



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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Item 4 (a) of the provisional agenda

Electric storage systems:

Testing of lithium batteries

UN 38.3 Lithium battery test sequence – clarification

Transmitted by PRBA – The Rechargeable Battery Association*, **

I. Introduction

1. According to the *Manual of Tests and Criteria*, the procedure in section 38.3.4 requires that tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. Test T.7 may be conducted using undamaged batteries previously used in tests T.1 to T.5 for purposes of testing on cycled batteries.
2. Questions have been raised if “in sequence” is explicitly referencing a numerical sequence 1 through 5, or as long as all T.1 through T.5 tests cumulatively apply stresses of the sequence of tests on the same cell or battery.
3. If the numerical sequence of T.1 to T.5 is not critical, there are some operational benefits for large format battery testing making it more efficient to conduct the testing. An example is for the T.2 test, which takes approximately two weeks to conduct. Often, only one or two large format batteries can be tested at once in a chamber. While a battery is under T.2 cycling, it would be beneficial to test T.3 and T.4 on the remaining batteries.
4. Another example where adjustments of the test sequence would be beneficial is in the case where unplanned events occur during testing. One such recent example is a power outage occurring during the T.2 tests, partially interrupting a cycle resulting in only 9 complete thermal cycles at end of the tests. The test laboratory did not capture the incomplete cycle until after the batteries were finished with T.3 vibration test. With the interpretation of numerical sequence of T.1 through T.5 test, the UN 38.3 procedure would have to start over with new samples at T.1. However, if the test sequence is not critical but merely the cumulative T.1 through T.5 stress, the test laboratory could go back and conduct one

* A/78/6 (Sect. 20), table 20.5.

** The document was submitted late to the conference services for processing without the explanation required under paragraph 8 of General Assembly resolution 53/208 B.



additional thermal cycle to complete the tenth thermal cycle then return to conduct T.4 and T.5 tests.

5. It would be expected that the T.5 test would be the last test in sequence regardless due to the destructive nature of the test. The cumulative stress of T.1 through T.4 should prove the robustness of the short circuit safety protection.

6. PRBA therefore proposes a change to the text of the procedure in 38.3.4 of the *Manual of Tests and Criteria* to clarify the acceptable sequence of tests for T.1 through T.5.

II. Proposal

7. The Sub-Committee is invited to amend 38.3.4 of the *Manual of Tests and Criteria* as follows (new text is underlined, deleted text in ~~striketrough~~):

“Tests T.1 to T.~~5~~4 shall be conducted in sequence or out of sequence on the same cell or battery followed by test T.5. Tests T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. Test T.7 may be conducted using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.”
