European Union Aviation Safety Agency

Lithium batteries (Non-rechargeable)

I plan to install a non-rechargeable Lithium battery (NRLB) with capacity under 2 Wh. How should I classify my project?

Answer

When the battery is qualified against UL1642 standard, the project can be classified as minor. Otherwise project should be classified as major.

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Link:
https://www.easa.europa.eu/en/faq/132532

I plan to relocate an equipment powered by a non-rechargeable lithium battery (NRLB) but the pre-mod configuration was designed by another design organization. Under which conditions am I allowed to classify the design change as minor?

Answer

The evaluation of the original safety assessment issued to justify the installation of the pre-mod configuration is a prerequisite to proceed with a minor classification. When the original safety assessment is not available, the non-rechargeable lithium battery (NRLB) relocation project should be classified as major.

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Link:
https://www.easa.europa.eu/en/faq/132531

What is the intent of Note 2 included in the non-rechargeable Lithium batteries (NRLBs) Special Condition’s published the 7th of April 2021 in EASA website?

Answer

Note 2 - included in the non-rechargeable Lithium batteries (NRLBs) Special Condition's of 7th of April 2021- has the intent to allow applicants to substantially increase the level of fire safety of already approved NRLB installations without the need to demonstrate compliance with the special conditions.

Based on "Note 2", the special conditions are not applicable to changes to previously certified non-rechargeable lithium battery installations where the only change is either cosmetic or to relocate the installation to improve the safety of the airplane and occupants. A cosmetic change is a change in appearance only, and does not change any function or safety characteristic of the battery installation. The special conditions are also not applicable to unchanged, previously certified non-rechargeable lithium battery installations that are affected by a change in a manner that improves the safety of its installation. The above exceptions are limited to changes/relocations to baseline aircraft installations approved for certification projects for which the special condition was not applicable.

EASA has determined that allowing the above exceptions is in the public interest because the need to meet all of the special conditions might otherwise deter design changes that may substantially improve safety.

Here an extract of the Special Condition document:

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.

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When a non-rechargeable lithium battery (NRLB) project is classified as major, how is EASA going to establish the level of involvement (LOI) in the certification project?

Answer

General EASA guidance on Level of Involvement (LOI) applies (ref. CM-21.A/21.B-001 Issue 2). Complexity of the project, Applicant Capabilities and past experience with NRLB installation projects should be taken into account to define the EASA LOI in the project.

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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?

Answer

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."*

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Link:
https://www.easa.europa.eu/en/faq/132528

Does EASA consider the installation of an equipment powered by a non-rechargeable lithium battery (NRLB) with an ETSO authorization compliant with the special conditions without further evaluation?

Answer

No, the ETSO authorization does not constitute a means of compliance with all the special conditions. In all cases installation aspects shall be taken into account and an assessment of the level of safety of the non-rechargeable lithium battery (NRLB) installation on the aircraft shall be generated, e.g. zonal safety analysis, etc..

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Link:
https://www.easa.europa.eu/en/faq/132527

How should I classify a change when my non-rechargeable lithium batteries (NRLBs) installation does not fit any of the 4 cases applicable as minor change under DOA privileges?

Answer

Other installations of non-rechargeable lithium batteries (NRLBs) would be classified as MAJOR. Here are some examples of design changes that should be classified as major changes:

Example A

Installation not subject to SC-F25.1353-01 (Special Condition final version published in EASA website on 7th April 2021), when a substantial fire safety improvement is demonstrated based on Note 2 of the special conditions.

Rationale for MAJOR classification

The evidence that a substantial fire safety improvement is achieved through the relocation of a NRLB shall be discussed and agreed with EASA.

Example B

The design change introduces an exposed installation of a NRLB, even if the battery meets ETSO-C142b (e.g. ELT installed on a bulkhead in the passenger cabin).

Rationale for MAJOR classification

Despite meeting the minimum performance standards of ETSO C142b provides a higher level of safety, excluding fire and explosions and requesting equipment skin temperatures under 204° C, ejection of gases from the venting provisions included in the battery design is allowed. Quantity, composition and temperature of vented gases are reportable items during ETSO approval and shall be evaluated during installation. DO-227A explains that the hazardous emissions may be flammable, explosive, corrosive or toxic in sufficient concentrations. DO-227A recommends the installer to work with the battery manufacturer to quantify and mitigate the effects of hazardous emissions based on venting capabilities of the battery system and air movement and exchange characteristics at the installed location.

Example C

The design change consists in the installation of a NRLB in the cockpit, even if the battery meets ETSO C-142b.

Rationale for MAJOR classification

The same considerations applicable to example B are valid also for example C. Furthermore, the direct exposure of flight crew members to the effects of a lithium battery thermal runaway event is considered particularly critical.

Example D

The design change consists in the installation of a NRLB in inaccessible areas*, 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.

Rationale for MAJOR classification

The same considerations applicable to example B are valid also for example D. Furthermore, the installation of a NRLB in an inaccessible area does not allow crew members to perform effective fire-fighting.

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Link:

https://www.easa.europa.eu/en/faq/132526

Which are the 4 cases involving non-rechargeable lithium batteries (NRLBs) agreed by EASA to be classified as minor change under DOA privileges?

Answer

Direct minor classifications (4 Cases):

1. 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.

2. Modifications involving the installation of a Lithium battery within an equipment with a capacity up to 5Wh AND ETSO 142b AND no other reasons to classify the change as Major.

3. 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).

4. Project requesting exemptions to Special Condition as per Note 2 on Special Conditions' final version published in EASA website on 7th April 2021 are limited to cosmetic changes.

NOTE: Changes expected to demonstrate substantial fire safety improvement as per Note 2 are considered as MAJOR.

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Link:
https://www.easa.europa.eu/en/faq/132524

Is the previous approach for minor/major classification presented in STC workshop 2019 still valid for non-rechargeable lithium batteries (NRLBs)?

Answer

No, it is superseded. Some types of design changes previously eligible for reclassification as minor will have to be classified as major. The new approach applies to projects starting on or after 1st January 2022.

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Link:
https://www.easa.europa.eu/en/faq/132525

What is the EASA approach for non-rechargeable lithium batteries (NRLB) installation on aircraft types other than CS-25?

Answer

The same policy is currently applicable to CS-25 aircraft types applies also to CS-29, CS-23 level 4, and CS-27 Cat A aircraft types. For CS-23 levels 1, 2, and 3 and for CS-27 non-CAT A, EASA will evaluate the need for using the same approach on a case-by-case basis, based on the risk that the installation could pose to aircraft safety.

When validation with foreign authorities would be envisaged, EASA recommends checking potential means of compliance discrepancies related to lithium batteries.

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Link:
https://www.easa.europa.eu/en/faq/132523

Has EASA released Special Conditions on non-rechargeable lithium batteries (NRLBs) installation for all CS-25 aircraft types?

Answer

The TCDS of the vast majority of CS-25 aircraft includes special conditions on non-rechargeable lithium batteries (NRLBs) installation. Just a few models remain for which special conditions have not been released. If your project applies to one of those models, please contact EASA.

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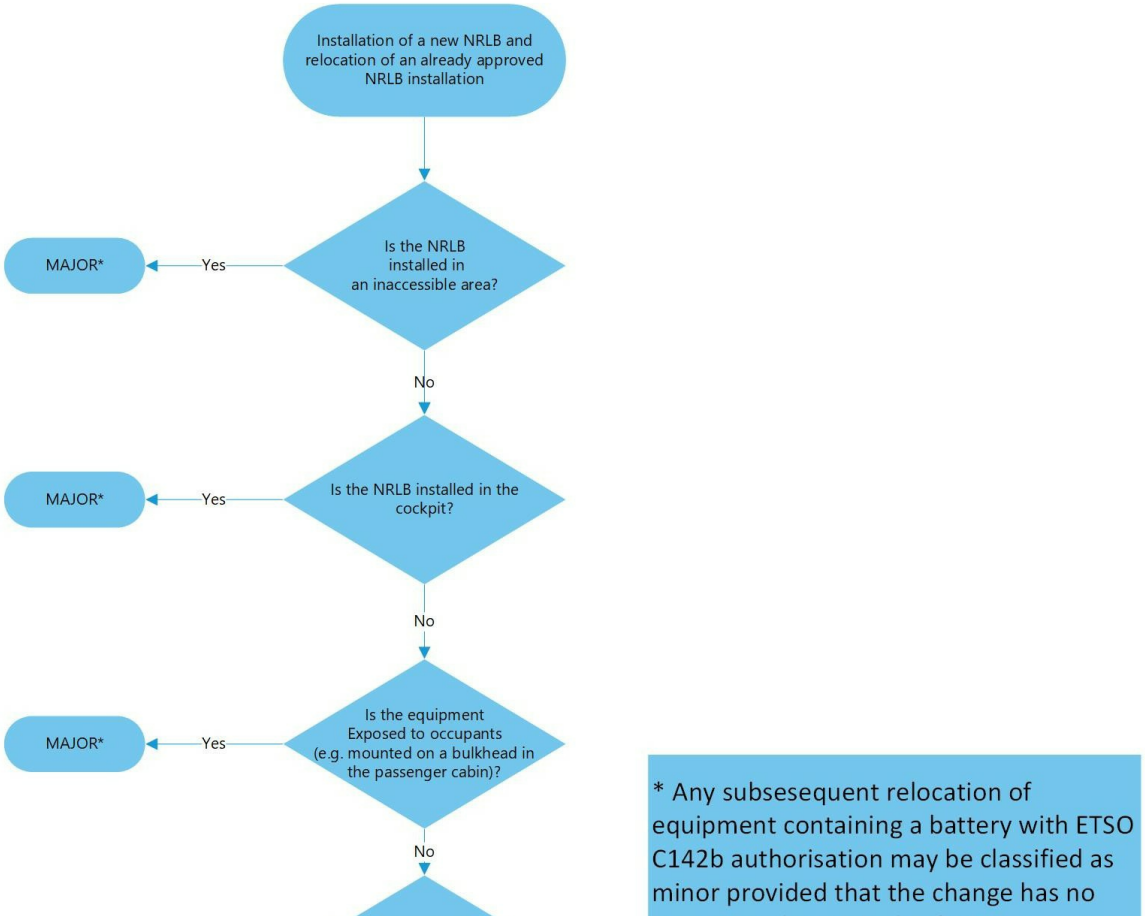
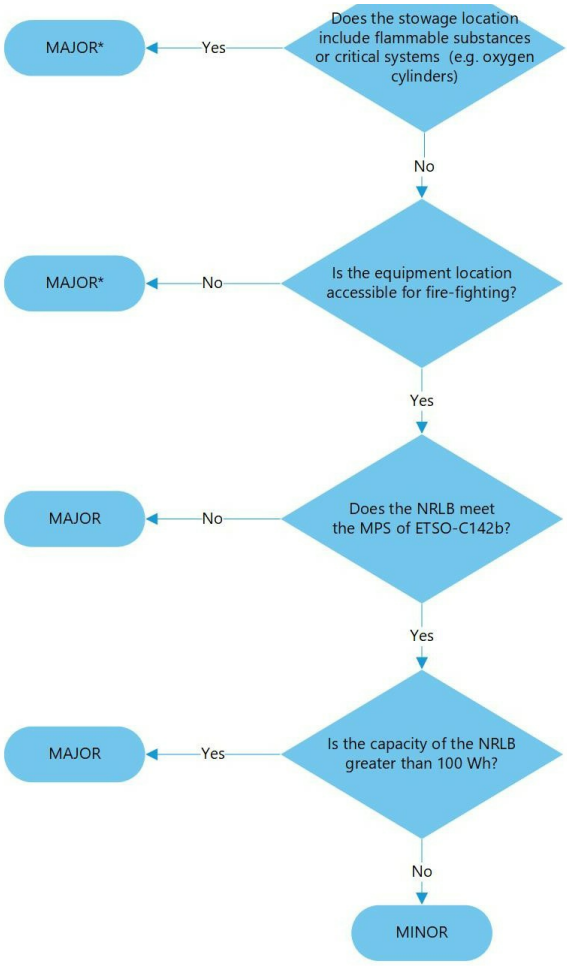
https://www.easa.europa.eu/en/faq/132522

Is there a flowchart helping on the minor/major classification of projects involving non-rechargeable lithium batteries (NRLB)?

Answer

Yes, see the following “Non rechargeable Lithium batteries installation minor/Major classification flowchart”





impact on the original Safety Assessment and the new conditions of installation are not worse than the original ones, in terms of separation to oxygen lines/equipment, water, fuel, other flammable substances, heat points, separation from occupants (in case of exposed installation).

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Link:

https://www.easa.europa.eu/en/faq/132536

What is EASA's plan on non-rechargeable lithium batteries (NRLB) regarding qualification and means of compliance (MoC) with the NRLB Special Conditions?

Answer

EASA intends that every single non/rechargeable lithium battery (NRLB) installation shall be compliant with ETSO C142b or that any installation has to assure qualification level according to MOPS DO-227A or later standards for any project with a date of application after 30 June 2025.

The entry into force date is based on the safety gain resulting from the installation of NRLBs

meeting this MOPS DO-227A standard (and ff.) and the availability of ETSO C142b/DO-227A equipment.

This decision leads to means of compliance (MoC) based on the installation of ETSO C142a/MOPS DO-227 equipment complemented with a risk assessment at A/C level, as MoC with the Special Conditions applicable to NRLB Installations (ref. SC-F25.1353-01) will not be accepted after 30 June 2025.

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https://www.easa.europa.eu/en/faq/136222