



Federal Aviation Administration

Memorandum

Date: November 20, 2009

To: Manager, Small Airplane Directorate, ACE-100

From: Manager, Project Support Office, ACE-112

Prepared by: Peter Rouse, Regulations and Policy Office, ACE-111

Subject: Extension of Equivalent Level of Safety (ELOS) to 14 CFR part 23, § 23.1145, Ignition Switches, for the Diamond Aircraft Industries for the DA-42NG Airplane.

ELOS Memo#: ACE-05-05A

Regulatory Ref: 14 CFR, part 23, § 23.1145

Diamond Aircraft Industries (DAI) requests extension of an existing ELOS, ACE-05-05, for the use of Full Authority Digital Engine Control (FADEC) power switches to accomplish the requirements of § 23.1145 to the model DA-42NG airplane.

Background:

The DA-42NG is a derivative model airplane to be included on type certificate A57CE, along with the prior certificated model DA-42. The Model DA-42NG will allow for the utilization of FADEC power switches in place of the function provided by ignition switches as described in § 23.1145. The major change with respect to this amended type design replaces the Thielert Model TAE 125-01 diesel engines with the Austro Model AE300 diesel engines; however, the FADEC power switch design is fundamentally identical for the requested ELOS extension to that of the original ELOS.

The following information provides the background information and justification for the original approval of ELOS ACE-05-05 to the Model DA-42:

The Diamond Aircraft Industries (DAI) DA-42 aircraft is a new fully composite, four place, twin-engine airplane with retractable gear, cantilever low wing and T-tail. The airplane was certified by EASA on type certificate number A005, dated May 13, 2004. The airplane is powered by two Thielert Aircraft Engines GmbH (Thielert) TAE 125-01

aircraft diesel engines (ADE), type certificated in the United States, type certificate number E00069EN. The Thielert engine is a diesel cycle engine, and does not have or require an ignition system. However, it is controlled by a Full Authority Digital Electronic Engine Control, FADEC. Controlling electrical power to the FADEC has the same effect on the Thielert as using ignition switches on a conventional engine. The engine can be shut off by shutting off FADEC power, which accomplishes the same task as required for ignition switches by § 23.1145. Under the Bilateral Airworthiness Agreement (BAA) between the USA and the Austrian Exporting Civil Aviation Authority (ECAA), the Austro Control GmbH (ACG), an application for U.S. Type Certification of Diamond Aircraft Industries (DAI) Model DA-42 was made on August 2, 2004, by the DAI through the European Aviation Safety Agency (EASA).

Applicable Regulation:

Section 23.1145, Ignition switches, requires the following:

§ 23.1145 Ignition switches

- (a) Ignition switches must control [and shut off] each ignition circuit on each engine.*
- (b) There must be means to quickly shut off all ignition on multiengine airplanes by the groupings of switches or by a master ignition control.*
- (c) Each group of ignition switches, except ignition switches for turbine engines for which continuous ignition is not required, and each master ignition control must have a means to prevent its inadvertent operation.*

Regulations Requiring an ELOS Finding:

14 CFR, part 23, § 23.1145

Description of Compensating Design Features:

The Thielert TAE-125 reciprocating diesel engine uses a FADEC to control engine operation and, by its nature, does not require the associated ignition systems and switches. However, the FADEC can be shut off, which will stop the engine, and a switch provides such a feature. This feature meets the intent of § 23.1145. To ensure an ELOS to the intent of § 23.1145, the installation in the Diamond Aircraft Industries DA-42 meets the requirements of § 23.1145, when the regulation is re-characterized to mean "FADEC power switch" in place of "ignition switch," and it meets all requirements as specified in § 23.1145. This provides an equivalent level of functionality and safety as intended by the rule for conventional ignition systems as used on gasoline engines.

Based on the functional identity of the respective design, we concur with the requested extension of this ELOS for the Austro AE300 engine installation's use of the FADEC power switches to accomplish the requirements of § 23.1145.

FAA Approval:

The Small Airplane Directorate concurs with the extension of ELOS ACE-05-05 for the DAI Model DA-42 to the Model DA-42NG. The DAI Model DA-42NG is granted ELOS number ACE-05-05A.

Margaret Kline for

11-20-09

Manager, Small Airplane Directorate
Aircraft Certification Service

Date

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| ELOS Originated by: Small Airplane Directorate | Project Support Branch Manager: William J. Timberlake | Symbol: ACE-112 |
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