



Lithium Batteries

Fact Sheet

What is the difference between lithium metal and lithium ion batteries?

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

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.

In addition, with effect 1 January 2019 all manufacturers and subsequent distributors of lithium cells or 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.

Wouldn't it be better and simpler just to ban all lithium batteries? Isn't that what the plane manufacturers recommended?

Implementing a ban on the carriage of lithium ion batteries as cargo only penalizes the compliant industry. It does not address areas of non-compliance and may lead to a false sense that there is now no safety risk posed by lithium batteries.

Placing a complete ban on the carriage of lithium ion batteries as cargo on aircraft may also have an impact on healthcare, emergency response and other critical services as lithium ion batteries are used in these applications.

Aircraft manufacturers have published information indicating that the fire suppression systems in aircraft cargo compartments may not be able to cope with a fire involving "large quantities" of lithium ion batteries. Consequently, they have recommended that airlines perform a safety risk assessment on the carriage of lithium batteries as cargo to determine appropriate mitigation measures.



Currently all lithium batteries are forbidden as cargo on passenger aircraft. This though does not apply where the lithium batteries are packed with the equipment that they power or where the lithium batteries are installed in equipment.

When shipped as cargo, on a cargo aircraft, lithium ion batteries must be at no more than 30% state of charge. Shipping lithium ion batteries at this lower state of charge has been shown to reduce the risk of a fire from lithium ion batteries should a cell go into thermal runaway during transport. This is a safety improvement and has addressed some of the aircraft manufacturers' concerns.

IATA supports the aircraft manufacturers' recommendations on safety risk assessments and has developed a toolkit to support airlines in performing their own safety risk assessment and deciding on whether they should carry lithium batteries in cargo.

Based on a request by ICAO, SAE Aerospace has established a committee that is tasked with the development of a performance standard that will allow for testing of lithium batteries, as packaged for transport, to verify that, in the event of a lithium cell in package going into thermal runaway, there are no hazardous effects outside of the package.

Development of this standard is in progress with possible completion by the end of 2021. Following completion of the standard, the ICAO Dangerous Goods, Flight Operations and Airworthiness Panels will have to consider implementation of the standard, including operational considerations. This work is likely to take at least two years. Provided that this is agreed, these panels would recommend adoption to the ICAO Air Navigation Commission (ANC) for their consideration, which if agreed by the ANC, would then make a recommendation to the ICAO Council for formal inclusion into the ICAO Technical Instructions. Adoption and implementation of the standard would then have the potential for the existing prohibition on the carriage of lithium batteries, both metal and ion, as cargo on passenger aircraft to be lifted. This is unlikely to come into effect before 1 January 2025.

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.