



WORKING PAPER

**DANGEROUS GOODS PANEL (DGP)
WORKING GROUP MEETING (DGP-WG/22)**

Montréal, 21 to 25 November 2022

- Agenda Item 2: Managing air-specific safety risks and identifying anomalies (REC-A-DGS-2025)**
2.2: Develop proposals, if necessary, for amendments to the *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284) for incorporation in the 2025-2026 Edition

**LITHIUM BATTERY POWERED TRACKING DEVICES CARRIED BY PASSENGERS OR
CREW**

(Presented by D. Brennan)

SUMMARY

This working paper seeks discussions on the allowance of activated tracking devices carried by passengers or crew in their checked baggage and consideration of permitting portable electronic devices powered by lithium batteries with a capacity of no more than 2.7 Wh or 0.3 g lithium metal content to remain on.

Action by the DGP-WG is in paragraph 2.

1. INTRODUCTION

1.1 Due to the security restrictions requiring passengers and crew to place large personal electronic devices in checked baggage on certain flights by some States, it was agreed that portable electronic devices containing lithium metal or lithium ion cells or batteries must be completely switched off and not in sleep or hibernation mode when these devices are carried in checked baggage at DGP-WG/17 (DGP-WG/17-WP/47 paragraph 3.5.1.1). The working group recommended that the amendments be incorporated in the 2017 – 2018 Edition of the Technical Instructions, and an addendum was then issued taking effect from 1 July 2017.

1.2 Although the initial concerns arose because of “large” personal electronic devices, when additional safety mitigation measures were introduced in Part 8; Table 8-1, they were implemented universally on all portable electronic devices containing lithium cells or batteries permitted in checked baggage.

1.3 At DGP/26, the Dangerous Goods Panel agreed to include baggage equipped with lithium batteries (DGP/26-WP/54 paragraph 6.3.5) in Part 8; Table 8-1, which was further amended as stated in DGP/26-WP/54 Addendum No. 1 that some baggage may contain a lithium metal battery with a lithium metal content of no more than 0.3 g or a lithium ion battery with a Watt-hour rating not exceeding 2.7 Wh to power locks or similar features on baggage. As the installed battery is to operate a built-in feature of the baggage, the feature cannot be switched off, and the provision also does not require the baggage to be switched off completely and is permitted to be checked in.

1.4 Partially due to the knock-on effect of the COVID-19 pandemic between the beginning of 2020 and early 2022, many operators, as well as airports and ground handling agents had to reduce the manpower following an almost complete shut-down of passenger travel. These companies faced operational challenges when passengers returned to domestic and international travel very rapidly in mid-2022. As a result, there was insufficient staff able to manage that checked baggage was actually loaded on departing and/or connecting flights, with the result that the volume of “lost” and mis-handled baggage became a significant issue at many airports.

1.5 Some passengers then decided to place tracking devices in their checked baggage so that these devices could help them locate their bags in case they went missing. Many of the tracking devices on the market only contain a lithium metal button cell (CR 2032) with no more than 0.3 g of lithium metal content and are equipped with low energy Bluetooth. Like baggage equipped with small lithium batteries, these devices are not equipped with an on/off switch and cannot be switched off. They communicate wirelessly with the paired portable electronic device, such as a mobile phone, and if these paired portable electronic devices are within the communication range of the tracking devices, the location of the tracking devices can be reflected on the paired devices. However, since these devices are placed in the checked baggage as an additional loose item, they cannot be considered as “baggage equipped with a lithium battery(ies)”. Therefore, these devices need to be treated as portable electronic devices (PED), which must be completely switched off.

1.6 At the moment, operators are complying with the provisions in Part 8, Table 8-1 that provided the tracking devices cannot be switched off, are not permitted to be placed in checked baggage. However, operators have identified through their safety risk assessment that the low energy Bluetooth these devices use meets the guidance issued by the United States Federal Aviation Administration (FAA) (Advisory Circular (AC) 91.21-1D) or the European Union Aviation Safety Agency (EASA) (EASA AMC1.CAT.GEN.MPA.140) and are not capable of interfering with aircraft systems.

1.7 The carriage of such tracking devices has been widely discussed on social media, and some operators have approached their State aviation authority to seek clarifications and assistance. According to available information, Luftfahrt Bundesamt (LBA) of Germany and the Swiss Federal Office of Civil Aviation (FOCA) have supported the safety risk assessment provided by operators and agreed that these tracking devices can be carried in passengers’ check baggage.

1.8 In the meantime, the FAA have performed fire tests on a variety of these tracking devices powered by lithium cells. The tests evaluated the reaction of six different types of tracking devices when forced into thermal runaway by means of a heating element placed on the lithium cell. Three of the devices that utilised Bluetooth wireless communications and were powered by lithium metal coin cells (CR 2032). The remaining three devices utilised cellular or mobile communications and were powered by lithium ion pouch cells ranging from 2.22 Wh to 17.02 Wh, and all three were tested at 100% State of Charge (SOC).

1.9 It was observed from the tests of the three Bluetooth tracking devices that the cell would vent but did not emit any sparks or flames. For the other three cellular or mobile communication trackers, likely due to the difference in energy capacity of the lithium ion pouch cells they contained, they produced different reactions. The devices containing a lithium ion cell with 2.22 Wh and 5.55 Wh produced venting and smoke but no sparks or flames; however, the one with a 17.02 Wh cell produced visible flames.

1.10 Lithium cells or batteries with similar energy of 0.3 g lithium metal content and 2.7 Wh can be found not only in baggage and tracking devices, but also other small electronic goods, such as watches. The FAA is preparing to perform additional fire tests of lithium metal coin cells with a lithium metal content amount closer to 0.3 g, and more test data is planned to be submitted in a separate information paper to be discussed at DGP-WG/22.

1.11 It is understood that the lithium battery installed in the tracking devices is only half the concern, and the low energy Bluetooth or cellular communication is the other. The latter is beyond the scope of the Technical Instructions; however, some insights have been gathered by the FAA, which can be beneficial for operators when performing their safety risk assessment, and regulators when reviewing the corresponding safety risk. Operators are encouraged to review Advisory Circular (AC) 91.21-1D and EASA AMC1.CAT.GEN.MPA.140, which discuss tracking devices that have transmission levels that are considered acceptable (low powered wireless communications) to be left on (activated) while on board the aircraft. They reference the standards EUROCAE ED-130A/RTCA DO-363A (Guidance for the Development of Portable Electronic Devices (PED) Tolerance for Civil Aircraft) and ED-239/DO-307 (Aircraft Design and Certification for Portable Electronic Device (PED) Tolerance). The aircraft manufacturer may also play a role in determining the aircraft's initial, as delivered, PED tolerance levels, as there is no regulation governing certification of aircraft PED tolerance.

1.12 In 2016, RTCA Special Committee (SC-234) and EUROCAE Working Group (WG-99) published ED-130A and DO-363 (as articulated in AC91.21-1D Section 10.3), that a tracking device does not have to be turned off during flight, if it has an effective isotropic radiated power (EIRP) of 100 milliwatts (mW) or less because it will not affect aircraft systems. This guidance covers technologies such as Bluetooth and Zigbee, which are generally used by the tracking devices that passengers want to place into their checked baggage today.

2. ACTION BY THE DGP-WG

2.1 The DGP-WG is invited to consider permitting portable electronic devices containing lithium metal batteries with a lithium metal content not exceeding 0.3 g and lithium ion batteries with a Watt-hour rating not exceeding 2.7 Wh to be in checked baggage to remain activated (i.e. without being switched off) as shown in the appendix to this working paper.

APPENDIX

PROPOSED AMENDMENT TO PART 8 OF THE TECHNICAL INSTRUCTIONS

Part 8

PROVISIONS CONCERNING
PASSENGERS AND CREW

Chapter 1

PROVISIONS FOR DANGEROUS GOODS
CARRIED BY PASSENGERS OR CREW

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Table 8-1. Provisions for dangerous goods carried by passengers or crew

<i>Dangerous Goods</i>	<i>Location</i>		<i>Approval of the operator(s) Is required</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>		
Batteries				
1) Lithium batteries (including portable electronic devices)	Yes (except for g) and h)	Yes	(see c) and d)	<p>a) each battery must be of a type which meets the requirements of each test in the UN <i>Manual of Tests and Criteria</i>, Part III, subsection 38.3;</p> <p>b) each battery must not exceed the following:</p> <ul style="list-style-type: none"> — for lithium metal batteries, a lithium content of 2 grams; or — for lithium ion batteries, a Watt-hour rating of 100 Wh; <p>c) each battery may exceed 100 Wh but not exceed 160 Wh Watt-hour rating for lithium ion with the approval of the operator;</p> <p>d) each battery may exceed 2 grams but not exceed 8 grams lithium content for lithium metal for portable medical electronic devices with the approval of the operator;</p> <p>e) batteries contained in portable electronic devices <u>must be protected from damage and unintentional activation. Devices containing batteries exceeding:</u></p> <ul style="list-style-type: none"> <u>— for lithium metal batteries, a lithium content of 0.3 grams;</u> <u>or</u> <u>— for lithium ion batteries, a Watt-hour rating of 2.7 Wh</u> <p>should be carried as carry-on baggage; however, if carried as checked baggage, <u>the devices must be completely switched off (not in sleep or hibernation mode).</u>÷</p> <p>— measures must be taken to prevent unintentional</p>

<i>Dangerous Goods</i>	<i>Location</i>		<i>Approval of the operator(s) is required</i>	<i>Restrictions</i>
	<i>Checked baggage</i>	<i>Carry-on baggage</i>		
				<p>activation and to protect the devices from damage; and</p> <p>the devices must be completely switched off (not in sleep or hibernation mode);</p> <p>f) batteries and heating elements must be isolated in portable electronic devices capable of generating extreme heat, which could cause a fire if activated, by removal of the heating element, battery or other components;</p> <p>g) spare batteries, including power banks:</p> <ul style="list-style-type: none"> — must be carried as carry-on baggage; and — must be individually protected so as to prevent short circuits (by placement in original retail packaging or by otherwise insulating terminals, e.g. by taping over exposed terminals or placing each battery in a separate plastic bag or protective pouch); <p>h) baggage equipped with a lithium battery(ies) exceeding:</p> <ul style="list-style-type: none"> — for lithium metal batteries, a lithium content of 0.3 grams; or — for lithium ion batteries, a Watt-hour rating of 2.7 Wh <p>must be carried as carry-on baggage unless the battery(ies) is removed from the baggage, in which case the battery(ies) must be carried in accordance with g);</p> <p>i) no more than two spare batteries meeting the requirements of c) or d) may be carried per person.</p>

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