

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 (b) of the provisional agenda

Electric storage systems:

Hazard-based system for classification
of lithium batteries

New identification system – lithium cells and batteries – precedents and reasoning

Transmitted by the expert from the United Kingdom

I. Introduction

1. Within informal documents INF.27, 28 and 29, the expert from the United Kingdom makes proposals for additions to the Dangerous Goods List, new special provisions and packing instructions as well as consequential amendments. This paper provides the precedents and reasoning relied upon to form those proposals.

II. Dangerous goods list

2. The classification of lithium batteries set out in the IWG document ST/SG/AC.10/C.3/2024/13 has been approached in the same way as that of explosives in that division numbers are proposed. As will already be appreciated, substances and articles in Class 1 can have more than one division and or compatibility group. Where this occurs separate UN number entries are given for each variant even though the proper shipping name (PSN) is identical. Such a practice should now be applied to lithium batteries using the 8 divisions currently proposed by the IWG.

3. A further consideration for the Dangerous Goods List is based on removing the one size fits all for lithium ion or lithium metal batteries. Granularity in identification has been suppressed, but the current text includes lots of identified variations, not least batteries and cells. Although there seems to be a current reluctance to add new UN numbers, previous Sub-Committee sessions have embraced mass changes where existing regulatory confusion can be removed. For example, corrosives that could occur in both the solid state and the liquid state were covered by a single UN number previously. This caused confusion in respect of packing as it was unclear which packing instruction applied, if the packaging had undergone the appropriate tests and how the documents should be completed. The decision was therefore taken to create new numbers and split the entries. This added 70 + new numbers but ended the confusion. A similar confusion now exists with the lithium battery regulations which is amply illustrated by the plethora of dedicated training courses on lithium batteries and how to ship lithium battery guidance.

4. Continuing the comparison between Class 8 and lithium batteries further highlights the suppression of granularity for lithium batteries. The table below illustrates how alien the current lithium battery entries are in comparison to Class 8.

1 st split	Corrosives				Lithium batteries			
	Basic		Acidic		Ion		Metal	
2 nd split	Liquid	Solid	Liquid	Solid	Battery	Cell	Battery	Cell
UN nos.	~ 290 with individual substances listed by name, many have same packing instruction and requirements.				1 despite there being at least 6 separate identities without the classification split.		1 despite there being at least 6 separate identities without the classification split.	
Packing instructions	One per UN number generally P001 for liquid entries and P002 for solids.				Same 5 per UN number.			
Special provisions	Many have no special provisions. SP274 for N.O.S entries.				~ 10.			

5. There is more to be said about special provisions and how the lithium battery special provisions do not follow the practice for other dangerous goods. To begin with, most dangerous goods do not have special provisions, although when they do, the average is 1-2, occasionally 3, per entry and in part many of these are due to SP274 for N.O.S entries, whereas lithium batteries can have around 10 special provisions. Furthermore, there is another significant difference between special provisions for everything else and lithium batteries. For everything else, a special provision may be applied to multiple UN numbers and when it does, the provision applies to all the UN numbers equally. However, in the case of the lithium battery special provisions, these are often shopping lists of provisions with different parts of the special provision applying to different UN numbers.

III. Packing instructions

6. In relation to UN packaging, it seems the basic principles of packaging have been lost for lithium batteries. The current packing instructions have been crowded with additional provisions and caveats. This introduces the potential for confusion. However, now that we are in a position of categorising the hazards, as a result of the classification system, we can identify the main hazards, identified as thermal runaway with propagation and runaway with fire, and set packing requirements that mitigate the risk such that the event is contained, and the means of transport and other freight are equally protected. In short, the higher the risk, the more robust the packaging. This is similar to the packing group principle applied to other dangerous goods.

IV. Other considerations

7. The proposed scheme is stand alone as it only applies to cells and batteries that have been classified according to the new test criteria. The existing text and provisions remain in place and no transition is needed as the new scheme will be running alongside the old. This proposed scheme is overarching in that it starts with marking cells and batteries with their classification, provides true granularity using all the existing sub-divisions of cells and batteries and adds a few new ones for the purposes of future proofing. The new divisions are reflected in both hazard communication and the packing instructions. Since the *Model Regulations* are multi-modal, specific airfreight issues are not addressed as these create disproportionate restrictions for other modes of transport.

8. Sodium batteries are not included, these are different items and as such should be treated separately as not all the lithium battery text is relevant. However, if the Sub-Committee believes that sodium batteries should be included then new numbers can be added.

9. A new number has been given to waste cells and batteries as the principal is generic rather than specific in relation to mixed collections.

10. Solid state cells and batteries are included in the anticipation that they can be classified by testing.

11. Separate UN numbers are proposed for reduced state of charge cells and batteries. This provides an incentive to test at a reduced state of charge in order to achieve a lower hazard division which correspond with less onerous packing instructions and at the same time provide an easier route for checking and enforcement.

12. Lithium batteries contained in articles is reversed so that the PSN accurately describes what is packed and reduces the likelihood of confusing the entry with a lithium battery entry. No entries are provided for lithium batteries packed with equipment. No other dangerous goods when packed with anything else has a separate UN number.

13. No entries are made for damaged and defective. Since the cell or battery will have been classified at 100 per cent state of charge (worst case) and the packaging required is designed to prevent any event from escaping the packaging, it follows that a damaged cell or battery cannot be any worse than the tested one. Therefore, the same level of packaging can be employed. What has changed as a result of it being damaged and defective is the possibility that there will be an event. Suitable indication can be given as with waste dangerous goods by adding the word 'DAMAGED' or 'DEFECTIVE' in front of the PSN.

14. Starting the UN numbers at 4000 was a deliberate decision. In the long term it will aid recognition that lithium cells and batteries are in the system. In due course the Dangerous Goods List may reach 4000. Similarly, with the packing instructions, the 'P94X' is to reflect the fact that lithium cells and batteries are Class 9, and found at sub-paragraph 4.
