

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

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Electric storage systems: miscellaneous

New special provision for all-solid-state lithium ion cells and batteries (UN 3480 and UN 3481) that do not cause thermal runaway - Alternative proposal to document ST/SG/AC.10/C.3/2024/42

Submitted by The Rechargeable Battery Association and Advanced Rechargeable and Lithium Batteries Association (RECHARGE)

I. Introduction

1. As introduced in the in the document ST/SG/AC.10/C.3/2024/42 presented in this session, RECHARGE considers necessary that a differentiation is made between lithium based batteries that can produce internal chemical reactions leading to thermal runaway and lithium based batteries where this risk is not existing because of the absence of the reactive substances in the battery design.
2. Due to the present UN classification system, all batteries chemistries that are using the ~~ion~~ lithium as the charge transfer agent are necessarily as affected to the UN numbers UN 3480 or UN 3090. Historically, all of the lithium battery chemistries presented a risk of thermal runaway, mainly due to the presence of the carbonate based liquid electrolyte.
3. But as introduced in the document ST/SG/AC.10/C.3/2024/42, new chemistries are emerging and now commercialized, called solid state batteries, that do not contain the liquid electrolyte and other substances liable to contribute to the thermal runaway reaction. Nevertheless, because they are still using the lithium ion as charge transfer agent, they are classified and transported under UN 3480 and 30890, whereas, when submitted to the mandatory safety tests of the *Manual of Tests and Criteria* paragraph 38.3, they do not react, as expected based on their chemical composition. Even when submitted to the specifically abusive test intended to initiate the thermal runaway reaction, described in the in newly proposed paragraph [38.3.6.1.2] of the *Manual of Tests and Criteria* (see document ST/SG/AC.10/C.3/2024/13 of this session), they do not produce this reaction until the temperature of 400°C, which represents a practical technical limit for this test.
4. The severity of this thermal run-away propagation test has been tested multiple time on multiple chemistries during the work of the IWG for the classification of lithium batteries, and it is generally leading to a conclusive criteria, initiating a thermal runaway reaction. Nevertheless, the absence of reaction under the test, as presented in the document ST/SG/AC.10/C.3/2024/42, is creating an exception: as these new products do not react under the test, they cannot be classified. Manufacturer of lithium solid state batteries face the paradoxical situation to be required demonstrating a reaction from a non-reactive battery, because of the absence of reactive material.
5. RECHARGE proposes an alternative text to simplify the proposal and clarify that the purpose of the verification test as described in the document ST/SG/AC.10/C.3/2024/42 is simply the demonstration of the absence of risk of thermal runaway, by making a test that is proven generating the thermal runaway in lithium-based batteries presenting this risk. To solve this issue, it is proposed to consider the absence of reaction during the thermal runaway

propagation test, applied to the cell or battery at 100% SOC, as the technical requirement demonstrating the validity of the declaration of absence of reactive substances.

6. Based on this approach, the following change is proposed, as an alternative to the proposal in the document ST/SG/AC.10/C.3/2024/42.

II. Proposal

7. Based on the above, it is proposed to insert in 3.3 of the *Model Regulations* a new special provision applicable to UN 3480 and UN 3481 to exclude lithium ion cells and batteries that satisfy the following conditions from the application of the regulations as follows (added texts to the draft special provision proposed in informal document INF.24 are underlined, deleted texts are in strikethrough):

“XXX: Cells and batteries offered for transport are not subject to other provisions of these Regulations if they meet the following conditions:

(a) cells and batteries meet the provisions of 2.9.4 (a), (e) and (g);

(b) cells and batteries do not contain substances liable to initiate a thermal runaway reaction when submitted to thermal, electrical or mechanical abuse, or internal short circuit, so that these cells or batteries do not cause thermal runaway, rupture, fragmentation, or ignition in the propagation test provided in paragraph [38.3.6.1.2] of the *Manual of Tests and Criteria, xx.x.x.x*;] and

(c) cells and batteries are protected from short circuits. When cells and batteries are installed in equipment, the equipment is provided with an effective means of preventing accidental activation. These requirements do not apply to devices which are intentionally active in transport and which are not capable of generating a dangerous evolution of heat.”
