

TRANSPORTATION & PACKAGING GUIDELINES GREATBATCH & ELECTROCHEM LITHIUM CELLS AND BATTERIES July 2011

1. Definitions of cell and battery:

A. Cell

A single encased electrochemical unit (one positive and one negative electrode), which exhibits a voltage differential across its two terminals. To the extent the encased electrochemical unit meets the definition of cell; it is a cell, regardless if it is referred to as a battery or single cell battery outside of this procedure (UN definition).

B. Battery

One or more cells which are electrically connected together by a permanent means, including case, terminals, and markings. Units commonly referred to as battery packs are considered batteries for purposes of this procedure (UN definition).

2. United States Department of Transportation (DOT) Regulation

Summary:

- A. All lithium metal and lithium ion cells and batteries are prohibited for transport on passenger aircraft to, over, & from the United States. Note: This ban may not apply outside of the United States.
- B. The United States regulations are not consistent with international regulations such as the International Air Transport Association (IATA) regulations, and the information in this section is guidance for shipping in the United States by ground only.
- C. A lithium cell or battery is classified by the lithium content thresholds in the table below when shipped in the **United States only**.

Item	Lithium Content	Class	US DOT Shipping Name
Lithium Metal Cell	< 1.0 grams	Non-restricted	Non-restricted Lithium Battery
Lithium Metal Cell	> 1.0 grams	Class 9 (Hazardous)	Lithium Battery (UN3090)
Lithium Metal Battery	< 2.0 grams	Non-restricted	Non-restricted Lithium Battery
Lithium Metal Battery	> 2.0 grams	Class 9 (Hazardous)	Lithium Battery (UN3090)
Lithium Ion Cell	< 1.5 grams ELC	Non-restricted	Non-restricted Lithium Battery
Lithium Ion Cell	> 1.5 grams ELC	Class 9 (Hazardous)	Lithium Battery (UN3090)
Lithium Ion Battery	< 8.0 grams ELC	Non-restricted	Non-restricted Lithium Battery
Lithium Ion Battery	> 8.0 grams ELC	Class 9 (Hazardous)	Lithium Battery (UN3090)

- D. All cells and batteries determined to be Class 9 must be transported in specification packaging (UN packaging) that has been tested according to regulations in section 49 CFR 178. Cells and batteries that are non-restricted may be transported in less stringent packaging meeting the requirements of 49 CFR 173.185 and Special Provision 188 if the package remains in the United States.
- E. Cells and batteries for disposal may be transported by ground in the United States in less stringent packaging meeting the requirements of 49 CFR 173.185.
- F. Cells and batteries transported with or contained in equipment must be transported according to the regulations in the 49 CFR. These packages may be transported as not- restricted or a Class 9 package with a different UN number, depending on the type and amount of lithium cells and batteries in the package.

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3. International Air Transport Association (IATA) Regulation Summary:

- A. The IATA Dangerous Good Regulations (DGR) should be followed when transporting lithium metal or lithium ion batteries by air.
- B. Since January 1, 2009, a battery handling label is required on all packages of lithium metal and ion cells and batteries being shipped by air.
- C. A lithium cell or battery is classified by the lithium content thresholds in the table below when transported by air. Please note that the lithium content for ion cells and batteries, as well as many shipping names and UN numbers have changed since the 2009 IATA Dangerous Goods Regulations (DGR) was published.

Item	Lithium Content	Class	IATA Shipping Name
Lithium Metal Cell	< 1.0 grams	Non-restricted	Non-restricted Lithium Battery
Lithium Metal Cell	> 1.0 grams	Class 9 (Hazardous)	Lithium Metal Batteries (UN3090)
Lithium Metal Battery	< 2.0 grams	Non-restricted	Non-restricted Lithium Battery
Lithium Metal Battery	> 2.0 grams	Class 9 (Hazardous)	Lithium Metal Batteries (UN3090)
Lithium Ion Cell	<20 Wh	Non-restricted	Non-restricted Lithium Battery
Lithium Ion Cell	>20 Wh	Class 9 (Hazardous)	Lithium Ion Batteries (UN3480)
Lithium Ion Battery	<100 Wh	Non-restricted	Non-restricted Lithium Battery
Lithium Ion Battery	>100 Wh	Class 9 (Hazardous)	Lithium Ion Battery (UN3480)

- D. All cells and batteries determined to be Class 9 must be transported in UN Performance Oriented packaging meeting the Packing Group II level. Cells and batteries that are non-restricted may be transported in less stringent packaging meeting the requirements of the corresponding Packing Instruction.
- E. In January 2009, the Shipping Name and UN ID # were changed for packages determined to be Class 9. The chart below summarizes the Packing Instruction that must be reviewed when shipping the specific lithium cell or battery, as well as the UN ID # if the lithium cell or battery is over the excepted lithium content levels in Section II of the Packing Instruction:

Item	Packing Instruction	Shipping Name for Class 9 Cells or Batteries	UN ID #
Lithium Ion Cell or Battery	965	Lithium Ion Batteries	UN3480 (if over the excepted limit)
Lithium Ion Cell or Battery Packed With Equipment	966	Lithium Ion Batteries Packed with Equipment	UN3481 (if over the excepted limit)
Lithium Ion Cell or Battery Contained in Equipment	967	Lithium Ion Batteries Contained in Equipment	UN3481 (if over the excepted limit)
Lithium Metal Cell or Battery	968	Lithium Metal Batteries	UN3090 (if over the excepted limit)
Lithium Metal Cell or Battery Packed With Equipment	969	Lithium Metal Batteries Packed with Equipment	UN3091 (if over the excepted limit)
Lithium Metal Cell or Battery Contained in Equipment	970	Lithium Metal Batteries Contained in Equipment	UN3091 (if over the excepted limit)

Please note there are restrictions in the gross weight of a package in Section I and II of the Packing Instructions.

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4. UN Lithium Battery Testing:

The shipper of a lithium cell or battery must have evidence that the lithium cell or battery meets the requirements of UN Recommendations on the Transport of Dangerous Goods – Manual of Tests and Criteria, Section 38.3, Lithium Batteries. Greatbatch and Electrochem will supply a Transport Certificate that certifies a model has met the UN testing requirements, as long as no changes, modifications, or additions are made to the model after being transported from a Greatbatch or Electrochem facility.

5. Packaging:

A. Greatbatch and Electrochem Packaging

If necessary to use Greatbatch or Electrochem original packaging for further transportation, all components of packaging must be included including any trays, inner boxes, foam pads, bubble wrap or other cushioning that may have been included in original packaging. Insulators on pins are required as well. Reuse of original packaging for transportation of lithium cells or batteries requires that the lithium cells or batteries are packed identically to how the packages were shipped from a Greatbatch or Electrochem facility. All components of the packaging must be the same as that used during the UN Performance Oriented Packaging testing.

B. Non-Greatbatch or Electrochem Packaging

If original packaging is unavailable, UN Performance Oriented Packaging must be obtained. Packaging must be tested and approved for the shipment of lithium batteries.

C. Prototype Cells and Batteries

Prototype cells and batteries, as well as production runs of less than 100, may be transported by ground in a Packing Group I packaging if the requirements of 49 CFR 173.185 and Special Provision 29 are met. Greatbatch and Electrochem maintain a USDOT approval (CA2010070033) to ship prototypes, but this applies only for shipments originating from a Greatbatch or Electrochem facility. Shipments of prototype cells and batteries originating from a non-Greatbatch or Electrochem facility must apply for an approval with the government agency in the country that the shipment originates from.

6. Shipping Papers:

A. Use of proper shipping names is required on all shipping papers:

1. For Class 9, hazardous models, use Proper Shipping Names indicated above
2. For non-hazardous or excepted models, use “Not-restricted lithium batteries”

B. Shipping papers must indicate “cargo-aircraft only” when transported by air, due to USDOT requirements (cannot ship using passenger aircraft, or any service which may use a passenger aircraft)

C. Shipping papers must also include; the package must be handled with care, flammability hazard exists if the package is damaged, special procedures should be followed if the package is damaged, and a telephone number for additional information.

D. The person signing the shipping papers must have completed training as per US DOT regulations or IATA regulations. The training must have been completed within the timeframe allowed per the regulations.

7. Additional Requirements:

A. Additional shipping regulations may apply when shipping in, over, or to another country. Please consult that country for requirements.

B. Additional shipping regulations may apply when shipping by water. Please consult the IMDG regulations for requirements.

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8. Defective or damaged cells and batteries:

- A. Cells and batteries defective for safety reasons, or that have the potential to produce heat, fire, or short circuit are forbidden for transport by air.
- B. To obtain specialized shipping instructions for defective or damaged cells and batteries please contact our Regulatory Specialist at (781) 830-5800.

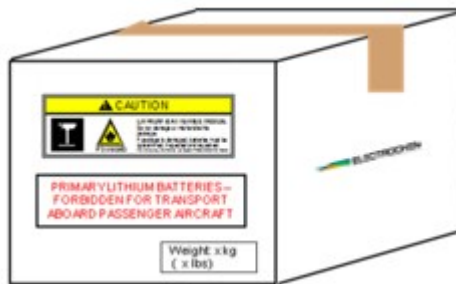
9. Questions:

Contact the Environmental, Health, and Safety Department at (781) 830-5800.

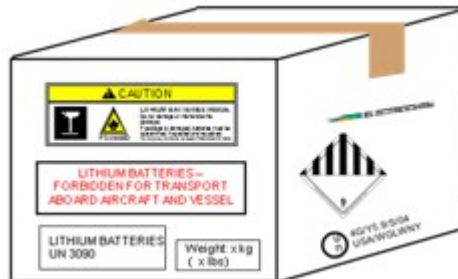
10. Examples of packaging labels and marking for Lithium Metal Cells and Batteries: Details are featured on the following page.

11. Examples of Packaging labels and marking for Lithium Metal Cells and Batteries:

- A. Non-restricted or excepted Lithium Metal Cells or Batteries transported by ground in the U.S.

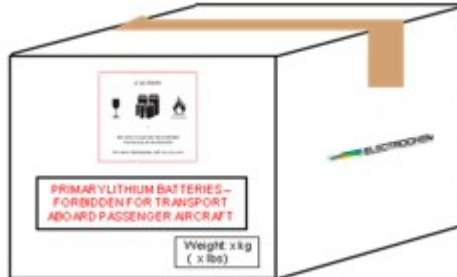


- B. Hazardous, Class 9, Lithium Metal Cells or Batteries transported by ground in the U.S.



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C. Non-restricted or excepted Lithium Metal Cells or Batteries Transported by Air



D. Hazardous, Class 9, Lithium Metal Cells or Batteries Transported by Air

