



Lithium Battery Shipping Requirements

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Lithium Battery Overview

- Cause for Concern
 - Lithium batteries are used in many electronic devices such as cameras, cell phones, laptop computers, medical equipment and power tools – They are everywhere!!!
 - Two types – Lithium Metal and Lithium Ion
 - Many of the portable electronics we have now would not exist without energy- dense, lithium-based batteries.
 - Most lithium batteries are safe, but some have overheated and caught fire.



Lithium Battery Overview

- Cause for Concern
 - Batteries are constructed in layers, like a jam sandwich with many pieces of bread.
 - If the layers are punctured and exposed to air, reactions occur causing thermal runaway and fires.
 - Counterfeit and no-brand lithium batteries are a concern because they may not have been safety-tested. These lithium batteries may be poorly designed, have little protection, and/or contain manufacturing flaws.



Lithium Battery Overview

- It is important to verify the batteries planned for shipment have been safety-tested.
- Safety tests for lithium batteries and cells (Refer to the UN Manual of Tests and Criteria- UN/DOT 38.3)
- Batteries that have not passed safety testing, Low-production and prototype batteries have specific requirements for shipping which are detailed in the 49 CFR Part 173.185.
- When shipping lithium batteries, it is not always clear which mode of transport will be used.
 - Regs differ based upon mode of shipping (DOT/ICAO/IATA/IMDG)
 - Shipments may end up on an aircraft and an aircraft's fire suppression system may not be able to extinguish all types of lithium battery fires



Shipping Considerations

- Lithium batteries are regulated based on the rated watt-hours for lithium ion batteries or the weight of the lithium contained in the batteries for lithium metal batteries. This information is usually marked on the battery or documented on a Safety Data Sheet (M/SDS) which can be obtained from your supplier or the battery manufacturer.
- Certain types of battery shipments are prohibited or may require special arrangements including damaged, defective or recalled batteries or batteries for disposal or recycling



Shipping Considerations

Small and medium-sized lithium cells (<60 watt-hours for ion or <5 grams for metal) and batteries (<300 watt-hours for ion or <25 grams for metal) can be shipped as partially regulated in the 48 contiguous states by highway or rail if stricter packaging and marking requirements are met



Small and Medium Size Exceptions

- Cells and batteries must be packaged in accordance with the requirements listed in 49 CFR 173.24, 173.24a and 173.185. UN specification packaging is encouraged but not required.
- The batteries must be placed in inner packaging designed to prevent damage, short circuits and movement within the outer package. The battery terminals are of a particular concern. They should not be able to contact other batteries and/or any other conductive contents or packaging.
- The batteries must be placed in rigid outer packaging. If the shipper chooses to use soft outer packaging, such as a padded envelope with the rigid packaging inside, the outer packaging must be marked as an “**OVERPACK**”. If the battery is contained (installed) in a device, the rigid packaging may not be necessary provided that the device will offer at least the same protection as rigid packaging.



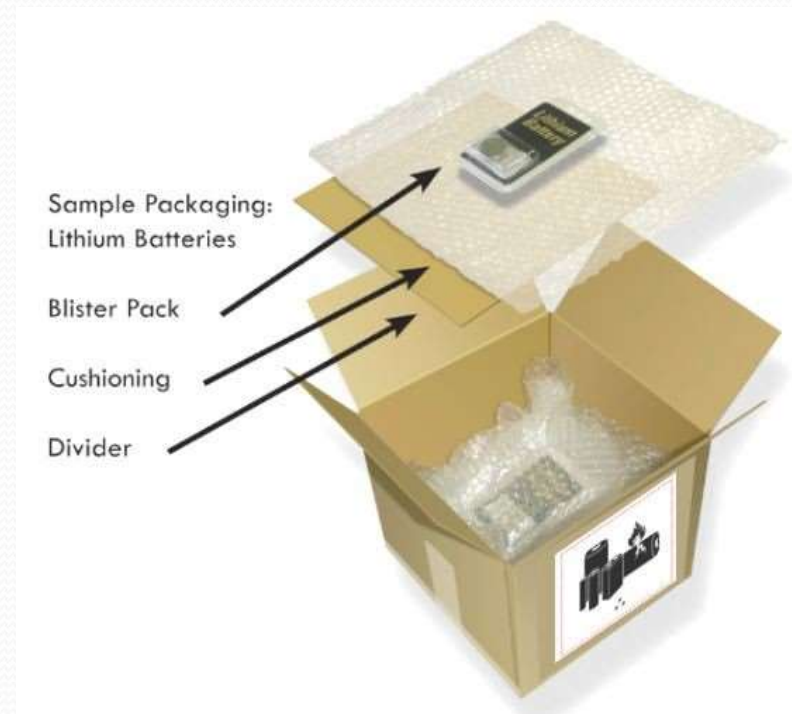
Small and Medium Size Exceptions

- If the battery is contained in a device, there needs to be a positive means to prevent activation of the device during transportation. This may be accomplished by measures such as disconnecting the battery or placing tape over a switch
- The package must not exceed 30 kg (66 lbs.) gross weight. This weight limit does not apply to lithium cells or batteries packed with or contained in equipment.
- Except for a package containing button cell batteries installed in equipment (including circuit boards), or no more than four lithium cells or two lithium batteries installed in a device, the outer package must display a lithium battery handling mark.
- Shipments prepared in accordance with international regulations, such as the IATA/ICAO Dangerous Good Regulations and the IMDG Code are acceptable for ground transport within the US provided that a portion of the trip is by air or water.



Shipping Considerations

- Major risks
 - Short-circuit of the battery as a result of the battery terminals coming into contact with other batteries, metal objects, or conductive surfaces.
 - Puncture or damage to cells - must be packed in a strong rigid outer packaging unless when contained in equipment.





- The handling mark must include the appropriate UN Identification number (see Basic Transport requirements above) as well as a phone number for additional information about the shipment.



- Medium-sized lithium batteries (Lithium Ion: >100 watt hours and <300 Watt hours OR Lithium Metal: >2 grams and <25 grams) must be additionally marked with the following statement:

“LITHIUM BATTERIES FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL.”

**LITHIUM BATTERIES -
FORBIDDEN FOR TRANSPORT
ABOARD AIRCRAFT AND VESSEL**

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Medium Size Requirements

- The following marking below must be placed on packages containing only primary lithium (metal) cells with no more than 1 gram of lithium content and batteries with an aggregate lithium content of no more than 2 grams, that do not exceed the quantity limits (per package) shown in the U.S. regulations: “The marking must be on a background of contrasting color in letters at least 6 mm (0.25 inch) on packages having a gross mass of 30 kg (66 lbs.) or less, except that smaller font may be used as necessary to fit package dimensions



**PRIMARY LITHIUM BATTERIES -
FORBIDDEN FOR TRANSPORT
ABOARD PASSENGER AIRCRAFT**



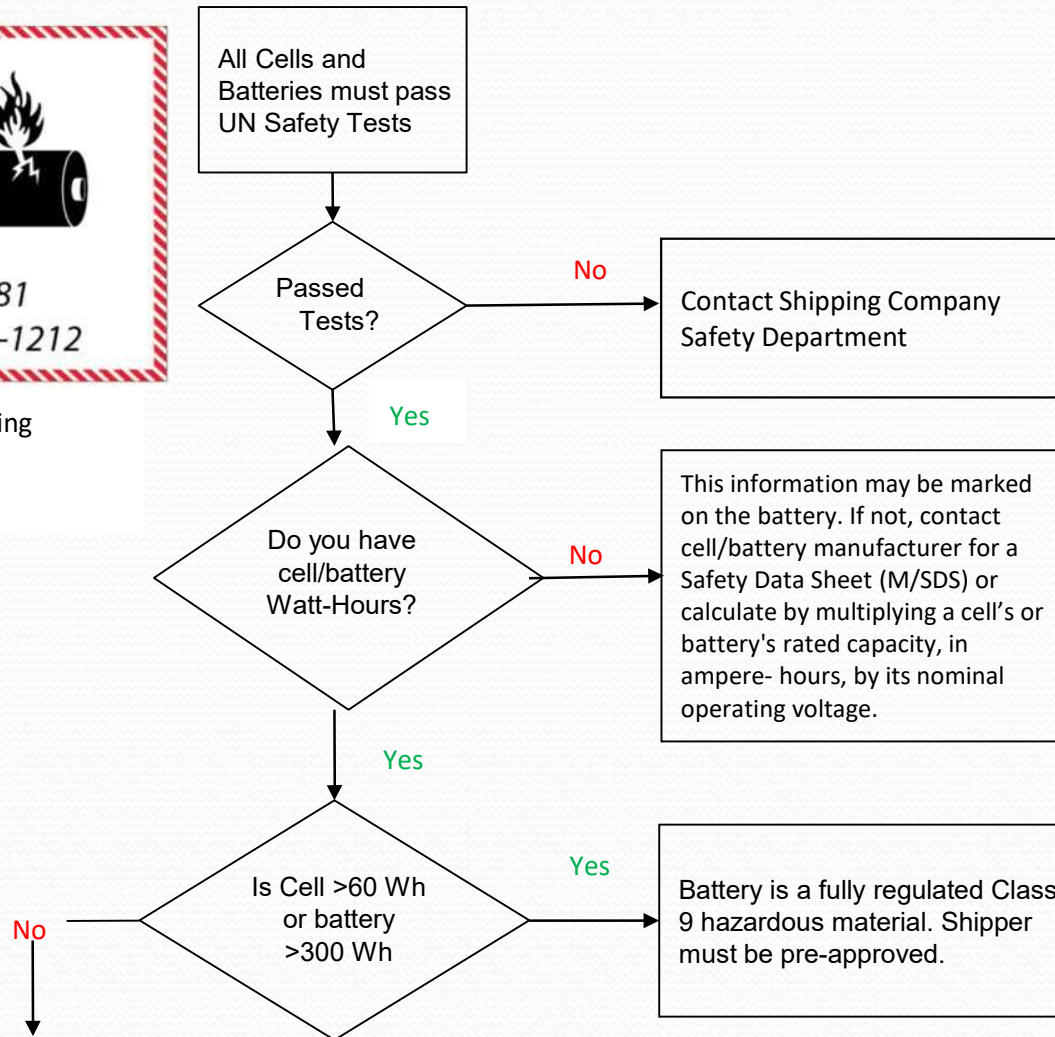
On Imported batteries, the DOT has issued an interpretation letter that permits shippers of lithium batteries to leave the Class 9 miscellaneous label still affixed to the package and still take advantage of the exceptions offered for domestic ground shipping in the 48 contiguous states. This means that the shipper does not need to remove or cover the Class 9 label on the package in order to ship as a partially regulated package (similar to an ORM-D). Therefore, these packages do not need shipping papers, such as a Hazmat Certification [OP-950] or OP-900 Hazmat tags. These packages will not need to be packaged in UN POP (performance oriented packaging), nor are they subject to the hazmat surcharge. The packages must display a battery handling mark to qualify for this exception. The packages are likely to be marked similar to this example when shipped by ground. Note there are no OP-900 tags on this package.



Small and Medium Lithium Ion Batteries: 48 Contiguous State FedEx Ground Shipping Only (July 2018)



Battery handling mark



Battery can be shipped with reduced regulatory requirements:

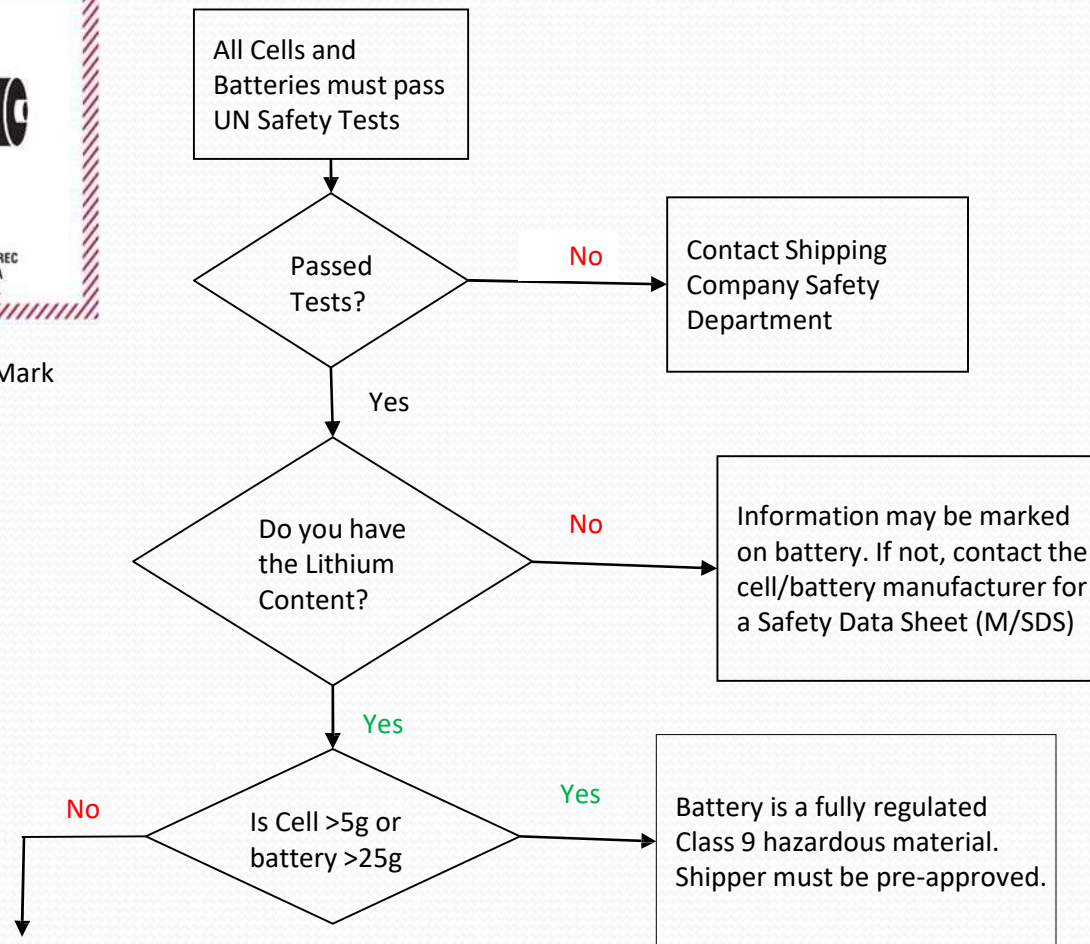
- Batteries must be placed in rigid outer packaging (unless contained in equipment) and inner packaging must be designed to prevent damage to the batteries and short circuits (non-conductive materials) and accidental activation of the device, if applicable.
- Package must not exceed 66lbs. (30Kg) unless packed with or contained in equipment.
- The battery handling mark pictured above must be applied to the package. The shipper must add the appropriate UN Identification Number (See the Safety Data Sheet [M/SDS] and/or contact supplier for this information). A phone number must be listed for information about the package. The number does not necessarily need to be an emergency response number and does not need to be a US domestic phone number. The mark must be fully on one package surface. The mark is not required to be applied when there are four (4) or less cells or two (2) or less batteries when they are contained in equipment. Button cell batteries installed in equipment also do not require the mark.
- If the cell is >20 Wh or the battery is >100 Wh the package must be marked “LITHIUM BATTERIES – FORBIDDEN ABOARD AIRCRAFT AND VESSEL.”



Small and Medium Lithium Metal Batteries: 48 Contiguous State FedEx Ground Shipping Only (July 2018)



Battery Handling Mark





- **Battery can be shipped with reduced regulatory requirements:**

- Batteries must be placed in rigid outer packaging (unless contained in equipment) and inner packaging must be designed to prevent damage to the batteries and short circuits (non-conductive materials) and accidental activation of the device, if applicable.
- Package must not exceed 66lbs. (30Kg) unless packaged with or installed in equipment.
- The battery handling mark pictured above must be applied to the package. The shipper must add the appropriate UN Identification Number (See the Safety Data Sheet [M/SDS] and/or contact their supplier for this information). A phone number must be listed for information about the package. The number does not necessarily need to be an emergency response number and does not need to be a US domestic phone number. The mark must be fully on one package surface. The mark is not required to be applied when there are four (4) or less cells or two (2) or less batteries when they are contained in equipment. Button cell batteries installed in equipment also do not require the mark.
- If the lithium metal cell is >1 gram and <5 grams or the lithium metal battery is >2 grams and <25 grams, the package must be marked “LITHIUM BATTERIES – FORBIDDEN ABOARD AIRCRAFT AND VESSEL.”

The following statement (marking) must be placed on packages containing only primary lithium (metal) cells with no more than 1 gram of lithium content and batteries with an aggregate lithium content of no more than 2 grams, that do not exceed the quantity limits (per package) shown in the U.S. regulations:

“LITHIUM METAL BATTERIES - FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT”. The orange Cargo Aircraft Only label can be used as an alternative (unless package is destined for Alaska or Hawaii).



Major Regulations

IATA - Dangerous Goods Regulations (DGR)

IATA Lithium Battery Shipping Guidelines (8th Ed.)

Addendums I and II – Effective until 12-31-2021

ICAO – Technical Instructions for the Safe Transport of
Dangerous Goods by Air (Doc 9284)

DOT – Hazardous Materials Regulations

49 CFR Parts 171-180

IMDG – Dangerous Goods Code



Recommendations

- When shipping, know your equipment.
 - Battery Type
 - Lithium Ion or Lithium Metal
 - Enclosed or Separate
 - Battery Size -Determines which rules/exemptions apply
- Seek training
 - Lots of good haz mat shipping training out there
 - Both online and in person.
- Contact your shipping company
 - They have resources to help!

