



U.S. Department
of Transportation
**Pipeline and
Hazardous Materials
Safety Administration**



**LiTHIUM
BATTERY
SAFETY**

UNDERSTANDING THE RISKS OF **DAMAGED, DEFECTIVE OR RECALLED (DDR)** **LITHIUM BATTERIES**

When you ship lithium batteries, you are shipping a hazardous material as regulated by the U.S. Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA).

All lithium batteries can pose a fire risk. Damaged, defective, or recalled (DDR) lithium batteries, including those misused and abused, pose an even greater risk than non-DDR lithium batteries in transportation. They are more likely to catch fire in a process known as “thermal runaway.” Unfortunately, misused, abused, and other kinds of DDR lithium batteries can be difficult to identify. Without the proper information and awareness, many shippers and carriers may continue to ship DDR lithium batteries in the same manner as non-DDR ones, creating additional risks for their communities. This guide is intended to help you identify DDR lithium batteries and properly package them for shipment.

The contents of this guide do not have the force and effect of law and are not meant to bind the public in any way. This guide is intended only to provide information to the public regarding existing requirements under the Hazardous Materials Regulations (HMR) (49 CFR Parts 171-180) and provide some examples of how to identify DDR lithium batteries for safe packaging and transport.

This document is not a substitute for the HMR; additional requirements for packaging, training, and hazard communication apply to DDR lithium batteries.

Is My Lithium Battery Damaged, Defective, or Recalled?

Determining DDR*

Lithium cells and batteries that have the potential of producing a dangerous evolution of heat, fire, or short circuit can be identified as damaged or defective if they:

HAS YOUR BATTERY
BEEN RECALLED?

WWW.RECALLS.GOV

WWW.CPSC.GOV/RECALLS

- Have sustained physical or mechanical damage.
- Have been identified previously as being defective for safety reasons.
- Have leaked or vented (or are currently leaking or venting).
- Are suspected to be damaged or defective but cannot be diagnosed prior to transport.
- Do not conform to the type tested according to the applicable provisions of the UN Manual of Tests and Criteria Part 3 sub-section 38.3.

How to Identify If a Lithium Battery is DDR

As a shipper, it is your responsibility to assess the condition of a lithium battery, including whether it is damaged or defective. You may rely on a technical expert with knowledge of the lithium battery's safety features and information from the equipment/product manufacturer.

Some criteria to consider when assessing whether a lithium battery is damaged, defective, or recalled include nonvisual conditions, such as:

- The condition of external and internal short circuit protection, voltage, or isolation measures.
- The condition of the safety features for the lithium cell or battery.
- Damage to any internal safety components, such as the battery management system.

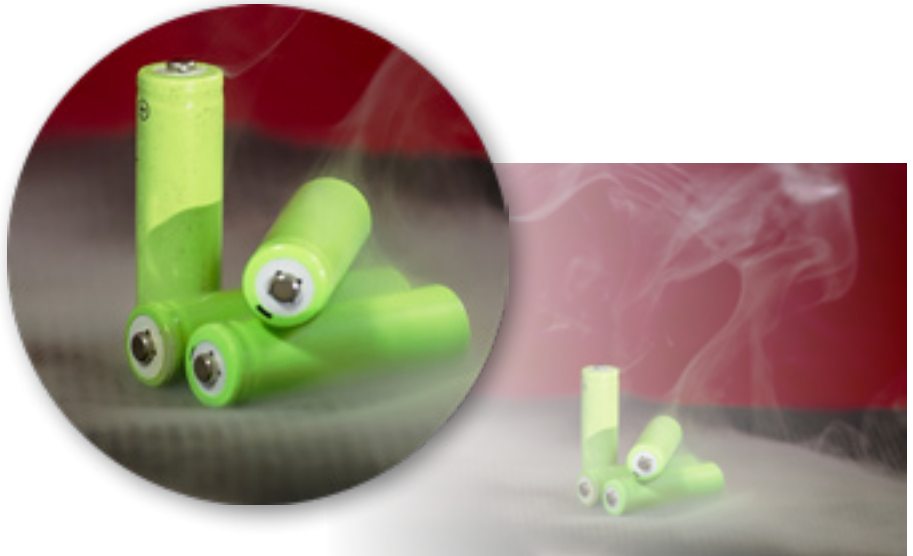
Visually-identifiable signs include the following:

- Acute hazard, such as gas, fire, or noticeable leaking electrolyte. **(Fig. 1)**
- Lithium batteries showing signs of physical or mechanical damage, such as:
 - * Swelling, relative to the same battery in its original state. **(Fig. 2)**
 - * Discoloration of the battery casing. **(Fig. 3)**
 - * Smell or corrosion. **(Fig. 4)**
 - * Loose or damaged wires. **(Fig. 5)**
 - * Known conditions of use or misuse. **(Fig. 6)**

* Special Provision 376 of the UN Recommendations on the Transportation of Dangerous Goods - Model Regulations (incorporated by reference, see § 171.7)

Acute hazard, such as gas, fire, or electrolyte leaking (Fig. 1)

Pictured: a set of smoking cylindrical batteries. A battery that exhibits intense heat that does not quickly dissipate may also be a sign of damage.



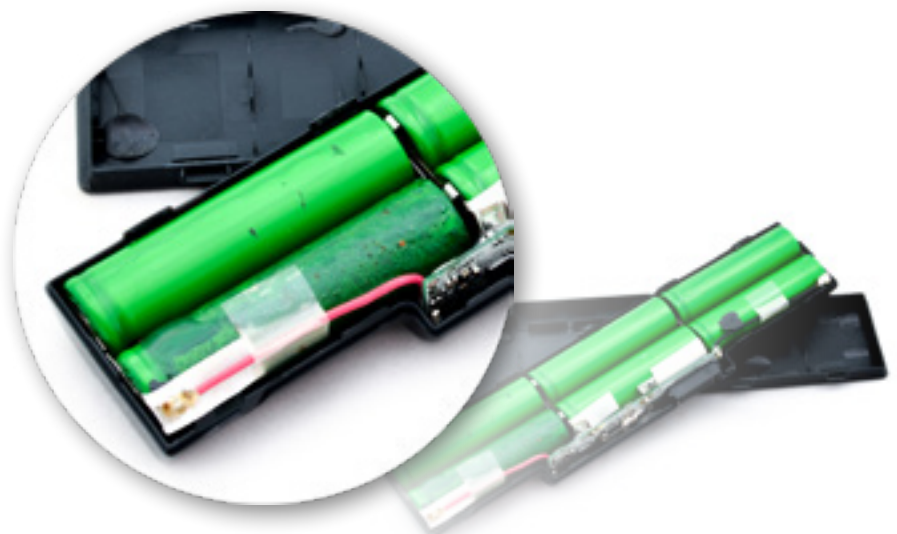
Swelling, relative to the same battery in its original state (Fig. 2)

Pictured: a swollen pouch cell battery, placed on top of an undamaged battery for comparison.



Discoloration of the battery casing (Fig. 3)

Pictured: a set of cylindrical cells in a battery pack. Note the discoloration of one of the cells.



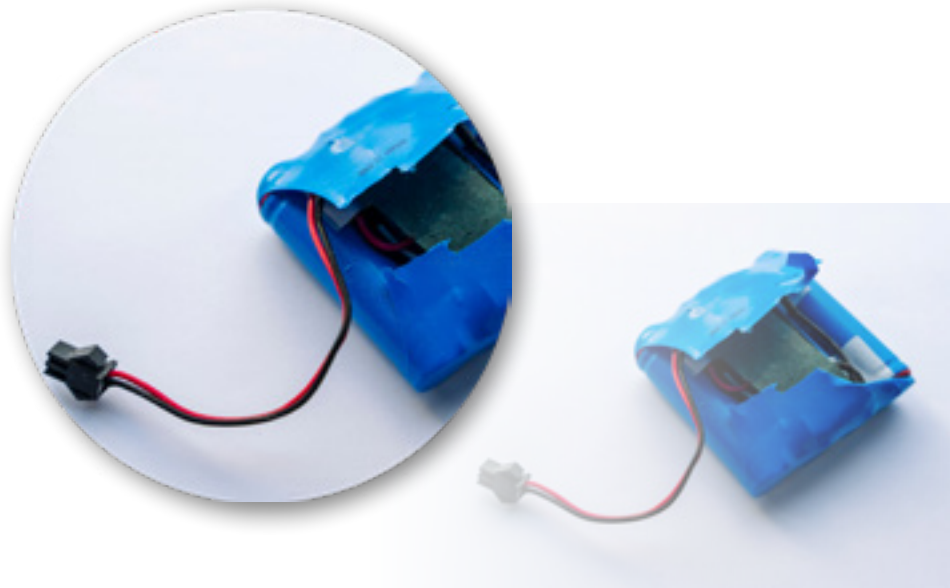
Smell or corrosion (Fig. 4)

Pictured: two coin cell batteries, displaying white, chalky corrosion on the terminals. Corrosion may present as other colors.



Loose or damaged wires (Fig. 5)

Pictured: a set of cylindrical cells with loose, damaged wires.



Known conditions of use or misuse (Fig. 6)

Pictured: a group of lithium battery-powered micro-mobility devices that have been recovered from a body of water. When not intended to be submerged, these batteries may be damaged due to flooding or water exposure.



How Do I Package My DDR Lithium Battery?

Unlike undamaged lithium batteries, **all** DDR lithium batteries are fully regulated under the HMR, regardless of weight. In other words, all hazard communication, emergency response, training, and packaging requirements apply—including shipping papers, markings, and Class 9 lithium battery label.

DDR lithium batteries are also subject to additional packaging requirements, (see § 173.185(f)(1-4)):

- An individual, non-metallic inner packaging that completely encloses the cell or battery.
- Cushioning material that is non-combustible, electrically non-conductive, and absorbent surrounding the inner packaging.
- Place each inner packaging, individually, in Packing Group I performance level packaging. This means only one lithium battery per inner packaging, and only one inner packaging per outer packaging.
- In addition to the proper shipping name and other required markings, mark the outer packaging "Damaged/defective lithium ion battery" and/or "Damaged/defective lithium metal battery," as appropriate. Letters must be at least 12 mm (0.47 inches) high.

Remember:

DDR lithium batteries are forbidden for transportation by aircraft, (see § 173.185(f)). Therefore, do not attempt overnight shipping of DDR lithium batteries.

For Further Questions

Additional resources and information on shipping DDR lithium batteries are available available on PHMSA's "[Transporting Lithium Batteries webpage](#)" (via the QR code below) or at the following links:

- PHMSA's Hazmat Safety web site: <http://www.phmsa.dot.gov/hazmat>
- [Lithium Battery Guide for Shippers](#)
- [Training Requirements Brochure](#)
- The Hazardous Materials Information Center

1-800-HMR-4922 (1-800-467-4922) 9:00 AM to 5:00 PM Eastern

Email: infocntr@dot.gov

<https://phmsa.dot.gov>



Community Safety Information

Damaged lithium batteries, like the ones found in scooters and ebikes, have been responsible for many serious incidents. The New York City Fire Department reports responding to over 200 lithium battery fire in 2022 and those fires were the cause of six deaths in the city. Nearly every one of these batteries were found to be previously damaged, misused or abused, or counterfeit.

- Damaged or unstable batteries and improper charging, storage or disposal can cause the batteries to overheat, leading to an explosive, aggressive fire that spreads rapidly, can reignite and is challenging to extinguish.
- Counterfeit batteries are often not tested according to the applicable provisions of the UN Manual of Tests and Criteria Part 3 sub-section 38.3 and present greater risks to the public. If you are trying to verify that a product is not counterfeit, contact the manufacturer for the test report.



If you notice intense heat coming from your battery that does not quickly dissipate, consider calling your area's non-emergency service telephone number (e.g., 311) if available before contacting emergency services.

When the battery cells explode they can quickly spread to another battery, another device, or another flammable object.

Fire extinguishers do not work on lithium-ion batteries fires. Water may not prevent a battery from burning and spreading. If you observe a lithium-ion battery fire, leave the area, CLOSE the door, and call 911 immediately.

**For the Office of Hazardous
Materials Safety, contact:**

The Hazardous Materials Info Center

1-800-HMR-4922

(1-800-467-4922)

E-mail: infocntr@dot.gov

<https://www.phmsa.dot.gov>

**Pipeline and Hazardous Materials
Safety Administration**

East Building, 2nd Floor

1200 New Jersey Ave., SE

Washington, DC 20590

E-mail: training@dot.gov

202-366-4900

202-366-7342 (Fax)



U.S. Department
of Transportation

**Pipeline and
Hazardous Materials
Safety Administration**

PHH50-0199-0323