



Federal Aviation Administration

Memorandum

Date: June 23, 2016

To: Manager, Chicago Aircraft Certification Office, ACE-115C

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: Wess Rouse, Propulsion & Program Management Branch, ACE-118C

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Cirrus Design Corporation, Model SF50 Jet, Storage Battery Design and Installation, FAA Project #: TC6444CH-A

ELOS Memo #: TC6444CH-A-S-11

Regulatory Ref: 14 CFR 23.1353(h) at amendment 23-62

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 SF50 jet.

Background:

Compliance to § 23.1353(h) is typically shown by the use of a dedicated emergency battery that provides electrical power to loads that are essential for continued safe flight and landing for a period of at least 30 or 60 minutes, as applicable. Cirrus does not have a single battery that will provide at least 60 minutes of electrical power to those loads that are essential for continued safe flight and landing. Two batteries, the emergency battery and the starter battery, are used to provide the required 60 minutes of electrical power. Cirrus proposes an equivalent level of safety finding be issued for the use of two batteries: an emergency battery and a starter battery to provide at least 60 minutes of emergency electrical power on the Model SF50 jet. The Model SF50 will be certified in the Normal Category to the certification basis of part 23 through amendment 23-62.

Applicable regulations:

14 CFR 23.1353(h)

Regulation(s) requiring an ELOS finding:

14 CFR 23.1353(h)

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):

Airplane Flight Manual (AFM) procedures will require a check of the health of the batteries prior to every take-off. Per the AFM normal checklist, take-off is not allowed unless both the starter and the emergency batteries are at or above a specific voltage.

During normal operations, the starting battery and emergency battery are independent. Bus voltage and generator current breaching out of limit conditions are automatically detected and annunciated as Crew Alerting System (CAS) messages to alert the crew to take the appropriate action. In the emergency situation, as indicated by the CAS warning EMER BUS VOLTS, the two batteries will connect in parallel by turning the EMER BATT switch ON, at the overhead control panel.

Battery capacity is monitored with periodic maintenance. The Model SF50 batteries will be maintained in accordance with the Aircraft Maintenance Manual, which incorporates the battery supplier's maintenance manual.

For operating capacity, Cirrus will provide the following compliance data:

1. A complete listing of loads that are connected to the BAT 1 Hot Bus and the Emergency Buses. A test will verify the status of each load.
2. Ground aircraft test data validating with the EMER BATT switch ON (starter and emergency batteries in parallel) that the emergency loads identified in the previous item 1, will have adequate electrical power to properly function for a period of a least one hour under worst case conditions, such as 25 percent discharge and cold soak to AFM limitation.

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

Section 23.1353, Storage battery design and installation, paragraph (h) at amendment 23-62, states the following:

“(1) In the event of a complete loss of the primary electrical power generating system, the battery must be capable of providing electrical power to those loads that are essential to continued safe flight and landing for:

(i) At least 30 minutes for airplanes that are certificated with a maximum altitude of 25,000 feet or less; and

(ii) At least 60 minutes for airplanes that are certificated with a maximum altitude over 25,000 feet.

(2) The time period includes the time to recognize the loss of generated power and to take appropriate load shedding action.”

Advisory Circular (AC) [AC 23-17C](#) provides guidance on considerations for an ELOS finding to § 23.1353(h). Specifically, an ELOS may be granted if adequate monitoring and procedures are

incorporated informing the pilot how the emergency electrical power configuration of the airplane meets the 60-minute criteria after an engine start and during all other operations. This is accomplished through the following methods:

1. For prior to every take-off, include a Normal Procedure within the AFM to determine the health of both batteries used to meet the 60-minute requirement.
2. Include an Emergency Procedure in the AFM how switching to emergency power is initiated when the CAS warning EMER BUS VOLTS is displayed.
3. For continued airworthiness, Cirrus will use battery manufacturer data for capacity testing incorporated into the Aircraft Maintenance Manual.
4. For the operating capacity, Cirrus will provide the following compliance data:
 - a) A complete listing of loads that are connected to the BAT 1 Hot Bus and the Emergency Buses. A test will verify the status of each load.
 - b) Ground aircraft test data validating with the EMER BATT switch ON (starter and emergency batteries in parallel) that the emergency loads identified in the previous item 4.a), will have adequate electrical power to properly function for a period of a least one hour under worst case conditions, such as 25 percent discharge and cold soak to AFM limitation.

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper S-11. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Small Airplane Directorate has assigned a unique ELOS Memorandum number 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 for the airplane Type Certificate. An example of an appropriate statement is provided below.

An Equivalent Level of Safety Finding has been made for the following regulation:

14 CFR 23.1353, Storage battery design and installation, paragraph (h) at amendment 23-62 (documented in ELOS Memo TC6444CH-A-S-11)

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William Schinstock, Acting Manager, Small Airplane Directorate,
Aircraft Certification Service

June 23, 2016
Date

ELOS Originated by: Chicago ACO	Manager, Chicago ACO: Timothy P. Smyth	Routing Symbol: ACE-115C
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