International Civil Aviation Organization

DGP-WG/LB/1-WP/9
23/1/12

WORKING PAPER

DANGEROUS GOODS PANEL (DGP)
WORKING GROUP OF THE WHOLE ON LITHIUM BATTERIES

FIRST MEETING

Montréal, 6 to 10 February 2012

Agenda Item 1: Carry-over work from DGP/23

REVISION TO LITHIUM BATTERY PACKING INSTRUCTIONS

(Presented by D. Brennan)

SUMMARY

This working paper proposes revisions to Section II of the lithium battery packing instructions to:

1. Provide for information to the Pilot-in-Command for shipments of lithium batteries under PI 965 and PI 968;
2. Address an existing gap in the provisions for lithium batteries packed with equipment under PI 966 and PI 969; and
3. Address operator concerns for provision of information for large shipments of lithium batteries contained in equipment where individual packages are not required to bear the lithium battery handling label.

Action by the DGP-WG/LB: The DGP-WG/LB is invited to adopt the revisions as presented in the appendix to this working paper.

1. INTRODUCTION

1.1 The provisions applicable to the air transport of lithium batteries have occupied a considerable amount of time at recent meetings of the Dangerous Goods Panel. The majority of this discussion has related to the exceptions from the regulatory requirements that are contained in Section II of Packing Instructions 965 to 970 and whether these exceptions create a safety risk, particularly through the lack of hazard communication to the flight crew and to emergency responders.

1.2 At DGP/23 there was a proposal submitted in DGP/23-WP/72 to eliminate Section II of PI 965 and of PI 968 on the basis that by removing this exception that all shipments of lithium batteries shipped by themselves would therefore have to be shown on the written information to the pilot-in-command (NOTOC). The proposals in DGP/23-WP/72 were modified on-site by Flimsy 9, which

proposed retention of Section II of the respective packing instructions, but with a significantly lower package mass and also a limit on the number of lithium cells or batteries permitted in a single package.

1.3 As the amendments proposed in Flimsy 9 have now been submitted as DGP-WG/LB-WP/1 there has been discussion by the operators represented on the IATA Dangerous Goods Board to consider the operational implications should such changes be adopted as well as the potential flow on effect of the these changes to other aspects involving shipments of lithium batteries.

1.4 With respect to the provision of information on the NOTOC for large shipments of lithium batteries shipped under Section II of Packing Instructions 965 and 968, for operators to manage this it is believed that the shipments must fit within the existing provisions for other dangerous goods consignments or else the operators will have to develop processes and procedures just for lithium batteries shipments, which may not prove effective and may be costly to implement.

1.5 On that basis, the direction proposed in DGP-WG/LB-WP/1 achieves the desired outcome, which is to revise the exceptions provided for in Section II of Packing Instructions 965 and 968 and therefore to effectively force consignments of lithium batteries shipped by themselves to be fully regulated.

1.6 There is though no evidence that the current package mass allowance in Section II or the packaging standards are deficient or unsafe. Large commercial shippers of lithium batteries that have established packaging and shipping processes that meet the existing provisions of Section II for their shipments will be significantly penalised if they have to completely change their shipping process to reduce the size of packagings and to implement UN specification packagings as required by Section I.

1.7 On that basis it is believed that there should be an allowance made for shipments of the smaller lithium batteries that meet the existing provisions of Section II to be shipped in the quantities permitted by the existing Section II in non-UN specification packagings. This would reduce the cost to the lithium battery industry while still achieving the objective of getting these shipments on the NOTOC.

1.8 While these changes would address lithium batteries shipped under PI 965 and PI 968, it is believed that there exists a gap in the current provisions applicable to lithium batteries packed with equipment according to Section II of Packing Instruction 966 and Packing Instruction 969. Section II of these packing instructions, does not impose a limit on the quantity of lithium batteries permitted in a single package. A shipper may pack hundreds of lithium batteries in a single package simply by including in the same outer packaging the number of pieces of equipment to meet the condition that there be no more than the number of lithium batteries to power the equipment plus two spares.

1.9 Amending Packing Instruction 965 and Packing Instruction 968 to force shipments into Section I of these packing instructions may encourage some shippers to further exploit the lack of a limit on the quantity of lithium batteries when these are packed with equipment according to Section II. For this reason it is believed that there should be a limit on the net quantity of lithium batteries per package in Section II of Packing Instruction 966 and Packing Instruction 969. For consistency it is proposed that the same net quantity limit also be applied to Section II of Packing Instructions 967 and 970.

1.10 In Section II of Packing Instructions 967 and 970 there is a provision that excepts shippers from having to apply the lithium battery handling label to packages when the package contains no more than four cells or two batteries. The requirement for the statement on the air waybill is tied to the presence of the lithium battery handling label, consequently if packages are not required to be labelled,

the operator does not receive an indication on the air waybill that the consignment contains lithium batteries.

1.11 For small consignments of only a few packages this is not seen as a concern, however some consignments may consist of multiple overpacks comprising hundreds of individual packages. In this instance the operator would like to be aware of the presence of the consignment so that operator specific procedures can be implemented. To achieve this it is proposed that when packages not requiring a label are assembled into an overpack that the overpack must bear the lithium battery handling label and the air waybill statement must be provided.

1.12 While these proposed changes may address operator, flight crew and emergency responder concerns about the provision of information for hazard communication, it is believed that the actual root cause of lithium battery incidents is still not being effectively addressed. Almost all of the available incident data indicates that the real problem is non-compliance with the existing provisions.

1.13 To address non-compliance by manufacturers and shippers of lithium batteries it is believed that there needs to be far more outreach by regulatory authorities to ensure that commercial shippers of lithium batteries are made aware of the regulatory requirements. The outreach should be supported by greater surveillance of shippers, and when necessary appropriate enforcement action.

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APPENDIX

PROPOSED AMENDMENTS TO LITHIUM BATTERY PROVISIONS

Part 3

DANGEROUS GOODS LIST, SPECIAL PROVISIONS AND LIMITED AND EXCEPTED QUANTITIES

Table 3-1. Dangerous Goods List

Name	*UN No.*	*Class or division*	*Subsidiary risk*	*Labels*	*State variations*	*Special provisions*	*UN packing group*	*Excepted quantity*	*Passenger aircraft*		*Cargo aircraft*	
									Packing instruction	*Max. net quantity per package*	*Packing instruction*	*Max. net quantity per package*
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*
Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	A51 A88 A99 A154 A164 A183 A1xx	II	E0	965	5 kg	965	35 kg
...												
Lithium metal batteries (including lithium alloy batteries)	3090	9		Miscellaneous	US 2 US 3	A88 A99 A154 A164 A183 A1xy	II	E0	968	2.5 kg	968	35 kg

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Chapter 3

SPECIAL PROVISIONS

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Table 3-2. Special provisions

TIs	*UN*	
Axx		Notwithstanding the limit specified in column 11 of Table 3-1 for UN 3480 and the packaging requirements of Section I of Packing Instruction 965, lithium ion cells and batteries may be accepted for transport as follows: Packages containing lithium ion cells with a Watt-hour rating of not more than 20 Wh and/or lithium ion batteries with a Watt-hour rating of not more than 100 Wh need not be UN specification packagings provided that the packagings and the completed package meet the packing requirements of Section II of Packing Instruction 965 and have a net quantity not exceeding 10 kg. Transport in accordance with this special provision must be noted on the dangerous goods transport document.
Axy		Notwithstanding the packaging requirements of Section I of Packing Instruction 968, lithium metal cells and batteries may be accepted for transport as follows: Packages containing lithium metal cells with a lithium content of not more than 1 g and/or lithium metal batteries with an aggregate lithium content of not more than 2 g may be packed in non-UN specification packagings provided that the packagings and the completed package meet the packing requirements of Section II of Packing Instruction 968 and have a net quantity not exceeding 2.5 kg. Transport in accordance with this special provision must be noted on the dangerous goods transport document.

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Part 4

PACKING INSTRUCTIONS

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Editorial Notes.—

1) The amendments agreed at DGP/23 to Packing Instructions 965-970 have been incorporated.
2) The redline and strikeout in Packing Instructions 965 and 968 indicate proposed changes to the proposal presented in DGP-WG/LB-WP/1.

Packing Instruction 965

Passenger and cargo aircraft for UN 3480

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew), 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.

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.

Lithium ion cells and batteries may be offered for transport if they meet the following:

Editorial Note.— The shaded text below is proposed for deletion in DGP-WG/LB-WP/1but retained in this proposal.

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;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

General requirements

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).

Editorial Note.— Changes below are against DGP-WG/LB-WP/1.

Contents	*Lithium ion ~~C~~cells and/or batteries with a Watt-hour rating not more than 2.7 Wh*	*Lithium ion ~~C~~cells with a Watt-hour rating more than 2.7 Wh but not more than 20 Wh*	*Lithium ion ~~B~~batteries with a Watt-hour rating more than 2.7 Wh but not more than 100 Wh*
~~Quantities~~ Maximum number of cells/batteries ~~allowed in a~~ per package	No limit	8 cells	2 batteries
~~Package weight~~Maximum net quantity (mass) per package	~~2.5 kg~~2.5 kg	~~3.0 kg G~~n/a	~~3.0 kg G~~n/a

Quantities of lithium ion cells or batteries meeting the requirements of Section II that exceed the mass or quantity limits specified above must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions, except that the allowances of Special Provision A1xx may be applied.

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Packing Instruction 966

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

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew), lithium ion cells and batteries packed with equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

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).

Lithium ion cells and batteries may be offered for transport if they meet 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;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

General requirements

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).

Contents	*Package quantity (Section II)*	
	Passenger	*Cargo*
Net quantity of lithium ion cells or batteries per package	10 kg	10 kg

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Packing Instruction 967

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

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew), lithium ion cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

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).

Lithium ion cells and batteries may be offered for transport if they meet 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;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

General requirements

Equipment 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).

Contents	*Package quantity (Section II)*	
	Passenger	*Cargo*
Net quantity of lithium ion cells or batteries per package	10 kg	10 kg

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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". When an overpack contains more than four cells or more than two batteries installed in equipment, the lithium battery handling label must be affixed on the outside of the overpack, the overpack must be marked with the word "Overpack" and the information required on the air waybill as described above must be placed on the air waybill, when an air waybill is used. This requirement does not apply to packages that contain only button cell batteries installed in equipment (including circuit boards).

Packing Instruction 968

Passenger and cargo aircraft for UN 3090

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew), 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.

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.

Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet the following:

Editorial Note.— The shaded text below is proposed for deletion in DGP-WG/LB-WP/1but retained in this proposal.

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;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

General requirements

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).

Editorial Note.— Changes below are against DGP-WG/LB-WP/1.

Contents	*Lithium metal ~~C~~cells and/or batteries with a lithium ~~metal~~ content of not more than 0.3 g*	*Lithium metal ~~C~~cells with a lithium ~~metal~~ content of more than 0.3 g but not more than 1 g*	*Lithium metal ~~B~~batteries with a lithium ~~metal~~ content of more than 0.3 g but not more than 2 g*
~~Quantities~~Maximum number of cells/batteries ~~allowed in a~~ per package	No limit	8 cells	2 batteries
~~Package weight~~Maximum net quantity (mass) per package	~~2.5 kg G~~2.5 kg	~~3.0 kg G~~n/a	~~3.0 kg G~~n/a

Quantities of lithium metal cells or batteries meeting the requirements of Section II that exceed the mass or quantity limits specified above must be assigned to Class 9 and are subject to all of the applicable provisions of these Instructions, except that the allowances of Special Provision A1xy may be applied.

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Packing Instruction 969

Passenger and cargo aircraft for UN 3091 (packed with equipment) only

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew),lithium metal cells and batteries packed with equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

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).

Lithium metal cells and batteries may be offered for transport if they meet 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;
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

General requirements

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).

Contents	*Package quantity (Section II)*	
	Passenger	*Cargo*
Net quantity of lithium metal cells or batteries per package	10 kg	10 kg

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Packing Instruction 970

Passenger and cargo aircraft for UN 3091 (contained in equipment) only

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SECTION II

With the exception of Part 1;2.3 (Transport of dangerous goods by post), 7;4.4 (Reporting of dangerous goods accidents and incidents) and 8;1.1 (Provisions for dangerous goods carried by passengers or crew), lithium metal cells and batteries contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

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).

Lithium metal cells and batteries may be offered for transport if they meet 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.
3) each cell or battery is of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3. However, batteries and cells manufactured before 1 January 2014 conforming to a design type tested according to the requirements of the fifth revised edition of the UN *Manual of Tests and Criteria*, Part III, sub-section 38.3 may continue to be transported;

   Note.— Batteries are subject to these tests irrespective of whether the cells of which they are composed have been so tested.

4) cells and batteries must be manufactured under a quality management programme as described in 2;9.3.1 e).

Devices such as radio frequency identification (RFID) tags, watches and temperature loggers, which are not capable of generating a dangerous evolution of heat, may be transported when intentionally active. When active, these devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

General requirements

Equipment containing 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).

Contents	*Package quantity (Section II)*	
	Passenger	*Cargo*
Net quantity of lithium metal cells or batteries per package	10 kg	10 kg

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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". When an overpack contains more than four cells or more than two batteries installed in equipment, the lithium battery handling label must be affixed on the outside of the overpack, the overpack must be marked with the word "Overpack" and the information required on the air waybill as described above must be placed on the air waybill, when an air waybill is used. This requirement does not apply to packages that contain only button cell batteries installed in equipment (including circuit boards).

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