



Lithium Battery Guidance Document

Revised 9 March 2016

*Transport of Lithium Metal and Lithium Ion Batteries
Revised for the 2016 Regulations*

Introduction



This document is based on the provisions set out in the 2015-2016 Edition of the ICAO Technical Instruction for the Safe Transport of Dangerous Goods by Air and the 57th Edition of the IATA Dangerous Goods Regulations (DGR).

The provisions of the DGR with respect to lithium batteries may also be found in the IATA lithium Battery Shipping Guidelines (LBSG). In addition to the content from the DGR, the LBSG also has additional classification flowcharts and detailed packing and documentation examples for lithium batteries.

Information on the DGR and LBSG can be found here:

<http://www.iata.org/publications/dgr/Pages/manuals.aspx>

<http://www.iata.org/publications/Pages/lithium-battery-guidelines.aspx>

The purpose of this document is to provide guidance for complying with provisions applicable to the transport by air of lithium batteries as set out in the DGR.

Specifically the document provides information on:

- Definitions;
- Classification (including classification flowcharts);
- Prohibitions;
- Restrictions;
- Frequently Asked Questions

Definitions

Lithium Battery – The term “lithium battery” refers to a family of batteries with different chemistries, comprising many types of cathodes and electrolytes. For the purposes of the DGR they are separated into:

Lithium metal batteries. Are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. Lithium metal batteries are generally used to power devices such as watches, calculators, cameras, temperature data loggers.

Note:

Lithium metal batteries packed by themselves (not contained in or packed with equipment) (Packing Instruction 968) are forbidden for transport as cargo on passenger aircraft) unless shipped under exemption issued by all States concerned, see special provision A201.



Figure 1 - Example of Lithium Metal Batteries

Lithium-ion batteries (sometimes abbreviated Li-ion batteries) are a type of secondary (rechargeable) battery commonly used in consumer electronics. Also included within the category of lithium-ion batteries are lithium polymer batteries. Lithium-ion batteries are generally found in mobile telephones, laptop computers, etc.



Figure 2 - Example of a Lithium Ion Battery

Note:

With effect 1 April 2016 lithium ion batteries packed by themselves (Packing Instruction 965) (not contained in or packed with equipment):

- (a) must be shipped at a state of charge (SoC) not exceeding 30% of their rated design capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities; and*
- (b) are forbidden for transport as cargo on passenger aircraft unless shipped under exemption issued by all States concerned, see special provision A201.*

The technical definition of a battery and cell, as indicated in the UN Manual of Tests and Criteria, is as follows:

“Battery” means two or more cells which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking and protective devices. A single cell lithium battery is considered a "cell" and must be tested according to the testing requirements for "cells" for the purposes of these Regulations and the provisions of subsection 38.3 of the UN Manual of Tests and Criteria (see also the definition for "cell").

Note:

Units that are commonly referred to as “battery packs”, “modules” or “battery assemblies” having the primary function of providing a source of power to another piece of equipment are for the purposes of these Regulations and the provisions of Subsection 38.3 of the UN Manual of Tests and Criteria treated as batteries.

“Cell” means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals. Under these Regulations and the *UN Manual of Tests and Criteria*, to the extent the encased electrochemical unit meets the definition of “cell” herein, it is a “cell”, not a “battery”, regardless of whether the unit is termed a “battery” or a “single cell battery” outside of these Regulations and the *UN Manual of Tests and Criteria*

Button cell or battery means a round small cell or battery when the overall height is less than the diameter.

Consignment, one or more packages of dangerous goods accepted by an operator (airline) from one shipper at one time and at one address, receipted for in one lot and moving to one consignee at one destination address.

Rated capacity means the capacity, in ampere-hours or milliampere-hours, of a cell or battery as measured by subjecting it to a load, temperature and voltage cut-off point specified by the manufacturer.

Note:

The following IEC standards provide guidance and methodology for determining the rated capacity:

- (1) IEC 61960 (First Edition 2003-12): Secondary cells and batteries containing alkaline or other non-acid electrolytes -Secondary lithium cells and batteries for portable applications;*
- (2) IEC 62133 (First Edition 2002-10): Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications;*
- (3) IEC 62660-1 (First Edition 2011-01): Secondary lithium-ion cells for the propulsion of electric road vehicles- Part 1: Performance testing.*

State of Origin, the country (State) in the territory of which the consignment is to first be loaded on an aircraft.

Classification (DGR 3.9.2.6)

Lithium batteries are classified in Class 9 – Miscellaneous dangerous goods as:

- UN 3090, **Lithium metal batteries**; and
- UN 3480, **Lithium ion batteries**

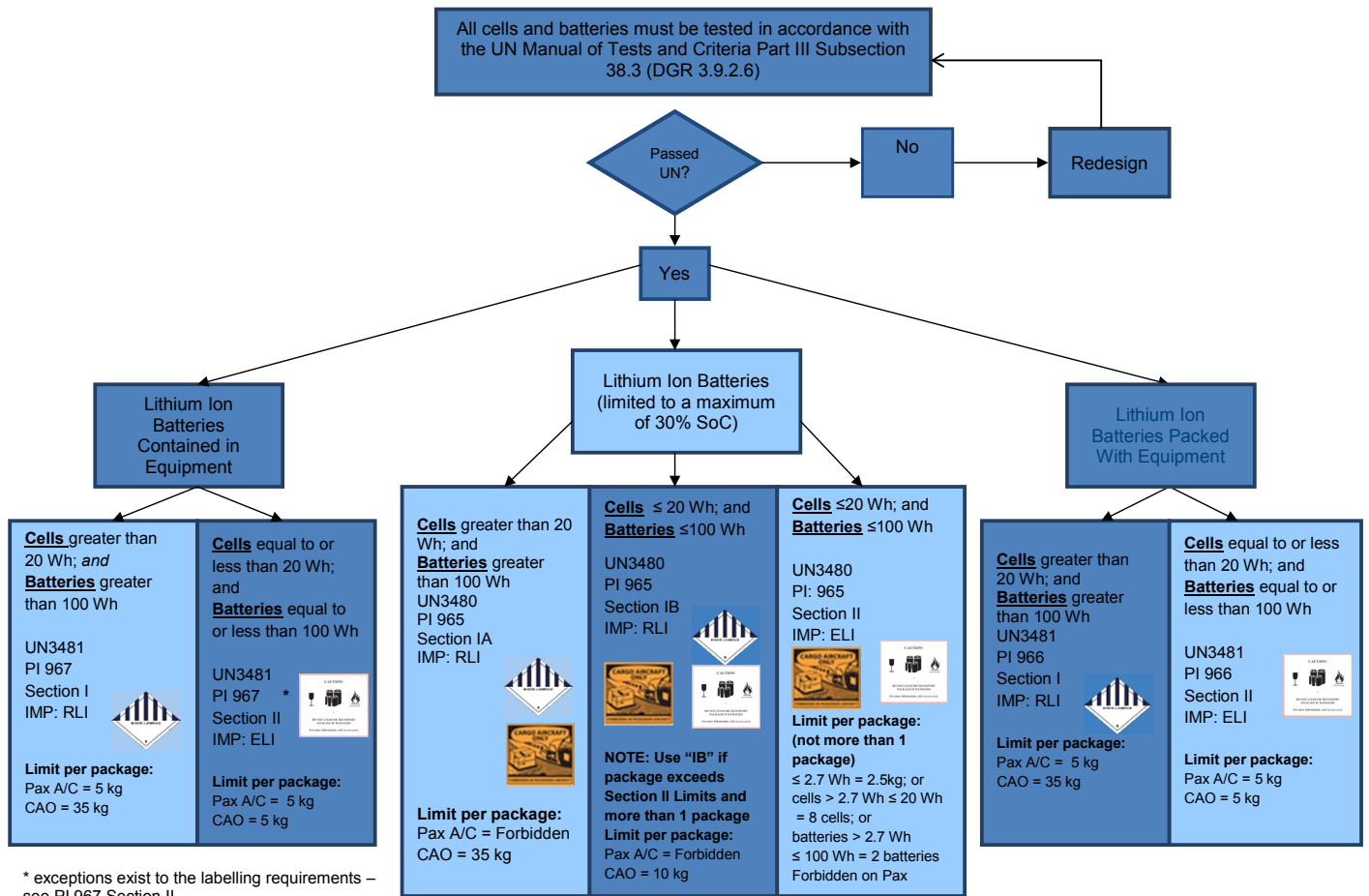
or, if inside a piece of equipment or packed separately with a piece of equipment as:

- UN 3091, **Lithium metal batteries contained in equipment**; or
- UN 3091, **Lithium metal batteries packed with equipment**; and
- UN 3481, **Lithium ion batteries contained in equipment**; or
- UN 3481, **Lithium ion batteries packed with equipment**.

Classification Flowcharts

The following (2) classification flowcharts are intended to provide guidance on the classification for lithium metal and lithium ion batteries.

Classification Flowchart – Lithium Ion Batteries



* exceptions exist to the labelling requirements – see PI 967 Section II

Classification Flowchart – Lithium Metal Batteries

All cells and batteries must be tested in accordance with the UN Manual of Tests and Criteria Part III Subsection 38.3 (DGR 3.9.2.6)



No



Redesign




Yes



Lithium Metal Batteries Contained in Equipment

Lithium Metal Batteries

Lithium Metal Batteries Packed With Equipment

<p>Cells greater than 1 g; and Batteries greater than 2 g</p> <p>UN3091 PI 970 Section I IMP: RLM</p>  <p>Limit per package: Pax A/C = 5 kg CAO = 35 kg</p>	<p>Cells equal to or less than 1 g; and Batteries equal to or less than 2 g</p> <p>UN3091 PI 970 Section II * IMP: ELM</p>  <p>Limit per package: Pax A/C = 5 kg CAO = 5 kg</p>
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<p>Cells greater than 1 g; and Batteries greater than 2 g</p> <p>UN3090 PI 968 Section IA IMP: RLM</p>  <p>Limit per package: Pax A/C = Forbidden CAO = 35 kg</p>	<p>Cells ≤ 1 g; and Batteries ≤ 2 g</p> <p>UN3090 PI 968 Section IB IMP: RLM</p>  <p>NOTE: Use "IB" if Package exceeds Section II Limits and more than 1 package</p> <p>Limit per package: Pax A/C = forbidden CAO = 2.5 kg</p>	<p>Cells equal to or less than 1 g; and Batteries equal to or less than 2 g</p> <p>UN3090 PI 968 Section II IMP: ELM</p>  <p>Limit per package: (not more than 1 package) Lithium metal content ≤ 0.3g = 2.5 kg; or cells > 0.3 g ≤ 1 g = 8 cells; or batteries > 0.3 g ≤ 2 g = 2 batteries Forbidden on PAX</p>
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<p>Cells greater than 1 g; and Batteries greater than 2 g</p> <p>UN3091 PI 969 Section I IMP: RLM</p>  <p>Limit per package: Pax A/C = 5 kg CAO = 35 kg</p>	<p>Cells equal to or less than 1 g; and Batteries equal to or less than 2 g</p> <p>UN3091 PI 969 Section II IMP: ELM</p>  <p>Limit per package: Pax A/C = 5 kg CAO = 5 kg</p>
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* exceptions exist to the labelling requirements – see PI 970 Section II

Prohibitions

Lithium ion batteries

With effect 1 April 2016 all lithium ion cells and batteries shipped by themselves (UN 3480) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 965, Section IA, IB and II, must bear a Cargo Aircraft Only label, in addition to existing labels.

Lithium metal batteries

All lithium metal cells and batteries shipped by themselves (UN 3090) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 968, Section IA, IB and II, must bear a Cargo Aircraft Only label, in addition to existing labels.

Restrictions

Lithium ion batteries

With effect 1 April 2016 all lithium ion cells and batteries must be shipped at a state of charge not exceeding 30% of their rated design capacity. Cells and/or batteries at a SoC of greater than 30% may only be shipped with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Frequently Asked Questions

Part 1 – Questions Related to Definitions**A. What are the various types of lithium batteries?**

Lithium batteries fall into two broad classifications; lithium metal batteries and lithium ion batteries. Lithium metal batteries are generally non-rechargeable and contain metallic lithium. Lithium ion batteries do not contain metallic lithium and are rechargeable.

B. What are lithium polymer batteries?

A lithium polymer battery is a type of lithium ion battery. Generally, the main difference is lithium ion polymer batteries contain a polymer electrolyte.

C. What is the difference between a lithium cell and a lithium battery?

A lithium cell is a single encased electrochemical unit consisting of one positive and one negative electrode that exhibits a voltage differential across the two terminals. A lithium battery is two or more cells electrically connected. A single cell battery is considered a cell and not a battery for the purposes of the limitations set out in the DGR.

***Note:** Units that are commonly referred to as “battery packs” having the primary function of providing a source of power to another piece of equipment are for the purposes of these Regulations treated as batteries. Refer to the section on Definitions for complete details.*

D. How are component cells connected to form a battery?

Cells in batteries may be connected in parallel, in series, or in a combination of the two. When cells are connected in series the voltage of the battery increases but the capacity in ampere-hours (Ah) does not change. By contrast, when cells are connected in parallel the capacity in ampere-hours of the battery (Ah) increases but the voltage stays the same.

E. How do I determine the watt-hour rating for a particular lithium ion battery?

The watt-hour (Wh) rating is a measure by which lithium ion batteries are regulated. Section II Lithium ion batteries manufactured after 1 January 2009 are required to be marked with the watt-hour rating. Section I Lithium ion batteries manufactured after 31 December 2011 are required to be marked with the watt-hour rating.

You can also arrive at the number of watt-hours your battery provides if you know the battery’s nominal voltage (V) and capacity in ampere-hours (Ah):

$$\text{Ah} \times \text{V} = \text{Wh}$$

This information is often marked on the battery.

Note: that if only the milliampere-hours (mAh) are marked on the battery then divide that number by 1000 to get ampere-hours (Ah) (i.e. 4400 mAh / 1000 = 4.4 Ah).

Most lithium ion batteries marketed to consumers are below 100 watt-hours. If you are unsure of the watt-hour rating of your lithium ion battery, contact the manufacturer.

F. What is a button cell battery?

A button cell battery is a round small cell or battery where the overall height is less than the diameter.

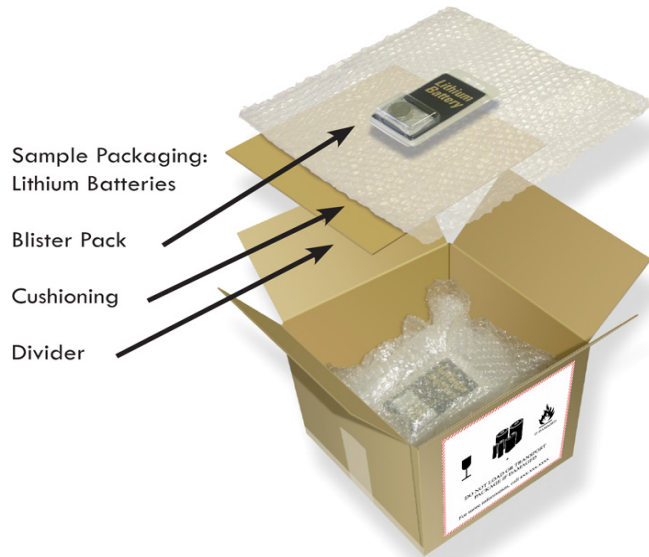
Part 2 – Questions related to Packaging and Transport Provisions

A. How do I safely package lithium batteries for transport?

One of the major risks associated with the transport of batteries and battery-powered equipment is short-circuit of the battery as a result of the battery terminals coming into contact with other batteries, metal objects, or conductive surfaces. Packaged batteries or cells must be separated in a way to prevent short circuits and damage to terminals. They must be packed in a strong outer packaging or be contained in equipment. Sample packaging meeting these requirements is shown below:

B. How can batteries be effectively protected against short circuit?

Methods to protect against short circuit include, but are not limited to, the following methods:



- Packing each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material (such as a plastic bag);
- Separating or packing batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g., metal) in the packagings; and
- Ensuring exposed terminals or connectors are protected with non-conductive caps, non-conductive tape, or by other appropriate means.

If not impact resistant, the outer packaging should not be used as the sole means of protecting the battery terminals from damage or short-circuiting. Batteries should be securely cushioned and packed to prevent shifting which could loosen terminal caps or reorient the terminals to produce short circuits.

Terminal protection methods include but are not limited to the following:

- Securely attaching covers of sufficient strength to protect the terminals;
- Packaging the battery in a rigid plastic packaging; and
- Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage if the package is dropped.

C. I'm shipping using Section II of the packing instructions, what constitutes "adequate instruction"?

Shippers of lithium batteries prepared in accordance with Section II of the lithium battery packing instructions are not subject to the formal dangerous goods training requirements set out in DGR 1.5, however persons preparing such shipments must be provided with "adequate instruction".

The following is offered as a starting point for an employer on what could be considered as being adequate instruction:

1. The employer must identify the different configurations of lithium batteries that they ship, i.e. lithium batteries and/or lithium batteries packed with equipment and/or lithium batteries contained in equipment; lithium metal batteries and/or lithium ion batteries.
2. The employer must document the procedures that apply to the configurations and battery types that they ship as determined in 1, above.
3. The procedures should be written up as a clear work instruction or other information that is available to all employees responsible for the preparation of lithium battery shipments.
4. All employees that are involved in the process of preparing lithium battery shipments must be taken through the procedure to ensure that they understand and can demonstrate the correct application of documented procedures for the packing, labelling, marking and documentations requirements, as applicable to their job function.
5. A record must be maintained that identifies each applicable employee and the date(s) that this instruction was provided.
6. Employees should be given periodic refresher, or at least demonstrate that they remain "adequately" instructed on how to perform the task. This should be done at least every two years or whenever the procedure is revised, or regulations are changed, whichever is the sooner.
7. Companies that are involved in reverse logistics, i.e. arranging for returns of lithium batteries, lithium batteries packed with equipment or lithium batteries contained in equipment must develop a clear instruction for consumers on the process to be followed for returning products. This instruction must include packaging materials and lithium battery handling labels, as necessary. The instruction must also include the transport method and mode that must be followed; this must include a clear statement on applicable prohibitions.

D. What does the lithium battery handling label look like and when is it required?

The lithium battery handling label is required as specified in the additional requirements of Section II of packing instructions 965, 966, 967, 968, 969 and 970. It is also required as specified in the additional requirements of Section IB of packing instruction 965 and 968 in addition to the Class 9 label and Cargo Aircraft Only label for Packing Instruction 965 and 968. The label is as shown in Figure 7.4.H of the IATA Dangerous Goods Regulations. The border of the label must have red diagonal hatchings with text and symbols in black on a contrasting background. The lithium battery handling label may be printed directly on the outer packaging provided that there is sufficient contrast between the elements of the lithium battery label and the colour of the packaging material. The minimum dimensions are 120 mm wide x 110 mm high.



* Place for "Lithium ion battery" and/or "Lithium metal battery"

E. If I have smaller packages, can I use a smaller lithium battery handling label?

Where the packages are of dimensions such that they can only bear smaller labels the label dimensions may be 105 mm wide × 74 mm high. The design specifications remain otherwise the same.



* Place for "Lithium metal battery" or "Lithium ion battery"



F. When is a lithium battery handling label not required?

A lithium battery handling label is not **permitted** for packages prepared in accordance with Section IA of Packing Instructions 965 and 968 and Section I of Packing Instructions 966, 967, 969 and 970.

A lithium battery handling label is not **required** for packages containing only button cell batteries installed in equipment (including circuit boards) (See PI 967 and 970 Section II) and consignments of two packages or less where each package contains no more than four cells or two batteries installed in equipment.

Notes:

1. *Shippers should take steps to implement the requirement to apply the lithium battery handling label to packages containing no more than four cells or two batteries and there are more than two packages in the consignment as soon as possible however consignments of Packing Instruction 967/970 Section II of more than two packages may continue to move without the lithium battery handling label until 31 December 2016 where each package contains no more than four cells or two batteries installed in equipment. Packages that do not require a lithium battery handling label do not require the accompanying document mentioned in the “Additional Requirements” of Section II of Packing Instructions 967 and 970.*
2. *The Air Waybill is only required to contain the statements "Lithium [ion or metal] batteries in compliance with Section II of PI9XX" when the lithium battery handling label needs to be affixed to the package(s).*

G. Is there a requirement for the Lithium Battery Handling Label to be available in languages other than English?

English is generally the standard language accepted in international aviation. However, the State of origin where the package is being offered for shipment may require their official language. Subsection 7.1.3.3 of the IATA DGR specifies that in addition to the languages which may be required by the State of origin, English must be used.



H. Section II in Packing Instructions 967 and 970 states that “consignments of two packages or less where each package contains no more than four cells or two batteries installed in equipment.” What is the intent of this provision?

This provision is to require, where there are more than two packages in the consignment (shipment), that each package bears the lithium battery handling label, and therefore the air waybill has the compliance statement e.g. “Lithium [ion or metal] batteries in compliance with Section II of PI 9xx [67 or 70]”.

The provision continues to allow for small consignments of one or two packages containing no more than four cells or two batteries installed in equipment per package to move without the lithium battery handling label and therefore compliance statement.

I. I have an MP3 player that contains one single-cell lithium ion battery pack. Do I have to label the shipping box that contains each MP3 player? What if I place five MP3 players in a shipping box? Does this require a label?

For packages of single MP3 players, no lithium battery label would be required since you can place up to 4 of these single-cell batteries in a box without labelling the outer box. In the case where 5 MP3 players are in a shipping package, a lithium battery label on the outer shipping package would be required.

J. Can a single label be used to identify that both lithium metal and lithium ion batteries are contained inside the package?

Yes. The label may bear the words “lithium ion and lithium metal batteries” to identify that both types of batteries are contained in the package.

K. What are the requirements for the telephone number on the lithium battery handling label?

The telephone number should be of a person knowledgeable about the shipment but is not intended to be for the purposes of obtaining immediate emergency response guidance, and is therefore not required to be monitored at all times that the package is in transit. It is acceptable for the number to be monitored during the company’s normal business hours in order to provide product-specific information relative to the shipment. However, it also is acceptable to use an emergency response, 24-hour phone number on the label.

L. For the purposes of the lithium battery packing instructions, what is considered the "package"?

The package is the complete product of the packing operation that satisfies the requirements of the packing instruction and in a manner ready to be presented for transport (shipper/consignee information, hazard communication, etc.). The package may contain multiple batteries or pieces of equipment provided the limitations set out in the applicable packing instruction are not exceeded. The package must be marked and labelled as required by the packing instruction. A single package may be offered for transport, or one or more packages may then be placed into an overpack for ease of handling or transport purposes. When an overpack is used, the package markings and labels must be duplicated on the overpack unless the markings and labels required on individual packages are visible, or are not required by the packing instruction (i.e. not more than 4 cells or 2 batteries when contained in equipment).

M. Please explain the documentation requirements for consignments of lithium batteries that are required to have the lithium battery label?

Each consignment of packages with lithium batteries that is required to have the lithium battery handling label must be accompanied by an additional document that indicates:

- 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.

This document may be in any form provided it contains all the appropriate information and accompanies the consignment. The document can be separate from the package or can be attached to the package. A peel-off type document attached to the package is also acceptable.

Two possible examples of the document have been provided at the end of this guidance document in [Appendix A](#).

This document is required for any shipment where the lithium battery handling label is required (i.e. Section IB and Section II). The information on the document may be added to the shipper’s Declaration for Dangerous Goods for Section IB shipments.

The document may be modified with company specific information (e.g. logo, letterhead, etc.) and the fields marked “optional” are not required to be completed and may be left blank or removed from a modified version. Blank “optional” fields should not constitute reason for a refusal.

N. Does IATA require an MSDS or SDS containing the UN test data?

No. IATA does not require the use of MSDS or SDS and test data is not part of the required documentation requirements when offering lithium batteries for transport.

O. Under Packing Instructions 966 and 969, it states that “The maximum number of batteries in each package must be the minimum number required to power the equipment, plus two spares”. If a package contains 4 power tools (each tool contains a lithium ion battery), can 2 extra lithium ion batteries be placed in the package for each piece of equipment for a total of 8 batteries?

Yes. The 8 batteries reflect two spares for each of the 4 power tools in the outer package.

P. May lithium battery packages be placed in an overpack in accordance with the new IATA Dangerous Goods Regulations?

Yes. The overpack may also contain packages of dangerous goods or goods not subject to the Regulations provided there are no packages enclosing different substances which might react dangerously with each other. An overpack must be marked with the word “overpack” and must be labelled with the lithium battery handling label (Figure 7.4.H), unless the label(s) on the package(s) inside the overpack are visible or not required by the Packing Instruction.

In addition, the word “overpack” must be marked on overpacks containing packages transported in accordance with Section I of the applicable Packing Instructions (i.e. bearing Class 9 labels).

Note:

For Section II of PI 965 and PI 968 the shipper is limited to one (1) package per consignment (shipment) and no more than one (1) package complying with the requirements of Section II may be placed in an overpack. This overpack may also contain packages prepared in accordance with Section IA and/or IB of PI 965 and/or PI 968 and/or packages of other dangerous goods and/or packages of non-dangerous goods.

Q. Do the quantity limits shown in the lithium battery packing instructions apply to overpacks containing lithium batteries?

The quantity limits shown in the packing instructions refer to the package. Provided each package remains within the limit specified in the packing instruction, the overpack may exceed the specified limits.

Note:

For Section II of PI 965 and PI 968 the shipper is limited to one (1) package per consignment (shipment) and no more than one (1) package complying with the requirements of Section II may be placed in an overpack. This package may be placed in an overpack. This overpack may also contain packages prepared in accordance with Section IA and/or IB of PI 965 and/or PI 968 and/or packages of other dangerous goods and/or packages of non-dangerous goods.

R. Packing Instructions 966 and 969 Section II include a requirement for a 1.2 metre drop test. What portion or portions of the package are subject to this test?

The completed package containing batteries as prepared for transport in accordance with the relevant packing instruction must be capable of withstanding the 1.2 m drop test. This could apply to a package solely containing batteries that is packaged in full compliance with the provisions of the packing instruction (to include the 1.2 m drop test capability requirement) and is then overpacked with equipment and offered for transport (see item 2P for additional information related to overpacks). Or, it could apply to a package that includes batteries properly packed in inner packaging and equipment or other non-dangerous goods that are placed in a single outer packaging. The package that includes both the inner packaging containing batteries and the equipment must comply with the packing instruction to include meeting the capability to pass the 1.2 m drop test.

S. How do I transport prototype lithium cells and batteries that have not been UN Tested?

Prototype or low-production lithium batteries may be transported by cargo aircraft if you do the following (See Special Provision A88):

1. Obtain approval from the competent authority of the State of origin prior to transport;
2. Protect the cells and batteries from short circuiting;
3. Individually pack each of the cells or batteries in an inner packaging inside an outer packaging that completely surrounds the cells and batteries. All packaging and cushioning material must be non-conductive and non-combustible
4. Place the cells and batteries in an outer drum or box made of metal, plastic or plywood that meets Packing Group I performance requirements.
 - a. 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 packed in outer packagings or protective enclosures not subject to the requirements of Section 6 of the IATA DGR.

T. Can I ship recalled, damaged or non-conforming cells or batteries?

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).

Batteries which have some other defective feature (e.g., LEDs not showing charge, incorrect model number on label, or batteries not holding enough charge) could still be shipped by air. Also, laptops being returned may not have a defective battery, it may not meet the needs of the customer, may be defective itself (but not the battery), etc. In these situations air transport would be permitted. The battery or equipment manufacturer should be contacted to determine the appropriate shipping method.

U. How do I protect against “inadvertent activation”?

When batteries are contained in equipment, the equipment should be packaged in a manner that prevents unintentional activation or should have an independent means of preventing unintentional activation (e.g., packaging restricts access to activation switch, switch caps or locks, recessed switches, trigger locks, temperature sensitive circuit breakers, etc.). This requirement does not apply to devices which are

intentionally active in transport (RFID transmitters, watches, sensors etc.) and which are not capable of generating a quantity of heat sufficient to be dangerous to packaging or personal safety.

V. What is the maximum weight of batteries per package for fully regulated batteries contained in equipment (Section I)?

The maximum weight is 5 kg of lithium batteries per package for passenger and cargo aircraft and 35 kg of lithium batteries per package for cargo aircraft only.

	Net Quantity per Package Passenger & Cargo Aircraft	Net Quantity per Package Cargo Aircraft Only
Lithium Ion & Lithium Metal cells and batteries contained in equipment	5 kg	35 kg

W. Do I need to declare a gross weight or a net weight for lithium batteries (Section I)?

All lithium battery shipments, including when packed with or contained in equipment, must be declared by the net weight as per the definition of “net weight” (IATA DGR Appendix A).

X. I have 2 kg of 2.7Wh cells and 2 batteries that meet the Section II limitations; can I place them in one package?

No. The limits found in Table 965-II and Table 968-II cannot be combined. With effect 1 April 2016, shippers are not permitted to ship more than one package of Section II PI 965 at one time. Therefore quantities of lithium ion cells or batteries that exceed the limit for one package must be shipped as Section IB.

Y. I am shipping Section IB lithium [ion or metal] batteries; do I need dangerous goods training?

Yes. All the provisions of the Dangerous Goods Regulations apply to shipments of Section IB batteries except the references listed in Section IB. Therefore, dangerous goods training as indicated in Subsection 1.5 of the Dangerous Goods Regulations is required.

Z. What are the additional marking requirements for a package prepared under Section IB of Packing Instruction 965 and 968?

Because all of the requirements of the dangerous goods regulations apply other than the exceptions listed in Section IB, each package must be marked with:

- the UN Number preceded by “UN” and the Proper Shipping Name (DGR 7.1.4.1 (a));
- the shipper and consignee address (DGR 7.1.4.1 (b)); and
- in addition, the net weight as required by (DGR 7.1.4.1(c)) must be marked on the package.

Note:

When using an overpack, each package must be marked in accordance with the Regulations and then, when placed in an overpack, marked as required by DGR 7.1.7.

AA. I am shipping perishable cargo with lithium battery powered temperature or data loggers; do I need to follow the Dangerous Goods Regulations?

Yes. All the applicable provisions for lithium batteries will need to be followed by the shipper of such devices, including the limitations for devices that are “active” (on) during transport.

Note:

The perishable cargo regulations (PCR) also apply to such shipments.

BB. Do I need to include an additional document or statement to certify that my lithium ion batteries are at no more than 30% SoC?

No. For lithium ion batteries shipped in accordance with Section IA or Section IB of PI 965, which must be on a Shipper’s Declaration, the Shipper’s Declaration includes a certification statement “I declare that all of the applicable air transport requirements have been met.”

By signing the Shipper’s Declaration the shipper is making a legal statement that all the applicable provisions of the DGR have been complied with, which includes that the lithium ion batteries are an no more than 30% SoC.

For Section II of PI 965 the provision of the compliance statement “lithium ion batteries in compliance with Section II of PI 965” on the air waybill will be taken by regulatory authorities as a legal declaration of compliance.

CC. I have lithium ion batteries packed with equipment (PI 966, Section I) where the lithium ion batteries are packed in a fibreboard (4G) box and then that box is packed with the equipment in a fibreboard outer packaging. Is this an overpack?

No, Section I of PI 966 (and also PI 969) allows two methods of having lithium batteries packed with equipment. Either:

- (a) the lithium batteries are packed into a UN specification packaging meeting PG II performance standards and then packed with the equipment in an outer packaging; or
- (b) the lithium batteries and the equipment are packed into UN specification packaging meeting PG II performance standards.

In either case what is presented for transport is a “package” and not an overpack.

Part 3 – Questions Related to Design Type Testing Provisions

A. Where can I find requirements related to testing of battery design types?

The UN Manual of Tests and Criteria sets out specific tests that must be conducted on each lithium cell or battery design type. Each test is intended to either simulate a common transportation occurrence such as vibration or changes in altitude or to test the integrity of a cell or battery. You may obtain a copy of these testing requirements via the following website:

http://www.unece.org/trans/danger/publi/manual/manual_e.html.

B. What constitutes a design change requiring renewed design type testing?

The following provisions are taken from the fifth (5th) revised edition of the UN Manual of Tests and Criteria, Amendment 1.

A cell or battery that differs from a tested design by:

- (a) For primary cells and batteries, a change of more than 0.1 g or 20% by mass, whichever is greater, to the cathode, to the anode, or to the electrolyte;
- (b) For rechargeable cells and batteries, a change in Watt-hours of more than 20% or an increase in voltage of more than 20%; or
- (c) A change that would materially affect the test results.

Shall be considered a new type and shall be subjected to the required tests.

Note: the type of change that might be considered to differ from a tested type, such that it might lead to a failure of any of the test results, may include, but is not limited to:

- *A change in the material of the anode, the cathode, the separator or the electrolyte;*
- *A change of protective devices, including the hardware and software;*
- *A change of safety design in cells or batteries, such as a venting valve;*
- *A change in the number of component cells; and*
- *A change in connection mode of component cells.*

In the event that a cell or battery type does not meet one or more of the test requirements, steps shall be taken to correct the deficiency or deficiencies that caused the failure before such a cell or battery type is retested.

Additional Information

Further information can be found here:

<http://www.iata.org/whatwedo/cargo/dgr/Pages/index.aspx>

<http://safetravel.dot.gov>

You may also contact the airline of your choice or your national civil aviation authority if you have any further concerns about travelling with lithium metal or lithium ion batteries.

You can also contact the IATA Dangerous Goods Support team if you have questions or concerns which may not have been addressed in this document:

dangood@iata.org

Abbreviation, Acronyms, Symbols

The following abbreviations, acronyms and symbols are used throughout the document.

Symbol	Meaning
≥	Equal to or greater than
≤	Equal to or less than
>	Greater than
<	Less than
Abbreviation	Meaning
Li Ion (li-ion)	Lithium ion
Li batt.	Lithium battery
PAX	Passenger
Acronym	Meaning
CAO	Cargo Aircraft Only
DGD	Shipper's Declaration for Dangerous Goods
DGR	IATA Dangerous Goods Regulations
LBSG	IATA Lithium Battery Shipping Guidelines

Appendix A - Template for Accompanying Lithium Battery Document

Additional Lithium Battery Safety Document – Example 1

Reference Number (optional): _____

WARNING: LITHIUM BATTERIES THAT HAVE BEEN RECALLED BY THE MANUFACTURER FOR SAFETY REASONS **MUST NOT** BE SHIPPED BY AIR.

Terminology:

- Cell – *electrochemical unit, consisting of an anode and a cathode, capable of generating electrical current*
- Battery – *assembly of cells*
- Lithium ion cells/batteries – *rechargeable – includes lithium polymer cells/batteries*
- Lithium metal cells/batteries – *generally non-rechargeable*

This package contains lithium cells or batteries in the following configuration (check applicable):

Lithium Ion - Maximum of <ul style="list-style-type: none"> • 20 Watt-hours per cell; and • 100 Watt-hours per battery 	Lithium Metal – Maximum of <ul style="list-style-type: none"> • 1 gram of lithium metal per cell; and • 2 grams of lithium per battery
<input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 965, Section II) – <i>Cells or batteries in a package, without electronic equipment</i> Package Limit: ≤2.7 Wh = 2.5 kg; <u>or</u> >2.7 Wh but ≤ 20 Wh = 8 cells; <u>or</u> >2.7 Wh but ≤ 100 Wh = 2 batteries	<input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 968, Section II) – <i>Cells or batteries in a package, without electronic equipment</i> Package Limit: ≤0.3 g = 2.5 kg; <u>or</u> >0.3 g but ≤ 1 g = 8 cells; <u>or</u> >0.3 g but ≤ 2 g = 2 batteries
<input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 965, Section IB) – <i>Cells or batteries in a package, without electronic equipment</i>	<input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 968, Section IB) – <i>Cells or batteries in a package, without electronic equipment</i>
<input type="checkbox"/> Packed with equipment (ICAO/IATA Packing Instruction 966, Section II) – <i>Cells or batteries contained in a package with associated electronic equipment</i>	<input type="checkbox"/> Packed with equipment (ICAO/IATA Packing Instruction 969, Section II) – <i>Cells or batteries contained in a package with associated battery-powered equipment – with the batteries not installed in the equipment</i>
<input type="checkbox"/> Contained in equipment (ICAO/IATA Packing Instruction 967, Section II) – <i>Cells or batteries installed in equipment</i>	<input type="checkbox"/> Contained in equipment (ICAO/IATA Packing Instruction 970, Section II) – <i>Cells or batteries installed in equipment</i>

- This package must be handled with care. A flammability hazard exists if the package is damaged.
- If this package is damaged in transportation, it must not be loaded until the condition of the contents can be verified. The batteries contained in this package must be inspected for damage and may only be repacked if they are intact and protected against short circuits.
- For more information about the batteries contained in this package, call the following telephone number:

List telephone number here, including area code and any applicable country code

Name/Address of shipper (optional):

Name/Address of Consignee (optional):

Date (optional):

Appendix A - Template for Accompanying Lithium Battery Document

Additional Lithium Battery Safety Document - Example 2

- This package must be handled with care. A flammability hazard exists if the package is damaged.
- If this package is damaged in transportation, it must not be loaded until the condition of the contents can be verified. The batteries contained in this package must be inspected for damage and may only be repacked if they are intact and protected against short circuits.
- For more information about the batteries contained in this package, call the following telephone number:

List telephone number here, including area code and any applicable country code