

Proposed Special Condition “Installation of Li-type storage batteries in sailplanes/powered sailplanes, LSA and VLA”

Introductory Note:

The hereby presented Special Condition has been classified as important and as such shall be subject to public consultation, in accordance with EASA Management Board Decision 12/2007 dated 11 September 2007, Article 3 (2.), which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

Statement of Issue:

This special condition covers the installation of new technology type battery as storage battery in sailplanes, powered sailplanes, light sport aeroplanes or very light aeroplanes (CS-VLA, CS-22 and CS-LSA).

Lithium batteries, intended to be used for storage, have specific failure and operational characteristics, and maintenance requirements that differ significantly from that of the nickel cadmium (Ni-Cd) and lead acid rechargeable batteries currently covered by CS-VLA, CS-22 and CS-LSA.

Therefore on the basis of Part 21, 21A.16B, the proposed Special Condition is to establish appropriate airworthiness standards for Li-Battery installations on General Aviation Aeroplanes and to ensure, that these battery installations do not have hazardous or unreliable design characteristics.

Justification

The use of Li-Batteries has since years prompted EASA to review the adequacy of the existing battery requirements with respect to the hazards introduced by the chemistry of Lithium. As a result of this review, EASA has already developed a Special Condition for CS-23 aeroplanes (SC-F23.1353-02), that addresses the hazards, the failure modes and the operational and maintenance characteristics of Li-Batteries that could affect safety and reliability of those battery installations.

This Special Condition has been developed on the basis of SC-F23.1353-02 taking into account the usage and the proportionality of requirements and compliance demonstration for these simple aircraft. A quantitative safety assessment is not required for the affected aircraft and good engineering judgment plays a major role to identify and mitigate potential critical items. To support the applicants the special condition is supplemented with references to useful standards and guidance material.

The Special Condition SC-ELA.2015-01 is proposed in Annex 1:

Annex 1

SC-ELA.2015-01 “Installation of Li-type storage batteries in sailplanes/powered sailplanes, LSA and VLA”

Useful Standards

- RTCA DO 311, DO 347 UN T 38.3, UL1642, UL 2054

Scope

This special condition covers the installation of new technology type battery as storage battery in sailplanes, powered sailplanes, light sport aeroplanes or very light aeroplanes.

The special condition does not cover or replace applicable regulations for handling, storage, transport and disposal of batteries.

Definitions and Terminology

- The following terms and definitions are used in the context of this special condition:
- Battery cell - electrochemical cells used to store electrical energy
- Battery – assembly of (rechargeable or non-rechargeable) battery cells and associated components e.g. control unit, sensors, connectors, circuit breaker, containment.
- Storage Battery – rechargeable battery to provide energy for engine and/or avionic or other equipment.
- Li batteries – rechargeable Lithium battery of various types
- GM - guidance material

In addition to the requirements established in the applicable Certification Specifications, these additional requirements shall be met:

SC-ELA.2015-01.02 Storage battery design and installation

(a) No explosive or toxic gases emitted by any battery in normal operation, or as the result of any probable malfunction in the charging system or battery installation, may accumulate in hazardous quantities within the aircraft. If it has not been proved that neither vapours nor fluids may separate out from the storage battery, its compartment must be ventilated and drained.

(b) A protection against overcharge and critical discharge of the batteries shall be provided including deep or unbalanced discharge if necessary for the type of battery.

GM: Control Units and Battery Management Systems should be designed and manufactured following good engineering practice with consideration of electric magnetic interference, environmental and software aspects.

(c) The suitability and reliability of batteries shall be proved due to experience or tests.

GM: Tests performed by the manufacturer of battery or battery cells according applicable standards (e.g. RTCA DO 311, DO 347, UN T 38.3, UL 1642) can be accepted upon agreement with the Agency.

(d) Characteristics of the storage batteries, including failure modes (e.g. thermal runaway, expansion, explosion, toxic emission) should be identified. Batteries cells and other subcomponents of the system should be assembled and installed minimizing the effects of failures.

GM: Possible design precautions depending on the identified risks might include:

- Providing the crew with the relevant information allowing to take proper actions (e.g. temperature or pressure monitoring),
- Mitigating the effect of thermal runaway or fire, and ensuring the surrounding structure is able to withstand the thermal loads,
- Designing the containment or compartment for the battery in order to cope with overpressure or expansion.

(e) No corrosive fluids or gases that may escape from the battery may damage adjacent essential structures or equipment.