



WORKING PAPER

DANGEROUS GOODS PANEL (DGP)

TWENTY-EIGHTH MEETING

Virtual, 15 to 19 November 2021

Agenda Item 4: Managing safety risks posed by the carriage of lithium batteries by air (Ref: Job Card DGP.003.03)

REDUCED STATE OF CHARGE NOT EXCEEDING 30 PER CENT FOR UN 3481 THROUGH PACKING INSTRUCTIONS 966 AND 967

(Presented by S. Schwartz)

SUMMARY

This working paper proposes to amend Packing Instructions 966 and 967 of the Technical Instructions to require UN 3481 — **Lithium ion batteries packed with equipment** and UN 3481 — **Lithium ion batteries contained in equipment** be offered for transport at the lowest practical state of charge, but not exceeding 30 per cent.

Action by the DGP: The DGP-WG is invited to consider amendments as detailed in the appendix to this working paper.

1. INTRODUCTION

1.1 When the 30 per cent state of charge (SOC) requirement for UN 3480 — **Lithium ion batteries** was implemented in Packing Instruction 965 of the Technical Instructions, it was seen as a way to quickly and easily reduce the general risk they pose in air transport. The 30 per cent level was based on tests demonstrating significantly reduced risk from many cells and batteries offered for transport.

1.2 It has been assumed that the equipment in UN 3481 **Lithium ion batteries packed with equipment** and UN 3481 — **Lithium ion batteries contained in equipment** provides adequate protection from both thermal runaway propagation and explosive gas generation, but little data has been presented to demonstrate this. Additionally, battery energy density has been increasing and electronic component size has been decreasing, resulting in reduced protection afforded by the equipment in the case of a battery failure.

1.3 Limiting the SOC for UN 3480 has been accepted as an important safety enhancement, and extending the same requirements to UN 3481 would further reduce the risk lithium batteries pose in air transport by reducing the likelihood of thermal runaway propagation, the energy available to initiate a fire in the event of an internal short circuit, and the amount of explosive gas generated during a thermal runaway.

1.4 The DGP is invited to consider whether Packing Instructions 966 and 967 of the Technical Instructions should be amended to require UN 3481 to be offered for transport at the lowest practical SOC, but no higher than 30 per cent.

2. **ACTION BY THE DGP**

2.1 The DGP-WG is invited to consider amendments as detailed in the appendix to this working paper.

APPENDIX

PROPOSED AMENDMENT TO PART 4 OF THE TECHNICAL INSTRUCTIONS

Part 4

PACKING INSTRUCTIONS

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Chapter 11

CLASS 9 — MISCELLANEOUS DANGEROUS GOODS

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Packing Instruction 966

Passenger and cargo aircraft for UN 3481 (packed with equipment) only

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I.2 Additional requirements

- Lithium ion cells and batteries must be offered for transport at the lowest practical state of charge but not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.
- Lithium ion cells and batteries must be protected against short circuits.

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II.2 Additional requirements

- Lithium ion cells and batteries must be offered for transport at the lowest practical state of charge but not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.
- Lithium ion cells and batteries must:
 - be placed in inner packagings that completely enclose the cell or battery, then placed in a strong rigid outer packaging; or
 - be placed in inner packagings that completely enclose the cell or battery, then placed with the equipment in a strong rigid outer packaging.

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Packing Instruction 967

Passenger and cargo aircraft for UN 3481 (contained in equipment) only

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I.2 Additional requirements

- Lithium ion cells and batteries must be offered for transport at the lowest practical state of charge but not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.
- The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

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II. SECTION II

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II.2 Additional requirements

- Lithium ion cells and batteries must be offered for transport at the lowest practical state of charge but not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the State of Origin and the State of the Operator.
- The equipment must be secured against movement within the outer packaging and must be equipped with an effective means of preventing accidental activation.

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