

Summary of the 24th Plenary Special Committee 235 - Non-Rechargeable Lithium Batteries

Meeting Summary:

The 24th Plenary Meeting of Special Committee 235 (SC-235) was held on July 28, 2022. 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.
Camilo Camargo	ECA Aerospace
Antonio Chiesa	Transport Canada
Jim Christo	NOAA
Nazih Khaouly	Federal Aviation Administration
Frederic Menard	Orolia
Kathryn Mulhollen	U.S. Air Force
Tom Pack	ACR Electronics
Ray Rodriguez	U.S. Air Force
Jim Russell	The Boeing Company (retired)
Leire Segura Martinez de Ilarduya	Airbus
Greg Smith	U.S. Air Force
Clayton Vondrasek	Garmin Ltd
Jeremy Zee	The Boeing Company

Opening Plenary

- The 24th Plenary meeting of SC-235 was convened on July 28, 2022 at 9:00am EDT 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 #23 was reviewed and approved as written.
- All documents and presentation material reviewed during Plenary #24 have been uploaded and are available on in the RTCA AerOpus documents folder.

Plenary #23 Action Item Review

There were no Action Items assigned during Plenary #23.

SC-235 Schedule Review

John Trela discussed the committee's progress towards updating and releasing DO-227B. He revisited the schedule discussed during Plenary #23 and identified minor updates since the last Plenary. He presented the following updated timeline representing achievable milestones:

- Upcoming RTCA PMC Meetings:, Sep 15, 2022, Dec 15, 2022, March 16, 2023, and June 22, 2023,
- Plenary #19: January 18th (Completed)
- Plenary #20: March 7th (Completed)
- Plenary #21: April 19th and 20th - Committee Review of Draft DO-227B (Completed)
- Plenary #22: May 18th and 19th Committee Review of Draft DO-227B (Completed)
- Plenary #23: June 28th and 29th Committee Review of Draft DO-227B (Completed)
- Plenary #24: July 28th Committee Review of Draft DO-227B
- Plenary #25: September 8th (Open FRAC)
- FRAC Process:
 - Submit Draft DO-227B to RTCA for FRAC Sept 9th
 - FRAC Start Sept 12th
 - FRAC comments due Oct 12th
- Plenary #26: Nov / Dec – In Person (FRAC Resolution)
- Plenary #27: Jan 2023– Complete FRAC Resolution and Approve DO-227B to PMC
- Release Process:
 - Document to RTCA February 1st
 - Target RTCA PMC Approval March 16, 2023

Due to lengthy discussions during working group meetings, the draft DO-227B was not ready for FRAC during this plenary meeting. It was agreed that one more month was needed to complete the review of the document changes and member comments. Therefore, it was agreed that the document would not be ready for the December 2022 PMC meeting, but rather the March 2023 meeting. The schedule above reflects these changes. It was also discussed that this schedule delay will require an update to the SC-235 TOR. The Plenary attendees reached consensus that this delay is warranted with wanting to get the document correct vs. causing problems during FRAC or requiring an immediate additional revision, Karan and John will present this requested TOR change at the next PMC meeting in September.

Draft DO-227B Review

The agenda for Plenary #24 was focused on discussing the proposed changes to the End Item Thermal Runaway Containment Test. A copy of the proposed changes to this section was uploaded into AerOpus prior to the Plenary meeting with comments provided by several committee members. The revised test section along with received comments were reviewed in detail.

Key discussion topics are summarized below.

Measurement of temperatures of released gases.

Based on earlier inputs from EASA, there was a request to include a measurement of the temperature(s) of vented gases from the end item during a thermal runaway. Working group discussions concluded that using a heat flux sensor could satisfy this request and suggested wording was included in the test section. There were several questions and opinions expressed during the Plenary meeting including:

1. *Where should the sensor be placed and how will the data be used?* One installer stated that their approach is to maintain a minimum spacing between an end-item containing primary lithium batteries and any surrounding equipment. It was suggested that this requirement not be included in DO-227B
2. *What if the end-item doesn't vent gases?* One equipment manufacturer stated that several of their products completely contain a TR event and that the requirement to use a Heat Flux Sensor overly complicates the test for data that will not be present. It was suggested that the requirement for the Heat Flux Sensor be conditional based on the presence of vented gases
3. *What if the end-item does not have a singular vent port?* One equipment manufacturer stated that some of their products do not contain a single vent port. Rather any released gases slowly "seep" out gasketed seams. Therefore, the location of a Heat Flux Sensor would be very difficult to determine. It was suggested that this requirement not be included in DO-227B

Because EASA was unable to attend this Plenary and that the suggested addition to the TR test was based on questions raised by EASA, it was decided to table further discussion until an upcoming working group meeting when EASA is able to participate in the discussions.

Test Sequence for Gas Collection

The sequence of testing was once again discussed. There appears to remain some uncertainty about the quantity, sequence, and conditions of tests for TR. The latest document clearly states/that at least two (2) TR tests are required, and that testing must consider the installed orientation of the end-item. There was, however, some questions regarding whether the (a) validation of containment and (b) collection of data related to released gas could occur in separate tests (e.g. one test for (a) and one test of (b)).

Collection and Measurement of Gas Data

Several paragraphs were added to the procedure to clarify the process for collecting and measuring vented gas data. As written, the proposed wording would require real-time monitoring and calculation of stability before collecting gas. It was suggested that the gas

sampling be a function of time (as it related to the mixing fan requirements) versus having to calculate percent variation in real time.

Trigger Method

DO-227A and the draft DO-227B require that the Battery Thermal Runaway be initiated by heating of the “worst case” cell. This is substantiated in the Rationale section of Paragraph 2.2.3.2.2. During the review of committee member comments, it was suggested that the initiation method should be heating of the entire battery versus a single cell. This comment was strongly debated as it was viewed as a significant increase in scope of the requirements. Consensus was not reached on this topic and discussion was deferred to future working group sessions.

The committee did not have time to complete review of all proposed changes to the Thermal Runaway Containment Test section. This will continue to be discussed during working group meetings, with the final recommendation to be presented at the next Plenary.

In closing, the committee agreed on updating the completion date stated in the Terms of Reference and requesting PMC Approval. It was also discussed and agreed that completion of the review of the Draft DO-227B document occur in working group sessions with the objective of having a clean, draft document for FRAC approval at the next Plenary meeting.

Action Item Summary

There were no new actions generated during Plenary #24:

Working Group Meetings

Weekly Working Group meetings will continue on Monday’s and Wednesday’s to continue review of the draft DO-227B. Additionally, John and Jeff agreed to begin a “consistency” review of the document.

Next Plenary

Plenary #25 has been scheduled as a Virtual Meeting on 8 September 2022. A detailed agenda and WebEx meeting information will be issued closer to this meeting date. The intent of the next Plenary is to approve DO-227B for FRAC.

-S-
Jeff Densmore
Secretary

CERTIFIED as a true and accurate summary of the meeting.

-S-
John Trela
Chairman