

# Advisory Circular

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## GUIDANCE FOR CARRIAGE OF LITHIUM BATTERIES BY AIR

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1. **GENERAL.** Pursuant to paragraph 88B of the Air Navigation Order, the Director General of the Civil Aviation Authority of Singapore (DGCA) may, from time to time, issue advisory circulars (ACs) on any aspect of safety in civil aviation. This AC contains information about standards, practices and procedures acceptable to CAAS. The revision number of the AC is indicated in parenthesis in the suffix of the AC number
2. **PURPOSE.** This AC is to provide guidance for the carriage of lithium batteries, being classified as dangerous goods by air.
3. **APPLICABILITY.** This AC applies to all Singapore air operators, foreign air operators operating aircraft into and from Singapore, ground handling agents, cargo agents and shippers intending to carry or involved in the carriage of lithium batteries as cargo and baggage. Cargo agents are strongly encouraged to disseminate the contents of this AC to your customers/shippers. This AC also applies to entities offering dangerous goods training programmes.
4. **CANCELLATION.** This AC supercedes AC-DGR-2(0) issued on 18 March 2011.
5. **EFFECTIVE DATE.** This AC is effective from 14 August 2012.
6. **REFERENCES.**
  - Air Navigation Order (ANO); and
  - ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284).
7. **BACKGROUND.**
  - 7.1 Lithium batteries are commonly transported both as cargo and in passenger baggage. They can be carried as cargo consignment or installed in or packed with equipment as carry-on or checked baggage. As the demand for lithium batteries increases so do the risk associated with their transport, especially on board aircraft. A number of air transport-related incidents involving lithium batteries and devices powered by lithium batteries have been reported worldwide. These incidents involved both passenger and cargo aircraft and occurred during pre-loading loading, in-flight and unloading. Some incidents have resulted in in-flight fire leading to emergency landings.

7.2 Appendix A is an extract of a recent AC issued by Hong Kong Civil Aviation Department (HK CAD). It highlighted several fires that resulted from the carriage of mis-declared and undeclared lithium batteries as cargo. Proper identification and declaration of the presence of lithium batteries are therefore essential for their safe handling and carriage in accordance with the ICAO TI.

## **8. COMPLIANCE WITH THE TECHNICAL INSTRUCTIONS.**

8.1 Compliance with the detailed requirements of the ICAO TI is critical to promote the safe transport of lithium batteries.

### CARRIAGE OF LITHIUM BATTERIES AS CARGO

8.2 Lithium batteries are classified as dangerous goods under the ICAO TI. The ICAO TI contains specific requirements for the proper preparation and transport of lithium batteries as cargo consignments. Operators, shippers and their agents must comply with the packing, marking, labeling and documentation requirements including special provisions and quantity limitations applicable to the following articles and their corresponding packing instructions:

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

### CARRIAGE OF LITHIUM BATTERIES AS CHECKED OR CARRY-ON BAGGAGE

8.3 When carried by passengers and crew for personal use, portable electronic devices (such as watches, calculating machines, cameras, cellular phones, laptop computers, camcorders, etc.) containing lithium metal or lithium ion cells or batteries should be carried as carry-on baggage.

8.4 Spare batteries 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 (lithium alloy) or lithium ion cells or batteries in checked-in baggage is forbidden.

8.5 In addition, each installed or spare battery must not exceed the following:

- for lithium metal or lithium alloy batteries, a lithium content of not more than 2 grams; or
- for lithium ion batteries, a watt-hour rating of not more than 100 Wh.

8.6 Operators are encouraged to advise their passengers about the proper carriage of dangerous goods, including lithium batteries. Where applicable, operators should require their check-in staff to assist passengers to identify lithium batteries or equipment containing lithium batteries, that are forbidden to be carried in carry-on or checked 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.

## **9. PENALTY.**

9.1 For compliance to the ICAO TI, paragraph 50E, together with the Nineteenth Schedule, of the ANO require the operator and shipper to, among other responsibilities, ensure that all dangerous goods including lithium batteries are properly:

- Classified;
- Packed;
- Marked;
- Labeled and stored;

- Loaded, stowed and checked; and
- Documented.

9.2 Any person who contravenes the above shall be liable on conviction to a fine not exceeding S\$100,000 or to imprisonment for a term of five years, or to both.

#### **10. TRAINING SERVICE PROVIDERS.**

10.1 Entities offering dangerous goods training programmes are to address the understanding of the ICAO TI requirements associated with the carriage of lithium batteries by air and to emphasize the need to comply with these requirements in the interest of safety.

#### **11. CONTACT PERSON AND INFORMATION.**

11.1 Should you have any queries relating to the above, please e-mail to us at [CAAS\\_Dangerousgoods@caas.gov.sg](mailto:CAAS_Dangerousgoods@caas.gov.sg).

**APPENDIX A :  
CASES OF MIS-DECLARED AND UN-DECLARED CARRIAGE OF LITHIUM BATTERIES**

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1. The cases highlighted here are taken from HK CAD Dangerous Goods Advisory Circular DGAC 2/2012 dated 6 June 2012.
2. Over the past six months, HK CAD have received four reports from foreign civil aviation authorities and airlines where lithium batteries on flights departed from Hong Kong caught fire at their destinations after unloading from the aircraft. Although all the fires were subsequently extinguished and no person was injured, the incidents revealed serious deficiencies on the part of the shippers.
3. All the lithium batteries involved were either “misdeclared” or “undeclared”.
4. In one case, the consignment contained fully regulated Class 9 lithium ion batteries INCORRECTLY declared and consigned as “excepted” lithium ion batteries. The other three cases involved UNDECLARED excepted lithium ion or lithium metal batteries. Moreover, for all cases, the consignments did not comply with their respective ICAO Technical Instructions Packing Instructions.
5. Figures 1 to 4 are the photographs of the subject lithium batteries mentioned above.

**Figure 1a – External appearance of the fully regulated lithium ion battery**



Figure 1b – Damage after the fire



Figure 1c – Labeling, outer and inner packagings of an identical package



**Figure 2 – Short circuit and the resulting fire damage of an undeclared package of lithium metal button cells**



**Figure 3 – Fire damage of an undeclared lithium ion battery for computer**



**Figure 4 – Fire damage of two undeclared lithium ion cells sent inside an envelope**

