International Civil Aviation Organization

DGP/28-WP/10
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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 3171

(Presented by S. Schwartz)

SUMMARY

This working paper proposes to amend Packing Instruction 952 of the Technical Instructions to require UN 3171 — **Battery-powered equipment** and UN 3171 — **Battery-powered vehicle** to be offered for transport at the lowest practical state of charge (SOC), but not exceeding 30 per cent.

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

1. INTRODUCTION

1.1 Packing Instruction 952 of the Technical Instructions applies to UN 3171 — **Battery-powered equipment** and UN 3171 — **Battery-powered vehicle**.

1.2 These batteries can be very large and can include a very large numbers of cells. Some electric automobile battery packs can weigh hundreds of kilos and contain around 10,000 cells that are approximately the same size as an 18650.

1.3 UN 3480 — **Lithium ion batteries** are normally shipped under Packing Instruction 965 of the Technical Instructions with a maximum battery mass of 35 kg. Without State approvals these packages must be offered for transport at a maximum state of charge (SOC) of 30 per cent.

1.4 Since there is no limit on the battery size of a battery installed in a vehicle (UN 3171) , the hazard from a propagating thermal runaway in UN 3171 is potentially much greater than that of a shipment of lithium ion batteries (UN 3480) when shipped in accordance with Packing Instruction 965 of the Technical Instructions.

1.5 Federal Aviation Administration (FAA) test data indicates thermal runaway propagation and explosive gas generation are both significantly reduced by shipping lithium ion batteries and cells below 30 per cent SOC.

1.6 In order to lower the risk of thermal runaway propagation and lower the amount of explosive gas generation if a cell goes into thermal runaway, it is proposed to limit the SOC of lithium ion battery powered equipment and vehicles shipped under Packing Instruction 952 of the Technical Instructions to the lowest practical level, but not to exceed 30 per cent.

2. ACTION BY THE DGP

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

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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 952

Passenger and cargo aircraft for UN 3171 only
(See Packing Instruction 220 for flammable gas-powered engines and machinery, Packing Instruction 378 for flammable liquid-powered engines and machinery, Packing Instruction 950 for flammable liquid-powered vehicles, Packing Instruction 951 for flammable gas-powered vehicles or Packing Instruction 972 for engines or machinery containing only environmentally hazardous fuels)

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BATTERY-POWERED VEHICLES, MACHINES OR EQUIPMENT MUST MEET THE FOLLOWING REQUIREMENTS:

Batteries

All batteries must be installed and securely fastened in the battery holder of the vehicle, machine 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, machine 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 492 or 870 as applicable;

2) if lithium batteries are installed in a vehicle, they must meet the provisions of Part 2;9.3, unless otherwise approved by the appropriate authority of the State of Origin. Where the lithium 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** or UN 3091 — **Lithium metal batteries packed with equipment** and packed according to Packing Instruction 966 or 969, as applicable; and

3) Lithium ion batteries installed in equipment or vehicles must be offered for transport at the lowest practical state of charge but not exceeding 30 per cent of their rated capacity; and

~~3~~4) if sodium batteries are installed they must conform to the requirements of Special Provision A94.

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