



Federal Aviation Administration

Memorandum

Date: January 11, 2011

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

From: Manager, Transport Standards Staff, Airframe and Cabin Safety Branch, ANM-115

Prepared by: Jeff Gardlin, Aerospace Engineer, ANM-115

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Airbus Model A380 airplane, FAA Project # TD0794IB-T

ELOS Memo#: TD0794IB-T-CI-6

Regulatory Ref: §§ 21.21(b)(1), 25.856(b), 121.312(e)(3)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for the Airbus Model A380 airplane.

Background

Amendment 25-111 was adopted in July 2003, to raise the level of fire safety on transport category airplanes both from an inflight and post-crash standpoint. With respect to post-crash fire safety, the new requirements involve a stringent test method for thermal/acoustic insulation installed in the lower half of the fuselage. This requirement is implemented for newly manufactured airplanes in U.S. air carrier operations by concurrent Amendment 121-301. The intent of the requirement is to provide an additional barrier between the occupants and a post-crash fire, that will extend the time available for evacuation. The rule applies to the thermal/acoustic insulation that is installed, but does not require the installation of insulation. Since transport category airplanes are generally insulated in the lower half, the FAA considered that this approach was appropriate. However, the rulemaking also noted that if insulation were to be removed to avoid compliance, the issue of whether to require insulation in the lower half of the fuselage would be revisited. Because the rule does not require insulation to be installed at all, when the insulation is installed in different parts of the airplane (for example, on the skin in some areas, and on the floor in other areas) there can be discontinuities in the 'barrier' formed by the insulation. So, although the objective of the rule is to have a continuous barrier in the lower

half of the fuselage to provide protection against an external fire, the rule does not explicitly require this. This premise underlies this ELOS finding.

Applicable regulation(s)

§§ 21.21(b)(1), 25.856(b), 121.312(e)(3)

Regulation(s) requiring an ELOS

§ 25.856(b)

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

Title 14 Code of Federal Regulations (14 CFR) 25.856(b), requires thermal/acoustic insulation materials in the lower half of the fuselage and their installation to comply with the flame penetration resistance test of Appendix F Part VII. Airbus airplanes typically do not have thermal/acoustic insulation installed on the fuselage skin in the bilge areas (the area below the lower lobe cargo floor). Instead, most Airbus airplanes have the insulation installed on the underside of the cargo floor, and per the requirements of § 25.856(b), this insulation would be subject to the fire penetration resistance test of Appendix F, part VII. Since implementing this level of fire protection into the insulation on the floor panels presents several design and implementation challenges, Airbus has proposed an alternative method of compliance under the equivalent level of safety provisions of § 21.21(b)(1).

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

Airbus has assessed the situation analytically (based on the existing Lower Deck Cargo Compartment (LDCC) design) and through testing, as follows:

The cargo floor panels have been tested and the results showed that they are flame penetration resistant in terms of § 25.856 (b). The floor panel constitutes a fire barrier, with a determined amount of openings (drain pans, power drive units, etc).

The cargo compartment lining is qualified and certified according to § 25.855(c), Appendix F part III, and constitutes a fire barrier.

With respect to the burnthrough resistance of LDCC floor, the barrier acts as a "filter." Airbus has demonstrated that the remaining heat flux that passes through it dissipates in the LDCC (forward and aft sections). The amount of heat flux to which the cargo lining and cargo ceiling

are exposed is significantly reduced. The analysis performed shows that the heat flux to which the cargo ceiling can be exposed is below the maximum heat flux value mandated by the rule. Furthermore, tests performed by Airbus have demonstrated that the temperature at the level of the cargo ceiling never exceeds 1700°F (927°C) within 4 minutes.

Airbus has demonstrated that the LDCC constitutes an effective burnthrough barrier. The combination of the two barriers increases the time for evacuation sufficiently in case of a post-crash fire to meet the intent of the requirements of § 25.856 (b).

Based on the LDCC demonstration, similar analysis has been conducted for all the different lower deck compartments, and demonstrates that these compartments provide an effective flame penetration protection. This analysis takes into account the specificities of each Airbus design and covers the different type of existing Crew Rest Compartments/Lower Deck Facilities, Mobile Crew Rest Compartment Aft, Bulk Crew rest Compartment Aft, Lower Deck Facilities.

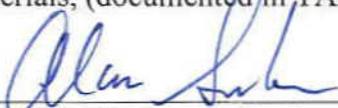
In view of the above considerations and related test evidences, the LDCC on Airbus A380 airplane is considered compliant with § 25.856(b) through an equivalent level of safety.

Thus, the design of the cargo compartment, as well as the lower deck service compartments, is an element of the ELOS finding for § 25.856(b), and any changes to those designs can affect the validity of this ELOS.

FAA approval and documentation of the ELOS

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper (IP) CI-6 titled "Fuselage Burnthrough Substantiation in Bilge area." 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 (TCs & ATCs) or in the Limitations and Conditions Section of the STC Certificate in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
14 CFR 25.856(b), Improved Flammability standards for Thermal/acoustic insulation materials, (documented in TAD ELOS Memo TD0794IB-T-CI-6).


For Manager, Transport Airplane Directorate,
Aircraft Certification Service

1/14/2011

Date

ELOS Originated by TAD:	Project Engineer: Jeff Gardlin	Routing Symbol ANM-115
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