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The Safe Transport of Lithium Batteries by Air

A recap....

Abu Dhabi, U.A.E.



Overview

- Background on ICAO
- ICAO and dangerous goods
- Lithium batteries
 - Where we are today and how we got here
 - Where we are going and how we will get there



ICAO — How does it work?

ICAO Assembly

ICAO Council

Air Navigation Commission (ANC)

- Panels of the ANC, e.g.
 - Airworthiness Panel (AIRP)
 - Flight Operations Panel (OPSP)
 - Safety Management Panel (SMP)
 - **Dangerous Goods Panel (DGP)**



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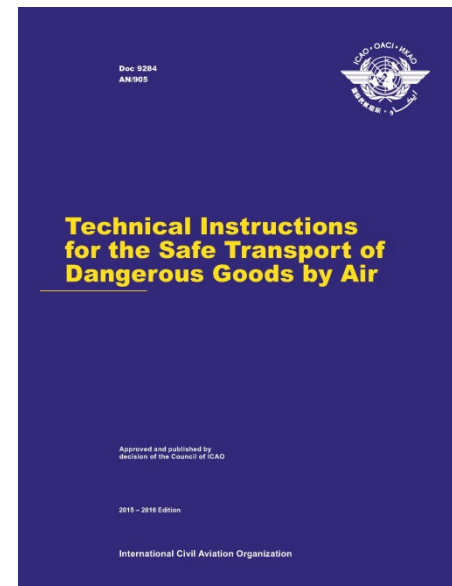


ICAO AND DANGEROUS GOODS



The Technical Instructions

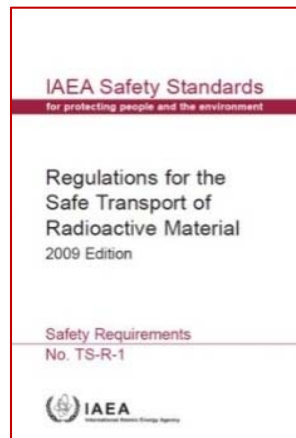
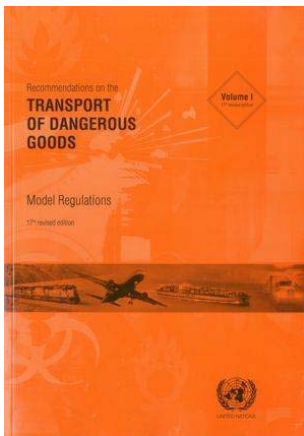
- Annex 18 — *The Safe Transport of Dangerous Goods by Air*
 - “The Standards and Recommended Practices of this Annex shall be applicable to all international operations of civil aircraft.”
 - “Each Contracting State shall take the necessary measures to achieve compliance with the detailed provisions contained in the Technical Instructions.”



(Annex 18, 2.1.1 and 2.2.1)

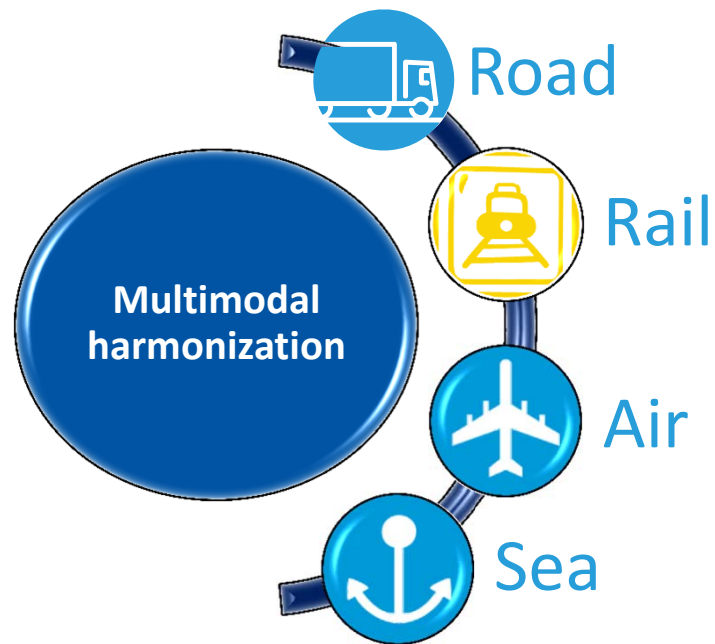


United Nations and Dangerous Goods





Harmonized Regulations





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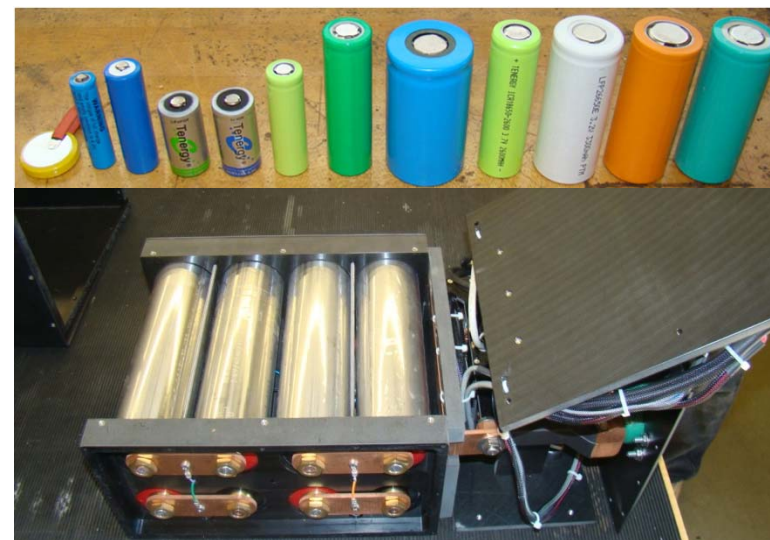


LITHIUM BATTERIES



Lithium Batteries — Hazards

- Ignition source
- Source of fuel for existing fire
- Release of flammable gases creating pressure pulse
- Degree of risk dependent on battery size, density, chemistry, design, manufacturer
- Incidents and accidents





Lithium Batteries — Classification Criteria



Lithium ion batteries

- Also called secondary lithium batteries
- Rechargeable
- Regulated based on Watt-hour rating and quantity of cells and batteries
- Used to power mobile phones, laptop computers, etc.



Lithium metal batteries

- Also called primary lithium batteries
- Non-rechargeable (generally)
- Regulated based on lithium metal content in grams and quantity of cells and batteries
- Used to power pace makers, watches, calculators, cameras etc.



Lithium Batteries — Where we are Now

- Lithium metal — prohibited on passenger aircraft
- Lithium ion — prohibited on passenger from 1 April 2016
- Additional restrictions for cargo aircraft from 1 April 2016
 - Reduced state of charge
 - One package Section II batteries per consignment
 - One package Section II batteries in an overpack



Packing Instructions 965 and 968

Lithium metal batteries (UN 3090)

Lithium ion batteries (UN 3480)



Cargo



How we got Here

- Lithium metal
 - Halon ineffective
- Lithium ion — New test results
 - High density packages may exceed capability of cargo fire protection systems

Cargo compartment fire protection systems unable to suppress or extinguish a fire involving high density lithium batteries, resulting in reduced time available for safe flight and landing of an aircraft to a diversion airport

(ICCAIA/airframe manufacturers)



High Density Batteries

- Any number that can overwhelm fire protection features
- Dependent on chemistry, size, design, quantities and cargo compartment configuration





DGP/25 Proposals

- Twenty-fifth Meeting of Dangerous Goods Panel
 - 19 to 30 October 2015
- Two major proposals
 - Ban lithium ion
 - Eliminate Section II



DGP Support

- Majority opposed
 - Risk of increased non-compliance
 - Need to ship small quantities
- Alternate mitigation strategies
 - Reduced state of charge
 - Limits on Section II packages
 - Passenger and cargo aircraft
 - Significant benefits to safety
- Acceptable level of safety?

Prohibition?

Elimination Section II?



Notices to Operators

- Boeing
- Airbus
- Embraer
- Voluntary operator bans

Support ICCAIA

Stop transporting

Risk assessment

- Include quantities and types of batteries



Flight Operations Panel

- FLTOPSP/2
 - 12 to 16 October 2015
- Support ICCAIA
- Transport only if acceptable criteria identified to carry out safety risk assessment
- Consensus

Minimum criteria

- Operator capabilities
- Type of operation
- Airplane and systems capabilities
- Packing and battery quantities
- Containment characteristics of ULDs
- Specific hazards and safety risks of each battery
- Chemical composition of batteries



Airworthiness Panel

- AIRP/3
 - 7 to 11 December 2015
- Support ICCAIA
- Should not be transported unless acceptable means to mitigate the risk can be established
- Consensus

Continuing to allow the carriage of significant quantities of lithium batteries within today's transport category aircraft cargo compartments which have not been certified to withstand a fire involving them is an unacceptable risk to aircraft



ANC and Council

- ANC
 - Risks associated with the carriage of lithium ion batteries as cargo are not adequately controlled and recommends a prohibition be established against lithium ion as cargo on passenger aircraft
- Council approval
 - Amendments to Technical Instructions
 - Ban
 - Reduced state of charge and limits on Section II for cargo aircraft
 - Guidance to States in Supplement



Additional Risks and Mitigation Measures

- Increased risk for cargo aircraft
- Increased non-compliance
- Complexity of supply chain

Effective oversight and enforcement

Battery industry responsibility

Known shippers

Transparency



Lithium Batteries — Where we are Going

- Temporary prohibition
 - Performance-based packaging standards
 - Additional operational controls necessary to mitigate risks to an acceptable level
 - Provisions for safety risk assessments
- Safe and stable method to transport
 - Remove prohibition (2017+)

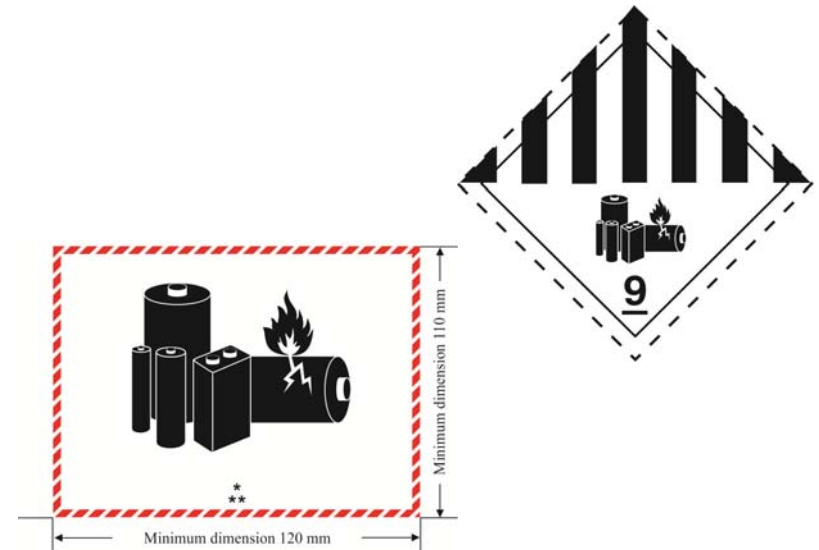


International Lithium Battery
Packaging Committee



Multimodal Changes

- New labels and markings
- Equipment defined
 - Apparatus for which the lithium cells or batteries will provide electrical power for its operation





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Central American
and Caribbean
[NACC] Office
Mexico City

South American
[SAM] Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
[WACAF] Office
Dakar

European and
North Atlantic
[EUR/NAT] Office
Paris

Middle East
[MID] Office
Cairo

Eastern and
Southern African
[ESAF] Office
Nairobi

Asia and Pacific
[APAC] Sub-office
Beijing

Asia and Pacific
[APAC] Office
Bangkok



THANK YOU