Battery Guidance Document

Transport of Lithium Metal, Lithium Ion and Sodium Ion Batteries

Revised for the 2026 Regulations

Introduction

△ This document is based on the provisions set out in the 2025-2026 Edition of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) and the 67th Edition (2026) of the IATA Dangerous Goods Regulations (DGR).

The provisions of the DGR with respect to lithium and sodium ion batteries may also be found in the IATA Battery Shipping Regulations (BSR) 13th Edition. In addition to the content from the DGR, the BSR also has additional classification flowcharts and detailed packing and documentation examples for these batteries.

Reference to "**sodium ion battery"** in this document, is to be taken as those that meet the testing and classification criteria for UN 3551, Sodium Ion Battery **with organic electrolyte** set out in the Manual of Tests and Criteria, part III, sub-section 38.3.

The information in this document is intended for guidance purposes only. It should not be relied upon as a source of regulatory compliance.

Information on the DGR and BSR can be found at:

http://www.iata.org/dgr

https://www.iata.org/en/publications/manuals/battery-shipping-regulations/

Further specific guidance material can be identified under "additional information" towards the end of this document.

Please note that there has been significant restructuring of the material in this document. When compared to the 2025 edition of this document; certain text changes can be identified by:

☐	Addition of an item
△	Change to an item
⊗	Deletion of an item

This document does not consider batteries other than lithium metal, lithium ion and sodium ion with organic electrolyte.

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Definitions

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 and lithium-ion batteries.

Lithium metal batteries are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. Also included within lithium metal are lithium alloy batteries. Lithium metal batteries are generally used to power devices such as watches, calculators, cameras, temperature data loggers, car key fobs and defibrillators.

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).

- *In accordance with Special Provision A201, lithium metal cells or batteries that meet the specified quantity limits may be shipped on a passenger aircraft under an approval issued by the authority of the State of Origin, State of Destination and State of the Operator.*
- *Or in the case of urgent medical need, one consignment of lithium batteries may be transported as Class 9 (UN 3090) on passenger aircraft with the prior approval of the authority of the State of Origin and with the approval of the operator, see Special Provision A201.*
- *All other lithium metal cells and batteries can only be shipped on a passenger aircraft under exemption issued by all States concerned.*

Figure 1 - Example of Lithium Metal Cells and Batteries

Lithium-ion batteries (also abbreviated as Li-ion batteries) are secondary (rechargeable) battery where the lithium is only present in an ionic form in the electrolyte. Also included within the category of lithium-ion batteries are lithium polymer batteries. Lithium-ion batteries are generally used to power devices such as mobile telephones, laptop computers, tablets, power tools, hybrid and electric vehicles and e-bikes. Other similar sources of power (power banks, power packs, etc, designed to primarily provide power to another device) are also classified as batteries and not batteries contained in equipment.

Figure 2 - Example of Lithium Ion Cells and Batteries

Note:
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 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 in accordance with Special Provision A331; and

b. cannot be shipped on a passenger aircraft unless approved by the relevant authorities in accordance with Special Provision A201.

△ **Sodium ion battery,** with organic electrolyte is a rechargeable electrochemical system where the positive and negative electrode are both intercalation or insertion compounds, constructed with no metallic sodium (or sodium alloy) in either electrode and with an organic non-aqueous compound as an electrolyte.

Sodium ion cells and batteries **with organic electrolyte must** be transported as UN 3551 or UN 3552 as appropriate.

Note:
*Sodium-ion batteries **with aqueous alkali electrolyte** must be transported as **UN 2795** Batteries, wet, filled with alkali.*

Figure 3 - Example of Sodium Ion Cells and Batteries

Aggregate lithium content means the sum of the grams of lithium content contained by the cells comprising a battery.

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

Battery means two or more cells or batteries which are electrically connected together and fitted with devices necessary for use, for example, case, terminals, marking and protective devices. Units which have two or more cells 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 the UN Model Regulations and this guidance document treated as batteries. See definitions for "cell" and "single cell battery". (See also "Power Banks")

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

Cell means a single encased electrochemical unit (one positive and one negative electrode) which exhibits a voltage differential across its two terminals and may contain protective devices.

Note: Under the UN Model Regulations, UN *Manual of Tests and Criteria* and this guidance, 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 the UN Model Regulations, the UN *Manual of Tests and Criteria* and this guidance.

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.

Indicated Battery Capacity is to be taken as the indicated remaining usable battery capacity that the user sees via a display gauge or indicator lights.

Net quantity, is either:

a. the weight or volume of the dangerous goods contained in a package excluding the weight or volume of any packaging material; or
b. the weight of an unpackaged article of dangerous goods (e.g. UN 3166).

For the purposes of this definition "dangerous goods" means the substance or article as described by the proper shipping name shown in Table 4.2, e.g. for "Fire extinguishers", the net quantity is the weight of the fire extinguisher (the article). For articles packed with equipment or contained in equipment, the net quantity is the net weight of the article, e.g. for "Lithium-ion batteries contained in equipment", the net quantity is the net weight of the lithium ion batteries (the article) in the package.

Overpack means an enclosure used by a single shipper to contain one or more packages and to form one handling unit for convenience of handling and stowage. Dangerous goods packages contained in the overpack must be properly packed, marked, labelled and in proper condition as required by the IATA Dangerous Goods Regulations.

The overpack must not contain packages enclosing different substances which might react dangerously with each other or packages of dangerous goods which require segregation according to Table 9.3.A.

In addition, packages containing

- UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI968,
- UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965, or
- UN 3551, sodium ion batteries prepared in accordance with PI 976.

are not permitted in an overpack with packages containing dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

△ **Power bank** (power pack, mobile battery, etc.), these are portable devices designed to be able to charge consumer devices such as mobile phones and tablets. For the purposes of this guidance document and the IATA Dangerous Goods Regulations, power banks are to be classified as batteries and must be assigned to UN 3480, lithium ion batteries, or UN 3090, lithium metal batteries, as applicable.

Note: *When carried by passengers, there are new restrictions on power banks. Further information can be found in the "Passengers travelling with lithium batteries guidance document including small vehicles ".*

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 61960-3 (Edition 1.0 2017-02): Secondary cells and batteries containing alkaline or other non-acid electrolytes -Secondary lithium cells and batteries for portable applications;*
2. *IEC 62133 -2 (Edition 1.1 Amd1 2021-07): 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 (Second Edition 2018-12): Secondary lithium-ion cells for the propulsion of electric road vehicles- Part 1: Performance testing.*

State of Charge (SoC): The State of Charge (SoC) represents the percentage of capacity stored in a battery or energy storage system relative to its rated capacity.

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

State of the Operator: The country (State) in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

State of Destination: The country (State) in the territory of which the consignment is finally to be unloaded from an aircraft.

Watt-hour rating: expressed in Wh, the Watt-hour rating of a lithium cell or battery is calculated by multiplying the rated capacity in ampere-hours by the nominal voltage.

Cargo-Tracking Devices, Data Loggers, Radio Frequency Identification (RFID), and Electronic Bag Tags

Many shipments of time and temperature sensitive products including food, pharmaceutical, medical devices, vaccines, and industrial chemicals such as chemical-mechanical planarization (CMP) slurries, adhesives, and sealants contain, or have attached to the package(s) and/or overpack(s) small battery-powered tracking devices and/or data loggers. Most of these devices use lithium metal or lithium-ion cells or batteries as a power source. To be permitted in transport all lithium cell and battery types must have passed the applicable tests set out in Subsection 38.3 of the UN Manual of Tests and Criteria.

The below recommendations on shipping active devices are based on the provisions set out in the 2025-2026 Edition of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) and the 67th Edition of the IATA DGRs.

When shipped as a cargo consignment, battery-powered tracking devices and data loggers that contain fully regulated lithium cells or batteries are subject to all of the provisions of the DGR, including training, packing, marking and labelling, and documentation requirements.

Exceptions (IATA DGR 1.2.7.1(i)):

Data loggers and cargo tracking devices with installed lithium batteries, attached to or placed in packages, overpacks or unit load devices are not subject to any provisions of these Regulations provided the following conditions are met:

a. the data loggers/cargo tracking devices must be in use or intended for use during transport;
b. each cell or battery must meet the provisions of 3.9.2.6(a), (e), (f) (if applicable) and (g);
c. for a lithium-ion cell or battery, a Watt-hour rating not exceeding 20 Wh;
d. for a lithium metal cell, a lithium content not exceeding 1 g;
e. for a lithium metal battery, an aggregate lithium content not exceeding 1 g;
f. the number of data loggers/cargo tracking devices in or on any package or overpack must be no more than the number required to track or to collect data for the specific consignment;
g. the data loggers/cargo tracking devices must be capable of withstanding the shocks and loadings normally encountered during transport;
h. the devices must not be capable of generating a dangerous evolution of heat;
i. the devices must meet defined standards for electromagnetic radiation to ensure that the operation of the device does not interfere with aircraft systems.

Note:

This exception does not apply where:

- *the cells or batteries exceed the energy or lithium mass limits, or*
- *the devices are powered by sodium ion batteries.*

In both of these cases, there is provision in the relevant packing instructions to permit these devices when active and accompanying cargo that is being tracked or monitored.

Data loggers or cargo tracking devices which are not active, are to be offered for transport as a consignment in accordance with Packing Instruction 967, 970, or 978.

Classification

Lithium, and sodium ion, batteries are classified in Class 9 – Miscellaneous dangerous goods as:

- UN 3090, **Lithium metal batteries**; and
- UN 3480, **Lithium ion batteries;** and
- UN 3551, **Sodium ion batteries** with organic electrolyte

or, if installed in a piece of equipment or packed separately with a piece of equipment for which it is designed to power 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;** and
- UN 3552, **Sodium ion batteries contained in equipment**; or
- UN 3552, **Sodium ion batteries packed with equipment**

Lithium battery test summary – except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of cells or batteries and equipment powered by cells and batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN *Manual of Tests and Criteria*, Revision 8, Part III, sub-section 38.3, paragraph 38.3.5.

Note:
The requirement is for the manufacturer and subsequent distributors to make this test summary available. Rather than providing a paper copy of the test summary with every consignment, compliance may be achieved by placing the test summary on a website and providing a QR code or URL with the battery, its packaging or on the transport documentation.

The following table provides details of the information required in the test summary:

Lithium, or sodium ion, cell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria
The following information shall be provided in this test summary: a. Name of cell, battery, or product manufacturer, as applicable; b. Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information; c. Name of the test laboratory to include address, phone number, email address and website for more information; d. A unique test report identification number; e. Date of test report; f. Description of cell or battery to include at a minimum: i. Lithium ion, or lithium metal, or sodium ion, cell or battery; ii. Mass; iii. Watt-hour rating, or lithium content; iv. Physical description of the cell/battery; and v. Model numbers. g. List of tests conducted and results (i.e., pass/fail); h. Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g)); i. Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any; and j. Name and title of responsible person as an indication of the validity of information provided.

Further information on the test summary is available in Part C of the FAQ's of this guidance document.

Classification Flowcharts

The following (3) classification flowcharts are intended to provide guidance on the classification for lithium ion, lithium metal and sodium ion batteries.

Classification Flowchart – Lithium Ion 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)

Passed UN Test?

No → May only be transported under State Approval as per Special Provision A88

Yes

Lithium Ion Batteries (limited to a maximum of 30% SoC)

Cells > 20 Wh Batteries > 100 Wh	Cells ≤ 20 Wh Batteries ≤ 100 Wh
UN 3480 PI 965 Section IA IMP: RBI	UN 3480 PI 965 Section IB IMP: RBI
	
Limit per package: Pax A/C = Forbidden CAO = 35 kg UN Specification packaging	**Limit per package:** Pax A/C = Forbidden CAO = 10 kg

Lithium Ion Batteries Packed with Equipment

Cells > 20 Wh Batteries > 100 Wh	Cells ≤ 20 Wh Batteries ≤ 100 Wh
UN 3481 PI 966 Section I IMP: RLI	UN 3481 PI 966 Section II IMP: ELI
	
Limit per package: Pax A/C = 5 kg CAO = 35 kg UN Specification packaging	**Limit per package:** Pax A/C = 5 kg CAO = 5 kg

Lithium Ion Batteries Contained in Equipment

Cells > 20 Wh Batteries > 100 Wh	Cells ≤ 20 Wh Batteries ≤ 100 Wh
UN 3481 PI 967 Section I IMP: RLI	UN 3481 PI 967 Section II * IMP: ELI
	
Limit per package: Pax A/C = 5 kg CAO = 35 kg	**Limit per package:** Pax A/C = 5 kg CAO = 5 kg * exceptions to battery mark

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)

Passed UN Test?

No → May only be transported under State Approval as per Special Provision A88

Yes

Lithium Metal Batteries

Cells > 1 g
Batteries > 2 g

UN 3090
PI 968
Section IA
IMP: RBM

Limit per package:
Pax A/C = Forbidden
CAO = 35 kg
UN Specification packaging

Cells ≤ 1 g
Batteries ≤ 2 g

UN 3090
PI 968
Section IB
IMP: RBM

Limit per package:
Pax A/C = Forbidden
CAO = 2.5 kg

Lithium Metal Batteries Packed with Equipment

Cells > 1 g
Batteries > 2 g

UN 3091
PI 969
Section I
IMP: RLM

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg
UN Specification packaging

Cells ≤ 1 g
Batteries ≤ 2 g

UN 3091
PI 969
Section II
IMP: ELM

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg

Lithium Metal Batteries Contained in Equipment

Cells > 1 g
Batteries > 2 g

UN 3091
PI 970
Section I
IMP: RLM

Limit per package:
Pax A/C = 5 kg
CAO = 35 kg

Cells ≤ 1 g
Batteries ≤ 2 g

UN 3091
PI 970
Section II *
IMP: ELM

Limit per package:
Pax A/C = 5 kg
CAO = 5 kg
* exceptions to battery mark

Classification Flowchart – Sodium Ion 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)

Passed UN Test?

No → May only be transported under State Approval as per Special Provision A88

Yes

Sodium Ion Batteries (limited to a maximum of 30% SoC)

UN 3551
PI 976
IMP: RBI

Limit per package:
Pax A/C = Forbidden
CAO = 35 kg
UN Specification packaging

Sodium Ion Batteries Packed with Equipment

Cells > 20 Wh Batteries > 100 Wh	Cells ≤ 20 Wh Batteries ≤ 100 Wh
UN 3552 PI 977 Section I IMP: RLI	UN 3552 PI 977 Section II IMP: ELI
	
Limit per package: Pax A/C = 5 kg CAO = 35 kg UN Specification packaging	**Limit per package:** Pax A/C = 5 kg CAO = 5 kg

Sodium Ion Batteries Contained in Equipment

Cells > 20 Wh Batteries > 100 Wh	Cells ≤ 20 Wh Batteries ≤ 100 Wh
UN 3552 PI 978 Section I IMP: RLI	UN 3552 PI 978 Section II * IMP: ELI
	
Limit per package: Pax A/C = 5 kg CAO = 35 kg	**Limit per package:** Pax A/C = 5 kg CAO = 5 kg * exceptions to battery mark

Recent and Upcoming Changes

Safety of the Supply Chain

☐ The supply chain can be considered as the interconnected network of processes and entities involved in the production, handling, and distribution of goods from the manufacturer to the end user. An efficient supply chain aims to ensure that products are transported quickly, safely and cost-effectively.

When taking a holistic approach to the "Safety of the Supply Chain", it has to be in the context of a coordinated effort to ensure that all stakeholders perform their safety functions when handling and transporting cargo and hazardous materials.

- Manufacturers are responsible for manufacturing and classification of their products and making the information available where it supports transport safety.
- Shippers are responsible for properly packaging, marking, labelling and documenting dangerous goods and for compliance with safety regulations.
- Freight forwarders play a key role in coordinating logistics and ensuring proper routing, whilst also monitoring for consignments that may contain undeclared dangerous goods.
- Operators, and their agents, ensure that all employees involved in handling passengers or cargo are trained to recognize the hazards presented by dangerous goods and to manage an arising emergency.
- Regulators set and enforce safety standards for all parties in the domestic supply chain and collaborate with each other where international borders are involved.
- Passengers and crew are presented with information, with the aim of ensuring that dangerous goods are not inadvertently carried on board.
- There is also a coordinating role for international bodies such as the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA).

In the future there will be an increasing focus on the parties involved in the cargo supply chain safety and their respective efforts in working to mitigate risks and maintain the safety and integrity of the air transport system.

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From 1 January 2026, lithium-ion batteries that are packed with equipment and vehicles powered by lithium ion or sodium ion batteries must be offered for air transport with the battery at a reduced state of charge, unless otherwise approved by the relevant States (Special Provision A331).

These changes have been adopted by ICAO into the 2025-2026 edition of the *Technical Instructions for the Safe Transport of Dangerous Goods by Air*. The objective of these changes is to reduce the potential risk posed by lithium-ion and sodium ion batteries in air transport. It has been demonstrated that reducing the state of charge in a lithium-ion cell or battery, reduces the potential for a lithium-ion cell to go into thermal runaway.

⊗

Lithium-ion batteries packed with equipment (PI 966) Section I and Section II

⊗

From 1 January 2026

Section I

Lithium-ion cells and batteries must be offered for transport at a state of charge not exceeding 30% of their rated capacity. Cells and/or batteries at a state of charge greater than 30% of their rated capacity 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.

Section II

Lithium-ion cells and batteries with a Watt-hour rating in excess of 2.7 Wh must be offered for transport at a state of charge not exceeding 30% of their rated capacity. Cells and/or batteries at a state of charge greater than 30% of their rated capacity must be offered for transport in accordance with the provisions of Section I of PI 966 with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities.

Note:

Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN Manual of Tests and Criteria*. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.*

Lithium-ion batteries contained in equipment (PI 967) Section I and Section II

It is recommended that, for lithium-ion cells and batteries which are contained in equipment, those cells and batteries are offered for transport:

- at a state of charge not exceeding 30% of their rated capacity; or
- with an indicated battery capacity not exceeding 25%.

While a reduced State of Charge is not mandatory for these items, the transport of products containing lithium batteries at not more than 30% (or 25% IBC) is strongly recommended as a transport safety measure.

Note: *Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the UN* Manual of Tests and Criteria*. Cells and batteries shipped at a reduced state of charge are less prone to thermal runaway.*

Sodium-ion batteries packed with equipment (PI 977) and contained in equipment (PI 978) Section I and Section II

Currently, the ICAO Technical Instructions are silent regarding the state of charge in these two packing instructions. Sodium ion batteries are an emerging technology and additional regulations will be developed if there appears to be an unexpected risk that can be easily mitigated.

In the interest of maintaining a consistent and cautious approach towards aviation safety, it is recommended that shippers consign equipment with the batteries at a state of charge not exceeding 30%.

Vehicles powered by batteries (PI 952)

The following UN numbers and proper shipping names apply to vehicles where the principal source of power is from a battery:

- UN 3171 - **Battery-powered vehicle;**
- UN 3556 – **Vehicle, lithium-ion battery powered;**
- UN 3557 – **Vehicle, lithium metal battery powered**; and
- UN 3558 – **Vehicle, sodium ion battery powered**.

⊗

Vehicles powered by batteries with a watt-hour rating exceeding 100 Wh **must** be offered for transport with:

- the battery(ies) at a state of charge not exceeding 30% of their rated capacity; or
- an indicated battery capacity not exceeding 25%.

Vehicles powered by batteries with a Watt-hour rating exceeding 100 Wh and at a state of charge greater than 30% of their rated capacity 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.

Whilst not mandatory, it is strongly recommended that vehicles powered by batteries with a watt-hour rating not exceeding 100 Wh are offered for transport with:

- the battery(ies) at a state of charge not exceeding 30% of their rated capacity; or
- an indicated battery capacity not exceeding 25%.

Note:

1. *Guidance and methodology for determining the rated capacity can be found in sub-section 38.3.2.3 of the* UN Manual of Tests and Criteria*.*
2. *Indicated Battery Capacity is easier for shippers to identify and determine. 25% is not directly equivalent to a 30% SoC but is a practical approach that delivers an equivalent safety mitigation.*
3. *Batteries shipped at a reduced state of charge are less prone to thermal runaway.*

Hybrid Powered Vehicles

☐ Vehicles which are powered by both flammable gas/liquid and a battery, are classified primarily under the provisions for flammable gas or flammable liquid powered vehicles. Often these vehicles are designed to maintain a high battery charge, whereby it is difficult to reduce the indicated battery capacity to 25%. In order to communicate the inherent hazard regarding the batteries in these hybrid vehicles, the addition of the descriptive text “hybrid” has been made to the proper shipping names for UN 3166. These are:

- UN 3166 – **Vehicle, flammable gas powered**, hybrid
- UN 3166 - **Vehicle, flammable liquid powered,** hybrid

While the descriptive text does not form part of the proper shipping name and is not mandatory, it is expected that Operators will be adjusting their booking systems to actively question whether a consignment of UN 3166 is a hybrid powered vehicle.

The addition of the word “hybrid” as a descriptive item does not change the proper shipping name and the vehicle is still properly classified for other modes of transport.

Prohibitions

Lithium ion batteries
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 and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or 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 and IB, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Sodium ion batteries
All sodium ion cells and batteries shipped by themselves (UN 3551) are forbidden for transport as cargo on passenger aircraft. All packages prepared in accordance with Packing Instruction 976, must bear a Cargo Aircraft Only label, in addition to other required marks and/or labels.

Restrictions

Lithium ion and sodium ion batteries

All lithium ion cells and batteries (UN 3480) and sodium ion cells and batteries (UN 3551) must be shipped at a state of charge (SoC) not exceeding 30% of their rated 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, see Special Provision A331.

Packing with other dangerous goods:

- UN 3090, lithium metal batteries prepared in accordance with PI 968,
- UN 3480, lithium-ion batteries prepared in accordance with PI 965 and
- UN 3551 sodium ion batteries prepared in accordance with PI 976,

must not be packed in the same outer packaging or overpack with dangerous goods classified as:

- Class 1 (explosives) other than Division 1.4S,
- Division 2.1 (flammable gases),
- Class 3 (flammable liquids),
- Division 4.1 (flammable solids) or
- Division 5.1 (oxidizers).

Transport of lithium batteries under State Approvals

☐ The IATA DGRs reference certain special provisions where the appropriate national authorities may consider approving the transport of batteries, which do not meet the criteria set out in the DGRs. These are:

- Special Provision A88 – Pre-production prototype and low production runs.
- Special Provision A99 – lithium or sodium ion battery mass exceeding 35 kg.
- Special Provision A183 – Waste cells and batteries and those being shipped for recycling and disposal.
- Special Provision A201 – transport of lithium or sodium ion batteries on passenger aircraft.

- Special Provision A331 – transport of lithium ion or sodium ion batteries at greater than 30% SoC.
- Special Provision A334 – transport of lithium or sodium ion batteries on a passenger aircraft where packaging mitigation exists.

In most circumstances, the requirement is that approvals must be issued by the States of Origin and Operator. Certain States have set out that where their State is the State of Destination, then approval from that State is also required.

Appendix D of the IATA DGR sets out contact details for dangerous goods regulators in various States.

Even though a shipper may have a State of Origin Approval, an operator is not obligated to transport a consignment presented under that approval. Prior to seeking a State of Origin Approval, shippers are encouraged to first make enquiries and find an Operator that already has, or is willing to seek a State of Operator Approval. A specialist logistics provider may be needed to establish and coordinate the links in the supply chain.

Frequently Asked Questions

Part A – Questions Related to Definitions

A.01 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 contain lithium which is only present in an ionic form in the electrolyte and are rechargeable.

Within these two broad classifications there are many different chemistries. For example, within lithium-ion batteries there are lithium polymer, lithium iron phosphate ($LiFePO_4$), lithium ion to name a few.

A.02 What is the difference between a cell and a battery?

A 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 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.

A.03 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.

A.04 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 I lithium-ion batteries manufactured after 31 December 2011 and Section IB and Section II lithium ion batteries manufactured after 1 January 2009 are required to be marked with the Watt-hour rating on the outside case.

The Watt-hours of the battery can be calculated by multiplying the nominal voltage (V) and capacity in ampere-hours (Ah):

Wh = V x Ah

Note:
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.

A.05 What is a button cell battery?

A button cell battery is a small round cell where the overall height is less than the diameter. Button cells are often referred to as “coin” cells.

A.06 What is a Power bank?

These are portable units, commonly referred to as "battery packs" or "power packs," primarily designed to supply power to other devices or equipment. For the purposes of these regulations, they are classified as batteries. Although some power banks may include additional features like a small flashlight, the bulk of the unit consists of the battery, and its primary intent is to provide power to other devices.

A.07 What is an Uninterruptible Power Supply (UPS) and how should it be classified?

In its simplest form, a UPS is a device whose purpose is to provide continuing power to a device or system, when the mains power supply ceases. These often take the form of a battery and as such the relevant battery classification (UN 3480, UN 3090 or UN 3551) is an appropriate starting point.

Where the UPS is in the form of a piece of equipment, which houses other components to enable the monitoring and regulating of the power supply into the device, such that the battery component of the UPS does not form a significant part of the item's mass or volume; then the shipper or manufacturer may consider classification under the relevant "contained in equipment" provision (UN 3481, UN 3091 or UN 3552).

Part B – Questions Related to Design Type Testing Provisions

B.01 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 or sodium ion 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.02 What constitutes a design change requiring renewed design type testing?

The following provisions are taken from the 8th revised edition, amendment 1 of the UN Manual of Tests and Criteria, paragraph 38.3.2.2.

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 might 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. A change in the material of the anode, the cathode, the separator or the electrolyte;

b. A change of protective devices, including the hardware and software;

c. A change of safety design in cells or batteries, such as a venting valve;

d. A change in the number of component cells;

e. A change in connection mode of component cells;

f. For batteries which are to be tested according to T.4 with a peak acceleration less than 150 g_n, a change in the mass which could adversely impact the result of the T.4 test and lead to a failure; and

☐ *g. Repairing, refurbishing or remanufacturing including replacement of parts with non-original spares, replacement of parts of a different specification, or in a manner that would result in a deviation from the manufacturer's tested type.*

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.

B.03 Which edition of the UN Manual of Tests and Criteria must be used when testing new lithium cell or battery designs

If a newly produced lithium cell or battery design is being tested for the first time, then the edition of the UN *Manual of Tests and Criteria* in effect at the time that the cell or battery designs are first tested must be used. For example, if a new lithium-ion battery design is produced for the first time in March 2023, then this battery must be tested in accordance with the provisions of the 8th revised edition, amendment 1 of the UN *Manual of Tests and Criteria* as this is the edition in effect as of 1 January 2023. See Note under DGR 1.1.1 (or section 1.1 of the BSR).

B.04 How do I transport prototype lithium cells and batteries that have not passed the UN 38.3 Tests?

Pre-production prototypes of lithium batteries or cells, when these prototypes are transported for testing, or low-production runs (i.e. annual production runs consisting of no more than 100 lithium cells and batteries) of lithium cells or batteries that have not been tested to the requirements in subsection 38.3 of the UN Manual of Tests and Criteria may be transported aboard cargo aircraft, if approved by the appropriate authorities of the State of Origin and the State of the Operator and the requirements in Packing Instruction 910 of the Supplement to the Technical Instructions are met (see Special Provision A88).

Part C – Questions Related to the Battery Test Summary

C.01 Does the test summary apply to equipment containing lithium cells or batteries?

Except where the equipment, including circuit boards, contains only lithium button cells, the test summary applies to all lithium cells and batteries, irrespective of whether they are shipped alone or contained in equipment.

C.02 Can multiple batteries/manufacturers/products be listed on one test summary?

Yes, it is acceptable to have a single document that addresses multiple batteries / manufacturers / products, provided all required information is stated. For example, a tablet manufacturer may purchase lithium-ion batteries from three different battery manufacturers. The test summary for the product will therefore list batteries and all related information (e.g. Watt-hours, test labs) from the three battery manufacturers without naming the manufacturer due to confidentiality issues.

C.03 Is it acceptable to list the various test houses, tests and range of revisions tested to for the UN 38.3 revision and amendments?

Yes, it is acceptable to have multiple test houses and their addresses, email information, etc. listed provided all required information is stated. The test house is not required to be aligned to a specific battery or product on the test summary when the test summary covers multiple batteries/products. It is required to have the test report number and date of test for each cell/battery/product listed on the test summary.

C.04 What is meant by physical description of cell or battery?

A physical description is intended to provide a check for the person requesting the test summary to know that it applies to the cell/battery/product covered by the test summary, i.e. if a cellular phone is the product being shipped, the invoice description or marketing name of the product as the physical description could be used on the test summary.

△ C.05 What does it mean when the Regulations require a manufacturer to "make available" a test report?

The test summary must be made available upon request. Any individual or entity in the supply chain may request the test summary, e.g. regulator, consumer, or transport provider. There are several ways to meet this requirement including providing a paper copy of the test summary or even placing

the test summary on a website and providing a QR code or URL with the battery, its packaging or on the transport documentation.

Note: IATA does not support requiring a shipper to provide a test summary with every shipment.

C.06 Can the test summary provider require a requestor to obtain the document from a website?

Yes, it is acceptable for the provider to require the requestor to obtain a document electronically from a provider's website. The provider must ensure that the cell/battery/product has appropriate identifiers to align to the test summary.

C.07 If a manufacturer considers their suppliers, test house and battery data confidential and competitive information, how would test summary compliance be achieved?

All 10 data elements and listed subsets of information are required to be on the test summary. As indicated above, the test house information may be listed to cover a range of products.

C.08 If a test summary is requested by a dangerous goods enforcement agency, how quickly must the test summary be made available? For example, would a manufacturer be expected to immediately produce a test summary or provide it within a certain amount of time (e.g. 72 hours)

Due to the large volume of lithium batteries and lithium battery powered products that are shipped daily, manufacturers and distributors should not be expected to immediately provide a test summary for every product they ship. Manufacturers and distributors should be provided a reasonable amount of time to provide the required test summary.

C.09 Would manufacturers and distributors of battery powered vehicles (UN3171, UN 3556, UN 3557 and UN 3558) and hybrid vehicles containing a lithium battery (UN3166) be expected to provide a test summary?

Yes. The test summary requirement applies to manufacturers and distributors of lithium or sodium ion cells and batteries. Therefore, a test summary must be made available for lithium or sodium ion battery-powered vehicles and other vehicles containing lithium or sodium ion batteries.

C.10 Is the test summary valid for a defined period?

No. Provided that the lithium or sodium ion cell or battery type has not been changed in a way that would require re-testing (see FAQ B.02 in this document) then the test summary remains valid.

C.11 Is there a mandated format for the test summary that manufacturers and distributors must follow?

No. Manufacturers and distributors may compile the information required in the test summary using any format. Three examples of test summaries are provided at the end of this document.

Part D – Questions related to Classification

D.01 Are all lithium and sodium ion batteries classified as dangerous goods (when transported by air/ when transported as air cargo)?

All lithium and sodium ion batteries are classified as dangerous goods due to the presence of the threat of thermal runaway and are subject to the requirements of the DGR.

Although some lithium and sodium ion batteries are eligible for transportation as Section II and exempted from certain labelling, packing and documentation requirements, these batteries are still regulated as a dangerous goods commodity, and subject to all other requirements, including the reporting of dangerous goods occurrences.

△ **D.02 What is the correct classification where I want to ship 2 mobile phones in the same package with 2 power banks?**

The power banks (assuming they meet UN 38.3) are classified as UN 3480, **Lithium-ion batteries** and therefore must be shipped, at less than 30% SoC, in accordance with Section IB of PI 965, if the power bank has a Watt-hour rating not exceeding 100 Wh, or in accordance with Section IA of PI 965 if the Watt-hour rating exceeds 100 Wh. Under the provisions of PI 965 Section IA and IB other lithium battery-powered equipment may be packed in the same outer packaging provided that all applicable parts of the relevant packing instructions are followed, which includes the net weight of lithium batteries contained in the package. The power banks are not considered as "spare batteries" for the purposes of PI 966, Lithium-ion batteries packed with equipment.

△ Therefore, the package must be marked and labeled to represent the dangerous goods inside. If the power banks meet the conditions for shipping under Section IB, the package must display the UN Number and Proper Shipping Name, the UN3480 battery mark, the Class 9 battery label, the Cargo Aircraft Only label, and - if applicable – the net quantity of batteries in the package. For the mobile phone, as per Section II of PI967, because there are no more than two batteries contained in equipment in the package, the package does not need to display the UN3481 battery mark.

Note: If there were more than two phones in the package however, the UN3481 battery mark would be required to appear on the package.

The Shipper's Declaration for Dangerous Goods must be prepared and must reflect the UN3480 Lithium ion batteries (power bank) in the package but does not need to list the UN3481 Lithium ion battery contained in equipment (mobile phone) shipped under the Section II exception provisions.

△ **D. 03 I am shipping perishable and/or pharmaceutical cargo with lithium battery powered temperature or data loggers, do the Dangerous Goods Regulations apply?**

Subsection 1.2.7.1(i) provides an exception for data loggers and cargo trackers when active during transport to monitor temperature of temperature sensitive cargo or track valuable cargo provided certain conditions are met. The Dangerous Goods Regulations only apply where the data loggers and cargo tracking devices are offered for transport as a consignment.

△ **D.04 What is the correct classification for hearing aids, Bluetooth® "earbuds" or other wearable devices that are shipped in a small charging case or with a charging case in the same package?**

These devices that are shipped in or with a charging case should be classified as "UN3481, Lithium batteries packed with equipment" and packaged in accordance with PI 966. If the charging case is shipped without the earbuds, the case becomes classified as "UN3480, Lithium-ion batteries" and packaged in accordance with PI 965.

△ **D.05 Can a package containing electrical cables, an AC adaptor and lithium-ion batteries be classified as UN 3481, Lithium-ion batteries packed with equipment?**

No, for the purpose of Packing Instruction 966, "equipment" means the device or apparatus for which the lithium-ion batteries will provide electrical power for its operation. When a package contains only an AC adaptor or charger, or ancillary cables etc, and lithium-ion batteries, the package must be classified as "UN 3480, Lithium ion batteries" and packaged in accordance with PI 965.

D.06 Can I ship recalled, damaged or non-conforming cells or batteries?

Lithium or sodium ion 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 by air (e.g. those being returned to the manufacturer for safety reasons). This applies also to lithium or sodium ion cells or batteries installed inside equipment such as mobile phones, laptops or tablets where the devices are subject to recall due to the safety

concerns of the lithium or sodium ion cell or battery installed in the device, see Special Provision A154 in the DGR.

△ 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. Similarly, laptops, phones and wearable devices being returned may not have a defective battery but may just not meet the needs of the customer, or the device may be defective (i.e. dead zones on a touch screen, non-functioning microphone/speaker etc). In these situations, air transport is not prohibited. The battery or equipment manufacturer should be providing instructions for the appropriate return shipping method.

Part E – Questions related to Packaging

E.01 For the purposes of the 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.

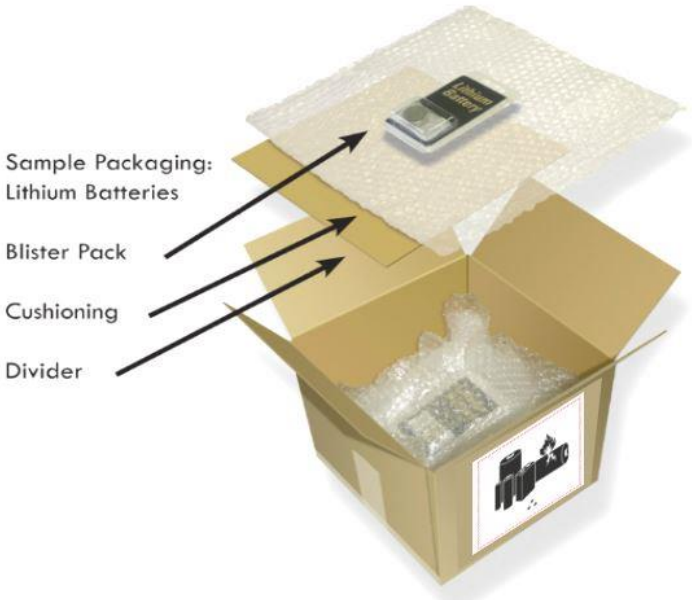
The package must be marked and labelled as required by the packing instruction.

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.

Note:
When an overpack is used, the package marks and labels must be duplicated on the overpack unless the marks 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 and no more than two packages in the consignment).

E.02 How do I safely package 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 rigid outer packaging unless when contained in equipment, the battery is afforded equivalent protection by the equipment in which it is contained. Sample packaging meeting these requirements is shown below:



E.03 How can batteries be effectively protected against short circuit?

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

a. Packing each battery or each battery-powered device when practicable, in fully enclosed inner packagings made of non-conductive material;
b. Separating or packing batteries in a manner to prevent contact with other batteries, devices or conductive materials (e.g. metal) in the packagings; or
c. 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 must 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:

a. Securely attaching covers of sufficient strength to protect the terminals;
b. Packaging the battery in a rigid packaging that is electrically non-conductive; or
c. Constructing the battery with terminals that are recessed or otherwise protected so that the terminals will not be subjected to damage/short circuit if the package is dropped or the inner contents shift.

E.04 May packages of lithium or sodium ion batteries be placed with other dangerous goods in an overpack in accordance with the IATA Dangerous Goods Regulations?

Yes, but there are segregation requirements that need to be considered for certain other classes of dangerous goods.

- UN 3090, lithium metal batteries prepared in accordance with PI 968 and
- UN 3480, lithium-ion batteries prepared in accordance with PI 965, and
- UN 3551, sodium ion batteries prepared in accordance with PI 976

are not permitted in the same outer packaging with dangerous goods classified in Class 1 other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1.

The overpack may also contain 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 battery mark (DGR Figure 7.1.C) unless the mark(s) on the package(s) inside the overpack are visible or not required by the Packing Instruction.

E.05 Do the quantity limits shown in the packing instructions for lithium and sodium ion batteries apply to overpacks containing lithium batteries?

No. The quantity limits shown in the packing instructions refer to the maximum net weight of the lithium cells or batteries that is permitted in each package. Provided each package remains within the limit specified in the packing instruction, there are no limits specified for an overpack.

E.06 Packing Instructions 966, 969 and 977 Section II specify that packages must be capable of withstanding 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 packed with

equipment in a strong rigid outer packaging and offered for transport. 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 strong rigid 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.

E.07 Packing Instructions 965 and 968 Section IB specify that packages must be capable of withstanding a 3 metre stack test. Do I have to have my package tested?

No, but the shipper must, if required, be able to demonstrate to the appropriate authority that they have determined the capability of the package to withstand a 3 m stack test for a period of 24 hours. One method could be that the shipper prepares a package containing batteries as tendered for transport in accordance with the relevant packing instruction and then places a weight equivalent to the weight of similar packages if stacked 3 m high and leaving that for 24 hours. This could be documented as evidence of demonstrating capability.

For packaging designed for a specific product, the shipper could consult the original packaging designer or packaging manufacturer for their expert assessment on the capability of the package.

For many equipment manufacturers and their current warehousing or transport operations, existing packages are routinely palletized (i.e. between 1.5 meters and 6 ft tall) and are stacked (i.e. in excess of 3 meters). This could be used as evidence of the package's capability.

The majority of wholesalers and OEMs (original equipment manufacturers) of electronic equipment, which is packed with or contains lithium batteries, already use purpose designed packaging. This packaging, and the completed package, has been constructed and designed to withstand the normal rigours encountered in the transport of their goods.

Further information on the stack test can be found at :

Packaging Requirement - Lithium Batteries (3m stack test)

E.08 How do I protect against "inadvertent activation"?

When batteries are contained in equipment, the equipment must be packaged in a manner that prevents unintentional activation or must 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.

E.09 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 or sodium ion batteries per package for passenger and cargo aircraft and 35 kg per package for cargo aircraft only. The net quantity shown excludes the weight of the equipment and packaging:

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

E.10 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 of lithium cells or batteries contained in the package.

The net weight that must be declared is the weight of the lithium cell or batteries contained in the package. This applies for both lithium-ion cells and batteries and lithium metal cell and batteries.

E.11 I have lithium-ion batteries packed with equipment (PI 966, Section I) where the lithium ion batteries are packed in a UN specification 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 Packing Group II performance standards and then packed with the equipment in a strong rigid outer packaging; or
b. the lithium batteries are packed into an inner packaging and then packed with the equipment into a UN specification packaging meeting Packing Group II performance standards.

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

E.12 Can I use a nylon bag, to contain the individual packages prepared in accordance with Section II of Packing Instruction 967, to form an overpack?

No, because the packages placed in an overpack must be secured within the overpack and that the intended function of each package must not be impaired by the overpack.

E.13 Under Packing Instructions 966 and 969, it states that "The maximum number of batteries in each package must not exceed the minimum number required to power the equipment, plus two spare sets. A "set" of cells or batteries is the number of individual cells or batteries that are required to power each piece of equipment". If a package contains 4 power tools (each tool contains 1 lithium-ion battery), can 2 extra lithium-ion batteries be placed in the package for each piece of equipment for a total of 12 batteries?

Yes, provided you do not exceed the maximum net quantity for the relevant section of the packing instruction and the chosen aircraft limitation. The 12 batteries reflect two spare sets (8) for each of the 4 power tools in the outer package plus one each to power the device (4).

△ While the batteries must be at an SoC of not more than 30%, as a safety measure, It is strongly recommended that the spare batteries are **not** placed adjacent to, or in close proximity to each other within the packaging.

Part F – Questions related to Marking and Labelling

F.01 What does the battery mark look like and when is it required?

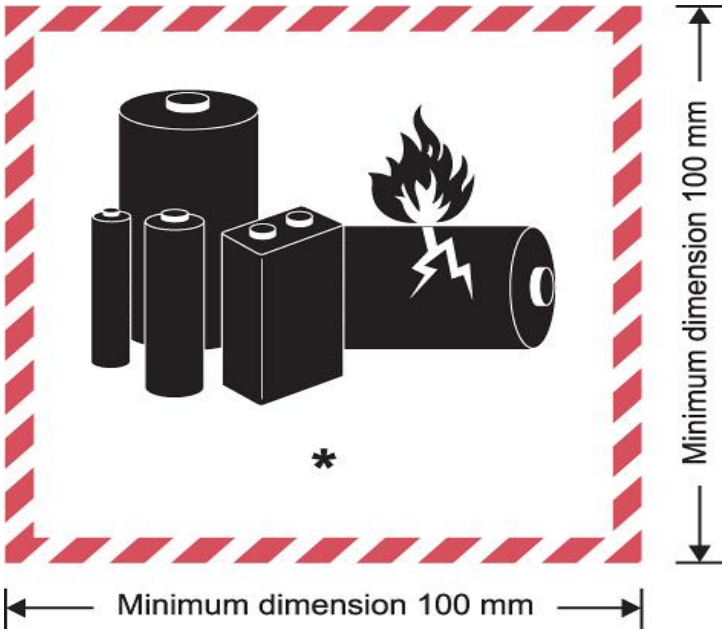
The battery mark is required as specified in the additional requirements of Section II of Packing Instructions 966, 967, 969, 970, 977 and 978.

It is also required as specified in the additional requirements of Section IB of Packing Instructions 965, 968 in addition to the Class 9 lithium and sodium ion battery hazard label and Cargo Aircraft Only label.

The mark (see below) is as shown in Figure 7.1.C of the IATA Dangerous Goods Regulations. The border of the mark must have red diagonal hatchings with a minimum width of 5 mm. The symbol (group of batteries, one damaged and emitting flame, above the UN number for lithium ion or lithium metal batteries or cells) must be black on white or suitable contrasting background. The lithium

battery mark may be printed directly on the outer packaging provided that there is sufficient contrast between the elements of the lithium battery mark and the colour of the packaging material.

The mark must be in the form of a rectangle or a square with minimum dimensions of 100 mm x 100 mm. If the size of the package so requires, the dimensions may be reduced to not less than 100 mm wide x 70 mm high, and all features must be in approximate proportion to those shown on the full-size mark.



* Place for UN number(s), i.e. UN 3090, UN 3091, UN 3480, UN 3481, UN 3551 and/or UN 3552 as applicable. The UN number(s) indicated on the mark should be at least 12 mm high.

F.02 If I have smaller packages, can I use a smaller battery mark?

Where the packages are of dimensions such that they cannot bear the full-size battery mark, the mark dimensions may be reduced to 100 mm wide × 70 mm high. The design specifications remain otherwise the same.

Where any face of a package is large enough to bear the full-size battery mark, the full-size mark must be used.

F.03 I am placing a data logger inside an aircraft unit load device (ULD) to monitor the temperature during transit. Do I need to place a lithium battery mark on the ULD?

A data logger that meets the exception provisions of DGR 1.2 7.1 (i), or the relevant part of the section II packing instructions does not require the battery mark or hazard labelling.

F.04 When is a battery mark not required on the package?

A battery mark is **not required** for packages prepared in accordance with section II of PI 967, PI 970, or PI978:

- containing only button cell batteries installed in equipment (including circuit boards)
- for consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment.

F.05 Section II in Packing Instructions 967, 970 and 978 states that "the battery mark is not required on 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, that each package bears the battery mark, and therefore the air waybill has the compliance statement e.g. "[Sodium or Lithium] [ion or metal] batteries in compliance with Section II of PI 9xx [67 or 70 or 78]".

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 mark and therefore without the compliance statement on the air waybill.

Note:

A consignment is 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.

F.06 I have a mobile (cell) phone that contains one single-cell lithium-ion battery. Do I have to mark the shipping box that contains each mobile phone? What if I place five mobile phones in a shipping box? Does this require the battery mark?

For packages of a single mobile phone, no battery mark would be required since you can place up to 4 of these single-cell batteries in a box without applying the battery mark on the outer box. In the case where 5 mobile phones are in a shipping package, a battery mark on the shipping package is required.

F.07 If I pack two mobile phones each containing a single cell lithium-ion battery, can I also pack a laptop with a lithium ion battery in the same package and not apply the battery mark using the 4 cell, 2 battery exception?

No, the exception is for 4 cells or 2 batteries in a package. There is no provision to mix and match with ½ the quota for cells and ½ the quota for batteries in a package. It would be acceptable to prepare the phones in one package, the laptop in a second package, and to put the packages together into one consignment, and not apply the battery mark.

F.08 Can a single battery mark be used to identify that a combination of different batteries are contained inside the package with equipment?

Yes. The mark may bear all applicable UN numbers, e.g. UN 3091, UN 3481 and UN 3552 to identify that the package contains different regulated battery types that are packed with, or contained in, equipment.

F.09 Must the battery mark be placed on the same face of the package with the Class 9 hazard label and/or Cargo Aircraft Only label?

No, the battery mark does not have to be on the same face of the package with these labels. It may be placed on a different face. However, if the package is of sufficient size all required marks and labels should be applied to one face of the package.

F.10 What are the additional marking requirements for a package prepared under Section IB of Packing Instruction 965, 968 or 976?

Because all of the requirements of the dangerous goods regulations apply other than the requirement to use UN specification packaging, each package must be marked with:

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

- the lithium battery mark (see Part F.01) in addition to the Class 9 lithium battery hazard label and Cargo Aircraft Only label.

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.

F.11 I want to ship a package, containing more than 10 pieces of equipment, and each piece of equipment has two button cell installed in it; there are no other dangerous goods or battery types in the package. Am I required to apply the battery mark?

No, you are not required to apply the battery mark in this case. Since your package contains multiple pieces of equipment, with each piece having only button cells installed, it falls under Section II of Packing Instructions for batteries contained in equipment. According to these regulations, button cells installed in equipment are generally exempt from the battery marking requirement, provided they meet the section II conditions. The compliance statement on the airway bill (required when a battery mark is applied), is also not applicable to shipments of equipment containing only button cells.

Additional packing requirements apply to the shipment including:

- the use of packages capable of withstanding a 3m stack test for a period of 24 hours,
- use of strong rigid outer packaging,
- adequate instruction for personnel preparing or offering the packages and
- relevant packing requirements when an overpack is used.

F.12 When must I not put a battery mark on the package?

The battery mark **must not** be affixed to packages containing larger lithium-ion (cells >20Wh or batteries >100Wh), lithium-metal (>1g per cell, >2g per battery), or sodium-ion cells and batteries. The battery mark is not applied to packages which have been prepared in accordance with:

- Packing Instruction 976,
- Section IA of Packing Instructions 965 and 968, and
- Section I of Packing Instructions 966, 967, 969, and 970.

The battery mark is primarily used to alert handlers and transport personnel to the presence of lithium batteries in less regulated shipments, such as those in Section II or Section IB.

F.13 I want to ship UN 3556, Vehicle, Lithium-ion battery powered and two spare batteries in the same package. Should I declare them individually or as batteries packed with equipment UN 3481?

Special provision A214 makes a clear distinction between vehicles and equipment, and it includes examples. As UN 3556 is classified as a vehicle, the package cannot be declared as UN 3481 which applies to equipment packed together with batteries.

The package, assuming that it complies with packaging standards, can be prepared and shipped using one of two methods:

1. **All Packed in One:** Declare as UN 3556, Vehicle, Lithium-ion battery-powered and UN 3480, Lithium-ion batteries in a single package, as “all packed in one”. Since UN 3556 does not have a specific quantity limit, no quantity calculation (Q-value) is required for this combination. The package must include the appropriate marks and hazard labels for both UN 3556 and UN 3480.

2. **Overpack Option:** Package and label the vehicle UN 3556 and the spare batteries UN 3480 in separate inner packaging and then place them inside an overpack. The overpack must display the

required marks and labels for all the contents inside, as well as the word "OVERPACK" if the marks and labels on the inner packages are not visible.

F.14 If a battery installed in equipment is made of cells of more than 20 Wh (e.g. 2x 30 Wh) does the exception of Section II in Packing Instructions 967, 970 and 978 stating that "the battery mark is not required on consignments of two packages or less where each package contains no more than four cells, or two batteries installed in equipment" still apply?

In this case, much as the cells in the battery exceed 20Wh, it is still considered a battery and as long as the battery passes the UN 38.3 testing, it can still be transported under the exception.

Part G – Questions related to Documentation

G.01 Does the IATA DGR require an MSDS or SDS containing the UN 38.3 test data?

△ No. Neither the IATA DGR, nor the regulatory requirements applicable to other modes of transport, requires a safety data sheet (SDS) when offering batteries for transport. When faced with demands from personnel in the supply chain for an SDS relating to articles, their attention should be referred to the DGR Appendix B.4

Notes:

1. *An SDS is not a transport document. An SDS is only required for the supply and use of a substance or mixture meeting the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) classification criteria. GHS does not include provisions for manufactured articles, such as batteries.*
2. *Except for button cells installed in equipment (including circuit boards), manufacturers and subsequent distributors of lithium or sodium ion cells and batteries and equipment with installed lithium or sodium ion cells or batteries must make available a test summary that identifies that the cell and battery types have passed the applicable UN 38.3 tests, see Part C of this document.*

G.02 Does the definition of "consignment" apply to the house air waybill (HAWB) or to the master air waybill (MAWB)?

The use of HAWB or MAWB has no direct relationship to what a "consignment" is. For example, a MAWB may have multiple consignments where each of the consignments are from separate shippers, or are from one shipper but to separate consignees, or the MAWB may just be a single consignment from one shipper to one consignee.

The following limitation applies to consignments:

- A shipper is not permitted to consign more than two packages of lithium or sodium ion batteries contained in equipment under Section II of PI 967, PI 970 and PI 978 where there are no more than 4 cells or 2 batteries in the package without the application of the battery mark on the package.

The objective of this condition is to require appropriate hazard communication on packages and on the air waybill where a shipper has more than two packages of lithium batteries contained in equipment.

Notes:

1. *This does not mean that every retail "package" must bear the battery mark. A shipper may place multiple retail boxes, each containing a battery meeting Section II installed in equipment, into an outer packaging to form the package for air transport. There is no limit on the number of individual retail boxes that can be placed into the outer packaging, except that a "package" must not contain more than 5 kg net weight of batteries. Each such package must bear the battery*

mark and when an air waybill is used, the air waybill must show the applicable compliance statement, e.g. "lithium-ion batteries in compliance with section II of PI 967".

2. *Shippers and freight forwarders should not split a consignment across multiple air waybills to try to avoid the application of the battery mark where there are more than two packages with lithium or sodium ion batteries contained in equipment under Section II, in a consignment.*

G.03 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 at no more than 30% SoC.

G.04 Do I have to provide a UN 38.3 Test summary with every shipment of lithium or sodium ion batteries?

Unless a particular State or an Operator has specified this as a requirement; then the test summary does not have to be provided. It is important for manufacturers and shippers to be able to have the information at hand, and to be able to provide that information quickly and easily. There is no real value in having to provide a paper copy of the test summary as a matter of routine with every shipment. It would be more efficient to consider making it available through either a QR code or URL (see the note under "Classification").

G.05 I am shipping equipment that has a mixture of lithium-ion cells packed in the package, and which the equipment contains a lithium metal cell. All batteries conform to Section II. How should the documentation be referenced?

The statement needs to refer to all relevant batteries and packing instructions. The packing instructions do not include the word "cells" in the statement: An example would be *"Lithium ion and lithium metal batteries in compliance with Section II of PI 966 and PI 969".*

△ **G.06 The 67th edition of the IATA Dangerous Goods Regulations introduced Special Handling codes for vehicles. What are the appropriate codes for these vehicles, are they mandatory and is there an effective date?**

Some operators might prefer using RLI or RLM to emphasize the battery hazard in UN 3556, UN 3557 and UN 3558, since batteries are the primary risk associated with these vehicles. New Special Handling Codes were introduced for battery-powered vehicles. They are:

RVB – UN 3556, 3557, UN 3558
RVF – UN 3166 (not hybrid)
RVH – UN 3166 (hybrid)
RVO – UN 3171.

Special Handling Codes are used to convey information to other employees within the organization and, while not mandatory, their usage is recommended for consistency.

Part H – Questions related to Training

H.01 I am shipping Section IB lithium [ion or metal] or sodium ion batteries; do I need dangerous goods training?

Yes. All the applicable provisions of the Dangerous Goods Regulations apply to shipments of Section IB lithium (ion or metal) and sodium ion batteries. Therefore, dangerous goods training as indicated in Subsection 1.5 of the Dangerous Goods Regulations is required.

H.02 I'm shipping using Section II of the packing instructions, what constitutes "adequate instruction"?

Shippers of lithium or sodium ion 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" as described in DGR 1.6.

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 batteries that they ship, i.e. batteries by themselves - sodium ion batteries, lithium batteries and/or batteries packed with equipment and/or batteries contained in equipment, or combinations of these batteries and equipment provisions.
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 preparing the equipment, 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 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 marks, as necessary. The instruction must also include the transport method and mode of transport that must be followed; this must include a clear statement on applicable prohibitions.

Example 1 - Lithium-Ion Battery Test Summary

BATTERY UNIVERSITY
Testlab Experts

DAkkS Deutsche Akkreditierungsstelle D-PL-20132-01-00

UN 38.3 TEST REPORT SUMMARY

We herewith confirm that each battery of this type is proved to meet the requirements of applicable tests in the UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.8, Part III, Sub-Section 38.3.

In the following, lithium battery test summary according to Sub-Section 38.3.5

(a), (b) Manufacturer:	Victron Energy B.V. De Paal 35 1351 JG Almere-Haven The Netherlands	Phone: +31 36 5359700 E-Mail: sales@victronenergy.com Webpage: www.victronenergy.com
Customer:	Victron Energy B.V. De Paal 35 1351 JG Almere-Haven The Netherlands	Phone: +31 36 5359700 E-Mail: sales@victronenergy.com Webpage: www.victronenergy.com
(c) Test laboratory:	Batteryuniversity GmbH Am Sportplatz 30 63791 Karlstein am Main Germany	Phone: +49 6188 – 99410-0 E-Mail: mail@bu-lab.eu Webpage: www.bu-lab.eu
(d) Report reference no.:	BU-202400028-B1	
(e) Date of test report:	March 8, 2024	
(f) Description of devices under test:	(i) Type: (ii) Mass of battery: (iii) Watt-hour rating: (iv) Physical description: (v) Model numbers:	Lithium ion batteries 36.4 kg 5120.00 Wh 8S2P Vision E36130200LFP-100Ah1C; rechargeable battery BAT524120620 SN: HQ2401CGB-01, -02, -03, HQ2402AEDGQ
(g) Performed tests:	T.1 Altitude simulation: T.2 Thermal test: T.3 Vibration: T.4 Shock: T.5 External short circuit: T.6 Impact/Crush: T.7 Overcharge: T.8 Forced discharge:	Passed Passed Passed Passed Passed Not applicable Not performed in accordance with 38.3.3.1(d) Not applicable
(h) Reference to assembled battery testing requirements:	Not applicable	
(i) Applied standard:	UN ST/SG/AC.10/11/Rev.8 Manual of Tests and Criteria, Part III, section 38.3, Lithium metal, lithium ion and sodium ion batteries	
(j) Signature:	March 8, 2024	A. Roth Alexander Roth, Laboratory Manager

Note: This confirmation is valid only in conjunction with the report reference.

Example 2 - Lithium Metal Battery Test Summary

renata batteries

LITHIUM CELLS OR BATTERIES TEST SUMMARY
IN ACCORDANCE WITH SUB-SECTION 38.3
OF MANUAL OF TESTS AND CRITERIA

TRANSPORTATION INFORMATION

Name of cell, battery or product manufacturer, as applicable:

☒ Cell ☐ Battery ☐ Product

Item Number/Name: **CR2325**

Item Description: **Primary Lithium Manganese Dioxide Cell (Li+MnO2 → LiMnO2)**

Nominal Voltage: **3V**

Cell, battery or product manufacturer's contact information to include address, phone number, email address and website for more information:

Renata SA
Kreuzenstrasse 30
4452 Itingen
Switzerland

+41 61 715 75 75 / logistics@renata.com
www.renata.com

Name of the test laboratory to include address, phone number, email address and website for more information:

Shanghai Research Institute of Chemical Industry
Testing Centre
Room 101, Building 2
No.345 East Yunling Road
200062 Shanghai
China
+86-21-31015216 / xutingmsds@gmail.com
http://www.ghs.cn

A unique test report identification number:
1117030312

Date of the test report:
11-MAY-2017

List of tests conducted and results (i.e., pass/fail):

Test T.1: Altitude Simulation	**Pass**
Test T.2: Thermal Test	**Pass**
Test T.3: Vibration	**Pass**
Test T.4: Shock	**Pass**
Test T.5: External short circuit	**Pass**
Test T.6: Impact/Crush	**Pass**
Test T.7: Overcharge	**Not applicable**
Test T.8: Forced discharge	**Pass**

Testing additional comments:

Description of cell or battery to include at a minimum: Lithium ion or Lithium metal cell or battery; Mass; Watt-hour rating, or lithium content; Physical description of the cell/battery:

Cell / battery Type:	**Lithium metal**
Cell or Battery	**Cell**
Lithium contain:	**0.055 Grams**
Battery Weight	**3.0 Grams**

Reference to assembled battery testing requirements, if applicable (i.e., 38.3.3(1) and 38.3.3(g)):

Not Applicable

Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto, if any:

ST/SG/AC. 10/11/Rev.5/Amend.1&Amend.2 38.3.

For air transport only:
Does the cell or battery comply with the 30% State of Charge?

Not Applicable

PRODUCT CLASSIFICATION FOR TRANSPORT (According to UN - DGP)

UN Classification:
UN 3090

Proper Shipping Name:
Lithium metal batteries

Signature with name and title of signatory as an indication of the validity of information provided:

Jürgen Rutsch
Head of Marketing & Sales
Member of the Management Board

Renata SA
Kreuzenstrasse 30
CH-4452 Itingen

Date document was completed:
25-NOV-2019

Important! The above signatory / signatories affirm that this document is a true and correct summary of the original individual tests and test data. The original test data is confidential information available to competent State Authorities with valid identification and only upon their formal request. Disclosure of the original test data to any other entity upon its request will be considered by Renata SA and, should Renata SA consider this request is with merit, may be subject to the prior execution of a nondisclosure agreement.

This document remains valid as long as no changes, modifications, or additions are made to the model(s) described in this document.

The model(s) has (have) been classified according to the applicable transport regulations and the UN Manual of Tests and Criteria as of the date of the certification. The model(s) must be packaged, labeled, and documented according to country and other international regulations for transportation.

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sales@renata.com

Additional Information

- Further information can be found in the links below:
  http://www.iata.org/lithiumbatteries
  Battery guidance document
  Nickel-Metal Hydride Batteries
  Packaging Requirement - Lithium Batteries (3m stack test)
- Information for passengers can be found here:
  https://www.iata.org/en/programs/cargo/dgr/dgr-guidance-passengers/
  Passengers travelling with lithium batteries
  Battery-Powered Wheelchair and Mobility Aid Guidance Document
  lithium_checklist_IATA
  www.faa.gov/go/safecargo

The Center of Excellence for Independent Validators Lithium Batteries (CEIV Li-batt) is a certification program designed to enable the supply chain of lithium battery products - shippers, freight forwarders, cargo handling facilities and airlines - to meet their safety obligations by complying with the applicable transport regulations, and to demonstrate their capability and competency in handling and transporting lithium battery products. Further information can be found at https://www.iata.org/en/services/certification/operations-safety-security/ceiv-lithium-battery/

If shipping lithium or sodium ion batteries, which do not fall into Section II, it is appropriate to seek further assistance from your preferred freight forwarder or a professional hazmat or dangerous goods shipping organisation.

You should contact the airline (at least check their website) that you will be travelling with, or consigning your dangerous goods with, if you have any concerns about carrying or transporting lithium metal, lithium ion or sodium 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.

Abbreviations, Acronyms, Symbols

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

Abbreviation	**Meaning**
A/C	Aircraft
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
GHS	Globally Harmonized System for the Classification of Chemicals
BSR	IATA Battery Shipping Regulations
SDS	Safety Data Sheet
SoC	State of Charge
Symbol	**Meaning**
≥	Equal to or greater than
≤	Equal to or less than
>	Greater than
<	Less than
☐	Addition of an item
△	Change to an item
⊗	Deletion of an item