EASA
European Union Aviation Safety Agency

ETSO Workshop
Battery ETSO Standards

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Content

- → What is the problem with batteries?
- → What is the problem with the Standard?
- → How do we deal with above problems?

What is the problem with batteries?

- → At my first installation I was smelling electricity
- → Cell problem during storage in a glider trailer
- → Dreamliner at Heathrow

Dreamliner at Heathrow

- *trapped wires created a short-circuit, resulting in unplanned discharge*
- *early depletion of a single cell which experienced a voltage reversal, leading to a thermal runaway*
- *protective device in the battery did not provide the level of external short-circuit protection intended*
- *no evidence that the behaviour of the protective device had been fully taken into account during the design*
- *absence of cell segregation allowed single-cell thermal runaway to propagate rapidly to the remaining cells*

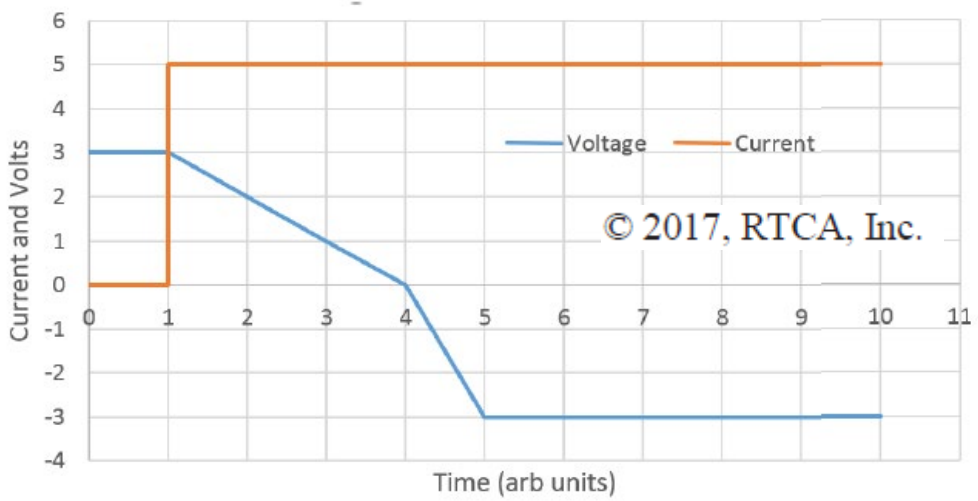
Cell Polarity Reversal

- → 3 barriers are necessary
  - → End item level
  - → Battery level
  - → Cell level
    - → also only close to cell but deviation with ELOS necessary
    - → Diodes antiparallel to the cell are not accepted

- → Deviation discarding the Cell Polarity Reversal Test rejected

Maximum Continuous Current Specified

- Discharge current is temperature depended
- Specified by cell supplier (manufacturer)
- Used for
  - Cell Discharge Current
  - Cell Polarity Reversal test



Cell Discharge Current Test Voltage

- → Deviates from RTCA DO-227 2.4.1.2.1 Cell Discharge Current Test
  - → d. immediately start to discharge the sample cells using the DC power supply set at a constant current and with a voltage of limit of 3 volts. (…)
- → replaced by
  - → d. immediately start to discharge the sample cells using the DC power supply set at a constant current and with a voltage of limit set to the cell nominal voltage. (…)

OCV during environmental test for LiMnO2

- Deviation to exceed the 2% change in OCV per environmental test, provided
  - that is does not increase more than 6% for the complete sequence
    - Vibration
    - Shock
    - Temperature cycling
    - Altitude
    - Humidity
  - long term OCV stability (30 days after test)
    - OCV shall not have increased
    - decrease limited to the item initial OCV allowed

OCV during environmental test for LiFeS2

- Deviation allows 5% change in OCV during temperature tests if
  - less than 5% for the complete sequence
  - meets the 2% within 45 days

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3 barriers for polarity reversal

No suppression of Cell Polarity Reversal Test

Deviations for OCV