



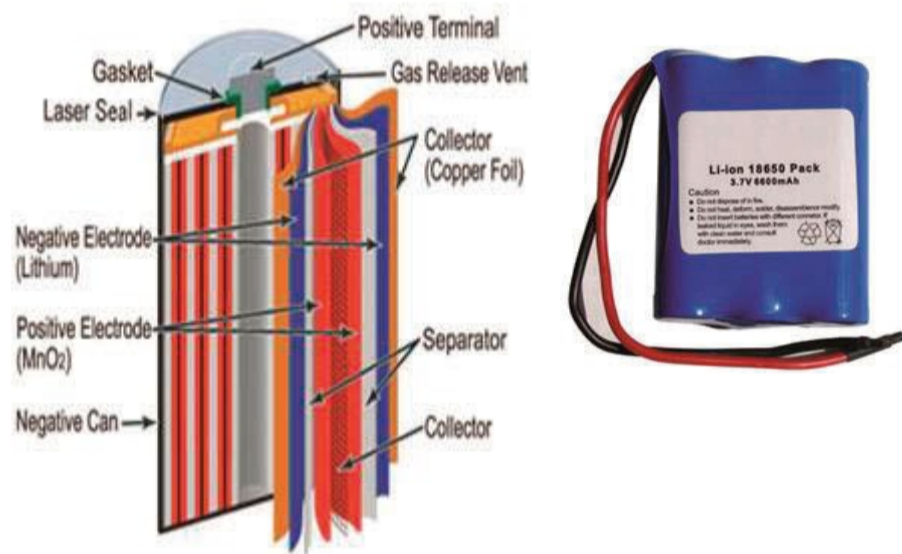
Air Niugini

# SAFETY BULLETIN

## "LITHIUM BATTERIES"

A battery is a device that stores electrical energy and delivers that energy through a controlled electrochemical reaction. A battery is usually composed of a series of cells that produce electricity- IATA defines a battery as two (2) or more cells that are connected together. Each cell has three essential components: the anode, the cathode and the electrolyte.

The anode donates electrons, and the cathode accepts them. The anode and cathode are separated by the electrolyte, which is a liquid or gel that conducts electricity. When the anode and cathode are connected, the anode undergoes a chemical reaction with the electrolyte in which it loses electrons, creating cations.



A Lithium Ion Battery or Li-ion battery is a type of rechargeable battery in which lithium ions move from the Negative electrode to the positive electrode during discharge and back when charging. Lithium-ion batteries are vulnerable to a number of potential problems including overheating at the anode & oxygen production due to overcharging at the cathode. This has the potential to cause thermal runaway. There are some very stringent tests performed during the manufacture and testing of lithium-ion batteries to limit the charging voltage and allow for venting in the case of build up of pressure. If the batteries overheat, they carry a fire risk.

Lithium batteries are primary batteries that have lithium as an anode. These types of batteries are also referred to as lithium –metal batteries. The difference between Lithium Metal and Lithium Ion is that Lithium Metal batteries are generally non –rechargeable and contain metallic lithium. Lithium ion batteries do not contain metallic lithium and are rechargeable.



Example of Lithium Metal Cells and Batteries

### Passenger/Crew Baggage

The widespread usage of portable electronic devices (PED) means that all passenger aircraft will be carrying lithium batteries in baggage. On large aircraft, the number of PED's on board could be in the hundreds. Currently there are no limits on how many PEDs and batteries passengers can carry, where the lithium battery does not exceed the standard limits of 2g for lithium metal batteries or 100 Watt-hours for lithium ion batteries. All PED carried on aircraft are subject to specific requirements to ensure that they do not pose a hazard to the aircraft systems due to electromagnetic radiation. Although they are "dangerous goods," the IATA Dangerous Goods

Regulations permit certain types and quantities to be carried by passengers and crew. If passengers need go over the limit for any reason, they will have to gain approval from Air Niugini.

### General Requirements

General provisions applying to both lithium ion and lithium metal batteries:

- It is recommended that PED's containing lithium batteries be carried in carry-on baggage and all transmitting functions are turned off at all times during the flight. However, if this is not possible and they are in checked baggage, measures must be taken to prevent their unintentional activation.
- Batteries and cells must have successfully passed the tests required by the United Nations. Clearly, this would be very difficult, if not impossible, for passengers or check-in staff to determine. However, batteries obtained from reputable sources, such as the original manufacturer, as opposed to market traders, will have been tested appropriately.

Spare batteries (i.e. those not contained in a PED) MUST be:

- ◆ in carry-on baggage; they are forbidden in checked-in baggage.
- ◆ protected against short circuit, such as by:
  - leaving the batteries in original retail packaging,
  - placing them in a plastic bag, such as those supplied at airport security points for liquids and gels, or
  - taping the exposed terminals.



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  - ◆ leaving the batteries in original retail packaging,
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There is no limit on the number of PED's or spare batteries, below a specified size, that a passenger or crewmember may carry, but they must be for "personal use." For example, a battery salesperson is not permitted to carry lithium batteries for commercial reasons.

### Specific Requirements Lithium ion:

Lithium batteries must not exceed the following specifications:

#### Watt-hour rating not exceeding 100 Wh

This provides for the vast majority of batteries contained in laptop computers, mobile phones and tablets. All new lithium ion batteries are marked with the Wh rating. No airline approval is required and are permitted only in carry-on baggage.

#### Watt-hour rating exceeding 100 Wh, but not exceeding 160 Wh

Carriage of PED's containing lithium batteries up to 160 Wh requires Air Niugini's approval and must be declared during check-in. A passenger must

# CORPORATE QUALITY AND SAFETY DEPARTMENT

not exceed more than 2 spare batteries.

Lithium-ion batteries over 160Wh are not permitted as passenger baggage and must be sent as freight.

To request prior airline approval contact Mr. Martin Tugano via email at least 24 hrs before the flight: [mtugano@airniugini.com.pg](mailto:mtugano@airniugini.com.pg)

## Passenger Check-In

As stated previously, spare lithium batteries are not permitted in checked baggage. Consequently, if there is a need for hand baggage to be loaded in the hold (e.g. because cabin baggage stowage areas are full), check-in, passenger handling staff or cabin crew should ask affected passengers whether their baggage contains spare lithium batteries and, if it does, the batteries must be removed and carried in the cabin. CASA's dangerous goods regulations ban loose lithium batteries in checked luggage, and place restrictions on those in carry-on baggage.

Where passengers advise cabin crew that they have spare lithium batteries in their checked baggage, this must be brought to the attention of ground staff if the aircraft is still at the gate so that the bag can be retrieved. If the aircraft has commenced push back or is in flight the cabin crew should report the matter to the flight crew. This must be followed up by submission of an appropriate occurrence report in accordance with the safety management system procedures.

Check-in and passenger services staff and cabin crew should be aware of the potential for items of checked and carry-on baggage to contain lithium battery power banks and tracking devices such as GPS / GSM.

Check-in and passenger services staff and cabin crew should be aware of the restrictions that apply to the carriage of this smart baggage. Specifically that:

- a) all lithium batteries must comply with the limits set out in the DGR for the watt-hour rating or lithium metal content, as applicable;
- b) Any PED equipped with a powerbank offered as checked baggage must have the powerbank removed prior to being checked-in. The powerbank must then be carried in the passenger's carry-on baggage where permitted by security regulations;
- c) Where a bag intended to be carried in the cabin is surrendered at the boarding gate or on the aircraft to be loaded in the cargo compartment the passenger should be asked if the bag contains any spare lithium batteries, including powerbanks. Where it is identified that there are spare lithium batteries or powerbanks, the passenger must remove them from the bag before it can be loaded into the cargo compartment. The spare battery/ power bank must then be carried in the cabin, where permitted by security regulations.

## SMART LUGGAGE

Recent developments of innovative baggage with integrated lithium batteries, commonly known as "smart luggage" are being marketed and sold to the traveling public. These devices include integrated lithium batteries, motors, power banks,

GPS, GSM, Bluetooth, RFID or Wi-Fi technology. The presence of the lithium batteries can contravene various regulatory requirements. These devices require careful attention – even if permitted by the applicable regulations.

Examples of "smart" luggage include features such as:

- Lithium ion battery and motor allowing it to be used as a personal transportation device, either as a stand-up scooter, or sit on vehicle. These devices do not meet the criteria of a mobility device.
- Lithium ion battery power bank that allows charging of

other electronic devices such as mobile phones, tablets and laptops.

- GPS tracking devices with or without GSM capability.
- ♦ Bluetooth, RFID and Wi-Fi capability.

According to the dangerous goods regulations issued by the International Air Transport Association (IATA), baggage fitted with non-removable lithium-ion or lithium-metal batteries or powerbanks that are used to:

- power inbuilt electronic bag functions( e.g bag tags, ride on bag, etc.); or
- recharge portable electronic devices (e.g.via USB style port),

are forbidden for carriage as carry-on or checked-in baggage on a flight. Air Niugini Airlines as a member of IATA has banned such items. However, non – lithium batteries/ powerbanks can remain fitted in the bag and carried as carry on baggage. (Refer to Safety Alert issue 1/18 dated 1 February 2018)



## CABIN FIREFIGHTING PROCEDURES

Fire fighting procedures require that any Lithium Battery showing signs of overheating should be cooled as quickly as possible using water or Non- flammable liquid.

The majority of PEDs powered by Lithium Batteries are handheld and/or used during flight.

Passengers and cabin crew are therefore able to identify an overheating device and take appropriate action to cool it off before the point of ignition.

In the case of batteries installed in carry on bags, these are more difficult to identify at an early stage, due to their stowage in the cabin. This is considered a safety risk . To effectively cool an overheating Lithium battery either before or after ignition, the battery should be fully immersed in water or non- flammable liquid where possible. Where a battery is not to be fully removed quickly or safely, the device in which it is contained should be immersed in water.

Where the overheated device is the size of a carry-on bag, it is unable to be fully immersed water or placed in a fire containment device. This is a considerable hazard.



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