

NTSB LITHIUM BATTERY FORUM

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ICAO Lithium Battery Amendments

- **23rd DGP Montreal**
 - 11-21 Oct 2011
 - 17 Countries, 2 Industry Groups
- **Working Group of the Whole On Lithium Batteries**
 - 6-10 Feb 2012
 - Specialized meeting on lithium batteries and postal issues
- **Revisions in 2013-2014 Technical Instructions**
 - Effective 1 Jan 2013
 - Includes editorial revisions and new issues



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Lithium ion and Lithium Metal Cells and Batteries

ICAO Technical Instructions (TI) Lithium Battery Packing Instructions (2013-2014)




	Exceptions	Regulated Class 9	Fully-Regulated Class 9
Lithium ion batteries Packing Instruction 965	Section II	Section I B	Section I A
Lithium metal batteries Packing Instruction 968	Section II	Section I B	Section I A



Lithium ion Cells and Batteries

PI 965, Section II

Exceptions for Lithium ion Cells/Batteries Effective Jan. 1, 2013

	Lithium ion cells and/or batteries with a Watt-hour rating not more than 2.7 Wh	Lithium ion cells with a Watt-hour rating more than 2.7 Wh, but not more than 20 Wh	Lithium ion batteries with a Watt-hour rating more than 2.7 Wh, but not more than 100 Wh
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg (net weight of cells/batteries)	No weight limit	No weight limit
Label			
Employee training	Adequate instructions	Adequate instructions	Adequate instructions
Classification	Excepted	Excepted	Excepted



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Lithium ion Cells and Batteries

PI 965, Section I B

Regulated Class 9 Lithium ion Cells/Batteries

Effective Jan. 1, 2013:



- **Similar to packaging requirements found in PI 965, Section II of ICAO TI (2011-2012 Ed.)**
- **Packages now must be offered to airlines as Class 9 dangerous goods**
- **No UN performance packaging**
- **Shipper's declaration for dangerous goods or alternative document is required**
- **Dangerous goods training required for employees**



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Lithium ion Cells and Batteries

PI 965, Section I B
Regulated Class 9 Lithium ion Cells/Batteries
 Effective Jan. 1, 2013

Lithium ion Watt-hour Rating ≤ 20 Wh – Cell ≤ 100 Wh – Battery <u>> 2 batteries or > 8 cells</u>	
Classification	Regulated Class 9 DG
Package Limits	10 kg gross weight of package (Passenger and cargo aircraft)
Packaging	Strong outer packaging 1.2 M drop test
Labels	 
Markings	UN3480, Lithium ion batteries
Shipping papers	Shipper's declaration for DG or alternative document
Training	DG training



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Lithium ion Cells and Batteries



**PI 965, Section I B, Shipping Papers
Regulated Class 9 Lithium ion Cells/Batteries
Effective Jan. 1, 2013:**

- **Shipper's declaration OR alternative written documentation must be provided by shipper**
- **Where an agreement exists with the operator, the shipper may provide information by electronic data processing (EDP) or electronic data interchange (EDI) techniques**
- **Information below must be shown in following order:**
 - ⑩ **1) the name and address of the shipper and consignee;**
 - ⑩ **2) UN 3480;**
 - ⑩ **3) Lithium ion batteries PI 965 IB; and**
 - ⑩ **4) the number of packages and gross mass of each package.**



Lithium ion Cells and Batteries

PI 965, Section I A
Fully-Regulated Lithium ion Cells/Batteries
 Effective Jan. 1, 2013




ICAO Technical Instructions Lithium ion Batteries (2013-2014)	
Lithium ion Watt-hour Rating > 20 Wh – Cell > 100 Wh – Battery	
Classification	Fully-regulated Class 9 DG
Package Limits	5 kg net weight (Pass.) 35 kg net weight (Cargo)
Packaging	UN performance packaging
Labels	 * Cargo aircraft only label not always required 
Markings	UN3480, Lithium ion batteries
Shipping paper	Shipper's Declaration for DG
Training	DG training



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Lithium Metal Cells and Batteries

PI 968, Section II
Exceptions for Lithium Metal Cells/Batteries
 Effective Jan. 1, 2013

	Lithium metal cells and/or batteries with a Li metal content of not more than 0.3 g	Lithium metal cells with a Li metal content of more than 0.3 g but not more than 1 g	Lithium metal batteries with a Li metal content of more than 0.3 g but not more than 2 g
Maximum number of cells / batteries per package	No limit	8 cells	2 batteries
Maximum net quantity (mass) per package	2.5 kg (net weight of cells/batteries)	No weight limit	No weight limit
Label			
Training	Adequate instructions	Adequate instructions	Adequate instructions
Classification	Excepted	Excepted	Excepted



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Lithium Metal Cells and Batteries

PI 968, Section I B

Regulated Class 9 Lithium Metal Cells/Batteries

Effective Jan. 1, 2013:


- **Similar to existing packaging requirements found in PI 968, Section II of ICAO TI (2011-2012 Ed.)**
- **Packages now must be offered as Class 9 dangerous goods**
- **No UN performance packaging**
- **Shipper's declaration for dangerous goods or alternative document is required**
- **Dangerous goods training required for employees**



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Lithium Metal Cells and Batteries

PI 968, Section I B
Regulated Class 9 Lithium Metal Cells/Batteries
 Effective Jan. 1, 2013

Lithium Metal Content ≤ 1 g – Cell ≤ 2 g – Battery > 2 batteries <u>or</u> > 8 cells	
Classification	Regulated Class 9 DG
Package Limits	2.5 kg gross weight of package (Passenger and cargo aircraft)
Packaging	Strong outer packaging 1.2 M drop test
Labels	
Markings	UN3090, Lithium metal batteries
Shipping papers	Shipper's declaration for DG or alternative document
Training	DG training



Lithium Metal Cells and Batteries

PI 968, Section I B, Shipping Papers

Regulated Class 9 Lithium Metal Cells/Batteries

Effective Jan. 1, 2013:



- Shipper's declaration OR alternative written documentation must be provided by shipper
- Where an agreement exists with the operator, the shipper may provide information by electronic data processing (EDP) or electronic data interchange (EDI) techniques
- Information below must be shown on shipping paper in following order:
 - ⑩ 1) the name and address of the shipper and consignee;
 - ⑩ 2) UN 3090;
 - ⑩ 3) Lithium ion batteries PI 968 I B; and
 - ⑩ 4) the number of packages and the gross mass of each package.



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Lithium Metal Cells and Batteries

PI 968, Section I A
Fully-Regulated Lithium Metal Cells/Batteries
 Effective Jan. 1, 2013

ICAO Technical Instructions Lithium ion Batteries (2013-2014)	
Lithium Metal Content > 1.0 g – Cell > 2.0 g – Battery	
Classification	Fully-regulated Class 9 DG
Package Limits	2.5 kg net weight (Pass.) 35 kg net weight (Cargo)
Packaging	UN performance packaging
Labels	  * Cargo aircraft only label not always required
Markings	UN3090, Lithium metal batteries
Shipping paper	Shipper's Declaration for DG
Training	DG training



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Lithium Metal Cells and Batteries

Lithium ion Batteries Packed with/Contained
in Equipment (PI 966 & 967)
Lithium Metal Batteries Packed with/Contained
in Equipment (PI 969 & 970)

ICAO Technical Instructions (2013-2014 Edition)	
	Limitation on Number of Cells/Batteries per Outer Package
Packing Instructions 966 and 967	5 kg net quantity of lithium ion cells or batteries.
Packing Instructions 969 and 970	5 kg net quantity of lithium metal cells or batteries



Cargo Safety System

Lithium Batteries are Hazardous Materials

- Hazardous Materials Regulations

- ⑩ The Hazardous Materials Regulations (HMR) regulate Hazmat up to the package level in cargo for aviation. Some segregation provisions are included but are based primarily on the reaction of one chemical coming into contact with another.

- The transport of Hazmat packages is a subset of the transport of cargo in aviation transport systems.

- ⑩ Historically, the distribution of hazmat included in air cargo was estimated to be approximately 5%.

- ⑩ Today it is estimated that cargo, on some routes, in one aircraft can typically include as much as 80% hazmat shipments.



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Cargo Safety Systems

- Aviation systems that are critical to flight safety must include continuous evaluation of operations, equipment, technology and personnel. Recognizing this approach to assess contributing factors such as incidents and accidents, history and operational data is vital to:
 - Developing and deploying systems that contribute to the defense against hazmat fires both on the ground and in flight;
 - This could include:
 - Fire-resistant containers (unit load devices (ULD))
 - Fire containment covers
 - Other suppression agents developed from research and development



Cargo Safety Systems

- Critical safety systems are based on redundancy. Therefore, if the Hazmat system fails, for any reason, the cargo safety mechanism would be the backup to prevent a catastrophic failure.
- As with all safety systems, cargo safety systems would be expected to have subcomponents that would be designed to be independent of each other so a failure would not in itself cause a catastrophic event. Hazmat packaging standards, suppression systems for ULD's, cargo fire suppression are all components of the design for the safe transportation of cargo.
- There is also an opportunity to revise and improve any FAA guidance material and policy to support implementation or use of any systems approach.



Safety Enhancements

- Continue research and development on cargo safety components (lithium battery properties, fire suppression)
- Review recent cargo incidents and accidents resulting from cargo fires.
- Assess feasibility of technologies and feasibility of implementation for cargo related components (i.e. performance standards, ULD capabilities, fire suppression).
- Continue to address the level of risk posed by in-flight fires on cargo airplanes.



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