International Civil Aviation Organization

WORKING PAPER

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DANGEROUS GOODS PANEL (DGP) WORKING GROUP MEETING (DGP-WG/21)

Virtual Meeting, 24 to 28 May 2021

Agenda Item 2: Managing air-specific safety risks and identifying anomalies
2.3: Develop proposals, if necessary, for amendments to the Supplement to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284SU) for incorporation in the 2023-2024 Edition

CLARIFICATION FOR PACKING INSTRUCTION 910

(Presented by the Rapporteur of the DGP Working Group on the Supplement)

REVISED

SUMMARY

Packing Instruction 910 applies to annual production runs consisting of not more than 100 cells or batteries and to pre-production prototype lithium ion/metal batteries and cells, both packed alone, or when packed with or contained in equipment. The batteries and cells transported under this packing instruction have not been tested to the requirements within the UN Manual of Tests and Criteria, Part III, subsection 38.3.

In Packing Instruction 910, there is a requirement for the lithium ion batteries or cells to be offered into transport with a state of charge that does not exceed 30 per cent; this requirement applies to both lithium ion batteries and cells that are packed alone, and also those that are packed with or contained in equipment.

Additionally, it was highlighted that the additional packing requirements for '*Cells and batteries, including when packed with equipment*' needs clarification to ensure that lithium ion/metal batteries and cells packed on their own are also subject to the six requirements.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 Packing Instruction 910 in the Supplement relates to the following dangerous goods: UN 3090 — **Lithium metal batteries**, UN 3091 — **Lithium metal batteries packed with equipment**,

UN 3091 — **Lithium metal batteries contained in equipment**, UN 3480 — **Lithium ion batteries**, UN 3481 — **Lithium ion batteries packed equipment** and UN 3481 — **Lithium ion batteries contained in equipment**.

1.2 Packing Instruction 910 applies to annual production runs consisting of not more than 100 cells or batteries and to pre-production prototype lithium ion/metal batteries and cells, both packed alone, or when packed with or contained in equipment. The batteries and cells transported under Packing Instruction 910 do not meet the requirements of Part 2;9.3 a) of the Technical Instructions, being the tests of section 38.3 contained within the UN Manual of Tests and Criteria (UN MTC).

1.3 The 'General requirements' section of Packing Instruction 910, requires that:

> Lithium ion cells and batteries must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the States of Origin and the State of the Operator.

1.4 The DGP Working Group on the Supplement (DGP-WG/SUPP) considered that Packing Instruction 910 relates to untested lithium batteries and cells, which in transport present a higher risk profile than those that meet the UN 38.3 test criteria. Therefore, the DGP-WG/SUPP concluded that it is the intent of Packing Instruction 910 to apply the requirement for no more than a 30 per cent state of charge (unless a higher state of charge is approved by the State of Origin and the State of Operator), to both lithium ion batteries and cells packed on their own (UN 3480), and when packed with or contained in equipment (UN 3481).

1.5 Additionally, in reading the title '*Cells and batteries, including when packed with equipment*' together with requirement 1), confusion is created as to whether this section only applies to cells and batteries when packed with equipment, and not also batteries or cells that are packed on their own:

> *Cells and batteries, including when packed with equipment*
>
> 1) Batteries and cells, including equipment, of different sizes, shapes or masses must be packaged in an outer packaging of a tested design type listed below provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested. Rigid large packagings, as shown below, are permitted for a single battery, including when packed with or contained in equipment;

1.6 Taking into consideration the discussion in paragraph 1.5 of this paper, and when compared to the structure of packing instruction LP 905 in the UN Recommendations on the Transport of Dangerous Goods Model Regulations (UNMR), the wording '…or contained in...' should be moved from the '*Cells and batteries, including when packed with equipment'* and incorporated within the '*Cells and batteries contained in equipment*' section under point 1).

1.7 Words consistent with LP 905 and the '*Cells and batteries, including when packed with equipment'* section of PI 910 were added to the '*Cells and batteries contained in equipment*' section to clarify that rigid large packagings are permitted for a single item of equipment containing cells or batteries.

1.8 To address the issues identified in this paper and provide clarification within Packing Instruction 910, the DGP-WG/SUPP has put forth recommendations within the appendix for review and consideration by the Dangerous Goods Panel DGP.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to review the amendments shown in the appendix and consider these amendments for inclusion into the Supplement by corrigendum, if a corrigendum is to be issued.

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APPENDIX

PROPOSED AMENDMENT TO PART S-4 OF THE SUPPLEMENT TO THE TECHNICAL INSTRUCTIONS

Part S-4

PACKING INSTRUCTIONS

. . .

Chapter 11

CLASS 9 – MISCELLANEOUS DANGEROUS GOODS

. . .

Packing Instruction 910

Cargo aircraft only

Introduction

This instruction applies to UN Nos. 3090, 3091, 3480 and 3481 annual production runs consisting of not more than 100 cells or batteries and to pre-production prototypes of cells or batteries when these prototypes are transported for testing.

General requirements

Part 4, Chapter 1 requirements of the Technical Instructions must be met.

Lithium ion cells and batteries (UN 3480), including when packed with or contained in equipment (UN 3481), must be offered for transport at a state of charge not exceeding 30 per cent of their rated capacity unless a higher state of charge is specifically approved by the States of Origin and the State of the Operator.

ADDITIONAL PACKING REQUIREMENTS

— Packagings, including large packagings, must meet the Packing Group I performance requirements.
— Cells and batteries must be protected against short circuit. Protection against short circuits includes, but is not limited to:

  — individual protection of the battery terminals;
  — inner packaging to prevent contact between cells and batteries;
  — batteries with recessed terminals designed to protect against short circuits; or
  — the use of an electrically non-conductive and non-combustible cushioning material to fill empty space between the cells or batteries in the packaging.

Cells and batteries, including when packed with equipment

1) Batteries and cells, including equipment, of different sizes, shapes or masses must be packaged in an outer packaging of a tested design type listed below provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested. Rigid large packagings, as shown below, are permitted for a single battery~~,~~ including when packed with ~~or contained in~~ equipment;
2) Each cell or battery must be individually packed in an inner packaging and placed inside an outer packaging;
3) Each inner packaging must be completely surrounded by sufficient non-combustible and electrically non-conductive thermal insulation material to protect against a dangerous evolution of heat;
4) Appropriate measures must be taken to minimize the effects of vibration and shocks and prevent movement of the cells or batteries within the package that may lead to damage and a dangerous condition during transport. Cushioning material that is non-combustible and electrically non-conductive may be used to meet this requirement;

5) Non-combustibility must be assessed according to a standard recognized in the State where the packaging is designed or manufactured;

6) A cell or battery with a net mass of more than 30 kg is limited to one cell or battery per outer packaging.

Cells and batteries contained in equipment

1) Equipment of different sizes, shapes or masses must be packed in an outer packaging of a tested design type listed below provided the total gross mass of the package does not exceed the gross mass for which the design type has been tested. Rigid large packagings, as shown below, are permitted for a single item of equipment containing cells or batteries;

2) The equipment must be constructed or packaged in such a manner as to prevent accidental operation during transport;

3) Appropriate measures must be taken to minimize the effects of vibration and shocks and prevent movement of the equipment within the package that may lead to damage and a dangerous condition during transport. When cushioning material is used to meet this requirement it must be non-combustible and electrically non-conductive; and

4) Non-combustibility must be assessed according to a standard recognized in the State where the packaging is designed or manufactured.

Packagings not subject to Part 6 of the Technical Instructions

The equipment or batteries may be packed in outer packagings or protective enclosures not subject to the requirements of Part 6 of the Technical Instructions under conditions specified by the appropriate national authority. Additional conditions that may be considered in the approval process include, but are not limited to:

1) The equipment or the battery must be strong enough to withstand the shocks and loadings normally encountered during transport, including trans-shipment between unit load devices and between unit load devices and warehouses as well as any removal from a pallet or unit load device for subsequent manual or mechanical handling; and

2) The equipment or the battery must be fixed in cradles or crates or other handling devices in such a way that it will not become loose during normal conditions of transport.

OUTER PACKAGINGS

Boxes	*Drums*	*Jerricans*
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibre (1G)	Plastics (3H2)
Natural wood (4C1, 4C2)	Other metal (1N2)	Steel (3A2)
Other metal (4N)	Plastics (1H2)	
Plywood (4D)	Plywood (1D)	
Reconstituted wood (4F)	Steel (1A2)	
Plastics (4H1, 4H2)		
Steel (4A)		

RIGID LARGE PACKAGINGS

Boxes

Aluminium (50B)
Fibreboard (50G)
Natural wood (50C)
Other metal (50N)
Plastics (50H)
Plywood (50D)
Reconstituted wood (50F)
Steel (50A)

— END —