



EASA
European Aviation Safety Agency

ETSO workshop 2018

Lithium Batteries

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History of incidents

➤ Rechargeable batteries

➤ B787-8, Boston, 7/01/2013



➤ B787, Takamatsu, 13/01/2013



➤ Non-rechargeable batteries

➤ B787-8, Heathrow, 12/07/2013

➤ ELT



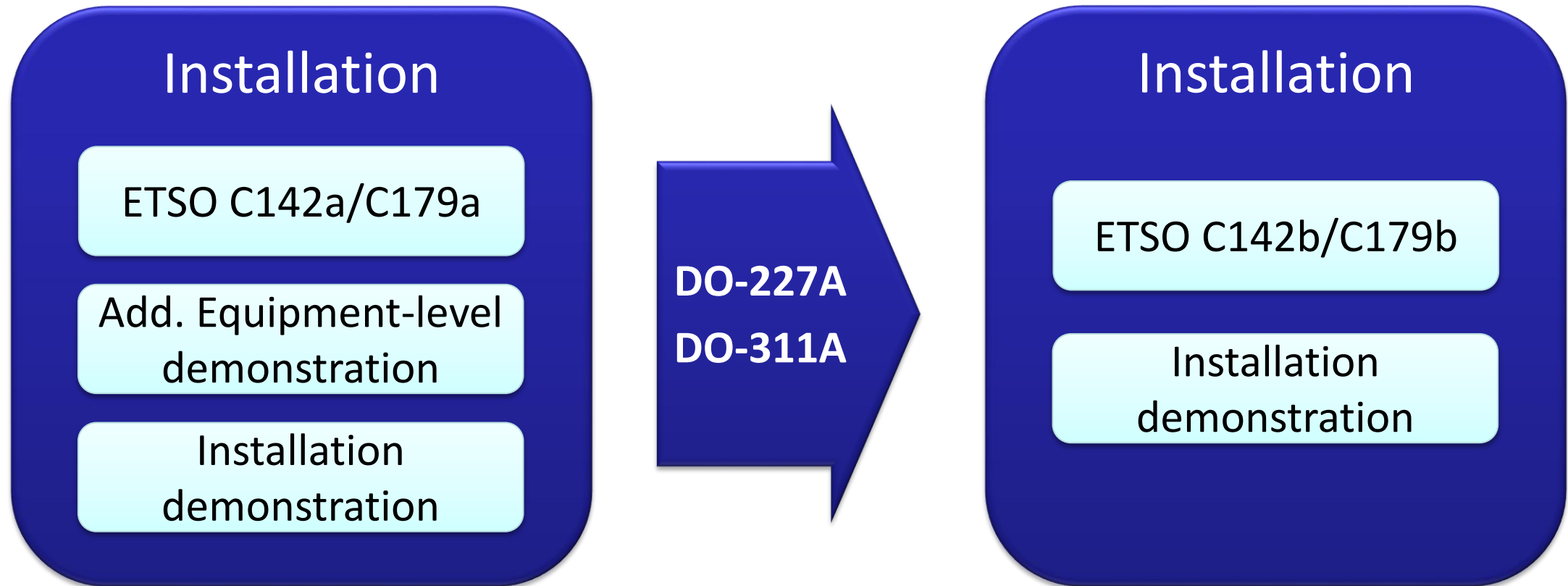
➤ Ventus cM, Innsbruck, 20/04/2015

➤ ELT





General approach



SPECIAL CONDITION APPLIES



Lithium battery ETSOs

➤ Rechargeable

- ETSO-C179b (RTCA DO-311A)
- Use of Appendix C not accepted
 - Alternate Test Method for Battery Thermal Runaway Containment Test
- Class A-XY or Class B-XY
 - Class A/B: nb of cells entering thermal runaway during 2.4.5.5 containment test
 - X energy category, Y Venting category
- < 2 W.h not applicable
 - UL 1642, UL 2054 & IEC 62133

➤ Non-Rechargeable

- ETSO-C142b (RTCA DO-227A)
 - Different level of tests
 - Cell (ETSO C142b-1)
 - Battery (ETSO C142b-3)
 - End-item (ETSO C142b-5)
 - E.g. All levels apply to an end-item
- < 5 W.h
 - ETSO-C142b-7 approval
 - = End item test only
- < 2 W.h not applicable
 - UL 1642

HARMONIZED WITH FAA



Subpart A – Additional requirements for Li Batteries

- CS-ETSO Subpart A applies to all ETSO standards
 - Environmental, SW, AEH
- Subpart A at amendment 15 will require compliance to the applicable battery ETSO when embedding a battery
 - E.g. ETSO-142b for a ETSO-C113a display including a non-rechargeable Li battery



Non-Rechargeable Lithium batteries SC

- Part 21A 16B: EASA published September 2016 the Special Conditions.
<https://www.easa.europa.eu/system/files/dfu/SC%20F-xx%20Issue%201.pdf>
- EASA implement the SC through a generic Non-rechargeable Li bat CRI to CS25 & CS29 products.
- CS-23/27 applicability is under discussion. Risk based approach.
- Previous Means of Compliance: Due to missing a more appropriate standard, ETSO-C142a + Risk assessment at A/C level is an acceptable MoC to the SC contained in this CRI.
- In parallel FAA created IP (SC & MoC) for this topic.
- FAA MoC TSO 142a + DO 347 “Certification Test Guidance for Small and Medium Sized Rechargeable Lithium Batteries and Battery Systems” (testing)



NRLB: Clarifications to MoC

- **ETSO-C142b/Minimum Operational Performance Standards (MOPS) for Non-Rechargeable Lithium Batteries DO-227A + risk assessment at A/C level (limited to Special Conditions 3, 4, 5 & 6) is an acceptable MoC to the Special Conditions 1 to 6 contained in this CRI.**
- Alternatively Means of Compliance can be proposed by the applicant to show compliance with the SC's included in this CRI and agreed by EASA in a case by case basis.
- Risk assessment at A/C level:
 - Cover the delta between qualification and safe functioning & installation.
 - Internal failures can occur!!! Mitigation means to be presented.
 - Understand the impact on the rest of the A/C, crew & passengers.



Rechargeable Lithium batteries SC

- EASA SC public consultation in 2006.
- EASA implement the SC through a generic Rechargeable Li bat CRI.
- Means of compliance:
 - ETSO-C179b/DO-311A + Risk assessment at A/C level is an acceptable means of compliance with these requirements. Applicable to all sizes of batteries.
- Applicable for A/C types under CS 23, 25, 27 & 29.
- CS-23/27 applies only to “Main batteries”. Further applicability is under discussion. Risk based approach.
- CS-22, VLA, SLA specific SC published in January 2016

<https://www.easa.europa.eu/documents/public-consultations/proposed-special-condition-sc-ela2015-01>



Very small batteries treatment

- For Very Small Lithium Batteries (equal or less than 2 Watt-hour of energy), an acceptable Means of Compliance with this Special Condition is showing these batteries compliant with Underwriters Laboratories UL 1642, UL 2054 (only rechargeable) & IEC 62133 (only rechargeable).
- EASA CRI Rechargeable & Non rechargeable Li bat does not apply to “very small batteries” qualified as per above if qualification is referenced in the Certification Plan.





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Thank you for your attention!

Any questions?

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