

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 5 of the provisional agenda

Electric storage system

Comments on INF.10 “new proper shipping name for lithium ion capacitors.”

Transmitted by the expert from France

Introduction

1. The expert from France would like to thank the expert from Japan for his paper INF.10. During the discussion on EDLC the fact that there were other types capacitors on the market was mentioned but time was too short to define suitable provisions. The expert from France supports the proposal from Japan to work on this subject.
2. In addition the expert from France would like to mention that other technologies were available like Nickel capacitors. Therefore he would like to propose to add these under the work item.
3. Some information concerning these capacitors including a short analysis on the possible risks, is provided for the sub committee in the annex.
4. One of the main issues related to these types of capacitors as well as with LIC capacitors is that they have to be transported under a certain state of charge. The new SP361 is not suitable for them. In particular short circuiting would damage them.
5. The expert from France supports future work on this type of capacitors. However, to avoid confusion between symmetrical capacitors covered by UN3499 and SP361 we think it would be better to state in special provision SP361 that the entry does not apply to capacitors that need a charge, such as Ni-C or lithium capacitors.

Proposal

At the end of SP 361 add the following sentence:

“Capacitors that need to be transported under a state of charge, such as asymmetrical capacitors (lithium ion capacitors, nickel carbon capacitors...) do not belong to this entry”.

ANNEX

Background information on Nickel Capacitor

Definition of Ni-C

2. Ni-C is an electrochemical hybrid capacitor in which charge and discharge can be repeated by (K⁺ ions) adsorption at the double layer of the negative electrode, and by electrochemical reaction at the nickel hydroxide positive electrode ($\text{NiO(OH)} + \text{H}_2\text{O} + e^- \rightleftharpoons \text{Ni(OH)}_2 + \text{OH}^-$). The positive electrode is comprised of Nickel based materials as for alkaline batteries, and the negative electrode is comprised of carbon materials. The electrolyte used in Ni-C is an alkaline electrolyte as for alkaline batteries.
3. Ni-C with different energy levels (300F to 2000F) has been commercialized as laminated cells, used configured in modules, which comprises cells connected in series and/or parallel to obtain proper voltage and energy necessary for the specific application.
4. Ni-C is quite suitable for applications which require a high energy density, a high power density and excellent durability. Potential applications for Ni-C are as follows:
 - Engine starting alone or in addition of existing starting batteries;
 - Back-up power sources, such as voltage sag compensation and uninterruptible power supplies (UPS);
 - Storage of renewable energy generation, such as wind and photo voltaic power generation; and
 - Energy recovery systems for industrial machinery and transport systems.

Possible risks in transport and safety assessment of Ni-C

5. The following potential transport risk of Ni-C is listed below:
 - Transport risk of energy storage device in a charged state;
 - Ni-C has a lower voltage limit (0.4V to 0.6V), below which, the cell loses its function. Therefore, Ni-C cells must be transported in a charged state;
 - Like Alkaline batteries, Ni-C uses an aqueous electrolyte which is not flammable. Therefore, there is no fire risk for Ni-C as for alkaline batteries.
6. Safety assessment for possible this risk is as follows:
 - Transport risk of energy storage device in a charged state; since Ni-C has a lower voltage limit below which the cell loses its function, Ni-C must be transported in a charged state. Therefore, Ni-C must be packed in a way to prevent short circuit. For safety confirmation, even if short-circuit occurs at the time of transport, the following test shall be applied;
 - External short circuit test: no rupture, no disassembly and no fire;