

CELL PHONES, LAPTOPS AND KEYCHAIN FLASHLIGHTS, OH MY!



SHIPPING SMALL LITHIUM BATTERIES

In the Wizard of Oz, Dorothy, the scarecrow and the tin man were afraid of lions, tigers and bears, but what scares me is when my customers ship cell phones, laptops and keychain flashlights that are powered by lithium batteries. Lithium is used in batteries, torpedoes, thermonuclear weapons and even prescriptions to treat and prevent manic episodes of bipolar disorder. That's right, lithium salts have been used since the early 1970s when they were approved for use in the correction of imbalances of the brain. But I would not suggest you pop a lithium button battery to self-medicate, because even the small button cell lithium batteries (in keychain flashlights) can cause life-changing health consequences. The damage is not necessarily or always from the small amount of the toxic lithium, but from the formation of sodium hydroxide from the electrical charge, which has been documented to dissolve, among other things, the tissue of the esophagus.



However, when most of you think of lithium, you think lithium batteries, or maybe even shipping lithium batteries; which is scary when you consider that when shipped by air, according to the Department of Transportation, ICAO, the International Coordinating Council of Aerospace Industries Association (ICCAIA), Boeing, and other aircraft manufacturers, the "fire suppression capabilities of an aircraft may be exceeded in a situation where heat and flames generated from thermal runaway in a single package of lithium ion batteries spreads to adjacent packages, potentially leading to a catastrophic loss of the aircraft because of a fire that cannot be contained or suppressed."

Are all lithium cells and batteries regulated when shipped by air and ground under the Department of Transportation Hazardous Materials Regulations in 49 CFR? Yes! But not to the same extent. I have

received quite a few questions recently about the Hazardous Materials Shipping Regulations concerning shipments of lithium batteries contained in cell phones, laptop computers and keychain flashlights.

BATTERIES AND CELLS

There are lithium cells and lithium batteries. For example, under ICAO, which most people use when shipping batteries by air, battery means two or more cells which are electronically connected together and fitted with a device necessary for use. A cell, on the other hand, means a single encapsulated electronic chemical unit with one positive and one negative electrode. A single cell lithium battery is considered a cell, not a battery.

ION AND METAL

Lithium cells and batteries can be further broken down into lithium ion batteries and lithium metal batteries. Lithium ion cells or batteries for cell phones and laptops do not contain metallic lithium and can be recharged. Metallic lithium, which is generally nonchargeable, is contained in lithium metal cells or batteries. The latter are often found in the keychain flashlights. Non-rechargeable lithium metal batteries are classified for shipment based on the amount of lithium in each battery. However, rechargeable lithium ion batteries are classified by their watt hour rating or Wh. The watt hours for your battery can be determined if you know what the capacity is in amp meters (Ah) and the battery's normal voltage or (V). The equation to figure out the watt hours is: $Ah \times V = Wh$. Most of the lithium ion batteries used in consumer devices are below 100 Wh. When unsure contact the battery manufacture or their website.

Shipping lithium batteries individually, with or contained in equipment, as fully regulated hazardous materials under DOT is not difficult once this information is acquired. The trouble starts when you try and ship small button cells or lithium batteries contained in equipment like cell phones, laptops and keychain flashlights, under the exceptions in 173.185(c).

The proper shipping names for cell phones and laptops with rechargeable batteries would be UN3481, Lithium ion batteries contained in equipment, 9, and for a keychain flashlight, containing non-rechargeable lithium metal cells would be UN3091, Lithium metal batteries contained in equipment, 9. Both of these names authorize the exceptions in Column 8 of the 172.101 Hazardous Materials Table.

These exceptions in 49 CFR 173.185 of the Hazardous Material Regulations can be used when shipping cell phones and laptop computers that use lithium ion (rechargeable) batteries and keychain flashlights containing small button cells lithium metal batteries (non-rechargeable) contained in equipment, when they meet the conditions in 173.185(c). These shipments are excepted from hazardous material shipping papers, marks, labels, placards, most training requirements in 49 CFR Part 172 Subpart C through H, and all of the UN performance packaging requirements.

AMOUNTS?

What are the size limits for lithium batteries and lithium cells contained in equipment under this exception? For laptops and cell phones, the Watt-hour (Wh) rating may not exceed 20 Wh for a lithium ion cell or 100 Wh for a lithium ion battery. The DOT also requires that each lithium ion battery must be marked with the Watt-hour rating on the outside case since December 31, 2015. For keychain flashlights, the lithium content may not exceed 1 g for a lithium metal cell or 2 g for a lithium metal battery.

CELL PHONES AND LAPTOPS BY GROUND

UN specification containers are not required when shipping lithium ion powered cell phones and laptops by ground, but the packagings are still required to meet general packaging requirements, which means the packages should not fail and the batteries should not short out or activate in normal transportation scenarios, but there is really no hazard communication documentation, marks or labels required. This is as long as each battery is not over 100 Wh and the package contains no more than two lithium batteries installed in each piece of equipment. Make sure that you don't exceed 5 kg net weight of lithium ion batteries contained in the cell phone or laptop, in each package or it will trigger additional marking and documentation requirements under 173.185(c)(1)(ii).

Whereas in the ground mode, if the package contains more than four lithium cells (except for button cell batteries), or more than two lithium batteries, the shipper would be required to include the hazard communication information in 173.185(c)(3)(ii) with the shipping document and the outer packaging would then be required to display the Air Lithium Battery Mark or the following information which is contained in the air mark in 173.185(c)(3)(i).

(1) An indication that the package contains "Lithium metal" and/or "Lithium ion" cells or batteries, as appropriate, or alternatively, the word "batteries" may be used for packages containing cells;

(2) An indication that the package is to be handled with care and that a flammable hazard exists if the package is damaged;

(3) An indication that special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and

(4) A telephone number for additional information.

It's important to remember by ground that this same information, as mentioned above, would be required to accompany the shipment in a separate written document with the shipping paper, if its air handling label, information or any other marking were required to be display under this exception as required in 173.185(c)(3)(ii).

It should also be noted that when shipped by ground, the lithium content of the cell and battery may be increased to 5 g for a lithium metal cell or 25 g for a lithium metal battery and 60 Wh for a lithium ion cell or 300 Wh for a lithium ion battery, but this only be allowed if the outer package were marked: "LITHIUM BATTERIES—FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL (which must be at least 6 mm (0.25 inch) in height) and (except for button cell batteries) the above mentioned hazard communication information under 173.185(c)(3)(ii) were included.

SMALL KEYCHAIN FLASHLIGHT BY GROUND

LITHIUM CELL 1 G OR LESS

Small button lithium metal cell batteries contained in equipment, like a small keychain flashlight, would be virtually free from all of the HMR, except for the packaging requirements when shipping by ground as long as: (1) the lithium content of each cell contained no more than 1 g of lithium in each cell, (2) there were no more than 4 cells in each piece of equipment, (3) the batteries contained in the equipment did not exceed 5 kg net weight, and (4) the gross weight of the package was not over 30 kg.

LITHIUM CELL OVER 1 G

The only time the outer package of a small keychain flashlight powered by lithium metal button cell batteries (non-rechargeable) not more than 1 g each, are required to be marked in the ground mode would be if the net weight of the lithium metal cell batteries exceeded 5 kg. In that case the outer packaging

would be required to be marked with the Cargo Aircraft Only label or the marks specified in 173.185(c)(1)(iii). However, in the case of keychain flashlights, because they contain button cell batteries, this mark does not trigger the Hazard Communication Document in 173.185(c)(3)(i).

CELL PHONES, LAPTOP AND KEYCHAIN FLASHLIGHT TRANSPORT BY AIR

Shipping lithium batteries and cells by ground is one thing, but if you plan to ship a cell phone, a laptop computers or small keychain flashlights, by air, you might have to step it up. Cell phones, laptops and keychain flashlights can also be shipped under this exception by air, but only if they can meet addition requirements; for example, the container must be always be marked with the Air Lithium Battery Mark.

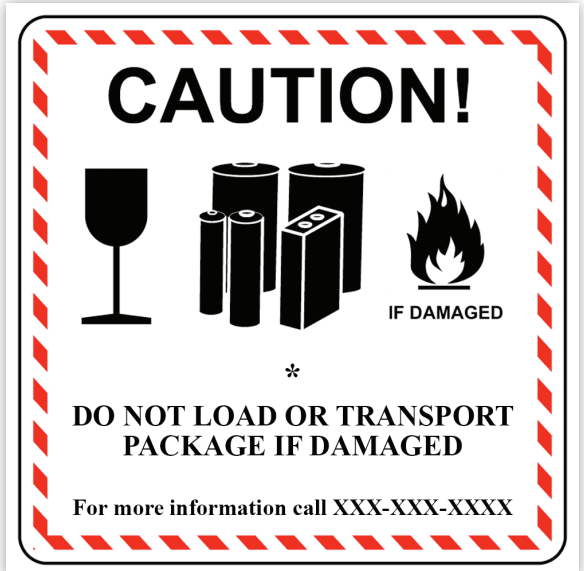
CELLPHONES & LAPTOPS BY AIR

It's true, a cell phone or laptop's lithium ion batteries when contained in equipment can be shipped by air, if under 100 Kw hours, the package does not contain more than 5 kg (net) of batteries, and if no more than 2 batteries were in each container as specified in the chart in 173.185(c)(4). But be aware, even though the shipper's declaration form (the air hazmat shipping paper) would not be required, for a package containing lithium ion batteries contained in a cell phone or laptop, because of the required Air Lithium Battery Container Mark must still be accompanied by the hazard communication document in 173.185(c)(3)(iii) that includes:

- (A) An indication that the package contains "lithium metal" or "lithium ion" cells or batteries, as appropriate;
- (B) An indication that the package is to be handled with care and that a flammable hazard exists if the package is damaged;
- (C) An indication that special procedures must be followed in the event the package is damaged, to include inspection and repacking if necessary; and
- (D) A telephone number for additional information.

KEYCHAIN FLASHLIGHTS BY AIR

When shipping small keychain flashlights containing lithium metal button cell batteries by air, the air lithium battery Mark is required on each container, same as above for cell phones and for laptops containing lithium ion batteries; however, the shipper would not have to include a hazard communication documentation when shipping button cell batteries contained in equipment, because of the exception for button cell batteries in 173.185(c)(3)(i).



The "" must be replaced by the words "Lithium ion battery" and/or as appropriate and the "xxx-xxx-xxxx" must be replaced by a telephone number for additional information"*

Lithium button cell batteries in keychain flashlights by air have no limit as to the number of cells in each package, if each cell contains no more than .3 grams of lithium and as long as the net mass of the batteries in each package does not exceed 2.5 kg. However, if the button cell batteries contain over .3 grams each, but not greater than 1 grams each, the total number of button cell batteries per package could not exceed a total of 8 cells as specified in 173.185(c)(4). The exception would not apply if the cells exceed the amounts in 173.185(c)(4).

CELL OR BATTERY ION OR METAL

Shippers must pay particular attention to whether they are shipping lithium ion or metal and whether it is a cell or a battery. As a general rule, laptops and phones contain lithium ion batteries (rechargeable) which are based on Wh, whereas, keychain flashlight lithium metal button cell (non-rechargeable) is based on the amount of lithium in each cell.

AIR CARRIERS

Even though it is not the shipper's responsibility, for each shipment of packages required to bear the handling marking, the air carrier must include an indication on the air waybill of compliance with 173.185(c)(4) or the applicable ICAO Packing Instruction, when an air waybill is used.

AIR TRAINING

Even though the full training requirements of 172.700 do not apply, the shipper must ensure each person who prepares a package for air receives adequate instruction on these conditions and limitations, commensurate with their responsibilities.

It always makes sense to take an exception when it's available under the HMR. In the long run taking an exception will save your company time and money, The hard part is trying to determine whether your shipment is authorized to take the exception. If the lithium battery shipping regulations are driving you crazy, before you pop a lithium button cell battery, please feel free, to call me or send an email. Thank you for your readership and support.

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