DGP/25-WP/21
20/8/15

منظمة الطيران المدني الدولي

ورقة عمل

فريق خبراء البضائع الخطرة

الاجتماع الخامس والعشرون

مونتريال، من ١٩ إلى ٢٠١٥/١٠/٣٠

البند رقم ٥ من جدول الأعمال: وضع استراتيجية شاملة للتخفيف من المخاطر المرتبطة بنقل بطاريات الليثيوم بما في ذلك وضع معايير للتغليف قائمة على الأداء وجهود لتيسير الامتثال.

حذف الأحكام الواردة في القسم الثاني فيما يخص إرساليات بطاريات أيونات الليثيوم (رقم الأمم المتحدة ٣٤٨٠) وبطاريات معدن الليثيوم (رقم الأمم المتحدة ٣٠٩٠)

(مقدمة من السيد روتجرز)

الملخص

تعرض ورقة العمل هذه اقتراحاً رسمياً بحذف الأحكام الواردة في القسم الثاني من تعليمات التعبئة ٩٦٥ و٩٦٨ فيما يخص **بطاريات أيونات الليثيوم** (رقم الأمم المتحدة ٣٤٨٠) **وبطاريات معدن الليثيوم** (رقم الأمم المتحدة ٣٠٩٠).

الإجراء المطلوب من مجموعة العمل لفريق خبراء البضائع الخطرة: فريق الخبراء مدعوّ إلى النظر في تعديل التعليمات الفنية ٩٦٥ و٩٦٨ على النحو المبيّن في المرفق بورقة العمل هذه.

1. INTRODUCTION

1.1 In October 2010, the Federal Aviation Administration (FAA) in the United States of America issued a Safety Alert for Operators, alerting operators to findings by the FAA William J. Hughes Technical Center and advising them to adopt certain recommendations for the carriage of lithium batteries by air. These recommendations included having operators request that customers identify bulk shipments of currently excepted lithium batteries, and that operators load these batteries in Class C cargo compartments or in locations where alternate fire suppression was available.

1.2 In July 2015, the Boeing Company issued a Multi Operator Message, advising operators of Boeing aircraft that transport either lithium ion or lithium metal batteries to conduct a safety risk assessment. Boeing recommended that the risk assessment should consider, among other factors, the

types and quantities of lithium batteries carried, the quantity of batteries per flight, the location of the batteries within the cargo compartment, and their proximity to other dangerous goods.

1.3 Also in July 2015, Airbus Industries published an In-Service Information article concerning the transport of lithium batteries aboard Airbus aircraft. Due to the limited fire suppression capabilities of cargo compartments designed to current standards in mitigating a fire involving lithium batteries, Airbus recommended that operators conduct a full risk assessment of lithium battery transport. This risk assessment should take into account the quantity and density of lithium battery shipments, the types of lithium batteries to be shipped, the likely location of pallets/containers within the cargo hold, and the capabilities of the aircraft cargo compartment in which the batteries are to be carried. Furthermore, Airbus recommended "the identification and notification of all shipments of lithium batteries (especially Section II)", and to consider "establishing a policy to notify the flight crew of all lithium battery shipments (including exempted shipments, Section II)".

1.4 A third ICAO multidisciplinary lithium battery meeting was held in Montreal in the last week in July. Following the conclusion of the meeting, several interim recommendations were made, including that operators perform a safety risk assessment in order to establish if they could manage the risks associated with the transport of lithium batteries as cargo on aircraft to an acceptable level of safety. In order to perform a safety risk assessment, the group concluded that information on the types and quantities of lithium batteries and cells being transported would need to be considered. Additionally, the very limited capabilities of the fire protection system in a lithium battery fire event would also need to be considered.

1.5 Section II of Packing Instructions 965 and 968 provides certain relief from the provisions of the Technical Instructions, including relief from the requirement to provide a dangerous goods transport document, the requirement to affix a Class 9 label to the package, the requirement for an acceptance check, and the requirement to notify the pilot in command of the shipment.

1.6 Due to the relief provided by Section II of the relevant packing instructions, it is not feasible for operators to determine the quantity of lithium batteries in a cargo hold or on an aircraft, nor is it feasible for operators to load Section II batteries in a cargo compartment with enhanced fire suppression capabilities. The provisions of Section II of Packing Instructions 965 and 968 make it impossible to adequately conduct the safety risk analysis recommended by Boeing, Airbus, and ICAO, and prevent operators from enacting the recommendations issued in the Safety Alert for Operators by the U.S. FAA.

2. ACTION BY THE DGP

2.1 The DGP is invited to amend Packing Instructions 965 and 968 for UN 3480 — **Lithium ion batteries** and UN 3090 — **Lithium metal batteries** respectively by:

a) deleting the Section II provisions; and

b) consolidating Sections IA and IB into a single packing instruction

as shown 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 965

Passenger and cargo aircraft for UN 3480

1. **Introduction**

This entry applies to lithium ion or lithium polymer batteries. ~~This packing instruction is structured as follows:~~

~~— Section IA applies to lithium ion cells with a Watt-hour rating in excess of 20 Wh and lithium ion batteries with a Watt-hour rating in excess of 100 Wh, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;~~
~~— Section IB applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II; and~~
~~— Section II applies to lithium ion cells with a Watt-hour rating not exceeding 20 Wh and lithium ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities not exceeding the allowance permitted in Section II, Table 965-II.~~

2. **Lithium batteries forbidden from transport**

The following applies to all lithium ion cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

~~IA. **SECTION IA**~~
3. **General requirements**
— Each cell or battery must meet all the provisions of 2;9.3.

~~1A.~~13. ~~**General requirements**~~

— Part 4;1 requirements must be met.
— Net quantity per package limitations:

~~**Table 965-IA**~~

UN number and proper shipping name		*Net quantity per package*	
		Passenger	*Cargo*
UN 3480	**Lithium ion batteries**	5 kg	35 kg

Packing Instruction 965

~~IA.2~~4. **Additional requirements**

— Lithium ion cells and batteries must be protected against short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Lithium ion cells and batteries must be placed in inner packagings that completely enclose the cell or battery then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be marked with the lithium battery mark (Figure 5-3) in addition to the Class 9 lithium battery hazard label (Figure 5-26).
— Lithium ion batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.
— Batteries manufactured after 31 December 2011 must be marked with the Watt-hour rating on the outside case.

~~IA.3~~5. **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)	
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

~~IB. **SECTION IB**~~

~~Quantities of lithium ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the the provisions of Part 6.~~

~~Lithium ion cells or batteries shipped in accordance with the provisions of Section IB must be described on a dangerous goods transport document as set in Part 5;4. The packing instruction number "965" required by 5;4.1.5.8.1 a) must be supplemented with "IB". All other applicable provisions of Part 5;4 apply.~~

~~Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and the following:~~

~~1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;~~

~~2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;~~
~~— the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009;~~

~~IB.1 **General requirements**~~

~~Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).~~

~~**Table 965-IB**~~

~~*Contents*~~	~~*Net quantity per package*~~	
	~~*Passenger*~~	~~*Cargo*~~
~~Lithium ion cells and batteries~~	~~10 kg~~	~~10 kg~~

Packing Instruction 965

IB.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be labelled with a lithium battery handling label (Figure 5-32) in addition to the Class 9 hazard label.
— Each consignment must be accompanied with a document with an indication that:
  — the package contains lithium ion cells or batteries;
  — the package must be handled with care and that a flammability hazard exists if the package is damaged;
  — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  — a telephone number for additional information.

+ *Note.— This information may be provided on the dangerous goods transport document.*

IB.3 **Outer packagings**

Boxes *Drums* *Jerricans*

Strong outer packagings

II. **SECTION II**

With the exception of Part 1;2.3 (General — Transport of dangerous goods by post), 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents), 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

≠ Lithium ion cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and the following:

1) for lithium ion cells, the Watt-hour rating (see the Glossary of Terms in Attachment 2) is not more than 20 Wh;
2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
   — the Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009.

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Packing Instruction 965

II.1 **General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

Table 965-II

Contents	*Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh*	*Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh*	*Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh*
1	*2*	*3*	*4*
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 965-II must not be combined in the same package.

II.2 **Additional requirements**

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-32).
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium ion cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words "lithium ion batteries, in compliance with Section II of PI965" must be placed on the air waybill, when an air waybill is used.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 **Outer packagings**

Boxes *Drums* *Jerricans*

Strong outer packagings

II.4 **Overpacks**

When packages are placed in an overpack, the lithium battery handling label required by this packing instruction must either be clearly visible or the label must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

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Packing Instruction 968

Cargo aircraft only for UN 3090

1. **Introduction**

This entry applies to lithium metal or lithium alloy batteries. ~~This packing instruction is structured as follows:~~

~~— Section IA applies to lithium metal cells with a lithium metal content in excess of 1 g and lithium metal batteries with a lithium metal content in excess of 2 g, which must be assigned to Class 9 and are subject to all of the applicable requirements of these Instructions;~~
~~— Section IB applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities that exceed the allowance permitted in Section II, Table 968-II; and~~
~~— Section II applies to lithium metal cells with a lithium metal content not exceeding 1 g and lithium metal batteries with a lithium metal content not exceeding 2 g packed in quantities not exceeding the allowance permitted in Section II, Table 968-II.~~

2. **Lithium batteries forbidden from transport**

The following applies to all lithium metal cells and batteries in this packing instruction:

Cells and batteries, identified by the manufacturer as being defective for safety reasons, or that have been damaged, that have the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden for transport (e.g. those being returned to the manufacturer for safety reasons).

Waste lithium batteries and lithium batteries being shipped for recycling or disposal are forbidden from air transport unless approved by the appropriate national authority of the State of Origin and the State of the Operator.

~~IA. **SECTION IA**~~
3. **General requirements**

— Each cell or battery must meet all the provisions of 2;9.3.

~~IA.1 **General requirements**~~

— Part 4;1 requirements must be met.
— Net quantity per package limitations:

~~**Table 968-IA**~~

UN number and proper shipping name		*Net quantity per package*	
		Passenger	*Cargo*
UN 3090	**Lithium metal batteries**	Forbidden	35 kg

Packing Instruction 968

~~IA.2~~4. **Additional requirements**

— Lithium metal cells and batteries must be protected against short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Lithium metal cells and batteries must be placed in inner packagings that completely enclose the cell or battery, then placed in an outer packaging. The completed package for the cells or batteries must meet the Packing Group II performance requirements.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  — damage to cells or batteries contained therein;
  — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  — release of contents.
— Each package must be marked with the lithium battery handling mark (Figure 5-3) in addition to the Class 9 lithium battery hazard label (Figure 5-26) and the cargo aircraft only label (Figure 5-26).
— Lithium metal batteries with a mass of 12 kg or greater and having a strong, impact-resistant outer casing, or assemblies of such batteries, may be transported when packed in strong outer packagings or protective enclosures (e.g. in fully enclosed or wooden slatted crates) not subject to the requirements of Part 6 of these Instructions, if approved by the appropriate authority of the State of Origin. A copy of the document of approval must accompany the consignment.

~~IA.3~~5. **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)	
Plastics (4H1, 4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		

~~IB. **SECTION IB**~~

~~Quantities of lithium metal cells or batteries that exceed the allowance permitted in Section II, Table 968-II, are subject to all of the applicable provisions of these Instructions (including the requirements in paragraph 2 of this packing instruction and of this section) except for the provisions of Part 6.~~

~~Lithium metal cells or batteries shipped in accordance with the provisions of Section IB must be described on a dangerous goods transport document as set in Part 5;4. The packing instruction number "968" required by 5;4.1.5.8.1 a) must be supplemented with "IB". All other applicable provisions of Part 5;4 apply.~~

~~Lithium metal or lithium alloy cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and the following:~~

~~1) for lithium metal cells, the lithium content is not more than 1 g;~~
~~2) for lithium metal or lithium alloy batteries, the aggregate lithium content is not more than 2 g.~~

Packing Instruction 968

IB.1 **General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

Table 968-IB

Contents	*Net quantity per package*	
	Passenger	*Cargo*
Lithium metal cells and batteries	Forbidden	2.5 kg

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IB.2 **Additional requirements**

— Cells and batteries must be packed in inner packagings that completely enclose the cell or battery then placed in a strong outer packaging.
— Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
— Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
— — damage to cells or batteries contained therein;
— — shifting of the contents so as to allow battery to battery (or cell to cell) contact;
— — release of contents.
≠ — Each package must be labelled with a lithium battery handling label (Figure 5-32) in addition to the Class 9 hazard label and the cargo aircraft only label (Figure 5-26).
— Each consignment must be accompanied with a document with an indication that:
— — the package contains lithium metal cells or batteries;
— — the package must be handled with care and that a flammability hazard exists if the package is damaged;
— — special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
— — a telephone number for additional information.

+ *Note.— This information may be provided on the dangerous goods transport document.*

IB.3 **Outer packagings**

Boxes *Drums* *Jerricans*

Strong outer packagings

II. **SECTION II**

≠ With the exception of Part 1;2.3 (General — Transport of dangerous goods by post), 5;1.1 g), 5;1.1 j) (Shipper's responsibilities — General requirements), 7;2.1 (Operator's responsibilities — Loading restrictions on the flight deck and for passenger aircraft), 7;2.4.1 (Operator's responsibilities — Loading of cargo aircraft), 7;4.4 (Operator's responsibilities — Reporting of dangerous goods accidents and incidents), 8;1.1 (Provisions concerning passengers and crew — Dangerous goods carried by passengers or crew) and paragraph 2 of this packing instruction, lithium metal or lithium alloy cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

≠ Lithium metal or lithium alloy cells and batteries may be offered for transport provided that each cell and battery meets the provisions of 2;9.3.1 a) and e) and the following:

1) for a lithium metal cell, the lithium content is not more than 1 g;
2) for a lithium metal or lithium alloy battery, the aggregate lithium content is not more than 2 g.

V

II.1 **General requirements**

Cells and batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.10 (except 1.1.10.1).

Packing Instruction 968

Table 968-II

Contents	Lithium metal cells and/or batteries with a lithium content not more than 0.3 g	Lithium metal cells with a lithium content more than 0.3 g but not more than 1 g	Lithium metal batteries with a lithium content more than 0.3 g but not more than 2 g
1	2	3	4
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg	n/a	n/a

The limits specified in columns 2, 3 and 4 of Table 968-II must not be combined in the same package.

II.2 **Additional requirements**

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery, then placed in a strong outer packaging.
- Cells and batteries must be protected so as to prevent short circuits. This includes protection against contact with conductive materials within the same packaging that could lead to a short circuit.
- Each package must be capable of withstanding a 1.2 m drop test in any orientation without:
  - damage to cells or batteries contained therein;
  - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
  - release of contents.
- Each package must be labelled with a lithium battery handling label (Figure 5-32) and the cargo aircraft only label (Figure 5-26).
  - the cargo aircraft only label must be located on the same surface of the package near the lithium battery handling label, if the package dimensions are adequate.
- Each consignment must be accompanied with a document with an indication that:
  - the package contains lithium metal cells or batteries;
  - the package must be handled with care and that a flammability hazard exists if the package is damaged;
  - special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
  - a telephone number for additional information.
- The words "lithium metal batteries, in compliance with Section II of PI968 — cargo aircraft only" or "lithium metal batteries, in compliance with Section II of PI968 — CAO" must be placed on the air waybill, when an air waybill is used.
- Consignments of lithium metal batteries prepared in accordance with the provisions of Section II must not be consolidated with other shipments of dangerous goods or non-dangerous goods and must not be loaded into a unit load device before being offered to the operator.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

II.3 **Outer packagings**

Boxes *Drums* *Jerricans*

Strong outer packagings

II.4 **Overpacks**

- When packages are placed in an overpack, the lithium battery handling label and the cargo aircraft only label (Figure 5-26) required by this packing instruction must either be clearly visible or the labels must be affixed on the outside of the overpack and the overpack must be marked with the word "Overpack".

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— END —