



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
MEETING OF THE WORKING GROUP OF THE WHOLE**

Auckland, New Zealand, 4 to 8 May 2009

Agenda Item 2: Development of recommendations for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2011/2012 Edition

Agenda Item 5.3: Review of provisions for dangerous goods relating to batteries
a) **lithium batteries**

SHIPPING LITHIUM BATTERIES INSTALLED IN EQUIPMENT

(Presented by Jiang Rui)

SUMMARY

This paper proposes amendments to Packing Instruction 967 and consequently to Packing Instructions 965, 966, 968, 969 and 970 of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284).

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 The 2009-2010 Edition of the *Technical Instructions* incorporated a number of revisions to requirements for the transport of lithium batteries. The revisions include:

- a) the development of new Packing Instructions 965, 966, 967, 968, 969 and 970 to more clearly state the requirements for the various types of lithium batteries covered by UN 3480, UN 3481, UN 3090 and UN 3091;
- b) incorporation of the requirements formerly in Special Provision A45 within the new packing instructions;
- c) application of a new lithium battery handling label for certain lithium batteries; and
- d) enhanced packaging and revised quantity limits for lithium batteries as shown in the new packing instructions.

1.2 This paper discusses Packing Instruction 967 only but the same arguments would apply to Packing Instructions 965, 966, 968, 969 and 970. If the amendments to Packing Instruction 967 proposed in this paper are agreed, the presenter of this paper offers to prepare similar amendments to the other related Packing Instructions listed above. The working group is invited to note that the issue of “activated” devices such as watches (refer to Section II, additional packing requirements) is not addressed in this paper as it has been raised in a different forum and it is expected to be discussed as a separate item.

1.3 Packing Instruction 967, as it appears in the 2009-2010 Edition of the Technical Instructions, is reproduced for reference in Appendix A to this working paper.

1.4 The new provisions for small lithium batteries appearing in Packing Instruction 967 are not clear for the following reasons:

- a) The introductory paragraph to PI 967 reproduced below is confusing as it is provided without any explanation about Section I or II:

“This entry applies to lithium ion or lithium polymer batteries contained in equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries contained in equipment subject to specific requirements of these Instructions (Section II).”

- b) A reader has to read halfway through the packing instruction to be advised that:

“Lithium 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).”

In view of it’s importance, the above sentence should be an opening statement of the packing instruction, rather than buried in the middle of the text.

- c) The requirements for the batteries to be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, section 38.3 appear in Section I and II. It is recommended to move this requirement to the opening statement as it applies to all lithium batteries shipped under this packing instruction.
- d) The differences between Section I and Section II (previously A45) are not explained and are difficult to grasp. It is proposed to reverse the order of presentation by starting with the smaller (less hazardous) batteries.
- e) The following statement in Section II refers to “Attachment 2” which is not part of the packing instruction:

“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 **Attachment 2**) is not more than 20 Wh;”

f) Section II, under “Additional Packing Requirements” specifies that:

“ Each consignment with packages bearing the lithium battery handling label must be accompanied with a document such as an air waybill 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and a telephone number for additional information.”

The above requirement originated from the UN Model Regulations on the Transport of Dangerous Goods (15th edition), SP 188 (g) which specifies that a consignment of lithium batteries must be accompanied by a document which includes the above information. The panel was more specific and added “such as an Air waybill” after “document”. Since the Air waybill is often prepared by the shipper’s agent not necessarily by the shipper, it is recommended that the statement be aligned with the UN requirement as indicated in Appendix B.

g) It is not clear that in the event of an incident involving small lithium batteries, the incident reporting requirements of the Technical Instructions apply for batteries meeting Section I or Section II requirements.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to amend PI 967 as indicated in Appendix B to this working paper.

APPENDIX A

CURRENT PACKING INSTRUCTION 967

PACKING INSTRUCTION 967

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

This entry applies to lithium ion or lithium polymer batteries contained in equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries contained in equipment subject to specific requirements of these Instructions (Section II).

SECTION I

Section I requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

- 1) be of the type proven to meet the requirements of each test in the UN *Manual of Tests and Criteria*, Part III, section 38.3; and
- 2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

General requirements

Part 4;1 requirements must be met.

<i>Contents</i>	<i>Net quantity per piece of equipment (Section I)</i>	
	<i>Passenger</i>	<i>Cargo</i>

ADDITIONAL PACKING REQUIREMENTS

- Outer packaging must be waterproof or made waterproof through the use of a liner, such as a plastic bag unless the equipment is made waterproof by nature of its construction.
- The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

OUTER PACKAGINGS

Boxes

Drums

Jerricans

Strong outer packagings

SECTION II

Lithium ion cells and batteries (including lithium polymer) contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.

Lithium 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 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, which may be transported in accordance with the provisions of this section and without the marking until 31 December 2010;
- 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, section 38.3.

General requirements

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.9 (except 1.1.9.1).

ADDITIONAL PACKING REQUIREMENTS

- The equipment must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31).
- Each consignment with packages bearing the lithium battery handling label must be accompanied with a document such as an air waybill 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - a telephone number for additional information.
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

OUTER PACKAGINGS

Boxes

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Strong outer packagings

APPENDIX B

PROPOSED PACKING INSTRUCTION 967

PACKING INSTRUCTION 967

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

~~This entry applies to lithium ion or lithium polymer batteries contained in equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries contained in equipment subject to specific requirements of these Instructions (Section II).~~

From current Section II and A154 (example contained in brackets moved) :

Lithium batteries, identified by the manufacturer as being defective for safety reasons (e.g. those being returned to the manufacturer 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.

From current Section I, 1) and current Section II 3)

Each cell or battery must be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, section 38.3

From current section II

Lithium ion cells and batteries (including lithium polymer) contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of Section I below.

New:

However, in the event of an incident involving these batteries, the incident reporting requirements apply. Other lithium ion cells and batteries offered for transport under this packing instruction must meet the requirements of Section II below, to be acceptable for transport.

~~SECTION II~~**SECTION I**

~~Lithium ion cells and batteries (including lithium polymer) contained in equipment offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements of this section.~~

~~Lithium 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).~~

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

- 1) for lithium ion cells ,the Watt-hour rating (~~see Attachment 2~~) is not more than 20 Wh;
- 2) for lithium ion batteries, the Watt-hour rating is not more than 100 Wh;
~~—t~~The Watt-hour rating must be marked on the outside of the battery case except for those batteries manufactured before 1 January 2009, which may be transported in accordance with the provisions of this section and without the marking until 31 December 2010;
- 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, section 38.3.~~

b) General **packing** requirements

Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 1.1.3.1 and 1.1.9 (except 1.1.9.1).

c) Additional packing requirements

- The equipment must be equipped with an effective means of preventing accidental activation.
- Cells and batteries must be protected so as to prevent short circuits.
- The equipment must be packed in strong outer packagings constructed of suitable material of adequate strength and design in relation to the packaging's capacity and its intended use unless the battery is afforded equivalent protection by the equipment in which it is contained.
- Each package containing more than four cells or more than two batteries installed in equipment must be labelled with a lithium battery handling label (Figure 5-31).

Moved from last bullet point:

- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.
- Each consignment with packages bearing the lithium battery handling label must be accompanied with a document such as an air waybill with an which will indicate 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - a telephone number for additional information.
- ~~Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.~~

d) Outer packagings

<i>Boxes</i>	<i>Drums</i>	<i>Jerricans</i>
Strong outer packagings		

e) Packages containing lithium ion cells or batteries contained in equipment that meet the provisions of Section I of this packing instruction are not required to have a Class 9 hazard label and a dangerous goods document is not required for such consignments. However, in the event of an incident involving these batteries, the incident reporting requirements apply.

~~SECTION I~~ **SECTION II**

Section II requirements apply to each cell or battery type that has been determined to meet the criteria for assignment to Class 9.

Each cell or battery must:

- 1) ~~be of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, section 38.3; and~~
- 2) incorporate a safety venting device or be designed to preclude a violent rupture under conditions normally incident to transport and be equipped with an effective means of preventing external short circuits.

Each battery containing cells or a series of cells connected in parallel must be equipped with an effective means, as necessary, to prevent dangerous reverse current flow (e.g. diodes, fuses).

General requirements

Part 4;1 requirements must be met.

<i>Contents</i>	<i>Net quantity per piece of equipment (Section II)</i>	
	<i>Passenger</i>	<i>Cargo</i>

ADDITIONAL PACKING REQUIREMENTS

- Outer packaging must be waterproof or made waterproof through the use of a liner, such as a plastic bag unless the equipment is made waterproof by nature of its construction.
- The equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during air transport.

OUTER PACKAGINGS*Boxes**Drums**Jerricans*

Strong outer packagings

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