Federal Aviation Administration

Memorandum

Date: November 20, 2015

To: Manager, Boeing Aviation Safety Oversight Office, ANM-100B

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: George Panger, ANM-150S

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Emergency Exit Markings on Boeing Models 787-8/-9/-10 and 747-8/-8F (Project Nos. TC6918SE-T, PS06-0496, PS06-0497, PS13-0546, PS14-1031, PS05-0211 and PS05-0212)

ELOS Memo#: TC6918SE-T-CS-2

Regulatory Ref: § 25.811

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 Boeing Model 787-8 airplane.

This memo was subsequently revised to extend this ELOS to the Boeing Models 747-8/-8F, 787-9, and 787-10.

Background

Title 14, Code of Federal Regulations (14 CFR) 25.811(f) requires a 2 inch colored band to outline the exit doors and the color contrast between the band and the surrounding fuselage surface to be distinguishable. The contrast must be such that if the reflectance of the darker color is 15 percent or less, then the reflectance of the lighter color must be at least 45 percent. When the reflectance of the darker color is greater than 15 percent, then the reflectance difference between the colored band and the surrounding fuselage surface must be at least 30 percent.

Metal door sills are often installed on the fuselage directly below floor-level exits to provide protection from impacts with loading equipment. If the colored band is located on the bottom edge of an exit door, its reflectance must be compared with the metal door sill reflectance to determine compliance with § 25.811(f)(2). This requirement can result in a color scheme which

is not desired by the operator. Note that painting the metal door sill is not considered a viable option since impacts with loading equipment cause the paint to scratch and wear away quickly.

As a means to remedy this problem, FAA Policy Memorandum PS-ANM100-2003-115-04, dated April 2, 2003, was issued to allow the colored band to be located a few inches above the base of the exit door and its reflectance compared with the door surface below the band instead of the metal door sill. This results in more color options for operators to choose from in determining a desired color scheme.

For the 787 and 747-8/-8F airplane programs, Boeing has requested that the FAA grant emergency exit marking equivalent safety findings which are the same as were previously granted on all of its current airplane programs. While memorandum PS-ANM100-2003-115-04 provides one method of demonstrating compliance with § 25.811(f)(2), Boeing's position is that it does not give all the needed versatility provided by the compliance methods specified in the previously granted issue papers. By receiving these same equivalent safety findings, Boeing feels that they can provide operators with paint schemes that meet their marketing requirements while still meeting the intent of § 25.811(f)(2).

While the method of compliance contained in memorandum PS-ANM100-2003-115-04 is the preferred method to address the non-compliance in the color contrast between the colored band and the metal door sill, the FAA finds that the following alternate method can be used.

If the reflectance difference between the colored band and the metal door sill is 25 percent or greater, then the contrast is acceptable, regardless of the reflectance value of the darker color. If the reflectance difference is less then 25 percent, then the metal door sill can be ignored and the reflectance evaluation can be conducted between the colored band and the fuselage surface below the metal door sill. In this case, a reflectance difference of 30 percent or greater is acceptable, regardless of the reflectance value of the darker color.

Applicable regulation(s)

§§ 21.21(b)(1) and 25.811

Regulation(s) requiring an ELOS finding

§ 25.811(f)(2)

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

The following design features allow the granting of the ELOS for configurations where the reflectance difference between the colored band and the metal door sill is 25 percent or greater:

1. The reflectance difference between the colored band and the remaining fuselage surface areas exceeds the minimum FAA standards. For this case, the remaining areas include the fuselage surface below the metal door sill.

The following design features allow the granting of the ELOS for configurations where the reflectance difference between the colored band and the metal door sill is less than 25 percent and the reflectance difference between the colored band and the fuselage surface below the metal door sill is 30 percent or greater:

1. The door sill height is limited to a maximum of 5 inches at the centerline of the door.
2. The reflectance difference between the colored band and the remaining fuselage surface areas exceeds the minimum FAA standards.
3. If the sides of the door sill extend up above the base of the door, the door sill extension height is limited to a maximum of 4 inches above the base of the door.

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

Section 25.811(f) requires that a 2 inch colored band outline the exit doors and the color contrast between the band and the surrounding fuselage surface to be distinguishable. The intent of the requirement is to assist rescue personnel outside the aircraft in finding the emergency exits. When the top, right side, and left side of the exit door exceeds the minimum FAA standards, then some deviations from the pertinent regulation are acceptable in the door sill area.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project Issue Papers CS-2 or 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 Safety Findings have been made for the following regulation(s):
§ 25.811(f)Emergency Exit Marking (documented in TAD ELOS Memo TC6918SE-T-CS-2)

Suzanne Masterson
Transport Airplane Directorate,
Aircraft Certification Service

November 24, 2015
Date

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