



# Federal Aviation Administration

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## Memorandum

Date: October 18, 2011

To: Manager, Atlanta Aircraft Certification Office, ACE-115A

From: Manager, Transport Airplane Directorate, ANM-100

Subject: INFORMATION: Equivalent Level of Safety (ELOS) for Turbine Engine Tailpipe Fire Detection on Gulfstream Model GVI Series Aircraft (FAA Project Number TC8700AT-T)

Memo No.: TC8700AT-T-P-6

Reg. Ref.: §§ 21.21(b)(1); 25.1181(a)(7); 25.1183(a); 25.1187; 25.1193(e)(1); 25.1203(a)

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The purpose of this memorandum is to inform 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 Gulfstream Model GVI series of aircraft.

### **Background**

The requirements of Title 14, Code of Federal Regulations (14 CFR) 25.1203(a) address fire detection within turbine engine tailpipe sections. The Gulfstream GVI aircraft includes the installation of thrust reversers which can be considered to act as a tailpipe for the Rolls-Royce Deutschland BR700-725A1-12 engine. The proposed engine installation does not incorporate fire detection within the tailpipe section and therefore, Gulfstream has requested an ELOS in lieu of direct compliance with the requirements of § 25.1203(a).

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

§§ 21.21(b)(1); 25.1181(a)(7); 25.1183(a); 25.1187; 25.1193(e)(1); 25.1203(a)

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

§ 25.1203(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)**

The engine tailpipe configuration of the GVI aircraft must either comply with § 25.1203(a) by incorporating fire detection within the tailpipe zone, or compensating design features should be presented and analyzed to support a finding of equivalent safety under the provisions of § 21.21(b)(1). The design of the Gulfstream thrust reverser and installation includes the following:

1. Gulfstream will demonstrate the the exhaust pipe surface (within this tailpipe zone) will not be an ignition source for the hydraulic fluid.
2. Gulfstream will demonstrate that risk of fire from hydraulic fluid coming into contact with electrical wiring or components has been minimized. As stow switches are the only electrically powered components in flight, there is very little current flow to this area. All wiring is adequately rated and shielded and proper separation (support / clamping) is provided.
3. Gulfstream will demonstrate that a minimum amount of hydraulic fluid can leak into the tailpipe zone.
4. Gulfstream will demonstrate compliance with the drainage and ventilation provisions of § 25.1187.
5. Gulfstream will demonstrate that firewalls are provided in the aft cowl and pylon sections which will isolate a fire within the tailpipe fire zone from the fuselage, pylon, and remainder of the engine nacelle and are in compliance with § 25.1193(e)(1).
6. Review of in-service data has confirmed that occurrences of tailpipe fires due to hydraulic fluid leakage / ignition on similar, previously certified engine / thrust reverser installations is in the extremely improbable range.

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

Compliance with the criteria stated above will minimize the potential for a fire in the tailpipe of the engine to such an extent that fire detection is unnecessary. The resulting configuration will be equivalently safe to the level of safety intended by the regulation.

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

The FAA has approved the aforementioned ELOS Finding in project Issue Paper P-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):

§ 25.1203(a), "Fire Detector System" (documented in TAD ELOS Memo TC8700AT-T-P-6).

Original Signed by

*Victor Wicklund*

November 7, 2011

Manager, Transport Airplane Directorate,  
Aircraft Certification Service

Date

ELOS Originated by ACO:	Darby Mirocha	ACE-118A
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