DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/25)

Delhi, India, 21 to 25 April 2025

Agenda Item 4: Managing safety risks posed by the carriage of energy storage devices *(Ref: Job Card DGP.003.05)*

UPDATE ON THE DEVELOPMENT OF A HAZARD-BASED CLASSIFICATION SYSTEM FOR LITHIUM BATTERIES BY THE UN INFORMAL WORKING GROUP ON HAZARD-BASED CLASSIFICATION OF LITHIUM BATTERIES AND CELLS

(Presented by the Secretary)

SUMMARY

The need for additional operational controls to mitigate aviation-specific risks posed by lithium batteries, including a mechanism to identify and communicate specific hazards and to ensure transparency of shipments, was raised by the ICAO Air Navigation Commission (ANC) and its Council during their consideration of recommendations that led to the establishment of the 30 oer cent state of charge limit for UN 3480 — **Lithium ion batteries** and the prohibition on their transport on passenger aircraft. ICAO advised the Forty-Ninth Session of the UN Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 27 June to 6 July 2016) of these restrictions and the factors that led to the decision of ICAO's governing bodies to adopt them, including the lack of a mechanism to identify and communicate the specific hazards and safety risks associated with each battery and cell type offered for transport to the operator(ST/SG/AC.10/C.3/2016/39)[1]. The Sub-Committee subsequently established an informal working group on lithium batteries and mandated that group to consider a hazard-based system to classify lithium batteries and cells for transport. The first meeting of this group was hosted by ICAO in Montréal from 27 to 29 March 2017.

This information paper provides a report of the UN informal working group on lithium batteries that will be presented to the Sixty-sixth session of the Sub-Committee of Experts on the Transport of Dangerous Goods (Geneva, 30 June to 4 July 2025). The DGP-WG is invited to review the report and provide feedback to ICAO for onward submission, if necessary, to the UN sub-committee.

[1] ST/SG/AC.10/C.3/2016/39

United Nations ST/SG/AC.10/C.3/2025/29

Secretariat

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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

Sixty-sixth session
Geneva, 30 June-4 July 2025
Item 4 (b) of the provisional agenda
Electric storage systems:
Hazard-based system for classification of lithium batteries

Progress report of the informal working group on the hazard-based classification system for lithium cells and batteries (IWG)

Submitted by the experts from Belgium, France and the Advanced Rechargeable and Lithium Batteries Association RECHARGE on behalf of the informal working group (IWG)*

I. Discussion summary

1. The informal working group on the hazard-based classification system for lithium cells and batteries (IWG) met in Shanghai from 4-7 March 2025. The group reviewed the proposals discussed during the previous sessions, and proposed to focus the meeting discussions on the following points:

(a) Updates and new proposals for the testing protocols to support the new classification;

(b) Update and discussion of the hazard-based classification method, appropriate level of granularity, and methods to identify and communicate the different categories; and

(c) Proposals for the transport conditions and related packaging requirement according to the battery categorization.

2. During the discussions, the following main points were identified:

(a) Testing protocols:

Concerning the testing protocols, the ability to measure and characterize vented battery gas was discussed. Data were presented indicating the gas composition for lithium batteries changes with the State of Charge (SoC). The potential benefit was therefore discussed for a test to determine this flammability property, in addition to the gas composition analysis. A new test to determine the gas flammability was

* A/79/6 (Sect. 20), Table 20.6.

proposed and will be discussed at a subsequent meeting of the sub-group of the testing laboratories.

Results of testing was presented indicating that air gaps between cells or batteries can prevent thermal runaway propagation. It was recognized that this information is very useful to define packaging criteria.

(b) Classification and identification:

Concerning the method for classification and identification, the IWG agreed that the following principles would apply:

(i) Separate entries for lithium metal and lithium ion/sodium ion (2)

(ii) Separate entries for cells or batteries alone, and packed with/contained in equipment (2)

(iii) Separate entries for 4 or 5 classification categories (4 or 5)

3. This would result in either 16 or 20 new UN entries.

4. The IWG agreed that the proper shipping names should be identified as “BATTERIES, [battery chemistry], TYPE [category]. For example:

BATTERIES, LITHIUM METAL, TYPE C

5. The majority of the IWG group concluded that it would be appropriate to consider SoC as an intrinsic hazard and, therefore, a reduced SoC would allow the battery to be classified by a lower category for the purposes of packaging and hazard communication. This should be described through a special provision. Some raised concerns over the ability of downstream shippers to appropriately use a system where the same battery can be transported under multiple descriptions based only on the SoC.

6. Regarding the design of the label, the IWG agreed that the Model 9A label would be appropriate for all categories without referencing the specific category in the bottom corner. Adding the category to the label would have no extra benefit in safety communication as the different categories are communicated through the UN number and proper shipping name:

(c) Packaging requirements:

The group discussed an initial proposal for new packing instructions, related to the categories.

The table in the annex of this document identifies different packing instructions appropriate for various battery categories. The content of the packing instructions will be further discussed, as well as how to apply those instructions, including potential modal considerations. The group requested representatives from the respective modes to provide input on the table for future meeting discussions.

7. The following dates are proposed for the next in-person meetings of the IWG:

(a) 3-5 December 2025 in Geneva, Switzerland following the sixty-seventh session of the Sub-Committee; and

(b) 8-10 July 2026 in Geneva, Switzerland following the sixty-eighth session of the Sub-Committee.

II. Summary of the IWG proposals

8. The group settled on the following points identified below:

Concerning the testing

(a) Cells testing and categorization: the flow chart will be updated to include the origin of the data (i.e. T.9-T.13);

(b) The amount of flammable gas that is produced is significantly reduced by lower SOC, gas flammability testing may be useful;

Concerning the identification

(c) Lithium ion and lithium metal should remain separated for emergency response, and separate entries for packed with/contained in equipment remained;

(d) No support to include the voltage on the test summary, but acknowledgement that voltage would be a way of determining SoC;

(e) A unique proper shipping name should be used for the new entries to distinguish new entries from the existing entries;

(f) There was no support to mark the category or type on the cell/battery;

(g) The Model 9A label is acceptable for communicating the hazard and would not need to include the category/type on the label;

Concerning the packing instructions

(h) Packaging mitigation will not change the categorization or type;

(i) If SoC is used to recategorize the cell/battery, this should be communicated on the documentation but not on the package (marks/labels);

(j) The majority of the IWG supported using SoC to change the categorization or type as it relates to intrinsic hazards. However, this will be presented to the Sub-Committee for consideration. If agreed, the cell/battery with a reduced SoC may benefit from lower categorization and packaging; and

(k) The inclusion of category D representing a large quantity of non-flammable gas generated during propagation was discussed but the group did not achieve consensus as to whether it needed to be included. The option will be presented to the Sub-Committee for consideration.

9. The minutes of the last IWG meeting are reproduced in informal document INF.12 to provide detailed information on the discussions.

10. An update to this document, introducing the changes discussed above, will be shared as a later additional informal document to the Sub-Committee session.

Annex

[English only]

Packing instructions for various battery categories

Maximum product Hazards characterization	*Product testing at 100% SOC and classification in Types*	Chemical Content Hazards Only **Type 9 F**	No propagation , heat, Gas < 0.25 L **Type 9 E**	No propagation, heat, Flammable 0.25L< Gas < 25 L **Type 9 D**	No propagation heat, flammable 25L< Gas <500 L **Type 9 C**	Propagation or not HEAT, Non flam. Large Q. Gas **Type 9 B**	Propagation or not HEAT, Flammable Large Q. Gas **Type 9 A**
Hazard mitigation at product level	*Main methods: Cell and battery SOC, Battery design*	/	/ Battery: propagation prevention	Cell: SOC Battery: propagation prevention	Cell: SOC Battery: propagation prevention	Cell: SOC Battery: propagation prevention	Cell: SOC Battery: propagation prevention
Product Hazard as transported characterization, Identification	*If needed, product test at SOC and battery test, Assignment of UN number and prop. shipping name*	**UN 3600** (BATTERY, SODIUM and LI ION) **UN 3601** (LI METAL) **Type 9 F**	**UN 3602** (BATTERY SODIUM and LI ION) **UN 3603** (LI METAL) **Type 9 E**	**UN 3604** (BATTERY SODIUM and LI ION) **UN 3605** (LI METAL) **Type 9 D**	**UN 3606** (BATTERY SODIUM and LI ION) **UN 3607** (LI METAL) **Type 9 C**	**UN 3606** (BATTERY SODIUM and LI ION) **UN 3607** (LI METAL) **Type 9 B**	**UN 3608** (BATTERY SODIUM and LI ION) **UN 3609**(LI METAL) **Type 9 A**
Product protection at packaging level	*Packaging selection and packaging instructions*	general provisions, or strong packaging or casing **PI 940** No short circuit/no activation	general provision or strong, rigid outer Packaging, or casing **PI 940** No short circuit/no activation	PG II or Strong, rigid outer Packaging, or casing >12 kg **PI 941** No short circuit/no activation	PG II or Strong, rigid outer Packaging, or casing>12kg **PI 941** No short circuit/no activation	PG II or Strong, rigid outer Packaging, or casing>12kg **PI 941** No short circuit/no activation	PG II or Strong, rigid outer Packaging, or casing>12kg **PI 941** No short circuit/no activation
Hazard mitigation at packaging level	*Product Gap testing and Complementary Packaging Instructions*	/	/	/	+ Propagation prevention by separations or others methods **PI 942**	+ Propagation prevention by separations or others methods **PI 942**	+ Propagation prevention by separations or others methods **PI 942**
Hazard containment at packaging level	*Package/material testing if needed, Complementary Packaging Instructions*				+ Non-combustible, non-conductive material **PI 943**	+ Non-combustible, non-conductive material **PI 943**	+ Non-combustible, non-conductive material **PI 943**

Note: In this table, the types have been renamed after the meeting in a reverse order F to A.