

Shipping Excepted Lithium Batteries Compliance Reference



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TECHNOLOGY INC.
Expert Training—Anytime, Anywhere™

SHIPPING EXCEPTED LITHIUM BATTERIES

Compliance Reference

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What Is a Battery?

- Everyday definition:
 - A battery is a device that converts stored chemical energy into usable electrical energy
- Technical definition:
 - A cell is a device that converts chemical energy into usable electrical energy (contains an anode, a cathode, and an electrolyte)
 - A battery is a series of connected cells

[49 CFR 171.8]




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Issues When Shipping Cells and Batteries

All cells and batteries may give off sparks or excessive heat due to short circuits, thus potentially leading to fires

- Lithium cells and batteries have "extra high" energy densities, making it difficult to extinguish these particular fires



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Lithium Cells and Batteries Must Pass UN Tests in Order to Be Shipped

"All" lithium cells and batteries must pass specific standards in the UN Manual of Tests and Criteria before they can be shipped

- Exceptions exist for prototypes, cells and batteries produced from small production runs, and cells and batteries being shipped for disposal or recycling



[49 CFR 173.185(a)(1)]

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Forbidden Shipments

The DOT prohibits offering or transporting electrical devices, such as batteries and battery-powered devices which "are likely to create sparks or generate dangerous amounts of heat, unless packaged in a manner which precludes such an occurrence"



[49 CFR 173.21(c)]

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What You Need to Know

To properly ship lithium cells and batteries, you need to know:

1. The "type" of cell or battery
2. The amount of "energy" in the cell or battery
3. The method of shipment:
 - Separately
 - With equipment
 - In equipment
4. The mode of transport



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Training for Employees Preparing Fully Regulated Packages

Employees who prepare "fully regulated" packages of lithium cells and batteries are subject to the DOT's hazmat training requirements and must receive:

- Function-specific training
- General awareness training
- Security awareness training



May also need safety training and security plan training

[49 CFR 172, Subpart H; IATA DGR 1.5; and IMDG 1.3]

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Training for Employees Preparing Excepted Packages

- Employees who prepare excepted packages of lithium cells and batteries are NOT subject to the DOT's hazmat training requirements
- IATA (air) regulations require "adequate instruction" of employees who prepare packages of excepted lithium cells and batteries for shipment



[IATA DGR 1.6]

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Lithium-Metal vs. Lithium-Ion Cells and Batteries

1. Lithium-metal cells and batteries
 - Primary cells and batteries
 - Contain lithium metal
 - "Non-rechargeable"
2. Lithium-ion cells and batteries
 - Secondary cells and batteries
 - Contain lithium ions
 - "Rechargeable"



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Battery Energy Levels: Fully Regulated vs. Excepted

Shipping requirements for lithium cells and batteries are based on the lithium content or watt-hour rating

- Cells and batteries with "high" lithium contents or watt-hour ratings will be "fully regulated cells and batteries"
- Cells and batteries with lower levels are eligible to be shipped as "excepted cells and batteries"



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Relationship Between Lithium Content or Watt-hour Rating and Shipment Type

Type	Rating	Shipment Method by Mode
Lithium-Metal Cell	≤ 1 g	Excepted by all modes
	> 1 g	Fully regulated by air and vessel
	≤ 5 g	Excepted by ground
Lithium-Metal Battery	> 5 g	Fully regulated by all modes
	≤ 2 g	Excepted by all modes
	> 2 g	Fully regulated by air and vessel
Lithium-Ion Cell	≤ 25 g	Excepted by ground
	> 25 g	Fully regulated by all modes
	≤ 20 Wh	Excepted by all modes
Lithium-Ion Battery	> 20 Wh	Fully regulated by air and vessel
	≤ 60 Wh	Excepted by ground
	> 60 Wh	Fully regulated by all modes
Lithium-Ion Battery	≤ 100 Wh	Excepted by all modes
	> 100 Wh	Fully regulated by air and vessel
	≤ 300 Wh	Excepted by ground
	> 300 Wh	Fully regulated by all modes

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Determining Lithium Content or Watt-hour Rating of a Cell or Battery

To determine the lithium content of a lithium-metal cell or battery:

- Check with the manufacturer
- Refer to the product spec sheet, Safety Data Sheet, etc.



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Determining Lithium Content or Watt-hour Rating of a Cell or Battery

If the watt-hour rating is not marked on the lithium-ion cell or battery, use the following formula (or check other technical data):

$$\text{Watt-hours} = \text{Amp-hours} \times \text{Voltage}$$



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Determining Lithium Content or Watt-hour Rating of a Cell or Battery

- All cells and batteries manufactured after December 31, 2011, must be marked with the rating when shipped by air or vessel
- "Excepted" cells and batteries manufactured after December 31, 2008, must be marked with the rating when shipped by air or vessel
- "Excepted" cells and batteries manufactured after December 31, 2015, must be marked with the rating when shipped by ground



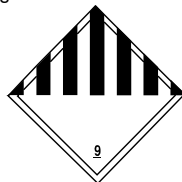
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Hazard Classification of Lithium Cells and Batteries

- Lithium cells and batteries are assigned to Class 9 when shipped by all modes
- Lithium cells and batteries are not assigned to packing groups



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Naming Lithium Batteries for Transport

Lithium-ion cells and batteries have three possible PSNs:

1. Lithium-ion batteries
 - UN 3480
2. Lithium-ion batteries contained in equipment
 - UN 3481
3. Lithium-ion batteries packed with equipment
 - UN 3481



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Naming Lithium Batteries for Transport

Lithium-metal cells and batteries have three possible PSNs:

1. Lithium-metal batteries
 - UN 3090
2. Lithium-metal batteries contained in equipment
 - UN 3091
3. Lithium-metal batteries packed with equipment
 - UN 3091



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Shipping Excepted Lithium Cells and Batteries



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FedEx and UPS Policy

When shipping excepted lithium batteries by air, alone (not in or with equipment), you must ship them as:

- Fully regulated, or
- Under a "partial exception" (Section 1B of the IATA DGR)



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Packaging Requirements for Excepted Lithium Cells and Batteries for All Modes

Excepted lithium cells and batteries shipped along (as well as those shipped with or in equipment) are eligible for relief from most hazmat regulations (including specification packaging) if they meet several requirements



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Packaging Requirements for Excepted Lithium Cells and Batteries for All Modes

Cells and batteries must:

- Pass the required UN tests
- Meet the general packaging requirements of 49 CFR 173, Subpart B
- Be packaged in a way to prevent short circuits, movement within the package, and accidental activation of equipment (when present)



[49 CFR 173.185(c); IATA DGR 5.9, PI 965–970; IMDG 3.3, SP 188]

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Packaging Requirements for Excepted Lithium Cells and Batteries for All Modes

Except when contained in equipment, cells and batteries must be placed in non-metallic inner packagings that completely enclose them and separate them from equipment



[49 CFR 173.185(c); IATA DGR 5.9, PI 965-970; IMDG 3.3, SP 188]

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Packaging Requirements for Excepted Lithium Cells and Batteries for All Modes

Cells and batteries must be packed in strong, rigid outer packagings or be contained in equipment

- When contained in equipment, the equipment must be packed in rigid outer packagings of adequate strength and design, unless the cell or battery is provided with equivalent protection by the equipment



[49 CFR 173.185(c); IATA DGR 5.9, PI 965-970; IMDG 3.3, SP 188]

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Packaging Requirements for Excepted Lithium Cells and Batteries for All Modes

Except when contained in equipment, packages of excepted cells and batteries must be able to withstand a drop test from 1.2 m without:

- Damage to the cells or batteries
- Shifting of the contents resulting in cell-to-cell or battery-to-battery contact
- Release of the contents



[49 CFR 173.185(c); IATA DGR 5.9, PI 965-970; IMDG 3.3, SP 188]

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Additional Requirements for Cells and Batteries Shipped “Separately” by Air

Lithium-ion cells and batteries shipped separately by air must be offered for transport at a state-of-charge (SoC) not exceeding 30% of their rated design capacity



Guidance and methodology for determining the rated capacity can be found in Section 38.3.2.3 of the UN Manual of Tests and Criteria, 6th revised edition



[IATA DGR 5.9, PI 965]

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Quantity Limits for Packages of Excepted Lithium Cells and Batteries Via Ground and Vessel

Unless the cells or batteries are packed with or contained in equipment, the completed package must not exceed 30 kg (66 lbs.) gross weight when shipped by **ground** or **vessel**



[49 CFR 173.185(c) and IMDG 3.3, SP 188]

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Quantity Limits for Excepted Packages Shipped With Equipment by Air

Packages can contain no greater number of lithium cells or batteries than the number needed to power the equipment, plus two spares



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Quantity Limits for Excepted Packages Shipped With or In Equipment by Air

When shipping lithium cells or batteries with or in equipment, the net quantity of cells and batteries in the package cannot exceed 5 kg per package



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Quantity Limits for Packages of Excepted Lithium Cells and Batteries Via Passenger Air

Packages of lithium cells and batteries shipped separately are forbidden from carriage on **passenger aircraft**



[IATA DGR 5.9, PI 965-970]

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Quantity Limits for Packages of Excepted Lithium-Ion Cells and Batteries Via Cargo Air

When shipping excepted lithium-ion cells or batteries separately by **cargo air**, package sizes are restricted to:

- 2.5 kg or less of cells or batteries if the Watt-hour rating is 2.7 Wh or less
- 8 *cells* or less if the Watt-hour rating is above 2.7 Wh but no more than 20 Wh
- 2 *batteries* or less if the Watt-hour rating is above 2.7 Wh but no more than 100 Wh



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Quantity Limits for Packages of Excepted Lithium-Metal Cells and Batteries Via Cargo Air

When shipping excepted lithium-metal cells or batteries separately by **cargo air**, package sizes are restricted to:

- 2.5 kg or less of cells or batteries if the lithium content is 0.3 g or less
- 8 *cells* or less if the lithium content is above 0.3 g but no more than 1 g
- 2 *batteries* if the lithium content is above 0.3 g but no more than 2 g



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Consignment Limits for Excepted Packages of Cells and Batteries Shipped Separately by Air

- Packages containing excepted lithium cells and batteries being shipped separately are limited to **one package per consignment**
- No more than one package may be placed in an overpack
- Packages and overpacks must be offered separately from goods that are not subject to IATA's dangerous goods regulations



[IATA DGR 5.9, PI 965 and 968]

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Marking Requirements for Excepted Lithium Cells and Batteries

- Excepted packages of lithium cells and batteries must be marked with the lithium battery mark
- Packages must be large enough to display the mark without the mark being folded onto more than one side



[49 CFR 173.185(c)(3); IATA DGR 5.9, PI 965–970, Section II; and IMDG 3.3, SP 188]

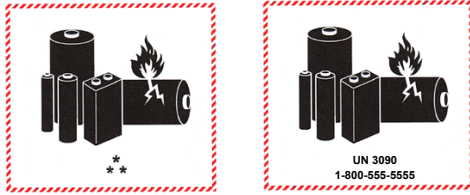
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The Lithium Battery Mark

- The "**" must be replaced with the applicable UN identification number(s)
- The "*****" must be replaced with a phone number for additional information



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Exception for Packages Containing Cells or Batteries Installed in Equipment

The lithium battery mark is not required for:

- Packages containing only button cells installed in equipment
- Consignments of two packages or less, where each package contains no more than four cells or two batteries installed in equipment



[49 CFR 173.185(c)(3)]

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Additional Marking Requirements for Ground "The Expanded Relief"

Packages of lithium cells and batteries shipped by **ground** may contain higher amounts of lithium or have higher Watt-hour ratings and still be shipped as excepted shipments

- Lithium-metal cells may contain ≤ 5 g lithium metal
- Lithium-metal batteries may contain ≤ 25 g lithium metal
- Lithium-ion cells may contain ≤ 60 Wh rating
- Lithium-ion batteries may contain ≤ 300 Wh rating



[49 CFR 173.185(c)(1)(iv)]

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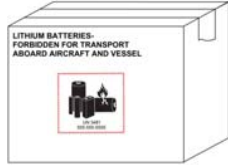
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Additional Marking Requirements for Ground “The Expanded Relief”

To make use of the expanded relief, packages must be marked with the following (in addition to other required markings):

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



[49 CFR 173.185(c)(1)(iv)]

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The “Cargo Aircraft Only” Label for Air Shipments

If a package can only be shipped by cargo aircraft,
must apply the “Cargo Aircraft Only” label to the
package

- For example, lithium batteries shipped separately



[IATA DGR 5.9, PI 965 and 968]

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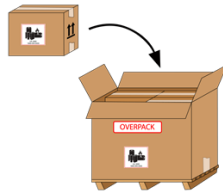
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Requirements for Ground and Air Shipments in Overpacks

If you can't see through the overpack, mark the
outside of the overpack with:

- All required markings and labels from inner packages
- The word “OVERPACK”



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Alternative Labeling Requirements The Lithium Battery Handling Label

Through December 31, 2018, the lithium battery handling label may be used for excepted **ground, air, and vessel** shipments

- The “**” must be replaced with “lithium metal batteries” or “lithium ion batteries” as applicable
 - If both are present, must show “lithium metal and ion batteries”
- The label must indicate a phone number for additional information



[49 CFR 173.85(c); IATA DGR 5.9, PI 965–970; and IMDG 3.3, SP 188]

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Alternative Marking Requirements Specific Text Identifying Hazards

Through December 31, 2018, specific text may be used to identify **ground and vessel** shipments of excepted lithium cells and batteries, as follows:

- The words “lithium metal” or “lithium ion” and the words “cells” or “batteries” as appropriate (e.g., “lithium-metal batteries” or “lithium-ion cells”)
- An indication that package must be handled with care and poses a flammability hazard
- A notice that special procedures should be taken in event of accident
- A telephone number for information



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Alternative Marking Requirements Specific Text Identifying Hazards



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Air Waybill Requirements for Excepted Lithium Cells and Batteries

When an air waybill is used for a shipment of excepted cells or batteries, the following phrase (as appropriate) must be included in the "Nature and Quantity of Goods" box:

- "Lithium ion/metal batteries in compliance with Section II of PI ###"

Must indicate actual packing instruction number

[IATA DGR 5.9, PI 965–970]

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The "Partial Exception" for Lithium Cells and Batteries

If a package of excepted cells or batteries being shipped by air is too large to qualify for the full exception (e.g., it contains too many batteries), the package can still receive "partial exception" from the regulations provided it is no larger than:

- 10 kg net weight for lithium-ion cells and batteries
- 2.5 kg net weight for lithium-metal cells and batteries



Exception only applies to cargo aircraft shipments since lithium cells and batteries shipped separately are forbidden on passenger aircraft

[IATA DGR 5.9, PI 965 and 968, Section IB]

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The "Partial Exception" for Cells and Batteries Packaging Requirements

- Partially excepted packages do not require UN performance tested packaging
- Cells and batteries must be placed in "strong, rigid outer" packagings and all other requirements for packaging excepted cells and batteries to be shipped separately must be met



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The “Partial Exception” for Cells and Batteries Marking and Labeling Requirements

Packages of cells and batteries shipped separately must be marked/labeled with:

- Lithium metal / ion battery
- UN 3090 / UN 3480
- Shipper's and consignee's names and addresses
- Class 9 “generic” label or lithium battery label
- Lithium battery mark or handling label
- “Cargo Aircraft Only” label



May also need to mark package with the net weight of cells/batteries

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The “Partial Exception” for Cells and Batteries Marking and Labeling Requirements



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The “Partial Exception” for Cells and Batteries Shipping Documents

Shipments of partially excepted packages do *require* a Shipper's Declaration

- Fill out the same way as for a fully regulated shipment except add “IB” after packing instruction number

**UN 3480, Lithium-ion batteries, 9
1 fibreboard box × 5.5 kg
965 IB**

[IATA DGR 8.1.6.9.3]

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The "Partial Exception" for Cells and Batteries Training Requirements

Shippers of "partially excepted" packages must receive full dangerous goods training



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Lithium Battery Special Issues



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Lithium Battery Special Issues For Disposal and Recycling

When transported by motor vehicle for disposal or recycling, cells and batteries:

- Do not need to pass UN Tests
- Do not need to be packaged in specification packaging



[49 CFR 173.185(d)]

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Lithium Battery Special Issues For Disposal and Recycling

To receive relief from testing and specification packaging, cells and batteries must be:

- Packaged in strong outer packaging
- Protected against short circuits

All other lithium cell and battery shipping rules apply!



[49 CFR 173.185(d)]

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Lithium Battery Special Issues Damaged / Defective / Recalled Cells and Batteries

Lithium cells and batteries that are damaged or defective may be shipped by highway, rail, or vessel, as long as:

- Each cell or battery is placed in an individual, non-metallic inner packaging that completely encloses it
- The inner packaging is surrounded by cushioning material and absorbent
- Each inner packaging is placed in UN specification packaging meeting the Packing Group I performance level



[49 CFR 173.185(f)]

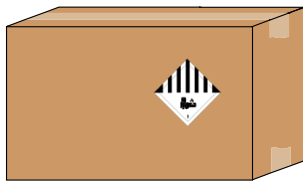
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Lithium Battery Special Issues Damaged / Defective / Recalled Cells and Batteries

In addition to other required markings, the outer package must also be marked "Damaged/defective lithium ion/metal battery," as appropriate



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Additional Issues
Incident and Emergency Reporting

The person "in possession" of the shipment during the cycle of transportation is required to make a written report for ALL cell/battery incidents, including excepted packages


- If a cell/battery-related incident occurs while being shipped by *air*, a telephone report must also be submitted to the National Response Center



[49 CFR 171.15 and 171.16]

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QUESTIONS?




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Thank You for Attending

We hope that you enjoyed the AHMP Conference!

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NOTES

SHIPPING EXCEPTED LITHIUM BATTERIES



OFFERING BATTERIES FOR TRANSPORTATION

General Issues

What Is a Battery?

In everyday terms, a battery is a device that converts stored chemical energy into usable electrical energy.

However, technical sources, including hazardous materials regulations, distinguish between a “cell” and a “battery.”

In technical terms, a cell is a device that converts stored chemical energy into usable electrical energy. A cell is made up of an anode, a cathode, and an electrolyte. A battery, on the other hand, is a series of connected cells. [49 CFR 171.8]

NOTE: The “batteries” that are typically used to power items such as flashlights, cameras, and smoke detectors would be considered “cells” in technical terms. An example of a “battery” based on these terms would be a battery that is used in a laptop computer.

Issues When Shipping Cells and Batteries

When shipped, cells and batteries present several potential dangers. For example, cells and batteries that contain corrosive liquids could spill or leak during transport, damaging equipment and property and injuring people. All cells and batteries have the potential to give off sparks or excessive heat due to short circuits across the terminals. Lithium cells and batteries in particular pose special risks of

causing fires because they have “extra high” energy densities, making it difficult to extinguish the fires that they cause.

All shipping regulations on offering and transporting cells and batteries are intended to prevent these dangers.

Lithium Cells and Batteries Must Pass UN Tests in Order to Be Shipped

With very limited exceptions, all lithium cells and batteries, no matter how they are shipped, must pass specific standards in the UN Manual of Tests and Criteria, Part III, Subsection 38.3. [49 CFR 173.185(a)(1)]

More information on the UN Manual of Tests and Criteria can be found at:

http://www.unece.org/trans/danger/publi/manual/manual_e.html

Lithium Cells and Batteries Must Be Manufactured Correctly [49 CFR 173.185(a)(3)]

Lithium cell and battery manufacturers must meet specific standards when manufacturing fully regulated lithium cells and batteries. Fully regulated lithium cells and batteries must be equipped with mechanisms to prevent:

Notes:

Offering Batteries for Transportation, continued

- Reverse current flow (e.g., diodes, fuses)
- Short circuits
- Violent rupture (e.g., safety venting device)

Forbidden Shipments

In addition to specific regulations for shipping cells and batteries, the “Forbidden Materials” requirements at 49 CFR 173.21(c) absolutely prohibit offering or transporting electrical devices, such as batteries and battery-powered devices that “are likely to create sparks or generate dangerous amounts of heat, unless packaged in a manner which precludes such an occurrence.” In particular, the DOT is especially concerned about sparks and excessive heat in carriage by aircraft.

What this rule means is that, at a minimum, cells and batteries must always be packaged in a way that prevents sparks or heat from being generated during transport (i.e., the terminals must be securely covered or insulated in some way).

What You Need to Know

To properly ship lithium cells and batteries, you need to know the answers to four questions. Based on the answers, the requirements for the shipments will vary.

1. What “types” of lithium cells and batteries are being shipped?
 - Lithium-metal?
 - Lithium-ion?

2. How much “energy” do the cells and batteries contain (i.e., are they “high” energy or “low” energy lithium cells and batteries? This will determine whether the shipment is:
 - Fully regulated, or
 - Excepted.
3. How will the cells and batteries be shipped?
 - Separately (i.e., no equipment)?
 - With equipment?
 - In equipment?
4. By what mode of transport will the cells and batteries be shipped?
 - Ground?
 - Air?
 - Vessel?

Training Requirements for Employees Preparing Packages of Lithium Cells and Batteries for Shipment

Training for Employees Preparing Fully Regulated Packages [49 CFR 172, Subpart H, IATA DGR 1.5, and IMDG 1.3]

Regardless of the mode of transport, employees who prepare “fully regulated” packages of lithium cells and batteries for shipment are subject to the DOT’s complete hazmat training requirements at 49 CFR 172, Subpart H. This means that in addition to “function-specific” training on the require-

Notes:

Offering Batteries for Transportation, continued

ments for lithium cells and batteries shipments, they must also receive general awareness and security awareness training, and depending on their facility and their job functions, they may also need safety training and security plan training.

This training must be documented and certified, and it must be repeated at least once every three years for employees who prepare ground and vessel shipments and at least once every two years for employees who prepare air shipments.

Training for Employees Preparing Excepted Packages**[IATA DGR 1.6]**

Employees who only prepare excepted packages of lithium cells and batteries are excluded from the DOT's hazmat training requirements. Under the IATA regulations, however, employees who prepare packages for shipment by air must receive "adequate instruction" on the requirements for shipping lithium cells and batteries, as appropriate for their responsibilities.

IATA identifies what adequate instruction would be at IATA DGR 1.6. At a minimum, an employer should consider the following as being adequate instruction:

1. Classification of lithium cells and batteries being shipped
2. Documentation of procedures applied to lithium cells and batteries being shipped
3. Written work instructions or other documentation, including automated controls
4. Review and understanding of documented procedures as applicable to job function
5. Instruction records including date(s) for all employees
6. Refresher instructions provided at a minimum every two years or as the documented instructions are revised or regulations are changed
7. Reverse logistics, including transport more and applicable prohibitions

Notes:

CLASSIFYING LITHIUM CELLS AND BATTERIES FOR TRANSPORT

Lithium-Metal vs. Lithium-Ion Cells and Batteries

Lithium cells and batteries can be divided into two basic categories: lithium-metal or lithium-ion. The difference between the two types is based on the “form” of the lithium that they contain.

Lithium-Metal Cells and Batteries (Primary)

A lithium-metal cell or battery, or primary cell or battery, is a cell or battery that has lithium metal or lithium alloys as the anode. Lithium-metal cells and batteries are sometimes referred to as “non-rechargeable” or “disposable” cells and batteries. Lithium-metal cells and batteries are also known as “Li-Metal cells and batteries.”

Lithium-metal batteries typically rank highest in energy density among batteries.

Lithium-Ion Cells and Batteries (Secondary)

A lithium-ion cell or battery, or secondary cell or battery, is a cell or battery that contains lithium ions that move from the negative electrode to the positive electrode during discharge, and back again when charging. The anodes of lithium-ion cells and batteries do not contain any metallic lithium. Lithium-ion cells and batteries are sometimes referred to as “rechargeable” cells and batteries. Lithium-ion cells and batteries are also known as “Li-Ion cells and batteries.”

Lithium-ion cells and batteries have a lower energy density than lithium-metal cells and batteries, but they are still considered “high” energy density cells and batteries and are often preferred over lithium metal.

Battery Energy Levels: Fully Regulated vs. Excepted

The shipping requirements for lithium cells and batteries are based on the lithium content or watt-hour rating of the cell or battery. Cells and batteries with “high” lithium contents or watt-hour ratings will be “fully regulated cells and batteries,” while those with lower levels are eligible to be shipped as “excepted cells and batteries.”

Notes:

Classifying Lithium Cells and Batteries for Transport, continued

Shipping Mode Based on Lithium Content or Watt Hour

Type	***Rating***	Shipping Method by Mode
Lithium Metal Cell	≤ 1 g	Excepted by all modes
	> 1 g	Fully regulated by air and vessel
	≤ 5 g	Excepted by ground
	> 5 g	Fully regulated by all modes
Lithium Metal Battery	≤ 2 g	Excepted by all modes
	> 2 g	Fully regulated by air and vessel
	≤ 25 g	Excepted by ground
	> 25 g	Fully regulated by all modes
Lithium Ion Cell	≤ 20 Wh	Excepted by all modes
	> 20 Wh	Fully regulated by air and vessel
	≤ 60 Wh	Excepted by ground
	> 60 Wh	Fully regulated by all modes
Lithium Ion Battery	≤ 100 Wh	Excepted by all modes
	> 100 Wh	Fully regulated by air and vessel
	≤ 300 Wh	Excepted by ground
	> 300 Wh	Fully regulated by all modes

Determining Lithium Content or Watt-hour Rating of a Cell or Battery

Lithium-Metal Cells and Batteries

To determine the lithium content of a lithium-metal cell or battery, a shipper would need to contact the manufacturer to find out how much lithium is in the cell or battery or refer-

ence a document that shows this information (a product specification sheet, a Safety Data Sheet, etc.).

Lithium-Ion Cells and Batteries

If the watt-hour rating is not marked on the cell or battery, the watt-hours can be calculated using the following formula:

$$\text{Watt-hours (Wh)} = \text{Amp-hours (Ah)} \times \text{Voltage (V)}$$

Notes:

Classifying Lithium Cells and Batteries for Transport, continued

Most lithium-ion cells and batteries, however, will be marked with the watt-hour rating:

- All cells and batteries manufactured after December 31, 2011, must be marked with the rating when shipped by air or vessel.
- Cells and batteries shipped by air or vessel as excepted shipments must be marked with the Watt-hour rating if they were manufactured after December 31, 2008.
- Cells and batteries shipped by ground as excepted shipments must be marked with the Watt-hour rating if they were manufactured after December 31, 2015.

Hazard Classification of Lithium Cells and Batteries

Lithium-ion and lithium-metal cells and batteries are assigned to miscellaneous hazard Class 9 when they are shipped by ground, air, or vessel.

Articles such as lithium cells and batteries are not assigned to packing groups when shipped.

Notes:

NAMING LITHIUM BATTERIES FOR TRANSPORT

Harmonized Proper Shipping Names

NOTE: The words in italics are optional and do not need to be included as part of the Proper Shipping Name.

The DOT, IATA, and IMDG rules all use the same Proper Shipping Names for lithium cell and battery shipments. These names distinguish between lithium-*metal* cells and batteries and lithium-*ion* cells and batteries. There are six possible Proper Shipping Names and four possible identification numbers that can be used when shipping lithium cells and batteries.

PSN	ID #
Lithium-ion batteries <i>including lithium-ion polymer batteries</i>	UN 3480
Lithium-ion batteries contained in equipment <i>including lithium-ion polymer batteries</i>	UN 3481
Lithium-ion batteries packed with equipment <i>including lithium-ion polymer batteries</i>	UN 3481
Lithium-metal batteries <i>including lithium alloy batteries</i>	UN 3090
Lithium-metal batteries contained in equipment <i>including lithium alloy batteries</i>	UN 3091
Lithium-metal batteries packed with equipment <i>including lithium alloy batteries</i>	UN 3091

Notes:

PACKAGING REQUIREMENTS FOR EXCEPTED LITHIUM CELLS AND BATTERIES

**49 CFR 173.185(c); IATA DGR 5.9, PI 965–970, Section II; and
IMDG Code 3.3, SP 188**

Requirements for All Modes

Shipments of excepted lithium cells or batteries (including those shipped in or with equipment) are provided relief from the majority of the hazmat and dangerous goods shipping rules (including specification packaging requirements), provided they:

- Pass the required UN tests.
- Meet all applicable general packaging requirements of 49 CFR 173, Subpart B.
- Are packaged to prevent:
 - Short circuits,
 - Movement within the package, and
 - Accidental operation when shipped in or with equipment.
- Are placed in non-metallic inner packagings that completely enclose them and separate them from equipment or conductive materials (e.g., blister packs), except when contained in equipment.
- Are placed in strong rigid outer packagings or are contained in equipment:
 - When contained in equipment, the equipment must be placed in packagings constructed of suitable materials of adequate strength and design in relation to the packaging's capacity and

intended use, or the cells and batteries must be provided with equivalent protection by the equipment itself.

- Are able to withstand a 1.2 m drop test, except when contained in equipment, without:
 - Damage to the cells or batteries,
 - Shifting of the contents resulting in cell-to-cell or battery-to-battery contact, or
 - Release of the contents.

Additional Requirements for Cells and Batteries Shipped “Separately” by Air

State-of-Charge Limits

Lithium-ion cells and batteries must be offered for transport at a state-of-charge, or SoC, not exceeding 30% of their rated design capacity when shipped separately by air.

NOTE: Guidance and methodology for determining the rated capacity of a lithium-ion battery can be found in Section 38.3.2.3 of the UN Manual of Tests and Criteria, 6th revised edition.

Notes:

Packaging Requirements for Excepted Lithium Cells and Batteries, continued

**Requirements for Cells and Batteries
Shipped with Other Dangerous Goods and in
Overpacks**

Excepted lithium-ion and lithium-metal cells and batteries shipped separately cannot be placed in the same outer packaging with other dangerous goods.

No more than ONE package of excepted lithium-ion or lithium-metal cells and batteries shipped separately may be placed in an overpack. In addition, packages of excepted lithium-ion and lithium-metal cells and batteries shipped separately cannot be placed in an overpack with packages containing dangerous goods classified as:

- Class 1 Explosives (other than Division 1.4S).
- Division 2.1, Flammable gases.
- Class 3, Flammable liquids.
- Division 4.1, Flammable solids.
- Division 5.1, Oxidizers.

NOTE: Packages of excepted lithium-ion and lithium-metal cells and batteries shipped separately are also explicitly prohibited from being placed in an overpack with non-dangerous goods that might react dangerously with the cells or batteries.

<p>Notes:</p>

QUANTITY LIMITS FOR PACKAGES OF EXCEPTED LITHIUM CELLS AND BATTERIES

49 CFR 173.185(c); IATA DGR 5.9, PI 965–970, Section II; and
IMDG Code 3.3, SP 188

Quantity Limits for Packages of Cells and Batteries Shipped by Ground and Vessel

When shipped by ground or vessel, unless the cells or batteries are packed with or contained in equipment, the completed package cannot exceed a gross weight of 30 kg, or 66 lbs.

Quantity Limits for Packages of Cells and Batteries Shipped Separately by Air

Lithium Cells and Batteries Shipped by Passenger Air

Packages of lithium-ion and lithium-metal cells and batteries shipped separately are forbidden from carriage on passenger aircraft.

Lithium-Ion Cells and Batteries Shipped by Cargo Air

When shipping excepted lithium-ion cells or batteries separately, package sizes are restricted as follows:

- Lithium-ion cells and batteries with watt-hour ratings less than or equal to 2.7 Wh:
 - No limit on the number allowed in the

package

- Maximum net quantity of 2.5 kg per package
- Lithium-ion *cells* with watt-hour ratings greater than 2.7 Wh, but less than or equal to 20 Wh:
 - No more than 8 cells per package
- Lithium-ion *batteries* with watt-hour ratings greater than 2.7 Wh, but less than or equal to 100 Wh:
 - No more than 2 batteries per package

Lithium-Metal Cells and Batteries Shipped by Cargo Air

When shipping excepted lithium-metal cells or batteries separately, package sizes are restricted as follows:

- Lithium-metal cells and batteries containing less than or equal to 0.3 g lithium:
 - No limit on the number allowed in the package
 - Maximum net quantity of 2.5 kg per package

Notes:

Quantity Limits for Packages of Excepted Lithium Cells and Batteries, continued

- Lithium-metal *cells* containing greater than 0.3 g lithium, but less than or equal to 1 g lithium:
 - No more than 8 cells per package
- Lithium-metal *batteries* containing greater than 0.3 g lithium, but less than or equal to 2 g lithium:
 - No more than 2 batteries per package

Consignment Limits for Packages of Cells and Batteries Shipped Separately by Air

When shipping excepted lithium cells and batteries separately, the number of packages in the actual consignment is limited to **one package per consignment**. This limit applies to both lithium-ion batteries and lithium-metal batteries

In addition, packages and overpacks containing excepted batteries must be offered to the operator separately from other goods that are not subject to IATA's dangerous goods regulations.

Quantity Limits for Packages of Cells and Batteries Shipped With or In Equipment by Air

When shipping excepted lithium-ion and -metal cells or batteries in or with equipment, package sizes are restricted as follows:

- When lithium cells or batteries are shipped with equipment, the package may contain no more than the minimum number of batteries necessary to power the equipment, plus two spares.
- When lithium cells or batteries are shipped with or in equipment, packages are limited to a maximum net quantity of 5 kg of cells or batteries per package.

Notes:

MARKING REQUIREMENTS FOR EXCEPTED LITHIUM CELLS AND BATTERIES

49 CFR 173.185(c)(3), IATA DGR 5.9, PI 965–970, Section II and
IMDG Code 3.3, SP 188

Excepted packages of lithium cells and batteries must be marked with the lithium battery mark. The package must be large enough to display the mark without the mark being folded onto more than one side.

The Lithium Battery Mark

The lithium battery mark contains both a single asterisk and a double asterisk in the bottom of the mark.

- The single asterisk must be replaced with the applicable UN identification number or numbers for the type or types of cells or batteries being shipped. For example, if you were shipping lithium ion batteries in equipment in the package, you would need to mark “UN 3481” on the package. If more than one type of cell or battery shipment is contained in the package (e.g., batteries with equipment and in equipment) then all applicable UN identification numbers must be used.

NOTE: The UN identification number must be at least 12 mm (0.5 in.) high.

- The double asterisk must be replaced with a phone number that can be called for additional information about the shipment.



NOTE: The size of the marking may be reduced to 105 mm by 74 mm when the package is too small for the larger mark.

Exception for Packages Containing Cells or Batteries Installed in Equipment

The lithium battery mark is not required for:

- Packages containing only button cells installed in equipment.
- Consignments of two packages or less, where each package contains no more than four cells or two batteries installed in equipment.

Notes:

ALTERNATIVE MARKING AND LABELING REQUIREMENTS FOR EXCEPTED LITHIUM CELLS AND BATTERIES

49 CFR 173.185(c), IATA DGR 5.9, PI 965–970, Section II and IMDG Code 3.3, SP 188

Although DOT, IATA, and IMDG rules all “require” the lithium battery mark on packages of excepted cells and batteries, through December 31, 2018, packages of excepted cells and batteries may continue to meet the previous requirements for identifying their contents by using either:

- The lithium battery handling label, or
- Specific text (ground and vessel shipments only).



The Lithium Battery Handling Label

The lithium battery label has an asterisk in the middle of the label, but unlike the lithium battery mark, this asterisk must be replaced with the words “lithium metal batteries” or “lithium ion batteries,” to describe the contents of the package. If both types of batteries are present, then the shipper must write “lithium metal and ion batteries” in the space.

Like the lithium battery mark, the lithium battery label must indicate a phone number that can be called for additional information about the shipment.

Specific Text Identifying Hazards

Specific information may be marked on packages of excepted lithium cells and batteries that are shipped by ground or vessel instead of using the lithium battery mark. The required information must include:

- The words “lithium metal” or “lithium ion” and the words “cells” and/or “batteries” as appropriate (e.g., “lithium-metal batteries” or “lithium-ion cells”).
- An indication that the package must be handled with care and that it poses a flammability hazard.

Notes:

Alternative Marking and Labeling Requirements for Excepted Lithium Cells and Batteries, continued

- A notice that special precautions must be taken if the package is damaged.
- A telephone number for additional information.

NOTE: It is not necessary to specify the particular procedures that must be followed in the event of damage to the package; simply indicate that special procedures will need to be taken. In addition, the telephone number is not considered an “emergency response” telephone number and can simply be the office number of the shipper.

Alternative Exception for Marking and Labeling Ground and Vessel Shipments

In addition to using the “old” marking and labeling requirements to identify packages of excepted lithium batteries, through December 31, 2018, shippers may continue to use the “old” exception to the marking and labeling requirements for ground and vessel shipments. Under these rules, neither the lithium battery mark nor label is required for packages containing equipment installed with:

- Any amount of button cells.
- Four or fewer cells.
- Two or fewer batteries.

Notes:

AIR WAYBILL REQUIREMENTS FOR EXCEPTED LITHIUM CELLS AND BATTERIES

IATA DGR 5.9, PI 965–970, Section II and IATA DGR 8.2

When an air waybill is used for a shipment of excepted cells or batteries, certain information must be included in the “Nature and Quantity of Goods” box, in the following order:

1. The words “Lithium ion batteries” or “Lithium metal batteries,” as appropriate.
2. The words “in compliance with Section II of PI,” followed by the correct packing instruction number that applies to the shipment.
3. If the cells or batteries are being shipped separately, an indication that the shipment is limited to cargo aircraft only.

Batteries Shipped *Alone* (No Equipment Present)

- “Lithium ion batteries in compliance with Section II of PI 965 Cargo Aircraft Only” (or “CAO”)
- “Lithium metal batteries in compliance with Section II of PI 968 Cargo Aircraft Only” (or “CAO”)

Batteries Shipped *With* Equipment

- “Lithium ion batteries in compliance with Section II of PI 966”
- “Lithium metal batteries in compliance with Section II of PI 969”

Batteries Shipped *In* Equipment

- “Lithium ion batteries in compliance with Section II of PI 967”
- “Lithium metal batteries in compliance with Section II of PI 970”

Notes:

THE “PARTIAL EXCEPTION” FOR LITHIUM CELLS AND BATTERIES IATA DGR 5.9, Packing Instructions 965 and 968, Section IB

Packages Too Large for Full Exception

“Excepted lithium cells and batteries” are generally provided with relief from full regulation under the hazmat and dangerous goods regulations when shipped. However, they are subject to quantity limits, particularly when shipped by air.

In most cases, if you ship “excepted lithium cells and batteries” separately by air in quantities above the specified limits (e.g., more than 2 lithium-ion batteries in a package when the watt-hour rating of the batteries is greater than 2.7 Wh), the shipment will be subject to full regulation. However, it is possible to still get some packaging relief from the full regulations when shipping these cells and batteries in quantities over the normal limits, under IATA’s “partial exception” for lithium cells and batteries in Section IB of Packing Instructions 965 and 968.

NOTE: Since both lithium-ion and lithium-metal cells and batteries are forbidden from transport on passenger aircraft, this partial exception only applies to cargo aircraft shipments.

Packaging Requirements

To be able to receive partial relief from IATA’s dangerous goods regulations, “larger” packages of “excepted cells and batteries” cannot exceed a net weight of:

- 10 kg for lithium-ion cells and batteries.
- 2.5 kg for lithium-metal cells and batteries.

If the package is within these size limits, UN performance tested packaging is *not required* as long as all the other requirements for packaging excepted cells and batteries to be shipped separately are met (e.g., the cells and batteries are placed in “strong rigid outer” packagings that are capable of withstanding a drop test of 1.2 meters, they are packaged to prevent short circuits, the cells and batteries are placed in inner packagings that completely enclose them, etc.).

Additional Requirements for Cells and Batteries Shipped With Other Dangerous Goods and in Overpacks

Lithium-ion and lithium-metal cells and batteries cannot be placed in the same outer packaging with dangerous goods classified as:

- Class 1 Explosives (other than Division 1.4S)
- Division 2.1, Flammable gases
- Class 3, Flammable liquids
- Division 4.1, Flammable solids
- Division 5.1, Oxidizers.

In addition, packages of lithium-ion and lithium-metal cells and batteries cannot be placed in an overpack with packages contain-

Notes:

The “Partial Exception” for Lithium Cells and Batteries, continued

ing dangerous goods classified in any of the above hazard classes or divisions.

Marking and Labeling Requirements

Partially excepted lithium cells and batteries shipped separately under this relief must be marked and labeled with all of the following information:

- Lithium-metal/ion battery (as appropriate)
- UN 3090/UN 3480 (as appropriate)
- The shipper’s and consignee’s names and addresses
- A Class 9 label:
 - Currently, either the “generic” Class 9 label or the Lithium Battery Class 9 label may be used.
 - Starting January 1, 2019, the Lithium Battery Class 9 label MUST be used.
- The lithium battery mark or handling label:
 - Currently, either the mark or label may be used.
 - Starting January 1, 2019, the lithium battery mark MUST be used.
- The “Cargo Aircraft Only” label

In addition, the net weight of the lithium cells or batteries in the package must be marked on packages when shipping multiple, non-identical packages.

Shipping Documents

A Shipper’s Declaration is *required* when shipping packages of lithium cells and batteries under the partial exception. The Shipper’s Declaration must be filled out in the same way as for a fully regulated shipment except that “IB” must be added after the packing instruction number. [IATA DGR 8.1.6.9.3]

For example:

UN 3480, Lithium-ion batteries, 9
1 fibreboard box × 5.5 kg
965 IB

UN 3090, Lithium-metal batteries, 9
1 fibreboard box × 2 kg
968 IB

Training Requirements

Unlike “fully excepted” shipments of lithium cells and batteries, “partially excepted” shipments of lithium cells and batteries shipped under Section IB require full dangerous goods training.

Notes:

REQUIREMENTS FOR SHIPPING EXCEPTED BATTERIES

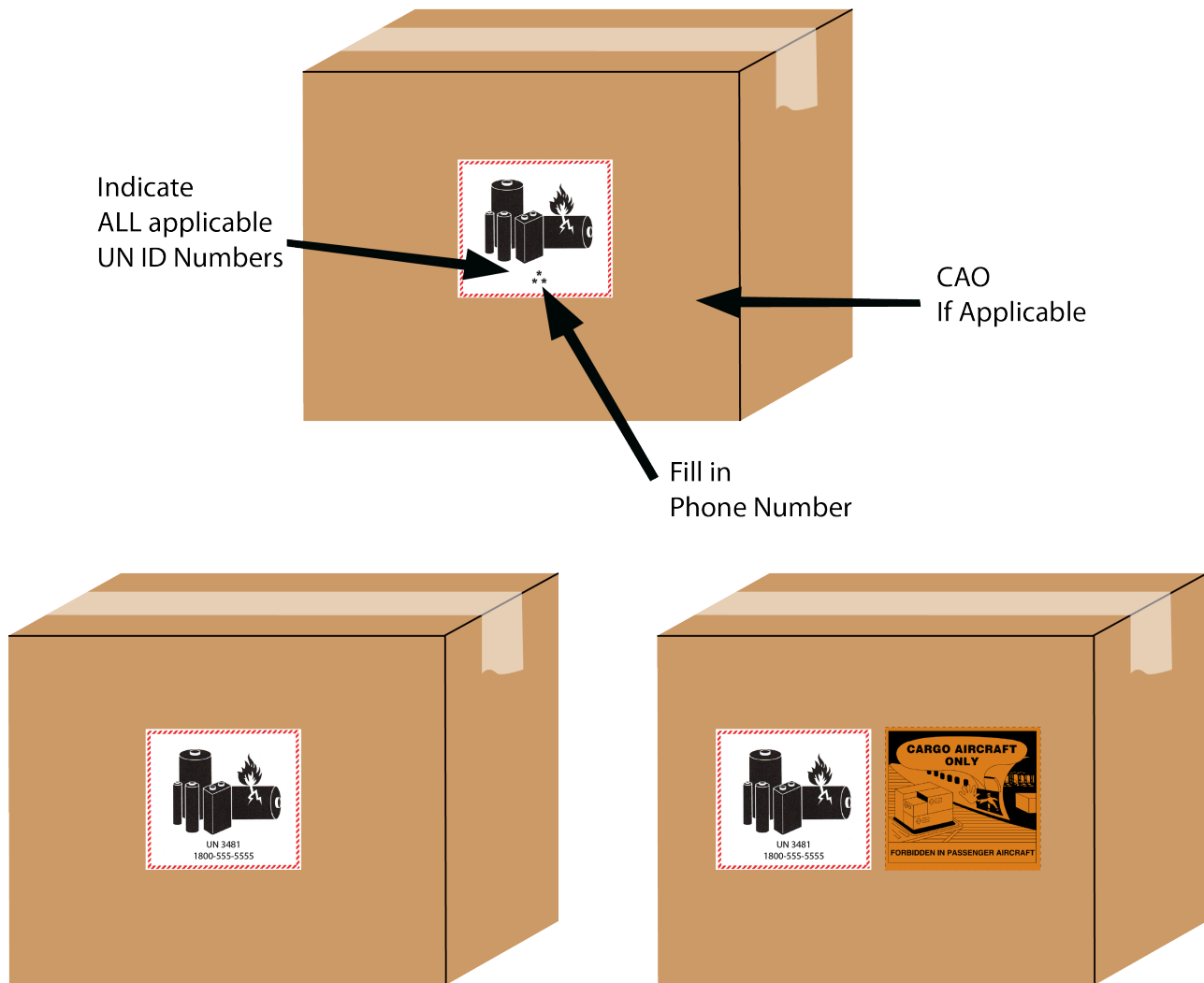
Summary

Shipment Type	Shipped Separately	Packed With Equipment	Contained in Equipment
Proper Shipping Names	"Lithium ion battery" (UN 3480) "Lithium metal battery" (UN 3090)	"Lithium ion battery packed with equipment" (UN 3481) "Lithium metal battery packed with equipment" (UN 3091)	"Lithium ion battery contained in equipment" (UN 3481) "Lithium metal battery contained in equipment" (UN 3091)
Packing Instructions	DOT – 173.185(c) IATA – 5.9 PI 965 and 968 Section IB and II IMDG – 3.3, Special Provision 188	DOT – 173.185(b) IATA – 5.9 PI 966 and 969 Section II IMDG – 3.3, Special Provision 188	DOT – 173.185(b) IATA – 5.9 PI 967 and 970 Section II IMDG – 3.3, Special Provision 188
DOT Special Provisions	A51 and A54	A54 and A101	A54
UN Tests	Must meet safety standards in the UN Manual of Tests and Criteria	Must meet safety standards in the UN Manual of Tests and Criteria	Must meet safety standards in the UN Manual of Tests and Criteria
General Packaging Requirements	Cells and batteries must be packaged in a way to prevent short circuits and movement within the outer package	Cells, batteries, and equipment must be packaged in a way to prevent short circuits, movement within the outer package, and accidental activation of the equipment	Cells, batteries, and equipment must be packaged in a way to prevent short circuits, movement within the outer package, and accidental activation of the equipment
Inner Packagings	Cells and batteries must be placed in non-metallic inner packagings that completely enclose them and separate them from contact with equipment or other conductive materials	Cells and batteries must be placed in non-metallic inner packagings that completely enclose them and separate them from contact with equipment or other conductive materials	Not required
UN Specification Packagings	Not required, however, must use a strong, rigid outer packaging	Not required, however, must use a strong, rigid outer packaging	Not required, however, must be packed in strong, rigid outer packagings of adequate strength and design, unless the cell or battery is provided with an equivalent level of protection by the equipment
Drop Test	Package must be able to withstand a drop test from 1.2 m without damage to the cells or batteries, shifting of the contents to allow battery to battery contact, or any release of contents	Package must be able to withstand a drop test from 1.2 m without damage to the cells or batteries, shifting of the contents to allow battery to battery contact, or any release of contents	Not required
Additional Packaging Requirements	Meet general packaging requirements for compatibility, using good quality packagings, etc. Lithium ion cells and batteries shipped by air must be offered for transport at a state-of-charge (SoC) not exceeding 30% of their rated design capacity	Meet general packaging requirements for compatibility, using good quality packagings, etc.	Meet general packaging requirements for compatibility, using good quality packagings, etc.

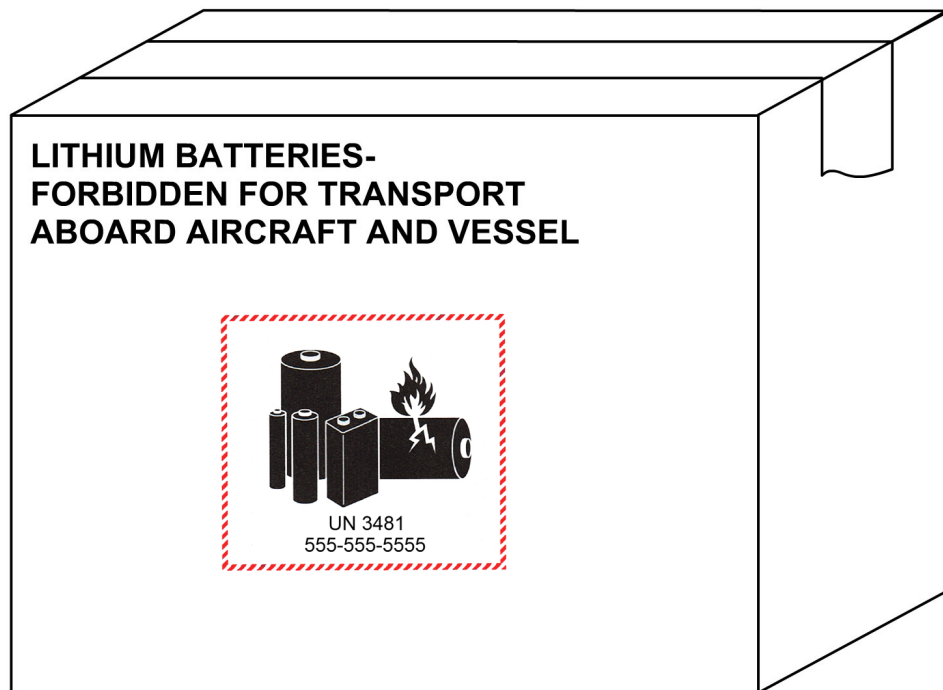
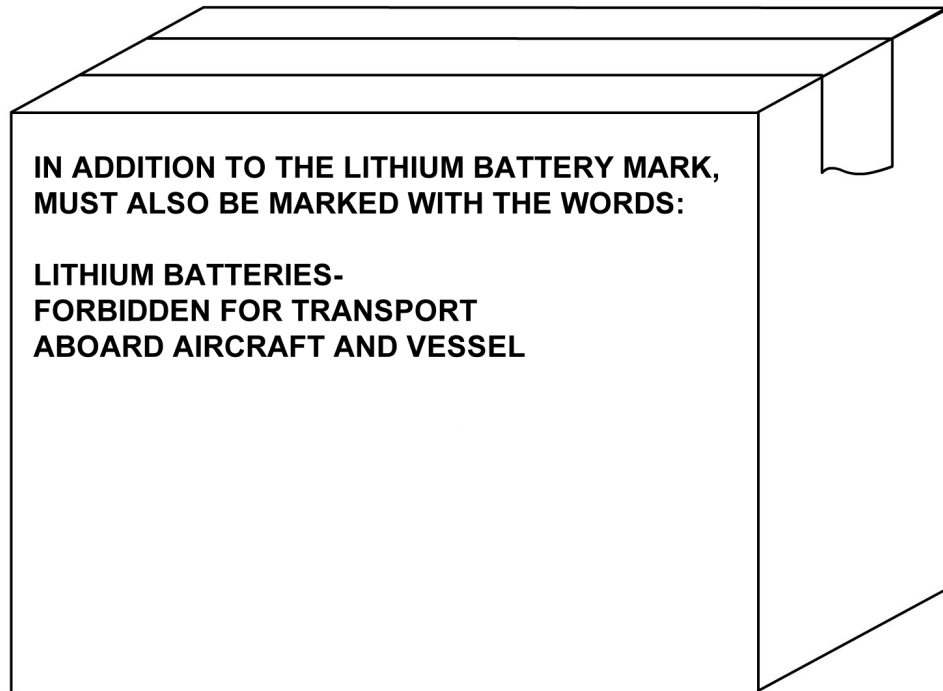
Requirements for Shipping Excepted Batteries, continued

Shipment Type	Shipped Separately	Packed With Equipment	Contained in Equipment
Package Gross Weight Limit for Ground and Vessel Shipments	Package cannot exceed 30 kg (66 lbs.)	No limit on gross weight	No limit on gross weight
Quantity Limits for Lithium Ion Batteries Shipped by Passenger or Cargo Air	<ol style="list-style-type: none"> Cells/batteries ≤ 2.7 Wh <ul style="list-style-type: none"> No limit to number in package Maximum net quantity ≤ 2.5 kg Cells > 2.7 Wh but ≤ 20 Wh <ul style="list-style-type: none"> 8 cells per package Batteries > 2.7 Wh but ≤ 100 Wh <ul style="list-style-type: none"> 2 batteries per package <p>NOTE: These are cargo aircraft limits only. Lithium batteries shipped separately are not permitted on passenger aircraft.</p>	<ul style="list-style-type: none"> Packages can contain no more than minimum number of batteries needed to power equipment plus two spares Packages are limited to a maximum net quantity of 5 kg cells and/or batteries per package 	Packages are limited to a maximum net quantity of 5 kg cells and/or batteries per package
Quantity Limits for Lithium Metal Batteries Shipped by Passenger or Cargo Air	<ol style="list-style-type: none"> Cells/batteries ≤ 0.3 g lithium <ul style="list-style-type: none"> No limit to number in package Maximum net quantity ≤ 2.5 kg Cells > 0.3 g lithium but ≤ 1 g lithium <ul style="list-style-type: none"> 8 cells per package Batteries > 1 g lithium but ≤ 2 g lithium <ul style="list-style-type: none"> 2 batteries per package <p>NOTE: These are cargo aircraft limits only. Lithium batteries shipped separately are not permitted on passenger aircraft.</p>	<ul style="list-style-type: none"> Packages can contain no more than minimum number of batteries needed to power equipment plus two spares Packages are limited to a maximum net quantity of 5 kg cells and/or batteries per package 	Packages are limited to a maximum net quantity of 5 kg cells and/or batteries per package
Package Limits per Consignment for Air Shipments	<ul style="list-style-type: none"> Packages are limited to one package per consignment No more than one package may be placed in an overpack Package and overpacks must be offered separately from goods that are not subject to IATA's dangerous goods regulations <p>NOTE: These are cargo aircraft limits only. Lithium batteries shipped separately are not permitted on passenger aircraft.</p>	No limit	No limit

MARKING AND LABELING REQUIREMENTS FOR EXCEPTED LITHIUM CELLS AND BATTERIES



ADDITIONAL MARKING REQUIREMENT FOR LITHIUM CELLS AND BATTERIES SHIPPED UNDER THE EXPANDED GROUND RELIEF



HAZMAT TRAINING



CORE HAZMAT PROGRAMS

HAZMAT GROUND SHIPPER CERTIFICATION (DOT)

Build the in-depth expertise to certify hazardous materials for transport by highway in the US.

[Online \(HMT 300\)](#) [Workshop \(HMT P30\)](#)

RECURRENT HAZMAT GROUND SHIPPER CERTIFICATION (DOT)

Meet DOT's three-year re-training mandate and get up to speed on new and changing 49 CFR hazmat standards.

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HAZMAT AIR SHIPPER CERTIFICATION (IATA)

Learn the latest IATA *Dangerous Goods Regulations (DGR)* requirements you must know to ship hazmat by airplane.

[Online \(HMT 350\)](#) [Workshop \(HMT P35\)](#) [Webinar \(HMT C35\)](#)

HAZMAT VESSEL SHIPPER CERTIFICATION (IMDG)

Shippers who offer hazardous materials for transport by vessel are subject to different regulations than those who ship only by ground or air.

[Online \(HMT 360\)](#) [Workshop \(HMT P36\)](#) [Webinar \(HMT C36\)](#)

MULTIMODAL HAZMAT SHIPPER CERTIFICATION WORKSHOPS (DOT, IATA, IMDG)

Learn the latest in DOT, IATA, and IMDG shipping regulations for hazmat by ground, air, and vessel.

[Workshop \(HMT P36A\)](#)



SPECIALIZED HAZMAT TRAINING

SHIPPING HAZMAT BY GROUND (DOT) – OPS

DOT hazmat training for operations employees like pickers, packers, and warehouse or administrative staff. Meet DOT requirements at 49 CFR 172.704.

[Online \(HMT 218\)](#)

SHIPPING HAZMAT BY AIR (IATA) – OPS

Covers additional IATA *DGR* rules that operations employees must know to prepare hazmat air shipments.

[Online \(HMT 219\)](#)

SHIPPING HAZMAT BY VESSEL (IMDG) – OPS

Covers additional *IMDG Code* rules that operations employees must know to prepare hazmat vessel shipments.

[Online \(HMT 220\)](#)

SHIPPING LIMITED QUANTITIES AND CONSUMER COMMODITIES

Learn to identify limited quantity hazmat shipments and capitalize on available reliefs.

[Online \(HMT 235\)](#)

HAZMAT GROUND SHIPPER - ADDITIONAL RAIL REQUIREMENTS

Provides function-specific training on the unique rules for offering hazmat shipments for rail transport.

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SHIPPING LITHIUM BATTERIES

Get full hazmat/DG training to ship lithium batteries—big or small, with equipment or standalone—by ground, air, or vessel.

[Online \(HMT 254\)](#) [Workshop \(HMT P54\)](#) [Webinar \(C54A\)](#)

SHIPPING LITHIUM BATTERIES (FUNCTION-SPECIFIC)

Already up-to-date on general hazmat training? Dive right into the specific, unique rules you must know to ship lithium batteries by ground, air, and vessel.

[Webinar \(HMT C54\)](#)

SHIPPING REGULATED MEDICAL WASTE

Hazmat training for hospital staff and healthcare workers who work with shipments of regulated medical waste.

[Online \(HMT 222\)](#)

SHIPPING INFECTIOUS SUBSTANCES WITH DRY ICE

Training for managers or employees at healthcare and research facilities who ship Division 6.2 infectious substances, including the rules for shipping dry ice.

[Online \(HMT 221\)](#)

SHIPPING AUTOMOTIVE AIRBAGS AND OTHER SAFETY DEVICES

This course focuses on the unique hazmat shipping rules for airbags and other automotive safety devices.

[Online \(HMT 256\)](#)



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OSHA TRAINING

CORE OSHA PROGRAMS

10 HOUR OSHA GENERAL INDUSTRY

This course provides OSHA safety training for general industry workers on topics like fall protection, HazCom, PPE, electrical safety, and bloodborne pathogens.

[Online \[OSH 300\]](#)

LITHIUM BATTERY SAFETY

Improper handling of lithium batteries can result in dangerous thermal runaway fires, which can cause serious injury, physical damage, and evacuations.

[Online \[OSH 254\]](#)

MANAGING HAZARD COMMUNICATION

This course covers the elements of OSHA's HazCom Standard at 29 CFR 1910.1200 for managers, including how to develop and oversee a workplace HazCom program.

[Online \[OSH 336\]](#)

FORKLIFT SAFETY

This course covers OSHA's rules for the safe operation and maintenance of powered industrial trucks.

[Online \[OSH 235\]](#)

HAZARD COMMUNICATION

This course guides employees on how to recognize and use workplace hazard labels, read Safety Data Sheets, and other OSHA hazard communications.

[Online \[OSH 200\]](#)

HAZWOPER TRAINING

8 HOUR HAZWOPER REFRESHER— EMERGENCY RESPONSE TECHNICIAN LEVEL III

This course provides 8 hours of HAZWOPER refresher training for Emergency Response Technicians who respond aggressively to a hazardous substance release.

[Online \[OSH 311\]](#)

2 HOUR HAZWOPER EMERGENCY RESPONSE FIRST RESPONDERS AWARENESS LEVEL I

This course provides an awareness-level training for employees who may witness or discover a hazardous substance release.

[Online \[OSH 308\]](#)

8 HOUR HAZWOPER REFRESHER— CONTAMINATED SITE CLEANUP

This course provides 8 hours of HAZWOPER refresher training for covered employees who perform monitoring or cleanup work at "uncontrolled hazardous waste sites," like Superfund sites.

[Online \[OSH 305\]](#)

SPECIALIZED OSHA TRAINING

LOCKOUT/TAGOUT

Informs workers of the hazards associated with unexpected start-up or release of stored energy during equipment maintenance or servicing. Covers critical requirements and procedures detailed in OSHA's Control of Hazardous Energy (Lockout/Tagout) Program.

[Online \[OSH 270\]](#)

PERSONAL PROTECTIVE EQUIPMENT

This one-hour course satisfies OSHA's PPE training requirement for employees by leading them through wearing, care, and maintenance of their equipment.

[Online \[OSH 219\]](#)

MATERIAL HANDLING AND STORAGE

Employees who handle materials must follow safe work practices to avoid injury and overexertion. This course covers safe material handling, storage, and stacking procedures.

[Online \[OSH 130\]](#)

BLOODBORNE PATHOGENS

Students who complete this course will have an understanding of the dangers of bloodborne pathogens, means of transmission, and using personal protective equipment.

[Online \[OSH 265\]](#)

HAZCOM & HAZMAT SAFETY TRAINING

HAZCOM: FLAMMABLES AND COMBUSTIBLES

Provides required OSHA Hazard Communication training and hazmat safety training for employees who work with or around flammable or combustible materials.

[Online \[OSH 202\]](#)

HAZCOM: COMPRESSED GASES

Provides required OSHA Hazard Communication training and hazmat safety training for employees who work with or around compressed gases.

[Online \[OSH 203\]](#)

HAZCOM: CORROSIVES

Provides required OSHA Hazard Communication training and hazmat safety training for employees who work with or around corrosive materials.

[Online \[OSH 204\]](#)

HAZCOM: POISONS/TOXIC SUBSTANCES

Provides required OSHA Hazard Communication training and hazmat safety training for employees who work with or around poisons or toxic substances.

[Online \[OSH 205\]](#)

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RCRA TRAINING



CORE RCRA PROGRAMS

RCRA HAZARDOUS WASTE MANAGEMENT

Satisfy EPA's initial or refresher RCRA training mandate at the expert-led workshops trusted nationwide since 1977.

[Online \(RCRA 300\)](#) [Workshop \(RCRA P30\)](#)

RCRA HAZARDOUS WASTE MANAGEMENT REFRESHER

This RCRA refresher training provides a review of critical RCRA management standards to meet EPA's annual training mandate.

[Online \(RCRA 310\)](#) [Workshop \(RCRA P31\)](#) [Webinar \(RCRA C31\)](#)

RCRA HAZARDOUS WASTE REFRESHER & RECURRENT HAZMAT GROUND SHIPPER (DOT) CERTIFICATION WORKSHOPS

2 days, 2 certificates. Meet RCRA hazardous waste and DOT hazmat ground shipper training requirements. Only in Sparta, NJ!

[Workshop \(RCRA P31A\)](#) Only available at NJ Training Center in Sparta, NJ

ADVANCED RCRA HAZARDOUS WASTE MANAGEMENT

Advanced RCRA training brings together experienced professionals to discover new opportunities to control costs and minimize waste.

[Workshop \(RCRA P40\)](#)

[Workshop \(RCRA P40A\)](#) Attend both RCRA & Advanced workshops

STATE HAZARDOUS WASTE PROGRAMS

NEW YORK HAZARDOUS WASTE MANAGEMENT

Learn NYSDEC's unique rules for managing hazardous waste, universal waste, and PCBs in the Empire State.

[Online \(RCRA 340\)](#) [Workshop \(RCRA P34\)](#)

TEXAS HAZARDOUS & INDUSTRIAL WASTE MANAGEMENT

Master TCEQ's hazardous and industrial waste standards, including STEERS reporting requirements, industrial waste ID, and more.

[Online \(RCRA 370\)](#) [Workshop \(RCRA P37\)](#)

[Workshop \(RCRA P37A\)](#) Attend both RCRA & Texas workshops

[Workshop \(RCRA P37B\)](#) Attend both Advanced & Texas workshops

[Workshop \(RCRA P40B\)](#) Attend RCRA, Advanced, & Texas workshops

CALIFORNIA HAZARDOUS WASTE MANAGEMENT

Learn the unique, stringent rules for managing hazardous waste in California and meet DTSC's annual training mandate.

Online refresher training also available.

[Online \(RCRA 320\)](#) [Workshop \(RCRA P32\)](#) [Refresher \(RCRA 321\)](#)

WASHINGTON DANGEROUS WASTE MANAGEMENT

Washington DOE sets specific requirements you must know to manage hazardous/dangerous waste in the state.

[Online \(RCRA 380\)](#)

SPECIALIZED OSHA TRAINING

LAND DISPOSAL RESTRICTIONS

Build expertise working with the complex RCRA Land Disposal Restrictions (LDRs) to ensure proper, safe disposal of your hazardous waste.

[Online \(RCRA 408\)](#)

STORING HAZARDOUS WASTE - OPS (RCRA)

Meet EPA's initial or annual RCRA training mandate for employees who accumulate, store, or handle hazardous waste, universal waste, or used oil at large or small quantity generator sites.

[Online \(RCRA 230\)](#)

STORING AND SHIPPING HAZARDOUS WASTE - OPS (RCRA & DOT)

This course covers everything that is in RCRA 230 and it provides critical training on DOT hazmat shipping requirements (49 CFR).

[Online \(RCRA 231\)](#)

EPA'S NEW ELECTRONIC MANIFEST SYSTEM

Covers what EPA expects from generators, transporters, and TSDFs, and how to select the best option for your facility.

[Webinar \(MEM 18-001\)](#)

HAZARDOUS WASTE RECYCLING RELIEFS

Master the latest RCRA recycling reliefs to minimize waste, reduce disposal fees, and streamline your hazardous waste management efforts.

[Online \(RCRA 460\)](#)

MANAGING USED OIL

Build your understanding of the RCRA used oil rules at 40 CFR Part 279. Make sure you know what's required—and what's not required—to stay in compliance.

[Online \(RCRA 290\)](#)

UNDERGROUND STORAGE TANKS

The course guides compliance professionals through the design, operation, administrative, financial, and closure requirements for USTs.

[Online \(RCRA 280\)](#)

RCRA FOR VERY SMALL QUANTITY GENERATORS

This course covers hazardous waste requirements for managers and employees at sites that generate ≤ 100 kg of waste per month.

[Online \(RCRA 305\)](#)

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EPA TRAINING

CORE EPA COMPLIANCE PROGRAMS

COMPLETE ENVIRONMENTAL REGULATIONS

Identify your responsibilities under a full range of EPA air, water, and chemical programs that impact your site. Learn the critical requirements for each program, and what you must do to comply.

EPA Regulations Training Highlights:

- Latest EPA Clean Air Act requirements
- CERCLA and EPCRA release reporting
- Big changes to TSCA chemical law
- Clean Water Act and SDWA compliance
- NPDES permits and stormwater rules
- Emergency preparedness and reporting
- Basics of RCRA hazardous waste

Catch the workshop in cities nationwide or train online when you want, where you want.

[Online \(ENV 300\)](#) [Workshop \(ENV P30\)](#)

SPECIALIZED EPA COMPLIANCE TRAINING

CLEAN WATER ACT AND SAFE DRINKING WATER ACT REGULATIONS

This course prepares you to identify and comply with the Clean Water Act and SDWA requirements that impact your site.

[Online \(ENV 306\)](#)

SUPERFUND AND RIGHT-TO-KNOW ACT REGULATIONS (EPCRA/CERCLA)

This training guides you through the EPCRA and CERCLA emergency preparedness and reporting requirements all managers must know.

[Online \(ENV 303\)](#)

TSCA REGULATIONS

Learn the detailed management and reporting rules for handling, storing, processing, and producing chemical substances.

[Online \(ENV 304\)](#)

INTRO TO ENVIRONMENTAL REGULATIONS

This course will help you identify the laws and EPA regulations that apply to your operations.

[Online \(ENV 301\)](#)

CLEAN AIR ACT REGULATIONS

This training walks you through the details and requirements of each Clean Air Act program, preparing you to oversee and maintain site compliance.

[Online \(ENV 302\)](#)



TSCA: CHEMICAL REPORTING & RECORDKEEPING

This training details what you must collect, report, and keep on file to remain in compliance with the latest US EPA TSCA chemical regulations.

[Webinar \(ENV C34\)](#)

REGULATORY LITERACY

This course provides an introduction to Federal regulations in the areas of environmental protection, safety, health, and transportation.

[Online \(EHS 101\)](#)

DEVELOPING AN SPCC PLAN

Learn what you must know to create and certify a fully compliant Spill Prevention, Control, and Countermeasure (SPCC) Plan to prepare for and mitigate oil spills.

[Online \(ENV 420\)](#)

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