



Federal Aviation Administration

Memorandum

Date: December 23, 2015

To: Manager, Regulations and Policy Branch, ACE-111

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: Jeff Pretz, Regulations and Policy Branch, ACE-111

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Diamond Aircraft Industries, Models DA 42 NG and DA62 Airplanes; Fuel Pumps, FAA Project Numbers: CE1704SN, TD0326CE-A, and AT0755CE-A

ELOS Memo#: ACE-10-07

Regulatory Ref: 14 CFR 23.991, amendment 23-43

Revision Description: The Federal Aviation Administration (FAA) revises this memo number to add the Diamond Aircraft Industries (DAI), Model DA62 airplane.

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Accountable Directorate on the establishment of an equivalent level of safety finding for the Model DA 42 NG and DA62 airplanes. The Small Airplane Directorate, having reviewed DAI's request to extend ELOS memo number ACE-10-07 to include the DA62, agrees that the design differences from the previous model does not affect any areas of consideration for the ELOS granted for the Model DA 42 NG. Therefore, the FAA has made the determination that it is acceptable to grant an extension of ELOS ACE-10-07 to the DA62. An ELOS for the same design feature on DAI Model DA 42 M-NG was granted by ELOS memo number ACE-10-09.

Background:

The DA62 is a derivative model airplane to be included on type certificate A57CE, along with prior certificated models DA 42, DA 42 NG, and DA 42 M-NG. ELOS [ACE-10-07](#) was originally granted to the model DA 42 NG. This ELOS documents an extension of the first ELOS to the model DA62.

The Model DA62 uses two electric fuel pumps per engine to supply pressurized fuel to the Austro AE300 engines (Model E4). Both pumps, main and emergency, are supplied electrical power through separate engine control unit busses which are controlled by each respective Full

Authority Digital Engine Control (FADEC). This system and architecture is unchanged from the DA 42 NG. The major change with respect to this amended type design, the DA62, is the addition of a larger cabin to accommodate up to seven seats. The fuel system and engine control design is identical to that of the original ELOS granted to the DA 42 NG (ACE-10-07).

The DA 42 NG requires electrical power for both the main and emergency fuel pumps. The electrical system architecture of the DA 42 NG provides a dedicated Engine Control Unit (ECU) bus per engine to power the dual channel FADEC and the two fuel pumps. The main and emergency fuel pumps are identical. Each pump powered by the ECU bus is controlled by its dedicated FADEC channel and serves as a main pump for the FADEC channel in control. The other pump is on standby together with its designated FADEC channel and serves as an emergency pump.

In the case of a sensed fuel pressure drop an automatic FADEC channel swap is initiated. This automatically activates the dedicated fuel pump of the new channel in control. Now this pump acts as a main pump. In addition, both pumps on one ECU bus can be manually turned on by the pilot at the same time to function as emergency pumps.

The electrical system architecture was developed with consideration to the basic design philosophy for FADECs powered by the aircraft power alone. Being aware of this, the left-hand (LH) and right-hand (RH) ECU busses are split into LH/RH ECU A and LH/RH ECU B busses with required diode isolation. In addition, a means is provided so that the LH ECU bus supplies power to the RH FADEC channel B and vice versa. The 30-minute backup supply capability is not affected by this change, since two backup batteries in the system are each capable of providing 30 minutes of sufficient electric power for one engine and the dedicated electric fuel pump. This version is implemented by Diamond Design Change MÄM 42-403.

Applicable Regulation:

- 14 CFR 23.991

Regulation Requiring an ELOS Finding:

14 CFR 23.991, Main pumps, paragraphs (a) and (1), state the following:

“Main pumps. For main pumps, the following apply:

For reciprocating engine installations having fuel pumps to supply fuel to the engine, at least one pump for each engine must be directly driven by the engine and must meet § 23.955. This pump is a main pump.”

14 CFR 23.991, Emergency pumps, paragraph (b), states the following:

“There must be an emergency pump immediately available to supply fuel to the engine if any main pump (other than a fuel injection pump approved as part of the engine) fails. The power supply for each emergency pump must be independent of the power supply for each corresponding main pump.”

Description of compensating design features or alternative Methods of Compliance (MoC) which allow the granting of the ELOS (including changes, limitations, or equipment needed for equivalency):

In order to achieve independence of the electric power supply for the fuel pump associated to FADEC channel A from the fuel pump associated to FADEC channel B, a split of the current LH and RH ECU busses into separate busses for FADEC channels A and B is proposed. The dedicated fuel pump is connected to the same bus as the related FADEC channel itself.

Explanation of how design features or alternative Methods of Compliance (MoC) provide an equivalent level of safety intended by the regulation:

The design provides two independent electrical power sources for the dedicated fuel pump, and there is 30 minutes of backup battery power for the fuel pumps in the event of a complete loss of the primary electrical power generating system. The installation in the DAI DA 42 NG and DA62 meet the requirements of § 23.991.

FAA approval and documentation of the ELOS Finding:

The FAA previously approved the aforementioned equivalent level of safety finding during certification of the DA 42 NG, and as documented in this memorandum, grants an extension from the existing ELOS ACE-10-07 to the DA62. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Accountable Directorate 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 Type Certificate (TC) and Amended Type Certificate (ATC) or in the Limitations and Conditions section of the Supplemental Type Certificate (STC). An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation:

14 CFR 23.991, amendment 23-43, Fuel pumps
(documented in ELOS Memo ACE-10-07)

//SIGNED//

Pat Mullen, Acting Manager, Small Airplane Directorate,
Aircraft Certification Service

December 23, 2015

Date

ELOS Originated by: Regulations and Policy Branch	Manager, Regulations and Policy Branch: William Schinstock	Routing Symbol: ACE-111
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