



Federal Aviation Administration

Memorandum

Date: April 5, 2016

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

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Sue Lucier, (425) 917-6438

Subject: INFORMATION: Equivalent Level of Safety (ELOS) for the Nacelle Area behind Firewalls, Flammable Fluid Carrying Components for Directional Control Valve (DCV) on Boeing Models 747-8F/-8, Project Nos. PS-05-0212 and PS-05-0211

ELOS Memo#: PS-05-0212-P-18

Regulatory Ref: §§ 25.1182(a) and 25.1183(a)

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 747-8F/-8 airplanes.

Background

The Boeing 747-8 airplanes equipped with GENx-2B engines do not directly comply with the engine installation requirements of Title 14, Code of Federal Regulations (14 CFR) 25.1182(a) and 25.1183(a) as applicable to the directional control valve (DCV). The compartment where the DCV is located is considered an “area behind a firewall” due to the drain/vent opening in the sealed drain pan, which allows fluid and/or air exchange from the strut fluid bay compartment, located directly below. The firewall is the lower surface of the strut fluid bay.

In combination, §§ 25.1182(a) and 25.1183(a) require that flammable fluid lines and components immediately behind a firewall must be fire resistant to comply with requirement of § 25.1183(a). The DCV has not been shown to be fire resistant.

The DCV is a hydraulic valve used by the thrust reverser directional control system to deploy and stow the engine thrust reverser. This valve is made of aluminum and is installed on the top of the strut in a sealed drain pan, which is a separate compartment by itself. The sealed drain pan however, has a two square inch vent and drain that interfaces with the strut fluid bay, the bottom

of which makes up the strut fire wall, and as such if the drain pan and the strut fluid bay are considered as part of a single compartment, the valve would have to be fire resistant.

Applicable regulation(s)

§§ 25.1182(a) and 25.1183(a)

Regulation(s) requiring an ELOS finding

§ 25.1183(a)

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

1. The DCV is located in a separate zone that is isolated from other zones with the exception of the two square inch vent/drain that connects the strut fluid tray zone to the strut fluid bay below. The DCV is installed away from the vent/drain and has no direct line of sight with the fire zone or the firewall. A fire in the fire zone will not affect the DCV.
2. The valve is installed in an area that is not adjacent to a firewall and that is separated from the strut lower fire wall by another compartment (strut fluid bay). It is located at least 15.85 inches above the strut fire wall.
3. The DCV is made of aluminum and is capable of withstanding temperatures in excess of 1000 degrees F.

The compensating design features provide protection to the DVC from any effects of temperature due to a fire in the fire zone. The compartment that the DCV is located in is separated from the fire zone by another compartment. As a result of this separation, a fire in the designated fire zone will not affect the aluminum DCV if it occurs, for fifteen minutes. This will be substantiated by a thermal analysis by Boeing.

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

Section 25.1182(a) requires that each area immediately behind a firewall and engine pod attaching structure containing flammable fluid lines must meet the requirement of § 25.1183 which states that any line, fitting and component carrying flammable fluid in any area subject to engine fire conditions and each component which conveys or contains flammable fluid in a designated fire zone must be fire resistant.

The intent of this regulation is to require protection from the effects of an engine fire, over and above the protections required of the engine fire zone itself, with the intent of preventing the

spread of fires initiated within a fire zone, and of preventing initiation of fires in adjacent zones or pod attaching structures due to fluid leaks.

The separation from the firewall provided by the physical distance and intervening drain pan will provide protection from heat due to radiation and convection from the backside of the firewall in the event of a fire and will provide protection in the event of a breach of the firewall. These features are considered to provide a level of protection that would be equivalent to that provided by making the DCV fire resistant. These compensating features are sufficient to justify a finding of ELOS to § 25.1183(a).

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned ELOS finding in project Issue Paper P-18. This memorandum provides standardized documentation of the ELOS finding that is nonproprietary 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 must be listed in the type certificate data sheet under the certification basis section.

An example of an appropriate statement is provided below.

ELOS findings have been made for the following regulation(s):

Section 25.1183, Flammable Fluid Carrying Components, paragraph (a) for the Nacelle Area behind Firewall, Flammable Fluid Carrying Components for Directional Control Valve (documented in TAD ELOS Memo PS05-0212-P-18)

Original Signed by

Jon Regimbal

Transport Airplane Directorate,
Aircraft Certification Service

May 16, 2016

Date

ELOS Originated by Seattle ACO:	Project Engineer Sue Lucier	Routing Symbol ANM-140S
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