Federal Aviation Administration

Memorandum

Date: September 30, 2010

To: Manager, Transport Airplane Directorate, ANM-100

From: Manager, Transport Standards Staff, Propulsion/Mechanical Systems, ANM-112

Prepared by: Steven Happenny, ANM-112

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for the Airbus Model A350 series Fire Extinguishing Agent Concentration (FAA Project Number TC0544IB-T)

ELOS Memo#: TC0544IB-T -P-25

Reg. Ref.: § 25.1195(c)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for the Airbus Model A350 aircraft.

Background

Title 14 Code of Federal Regulations 25.1195(c) requires that "The fire extinguishing system for a nacelle must be able to simultaneously protect each zone of the nacelle for which protection is provided."

The FAA Advisory Circular (AC) 20-100, "General Guidelines for Measuring Fire Extinguishing Agent Concentrations in Powerplant Compartments," dated September 21, 1977, provides the procedure for installing twelve probes within the fire zone at critical locations and assuring that a 6% by volume concentration level is maintained for a minimum of 1/2 second, simultaneously in all portions of the fire zone, during critical compartment airflow conditions.

The fire extinguishing system of the Airbus Model A350 airplane does not ensure that the 6% by volume concentration level, maintained for a minimum of 1/2 second, will occur simultaneously in each designated fire zone (DFZ). Therefore the fire extinguishing system does not directly comply with the provisions of § 25.1195(c).

Applicable regulation(s)
§ 25.1195(c)

Regulation(s) requiring an ELOS finding
§ 25.1195(c)

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 Airbus Model A350 airplane equipped with the Rolls-Royce Trent XWB engine has three designated fire zones. Each DFZ is physically separated from the other by firewalls, which will ensure no hazardous quantity of fluid, air or flame can pass from one DFZ to another. This will be validated by component fire tests and systems drainage tests. Maintenance instructions will be defined and provided as part of the Instructions for Continued Airworthiness (ICA) so that the firewall integrity is maintained throughout the operational life of the airplane.

The fire extinguishing system is designed to distribute the fire extinguishing agent from the storage bottles through a single pipe that splits into several branches and to each DFZ. The discharge command is set by a unique action and the total content of the storage bottle will be expelled from the bottle into the pipe and towards each DFZ without any need for further system operation. The length of pipe to each DFZ directly influences how long it takes for the agent to reach the DFZ.

The fire extinguishing system for each DFZ, considered individually, will provide a 6% by volume concentration level that is maintained for a minimum of 1/2 second, simultaneously in all portions of the DFZ, during critical compartment airflow conditions. This will be validated by following the AC 20-100 procedure for each DFZ.

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

Although noncompliant with the regulation, the isolation of each DFZ is considered to provide adequate compensation for the lack of the required simultaneous protection. Relevant compensating features include: (1) single unique action to provide fire extinguishing agent to all of the DFZ at the same time, (2) achievement of a 6% by volume concentration level, maintained for a minimum of 1/2 second, simultaneously in all portions of an individual DFZ, (3) isolation of each DFZ by firewalls that ensure no hazardous quantity of fluid, air or flame can pass from one DFZ to another, and (4) the integrity of the firewalls are maintained as part of the ICA throughout the operational life of the airplane.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned equivalent level of safety finding in the A350 project issue paper P-25, titled "Fire Extinguishing Agent Concentration." This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport Directorate 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 (TC's & ATC's) or in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below:

Equivalent Level of Safety Findings have been made for the following regulation(s):
§ 25.1195(c), Fire Extinguishing Systems
(documented in TAD ELOS Memo TC0544IB-T-P-25)

October 7, 2010

Manager, Transport Airplane Directorate,
Aircraft Certification Service

Date

ELOS Originated by Transport Standards Staff:	Project Engineer Stephen Happenny	Routing Symbol ANM-112