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2015-2016 Edition  
SUPPLEMENT  
ADDENDUM  
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**INTERNATIONAL CIVIL AVIATION ORGANIZATION**

**SUPPLEMENT TO THE  
TECHNICAL INSTRUCTIONS FOR THE SAFE TRANSPORT  
OF DANGEROUS GOODS BY AIR**

**2015-2016 EDITION**

**ADDENDUM**

The attached addendum should be incorporated into the 2015-2016 Edition of the Supplement to the Technical Instructions (Doc 9284).

(3 pages)



## TECHNICAL INSTRUCTIONS FOR THE SAFE TRANSPORT OF DANGEROUS GOODS BY AIR

The following amendments are approved and published by decision of the Council of ICAO and should be incorporated in the 2015-2016 Edition of the Supplement to the Technical Instructions (Doc 9284) with an applicability date of 1 April 2016:

In Part S-1, *add* new Chapter 4:

### Chapter 4

## GUIDANCE TO STATES ON THE TRANSPORT OF LITHIUM BATTERIES AS CARGO

### 4.1 INTRODUCTION

4.1.1 Lithium batteries have the potential to create thermal runaway, a chain reaction which leads to repeated self-heating and the release of a battery's stored energy. Once one battery experiences thermal runaway, it can generate enough heat to trigger thermal runaway in adjacent batteries. Thermal runaway can occur for a number of reasons, including poor cell design, cell manufacturing flaws and external abuse. It has been demonstrated through testing that thermal runaway can result in fire and/or explosion.

4.1.2 A prohibition on the transport of UN 3090 — **Lithium metal batteries** as cargo on passenger aircraft was introduced into the 2015-2016 Edition of the Technical Instructions with the knowledge that aircraft cargo fire protection systems could not control a lithium metal fire. More recent test results demonstrate that a fire involving high-density packages of UN 3480 — **Lithium ion batteries** may exceed the capability of aircraft cargo fire protection systems. High-density packages of lithium ion batteries may consist of any number of batteries or cells having the potential to overwhelm cargo compartment fire protection features. The potential is dependent on a number of variables including the battery or cell chemistry, size, design type, quantities and the cargo compartment configuration. The inability to determine an absolute safe quantity limit for lithium ion batteries and the absence of a packaging standard to mitigate the risks has led to the decision to introduce a prohibition on the transport of UN 3480 — **Lithium ion batteries** as cargo on passenger aircraft.

4.1.3 Development of a performance-based packaging standard for lithium ion batteries is currently under way. It is anticipated that once this standard is completed and any additional controls necessary to mitigate risks are established, an amendment to the Technical Instructions will be made to allow for their transport as cargo on passenger aircraft.

4.1.4 At a minimum, the following criteria should be identified as part of a safety risk assessment when considering whether or not to grant an exemption to transport UN 3480 — **Lithium ion batteries** as cargo on passenger aircraft under Special Provision A201:

- a) capabilities of the operator;
  - b) overall capability of the aircraft and its systems;
  - c) packing and packaging;
  - d) quantity of batteries and cells;
  - e) containment characteristics of unit load devices;
  - f) specific hazards and safety risks associated with each battery and cell type to be carried alone or in combination; and
  - g) chemical composition of the batteries and cells.
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In Part S-3, Chapter 4, Table S-3-1, page S-3-4-17, *add* the following new entry:

Name 1	UN No. 2	Class or division 3	Subsidiary risk 4	Labels 5	State variations 6	Special provisions 7	UN packing group 8	Excepted quantity 9	Passenger and cargo aircraft		Cargo aircraft only	
									Packing instruction 10	Max. net quantity per package 11	Packing instruction 12	Max. net quantity per package 13
Lithium ion batteries (including lithium ion polymer batteries)	3480	9		Miscellaneous	US 3	A88 A99 A154 A164 A183 A201 A331		E0	FORBIDDEN		See 965	

In Part S-3, Chapter 6, Table S-3-4, page S-3-6-3, *add* the following new special provision:

A331 Lithium ion cells or batteries may be offered for transport, on cargo aircraft only, at a state of charge greater than 30 per cent of their rated capacity with the approval of the State of Origin and the State of the Operator under the written conditions established by those authorities. When considering an approval, at a minimum, the following criteria should be considered to mitigate risks posed by a lithium cell or battery heat, smoke or fire event inside a package at the cell, battery or package level:

- a) no hazardous amount of flame is allowed outside the package;
- b) the external surface temperature of the package cannot exceed the amount that would ignite adjacent packing material or cause batteries or cells in adjacent packages to go into thermal runaway;
- c) no hazardous fragments can exit the package, and the package must maintain structural integrity; and
- d) the quantity of flammable vapour emitted must be less than the amount of gas that when mixed with air and ignited could cause a pressure pulse that could dislodge the overpressure panels of the aircraft cargo compartment or damage the aircraft cargo compartment liners.