



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: INFORMATION: Equivalent Level of Safety Finding for
Wing Aerodynamic Loads and Applied Factors of Safety
for Aviation Partners Boeing Model 757-200 Winglet
FAA Project Number ST8664SE-T

Date: March 9, 2005

Reg Ref: § 25.303

From: Manager, Transport Airplane Directorate, ANM-100

Reply to: Suzanne Masterson ,
Attn of: ANM-120S

To: Manager, Seattle ACO, ANM-100S

ELOS: ST8664SE-T-A-1
Memo #:

The purpose of this memorandum is to inform 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 Model 757-200 series of aircraft.

Background

Aviation Partners Boeing (APB) has evaluated the 757-200 wing structure with APB blended winglets 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 blended winglets would require extensive structural modification of the production wing to meet the requirements of §§ 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 blended winglets, 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 draft NPRM §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)

§§ 25.203, 25.305, 25.307, 25.331, 25.333, 25.337, 25.373

Regulation(s) requiring an ELOS

§ 25.303

Description of compensating design features or alternative standards, which allow the granting of the ELOS (including design changes, limitations or equipment needed 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 equivalent level of safety to the level of safety 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 draft NPRM § 25.302.

The system has been configured to provide flight crew annunciation in a failed state as prescribed in the draft NPRM. 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

The FAA has approved the aforementioned Equivalent Level of Safety Finding in project issue paper A-1. This memorandum provides standardized documentation of the ELOS that is non-proprietary and can be made available to the public. The Transport 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 (TC's & ATC's) or in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

An Equivalent Safety Finding has been made for the following regulation:
§ 25.303 Factor of Safety (documented in TAD ELOS Memo ST8664SE-T-A-1)]

Original Signed by
Franklin Tiangsing
Transport Airplane Directorate,
Aircraft Certification Service

March 9, 2005
Date

ELOS Originated by Seattle ACO:	Suzanne Masterson	ANM-120S
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