

# Advisory Circular

---

## GUIDANCE ON DANGEROUS GOODS CARRIED IN PASSENGER AND CREW BAGGAGE

GENERAL.....	1
PURPOSE .....	1
APPLICABILITY .....	1
RELATED REGULATIONS .....	2
RELATED ADVISORY CIRCULARS .....	2
CANCELLATION .....	2
EFFECTIVE DATE .....	2
OTHER REFERENCES .....	2
1 INTRODUCTION.....	3
2 LITHIUM BATTERIES (INCLUDING PORTABLE ELECTRONIC DEVICES).....	3
3 BAGGAGE EQUIPPED WITH LITHIUM BATTERIES .....	4
4 ELECTRONIC CIGARETTES .....	6
5 PERSONAL TRANSPORTATION DEVICES POWERED BY LITHIUM BATTERIES .....	6
6 MOBILITY AIDS POWERED BY LITHIUM ION BATTERIES .....	7
7 ENQUIRIES .....	8

### GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 11 of the Air Navigation Act 1966 (ANA), to demonstrate compliance with a statutory requirement. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

### PURPOSE

This AC provides guidance to demonstrate compliance with, and information related to, regulation 12 on dangerous goods that are permitted to be carried by passengers and crew in baggage of the Air Navigation (92 – Carriage of Dangerous Goods) Regulations, (ANR-92).

### APPLICABILITY

This AC is applicable to:

- An AOC holder operating an aeroplane in accordance with Air Navigation (121 – Commercial Air Transport by Large Aeroplanes) Regulations 2018 (“ANR-121”);
- An AOC holder operating an aeroplane in accordance with Air Navigation (135 – Commercial Air Transport by Helicopters and Small Aeroplanes) Regulations 2018 (“ANR-135”);
- An operator of a Singapore registered aeroplane operated for the purpose of general aviation in accordance with Air Navigation (91 – General Operating Rules) Regulations 2018 (“ANR-91”);

- An operator of a foreign registered aircraft in Singapore in accordance with Air Navigation (91 – General Operating Rules) Regulations 2018 (“ANR-91”);
- Any agent of a foreign operator, Singapore operator or an operator of a Singapore registered aircraft operated for the purpose of general aviation.
- An agency in Singapore that performs security screening of passengers or baggage on behalf of a foreign operator, Singapore operator or an operator of a Singapore registered aircraft operated for the purpose of general aviation;

#### **RELATED REGULATIONS**

This Advisory Circular relates specifically to regulation 12 of ANR-92.

#### **RELATED ADVISORY CIRCULARS**

- AC 121-2-7 Management of Lithium Batteries in the Aircraft Passenger Cabin

#### **CANCELLATION**

This AC supersedes AC 92-2-2 (Rev 0) dated 30 December 2022. In this revision, new limits on a lithium battery’s energy capacity is introduced to determine whether a portable electronic device should be completely switched off when carried in checked baggage.

#### **EFFECTIVE DATE**

This AC is effective from 11 May 2023.

#### **OTHER REFERENCES**

- IATA Dangerous Goods Regulations Manual

## 1 INTRODUCTION

- 1.1 Passengers and crew on board an aircraft are not permitted to carry dangerous goods, either on the persons or as baggage, unless they are specifically permitted in accordance with Part 8 of the ICAO Technical Instructions (TI) for the Safe Transport of Dangerous Goods by Air (corresponding to Subsection 2.3 of the IATA Dangerous Goods Regulations Manual). To ensure that prohibited dangerous goods are not inadvertently carried on board an aircraft, regulation 12(1) requires that organisations processing and accepting passengers, crew or their baggage for transport on an aircraft must not cause to be taken or accept for loading on board an aircraft if an article or substance is known or suspected to be dangerous goods not permitted to be carried by passengers and crew members.
- 1.2 This AC provides additional guidance on some of the dangerous goods that are frequently carried by passengers and crew onboard aircraft.

## 2 LITHIUM BATTERIES (INCLUDING PORTABLE ELECTRONIC DEVICES)

- 2.1 When carried by passengers and crew for personal use, portable electronic devices (such as cameras, mobile phones, laptops, tablets etc.) and portable medical electronic devices (such as automated external defibrillators, nebulizer, continuous positive airway, portable oxygen concentrators etc.) containing lithium metal or lithium ion cells or batteries may be permitted in checked or carry-on baggage.
- 2.2 Although portable electronic devices containing batteries are permitted in both checked and carry-on baggage, it is recommended that such devices be carried in carry-on baggage so that any incident involving such devices may be alerted to cabin crew and mitigated without delay. For any device carried in checked baggage:-
- (a) measures must be taken to prevent unintentional activation and to protect the device from damage; and
  - (b) the device is to be completely switched off (not in sleep or hibernation mode) if it contains lithium batteries exceeding:
    - (i) 0.3 grams of lithium content for lithium metal batteries; or
    - (ii) 2.7 Wh (Watt-hour rating) for lithium ion batteries.
- 2.3 Spare batteries, including powerbanks, 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) and carried in carry-on baggage only. The carriage of spare lithium metal or lithium ion cells or batteries in checked baggage is forbidden.
- 2.4 In addition, each installed or spare battery must be of the type which meets the requirements of each test in the *UN Manual of Test and Criteria*, Part III, Subsection 38.3 and its energy capacity does not exceed the following:
- for lithium metal batteries, a lithium content of not more than 2 grams; and
  - for lithium ion batteries, a watt-hour rating of not more than 100 Wh.
- 2.5 For passengers and crew who wish to bring onboard any portable electronic devices or portable medical electronic devices containing lithium batteries (including spare batteries) beyond the capacity limitations specified in paragraph 2.4, passenger handling staff should seek the approval of the air operator. Upon verifying that the batteries installed in such devices and their spare batteries meet the applicable requirements of the ICAO TI,

the air operator may approve their carriage by air provided that each battery installed in a device and any spare batteries does not exceed the following:

- for lithium metal batteries, not more than 8 grams; and
- for lithium ion batteries, a watt-hour rating not more than 160Wh.

- 2.6 For the carriage of spare batteries exceeding the capacity limitations of paragraph 2.4 and with prior approval of the air operator, only two spare batteries (excluding the batteries install in the device) may be carried by each passenger or crew in carry-on baggage. In addition, lithium metal batteries exceeding 2g of lithium metal content installed in devices (including any spare batteries) may be carried by a passenger or crew in portable medical electronic devices only.
- 2.7 Lithium ion and lithium metal batteries contained in equipment, meeting the requirements of paragraphs 2.1, 2.2, 2.4 and 2.5, may be transported in mishandled baggage or excess baggage. Spare lithium ion and lithium metal batteries must not be transported in mishandled or excess baggage.
- 2.8 Air operators are encouraged to provide information and advise its crew, passengers and check-in staff on the proper carriage of lithium batteries. Where applicable, the operator should require its check-in staff to assist passengers to identify lithium batteries or equipment containing lithium batteries that are forbidden to be carried in checked or carry-on baggage. Check-in staff should seek confirmation from a passenger about the contents of any item whenever there is any suspicion that it may contain lithium batteries.
- 2.9 To mitigate the safety risk of passengers carrying lithium ion or lithium metal batteries or devices containing such batteries that have been subjected to safety recall by its manufacturer due to safety defects, air operators should provide information to passengers to refrain from charging or using them onboard the aircraft. Such batteries or devices should remain completely switched off, protected from accidental activation and carried in carry-on baggage or on the person.

### **3 BAGGAGE EQUIPPED WITH LITHIUM BATTERIES**

- 3.1 Baggage with high-tech features such as location tracking, charging capability and digital weighing capability equipped with lithium batteries are being carried in increasing numbers as checked and/or carry-on baggage. Collectively known as smart luggage, they are equipped with lithium batteries and may contain powerbanks intended to provide power to other electronic devices, USB ports, GPS and other technologies such as Bluetooth, RFID and WIFI capabilities.
- 3.2 The presence of lithium batteries in smart luggage presents a fire risk when transported by air as checked and/or carry-on baggage.
- 3.3 To mitigate the safety risk in the carriage of smart luggage by passengers and crew, smart luggage equipped with lithium batteries exceeding 0.3 grams of lithium content for lithium metal batteries or 2.7 Wh (Watt-hour rating) for lithium ion batteries:
- (a) must not be transported as checked baggage unless its batteries are removed and carried by passengers or crew into the cabin. The removed batteries will be deemed as spare lithium batteries and must be protected from short circuit according to paragraph 2.3;

- (b) if the smart luggage is designed such that the batteries could not be removed, the baggage with its batteries should be carried into the cabin by the passenger or crew as carry-on baggage so that any incident can be immediately mitigated by trained cabin crew. Carry-on baggage should adhere to size and weight limitations and any restrictions (such as ensuring the transmitting functions are disabled at all times during flight) that may be imposed by the air operator.
  - (c) if the smart luggage is designed such that the batteries could not be removed and its size, weight or any air operator specific restrictions do not permit it to be transported in the cabin as carry-on baggage, it must not be accepted for transportation.
- 3.4 Notwithstanding paragraph 3.3(b), it is recommended that air operators accept for carriage as carry-on baggage smart luggage designed to allow for its lithium batteries to be removed. This is to facilitate cabin crew in mitigating a fire incident involving such batteries.

#### Handling of Mishandled Smart Luggage

- 3.5 Mishandled smart luggage (transported under “Rush Tag”) equipped with lithium batteries exceeding the capacity specified in paragraph 3.3 should not be accepted for transportation unless its batteries were removed.

#### Smart Luggage Designed to also Function as Personal Mobility Devices

- 3.6 Baggage installed with lithium batteries for the purpose of functioning as personal mobility devices must be considered as personal transportation devices and should be transported as carry-on baggage in the cabin. Refer to paragraph 5 for more guidance on the carriage of personal transportation devices powered by lithium batteries.

#### Other Lithium Battery Requirements

- 3.7 All lithium batteries contained in smart luggage including their spare batteries accepted for carriage by passengers and crew must comply with the capacity limitations in paragraph 2.4 and 2.5 as applicable.

#### Mitigating the Interference Effects of Smart Luggage

- 3.8 Smart luggage with location tracking capability using GPS and GSM technology may pose a hazard to aircraft systems due to electromagnetic transmissions. To mitigate the risk of such interference by smart luggage, Singapore air operators must comply with applicable requirements in ANR-121. Further guidance can also be found in AC 121-1-2. Foreign air operators should comply with applicable regulations of its State of the operator.
- 3.9 In addition, motorised smart luggage must be switched off when carried on board the aircraft. This is because motorised luggage may unintentionally emit spurious radio frequency signals during its operation and cause interference with the aircraft systems.

#### Provision of Dangerous Goods Information to Passengers and Check-in Process

- 3.10 To alert passengers regarding the requirements and limitations on the carriage of smart luggage, air operators should include specific information on the carriage of smart luggage on their website, at the ticket purchase, check-in counters, self-check-in kiosk, baggage drop areas and the boarding gates.
- 3.11 Passenger service staff accepting checked baggage at the check-in counters or the boarding gate should be vigilant when accepting smart luggage carried by passengers. To prevent smart luggage containing lithium batteries exceeding the capacity specified

in paragraph 3.3 from being accepted as checked baggage, passenger service staff should seek confirmation from passengers and crew and request for such batteries, including any spare lithium batteries, to be removed prior to accepting them for carriage as checked baggage.

#### **4 ELECTRONIC CIGARETTES**

- 4.1 Electronic cigarettes, more commonly known as e-cigarettes, are devices that simulate smoking. Typical e-cigarettes contain lithium batteries used to operate a heating element to heat a liquid solution to produce vapour. When carried by passengers or crew, there is a risk of accidental activation of the heating element contained within such devices, resulting in overheating and fire on an aircraft. This risk is of particular concern when the e-cigarette is carried in checked baggage loaded in aircraft cargo compartments, as cabin crew will not be able to mitigate such overheating or fire incidents immediately.
- 4.2 Several incidents of this nature have been reported by other States in the past and it has also been confirmed that vapours from e-cigarettes are able to trigger optical smoke detectors installed in various places of the aircraft such as lavatories.
- 4.3 ICAO TI identifies e-cigarettes as battery powered portable electronic smoking devices which also include e-cigars, e-pipes, personal vaporizers and electronic nicotine delivery systems. When carried for personal use, such devices may only be permitted in carry-on baggage or on the person in the cabin of an aircraft so that any incident originating from such devices can be immediately mitigated by the crew. Consequently, such devices are prohibited to be carried in checked baggage.
- 4.4 Each lithium battery installed in such devices and any spare batteries must not exceed the capacity limitations specified in paragraph 2.4. Spare batteries for such devices must also be individually protected to prevent short circuits according to paragraph 2.3.
- 4.5 Although permitted to be carried in the cabin, recharging of these devices and/or their batteries onboard the aircraft is not permitted. Cabin crew on board the aircraft should remain vigilant to ensure that passengers do not inadvertently charge such devices and/or their batteries using the power outlets at their seats.
- 4.6 All air operators should communicate restrictions on the carriage of e-cigarettes to crew and staff of their ground handling agents and provide information to passengers on the carriage and use of e-cigarettes on board an aircraft. At the time of check-in, staff of handling agents should verify that passengers and their baggage comply with the dangerous goods restrictions prior to accepting them on an aircraft.
- 4.7 Singapore air operators should communicate the prohibition on smoking, including the use of e-cigarettes, during the safety briefing to passengers.

#### **5 PERSONAL TRANSPORTATION DEVICES POWERED BY LITHIUM BATTERIES**

- 5.1 When personal transportation devices containing lithium ion batteries are carried by passengers or crew, the requirements applicable to portable electronic devices containing lithium ion cells or batteries as described in paragraph 2 would apply to the carriage of such devices. Passenger handling staff should be aware that such devices are not mobility aids which are intended for use by passengers with mobility challenges.

- 5.2 Some personal transportation devices powered by lithium ion batteries contain batteries having energy capacities that are near or exceeding 160Wh. To mitigate safety risk, such devices should not be carried in checked in baggage. They are recommended to be carried in carry-on baggage in the cabin where any incident can be immediately mitigated by the crew.
- 5.3 Air operator may allow devices containing lithium ion batteries having a Watt-hour rating not exceeding 100Wh to be carried by passengers or crew. Devices containing lithium ion batteries having a Watt-hour rating exceeding 100Wh but not more than 160Wh may be carried subject to approval by the air operator.
- 5.4 Passengers and crew are not permitted to carry portable electronic devices containing lithium ion batteries exceeding 160Wh. Charging of these devices in the cabin is also prohibited.

## **6 MOBILITY AIDS POWERED BY LITHIUM ION BATTERIES**

- 6.1 Mobility aids refer to wheelchairs for use by passengers whose mobility is restricted by a disability, health, age or a temporary mobility problem. Due to its energy efficiency and ease of maintenance, increasingly, passengers with mobility challenges are travelling with wheelchairs that are powered by lithium batteries. However, because of the high energy capacity of batteries contained in wheelchairs, there is safety risk of a fire incident when they are transported on an aircraft. Hence, wheelchairs powered by lithium batteries needs to comply with certain safety requirements.
- 6.2 Upon passenger's request to transport wheelchairs containing a lithium battery, air operators are required to verify that the battery installed in the wheelchair complies with safety requirements. If deemed compliant, air operators may approve the wheelchair with the installed batteries for carriage as checked baggage. Part of the verification includes determining if the battery
- meets the test requirements of *UN Manual of Test and Criteria*, Part III, Subsection 38.3;
  - does not exceed 300Wh; and
  - the wheelchair provides adequate protection to the battery to prevent damage, short circuit and accidental activation when transported on an aircraft;
- 6.3 Should the wheelchair not provide adequate protection to the battery, the battery must be removed following the manufacturer's instructions and carried in the cabin of the aircraft. The battery must also be protected from short circuit (e.g. by taping any exposed terminals) and damage (e.g. by placing the battery in a protective pouch).
- 6.4 Spare batteries may only be carried in the cabin as carry-on baggage. Notwithstanding the guidance in paragraphs 2.4, 2.5 and 2.6, when intended for use in mobility aids, passengers are permitted to carry one spare battery not exceeding 300Wh or two spare batteries not exceeding 160Wh each.
- 6.5 Air operators should ensure that the pilot-in-command is informed of the location of the mobility aid with installed batteries, removed batteries and spare batteries. To achieve this, air operators should establish procedures in its operations manual specifying how

relevant information may be documented and communicated to the pilot-in-command of the aircraft transporting the mobility aid and its batteries.

## **7 ENQUIRIES**

- 7.1 Should you have any queries regarding the contents of the AC, you may e-mail to us at [CAAS\\_DangerousGoods@caas.gov.sg](mailto:CAAS_DangerousGoods@caas.gov.sg).