

# Part-21 Implementation Workshop

## October 2023 - Non rechargeable Lithium batteries

26<sup>th</sup> October 2023

**Your safety is our mission.**

An Agency of the European Union 

# Non-rechargeable Lithium battery – minor/MAJ classification

Fernando Menendez (Electrical Systems)



# STC Workshop 2019 approach

## → Battery installation classification

**All Lithium battery modifications shall be classified Major**, because Special Conditions are always applicable and a lithium battery thermal runaway is considered at least as hazardous.

However, in accordance with Part 21 „*When the strict application of the paragraph 3.3 criteria(\*) results in a major classification, the applicant may request re-classification, if justified, and Agency could take the responsibility in re-classifying the change.*”

**EASA may re-classify a Lithium battery modification as minor in some cases.**

(\*) paragraph 3.3 from GM 21A.91 Classification of changes to a type Design

# STC Workshop 2019 approach

- Battery with Capacity up to 100Wh AND installed in the cabin in an area where the cabin crew can visually localize it in case of fumes or fire AND no oxygen lines/equipment, water, fuel or any other flammable substances in the same enclosure AND battery qualified at least to DO-311, DO-227 or DO-347.
- Modifications including a Li battery within an equipment with a capacity up to 5Wh AND ETSO 142b AND no other reasons to classify the change as Major.
- Relocation of an already approved installation (where the SCs were applicable) with no impact in the original Safety Assessment AND conditions of installation not worse than the original ones (in terms of separation to oxygen lines/equipment, water, fuel, other flammable substances, heat points)

# Coming future approach presented in March 2021

## → Battery installation classification

→ STC workshop approach revision on the following bases:

→ 1) Plan to include Non-rechargeable SC's CRI in all CS-25 TCDS. (In progress)

→ 2) More experience in testing activities

→ 3) Equipments containing batteries DO-227A compliant (ETSO-C142b)

→ Minor classifications will be allowed in the cases the Hazard can be considered no more than MAJ.

→ Exhaustive list under preparation (available now in slides 6-9)

→ Decision will be published in EASA Website – FAQ (available, link below)

<https://www.easa.europa.eu/the-agency/faqs/lithium-batteries-non-rechargeable>

# New approach

## 1. Direct minor classifications (4 Cases):

- A. Battery with Capacity up to 100Wh AND installed in the cabin in a fully enclosed area where the occupants can visually localize it in case of fumes or fire AND no oxygen lines/equipment, water, fuel or any other flammable substances in the same enclosure AND battery qualified at least to ETSO-C142b.
- B. Modifications involving the installation of a Li battery within an equipment with a capacity up to 5Wh AND ETSO C-142b AND no other reasons to classify the change as Major.

# New approach

## 1. Direct minor classifications (4 Cases):

- C. Relocation of equipment containing a battery with ETSO C142b authorisation and with no impact in the original Safety Assessment AND conditions of installation not worse than the original ones (in terms of separation to oxygen lines/equipment, water, fuel, other flammable substances, heat points, occupants in case of exposed installation, etc...)
- D. Project requesting exemptions to SC as per Note 2 on SC's version published in EASA website on 7th April 2021 (see link below), limited to cosmetic changes. NOTE: Changes expected to demonstrate substantial fire safety improvement as per note 2 are considered as MAJOR.

<https://www.easa.europa.eu/document-library/product-certification-consultations/final-special-condition-ref-sc-f251353-01-non>

# New approach

## 2. Other installations would be classified as MAJOR:

Some examples to illustrate:

- A. installation not subject to SC-F25.1353-01 (SC version published in EASA website on 7<sup>th</sup> April 2021), when a substantial fire safety improvement is demonstrated based on Note 2 of the special conditions.
  - B. exposed installations, even if the battery meets ETSO-C142b (e.g. ELT installed on a bulkhead in the passenger cabin)
  - C. Cockpit installations
  - D. installations in an inaccessible area\*, even if the battery meets ETSO-C142b.
- \*An inaccessible area is an area that can be accessed only after the removal of panels, or is not readily reachable by a person with the contents of a hand-held fire extinguisher. These areas tend to be behind interior panels (such as sidewalls or ceilings), or areas below the passenger floor.



# New approach

- Note 2: These special conditions apply in lieu of 25.1353(c)(1) through (c)(4) to non-rechargeable lithium battery installations as follows:
  - • To all changed installation (new battery part number or new environment) except if the design change can be considered cosmetic. A cosmetic change is a change in appearance only and does not change any function or safety characteristic of the battery installation.
  - • To all relocated lithium batteries, except if the relocation is demonstrated to improve the safety of the aeroplane and of the occupants, leading to a change that provides a substantial fire safety improvement.
  - • To all existing non-rechargeable lithium battery installations affected by a design change, even if the battery or battery installation itself does not change. (e.g. change in ambient temperature or pressure environment in which the battery operates, change on the electrical load on a battery). Except if the design change improves the safety of the non-rechargeable lithium battery installation.
- Applicants, who intend to justify that this Special Condition is not applicable, **shall generate the evidence** that the proposed design meets the above criteria in this note 2. This evidence shall include a detailed assessment of the battery installation on the baseline aircraft and the improvement due to the proposed change considering a battery thermal runaway failure for both installations.
- The assessment should:
  - • Consider the battery thermal runaway effects of heat, explosive energy, projecting debris and toxic gases.
  - • Address the proximity of the battery to occupants, critical systems and equipment, structure, and any other installations that could be a hazard if exposed to a battery thermal runaway (e.g., oxygen bottles/lines, fuel lines). The above exceptions are limited to changes/relocations to baseline aircraft installations approved for certification projects for which the special condition was not applicable.
- CS 25.1353(c)(1) through (c)(4) remains in effect for other battery installations.

# New approach

- Note 2 discussions:
- - To all existing non-rechargeable lithium battery installations **affected** by a design change, even if the battery or battery installation itself does not change.(e.g. change in ambient temperature or pressure environment in which the battery operates, change on the electrical load on a battery). Except if the design change improves the safety of the non-rechargeable lithium battery installation.
- EXAMPLES:
  - a. Obsolescence/Change of an internal component other than the battery of an already approved equipment item (containing a Lithium battery) **without any impact** on battery operation and its environment,
  - b. SW change of an already approved equipment item (containing a Lithium battery) **without any impact** on battery operation and its environment,
  - c. Modification of the surrounding environment of an already approved equipment item (containing a Lithium battery) **without any impact** on battery operation and its environment,
  - d. **Administrative** modification: drawings reference change without any technical change / change of numbering rules for harnesses...
  - e. Change of configuration file of an already approved equipment item (containing a Lithium battery) **without any impact** on battery operation and its environment,

# Re-classification Path

- If I have a non-rechargeable lithium battery (NRLB) specific case not fitting to the 4 cases where a direct minor classification is allowed, and I consider that severity of a thermal runaway failure can be considered less than hazardous, can I ask to EASA to re-classify one specific project?
- Yes, according to Part 21 „*When the strict application of the paragraph 3.3 criteria from [GM 21A.91 Classification of changes to a type Design](#) results in a major classification, the applicant may request re-classification, if justified, and Agency could take the responsibility in re-classifying the change.*”

# Mid term Plan - FAQ

- **What is EASA's mid term plan on Non-rechargeable Lithium batteries (NRLB) regarding qualification and Means of compliance (MoC) with the Non-rechargeable lithium batteries Special Conditions?**
- EASA intends that every single non/rechargeable Lithium battery installation shall be compliant with [ETSO C142b](#) or that any installation has to assure qualification level according to MOPS DO-227A or later standards.
- The entry into force date will be based on the safety gain resulting from the installation of non-rechargeable lithium batteries meeting this MOPS DO-227A standard (and ff.) and the expected availability of ETSO C142b/DO-227A equipment.
- Equipments availability is growing, anyhow development was a bit slower than expected.
- The upcoming deadline for applications will be set to ensure that an adequate number of equipment compliant with ETSO C142b/DO-227A is available in the market thus leading to a smooth transition to the new approach.

# MOPS DO-227B is under preparation

- RTCA SC-235 is in charge to develop DO-227 standards.
- DO-227A was published in September 2017.
- DO-227B is currently in the final phase before sending to public consultation for a second time.
- Currently scheduled to be ready by April 2024.
- TSO-C142c and ETSO-C142c are expected to call to this standard.

# Thank you for your attention

[easa.europa.eu/connect](https://easa.europa.eu/connect)



**Your safety is our mission.**

An Agency of the European Union 