

Lithium Battery Shipments

Everything you wanted to know and more...

Compliance with U.S. regulations applicable to shipments of lithium batteries is mandatory effective February 6, 2015. However it has been extended until August 7, 2015 for all modes other than transportation by aircraft to allow additional time to implement the requirements of the rule. The mandatory compliance date of February 6, 2015 remains in effect with respect to offering, acceptance, and transportation by aircraft.

The regulations apply to both air and ground shipments in the U.S. It is important to note that while the U.S. air regulations are generally harmonizing with international air requirements, ground shipments within the U.S. will now be subject to packaging, marking, and other requirements similar to the air requirements.

All shippers are required to understand and comply with the applicable regulations. This general information about shipping to, from or within the U.S. is for demonstrative purposes only. Please reference regulations published by the U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), which may be found online at: <http://hazmat.dot.gov>.

BACKGROUND

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 PHMSA and/or the International Air Transport Association (IATA)

<http://www.iata.org/whatwedo/cargo/dgr/Documents/lithium-battery-guidance-document-2015-en.pdf>

Please know that DOT can and will issue civil penalties when the regulations are violated. It is just as wrong to mark and label a non-regulated package as it is to incorrectly mark and label a regulated package.

Offering for transportation a lithium battery, without shipping papers, package markings, labels, or placards (when required):

a. For air transport	\$40,000.
b. For ground transport	\$20,000.

Or

Marking a package as containing hazardous material when it contains no hazardous material. 172.303(a) \$1,000.

Federal Register - <http://www.gpo.gov/fdsys/pkg/FR-2013-10-02/pdf/2013-23887.pdf>

Warning: Damaged and/or waste cells and batteries are forbidden from transport.

DEFINITIONS

Lithium Metal Cell or Battery: an electrochemical cell or battery utilizing lithium metal or lithium alloys as the anode. The lithium content of a lithium metal or lithium alloy cell or battery is measured when the cell or battery is measured when the cell or battery is in an undischarged state. The lithium content of a lithium metal or lithium alloy battery is the sum of the grams of lithium content contained in the component cells of the battery. Lithium metal cell or battery is usually non-rechargeable, "primary" battery, one-time use. They are used to power watches, calculators, cameras etc.

Lithium Ion Cell or Battery: a rechargeable electrochemical cell or battery in which the positive and negative electrodes are both lithium compounds constructed with no metallic lithium in either electrode. A lithium ion polymer cell or battery that uses lithium ion chemistries, as described herein, is regulated as a lithium ion cell or battery. They are “secondary” batteries, rechargeable. They have one or more cells per battery pack. They are commonly used in consumer electronics such as cell phones and laptops.

Cell: A single encased electrochemical unit with one positive and one negative electrode. DOT considers a one cell battery as a “cell”. Many cells can be termed “battery” or “single cell battery”. Under this new regulation a single cell must use the requirements related to “cells” only. An example of a “cell” would be a CR123 primary lithium cell used for cameras and flashlights.

Battery: Two or more cells which are electrically connected and fitted with devices necessary for use such as a case, terminals, markings and protective devices. “Battery packs,” “modules”, or “battery assemblies” are considered batteries.

Button Cell: A button battery is a small round battery when the height is less than the diameter. It is commonly referred to as “coin battery”.

Wh: The watt-hour rating of the battery. If the Wh is not listed on the cell or battery it should list the Amp-hour (Ah) rating and a Voltage (V). Multiply the Amp-hours times the Voltage to get the Wh rating (i.e. Ah X V = Wh)

Equivalent Lithium Content (ELC): Amount of lithium in the lithium-ion battery. This is calculated in grams on a per-cell basis as 0.3 times the rated capacity of the cell in Amp-hours times the number of cells per pack. (Example: Li-ion cell is rated at 2.2Ah. Applying the conversion factor of 0.3, the cell has 0.66 grams ($2.2 \times 0.3 = .66$) of equivalent lithium content. A battery pack containing 9 of these cells would contain 5.94 grams of equivalent lithium content ($9 \text{ cells} \times .66 = 5.94\text{g ELC}$). So this would equal $2.2 \times 0.3 \times 9 = 5.94$ grams of equivalent lithium content in a 9-cell 2.2Ah pack.

Lithium Content (LC): The amount of lithium in a lithium metal battery is usually stamped or printed on the battery.

REQUIREMENTS

Requirements for the use of the labels and markings vary depending upon the type of battery being shipped (lithium ion or lithium metal); how the batteries are packed (without equipment, with equipment, or contained in equipment); how they are being shipped (air, or ground); how many or weight of the batteries; the equivalent lithium content/lithium content of the batteries or the weight of the entire package.

Therefore, it is very important to know the type of battery your technical equipment uses and/or has installed before it is shipped to CTC for service or to another location.

CTC has contacted the manufacturers of technical equipment to verify the types of batteries used with or in the equipment. CTC has prepared a list of technical equipment that requires these special shipping requirements.

Some technical equipment may require these special shipping requirements. Please note, we say “may” because it all depends on the type of battery installed in the equipment. An example, the equipment can use alkaline or lithium ion batteries so it depends on what the user has installed. Therefore, it is the responsibility of the shipper to know what is being shipped and to properly label and mark the package.

EQUIPMENT WITH “BUTTON ONLY” LITHIUM BATTERIES INSTALLED

Equipment with “Button Only” type lithium batteries installed in the equipment is exempt from the new shipping regulations as long as the following conditions are met:

1. Equipment is not damaged.
2. There are no lithium spare batteries packed with the equipment.
3. Packaged to prevent short circuit.
4. Secured against movement within the outer package.
5. Packed to prevent accidental operation during transport.
6. If shipping by Air: The entire net weight of the lithium batteries cannot exceed 5 kg (11 lbs.)
7. Equipment with the “button only” type lithium batteries and equipment that has no other type of lithium battery can be packaged together. (i.e. a gas measuring, Draeger, CMS (button only) can be packed with a pump, MSA, Escort Elf (no lithium battery) to meet this exemption. However, a CMS (button only) can't be packed with a PAC 7000 (lithium metal) to meet this exemption.)

GENERAL PACKAGING INSTRUCTIONS

Please note the packaging requirements for all equipment:

- (1) Each package offered for transportation must be packaged in a manner to prevent:
 - (i) Short circuits;
 - (ii) Movement within the outer package and
 - (iii) Accidental activation of the equipment
- (2) When lithium cells or batteries are contained in equipment:
 - (i) The outer packaging must be constructed of suitable material of adequate strength and design in relation to the capacity and intended use of the packaging, unless the lithium cells or batteries are afforded equivalent protection by the equipment in which they are contained;
 - (ii) Equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental operation during transport.
 - (iii) Do not include any spare lithium cells or batteries with the equipment.

Note: All equipment will meet the above criteria if packaged in accordance with CTC's shipping procedure. [Procedure for Packing Equipment to CTC](#) .

VENDOR INFORMATION

UPS: http://www.ups.com/media/news/en/us_lithium_battery_regulations.pdf

FedEx: <http://www.fedex.com/id/tools/lithium.html>

Post Office: http://about.usps.com/postal-bulletin/2015/pb22408/html/updt_008.htm

Label Master: <http://www.labelmaster.com/lithium-battery-shipping/>

If you have any questions please feel free to contact Donna Lake, Program Support Manager, 513-684-6855 or lake.donna@dol.gov