

Summary of the 13th Plenary Special Committee 235 - Non-Rechargeable Lithium Batteries Active Monitor Status Meeting

Meeting Summary:

The 13th Plenary Meeting of Special Committee 235 (SC-235) was held on January 11, 2021. The meeting was conducted as a Virtual Meeting with the following attendees participating via WebEx:

John Trela (Chairman)	The Boeing Company
Norman Pereira (Government Authorized Representative)	Federal Aviation Administration
Jeff Densmore (Secretary)	Radiant Power Corporation
Karan Hofmann (Program Director)	RTCA, Inc.
Susanna Bruffett	National Institute for Aviation Research
Antonio Chiesa	Transport Canada
James Christo	NOAA
Claude Cresp	ELTA
Rodolfo Duran	Astronics DME
Leire SeguraMartinez de Ilarduya	Airbus
Nazih Khaouly	Federal Aviation Administration
Larry Masters	Gulfstream Aerospace Corporation
Brad Miller	Honeywell International
Thomas Pack	ACR Electronics
Paul Pfeifer	Textron
Sergio Roberto	ANAC-Brazil
Fernando Menendez Rodriguez	European Aviation Safety Agency
Jim Russell	The Boeing Company
Stuart (Skip) Scott	Rockwell Collins
Clayton Vondrasek	Garmin
Charlie Wright	Astronics DME

Opening Plenary

- The 13th Plenary meeting of SC-235 was convened on January 11, 2021 at 11:00pm EST by Chair John Trela (Boeing). Jeff Densmore (Radiant Power) was the SC-235 Recording Secretary.
- Norman Pereira was introduced as the Government Authorized Representative.
- An RTCA overview, including RTCA's Proprietary References Policy was read by Karan Hofmann, the Program Director.
- Welcoming remarks were made by John Trela. Each person in attendance was invited to introduce themselves.
- The meeting agenda was reviewed.
- The Meeting Summary for SC-235 Plenary #12 was reviewed and approved.
- All documents and presentation material reviewed during Plenary #13 have been uploaded and is available on the RTCA Workspace at the following location:
https://workspace.rtca.org/apps/org/workgroup/sc235_nonrechargeble_lithium_batteries/documents.php?folder_id=9672

Plenary #12 Action Item Review

There were four (4) action items assigned during Plenary #12. The status of each are reviewed below:

- (1) Update Table 2-1 and Table 2-2 to match the written description / requirements to be presented during Plenary #13.

Assigned to: Jim Russell

Status: **CLOSED**

Proposed revisions to the text, table, and figure within 2.4.1.1.6 (Cell Humidity Test) was reviewed and accepted during the Plenary. The revised wording has been uploaded into the Workspace folder listed above.

- (2) Update Figure 2-6 and Figure 2-16 to match the written description / requirements to be presented during Plenary #13.

Assigned to: Jim Russell

Status: **CLOSED**

Proposed revisions to the text, table, and figure within 2.4.2.1.7 (Battery Humidity Test) was reviewed and accepted during the Plenary. The revised wording has been uploaded into the Workspace folder listed above.

- (3) EASA request Deviation ETSO.Dev.C142a#5 Applicant to provide OCV Variation Summary test data to support continued discussion of the requested OCV Variation change

Assigned to: Fernando Menendez Rodriguez

Status: **OPEN**

EASA discussed test data that he has reviewed. He stated that the chemistry in question is LiFeS₂ and the OCV variation exceeded the current 2% requirement. Previous data discussed during Plenary #12 reflected LiMnO₂ and CFx chemistries. The discussion weighed the effectiveness of OCV as a measure of safety versus excluding a perceived safe chemistry that may not meet these requirements. It was suggested that the OCV could be changed to a “reportable” item instead of a “pass/fail” item. EASA stated they would forward the data for review during the next Plenary.

- (4) Extend request to other SC-235 members for OCV summary data.
Assigned to: Karan Hofmann
Status: **CLOSED**

A second request for test data was transmitted to the SC-235 members, however, no further data was received.

DO-227A Comment Review

The committee reviewed the comments to DO-227A compiled in the “Monitor Comments” spreadsheet located in the SC-235 Workspace folder. Below is a summary of this review.

Table 2-1 and 2-2: Relative Humidity / Temperature Test Profile

As discussed above, the proposed changes were reviewed and accepted. It was agreed that this change was considered a clarification and not a requirement change.

Figure 2-6 and 2-16: Relative Humidity / Temperature Test Profile

As discussed above, the proposed changes were reviewed and accepted. It was agreed that this change was considered a clarification and not a requirement change.

Cell and Battery Test Evaluation Criteria for Temperature Cycling

Table 2-3 and 2-4 state that the OCV variation before and after Temperature Cycling Test should be less than 2%. (ETSO.Dev.C142a#5). As discussed above, EASA discussed OCV performance for a LiFeO₂ battery. The concern is using OCV as measure of safety for a chemistry that is perceived to be safe, but can't meet this requirement. EASA agreed to provide the data for the committee to review at the next plenary.

End Item Vibration

The End Item Vibration test requires that the battery OCV be constantly monitored during test. Additionally, it is required that the test be performed in a state that does not draw current from the battery. This implies that this may require alteration of the end item to comply. It has been proposed to add a clarifying statement allowing alteration of the end item to meet these requirements. The committee agreed provided that the alterations are limited to instrumentation and isolation of the battery. It was also stated that any alterations are subject to approval by the responsible civil aviation authority. **ACTION:** J Densmore to propose revised wording for review during Plenary #14.

End Item Thermal Management

Test Procedure step (e) states to continue testing until the battery current is less than 0.1A. For low current cells, battery current may always be below 0.1A. It is suggested that that this step change from "is less than 0.1A" to "is less than 0.1A or 1/100th of I1, whichever is lower". After discussing, the committee concluded that for low current applications, there are minimal thermal management concerns. Passing the test "quickly" is acceptable. No change required. The proposed change was rejected.

Table 2-4: Battery Test Evaluation Criteria

Table 2-4 has a "blank" entry for the evaluation criteria for the Battery Drop Test. Because the written requirements of the Battery Drop Test procedure (paragraph 2.4.2.2.2) does not require OCV be reported or included in the evaluation criteria, it is implied that the table should show "-". The table also has an "F" entry for the evaluation criteria for the Battery Impact Test, but no footnote (e.g. 1). Because the written requirements of the Battery Impact Test procedure (paragraph 2.4.2.2.3) does not require OCV be reported or included in the evaluation criteria, it is implied that the table should show "-". After much discussion, the committee reached consensus to place an "-" in each of these entries as the other evaluation criteria effectively capture the presence of a hazardous condition. It was also agreed that "-" needs to be defined for all tables. It was agreed that this is a clarifying editorial change. **ACTION** – J Densmore to propose revised wording for review during Plenary #14.

Table 2-3: Cell Test Evaluation Criteria

Table 2-3 has an "F" entry for the evaluation criteria for the Cell Drop Test, but no footnote (e.g. 1). Because the written requirements of the Cell Drop Test procedure (paragraph 2.4.1.2.4) does not require OCV be reported or included in the evaluation criteria, it is implied that the table should show "-". After much discussion, the committee reached consensus to place an "-" in this entry as the other evaluation criteria effectively capture the presence of a hazardous condition. It was also agreed that "-" needs to be defined for all tables. It was agreed that this is a clarifying editorial change. **ACTION** – J Densmore to propose revised wording for review during Plenary #14.

Action Item Summary

There was one (1) open action from Plenary #12 and three (3) new actions assigned during this Plenary as summarized below:

- (1) EASA request Deviation ETSO.Dev.C142a#5 Applicant to provide OCV Variation Summary test data to support continued discussion of the requested OCV Variation change
Assigned to: Fernando Menendez Rodriguez
- (2) Propose revised wording to End Item Vibration Test to address allowable alterations for review during Plenary #14.
Assigned to: Jeff Densmore
- (3) Update Table 2-4 to correct entry errors for Battery Drop and Battery Impact tests. Also include note to define "-". Updates to be during Plenary #14.
Assigned to: Jeff Densmore



- (4) Update Table 2-3 to correct entry errors for the Cell Drop test. Also include note to define "-". Updates to be during Plenary #14.

Assigned to: Jeff Densmore

Next Plenary

Plenary #14 has been scheduled as a Virtual Meeting on February 22, 2021. A detailed agenda and WebEx meeting information will be issued closer to this meeting date.

-S-
Jeff Densmore
Secretary

CERTIFIED as a true and accurate summary of the meeting.

-S-
John Trela
Chairman