



# Federal Aviation Administration

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## Memorandum

Date: November 20, 2015

To: Manager, Angelos Xidias BASOO, ANM-100B

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Jim Voytilla, ANM-100B

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Boeing 787 Seal Krueger Flap Stops on a Model 787 Airplane, FAA Project No. PS06-0496

ELOS Memo #: PS06-0496-SF-7

Regulatory Ref: § 25.675

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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 787 airplane.

This memo is being revised to define Boeing Model 787 as mentioned in this ELOS as being applicable to the Boeing Model 787-8, 787-9, and 787-10.

### **Background**

Title 14, Code of Federal Regulations (14 CFR) 25.675 requires that each control system must have stops that positively limit the range of motion of each movable aerodynamic surface controlled by the system, that each stop must be located so that wear, slackness, or take-up adjustments will not adversely affect the control characteristics of the airplane because of a change in the range of surface travel, and that each stop must be able to withstand any loads corresponding to the design conditions for the control system.

The Boeing 787 Leading Edge (LE) Seal Krueger flap surface lacks travel motion stops required by § 25.675.

### **Applicable regulation(s)**

§ 25.675

## **Regulation(s) requiring an ELOS finding**

§ 25.675

### **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 compensating factors that provide an equivalent level of safety for the regulations not complied with are as follows:

- The leading edge drive system is common to the Seal Krueger flap and the leading edge slats. There is no condition in which the Seal Krueger flap can be overdriven by the leading edge drive system without also causing an overdrive condition on the leading edge slats. (Note: The leading edge slats are equipped with stops in compliance with § 25.675, Amendment 25-38.)

An overdrive condition on the leading edge slats would cause the slats to reach their stops and the shearouts in each slat actuator to be utilized. Continued drive system travel beyond the point of slat actuator shearouts causes the slat over-travel monitor to shut the leading edge drive system down and triggers the SLATS DRIVE caution message and at the same time triggers the stall warning to use the slats retracted schedule.

- The kinematic properties of the Seal Krueger flap linkage make it impossible for the actuator to overextend. In the retract direction the Seal Krueger flap motion is limited by the fixed-wing structure.

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

The compensating factor(s) raise the level of safety to that required § 25.675 by having the leading edge drive system stop the Seal Krueger flap travel before it can reach its travel limits.

### **FAA approval and documentation of the ELOS finding**

The FAA has approved the aforementioned ELOS finding in project Issue Paper SF-7, “Seal Krueger Flap Stops” or in the Administrative Collector Issue Paper G-6. This memorandum provides standardized documentation of the ELOS 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 type certificate data sheet under the Certification Basis section. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s): §  
25.675 Stops (documented in TAD ELOS Memorandum PS06-0496-SF-7)



Transport Airplane Directorate,  
Aircraft Certification Service

12/3/2015

Date

ELOS Originated by BASOO: Douglas Tsuji	BASOO Manager (or Project Engineer for ANM-116):	Routing Symbol: ANM-100B
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