

# 2022 Lithium Battery Guidance Document

## Transport of Lithium Metal and Lithium Ion Batteries

Revised for the 2022 Regulations

### Introduction

This document is based on the provisions set out in the 2021-2022 Edition of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Technical Instructions) and the 63<sup>rd</sup> Edition of the IATA Dangerous Goods Regulations (DGR).

The provisions of the DGR with respect to lithium batteries may also be found in the IATA lithium Battery Shipping Regulations (LBSR) 9<sup>th</sup> Edition. In addition to the content from the DGR, the LBSR also has additional classification flowcharts and detailed packing and documentation examples for lithium batteries.

Information on the DGR and LBSR can be found here:

<http://www.iata.org/dgr>

<http://www.iata.org/lbsr>

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

- Definitions
- Classification (including classification flowcharts):
- Prohibitions:
- Restrictions:

### Definitions

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

**Lithium metal batteries.** Are generally primary (non-rechargeable) batteries that have lithium metal or lithium compounds as an anode. 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.

**Lithium-ion batteries** (sometimes abbreviated Li-ion batteries) are a 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 and e- bikes.

**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 under the written conditions established by those authorities, see Special Provision A331; and

(b) in accordance with Special Provision A201, lithium ion cells or batteries that meet the specified quantity limits may be shipped as cargo 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 3480) 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 ion cells and batteries can only be shipped as cargo on a passenger aircraft under exemption issued by all States concerned.

**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 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")

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

**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. For carriage by passengers, power banks are considered spare batteries and must be individually protected from short-circuit and carried in carry-on baggage only.

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

**Note:**

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

(1) IEC 61960 (First Edition 2003-12): Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications;

(2) IEC 62133 (First Edition 2002-10): Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications;

(3) IEC62660-1(FirstEdition2011-01): Secondary lithium-ion cells for the propulsion of electric road vehicles- Part 1: Performance testing.

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

**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.

**Watt-hour rating**, expressed in Watt-hours (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.

#### Classification (DGR 3.9.2.6)

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

UN 3090, **Lithium metal batteries**; or

UN 3480, **Lithium ion batteries**

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

UN 3091, **Lithium metal batteries contained in equipment**; or

UN 3091, **Lithium metal batteries packed with equipment**; and

UN 3481, **Lithium ion batteries contained in equipment**; or

UN 3481, **Lithium ion batteries packed with equipment**.

Lithium battery test summary –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 7. 1, 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. There are numerous ways this can be achieved, such as by listing the applicable summary document on the company website. There is no expectation for the shipper/distributor to provide paper copies with each consignment containing lithium batteries. The supply chain is encouraged to make use of technology to facilitate the availability of the test summary.*

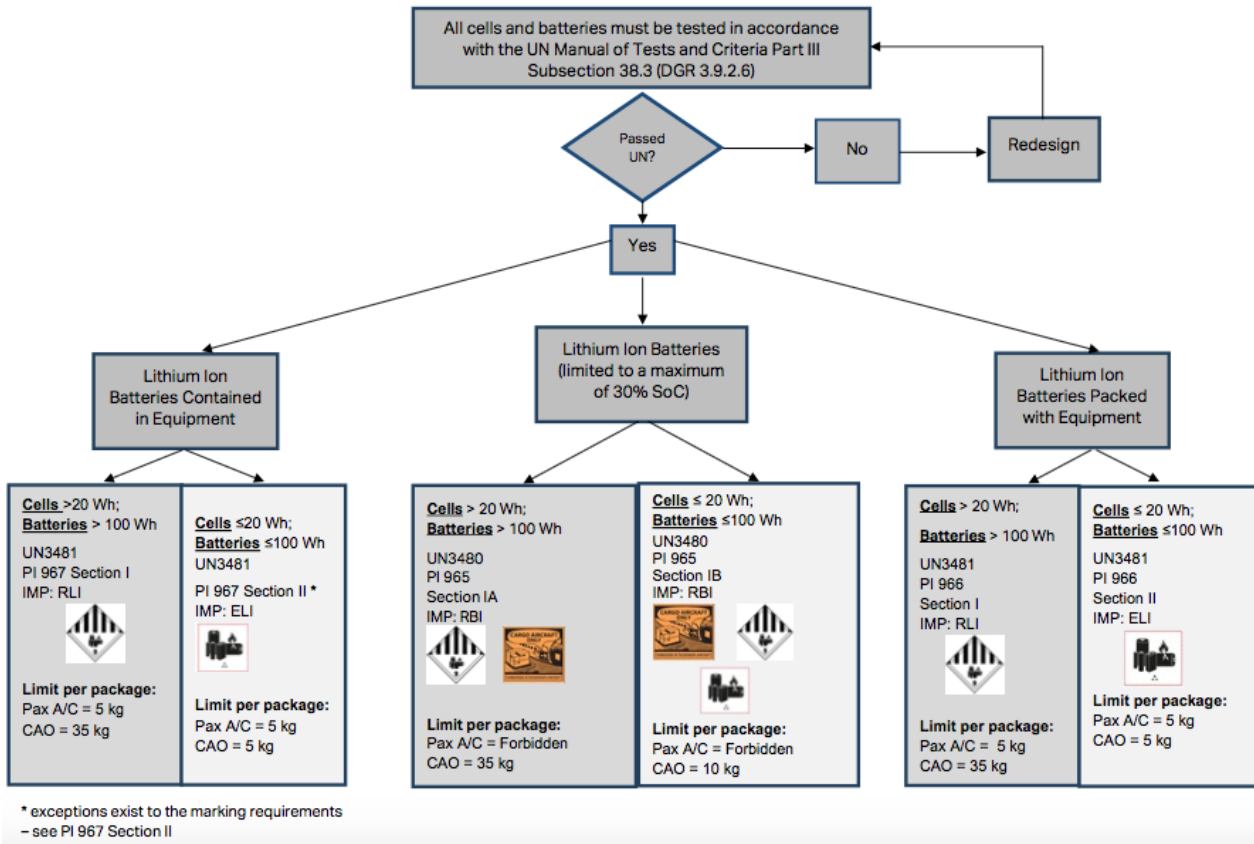
The following table provides details of the information required in the test summary:

<b>Lithium cell or battery test summary in accordance with sub-section 38.3 of Manual of Tests and Criteria</b>
<p>The following information shall be provided in this test summary:</p> <ul style="list-style-type: none"><li><b>(a)</b> Name of cell, battery, or product manufacturer, as applicable;</li><li><b>(b)</b> Cell, battery, or product manufacturer's contact information to include address, phone number, email address and website for more information;</li><li><b>(c)</b> Name of the test laboratory to include address, phone number, email address and website for more information;</li><li><b>(d)</b> A unique test report identification number;</li><li><b>(e)</b> Date of test report;</li><li><b>(f)</b> Description of cell or battery to include at a minimum:<ul style="list-style-type: none"><li><b>(i)</b> Lithium ion or lithium metal cell or battery;</li><li><b>(ii)</b> Mass;</li><li><b>(iii)</b> Watt-hour rating, or lithium content;</li></ul></li><li><b>(iv)</b> Physical description of the cell/battery; and</li><li><b>(v)</b> Model numbers.</li><li><b>(g)</b> List of tests conducted and results (i.e., pass/fail);</li><li><b>(h)</b> Reference to assembled battery testing requirements, if applicable (i.e. 38.3.3 (f) and 38.3.3 (g));</li><li><b>(i)</b> ReferencetotherevisededitionoftheManualofTestsandCriteriausedandto amendments thereto, if any; and</li><li><b>(j)</b> Signaturewithnameandtitleofsignatoryasanindicationofthevalidityofinformation provided.</li></ul>

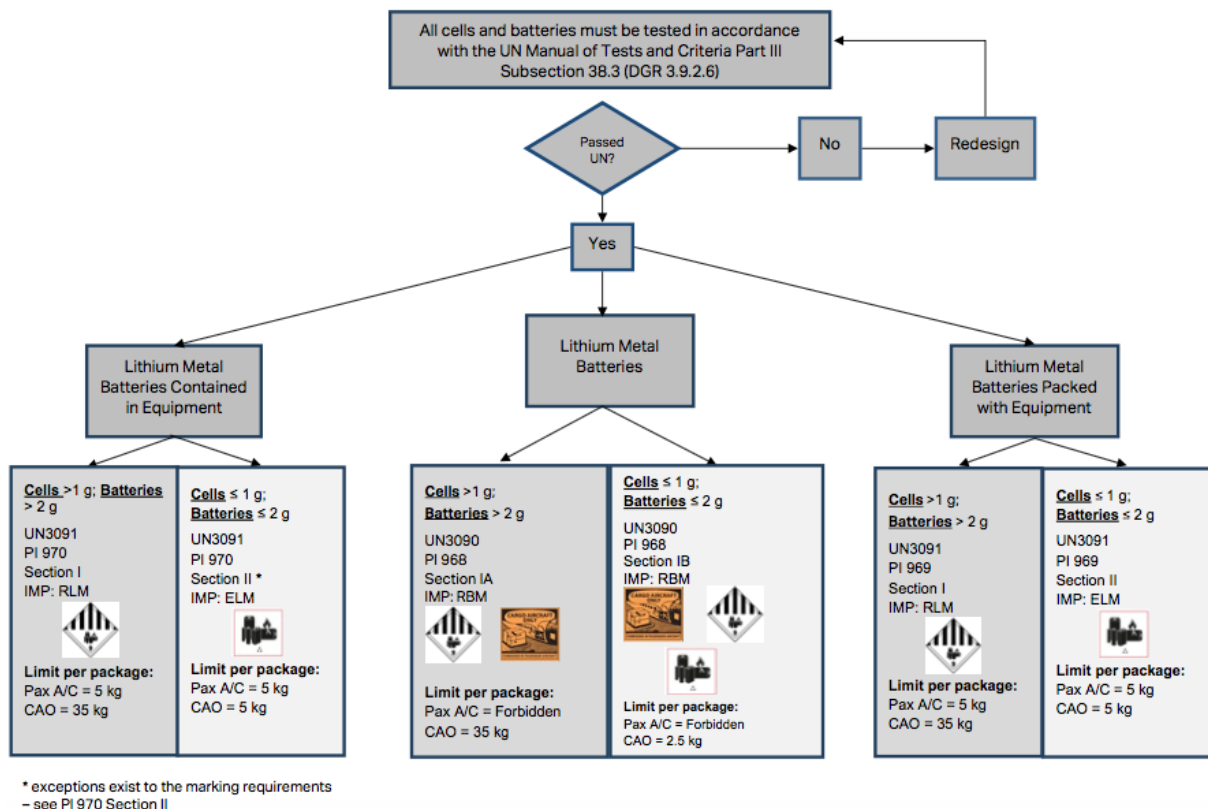
## Classification Flowcharts

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

### Classification Flowchart – Lithium Ion Batteries



### Classification Flowchart – Lithium Metal Batteries



## 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.

## Restrictions

### **Lithium ion batteries**

All lithium ion cells and batteries (UN 3480 only) 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 Restrictions**

PI 965 & PI 968 Section IA & IB

UN 3090, lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 and UN 3480, lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 must not be packed in the same outer packaging with dangerous goods classified in 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). Packages containing cells or batteries must not be placed 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.