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**Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals**

**Sub-Committee of Experts on the Transport of Dangerous Goods**

**Fifty-ninth session**
Geneva, 29 November – 8 December 2021
Item 4 (b) of the provisional agenda
**Electric storage systems: hazard-based system for classification of lithium batteries**

# Work of the informal working group on hazard-based classification of lithium batteries and cells

**Transmitted by the experts from France and RECHARGE, on behalf of the informal working group***

## Introduction

1. The sixth meeting of the Informal Working Group on hazard-based classification of Lithium Batteries and cells (IWGLB) was held by video conference on 9 and 10 December 2020 and was followed by another video conference on 26 May 2021.

2. A report is annexed to this document to inform the Sub-Committee on the work in progress.

3. More information may be found on the RECHARGE website: https://rechargebatteries.org/sustainable-batteries/unsctdg/.

4. The working group will meet again in December 2021 if regular travel and meeting conditions are restored, following the COVID-19 pandemic situation.

5. The Sub-Committee is invited to take note of the work in progress and comment as appropriate.

* A/75/6 (Sect.20), para. 20.51

# Annex

## Informal working group on hazard-based classification of lithium batteries and cells – Biennium 2021-2022

### Meeting minutes of 26 May 2021 – Video Conference

## Introduction

1. Claude Pfauvadel (France, Chairperson), George Kerchner (PRBA) and Claude Chanson (RECHARGE) welcomed participants to the session. The intent of the meeting is to update the group on the testing that has been completed to date and provide additional information as to next steps regarding propagation and test methods. Given the continued restrictions on travel due to the COVID-19 pandemic, the group was not able to meet in person.

2. Agenda of the meeting:

(a) Review previous meeting minutes (9-10 December 2020).

(b) Review/update of the last laboratories data, based on the report discussed on 9 December 2020, conclusions on the test protocols used. (C. Chanson)

(c) Methodology for cell and batteries classification: review of the proposed classification processes, and associated classification tree. Discussion of new proposals. (P. Bermis, A. Bordes, M. Tsushima)

(d) Methodology for testing the cells and batteries: review and discussion of the methods proposed to identify and quantify the hazards. (All)

(e) Preliminary discussion on the requirements of hazards quantification for the determination of transport classes. (All)

(f) Wrap-up and conclusion by the Chairperson, C. Pfauvadel.

3. Information and presentations given at the meeting are available from the RECHARGE website: https://rechargebatteries.org/sustainable-batteries/unsctdg/.

4. In addition, all historical documents related to the current Informal Working Group are also posted on the RECHARGE website.

#### Review of previous minutes (9-10 December 2020)

5. No comments were received on the previous meeting minutes. The full text is available on the RECHARGE website.

#### Review/update of the last laboratories data, based on the report discussed on 9 December 2020, conclusions on the test protocols used

6. Recharge reminded the group of the test results shared during the December meeting.

7. Conclusions of test protocols used:

(a) Tests were impacted by variations in test methods and that led to challenges in reproducibility. However, there was repeatability of the thermal runaway test using external heating method.

(b) Variations in the following parameters appeared to have significant impact on cell hazards and propagation: Cell format, cell state of charge (SOC), heating rate.

(c) Specific toxicity (i.e. HF and HCN content) review was not repeatable. Significant differences between laboratories were noted.

(d) Regarding the test method:

(i) Heater method provides reproducible way to initiate a thermal runaway. Additional limitations are needed to improve reproducibility: heating rates, heater types, compression between cells.

(ii) Thermal runaway events encountered using the heater method is close to one obtained by self-propagation, although propagation time is different, representing robustness of the test.

(iii) Larger disparity in results appears when the thermal runaway energy is closer to the boundary of non-propagation. It was suggested that some low SOC cells that were not likely to contain enough reaction energy to propagate resulted in a more severe reaction with the heater than a typical internal short circuit.

(e) Reproducibility

(i) Significant difference remains in results between laboratories. Test methodology needs more specificity.

(ii) Set up and equipment

a. Avoid absence of lid on test chamber.

b. Specify efforts for cell compression during test.

c. Detail heating equipment specification and control as well as heating zone size.

(iii) Test protocol

a. Heating rate.

(iv) Hazard characterization

a. Identify additional data points to measure or record (maximum temperature, onset temperature, etc.).

8. It was discussed that laboratories should provide proposals on how to clarify the protocols addressing the conclusions from earlier tests:

(a) Laboratories shared that the technical committee SAE G-27[1] has reviewed many of the specific parameters that are being discussed and developed some similar protocols. However, they have not addressed pouch cell compression.

(b) Participants in the G-27 offered to share their test procedures with the IWGLB for support. It was noted the efforts of the IWGLB is to properly characterize inherent hazards of lithium batteries while G-27 is testing lithium batteries contained in packaging. Thus, there are different goals. Joint discussions would be beneficial to both groups, however.

(c) IWGLB agreed that a smaller test laboratories group should compare different cell chemistries, geography, SOC. Work would be used to address necessary differences in tests based on these parameters.

(d) It would be expected that common cells would be used again to continue to refine the protocols. However, if laboratories have the resources, additional designs could be tested to further test the new protocols. Laboratories would need to obtain their own samples to test (the group will not be provided cells during this round of tests). PRBA can facilitate contact for obtaining appropriate cells.

(e) A smaller group would meet separately in 2021 and results could be presented to the larger group in December 2021.

[1] SAE G-27 is a technical committee on Lithium Battery Packaging Performance within SAE International, formerly named the Society of Automotive Engineers.