



Federal Aviation Administration

Memorandum

Date: January 8, 2016

To: Manager, Seattle Aircraft Certification Office, ANM-100S

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Eric Lin, ANM-120S

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Wing Aerodynamic Loads and Applied Factors of Safety on a Model Boeing 757-200 Airplane, FAA Project No. SA12696SE-T

ELOS Memo #: SA12696SE-T-A-1

Regulatory Ref: § 25.303

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 Model Boeing 757-200 airplane.

Background

Aviation Partners Boeing (APB) has evaluated the 757-200 wing structure with APB scimitar blended winglets (SBW) for flight loads that included various speed brake deflections, up to the full flight detent speed brake deflection of the production 757-200. Because of increased structural loading, the 757-200 with APB SBW would require extensive structural modification of the production wing to meet the requirements of Title 14, Code of Federal Regulations (14 CFR) 25.303, 25.331, 25.333, 25.335(f), 25.337, and 25.373. Such extensive structural reinforcement of the wing after original production is considered impractical because of the disassembly required for installation of additional structural elements.

To reduce the structural loading of the 757-200 with APB SBW, APB designed a load alleviation system (LAS) that limits the speed brake deflection when the airplane gross weight is above 221,000 LB (trigger weight) and the airspeed is above 330 knots indicated airspeed (KIAS). The speed brake deflection is limited to 50% of the flight detent of the production airplane. The new limited 50% position is indicated on the revised control stand light plate, next to the speed brake lever, by the term "50%" to provide appropriate cue to the pilots. An automated speedbrake load

alleviation system test feature is installed, providing an “AUTO SPDBRK” annunciation to the flight-crew should the system “fail” the test, in accordance with the Aviation Rulemaking Advisory Committee (ARAC) recommendation for incorporation of § 25.302. The airplane flight manual supplement will contain text identifying an airspeed limit of 330 KT, if the actuator fails to perform the complete cycle successfully.

Applicable regulation(s)

§§ 25.303, 25.305, 25.307, 25.331, 25.333, 25.337, 25.373

Regulation(s) requiring an ELOS finding

§ 25.303

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)

APB designed a load alleviation system (LAS) that limits the speedbrake deflection of the winglet airplane to 50% of the flight-detent of the production airplane.

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

The LAS reduces wing loading in the critical cases by limiting the speedbrakes to 50% deflection if the gross weight is above 221,000 LB and the airspeed is also above 330 knots indicated airspeed (KIAS). APB provided data demonstrating that the protection provided by the speedbrake LAS meets the system reliability and structural margins of safety requirements prescribed in the ARAC recommendation for § 25.302.

The system has been configured to provide flight crew annunciation in a failed state as prescribed in the ARAC recommendation. In the event the flight crew is not alerted to a failed condition, the aircraft can be safely operated in all regimes of the flight envelope with the possibility of reduced structural margins only under certain high gross weight, high speed, high "G-force" pitch up maneuvers, with speedbrakes deployed.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Paper G-6, titled Boeing Model 757-200 Series – Usage of Previously Applied Issue Papers and Policy Guidance Material. 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 Limitations and Conditions section of the supplemental type certificate (STC) in accordance with the statement below:

Equivalent Level of Safety Findings have been made for the following regulation(s):

§ 25.303 Factor of Safety

(documented in TAD ELOS Memorandum SA12696SE-T-A-1)

Original Signed by

Suzanne Masterson

January 26, 2016

Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by ACO: Seattle ACO	ACO Manager (or Project Engineer for ANM-116): Ross Landes	Routing Symbol: ANM-100S
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