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# Lithium Batteries

# Fact Sheet

## What are lithium batteries?

Lithium batteries can be separated into two broad groups:

- Lithium metal batteries, which contain metallic lithium as a component of the battery, typically the anode. In general terms lithium metal batteries are non-rechargeable and are the types found in devices such as watches, car remote control fobs, emergency locator beacons and defibrillators; and
- Lithium ion batteries, which contain no metallic lithium and instead the lithium exists in an ionic form. Lithium ion batteries are rechargeable and used in consumer devices such as mobile phones, tablets and laptops; larger lithium ion batteries are used in e-bikes and electric vehicles.

## What requirements apply to lithium batteries to address safety in transport?

All lithium cell and battery types must pass up to 8 different tests as specified in the United Nations (UN) *Manual of Tests and Criteria*. These tests include an altitude simulation where lithium cells and batteries are subjected to a reduced pressure equivalent to 50,000 ft (15,200 m) for 6 hours, and a thermal test where cells and batteries are stored for at least 6 hours at a temperature of 72°C (161.6°F) followed by 6 hours at -40°C (-40°F), repeated 10 times. Cells and batteries are also subjected to vibration, shock, short circuit and crush tests. These tests are designed to verify that the cell and battery types are safe to transport.

The manufacturer of lithium cells and batteries is required to develop and implement a quality management system to ensure that the cells and batteries being manufactured all meet the same specifications as those subjected to the design type tests. Manufacturers and subsequent distributors of lithium cells or batteries, including equipment containing lithium cells and batteries, must make available a test summary that identifies that the cells or batteries have passed the applicable tests set out in subsection 38.3 of the UN Manual of Tests and Criteria.

## Are all lithium batteries allowed as cargo on both passenger and cargo aircraft?

The regulations on the transport of lithium batteries take a risk-based approach regarding the type and size of lithium batteries that are permitted as cargo on a passenger aircraft versus those that are restricted to carriage on a cargo aircraft.

All shipments of lithium metal batteries and lithium ion batteries when shipped by themselves, i.e., when not packed with the equipment the battery powers or installed in equipment, are restricted to carriage on a cargo aircraft. Lithium ion cells and batteries are required to be shipped at a state of charge not exceeding 30% of their rated capacity. In addition, shipments are restricted to carriage on a cargo aircraft where the weight of lithium batteries in a package exceeds 5 kg. This applies to all shipments including where the packages contain lithium batteries packed with the equipment the battery powers and lithium batteries installed in equipment.

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## How can the airline be sure that lithium batteries offered for transport as cargo are being declared and packed correctly, at the right state of charge?

It is the shipper's responsibility, as with all dangerous goods, to sign a declaration that the dangerous goods have been prepared in accordance with and meet all applicable provisions of the regulations. The airlines take this legal declaration as evidence that, in the case of lithium ion batteries, they are in a state of charge not exceeding 30% and that the battery design has passed all the required UN tests. If the shipper fails to comply with the regulations and this is identified, then the airlines report the incident to their regulatory authority. It is expected that the regulatory authorities then take appropriate action against the shipper for non-compliance.

## What additional steps are airlines taking to reduce the risk of incidents involving lithium batteries?

Airlines are required to conduct a safety risk assessment that includes consideration of the hazard posed by cargo, mail and baggage that will be carried, the quantity of these that will carried on an aircraft, where they will be loaded, as well as the risks posed by the entities in the supply chain that offer cargo and mail, which may include lithium batteries that have not been properly prepared in accordance with the regulations.

Having identified the potential risks, the airline then must develop and implement mitigations that reduce the risks to a level that is acceptable to the airline. Based on the identified safety risks, these mitigations could include such things as: additional screening of cargo and passenger baggage to identify lithium batteries that are not permitted or that do not comply with the regulations and the use of aircraft containers that are capable of withstanding a fire involving lithium batteries to supplement the fire suppression capabilities of the aircraft.

## What are the requirements for portable electronic devices (PEDs), and can they be in checked baggage?

- Small lithium batteries in PEDs are not considered a major safety hazard provided that the battery terminals are protected from short circuiting.
- Occasional incidents have occurred with malfunctioning or damaged batteries or with PEDs being crushed in seats, but these do not merit a blanket ban. IATA with ICAO has developed comprehensive guidance for cabin crew on how to safely deal with a fire in the cabin involving a lithium-battery-powered PED.
- Consumers should only buy lithium batteries from reputable sources as many counterfeit or substandard lithium batteries have been involved in incidents.
- Spare lithium batteries, power banks and e-cigarettes must be carried in hand luggage; batteries between 100-160 Watt hours (Wh) capacity are subject to specific approval by the airline concerned and must be carried in carry-on baggage,
    - When installed in a device, a battery may be carried in checked baggage (Note: a laptop battery is about 60 Wh in capacity)

- IATA recommends that if passengers need to pack a PED in their checked baggage that it is:
    - protected against damage and protected from accidental activation;
    - completely switched off, i.e. not in sleep or hibernation mode; and
    - not packed near flammable liquids such as perfumes, colognes or aerosols.

## Power banks, including those installed in "smart luggage"

- Considered as spare lithium batteries and must be in carry-on baggage. They are forbidden in checked baggage.
- Power banks installed in items of baggage must be user-removable. If the power bank cannot be removed, then the baggage item is forbidden for carriage.
- "Smart luggage" may contain small lithium cells or batteries with no more than 0.3 g of lithium metal or a Watt-hour rating not exceeding 2.7 Wh that power items such as scales, locks or tracking devices. Any tracking device with a transmitting function must automatically shut down when inside the aircraft.

## AirTags and similar baggage tracking devices

- The ICAO Technical Instructions and IATA Dangerous Goods Regulations specify that portable electronic devices containing lithium batteries when in checked baggage must be completely turned off. As they contain lithium batteries, AirTags and other baggage tracking devices fall under the category of PEDs for regulations concerning their carriage by travelers.
- The potential safety risks of AirTags in checked baggage, however, appear to be minimal. Trackers contain very small lithium-ion batteries, and being low energy Bluetooth, emit a level of electromagnetic radiation that is below the threshold specified by the US Federal Aviation Authority (FAA) and the European Aviation Safety Agency (EASA) as having the potential to interfere with aircraft systems.
- Several civil aviation authorities have issued approvals to their airlines permitting the carriage of AirTags and similar trackers in passenger checked baggage provided that the lithium cell or battery does not exceed 0.3 g of lithium metal or a Watt-hour rating of 2.7 Wh and the tags only use low energy Bluetooth. IATA has submitted a working paper to the meeting of the ICAO Dangerous Goods Panel (DGP) which will meet 21 – 25 November 2022. The objective is to seek agreement from the members of the members of the DGP to provide a specific exception for baggage trackers in passenger checked baggage where the trackers meet these conditions.