How to safely pack and ship batteries

Although they are very common today in portable electronics, tools and other applications, batteries can be a source of dangerous heat, sparks or fire if they are improperly packaged for shipping. For this reason, UPS® customers must follow the applicable safety regulations and appropriate precautions when preparing batteries for transportation. Battery shipments may be subject to both US and international safety regulations, and because of the potential dangers associated with violations of those regulations, people who do not follow the regulations when packing their shipments could be subject to fines or other penalties.

UPS has assembled this illustrative guide to help you safely pack and ship many kinds of batteries. In some cases, such as with alkaline or certain non-spillable lead-acid batteries, your responsibilities may be limited to simple steps such as: selecting strong outer packaging; carefully protecting battery terminals to prevent sparking or short circuits; and carefully preparing the interior package components to keep tools or other metal objects away from batteries.

Other types of batteries, including lithium ion and lithium metal types, may be fully regulated as hazardous materials (also known as dangerous goods) for transportation, so that in addition to those basic safety precautions they require use of specialized packaging, specific hazard labelling and specific documents certifying compliance with the applicable regulations.

All shippers are required to understand and comply with the applicable regulations and UPS tariffs. This guide provides general information about shipments governed by regulations published by the International Air Transport Association (IATA), http://www.iata.org and the US Department of Transportation’s Pipeline and Hazardous Materials Safety Administration (PHMSA), http://phmsa.dot.gov/hazmat. Additionally, other international regulatory requirements apply, such as the International Maritime Dangerous Goods (IMDG) Code, ADR Dangerous Goods Regulations for European Road Transport or Transport Canada Dangerous Goods Regulations (TDGR).

### Protect batteries and terminals

When shipping almost any battery, you must protect all terminals against short circuits that can result in fires. Protect terminals by completely covering them with an insulating, non-conductive material (e.g. using electrical tape or enclosing each battery separately in a plastic bag), or packing each battery in fully enclosed inner packaging to ensure that exposed terminals are protected.

- Package the batteries to keep them from being crushed or damaged, and to keep them from shifting during handling.
- Always keep metal objects or other materials that can short circuit battery terminals away from the batteries (e.g. using a separate inner box for the batteries).

**Note:** To prevent fire, any device with installed batteries must not turn on while in transport. Protect switches that can be accidentally activated. Even very simple devices like flashlights or rechargeable drills can generate a dangerous amount of heat if accidentally activated.

### Recalled or recycled batteries

*Never* use Air services to ship batteries recalled by the manufacturer for safety reasons, as such shipments are prohibited by regulation (i.e. *IATA Dangerous Goods Regulations, Special Provision A154*). In addition, batteries accumulated for recycling may not be sent via Air services: https://www.ups.com/content/us/en/shipping/time/service/index.html. UPS® Ground service between Alaska, Hawaii or Puerto Rico and the continental US is unavailable for either recalled or recycled batteries, as shipments to or from these points must travel by aircraft for at least one flight segment.

Customers wishing to transport damaged, defective or recalled (DDR) batteries must be pre-approved by UPS. UPS only accepts DDR shipments via Ground Continental US Service in special permit packaging designed to contain a thermal event. Contact your Sales Team for more information.
**Electronic items for repair**

When sending equipment for repairs, such as computers and mobile phones or other battery-operated devices, if there is any risk that the device could overheat, it should be sent **without batteries**.

**Regulatory agencies**

*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*. The ICAO is the United Nations body with jurisdiction over international aviation issues.

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

**Types of batteries**

There are a variety of batteries available today and, while in transport, many are regulated as hazardous materials (also known as dangerous goods) that may only be shipped with UPS by shippers with contracts for hazardous materials/dangerous goods service.

<table>
<thead>
<tr>
<th>ID Number</th>
<th>Proper Shipping Name and Description</th>
<th>Hazard Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN2794</td>
<td>Batteries, Wet, Filled with Acid</td>
<td>8</td>
</tr>
<tr>
<td>UN2795</td>
<td>Batteries, Wet, Filled with Alkali</td>
<td>8</td>
</tr>
<tr>
<td>UN2800</td>
<td>Batteries, Wet, Non-spillable</td>
<td>8</td>
</tr>
<tr>
<td>UN3028</td>
<td>Batteries, Dry, Containing Potassium Hydroxide Solid</td>
<td>8</td>
</tr>
<tr>
<td>UN3090</td>
<td>Lithium Metal Batteries</td>
<td>9</td>
</tr>
<tr>
<td>UN3091</td>
<td>Lithium Metal Batteries Contained in Equipment or Lithium Metal Batteries</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Packed with Equipment</td>
<td></td>
</tr>
<tr>
<td>UN3292</td>
<td>Batteries, Containing Sodium</td>
<td>4.3</td>
</tr>
<tr>
<td>UN3480</td>
<td>Lithium Ion Batteries</td>
<td>9</td>
</tr>
<tr>
<td>UN3481</td>
<td>Lithium Ion Batteries Contained in Equipment or Lithium Ion Batteries</td>
<td>9</td>
</tr>
</tbody>
</table>

Some of the battery types shown above may be shipped under regulatory exceptions that provide relief from the full requirements of the hazardous materials/dangerous goods regulations. In addition, there are some battery types (e.g. conventional dry cell or alkaline batteries in consumer sizes) that are not regulated at all, provided they are adequately protected against short circuits.

While this document is designed to highlight safety practices for UPS customers who pack and ship batteries, it does not replace the applicable regulations. For more information, consult the US DoT’s Hazardous Materials Regulations (49 CFR). You may also consult the US DoT’s online information at [http://phmsa.dot.gov/hazmat](http://phmsa.dot.gov/hazmat), or call the US DoT’s Hazardous Materials Information Centre on + 1 800 467 4922.

International air shipments may additionally be subject to the *Dangerous Goods Regulations of the International Air Transport Association (IATA)*. For more information, see [http://www.iata.org](http://www.iata.org) or check local regulations.
Types of batteries (cont.)

Wet Batteries (UN2794 and UN2795)
These batteries are commonly used in cars, electric wheelchairs, forklifts, some continuous computer power sources and other applications. They contain highly corrosive acid or alkali and can cause fires from short circuits. All terminals must be protected against short circuits, and the batteries packaged and tested according to 49 CFR 173.159 for US shipments, or IATA Section 5, Packing Instruction 870. Note that regardless of service level, small package shipments must use packaging prescribed for air shipment – e.g. the air shipments must include an acid- or alkali-proof liner, or include supplementary packaging with sufficient strength and adequate seals to prevent leakage of electrolyte fluid in the event of spillage (see Figs. 1 and 2). In regard to Figure 2, packages must be packed using a leak-proof liner. A rugged plastic bag resistant to the corrosive electrolyte is one way to create a leak-proof liner. Applicable shipping paper/Declarations for Dangerous Goods requirements must be met.

Non-spillable Batteries (UN2800)
These batteries may not be subject to the Hazardous Materials Regulations if they meet the pressure differential and vibration testing in 49 CFR 173.159, as well as being plainly and durably marked either ‘NON-SPILLABLE’ or ‘NON-SPILLABLE BATTERY’ on the outer packaging (see Fig. 3). Conformance with 49 CFR 173.159a is mandatory and the batteries must be prepared for transport so as to prevent short circuits and the unintentional activation of any devices or equipment in the package.

Shipments of non-spillable acid or alkali batteries prepared under the IATA Dangerous Goods Regulations must be fully declared and conform to the requirements of Packing Instruction 872.

Non-spillable acid or alkali batteries that comply with certain additional testing are not subject to any regulations, provided the terminals are protected against short circuits. These additional requirements, which are stated in 49 CFR 173.159a(d) and in IATA Section 4.4, Special Provision A67, require that the battery contain no free-flowing liquid, and the electrolyte must not flow from a cracked case at 55°C (131°F). The battery and package should be marked ‘NON-SPILLABLE’ or ‘NON-SPILLABLE BATTERY’.
Types of batteries (cont.)

Dry Batteries, Containing Potassium Hydroxide Solid (UN3028)
In the US, these batteries must be prepared according to Special Provision 237 in 49 CFR 172.102, which states that UN3028 materials ‘must be prepared and packaged in accordance with the requirements of 173.159(a) and (c). For transportation by aircraft, the provisions of 173.159(b)(2) are applicable’. International air shipments of these types of batteries must conform to IATA Packing Instruction 871.

Batteries, Containing Sodium (UN3292)
These batteries are not accepted in the UPS package environment.

Dry Batteries, Sealed, NOS (Not Otherwise Specified)
These batteries are typically used for portable power applications, are hermetically sealed and generally use metals (other than lead) and/or carbon as electrodes. They must meet all the requirements set forth in Special Provision 130 in 49 CFR 172.102, which includes prevention of the dangerous evolution of heat from short circuit or damage. Under IATA, Special Provision A123 must be followed, which includes the short circuit protection of exposed terminals and protection against accidental activation of the battery.

Other batteries
Although common dry cells (e.g. AA, C, D batteries) may not be regulated as hazardous materials, all batteries can cause fires from short circuit if batteries and terminals are not protected. Each battery shipment must meet all the requirements set forth in Special Provision 130 in 49 CFR 172.102, which includes prevention of the dangerous evolution of heat from short circuit or damage. Under IATA, Special Provision A123 must be followed, which includes the short circuit protection of exposed terminals and protection against accidental activation of the battery.

Lithium batteries
(UN3090, UN5091, UN3480, UN3481)

Regulatory Changes
Please note that regulations applicable to lithium batteries are dynamic. UPS will update this guidance document as quickly as possible. Lithium battery shippers must stay abreast of changes.

UN38.3 test summary documents must be made available upon request
Manufacturers and subsequent distributors of cells or batteries manufactured after 30 June 2003 must make available the test summary as specified in the UN Manual of Tests and Criteria, Part III, sub-section 38.3, paragraph 38.3.5: 'IATA 3.9.2.6.1(g).

Every shipper of lithium batteries via air transport has the responsibility to comply with IATA 3.9.2.6.1(g) requirements as of 01 January 2020. ADR regulations have incorporated this requirement for ground transport (01 July 2019) and it is expected that other regulation sets will have the same requirement in the near future.

This applies to all shipments of lithium ion and metal batteries whether alone, contained in equipment, packed with equipment or powering a vehicle.

There is no expectation for the shipper/distributor to provide paper copies with each consignment containing lithium batteries. Regulatory guidance documents encourage the use of technology to facilitate availability upon request (such as links to websites).

NOTE: UPS will not mandate a test summary with every shipment but it is the shipper’s responsibility to have that information readily available upon request. Service may be disrupted if the shipper is unable to comply when requested.

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 the PHMSA and/or IATA.

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 by air. UPS accepts such common lithium batteries under those reduced regulations only when the batteries are packed with or contained in equipment (UN3091, UN3481).

For UPS, all air shipments of lithium ion or metal batteries shipped without equipment (UN3090, UN3480) must be fully regulated as dangerous goods, which requires a UPS Dangerous Goods contract.

This document describes the rules for shipping small lithium batteries packed with or contained in equipment for which UPS does not require a UPS Dangerous Goods contract.
Shipping lithium batteries by air service
Regulations differ depending upon what type of lithium battery you are shipping (lithium ion or lithium metal) and whether you are shipping batteries packed with equipment or batteries contained in equipment.

Reminder: UPS does not accept Section II shipments of UN3090 or UN3480 in air services. These shipments must be fully regulated Dangerous Goods shipments, which require a UPS Dangerous Goods contract.

UPS has additional marking requirements for air shipments of UN3481 and UN3091 prepared and marked/labelled in accordance with Section II of the relevant Packing Instruction. Please see IATA Variation 5X-07. Note that this is optional for shipments with both origin and destination within the contiguous 48 US states, excluding Alaska and Hawaii. http://www.iata.org/ 

UPS requires all lithium metal battery air shippers to be approved prior to shipping. This is in addition to a Dangerous Goods contract if required. Please review the requirements for lithium metal battery approval: https://www.ups.com/content/us/en/resources/ship/hazardous/responsible/lithium-battery-preapproval.html

Shipping lithium batteries by ground service
US Only: Additional weight and labelling requirements apply to ground shipments of lithium batteries in the US. The requirements differ depending upon what type of lithium 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. (See pages 7, 9 and 11 for more guidance.)

Non-U.S: Most ground regulations such as ADR and TDGR have exceptions for shipping small lithium batteries. Check with local regulations to ensure compliance with any local or state/provincial variations.

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 mobile phones and laptops

Lithium metal batteries are generally non-rechargeable.
- Sometimes called ‘primary lithium batteries’

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 5 for an example). Ensure that no batteries can come in contact with other batteries, conductive surfaces or metal objects while in transport. Regulations require packing cells and batteries in fully enclosed inner packaging made of non-conductive material (e.g., plastic bags) and ensuring that exposed terminals or connectors are protected with non-conductive caps or tape or by other similar means. They also recommend securely cushioning batteries and packing them 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.

Figure 5
Sample Packaging
Lithium Batteries

Blister Pack
Cushioning
Divider

UPS® Ground service to or from Alaska, Hawaii, Puerto Rico and many small islands also must travel by aircraft for at least one flight segment. Such services may not be used for lithium batteries.
General regulations and FAQs

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. Lithium ion or metal batteries packed with or contained in equipment that are prepared under Section II of IATA Packing Instructions 966, 967, 969 or 970 in 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 marked with the appropriate lithium battery mark. See Figure 6 below.

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.

What is a ‘button battery’?

A button battery is a small round battery where the height is less than the diameter2 also commonly referred to as a ‘coin battery’. Examples can be found in watches, calculators, electronic clocks, toys and other applications.

What hazard labels are required?

For fully regulated shipments, the Class 9 Lithium Battery label is required. Note that the new label is mandatory from 1 January 2019.

Guidance on Shipping Lithium Battery Power Banks

The 2017 IATA Dangerous Goods Regulations and supplemental IATA Lithium Battery Guidance clarify that battery packs, modules or battery assemblies, often known as power banks or portable chargers, are regulated as lithium ion batteries (UN3480). Such shipments are subject to the UPS requirement that, when shipped by air, all lithium ion and metal batteries must be shipped as fully regulated dangerous goods, which requires a UPS Dangerous Goods contract.

Classification questions related to a specific product should be directed to the appropriate national authority in the country from or within which a shipper wishes to send lithium batteries.

Required labels and markings

Requirements for the use of the labels and markings described on the next page vary depending upon the type of battery being shipped (lithium ion or lithium metal) and whether the batteries are packed with equipment or contained in equipment.

See pages 8 and 10 for how and when these labels and markings must be used for air shipments of lithium batteries packed with or contained in equipment, as required by regulations. See pages 9 and 11 for labelling and marking requirements for ground shipments. Remember that air shipments of lithium ion (UN3480) and lithium metal (UN3090) batteries without equipment must be sent as fully regulated dangerous goods when shipped with UPS, which requires a UPS Dangerous Goods contract.

What does ‘equipment’ mean when associated with lithium battery shipments?

Under the regulations, lithium ion or metal batteries may be classed as ‘packed with equipment’ or ‘contained in equipment’ when the batteries accompany or are installed in apparatus for which the lithium batteries will provide electrical power for operation.

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 (amp hours x voltage = watt hours).

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. In accordance with the IATA, all lithium ion batteries (without equipment) shipped by air must not exceed 30% SoC.

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 (amp hours x voltage = watt hours).

Note: ‘Battery packs’, ‘modules’ or ‘battery assemblies’ are treated as batteries under this regulation.

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.

What hazard labels are required?

For fully regulated shipments, the Class 9 Lithium Battery label is required. Note that the new label is mandatory from 1 January 2019.


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How to safely pack and ship batteries
Effective May 2019

**Air Shipments**

Lithium ion batteries packed with equipment:

Additional marking as follows:

– Lithium ion batteries packed with equipment: ‘P.I. 966-II’*

Lithium Ion

![Lithium Ion](image)

May not be used after 31 December 2018

**Place a telephone number for additional information.

Lithium ion batteries contained in equipment:

For lithium ion batteries contained in equipment, the mark need not be used provided (a) the package contains no more than 4 cells or 2 batteries, and (b) the consignment contains no more than two packages of lithium ion batteries contained in equipment.

Additional marking as follows:

– Lithium ion batteries contained in equipment: ‘P.I. 967-II’*

Lithium metal batteries packed with equipment:

Additional marking as follows:

– Lithium metal batteries packed with equipment: ‘P.I. 969-II’*

Lithium Metal

![Lithium Metal](image)

May not be used after 31 December 2018

**Place a telephone number for additional information.

Lithium metal batteries contained in equipment:

For lithium metal batteries contained in equipment, the mark need not be used provided (a) the package contains no more than 4 cells or 2 batteries, and (b) the consignment contains no more than two packages of lithium metal batteries contained in equipment.

Additional marking as follows:

– Lithium metal batteries contained in equipment: ‘P.I. 970-II’*

*Optional when origin and destination are both within the contiguous 48 US states.

**Ground Shipments**

For ground shipments, the markings shown above are common in most countries around the world (see ADR SP 188, TDGR SP 34, or check local regulations). The US additionally requires ground shipments of small lithium batteries to be identified as forbidden on passenger aircraft. The Cargo Aircraft Only label may be used, or either of the following statements, in letters at least 6 mm high:

‘PRIMARY LITHIUM BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT’

– or –

‘LITHIUM METAL BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT’

– or –

‘LITHIUM ION BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT.’

The US also allows unique exceptions on the ground for medium lithium batteries, not recognized in other, international regulations. For lithium ion, medium cells have > 20 Wh but ≤ 60 Wh; and medium batteries have > 100 Wh but ≤ 300 Wh. For lithium metal, medium cells have a lithium content > 1 gram, but ≤ 5 grams; and lithium metal batteries have a lithium content > 2 grams, but ≤ 25 grams. Medium lithium cells/batteries may be shipped by ground as lightly regulated, provided they have the appropriate lithium ion or lithium metal mark (as shown above) and display the following marking:

‘LITHIUM BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL.’

*Note:* Ground service cannot be used for lithium battery shipments to Alaska, Hawaii, Puerto Rico or Avalon, California (US).
Is my Lithium Ion Battery air shipment fully regulated so that it requires UPS Dangerous Goods service?
(For detailed information about required documentation and labelling noted below, please see Page 7.)

**Figure 7**
Air Shipments of Lithium Ion Batteries

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

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

- **NO**
  - **YES**
    - Are you shipping lithium batteries contained in equipment or packed with equipment?
      - **YES**
        - A UPS Dangerous Goods contract will be required:*** Please see IATA requirements for UN3480 Section IB (≤10 kg of batteries) or Section IA (>10 kg). http://www.iata.org/
      - **NO**
        - Is the combined net weight of all lithium batteries in your package >5 kg?
          - **YES**
            - Your package does not need to be shipped as fully regulated Dangerous Goods. Please see IATA regulations for UN3481 Section II requirements. http://www.iata.org/
            - All packages of ‘Lithium ion batteries packed with equipment’* require the UN3481 Lithium battery mark. Also mark package ‘P.I. 966-II.’†
            - For ‘Lithium ion batteries contained in equipment’, display the UN3481 Lithium battery mark for any single package that contains >4 cells or >2 batteries. Also, mark any of these packages ‘P.I. 967-II’.†
            - Note: If there are no more than 4 cells or 2 batteries and no more than 2 packages in a consignment, no markings or labels are required.
          - **NO**
            - A UPS Dangerous Goods contract will be required:** Please see IATA regulations for UN3480 Section IA (≤10 kg of batteries) or Section IB (>10 kg). http://www.iata.org/

- **NO**
  - A UPS Dangerous Goods contract will be required.** Please see IATA regulations for further details on UN3481 Section I shipping requirements. http://www.iata.org/

*Packaging for shipments of lithium batteries ‘packed with equipment’ must be able to withstand a 1.2-metre drop test, and all batteries must be packed to eliminate the possibility of a short-circuit or activation. Do not use envelopes or any soft-sided packs.

**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.

†Optional when origin and destination are both within the contiguous 48 US states.
Is my Lithium Ion Battery ground shipment fully regulated, requiring UPS Dangerous Goods service? (For detailed information about required marking and labelling noted below, please see page 7.)

Note: Ground shipments of lithium batteries must not be sent to any address in Alaska, Hawaii or Puerto Rico, or destinations on islands such as Avalon, CA.

**Figure 8**

**Ground Shipments of Lithium Ion Batteries***

Are lithium ion batteries >100 Wh or lithium-ion cells >20 Wh?

- **YES**
  - Are batteries >100 Wh but ≤300 Wh, or cells >20 Wh but ≤60 Wh?
    - **NO**
    - **YES**
      - Does the package contain lithium ion batteries packed with equipment?
        - **NO**
        - **YES**
          - Is the gross weight of the package >30 kg?
            - **NO**
            - **YES**
              - Is the package contained in equipment?
                - **NO**
                - **YES**
                  - Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

- **NO**
  - Does the package contain lithium ion batteries packed with equipment?
    - **NO**
    - **YES**
      - Is the gross weight of the package >30 kg?
        - **NO**
        - **YES**
          - US Only: Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

US Only: Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

Required: Warning markings stating ‘Lithium Batteries – Forbidden for Transport Aboard Aircraft and Vessel’.

Lithium ion battery mark is required for packages containing >4 cells or >2 batteries.

Not eligible for air service.

A UPS Dangerous Goods contract will be required.** UN spec packaging, Class 9 Lithium Battery label, hazmat shipping papers and package markings are required. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

The lithium ion battery mark is required for packages containing >4 cells or >2 batteries and warning markings stating, ‘Lithium ion batteries – forbidden aboard passenger aircraft.’

May not be eligible for air service. See Figure 7 on page 8.

US Only: Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

Required: Warning markings stating ‘Lithium Batteries – Forbidden for Transport Aboard Aircraft and Vessel’, lithium ion battery mark.

Not eligible for air service.

Fully regulated by ground outside the US.

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*Packaging for shipments of lithium batteries shipped alone or packed with equipment must be able to withstand a 1.2-metre 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 page 5 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.

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Figure 9
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 labelling noted below, please see Page 7.)
Note: Pre-approval is required to ship lithium metal batteries packed without equipment via UPS Air services. Visit ups.com for additional information.

Do any lithium metal batteries in your shipment contain >2 g of lithium metal, or do cells contain >1 g of lithium metal?

- YES
  - A UPS Dangerous Goods contract will be required.**
  - Please see IATA regulations for further details:
    - UN spec packaging, Class 9 Lithium Battery label, hazmat shipping papers or declaration and package markings are required. Please see IATA regulations for further details: [http://www.iata.org/](http://www.iata.org/)

- NO
  - Are you shipping lithium batteries contained in equipment or packed with equipment?

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

- YES
  - A UPS Dangerous Goods contract will be required.**
  - Please see IATA requirements for UN3090 Section IB (≤2.5 kg of batteries) or Section IA (>2.5 kg).
    - [http://www.iata.org/](http://www.iata.org/)
  - All packages of 'Lithium metal batteries packed with equipment'** require the UN3091 Lithium battery mark. Also mark the package 'P.I. 969-II'.
  - For 'Lithium metal batteries contained in equipment', display the UN3091 Lithium battery mark for any single package that contains >4 cells or >2 batteries. Also, mark the package 'P.I. 970-II'.†
  - Note: If there are no more than 4 cells or 2 batteries and no more than 2 packages in a consignment, no markings or labels are required.

- NO
  - Your package does not need to be shipped as fully regulated Dangerous Goods. Please see IATA regulations for UN3091 Section II requirements.
    - [http://www.iata.org/](http://www.iata.org/)

- NO
  - A UPS Dangerous Goods contract will be required.**
  - Please see IATA requirements for UN3090 Section IB (≤2.5 kg of batteries) or Section IA (>2.5 kg).
    - [http://www.iata.org/](http://www.iata.org/)
  - All packages of 'Lithium metal batteries packed with equipment'** require the UN3091 Lithium battery mark. Also mark the package 'P.I. 969-II'.
  - For 'Lithium metal batteries contained in equipment', display the UN3091 Lithium battery mark for any single package that contains >4 cells or >2 batteries. Also, mark the package 'P.I. 970-II'.†
  - Note: If there are no more than 4 cells or 2 batteries and no more than 2 packages in a consignment, no markings or labels are required.

*Packaging for shipments of lithium batteries 'packed with equipment' must be able to withstand a 1.2-metre drop test, and all batteries must be packed to eliminate the possibility of a short-circuit or activation. Do not use envelopes or any soft-sided packs.

**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.

†Optional when origin and destination are both within the contiguous 48 US states.

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Figure 10
Ground Shipments of Lithium Metal Batteries*

Is my Lithium Metal Battery ground shipment fully regulated so that it requires UPS Dangerous Goods service?
(For detailed information about required marking and labelling noted below, please see page 7.)

Note: Ground shipments of lithium batteries must not be sent to any address in Alaska, Hawaii or Puerto Rico, or destinations on islands such as Avalon, CA.

Are lithium metal batteries >2 g Li metal or lithium metal cells >1 g Li metal?

YES

Are batteries >2 g but ≤25 g Li metal, or cells >1 g but ≤5 g Li metal?

NO

Does the package contain lithium metal batteries packed with equipment?

YES

Does the package contain lithium metal batteries contained in equipment?

NO

Is the gross weight of the package >30 kg?

NO

Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

US Only: Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

Required: Warning markings stating ‘Lithium Batteries – Forbidden for Transport Aboard Aircraft and Vessel’.

Lithium metal battery mark is required for packages containing >4 cells or >2 batteries.

Not eligible for air service.

NO

Does the package contain lithium metal batteries packed with equipment?

YES

A UPS Dangerous Goods contract will be required.** UN spec packaging, Class 9 Lithium Battery label, hazmat shipping papers and package markings are required. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

Your package does not need to be shipped as fully regulated Dangerous Goods. Please see local ground regulations for further details about shipping requirements.

‘packed with equipment’

No

Does the package hold >5 kg net weight of lithium metal batteries?

NO

Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.

‘contained in equipment’

NO

Does the package hold >5 kg net weight of lithium metal batteries?

YES

Your package does not need to be shipped as fully regulated Dangerous Goods. Please see local ground regulations for further details about shipping requirements.

Lithium metal battery mark is required for packages containing >4 cells or >2 batteries.

May not be eligible for air service.

See Figure 9 on page 10.

US Only: Your package does not need to be shipped as fully regulated Dangerous Goods. Please see US DoT Hazardous Materials Regulations for further details about shipping requirements.


May not be eligible for air service.

See Figure 9 on page 10.

*Packaging for shipments of lithium batteries shipped alone or packed with equipment must be able to withstand a 1.2-metre 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 page 5 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.

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