

COMMITTEE OF EXPERTS ON THE TRANSPORT OF DANGEROUS GOODS AND ON THE GLOBALLY HARMONIZED SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS

Sub-Committee of Experts on the
Transport of Dangerous Goods

Thirty-second session
Geneva, 3-7 December 2007

Item 3 of the provisional agenda

LISTING , CLASSIFICATION AND PACKING

Outcome of the ICAO Dangerous Goods Panel discussions on lithium batteries

Transmitted by the International Civil Aviation Organization (ICAO)

1. INTRODUCTION

1.1 The outcome of discussions on lithium batteries by the DGP at the twenty-first meeting of the panel are presented for information. The proposed amendments to the Technical Instructions are presented in the Appendix.

2. SUMMARY OF DISCUSSIONS

2.1 The DGP considered the results of the 2-day working group meeting that took place 4/5 October in Montreal as well as of working group meetings that took place during lunch and following plenary.

2.2 The consideration for lithium batteries focussed on three main issues:

1. carriage of lithium metal batteries under the provisions of Special Provision A45 (UN SP 188);
2. carriage of lithium metal batteries on passenger aircraft; and
3. carriage of lithium ion batteries under the provisions of Special Provision A45.

2.3 Notwithstanding the enhanced packaging and identification requirements flowing from the amendments to SP 188 in the 15th revised edition of the UN Model regulations, the working group determined that the current per package mass of 30 kg for lithium ion batteries meeting the requirements of Special Provision A45 was excessive given the 5 kg gross mass limit that applies for packages containing fully regulated batteries when transported on a passenger aircraft.

2.4 Based on representation from the battery industry, and based on the amendments to SP A45 coming from UN SP 188 a 10 kg gross mass per package was adopted for lithium ion batteries meeting SP A45.

2.5 With respect to A45 there was agreement that the wording had become so detailed as to create confusion for shippers. It was therefore determined that the applicable provisions in A45 relating to batteries should be transferred to a packing instruction to more clearly detail the requirements. A similar approach would also be taken for batteries under A45 packed with or contained in equipment. Separate packing instructions were created for lithium metal batteries and lithium ion batteries to reflect the differences in the two chemistries and the separation of the UN numbers.

2.6 For the lithium metal batteries it was determined that a prohibition on passenger aircraft, except for small batteries meeting SP A45 when packed with, or contained in equipment, as implemented by the United States would cause significant difficulties in countries outside of North America or Western Europe. It was pointed out that in both Australia and Canada there were communities in remote areas that were only serviced by passenger aircraft and there did need to be provision in the Technical Instructions to be able to ship these batteries on a passenger aircraft.

2.7 The final determination by the DGP was that fully regulated lithium metal batteries will remain permitted on passenger aircraft with a maximum gross mass per package of 2.5 kg with a metal intermediate or metal outer packaging. The addition of a metal intermediate packaging provided an additional level of protection in the event of fire and therefore it would be acceptable to permit these packages on passenger aircraft. For the small lithium metal batteries that meet the provisions of A45, the same 2.5 kg gross mass per packaged will apply, although the metal packaging was not deemed necessary.

2.8 To alert all persons in the transport chain that the packages contain lithium metal or lithium ion batteries, as applicable it was agreed to require a new red-hatched marking on packages. The red-hatched marking would contain the ISO "wineglass" symbol to identify that the packages were to be handled with care, a "flame" symbol to indicate that if the packages were damaged that a fire risk was present and then indication that the packages contain lithium metal or lithium ion batteries and the telephone number for use in an emergency.

APPENDIX

AMENDMENTS TO LITHIUM BATTERY PROVISIONS

Table 3-1. Dangerous Goods List

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	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
Lithium metal batteries (including lithium alloy batteries)†	3090	9		Miscellaneous		A88 A99 A154 A164	II	9X1	2.5 kg G	9X1	35 kg G
Lithium metal batteries contained in equipment (including lithium alloy batteries) †	3091	9		Miscellaneous		A48 A154 A164		see 9X2		see 9X2	
Lithium metal batteries packed with equipment (including lithium alloy batteries)†	3091	9		Miscellaneous		A154 A164		see 9X3		see 9X3	
Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous		A88 A99 A154	II	9X4	5 kg G	9X4	35 kg G
Lithium ion batteries contained in equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous		A48 A154	II	see 9X5		see 9X5	
Lithium ion batteries packed with equipment (including lithium ion polymer batteries)	3481	9		Miscellaneous		A88 A154	II	see 9X6		see 9X6	

...

Table 3-2. Special provisions

...

A45

Not used.

PACKING INSTRUCTION 9X1		
Passenger and Cargo Aircraft for UN 3090		
Lithium Metal Cells and Batteries		
This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ul style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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). • Cells, batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride which have been discharged to the extent that the open circuit voltage is less than the lower of: <ul style="list-style-type: none"> a) 2 volts; or b) two-thirds of the voltage of the undischarged cell; are forbidden from transport. 		
General Requirements:		
Part 4;1 requirements must be met.		
Outer Packagings		
Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
All lithium metal cells and batteries prepared for transport as Class 9 must:		
<ul style="list-style-type: none"> • Be protected against short circuits; • Packagings must meet Packing Group II performance requirements; • Lithium 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 and protective enclosures 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. 		
For lithium metal cells and batteries prepared for transport on Passenger Aircraft as Class 9:		
<ul style="list-style-type: none"> • Cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging. • Cell and batteries must be surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging. 		
Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Metal Cells and Batteries	2.5 kg G	35 kg G

Section II		
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 in Section II.		
Lithium metal or lithium alloy cells and batteries may be offered for transport if they meet the following:		
<ol style="list-style-type: none"> 1. A lithium metal cell, the lithium content is not more than 1 g; 2. 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 <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. 		
General Requirements:		
Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)		
STRONG OUTER PACKAGINGS		
Boxes	Drums	Jerricans
Additional Requirements		
<ul style="list-style-type: none"> • Cells and batteries must be packed in inner packagings that completely enclose the cell or battery. • 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: <ul style="list-style-type: none"> ○ 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 consignment must be accompanied with a document such as an air waybill with an indication that: <ul style="list-style-type: none"> ○ 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and ○ a telephone number for additional information. • Each package must be labelled with a lithium battery handling label (Figure 5-xx); • Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities. 		
Section II	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Metal Cells and Batteries	2.5 kg G	2.5 kg G

PACKING INSTRUCTION 9X2		
Passenger and Cargo Aircraft for UN 3091		
Lithium Metal Cells and Batteries packed with equipment		
This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ol style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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). • Cells, batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride which have been discharged to the extent that the open circuit voltage is less than the lower of: <ol style="list-style-type: none"> a) 2 volts; or b) two-thirds of the voltage of the undischarged cell; are forbidden from transport. 		
General Requirements:		
Part 4;1 requirements must be met.		
Outer Packagings		
Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
All lithium metal cells and batteries prepared for transport as Class 9 must:		
<ul style="list-style-type: none"> • Be protected against short circuits; • The completed package for the cells or batteries must meet the Packing Group II packaging requirements. • Each completed package containing lithium cells or batteries must be marked and labelled in accordance with the applicable requirements of Part 5, Chapters 1, 2 and 3; • The equipment and the packages of lithium cells or batteries must be placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9; • For the purpose of this packing instruction, "equipment" means apparatus requiring the lithium batteries with which it is packed for its operation. 		
Lithium metal cells and batteries prepared for transport on Passenger Aircraft as Class 9 must in addition meet the following requirements:		
<ul style="list-style-type: none"> • Cells and batteries offered for transport on passenger aircraft must be packed in intermediate or outer rigid metal packaging. • Surrounded by cushioning material that is non-combustible and non-conductive, and placed inside an outer packaging. 		
Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Packaged Quantity of Lithium Metal Cells and Batteries per overpack (Excluding Equipment)	5 kg	35 kg

Section II**Lithium metal cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.**

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

1. A lithium metal cell, the lithium content is not more than 1 g;
2. 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, subsection 38.3.

General Requirements:

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

STRONG OUTER PACKAGINGS**Boxes****Drums****Jerricans****Additional Requirements**

- Cells and batteries must be packed in inner packagings that completely enclose the cell or battery;
- 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;
- The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares;
- Each package of batteries 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 consignment must be accompanied with a document such as an air waybill 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - a telephone number for additional information.
- Each package must be labelled with a lithium battery handling label (Figure 5-xx);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

PACKING INSTRUCTION 9X3		
Passenger and Cargo Aircraft for UN 3091		
Lithium Metal Cells and Batteries contained in equipment		
This entry applies to lithium metal or lithium alloy batteries in Class 9 (Section I) and lithium metal or lithium alloy batteries subject to specific requirements of the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ul style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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). • Cells, batteries containing one or more cells, with a liquid cathode containing sulphur dioxide, sulphuryl chloride or thionyl chloride which have been discharged to the extent that the open circuit voltage is less than the lower of: <ul style="list-style-type: none"> a) 2 volts; or b) two-thirds of the voltage of the undischarged cell; are forbidden from transport. 		
General Requirements:		
Part 4;1 requirements must be met.		
Outer Packagings		
Boxes	Drums	Jerricans
Additional Requirements		
For all lithium metal cells and batteries prepared for transport as Class 9:		
<ul style="list-style-type: none"> • 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. • The quantity of lithium metal contained in any piece of equipment must not exceed 12 g per cell and 500 g per battery. 		
Section I	Passenger Aircraft	Cargo Aircraft
Net Quantity of Lithium Metal Batteries per Piece of Equipment	5 kg	35 kg
Section II		
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 in Section II.		
Lithium metal cells and batteries may be offered for transport if they meet the following:		
<ol style="list-style-type: none"> 1. A lithium metal cell, the lithium content is not more than 1 g; 2. 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 <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. 		
General Requirements:		
<ul style="list-style-type: none"> • Equipment containing batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1) 		
STRONG OUTER PACKAGINGS		
Boxes	Drums	Jerricans

Additional 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 consignment with packages bearing the lithium battery handling label (DB) must be accompanied with a document such as an air waybill 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 should be followed in the event the package is damaged, to include inspection and repacking if necessary; and
 - a telephone number for additional information.
- Each package containing more than four cells or more than two batteries installed in equipment (DB) must be labelled with a lithium battery handling label (Figure 5-xx);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

PACKING INSTRUCTION 9X4		
Passenger and Cargo Aircraft for UN 3480		
Lithium Ion Cells and Batteries (including lithium polymer)		
This entry applies to lithium ion or lithium polymer batteries in Class 9 (Section I) and lithium ion or lithium polymer batteries subject to specific requirements of the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ul style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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.		
Outer Packagings		
Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
For all lithium ion cells and batteries prepared for transport as Class 9:		
<ul style="list-style-type: none"> • Protected against short circuits; • Packagings must meet Packing Group II performance requirements; • 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 and protective enclosures 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 		
Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Ion Cells and Batteries	5 kg G	35 kg G

Section II		
Lithium ion cells and batteries offered for transport are not subject to other additional requirements of these Instructions if they meet the requirements in Section II.		
Lithium ion cells and batteries may be offered for transport if they meet the following:		
<ol style="list-style-type: none"> 1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh; 2. Lithium ion batteries, the Watt-hour rating is not more than 100 Wh; <ul style="list-style-type: none"> • The Watt-hour rating must be marked on the outside of the battery case. 3. Each cell or battery is of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. 		
General Requirements:		
Batteries must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1)		
STRONG OUTER PACKAGINGS		
Boxes	Drums	Jerricans
Additional Requirements		
<ul style="list-style-type: none"> • Cells and batteries must be packed in inner packagings that completely enclose the cell or battery. • 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: <ul style="list-style-type: none"> ○ 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 consignment must be accompanied with a document such as an air waybill with an indication that: <ul style="list-style-type: none"> ○ 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. • Each package must be labelled with a lithium battery handling label (Figure 5-xx); • Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities. 		
Section II	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Lithium Ion Cells and Batteries	10 kg G	10 kg G

PACKING INSTRUCTION 9X5		
Passenger and Cargo Aircraft for UN 3481		
Lithium Ion Cells and Batteries (including lithium polymer) packed with equipment		
This entry applies to lithium ion or lithium polymer batteries packed with equipment in Class 9 (Section I) and lithium ion or lithium polymer batteries packed with equipment subject to specific requirements of the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ul style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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.		
Outer Packagings		
Boxes	Drums	Jerricans
Aluminium (4B)	Aluminium (1B2)	Aluminium (3B2)
Fibreboard (4G)	Fibreboard (1G)	Plastic (3H2)
Natural wood (4C1, 4C2)	Plastic (1H2)	Steel (3A2)
Plastic (4H2)	Plywood (1D)	
Plywood (4D)	Steel (1A2)	
Reconstituted wood (4F)		
Steel (4A)		
Additional Requirements		
For all lithium ion cells and batteries prepared for transport as Class 9:		
<ul style="list-style-type: none"> • Protected against short circuiting. • The completed package for the cells or batteries must meet the Packing Group II packaging requirements. • The equipment and the packages of lithium cells or batteries must be placed in an overpack. The overpack must bear applicable marks and labels as set out in Part 5;1 and 5;2.4.9. • For the purpose of this packing instruction, “equipment” means apparatus requiring the lithium ion batteries with which it is packed for its operation. 		
Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Packaged Quantity of Lithium Ion Cells and Batteries per overpack (excluding equipment)	5 kg	35 kg

Section II

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

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

1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh;
2. 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.
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, subsection 38.3.

General Requirements:

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

STRONG OUTER PACKAGINGS

Boxes	Drums	Jerricans
Additional Requirements		
<ul style="list-style-type: none"> • Cells and batteries must be packed in inner packagings that completely enclose the cell or battery. • 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. • The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares; • Each package of batteries must be capable of withstanding a 1.2 m drop test in any orientation without <ul style="list-style-type: none"> ○ 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 consignment must be accompanied with a document such as an air waybill with an indication that: <ul style="list-style-type: none"> ○ 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. • Each package must be labelled with a lithium battery handling label (Figure 5-xx); • Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities. 		

PACKING INSTRUCTION 9X6		
Passenger and Cargo Aircraft for UN 3481		
Lithium Ions Cells and Batteries (including lithium polymer) contained in equipment		
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 the Technical 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.		
<ul style="list-style-type: none"> • Each cell or battery must: <ul style="list-style-type: none"> i. Be of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. ii. 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 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.		
Outer Packagings		
Boxes	Drums	Jerricans
Additional Requirements		
<ul style="list-style-type: none"> • 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. 		
Section I	Package Quantity for Passenger Aircraft	Package Quantity for Cargo Aircraft
Net Quantity of Lithium Ion Batteries Per Piece of Equipment	5 kg	35 kg
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 in Section II.		
Lithium ion cells and batteries may be offered for transport if they meet the following:		
<ol style="list-style-type: none"> 1. Lithium ion cells, the Watt-hour rating is not more than 20 Wh; 2. Lithium ion batteries, the Watt-hour rating is not more than 100 Wh; <ul style="list-style-type: none"> • The Watt-hour rating must be marked on the outside of the battery case. 3. Each cell or battery is of the type proven to meet the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3. 		
General Requirements:		
Equipment must be packed in strong outer packagings that conform to Part 4;1.1.1, 4;1.1.3.1 and 4;1.1.9 (except 4;1.1.9.1).		
STRONG OUTER PACKAGINGS		
Boxes	Drums	Jerricans

Additional 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 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.
- Each package containing more than four cells or more than two batteries installed in equipment (DB) must be labelled with a lithium battery handling label (Figure 5-xx);
- Any person preparing or offering cells or batteries for transport must receive adequate instruction on these requirements commensurate with their responsibilities.

Editorial Note.— Delete Packing instructions 903, 912 and 918.

Part 5

SHIPPER'S RESPONSIBILITIES

...

Add new heading 3.5.2.1 and new paragraph 3.5.2.2:

3.5.2 Handling label

3.5.2.1 Handling label specifications

An illustration of each of the handling labels showing the approved design and colour is given in Figures 5-23 to 5-25 and Figures 5-27 to 5-29. The minimum label dimensions are shown in the figures; however, labels having dimensions not smaller than half of those indicated may be used on packages containing infectious substances when the packages are of dimensions such that they can only bear smaller labels.

3.5.2.2 Lithium battery handling label

Packages containing lithium batteries packed according to packing instructions 9X1 to 9X6 that are not subject to other additional requirements of these Instructions must bear a "Lithium battery" handling label (Figure 5-xx). The label must show "Lithium metal batteries" or "Lithium ion batteries", as applicable.

...



Figure 5-xx. Lithium battery handling label
