

Advisory Circular

GUIDANCE ON CARRIAGE OF LITHIUM BATTERIES AS CARGO

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 THOSE PACKED WITH OR CONTAINED IN EQUIPMENT	3
3 PERSONAL TRANSPORTATION DEVICES / MOBILITY AIDS / SMALL VEHICLES POWERED BY LITHIUM BATTERIES TRANSPORTED AS CARGO CONSIGNMENTS.....	4
4 CARRIAGE OF BAGGAGE EQUIPPED WITH LITHIUM BATTERIES AS CARGO CONSIGNMENTS.....	5
5 SAFETY RISK ASSESSMENT.....	5
6 ENQUIRIES	5

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 11 of the Air Navigation (92 – Carriage of Dangerous Goods) Regulations, (ANR-92) on the carriage of lithium batteries as cargo.

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 cargo 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 11 of ANR-92.

RELATED ADVISORY CIRCULARS

- AC 121-2-11 Aircraft Cargo Compartment Safety
- AC 121-4-2 Carriage of Cargo in the Passenger Cabin

CANCELLATION

This is the first AC issued on this subject.

EFFECTIVE DATE

This AC is effective from 1 January 2023.

OTHER REFERENCES

- IATA Dangerous Goods Regulations Manual

1 INTRODUCTION

- 1.1 A number of air transport-related incidents linked to lithium batteries and devices powered by such batteries have been reported worldwide. These incidents involved both passenger and cargo aircraft, and occurred during pre-loading, loading, in-flight and unloading activities. Some incidents have also resulted in in-flight fire leading to emergency landings. CAAS had also received reports of undeclared and mis-declared lithium batteries offered by shippers and their agents as cargo consignments to air operators for carriage by air. To minimize the safety risks to air transport, compliance with the requirements of the ICAO Technical Instructions (TI) for the Safe Transport of Dangerous Goods by Air is essential for their safe handling and carriage by air. This Advisory Circular provides guidance on the safe handling and carriage of lithium batteries and devices containing such batteries.

2 LITHIUM BATTERIES INCLUDING THOSE PACKED WITH OR CONTAINED IN EQUIPMENT

- 2.1 Lithium batteries are classified as dangerous goods according to the ICAO TI. The ICAO TI contains specific requirements for the proper preparation and transport of lithium batteries as cargo consignments. Air operators, shippers and their agents have to comply with the classification, packing, marking, labelling and documentation requirements including special provisions and quantity limitations applicable to the following articles and their corresponding packing instruction:

UN No.	Proper Shipping Name	Packing Instruction
UN3480	Lithium ion batteries	965
UN3481	Lithium ion batteries packed with equipment	966
UN3481	Lithium ion batteries contained in equipment	967
UN3090	Lithium metal batteries	968
UN3091	Lithium metal batteries packed with equipment	969
UN3091	Lithium metal batteries contained in equipment	970

- 2.2 Due to significant fire risk to the aircraft and its occupants, standalone lithium ion and lithium metal cells or batteries identified under UN3480 and UN3090 respectively are forbidden to be transported by air as cargo consignments on passenger aircraft. They may be transported on cargo aircraft only. Shippers or air operators who wish to offer for transport or to transport standalone lithium ion or lithium metal batteries as cargo on passenger aircraft must seek exemptions from the authorities of the States of origin, air operator, transit, overflight and destination in accordance with special provision A201.
- 2.3 When packed in an overpack, such standalone lithium cells or batteries are not permitted to be packed with incompatible dangerous goods packages that require segregation according to Table 7-1 of the ICAO TI (corresponding to Table 9.3.A of the IATA Dangerous Goods Regulations Manual).
- 2.4 For lithium ion cells or batteries, identified under UN3480, shippers must ensure that all consignments of such cells or batteries prepared in accordance with the requirements of Section IA and Section IB of Packing Instructions 965 and do not have a state of charge exceeding 30% of their rated design capacity. Shippers and air operators who wish to

offer and transport consignments of lithium ion batteries whose state of charge exceeds 30% of their rated design capacity must seek approvals from the authorities of the State of origin and State of the air operator. Such consignments may only be transported on cargo aircraft only under the written conditions established by those authorities.

- 2.5 Prototypes of lithium cells or batteries (including those contained in or packed with equipment) or those with low production runs (not exceeding 100 cells or batteries annually) that have not been tested to the requirements of subsection 38.3 of the *UN Manual of Test and Criteria* may only be transported on cargo aircraft with the approval of the appropriate authority of the State of origin and the State of the air operator. Shippers offering such batteries for transport by air from Singapore should seek approval from CAAS.
- 2.6 Lithium ion and lithium metal batteries, including those packed with or contained in equipment, that have been identified by the manufacturer as being defective for safety reasons, or that have been damaged thus having the potential of producing a dangerous evolution of heat, fire or short circuit are forbidden to be transported by air.
- 2.7 Defective lithium cells or batteries identified as being damaged such that they no longer conform to the type that have been tested according to the requirements of subsection 38.3 of the *UN Manual of Test and Criteria* are also forbidden for transport by air. Defective lithium cells or batteries may include, but are not limited to, those that have leaked or vented, or those that have sustained physical or mechanical damage. Used lithium cells or batteries intended to be handled through reverse logistics but which cannot be diagnosed prior to transport are also considered as being defective and forbidden for transport by air.
- 2.8 Waste lithium batteries and batteries being shipped for recycling or disposal are forbidden to be transported by air unless approved by the appropriate national authority of the State of origin and the State of the air operator.
- 2.9 When consigning unaccompanied baggage as cargo for carriage on passenger aircraft, shippers, air operators and their agents have to ensure that such baggage do not inadvertently contain lithium ion or lithium metal cells or batteries in them.

3 PERSONAL TRANSPORTATION DEVICES / MOBILITY AIDS / SMALL VEHICLES POWERED BY LITHIUM BATTERIES TRANSPORTED AS CARGO CONSIGNMENTS

- 3.1 Personal transportation devices / mobility aids / small vehicles powered by lithium batteries intended to be transported as cargo consignments must be assigned to UN3171 - *Battery-powered vehicle*, and have to comply with the requirements of Packing Instruction 952 of the ICAO TI. Examples of such devices and vehicles include, but are not limited to, electric wheelchairs, hoverboards, e-bikes and solowheels.
- 3.2 If the lithium ion cells or batteries used to power such devices or vehicles are removed and packed separately in the same outer packaging, they must be assigned to UN3480 - *Lithium ion batteries* and have to comply with Packing Instructions 965 and all applicable requirements of the ICAO TI.

4 CARRIAGE OF BAGGAGE EQUIPPED WITH LITHIUM BATTERIES AS CARGO CONSIGNMENTS

- 4.1 Baggage equipped with lithium batteries are often those with features such as location tracking, charging capability and digital weighing capability that may be carried by passengers. When transported in cargo as unaccompanied baggage, such baggage 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 should not be accepted for transportation unless its batteries have been removed.
- 4.2 Other than in unaccompanied baggage, baggage equipped with lithium batteries or button cells must be assigned to UN3481 - *Lithium ion batteries contained in equipment* and have to comply with Packing Instruction 967 or UN3091 - *Lithium metal batteries contained in equipment* and have to comply with Packing Instruction 970 as appropriate.
- 4.3 Baggage installed with lithium batteries for the purpose of functioning as personal mobility devices must be considered as personal transportation devices. When transporting such devices as cargo, shippers should follow the guidance as described in paragraph 3.

5 SAFETY RISK ASSESSMENT

- 5.1 Global aviation communities continue to be concerned over the fire risk in the carriage of lithium batteries by air. Air operators intending to or are currently transporting lithium batteries in aircraft cargo compartments should conduct a safety risk assessment, regularly review their safety risk and consider all factors associated with the carriage of such consignments on passenger and cargo aircraft.
- 5.2 Air operators are encouraged to consider the history of compliance by shippers and their agents with the dangerous goods regulations prior to accepting consignments of lithium batteries (including those packed with or contained in equipment) as cargo on its aircraft.
- 5.3 Singapore air operators assessing the safety risks associated with the carriage of items in aircraft cargo compartments should refer to the guidance in AC 121-2-11, *Aircraft Cargo Compartment Safety*.

6 ENQUIRIES

- 6.1 Should you have any queries regarding the contents of the AC, you may e-mail to us at CAAS_DangerousGoods@caas.gov.sg.