



# Federal Aviation Administration

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## Memorandum

Date: November 20, 2015

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

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Jim Voytilla, ANM-100B

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for the Passenger Oxygen System for Boeing Model 787-8/-9/-10 (Project Nos. TC6918SE-T, PS06-0496, PS06-0497, PS13-0546 and PS14-1031)

ELOS Memo#.: TC6918SE-T-ES-18

Reg. Ref.: § 25.1441(c)

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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 Boeing Model 787-8 airplane.

This memo was subsequently revised to extend this ELOS to the Boeing Model 787-9 and 787-10 airplane models

### **Background**

Boeing has submitted a request for an equivalent safety finding to Title 14, Code of Federal Regulations (14 CFR) 25.1441(c) for the Model 787. Section 25.1441(c) specifies that a means must be provided to allow the crew to readily determine, during flight, the quantity of oxygen available in each oxygen supply source. For typical passenger systems that use gaseous oxygen, the oxygen supply is stored in large, remotely located high pressure bottles interconnected together via high pressure lines and plumbed to the passenger masks via low pressure distribution lines running the length of the airplane. Pressure transducers at the bottles or in the high pressure portion of the system measure pressure are then used to provide oxygen quantity information to the flight crew.

The Model 787 series passenger oxygen system will differ from past systems in that the oxygen supply will be in small bottles distributed throughout the passenger cabin, similar to systems that use chemical oxygen generators. They will be sealed, one-time use bottles that will provide oxygen to the occupants of a specific seat row, attendant station, crew rest, lavatory, etc., if a decompression occurs. Once expended, they cannot be refilled on the airplane and must be removed and replaced, similar to chemical oxygen generators.

**Applicable regulation(s)**

§ 25.1441(c)

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

§ 25.1441(c), Oxygen equipment and supply.

**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 FAA finds the following criteria would provide an equivalent level of safety to § 25.1441(c):

- 1) A detailed description of the design is provided to describe the compensating features which provide an equivalent level of safety.
- 2) The bottle is designed and tested to ensure that it will retain its required quantity of oxygen throughout its expected life under foreseeable operating conditions.
- 3) A means is provided for maintenance to readily determine whether a bottle has discharged.
- 4) The life limit of the bottle is established by test and analysis.
- 5) Each bottle is labeled such that the expiration date can be easily determined by maintenance.
- 6) Boeing defines maintenance and inspection procedures in the Maintenance Planning Document/Maintenance Manual for FAA acceptance to ensure that
  - i) discharged bottles are removed from the airplane within a reasonably short time under normal maintenance procedures, and
  - ii) bottles are not installed on the airplane past their expiration date.
- 7) Each bottle does not supply oxygen to more than six oxygen masks.

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

The requirements of § 25.1441(c) are intended to ensure that an adequate oxygen supply is maintained during flight. The compensating design features and alternative standards listed above can make the system equivalently safe to systems that provide oxygen quantity information per § 25.1441(c)

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

The FAA has approved the aforementioned ELOS finding in project Issue Paper ES-18 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 level of safety findings have been made for the following regulation(s):  
§ 25.1441(c), Oxygen Equipment and Supply  
(documented in TAD ELOS Memo TC6918SE-T-ES-18)



Transport Airplane Directorate,  
Aircraft Certification Service

12/3/2015  
Date

ELOS Originated by Seattle ACO:	Project Engineer Robert Hettman	Routing Symbol ANM-150S
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