COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS
Sub-Committee of Experts on the Transport of Dangerous Goods
(Seventeenth session, Geneva, 6-17 December l999, agenda item 5 (c))

MISCELLANEOUS DRAFT AMENDMENTS TO THE MODEL REGULATIONS ON THE TRANSPORT OF DANGEROUS GOODS

Lithium batteries

State of charge during transport and tests for rechargeable batteries/cells

Transmitted by the expert from France

We welcome the proposal of Canada and Japan in INF 7, which brings a lot of improvements to the current test procedures.

Nonetheless we would like the sub-committee to look carefully at the following considerations, related to the state of charge of rechargeable batteries/cells during tests and transport.

In the proposal some tests (ST6) have to be carried out at a state of charge which is lower than the rated capacity (state of charge when transported).

A lower state of charge during the tests makes it easier for the battery/cell to pass the test, because the energy involved is lower and the effects less acute. Therefore it is essential to ensure that the battery/cell may not be transported at a higher state of charge.

On the other side, the rated capacity, as defined in the proposal, is specified by the manufacturer, and does not automatically have to be the maximum capacity of the battery/cell. The specified rated capacity depends on the use of the battery/cell, and a same item may be « pushed » to the upper limits made possible by the technology, especially when a big amount of energy is needed in a short time, as in power supplies for electrical vehicles.

The concept of « rated capacity » is not as clear as it seems and referring to it does not ensure that the battery/cell will nether be transported at a state of charge that makes it dangerous.

For some applications batteries/cells have to be used at a state of charge which does not allow them to pass some tests for transport. This does not harm safety during that use, because in this case the batteries/cells are monitored by complex computerized devices which take care of dangerous reactions.

To avoid any misunderstanding in the way tests shall be performed and further in the way the batteries/cells will be transported, we propose :

1) to have a marking on each rechargeable battery/cell indicating the maximum open circuit voltage admissible during transport ;

2) to prohibit the transport of rechargeable batteries/cells at an open circuit voltage exceeding the specified one ;

3) to define the concept of state of charge when transported in relation with the open circuit voltage which makes it easy to check ;

4) to perform the tests ST1 to ST6 at the state of charge when transported.

PROPOSAL 1 :

In special provision 188. Add the following paragraphs :

« 8. Each rechargeable battery/cell in category B,C, and D shall bear in permanent and clearly legible characters, as appropriate according to its size, the indication :

« MAXIMUM TRANSPORT VOLTAGE : -,- V »

9. No rechargeable battery/cell in category B,C, and D may be transported at a state of charge where the open circuit voltage exceeds the value specified according to § 8. Above. »

Renumber § 8. to 12 as appropriate.

PROPOSAL 2 :

In 38.3.2., add the following definition :

« *Maximum transport voltage* for a rechargeable battery/cell, means the open circuit voltage corresponding to the maximum state of charge permitted during transport, and at which the tests ST1 to ST6 described in 38.3.4. have to be performed. »

In 38.3.3. amend (b) and (c) as follows :

« (b) When testing rechargeable cells and batteries under Tests ST.1 to ST.5 the following shall be tested:

(i) ten cells, at first cycle, at the maximum transport voltage,

(ii) ten cells, at first cycle, in fully discharged states,

(iii) four batteries, at first cycle, at the maximum transport voltage,

(iv) four batteries, at first cycle, in fully discharged states,

(v) four batteries at the maximum transport voltage after fifty deep cycles ending in fully charged states, and

(vi) four batteries after fifty deep cycles ending in fully discharged states.

(c) When testing primary and rechargeable cells under the ST.6 test, the following shall be tested:

(i) for primary cells, five cells in undischarged states and five cells in fully discharged states,

(ii) for component cells of primary batteries, five cells in undischarged states and five cells in fully discharged states,

(iii) for rechargeable cells, five cells at first cycle at the maximum transport voltage and five cells after 50 deep cycles ending in fully discharged states, and

(iv) for component cells of rechargeable batteries, five cells at first cycle at the maximum transport voltage and five cells after 50 deep cycles ending in fully discharged states.

In the case of prismatic cells, ten test cells are required for each of the states of charge being tested, instead of the five described above, in order that the procedure can be carried out on five cells along

the longitudinal axes and, separately, five cells along the other axes. In every case, the test cell is only subjected to one crush.

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