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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

Forty-third session
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Item 4 (e) of the provisional agenda
Electric storage systems: miscellaneous

Electric storage systems – appropriate hazard communication

Transmitted by the International Civil Aviation Organization (ICAO)[1]

Introduction

1. At its forty-first session, the Sub-Committee noted the proposal by ICAO (informal document INF.50) that energy storage devices should constitute a specific group of dangerous goods with specific provisions and agreed that this issue should be considered in the next biennium (ST/SG/AC.10/C.3/82, paragraph 107 refers). It had been noted by ICAO that whilst class 9 includes miscellaneous dangerous substances and articles, only one danger label is assigned to this class and had queried whether this was sufficient to communicate correctly the potential risks posed by these articles e.g. lithium batteries present both electrical and chemical (flammable electrolyte) hazards which are rather different to those posed by substances as diverse as dry ice or environmentally hazardous substances. In addition, it was suggested that, with constantly developing new technology, new articles will be brought to the Sub-Committee, some of which may well be classified as class 9.

2. With regard specifically to lithium batteries in air transport, this has been the subject of extensive discussion by the ICAO Dangerous Goods Panel (DGP).

[1] In accordance with the programme of work of the Sub-Committee for 2013-2014 approved by the Committee at its sixth session (refer to ST/SG/AC.10/C.3/84, para. 86 and ST/SG/AC.10/40, para. 14).

- Informal document INF.51 at the 41st session contained the report of a special meeting devoted to this subject, in particular for those batteries excepted under special provision 188. Resulting amendments to the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* included requirements for training, documentation, operator acceptance checks and provision of information to the pilot-in-command.

- It is obvious that fire on board an aircraft poses one of the most significant threats to safety during flight. Although lithium batteries are allowed as cargo on both passenger and cargo aircraft, it must be noted that aircraft fire suppression systems (Halon 1301) are unable to extinguish lithium metal battery fires. For lithium ion batteries, although Halon 1301 is effective in controlling an open flame and the spread of the fire to adjacent materials, it is not effective in stopping the propagation of thermal runaway within the shipment. Previous decisions by the DGP resulted in the development of a handling label for these excepted batteries in order to convey information to personnel handling them of the risk of fire and that care must be taken to prevent damage to them.

3. In previous biennia, the issue of energy storage systems has been raised (ST/SG/AC.10/C.3/2009/26, informal documents INF.37 and INF.62 at the 35th session) in which discussions focused on the risks posed in transport and how the regulatory requirements addressed the risks. Three categories of hazard posed by electric storage devices were identified:

(a) Chemical hazard based on the electrolyte or material contained within the article

(b) Electrical hazard based on electric storage – dependent on the state of charge and

(c) Both chemical and electrical hazards.

4. Further discussion of the dual chemical and electrical properties of different articles (informal document INF.37, 35th session) led to the Sub-Committee noting "the opinion according to which it was not necessary to deal with electricity storage systems in a special section of the Model Regulations, and also the recommendation that the regulatory scheme currently applicable to them should not be modified." (ST/SG/AC.10/C.3/72, paragraph 52). However, this did not take into account the conclusion contained in the analysis in which it was stated "Batteries transported in a charge state may present such dual properties when they are subject to short-circuit during transportation." Nor did it include any discussion on the possibility of defining an order of precedence i.e. the cases in which the electrical hazard take precedence over the chemical hazard, as suggested in informal document INF.62 (35th session), and the possible need for communication of the electrical hazard.

5. The Sub-Committee is reminded that Part 2 of the Guiding Principles for the Development of the United Nations Model Regulations contains explanatory material outlining the rationale behind the development of the nine classes of dangerous goods:

> To accommodate the large number of dangerous goods and the consistent, rapid development of new substances, the unusual chemical names used to describe them and the different emergency response for them, the Sub-Committee devised tests and criteria to be used to determine which substances could be identified as dangerous goods in transport. The Sub-Committee then devised a system of nine classes for substances with the objective of dividing all current and future dangerous goods into these classes. The system of classes was established keeping in mind the type of containment to be used, the chemical and physical characteristics of the substances

and response procedures that would be most appropriate in the event of an accidental release.

Prior to 1989, classification of lithium batteries would have been based on the chemical lithium, resulting in assignment to Division 4.3 "Substances which, in contact with water, emit flammable gases", packing group I. They were classified as *articles* in Class 9 in the sixth edition of the United Nations Recommendations on the Transport of Dangerous Goods (1989).

6. Based on the foregoing, it is suggested that the following should be considered:

- Is classification of *some* articles to Class 9 appropriate? If yes, what is the rationale behind this assignment, keeping in mind the explanatory material in the Guiding Principles given above?

- If Class 9 is not the most appropriate classification, should consideration be given to new divisions in that class or a new class?

- Is better hazard communication an issue, given that there is no appropriate class/division available to reflect the intrinsically hazardous properties e.g. potential thermal runaway, short circuit, state of charge, electrical properties, dual electrical and chemical properties? If yes, what pictograms/colours would be appropriate to communicate the "different" hazard – the standard "electric shock risk" symbol? Could the "electric shock risk" symbol be incorporated into a new hazard label for those articles identified as possessing the hazard? (either for a new class or division or for those entries identified by UN number)

- Do the current labelling/marking requirements need improvement in order to ensure effective and appropriate hazard communication is given to emergency responders and personnel/organizations involved in the transport/handling of dangerous goods?

- Should the risks take into account the size, quantities and, where appropriate, the energy densities of the particular articles being moved in transport?

Proposal

7. The Sub-Committee is invited to consider whether assignment to class 9 with the consequential danger label (No. 9) is sufficient to convey the specific dangers posed by electric storage devices such as lithium batteries. Depending upon the outcome of the discussion, a paper will be submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods or the Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals, if appropriate.