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Background

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.
- Electronic baggage tags.
- Electronic lock/s.
- Lithium ion battery, motor and tracking device (GPS) allowing the bag to self-propel and ‘follow’ the owner.

Regulatory Requirements

1.1 Lithium Batteries – Passenger / Crew Provisions

All lithium batteries carried by passengers or crew are subject to the provisions of Part 8, Chapter 1 of the ICAO Technical Instructions. The provisions of the ICAO Technical Instructions are contained in Subsection 2.3 of the IATA Dangerous Goods Regulations (DGR).

The provisions set out in DGR 2.3 for lithium batteries provide for the following:

A. Operator approval not required:

- a) each installed or spare battery must not exceed:
 1. for lithium metal or lithium alloy batteries, a lithium content of not more than 2 g; or
 2. for lithium ion batteries, a watt-hour rating of not more than 100 Wh.
- b) batteries and cells must be of a type that meets the requirements of the UN Manual of Tests and Criteria, Part III, subsection 38.3;
- c) articles containing lithium metal or lithium ion cells or batteries, the primary purpose of which is to provide power to another device, e.g. power banks, and spare lithium batteries are permitted in carry-on baggage only.

Note: Specific security regulations may prevent the carriage of some peripherals, spare batteries and power banks in carry-on baggage.

B. Operator approval required:

- a) Each installed or spare battery must not exceed:
 - 1. for lithium metal or lithium alloy batteries, a lithium content exceeding 2 g, but not exceeding 8 g. Only permitted in portable medical electronic devices,
 - 2. for lithium ion batteries a watt-hour rating exceeding 100 Wh, but not exceeding 160 Wh;
- b) batteries must be of a type that meets the requirements of the UN Manual of Tests and Criteria, Part III, subsection 38.3;
- c) articles containing lithium metal or lithium ion cells or batteries, the primary purpose of which is to provide power to another device, e.g. power banks, and spare lithium batteries are permitted in carry-on baggage only with a limit of two spare lithium ion batteries per passenger.

Note: Specific security regulations may prevent the carriage of some peripherals, spare batteries and power banks in carry-on baggage.

1.2 Active Devices

All portable electronic devices (PED) carried on an aircraft are subject to specific requirements to ensure that they do not pose a hazard to aircraft systems due to electromagnetic radiation. These provisions are set out in applicable EASA and FAA regulations. The provisions in the regulations are the described in EASA AMC and GM to Part-CAT – Issue 2, Amendment 1 or subsequent versions of such guidance and FAA Advisory Circular AC 91.21-1C.

These documents require the following:

- a) for PED carried in the cabin by passengers or crew the passenger or crew member is responsible for ensuring that all transmitting functions are turned off at all times during flight.
- b) for devices carried in or as part of checked baggage there is a requirement that:
 - 1. The PED must have been demonstrated to meet specific electromagnetic radiation standards and the PED must be approved by the operator (airline).
 - 2. The PED must be designed with a minimum of two independent means to turn off completely, turn off cellular or mobile functions, or a combination of both when airborne. These independent methods must use different sources to identify flight. For example, a PED designed to sense rapid altitude changes and acceleration to turn off cellular transmissions is an acceptable design feature that meets the requirement. Redundant sources of the same information, such as two vertical accelerometers, would not be an acceptable design.

1.3 Quick reference

<p>Lithium batteries*</p>	<p>Any spare lithium battery, including power banks that are designed to charge other electronic devices, installed in a baggage item must be able to be removed from the bag so that the passenger can carry the spare lithium battery / power bank into the cabin. No lithium battery contained in a bag may be considered as “installed in equipment”</p> <p>The lithium ion batteries must have a power rating of not more than 100 Wh unless the passenger has approval from the operator, in which case the lithium ion battery must not have a Watt-hour rating exceeding 160 Wh.</p>
<p>Power banks*</p>	<p>Where a lithium ion battery is installed in a bag for the primary purpose of charging other devices, it must be considered as a power bank and comply with existing requirements for carriage of such devices.</p>
<p>Tracking systems</p>	<p>Tracking devices must comply with FAA guidance 91-21-c or EASA AMC and GM to Part-CAT – Issue 2, Amendment 1 or subsequent versions of such guidance.</p> <p>Specifically under FAA guidance:</p> <ul style="list-style-type: none"> • The PED must be designed with a minimum of two independent means to turn off completely, turn off cellular or mobile functions, or a combination of both when airborne. • Tracking through passive RFID should comply with IATA RP1740C.
<p>Electronic baggage tags</p>	<p>Electronic Baggage Tags (EBT) have a screen, power source, passive RFID and a QR code as their major design components. The airline industry acceptable EBT is defined in IATA Recommended Practice 1754.</p> <p>These baggage tags have a Bluetooth LE interface that is activated for a short time through a hardware button on the baggage tag. During the active period the airline programs the bag tag with the passenger journey information. The tag then deactivates.</p>

**Note: Specific security regulations may prevent the carriage of power banks and spare lithium batteries in the cabin. Operators must ensure that they are aware of these restrictions and comply accordingly. Further information may be found in [IATA guidance document](#).*

Recommendations for Operators

Operators should ensure that airport check-in and passenger services staff and cabin crew are made 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 made 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 power bank offered as checked baggage must have the power bank removed prior to being checked-in. The power bank 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 power banks. Where it is identified that there are spare lithium batteries or power banks, 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.

To alert passengers as to the requirements and limitations on the carriage of this smart baggage operators should include specific information on their booking and check-in websites, ticket purchase and check-in counters, baggage drop-off areas and boarding gates. Operators should also consider including information contained within in-flight magazines, or other tools used to communicate with passengers.

Cabin firefighting procedures

Firefighting 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 held and/or used during flight. Passengers and cabin crew are therefore more able to identify an overheating device and take appropriate action to cool it before the point of ignition.

In the case of batteries installed within carry-on bags, these are more difficult to identify at an early stage, due to their stowage in the cabin. This should be considered in the safety risk assessment.

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 able to be 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 in water or placed in a fire containment device. This is a considerable hazard and should be carefully considered by the operator before determining a policy on acceptance for carriage.

Safety Risk Assessment

Operators should carry out their own safety risk assessment (SRA) regarding the carriage of these devices to determine whether they can be safely accepted for carriage and any mitigations which may be required. The following are examples which should be considered.

Hazards	Potential consequences
Ignition of a lithium battery which cannot be removed from bag.	Inability to cool battery effectively. Inability to isolate battery and prevent spreading.
Installation of power bank in bag not identified at check in.	Carried as checked baggage contrary to regulation.
Installation of tracking technology	Electromagnetic interference with aircraft systems.
Installation of connectivity systems e.g. Wi-Fi, Bluetooth, GSM, GPS	Electromagnetic interference with aircraft systems.
Bag intercepted and removed at departure gate and unable to be carried as checked bag due to installation of lithium ion power bank.	Passenger required to surrender bag and contents, or passenger offloaded.
Unacceptable devices checked in and not detected as inadmissible	Failure of battery pack and consequent fire in inaccessible hold

Device marketing websites

The following list allows operators to review some examples of these devices.

Note: This is not an exclusive list of the available technologies.

Inclusion on this list does not imply IATA's approval but allows operators to research technology for their risk assessment process.

<http://modobag.com/>

<http://bluesmart.com>

<http://www.hammacher.com/Product/11406>

<http://travelmaterobotics.com/#rec8023776>

<http://unbouncepages.com/nuarobotics/>

<https://www.awaytravel.com/luggage/carry-on/blue?gclid=CJHz7onHx9ICFZmCswodzIYK9A>

<https://www.raden.com/>