a Type B exit), of the Airbus single aisle oversized Type I exits, were significantly better than a standard Type C exit installation. In an effort to obtain an increased maximum passenger capacity on the Airbus Model A321-211, -212, -213, -231 and -232 airplane, which has identical exits at doors 1 and 4, Airbus is utilizing the data from the tests performed on the Airbus Model A320 program to demonstrate that the Airbus Model A321 exit arrangement is superior to that required by the regulations and therefore justified for an increased passenger capacity.

Applicable regulations:

§ 25.807(g)

Regulation requiring an ELOS finding:

§ 25.807(g)

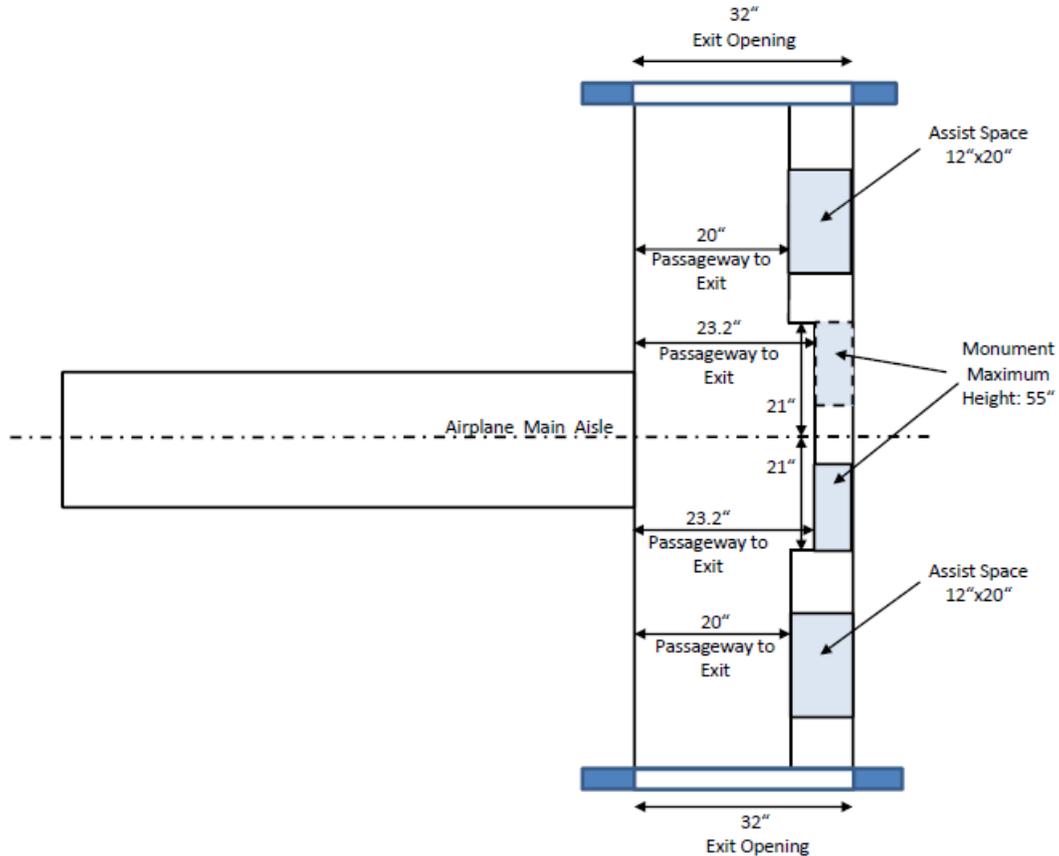
Description of compensating design features or alternative standards which allow the granting of the ELOS finding (including design changes, limitations or equipment need for equivalency):

The floor level exits of the baseline Model A321-211, -212, -213, -231 and -232 airplanes provide an opening of 32 inches x 73 inches which exceeds the dimensions required for Type B exits. The slide/raft or wide slide assist means, that are required to be installed for the proposed increase in passenger seating capacity, provide a sliding surface which is more than twice as wide (83" versus 30.5") as the standard slide. These assist means are equipped with an enhanced Light Emitting Diode (LED) lighting system that provides a much better visibility of the area of evacuee ground contact. In addition, the slide/raft and wide slide units (the latter are derived from the slide/raft for airplanes that will not be used for extended over-water operations) provide beam strength levels meeting the requirements of Technical Standard Order (TSO) C69c.

The following Limitations will be added to the Type Certificate Data Sheet (TCDS) for Model A321-211, -212, -213, -231 and -232 installed with Modifications 160023 (Sharklet) and 157272 (MAX PAX):

- The exit passageway width, starting at the aircraft aisle centerline and extending 21 inches outboard from the aircraft aisle centerline, must be a minimum of 23.2 inches. Any attendant seat or other assembly installed on the side of the exit passageway must not result in a passageway less than 23.2 inches for the inboard portion of the passageway. The remaining passageway (starting 21 inches from the aircraft centerline to the emergency exit) must be a minimum of 20 inches.

The height of the attendant seat or other assembly is limited to a maximum height of 55 inches.



- The unobstructed exit dimensions of the floor level emergency exits must not be less than 32" x 73."
- A wide slide (sliding surface width 83") must be installed at doors 1 and 4.
- The wide slides installed at doors #1 and #4 must have a beam strength meeting the requirements of TSO C69c.

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

The compensating design features listed above were subject to extensive testing on Model A320 series airplane. Comparative back-to-back tests, using a high-fidelity mock-up, has shown that the Model A320 floor level exits fitted with slide/rafts or wide slides provide a much better egress performance as compared to a representative Type C exit fitted with standard slides as required by the regulation. This result was further substantiated by two partial evacuation tests on an Airbus Model A320 aircraft. Pass/fail criteria for a door rating (number of seats permitted per pair of exits) of 65 were agreed with the FAA and EASA prior to the test, and were met or exceeded.

Airbus is utilizing the data from the tests performed on the Airbus Model A320 series to substantiate the proposed passenger increase on the Airbus Model A321 series airplanes. This substantiation will show the Airbus Models A321-211, -212, -213, -231 and -232 installed with Modifications 160023 (Sharklet) and 157272 (MAX PAX), i.e. fitted with slide/raft or wide slide emergency egress assist means as described above, provide an ELOS to § 25.807(g) with a maximum passenger capacity of 230.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project issue paper CS-2, titled - Increase of the Maximum Passenger Capacity. 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 must be listed in the TCDS under the Certification Basis section in accordance with the statement below:

ELOS Findings have been made for the following regulation:

§ 25.807(g) Emergency Exit Access (documented in ELOS Memo AT10407IB-T-CS-2).

Original Signed by Suzanne Masterson

Transport Airplane Directorate
Aircraft Certification Service

July 7, 2015

Date

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