



WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTY-NINTH MEETING

13 to 17 November 2023

Agenda Item 4: Managing safety risks posed by the carriage of lithium batteries by air (Ref: Job Card DGP.003.04)

REDUCED CHARGE FOR VEHICLES POWERED BY LITHIUM ION BATTERIES

(Presented by D. Brennan)

SUMMARY

This working paper proposes that vehicles powered by lithium ion batteries (new UN No. 3556 (see DGP/29-WP/13)) with a Watt-hour rating greater than 100 Wh be offered for air transport with the battery “fuel gauge” at 25 per cent or less.

Action by the DGP: The DGP is invited to consider the proposal to amend Packing Instruction 952 shown in the appendix to this working paper.

Note.— Amendments to Packing Instruction 952 proposed in DGP/29-WP/14 for the sake of harmonization with the twenty-third revised edition of the Recommendations on the Transport of Dangerous Goods, UN Model Regulations have been incorporated (without redline or strikeout) in the appendix to this working paper.

1. INTRODUCTION

1.1 Proposed revisions to Packing Instruction 952 to apply a limit on the amount of charge in lithium ion batteries installed in vehicles (new UN No. 3556 (see DGP/29-WP/13)) were discussed at the 2023 DGP Working Group meeting (DGP-WG/23, 15 to 19 May 2023, Rio de Janeiro, Brazil) (see paragraph 4.4.1.1 of the DGP-WG/23 Report). While there was strong support for the amendment proposed, there were some concerns expressed by some panel members against adopting the proposal at DGP-WG/23.

1.2 The concerns expressed by some panel members included the potential overlap between articles currently assigned to UN 3481 — **Lithium ion batteries contained in equipment** and to small vehicles that will be assigned to UN 3556 — **Vehicle, lithium ion battery powered** with effect 1 January 2025. Presently there is no requirement for lithium ion batteries to be shipped at a lower state of

charge when installed in equipment, and just applying this requirement to vehicles and not equipment was seen as being inconsistent.

1.3 It is recognized that there are a number of inconsistencies with the provisions for lithium ion batteries, particularly where vehicles are concerned. For example, there is a 35 kg limit on lithium ion batteries shipped under UN 3480 — **Lithium ion batteries** or UN 3481 — **Lithium ion batteries packed with or contained in equipment**, above which approval is required from the appropriate national authorities of the States of Origin and of the Operator. No such limit applies to lithium ion batteries installed in vehicles.

1.4 Even the determination of just what is a “vehicle” can be problematic, particularly for items such as drones or robots. If the drone or robot is not a “self-propelled apparatus designed to carry one or more persons or goods”, then according to Special Provision A214, it is not a vehicle and instead must be classified as UN 3481 — **Lithium ion batteries contained in equipment**.

1.5 However, these are existing inconsistencies arising from the way that the provisions in the UN Model Regulations have been developed over time that cannot be addressed by the panel at this time and should not prevent the panel from considering this proposal favourably.

1.6 There were comments provided that given the decision by the panel at DGP/28 that any decision on adopting a requirement for lithium ion batteries contained in equipment to be shipped at a reduced state of charge should be based on a safety risk assessment (see paragraph 4.2 of the DGP/28 Report), it would be inconsistent to implement a requirement for vehicles powered by lithium ion batteries to be discharged without conducting a safety risk assessment.

1.7 In this respect the author believes that there is ample evidence of the risk posed by vehicles powered by lithium ion batteries where the battery is fully charged. This has been demonstrated by at least two serious fires on board ships that involved the lithium ion batteries installed in the vehicles, resulting in an uncontrollable fire, with one ship being lost in the middle of the Atlantic.

1.8 As such it is believed that there is little to be gained by delaying a decision on adopting a reduction to the power in lithium ion batteries installed in vehicles, just so that a safety risk assessment can be performed, that will almost certainly conclude that the risk associated with the carriage of these vehicles can be reduced by imposing a limitation on the indicated charge in the lithium ion battery.

1.9 However, it is recognized that small vehicles with a lithium ion battery not exceeding 100 Wh should perhaps be treated differently given that equipment with installed lithium ion batteries meeting Section II of Packing Instruction 967 are excepted from most of the provisions of the Technical Instructions. For this reason, the proposal excepts vehicles powered by lithium ion batteries from having to be shipped with the lithium ion battery at a reduced state of charge where the lithium ion battery has a Watt-hour rating not exceeding 100 Wh.

2. ACTION BY THE DGP

2.1 The DGP is invited to consider the proposal to amend Packing Instruction 952 shown in the appendix to this working paper.

Note. — Amendments to Packing Instruction 952 proposed in DGP/29-WP/14 for the sake of harmonization with the twenty-third revised edition of the Recommendations on the Transport of Dangerous Goods, UN Model Regulations have been incorporated without redline or strikeout in the appendix to this working paper.

APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

...

Part 4

PACKING INSTRUCTIONS

...

Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

...

Packing Instruction 952

...

Amendments proposed in DGP/29-WP/14 are incorporated in this proposal.

ADDITIONAL PACKING REQUIREMENTS

...

Battery-powered vehicles or equipment must meet the following requirements:

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle or equipment and must be protected in such a manner so as to prevent damage and short circuits. In addition:

- 1) If spillable batteries are installed, and it is possible for the vehicle or equipment to be handled in such a way that batteries would not remain in their intended orientation, they must be removed and packed according to Packing Instruction 870.
- 2) If lithium batteries or sodium ion batteries are installed:
 - i) batteries identified as being damaged or defective in accordance with Special Provision A154 are forbidden for transport; and
 - ii) lithium batteries must meet the provisions of Part 2;9.3 and sodium ion batteries must meet the provisions of Part 2;9.4, unless otherwise approved by the appropriate authority of the State of Origin, except that pre-production prototypes of lithium or sodium ion batteries or cells, when these prototypes are transported for testing, or low production runs of lithium or sodium ion batteries or cells that have not been tested to the requirements in Part III, subsection 38.3 of the UN *Manual of Tests and Criteria* may be transported aboard cargo aircraft if approved by the appropriate authority of the State of Origin and the State of the Operator. A copy of the document of approval must accompany the consignment.
 - iii) where the battery is removed from the vehicle and is packed separate from the vehicle in the same outer packaging, the package must be consigned as UN 3481— **Lithium ion batteries packed with equipment**, UN 3552 — **Sodium ion batteries packed with equipment** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966, 977 or 969, as applicable.
 - iv) vehicles powered by lithium ion batteries (UN 3556) must have the battery(ies) discharged as far as practicable, and where charge remains, the indicated range or indicated battery capacity must not exceed 25 per cent. This requirement does not apply where the lithium ion battery(ies) powering the vehicle has a Watt-hour rating not exceeding 100 Wh.
- 3) If metallic sodium or sodium alloy batteries are installed, they must conform to the requirements of Special Provision A94.

...