

Lithium Batteries

Challenges - Business - Compliance

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Agenda

1. Introduction
2. Regulations
3. Hazards
4. Challenges

Introduction

Increasing demand for lithium batteries as they can be found in:

Consumer Goods



Industrial Goods



Types of Lithium Batteries

Lithium ION (including Lithium polymer batteries)

- rechargeable (secondary) batteries commonly used in consumer electronics
- most popular battery for portable electronics: laptops, mobile phones, camcorders, etc.



Lithium METAL (including Lithium alloy batteries)

- contain lithium metal, not rechargeable
- most popular for powering watches, calculators, cameras and remote controls but also used in PC motherboards to store the bios memory



Batteries and Cells

Lithium battery

- a lithium battery consists of two or more connected cells
- Although a battery contains multiple cells for the purpose of these regulations it is considered as one battery. The number of cells inside the battery is irrelevant.



Lithium cell

- sometimes single cells are sufficient to power a small device



Dangerous Goods Regulations - Overview



Orange Book - United Nations Recommendations on the Transport of Dangerous Goods



GGBefG - Gefahrgutbeförderungsgesetz
GbV - Gefahrgutbeauftragtenverordnung



ADR - European Agreement Concerning the International Carriage of Dangerous Goods by Road



IMDG-Code - International Maritime Dangerous Code



IATA-DGR - International Air Transport Association-Dangerous Goods Regulation
ICAO T.I. - International Civil Aviation Organization Technical Instructions

IATA DGR Classification

- Lithium Batteries are classified as Class 9 – Miscellaneous Goods as:
 - UN3480 LITHIUM ION BATTERIES
 - UN3090 LITHIUM METAL BATTERIES
- or if inside a piece of equipment or packed separately with a piece of equipment as:
 - UN3481 LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT
 - UN3481 LITHIUM ION BATTERIES PACKED WITH EQUIPMENT
 - UN3091 LITHIUM METAL BATTERIES CONTAINED IN EQUIPMENT
 - UN3091 LITHIUM METAL BATTERIES PACKED WITH EQUIPMENT
- In the absence of exceptions these batteries must be shipped in quantities that comply with IATA DGR.

Battery Sections

Depending on the watt-hour or lithium content of the batteries, these can be transported according to the following sections.

Exemption: If batteries are meeting the requirements in Section II PI 967 & PI 970 no marking and labeling is required.

Section I / IA

PI 965 – 970

Requirements:

- DG trained
- UN specification packaging
- Marking and labeling
- Shipper's declaration for Dangerous Goods

Section IB

PI 965 & 968

Exceeds weight limitations of Sec II

Requirements:

- DG trained
- Strong outer package
- Marking and labeling
- Weight limitation
- Transport Document

Section II

PI 965, 966, 968, 969

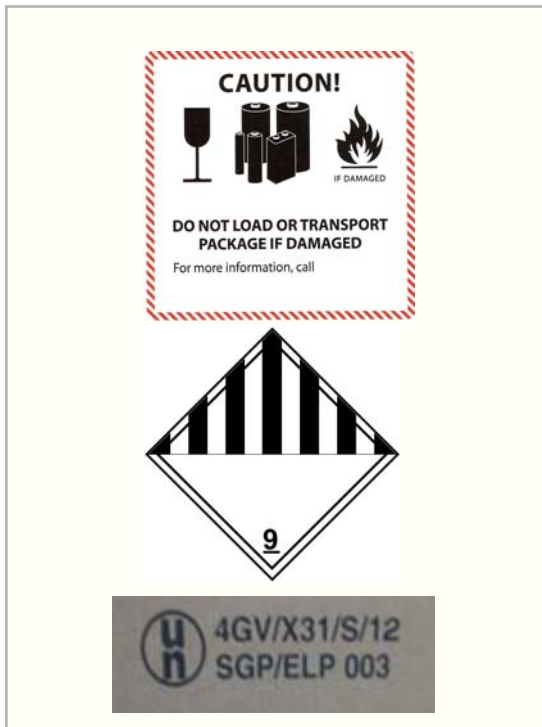
Requirements:

- Strong outer package
- Marking and labeling
- Weight limitation
- Transport Document

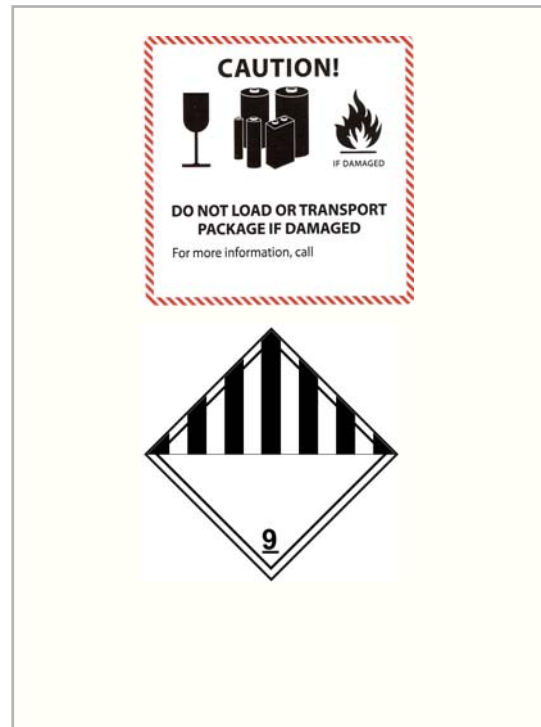
Battery Sections

Label requirements according to IATA DGR

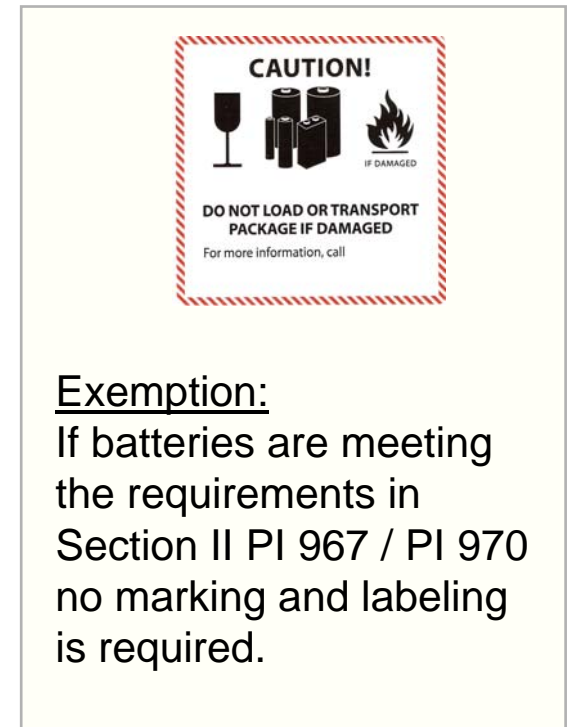
Section I / IA



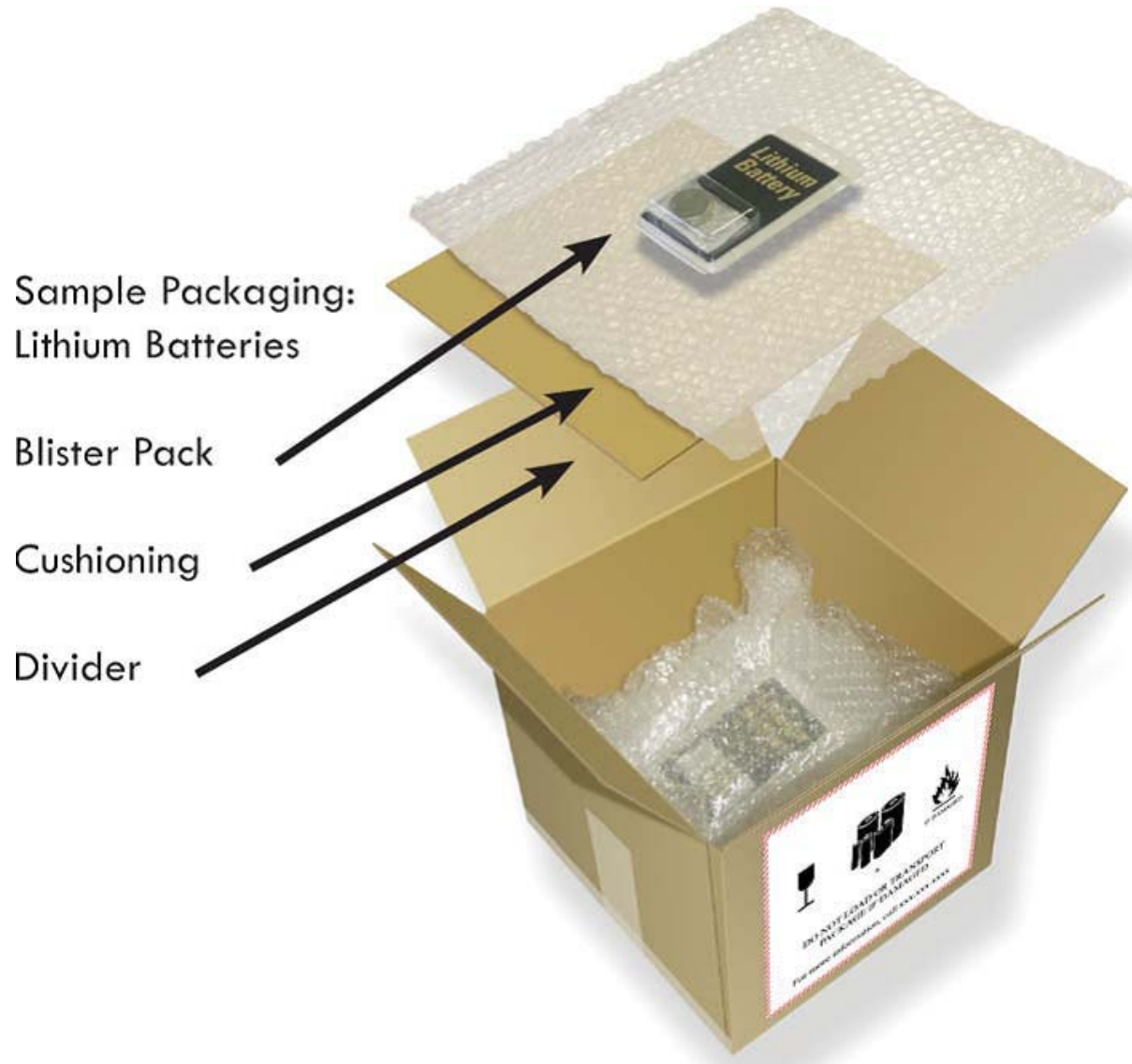
Section IB



Section II



Sample Packaging as per IATA DGR



Extract of Special Provisions in IATA DGR

A48 Packaging tests are not considered necessary (UN3091/UN3481 only)

A88 Transport of Prototypes and low production

A99 Shipments >35kg gross mass allowed (UN3090/UN3480 only)

A154 Defective batteries and cells are forbidden for transport

A164 Transport of electrical batteries and battery-powered vehicles

Extract only. Other Special Provisions may be applicable to your shipment.

Hazards

We need to be compliant to prevent incidents involving single shipments to whole pieces of equipment



Hazards

Remember:

While you can extinguish a fire involving lithium ion batteries with an aircraft halon fire extinguisher you **cannot** do the same with lithium metal batteries.



Challenges



Raise Customer Awareness – “But it’s only a battery! That’s not DG!”



Help customers with identifying their products and thus stay compliant



Educate staff on detecting hidden DG



Create systems that help identifying batteries that do not have any special requirements

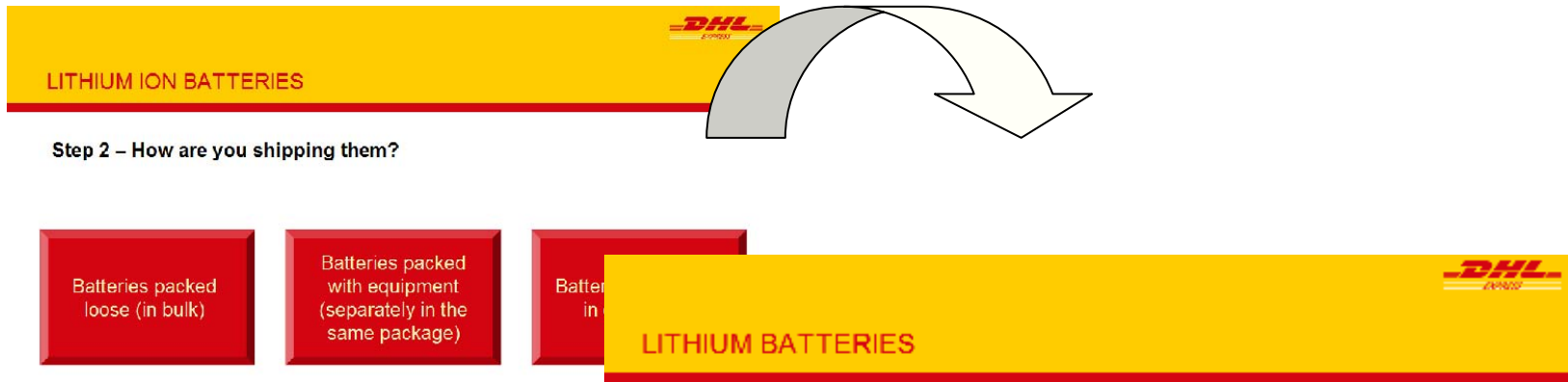


Providing all necessary information/documents to make it easier for the customer



Identifying Batteries

DHL provides a LiBa interactive tool which provides an overview of the requirements



Step 2 – How are you shipping them?

Batteries packed loose (in bulk)

Batteries packed with equipment (separately in the same package)

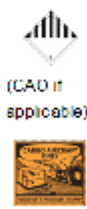


Batteries packed in...



LITHIUM BATTERIES

UN3480, Lithium Ion Batteries - Packing Instruction 965 Section IA

Restricted Commodities Group | January 2018

Packaging	Package Tests	Documentation	Labeling	DHL Product Available
<p>Each Battery must be protected against a short circuit</p> <p>UN-H Packaging</p> <p>Maximum 5 kg Net quantity per package for PAX shipments</p> <p>Maximum 35 kg Net quantity per package for CAO shipments</p> <p>PAX = Passenger aircraft</p> <p>CAO = Cargo aircraft</p>	<p>Packing Group II performance standards</p>	<p>Shipper's Declaration</p> <p>Master Air Waybill</p>	 <p>(CAO if applicable)</p> <p></p> <p> Note: Entry required</p>	<p>ACS only</p> <p>ACIND booking required as PAX/CAO</p>



[Link](#)



Educate staff on hidden DG

Theoretical Training

- „How to identify Hidden Dangerous Goods“ is part of every DG Awareness course
- Staff is trained in indications of hidden DG, for example typical AWB entries, marking, labeling, general descriptions, etc.

Practical Training

- Practical addition to theoretical DG Awareness training
- The focus is on overall awareness, as well as identifying and detecting dangerous goods presented as general cargo
- DHL called it S.A.L.T. = Standard Awareness Level Testing

Available Information

- Information for the handling staff must be available at all times, for example job aids, operating procedures, etc.



Information / Documents

In addition to information material DHL also provides editable pdf files for their customers.

Transport Document for Lithium Batteries in Section IB and II

Air Waybill / HAWB:	
Shipper:	Consignee:

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 (tick applicable box):

Lithium Ion - Maximum of	Lithium Metal - Maximum of
<ul style="list-style-type: none">20 Watt-hours per cell; and100 Watt-hours per battery <input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 965, Section II) – Cells or batteries in a package, without electronic equipment Package Limit: ≤2.7Wh = 2.5kg; or >2.7Wh but ≤ 20Wh = 8 cells; or >2.7Wh but ≤ 100Wh = 2 batteries	<ul style="list-style-type: none">1 gram of lithium metal per cell2 grams of lithium per battery <input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 968, Section II) – Cells or batteries in a package, without electronic equipment Package Limit: ≤0.3g = 2.5kg; or >0.3g but ≤ 1g = 8 cells; or >0.3g but ≤ 2g = 2 batteries
<input type="checkbox"/> Cells or batteries only (ICAO/IATA UN 3480 Packing Instruction 965, Section IB) – Cells or batteries in a package, without electronic equipment _____ packages x _____ kg gross each	<input type="checkbox"/> Cells or batteries only (ICAO/IATA Packing Instruction 968, Section II) – Cells or batteries in a package, without electronic equipment _____ packages x _____ kg
<input type="checkbox"/> Packed with equipment (ICAO/IATA Packing Instruction 966, Section II) – Cells or batteries contained in a package with associated electronic equipment	<input type="checkbox"/> Packed with equipment (ICAO/IATA Packing Instruction 969, Section II) – Cells or batteries contained in a package with associated battery-powered equipment, the batteries not installed in the equipment
<input type="checkbox"/> Contained in equipment (ICAO/IATA Packing Instruction 967, Section II) – > 4 Cells or 2 batteries installed in equipment	<input type="checkbox"/> Contained in equipment (ICAO/IATA Packing Instruction 970, Section II) – > 4 Cells or 2 batteries installed in equipment

➤ 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 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 / Signature: _____ Date: _____

Transport Document for Lithium Batteries in Section IB and II

AWB nr:	For additional info call:
Shipper:	Consignee:

I hereby declare that the shipment containing below mentioned Lithium Batteries is compliant with the ICAO / IATA DGR corresponding Packing Instruction and if applicable to ADR / IMDG Special Provision 188.

Transport by:	Contents description:
Air	<input type="checkbox"/> UN3480 Lithium Ion Batteries in compliance with Section II of PI965
	<input type="checkbox"/> UN3480 Lithium Ion Batteries, PI965 IB, _____ packages x _____ kg gross each
	<input type="checkbox"/> UN3481 Lithium Ion Batteries in compliance with Section II of PI966
	<input type="checkbox"/> UN3481 Lithium Ion Batteries in compliance with Section II of PI967
	<input type="checkbox"/> UN3090 Lithium Metal Batteries in compliance with Section II of PI968
Road / IMDG	<input type="checkbox"/> UN3090 Lithium Metal Batteries, PI968 IB, _____ packages x _____ kg gross each
	<input type="checkbox"/> UN3091 Lithium Metal Batteries in compliance with Section II of PI969
	<input type="checkbox"/> UN3091 Lithium Metal Batteries in compliance with Section II of PI970
	<input type="checkbox"/> Lithium Ion Batteries "Not restricted as per ADR / IMDG SP 188"
	<input type="checkbox"/> Lithium Metal Batteries "Not restricted as per ADR / IMDG SP 188"

Warning: Lithium batteries that have been recalled by the manufacturer for safety reasons are forbidden for air transport.
This package must be handled with care. A flammability hazard exists if the package is damaged.
If the 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 replaced if they are intact and protected against short circuits.

Name / Signature (Stamp): _____ Date: _____

After filling the above required details, please fold this document along the line and place it in the clear plastic envelope in such way that all Lithium Batteries informations are clearly visible without being necessary to open the envelope for checking the content.



[Link](#)

Any questions?



**Thank you for
your
attention!**

