



香港民航處

Civil Aviation Department Hong Kong

New International Requirements on Lithium Batteries

12 December 2008, CX City

Battery Seminar

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Overview

- ✿ Basis of International Standards
- ✿ Legal responsibilities of Consignors
- ✿ Causes of lithium battery fires
- ✿ Definitions
- ✿ Forbidden DG
- ✿ New PSN, PI for 2009

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Basis of the International Standards

- ✪ ICAO 2009-10 edition Technical Instructions, TI (United Nations)
- ↓
- ✪ HK CAD - Laws of HK (Government)
- ↓
- ✪ IATA / Airlines Industry manuals eg. IATA DGR

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Chapter 384A – Dangerous Goods (Consignment by Air) (Safety) Regulations

Consignor's Responsibilities

- ✪ Classify and Pack
- ✪ Mark and Label
- ✪ Declare / Document
- ✪ DG Training

Maximum Penalties

- ✪ Fine \$250,000 and Imprisonment for 2 Years
- ✪ Fine \$20,000 and Imprisonment for 6 Months

Laws of HK website
<http://www.legislation.gov.hk/eng/home.htm>

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Reasons to Regulate Lithium Battery

Lithium Battery Incidents in 2007

- ✈️ 80+ battery fire
- ✈️ 28 are lithium batteries
- ✈️ Battery fire difficult to extinct

Reference: US FAA

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UPS1307 fire at Philadelphia USA, 7 Feb 2006



Lithium batteries cargo suspected as cause of fire

Reference: US DOT

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Three Crew Sustained Minor Injuries



Notebook Computer Fire at LAX



Reference: US FAA

Cargo Pallet Fire at LAX, 1999



Reference: US FAA

Most Likely Causes for Lithium Battery Incidents

1. False certification of compliance
2. Inadvertent activation and subsequent overheating
3. External short circuit eg. exposed battery terminal
4. Internal short circuit eg. physical damage
5. Faulty design
6. Improper charging and discharging

Reference: US DOT

Definition: Cell vs. Battery

☀ Cell



☀ Battery, Battery Pack



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Definition: Lithium metal vs. Lithium ion

1. Lithium metal /
Lithium alloy

- ☀ Primary /
non-rechargeable
- ☀ Lithium content: Gram (g)
- ☀ eg. camera, calculator



2. Lithium ion /
Lithium polymer

- ☀ Rechargeable
- ☀ Equivalent lithium content:
Watt-hour (Wh)
- ☀ eg. computer, phone



Forbidden from Air Transport

- ☛ Lithium batteries not tested to the requirements of the UN Manual of Tests and Criteria, Part III, section 38.3
- ☛ Lithium batteries identified by the manufacturer as being defective eg. safety recall

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Proper Shipping Name & Packing Instruction

- ☛ UN 3090 / PI 968
lithium metal or lithium alloy
cells and batteries
- ☛ UN 3091 / PI 969
..... packed with equipment
- ☛ UN 3091 / PI 970
..... contained in equipment

- ★
☛ UN 3480 / PI 965
lithium ion or lithium polymer
cells and batteries
- ★
☛ UN 3481 / PI 966
..... packed with equipment
- ★
☛ UN 3481 / PI 967
..... contained in equipment

Partially Regulated DG

PI 965 – PI 970, Part 1

UN 3090 / UN 3091

- ☀ Cell limit 1 g
- ☀ Battery limit 2 g
- ☀ UN testing - Section 38.3

- ☀ UN3090: 2.5 Kg Gross
- ☀ UN3091: no weight limit

- ☀ Strong outer packaging
- ☀ 1.2 m drop test (except PI 970)

UN 3480 / UN 3481 ★

- ☀ Cell limit 20 Wh
- ☀ Battery limit 100 Wh
- ☀ UN testing - Section 38.3

- ☀ UN3480: 10 Kg Gross
- ☀ UN3481: no weight limit

- ☀ Strong outer packaging
- ☀ 1.2 m drop test (except PI 967)

Partially Regulated DG - Replace A45

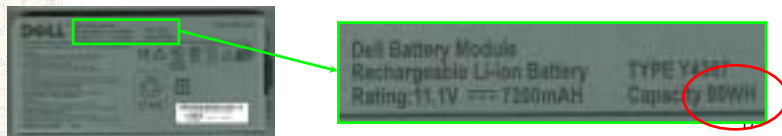
Document for partially regulated DG ★
(such as Air Waybill) :

- ☀ Package contains lithium metal / ion cells / batteries
- ☀ Handle with care, may catch fire if damaged
- ☀ Special procedures if damaged, inspection, repacking
- ☀ Telephone number

Watt-hour (Wh) Marking for Lithium ion / polymer Battery

- ☀ Wh marked on outside of battery case ★
- ☀ Batteries manufactured before 1 Jan 2009 continue to ship until 31 Dec 2010 without marking

Calculation eg: $7.2 \text{ Ah} \times 11.1 \text{ V} = 80 \text{ Wh}$
(1 Ah = 1000 mAh)



New Handling Label for Lithium Battery



- *
xxx.xxx.xxx
1. Fill in "Lithium ion battery" or "Lithium metal battery" as appropriate
 2. Telephone number for additional information

PI 965 – PI 970, Part 2 Class 9 Quantity

PI	Quantity of cells and batteries	Pax/Cargo	CAO
PI 965	Gross	5 Kg G	35 Kg G
PI 966	Qty. of cells & batteries per overpack	5 Kg	35 Kg
PI 967	Qty. of batteries per piece of equipment	5 Kg	35 Kg
PI 968	Gross	★ 2.5 Kg G	35 Kg G
PI 969	Qty. of cells & batteries per overpack	5 Kg	35 Kg
PI 970	Qty. of batteries per piece of equipment	5 Kg	★ 35 Kg

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Class 9 DG

Classification, Packing, Marking & Labeling

- ☀ DGD
- ☀ DG markings and labeling
- ☀ UN Packaging (PI 965, 966, 968, 969)
- ☀ - Overpack (...packed with equipment)
- ☀ - Waterproof (...contained in equipment)

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Summary

New for 2009 – 2010

- ☀ Partially regulated DG, Part 1 of PI (replace A45)
- ☀ Wh Marking + Battery Label + Document
- ☀ Class 9 DG, Part 2 of PI
- ☀ Observe Gross Weight, Qty. per Overpack and Qty. per piece of equipment