International lithium battery regulations

The international regulations applicable to air shipments of lithium batteries have changed. Compliance with the new regulations is mandatory effective April 1, 2016.

All shippers are required to understand and comply with the applicable regulations. This guide provides general information about shipments governed by regulations published by the International Air Transport Association (IATA). It is for illustrative purposes only. Please reference the IATA regulations, which may be found online at: http://www.iata.org/lithiumbatteries.

Note: For information about shipping lithium batteries within the U.S., please refer to regulations published by the U.S. Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHMSA), which may be found at: http://phmsa.dot.gov/hazmat.

About lithium batteries

Because lithium batteries are designed to provide high levels of power, the electrical energy in these batteries is significant, meaning that such batteries can sometimes generate a great amount of heat if short circuited. In addition, the chemical contents of these batteries may catch fire if damaged or if improperly designed or assembled. For these reasons, there are safety regulations controlling the shipment of these types of batteries. Shippers must conform to the applicable regulations published by IATA and/or PHMSA.

Shipping lithium batteries by air service

Effective April 1, 2016, both lithium ion and lithium metal batteries shipped without equipment are prohibited on passenger aircraft. These shipments are limited to the countries identified in the UPS Approved Countries List for Section II Lithium Ion or Lithium Metal Batteries, as shown below on the UPS Approved Countries List or by searching “Dangerous Goods Service Areas” on www.ups.com.

Effective July 1, 2015, only pre-approved customers are allowed to ship lithium metal batteries without equipment (UN3090) via UPS® Air services. Learn more about pre-approval: http://www.ups.com/content/us/en/resources/ship/hazardous/responsible/lithium-battery-preapproval.html.

Lithium battery types

There are two major kinds of lithium batteries, both of which contain very high levels of energy:

Lithium ion (Li-ion) batteries are rechargeable.
- Sometimes called “secondary lithium batteries”
- Includes lithium polymer (Li-Po) batteries
- These batteries are often found in common electronic devices such as cell phones and laptops

Lithium metal batteries are generally non-rechargeable.
- Sometimes called “primary lithium batteries”
Shipping lithium batteries by air service (cont.)

While all lithium batteries are classified as hazardous materials (also referred to as dangerous goods), there are exceptions for common small sizes of these batteries that simplify the rules for shipping these items. This document describes the rules for shipping these small lithium batteries. Shipments not fully regulated as Dangerous Goods do not require a UPS Dangerous Goods contract, provided restrictions above are satisfied.

Regulations differ depending upon what type of battery you are shipping (lithium ion or lithium metal) and whether you are shipping batteries packed without equipment, batteries packed with equipment, or batteries contained in equipment. Please see Figure 3 (Page 5) and Figure 4 (Page 6) for additional information.

Note: In recent years, there have been occasional recalls of defective lithium batteries. Never send recalled lithium batteries by air; doing so can be very dangerous and may result in fines or penalties against you, the sender. In addition, UPS does not transport recycled batteries by air. UPS® services that have the potential to travel by air include: UPS Next Day Air®, UPS 2nd Day Air®, UPS 3 Day Select®, UPS Express Critical®, UPS Worldwide Express Plus®, UPS Worldwide Express®, UPS Worldwide Express Freight®, UPS Worldwide Saver®, UPS Worldwide Expedited®, UPS Express® Freight, UPS Air Freight Direct®, UPS Air Freight Consolidated®, UPS Next Day Air® Freight and UPS 2nd Day Air® Freight.

General regulations and FAQs

What do the abbreviations “IATA” and “PHMSA” mean?

IATA is the International Air Transport Association. It is a global trade organization that develops commercial standards and publishes the Dangerous Goods Regulations, containing standards for the transport of dangerous goods by air. IATA’s Dangerous Goods Regulations are based on the International Civil Aviation Organization (ICAO) Technical Instructions for the Safe Transport of Dangerous Goods by Air. ICAO is the UN body with jurisdiction over international aviation issues.

PHMSA is the Pipeline and Hazardous Materials Safety Administration of the U.S. Department of Transportation, which develops regulations for transport of dangerous goods by all modes within the U.S.

What are some ways I can help prevent a short-circuit or activation of lithium batteries in my shipment while in transport?

A major risk of shipping lithium batteries is short-circuit of a battery or inadvertent activation while in transport. All batteries should be packed to eliminate the possibility of a short-circuit or activation (see Figure 1 for an example). Ensure no batteries can come in contact with other batteries, conductive surfaces or metal objects while in transport. IATA regulations require packing cells and batteries in fully enclosed inner packaging made of nonconductive material (e.g., plastic bags) and ensuring that exposed terminals or connectors are protected with nonconductive caps or tape or by other similar means. They also recommend securely cushioning and require packing batteries to prevent shifting during transport or loosening of terminal caps. Do not use envelopes or other soft-sided packs. Please see the IATA website for additional tips and guidance:

http://www.iata.org/lithiumbatteries.
General regulations and FAQs (cont.)

Do quantity limits on cells and batteries apply to the overpacks? For the purposes of the regulation, what is considered the “package”?

An overpack may be used to consolidate several packages that have been properly prepared for shipment, but it is essential to understand that not all lithium battery shipments may be consolidated in an overpack. New regulations effective April 1, 2016 now prohibit placement in an overpack of more than one package containing either lithium ion or lithium metal cells or batteries prepared under Section II of IATA Packing Instructions 965 or 968. For lithium ion or metal batteries that are packed with or contained in equipment, prepared under Section II of IATA Packing Instructions 966, 967, 969 or 970, individual packages that are in compliance with the regulations may be consolidated within an overpack. However, it is required that the individual packages comply with the necessary requirements (such as limitations on the net battery weight or the ability to withstand a 1.2 meter drop test, as applicable). The overpack must be marked with the word “overpack” and labeled with the appropriate lithium battery handling label. See Figure 2 below.

What does the abbreviation “Wh” mean?
“Wh” stands for “watt-hour.” It is a measure used to indicate the energy capacity of a lithium ion cell or battery.

What is the “state of charge” or SOC?
This term refers to the percentage of the electrical stored capacity in a rechargeable cell or battery (e.g., lithium ion cells or batteries) that is available for use. A fully charged lithium ion battery has a 100% state of charge (SOC). Research has demonstrated that for lithium ion batteries, reduced SOC may provide an additional level of safety during transport and reduce the likelihood of a thermal event. Effective April 1, 2016, all lithium ion batteries shipped by air without equipment must not exceed 30% SOC.

What is a “button battery”?
A button battery is a small round battery where the height is less than the diameter also commonly referred to as “coin batteries.” Examples can be found in watches, calculators, electronic clocks, toys and other applications.

What is a “cell” versus a “battery” under this regulation?
• A battery is two or more cells electrically connected together by permanent means, including case, terminals and markings. 
  **Note:** “Battery packs,” “modules” or “battery assemblies” are treated as batteries under this regulation.
• A cell is a single encased electrochemical unit. It has one positive and one negative electrode that exhibit a voltage differential across its two terminals.1
  **Note:** Many cells can be termed “battery” or “single-cell battery” in common conversation, but under this regulation a single cell must use the requirements related to “cells” only. Examples of a “cell” would be a CR123 primary lithium cell used for cameras and flashlights.

Required labels and markings

Requirements for the use of the labels and markings described on this page vary depending upon the type of battery being shipped (lithium ion or lithium metal) and how the batteries are packed (without equipment, with equipment, or contained in equipment).

See pages 5 and 6 for how and when these labels and markings must be used for air shipments, as required by international regulations.

Required documentation

Many shipments must be accompanied by documentation (which may be affixed to a UPS® package in a document pouch) that must state the following:

- The package must be handled with care because a fire hazard exists if it is damaged
- Special procedures are to be followed if the package is damaged, to include inspection and repacking if necessary
- A telephone number for additional information

Distinctive handling label (Lithium Ion Batteries)

This label must be at least 110 mm × 120 mm and be on the outside of a package containing lithium ion batteries. For smaller packages that can only bear smaller labels, the label dimensions may be 105 mm wide × 74 mm high.

Cargo Aircraft Only label

If you plan to ship either lithium ion or lithium metal batteries packed without equipment by air, the package must display the Cargo Aircraft Only label shown below. Refer to page 1 to learn more about service restrictions through the Approved Countries List or by searching “Dangerous Goods Service Areas” on ups.com®.

Note: Customers who wish to ship lithium metal batteries without equipment (UN3090) via UPS Air services must obtain pre-approval from UPS Airlines. Learn more at https://www.ups.com/content/us/en/resources/ship/hazardous/responsible/lithium-battery-preapproval.html.
Figure 3
Air Shipments of Lithium Ion Batteries

Is my Lithium Ion Battery air shipment fully regulated so that it requires UPS Dangerous Goods service?
(For detailed information about required documentation and labeling noted below, please see Page 4.)

Are any lithium ion batteries in your shipment >100 Wh or lithium-ion cells >20 Wh?

NO

A UPS Dangerous Goods contract will be required.**
UN spec packaging, class 9 label, hazmat shipping papers and package markings are required. Please see IATA regulations for further details:
http://www.iata.org/lithiumbatteries

YES

Are you shipping lithium batteries contained in equipment or packed with equipment?

NO***

A UPS Dangerous Goods contract will be required.** Please see IATA regulations for UN3481 Section I shipping requirements:
http://www.iata.org/lithiumbatteries

YES

Is the combined net weight of all lithium batteries in your package >5 kg?

NO

Your package does not need to be shipped as UPS Dangerous Goods. Please see IATA regulations for UN3481 Section II requirements:
http://www.iata.org/lithiumbatteries

YES

Does your package contain >8 cells or >2 batteries?

NO

Your package does not need to be shipped as UPS Dangerous Goods. Required: Lithium battery handling label, Cargo Aircraft Only label and lithium battery safety document. However, only one package may be shipped per consignment. Refer to page 1 to learn more about service restrictions through the Approved Countries List or by searching “Dangerous Goods Service Areas” on ups.com.

NO

Does the batteries >2.7 Wh?

YES

Does your package contain >2.5 kg of batteries?

NO

A UPS Dangerous Goods contract will be required.** Please see IATA requirements for UN3480 Section 1B (<10 kg of batteries) or Section 1A (>10 kg):
http://www.iata.org/lithiumbatteries

NO

Your package does not need to be shipped as UPS Dangerous Goods. Required: Lithium battery handling label, Cargo Aircraft Only label and lithium battery safety document. However, only one package may be shipped per consignment. Refer to page 1 to learn more about service restrictions through the Approved Countries List or by searching “Dangerous Goods Service Areas” on ups.com.

*Packaging for all shipments of lithium batteries must be able to withstand a 1.2 meter drop test, and all batteries must be packed to eliminate the possibility of a short-circuit or activation. Do not use envelopes or any other soft-sided packs. Please see pages 2-3 for more information. Service limitations may apply for some shipments of lithium ion batteries. Visit ups.com® for more information.

**Contracts are required for UPS® Small Package and UPS Air Cargo® services but not UPS® Air Freight hazmat shipments; please contact your customer representative for details.

***Lithium ion batteries shipped without equipment are limited to no more than a 30% state of charge.

†For UPS Small Package services, one package per consignment means that a shipper may send no more than one package per day to any one consignee.

© 2012-2016 United Parcel Service of America, Inc. UPS, the UPS brandmark and the color brown are trademarks of United Parcel Service of America, Inc. All rights reserved. 3/16
Figure 4
Air Shipments of Lithium Metal Batteries

Is my Lithium Metal Battery air shipment* fully regulated so that it requires UPS® Dangerous Goods service? (For detailed information about required documentation and labeling noted below, please see Page 4.)

Note: Pre-approval is required to ship lithium metal batteries packed without equipment via UPS Air services. Visit ups.com® for additional information.

Are any lithium metal batteries in your shipment >2 g or lithium metal cells >1 g?

YES

NO

A UPS Dangerous Goods contract will be required.**

UN spec packaging, class 9 label, hazmat shipping papers and package markings are required. Please see IATA regulations for further details:

http://www.iata.org/lithiumbatteries

Are you shipping lithium batteries contained in equipment or packed with equipment?

YES

NO

Is the net weight of lithium batteries in your package >5 kg?

YES

NO

Are any of the batteries >0.3 g?

YES

NO

Does your package of lithium batteries contain >8 cells or >2 batteries?

YES

NO

Does your package contain >2.5 kg of batteries?

YES

NO

A UPS Dangerous Goods contract will be required.**

Please see IATA requirements for UN3091 Section II requirements:

http://www.iata.org/lithiumbatteries

Your package does not need to be shipped as UPS Dangerous Goods. Please see IATA requirements for UN3090 Section 1B (≤2.5 kg of batteries) or Section 1A (>2.5 kg):

http://www.iata.org/lithiumbatteries

A UPS Dangerous Goods contract will be required.** Please see IATA requirements for UN3090 Section 1B (>2.5 kg of batteries) or Section 1A (>2.5 kg):

http://www.iata.org/lithiumbatteries

Your package does not need to be shipped as UPS Dangerous Goods. Lithium battery handling label and lithium battery safety document are required for:

(a) All packages of lithium batteries packed with equipment
(b) Any package of equipment containing >4 cells or >2 batteries.

(Exercise containing button batteries, such as a circuit board with an installed button cell, does not require the handling label or safety document.)

A UPS Dangerous Goods contract will be required.** Please see IATA requirements for UN3090 Section 1B (≤2.5 kg of batteries) or Section 1A (>2.5 kg):

http://www.iata.org/lithiumbatteries

Your package does not need to be shipped as UPS Dangerous Goods. Lithium battery handling label, lithium battery safety document, and Cargo Aircraft Only label/markings are required. However, only one package may be shipped per consignment. Refer to page 1 to learn more about service restrictions through the Approved Countries List or by searching “Dangerous Goods Service Areas” on ups.com®.

*Packaging for all shipments of lithium batteries must be able to withstand a 1.2 meter drop test, and all batteries must be packed to eliminate the possibility of a short-circuit or activation. Do not use envelopes or any other soft-sided packs. Please see pages 2-3 for more information. Pre-approval requirements may apply. Visit ups.com to begin the pre-approval process.

**Contracts are required for UPS® Small Package and UPS Air Cargo® services but not UPS® Air Freight hazmat shipments; please contact your customer representative for details.

†For UPS Small Package services, one package per consignment means that a shipper may send no more than one package per day to any one consignee.