

A close-up photograph of several metal washers or nuts, arranged in a grid-like pattern. The image is heavily blurred, with a strong blue color cast, creating a sense of depth and texture. The washers are circular with a central hole and a raised, concentric ring structure.

SafeCASE Training

July 2024

*2.5 kWh Model



Thank you for safely transporting your
batteries using KULR's SafeCASE.
This training will teach you its **proper use**
and **shipping requirements**.

KULR – Accelerating the Transition to a Circular Electrification Economy

The **SafeCASE** technology featured in these training slides has been used by NASA since 2019 for securing batteries on the Space Station and is now accelerating a global transition to a circular electrification economy.



Ordering Your SafeCASE

Ready for Shipment

- When you are ready to ship batteries, you will order your SafeCASE from your OEM (original equipment manufacturer) or shipping partner.



Defective Batteries

- When you place your order, you will need to determine if any of your batteries are DDR (damaged-defective-recalled).
 - Damaged - If the battery appears cracked, swollen, leaking, hot, or any other problems, then it is damaged.
 - Defective – If the battery has any apparent defects from its manufacturing process, then it is defective.
 - Recalled – If the OEM has issued a nationwide recall for the battery, then they have determined it has an issue requiring it be pulled from the market.

Remember

DDR

Damaged, defective, recalled.

Boxes and
Labeling

DDR batteries require special boxes and labels for shipping, provided to you by your OEM or shipping partner.

Why SafeCASE?

Maximum Energy Storage

- SafeCASE is for transporting lithium-ion batteries up to 2500 watt-hours (Wh), or 2.5 kilowatt-hours (kWh), or 300 watt hours depending on which permit you ship under. Each DoT Special Permit must be reviewed for the scenario you are shipping under.
 - You can place multiple batteries in one SafeCASE, but their total energy cannot exceed the limit of the permit you are using (300 or 2500 Wh)

Example

- 5 batteries at 500 watt-hours each = 2500 watt-hours (2.5 kWh)
- All 5 batteries can ship in the SafeCASE, since the total energy is under the 2500 watt-hour (2.5 kWh) limit.
- Note: Gross weight of each safe case cannot exceed the limit of the special permit used. (Limits range from 66 to 70 lbs. by permit)

Remember	
Total Energy Permitted	Up to 2500 watt-hours (2.5 kWh)
Total Batteries Permitted	Any amount, but total energy of all batteries cannot exceed 2500 watt-hours (2.5 kWh)



Voltage

Calculating Voltage

- If your battery's label does not provide watt-hours (Wh) or kilowatt-hours (kWh), you can calculate as follows:
 - ***Volts x Amp-Hours = Watt-Hours***
 - *Note, there are 1000 watt-hours in 1 kilowatt-hour.

Example

- 40 volts x 10 amp-hours = 400 watt-hours or 0.4 kilowatt-hours

Remember	
Watt-Hours	Volts x Amp-Hours = Watt-Hours
Kilowatt-Hours	There are 1000 watt-hours (Wh) in 1 kilowatt-hour (kWh)



Permit

- SafeCASE has 5 permits from Department of Transportation:
 - Recycling – For shipping batteries that have finished their life and ready to be retired/recycled. (DoT-SP 21704, 21139)
 - 300 Wh = SP 21704 (UPS accepted)
 - 2.5 kWh = SP 21139
 - DDR – For shipping batteries that are damaged-defective-recalled. (DoT-SP 21693, 21193)
 - 300 Wh = SP 21693 (UPS accepted)
 - 2.5 kWh = SP 21193
 - Prototype – For shipping prototype batteries, that are not sold in the marketplace yet. This is uncommon. (DoT-SP 21167)

Proper Shipping Labels

- *Once you have selected the correct DoT SP, please review the KULR Shipping checklists and the text of the DoT Special Permit selected to confirm you have the correct labeling and placarding*
 - 49 CFR 171-185 Regulation: Governs Hazardous Material Transport

Remember	
Recycling Permit	For batteries at end-of-life.
DDR Permit	For damaged, defective, recalled batteries.
Prototype Permit	For shipping prototype batteries.

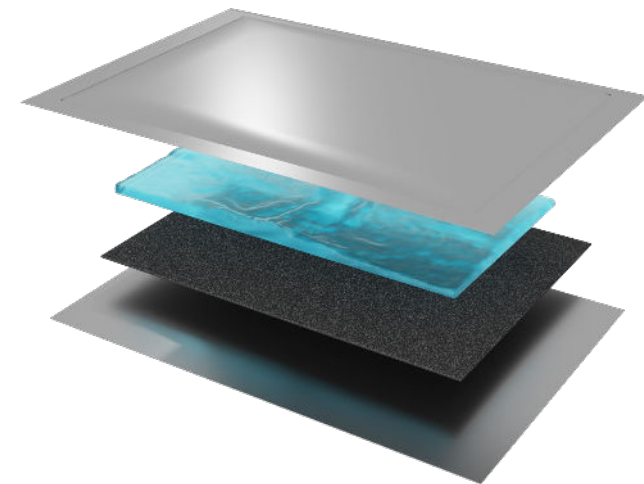


Thermal Runaway Shield (TRS)

Product Description

- In the walls of the SafeCASE are 6 pouches, called Thermal Runaway Shield® (TRS). Within each pouch is a liquid. During a lithium-ion battery fire, a pouch will rupture liquid onto battery cells to stop the heat propagation.
- Always inspect all TRS pouches in your SafeCASE, to see if any liquid has leaked, or if the pouches are degraded. Contact your shipping partner or KULR if you need new pouches or an entire new SafeCASE. Do not ship a faulty SafeCASE.

Remember	
6 Pouches	Inspect each pouch before shipping your SafeCASE
If Leaking/Damaged	Contact KULR or your shipping partner.



How to Use SafeCASE



SafeCASE

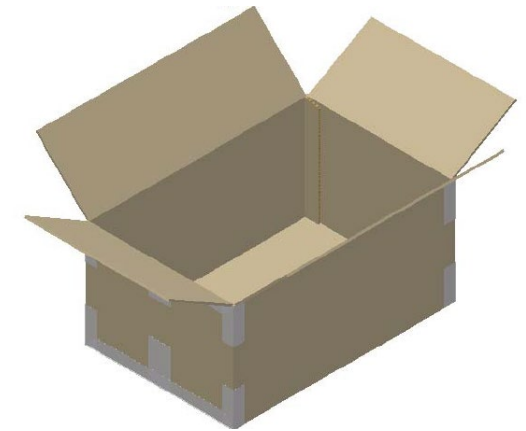
Packaging of SafeCASE

- Each SafeCASE comes with a printed card containing a QR code to scan with your phone for digital instructions. This code is also fixed onto the SafeCASE . If you do not receive instructions, please contact KULR Technology.
- **WARNING: It is not recommended to use a box cutter to open the boxes, or you may slice the lid of the SafeCASE.**
- Follow the instructions in the checklist and the special permit to label the box accordingly before shipping your battery back to your recycling provider.
- SafeCASE Assembly & Use Instructions
 - <https://www.kulrtechnology.com/wp-content/uploads/2024/07/SafeCASE-Assembly-Use-Instructions-July-2024.pdf>

SafeCASE

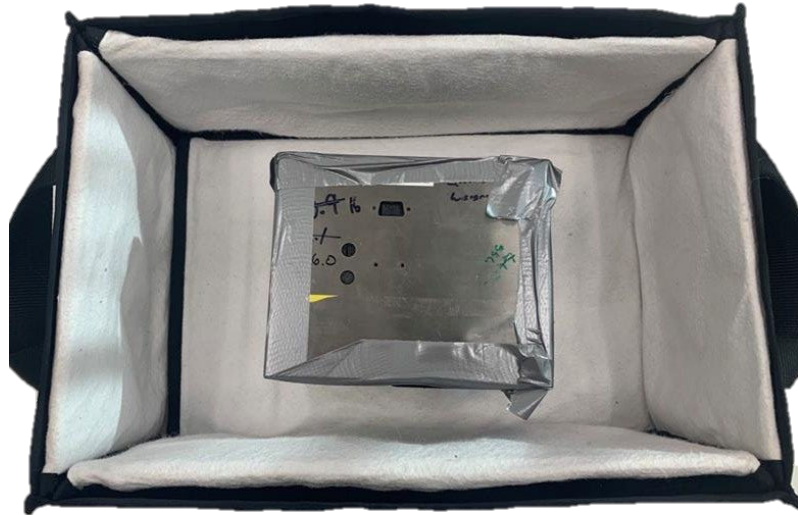


Outer Box
Or
UN Rated Box



SafeCASE Instructions: Battery Prep

Step One



Discharge battery pack/cells to 30% SOC or less if possible. Cover **ALL EXPOSED** battery terminals, protect with non-conductive electrical tape or place cells/batteries in a plastic bag.

Step Two



Ensure all sharp edges are covered and/or protected on battery pack using bubble wrap and other packaging materials.

SafeCASE Instructions

Step Three



Remove SafeCASE lid/cover by releasing the velcro sides and straps. Open SafeCASE and visually inspect all contents for damages before and after every use.

Step Four



Remove blanket and inner case top pouch and set aside.

SafeCASE Instructions

Step Five



Prep battery pack and insert into case on top of the (bottom) pouch.

Step Six



Place packing material around batteries to secure and fill to top of the case.

Note: All TRS needs to be facing inwards towards the battery on both bottom and top pouches.

SafeCASE Instructions

Step Seven



Place inner case top pouch on top of bubble wrapped battery with TRS (soft side) facing down towards the battery and ablative shield (hard plate) side up.

Step Eight



Take the blanket and place on top of the case.

SafeCASE Instructions

Step Nine



Fold corners of fire-resistant blanket and tuck all sides in between the outer case and inner pouches.

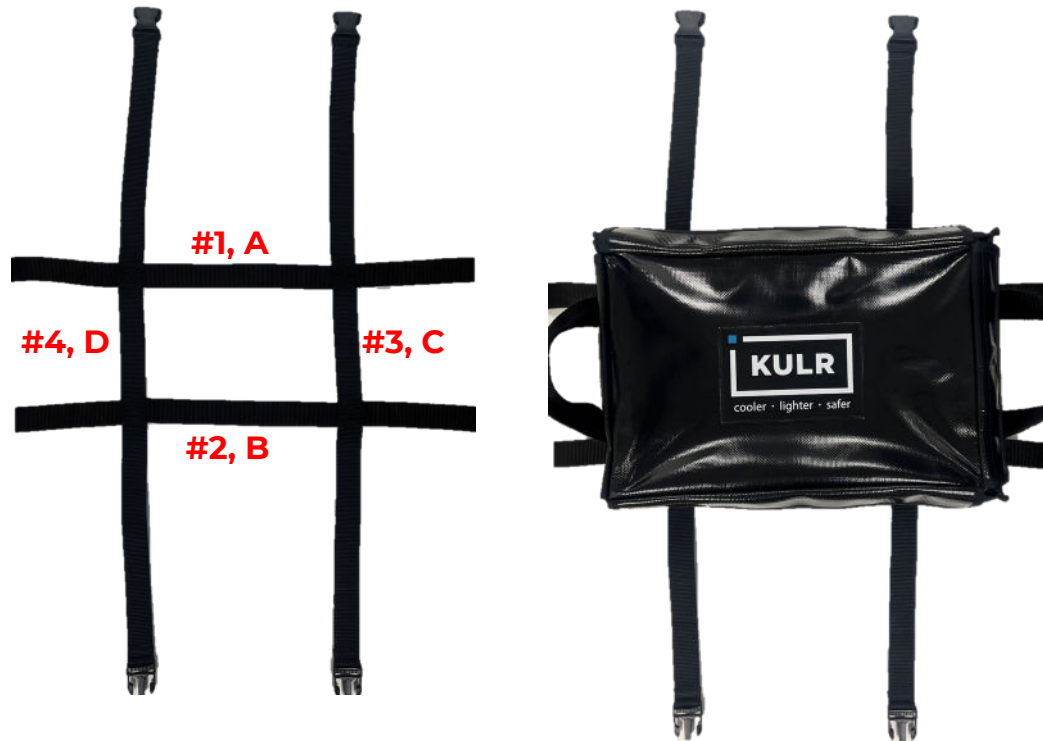
Step Ten



Close lid and confirm velcro mating material is secured firmly around entire SafeCASE.

SafeCASE Instructions

Step Eleven



Place the strap harness on a level surface with the labels facing downwards and position the SafeCASE at the center of the harness.

Step Twelve



Fasten the buckles securely in the sequence marked A, B, C, D.

Shipping Information



Overview

Training

- It is the responsibility of each employer to train their employees, as applicable. KULR is unable to certify employees of other companies.
- KULR is providing this material to inform product end users of certain US DoT requirements applicable to US highway shipments of end-of-life or damaged lithium-ion batteries. Shipper is responsible for complying with the regulations of their applicable transport modes.
 - However, other companies may choose to use the materials provided to assist them in building a transportation training program in accordance with 49 CFR Part 172, Subpart H ([link to regulations](#)).

Compliant Hazmat Transportation Training

- May Include:
 - General Awareness of HazMat Regulations
 - Safety & Security Awareness
 - Function Specific Instructions
 - A test
 - Training record per 49 CFR 172.704(d) retained at least 2 years
- For more information on US DoT hazardous materials requirements, please visit: <https://www.phmsa.dot.gov/standards-rulemaking/hazmat/hazardous-materials-information-center>



Dangerous Goods (HazMat)

Hazardous Materials

- Articles or substances that pose a risk to health, safety, property, or the environment in transport. Lithium-ion batteries are **Class 9**.

Class 1
Explosives

Class 2
Gases

diary Risk Label

Class 3
Flammable Liquids

Class 4
Flam Solid, SC, DWW

Class 5
Oxidizers & Org Peroxide

Class 6
Poisons & Infect. Subs

Class 7
Radioactive Material

Class 8
Corrosive

Class 9
Miscellaneous

Shipper's Responsibility

Who is the Shipper?

- It is the shipper's responsibility to comply with applicable hazmat regulations.
- The shipper is the company that:
 - Performs any pre-transportation function (e.g. filling package, applying mark, product classification, state of charge checks)
 - Tenders a hazardous material to a carrier for transport
- You are a shipper**, since you are preparing the SafeCASE for shipping.

From: Address ?	Ship Date: 30APR15 ActWgt: 1.0 LB CAD: 169523FXRS1501
TO Address (US) 	(123) 456-7890
Ref: HAZ DSR Ground INV: PO:	Dept
	
	
GND Prepaid	(9612302) 7889722 70000039 Hazmat DIRECT SIGN
HAZ Emergency Contact# 9012639811	

Training Provisions

Hazmat Training

- Required for staff involved in:
 - Packaging & loading hazardous materials
 - Applying hazard marks and labels
 - Completing shipping paperwork
 - Transporting hazardous materials
 - The Department of Transportation and the couriers transporting SafeCASE, both require that the person packing batteries and shipping SafeCASE be properly trained.
- This certification is valid for 3 years (2 years international), then recurrent training is required.
 - *Please keep a copy of your training email. Training records must be maintained on-site.



Enforcement

Largest Financial Penalties

- If proper shipping procedures are not followed, then you could face **enforcement**. Enforcement is handled on a case-by-case basis.
- Example of Possible Penalties:
 - Frequent violators
 - Companies with no HazMat program or training
 - Undeclared shipment

Press Release – FAA Proposes \$1.1 Million Civil Penalty Against Braille Battery Inc. For Alleged HazMat Violations



4. Offering for transportation a lithium battery, without shipping papers, package markings, labels, or placards (when required):	
a. For air transport	\$40,000.
b. For ground transport	\$20,000.

Common Violations Cited

Most Common Violations Cited in Enforcement

- **Failure to train, improper training records**
- Undeclared shipments
- Hazmat improperly declared on shipping paper
- Failure to use authorized package
- Labels and marks not properly applied
- No emergency response number



Matter of Public Record!

Lang's Standard Solution Inc. Baton Rouge, LA Ticket #: 18T-0376-SH-SO	Transported a hazardous material while failing to provide a hazardous materials shipping paper, allowed employees to perform a function subject to the requirements of the federal hazardous materials regulations while failing to document initial training provided to hazmat employees (general awareness, function-specific, safety and security awareness); transported a hazardous material in UN certified fiberboard box 1x5-gallon and 1x1-gallon combination packaging, marked UN 4G, while failing to close the UN specification packaging in accordance with the closure notification, thereby failing to bring the package into compliance with the manufactures test report.	172.200; 172.201(d); 172.202(a); 172.604(a); 172.702(a) & (b); 172.704(a)(1), (2), (3), (4), (c), & (d); 173.22(a)(4)(i); 173.24(f)(2)	\$5,280
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Safety and Security

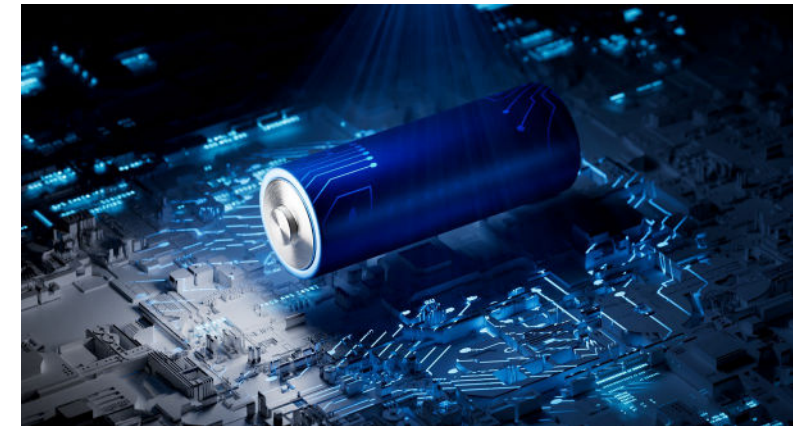
Battery Safety

- Handle all batteries carefully
- Know fire response procedures
- Understand battery hazards



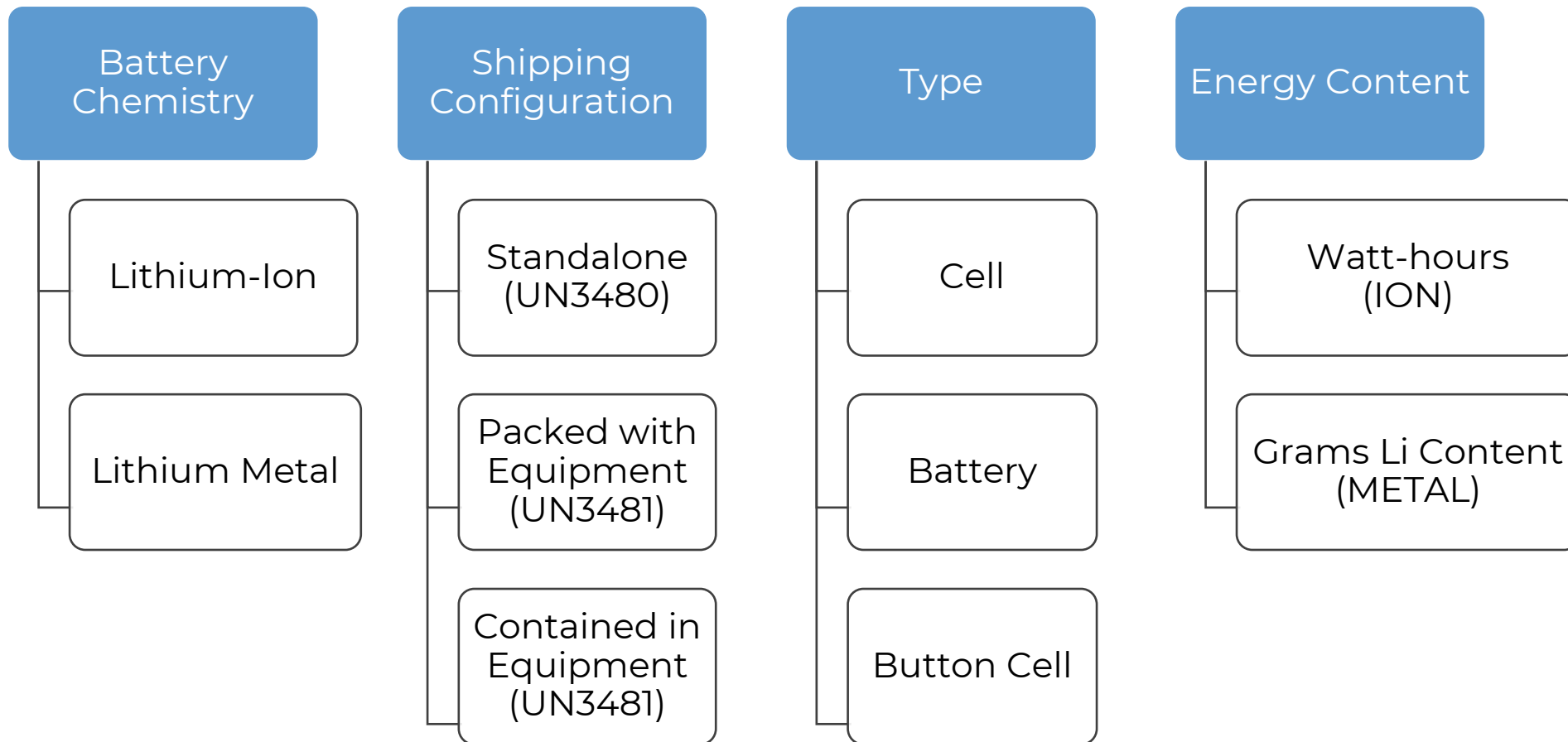
Security Awareness

- In the wrong hands, hazmat can be weaponized
- Secure all hazmat and batteries at the facility



Lithium Battery Classification

- The following are lithium battery classifications. Note, SafeCASE is for transporting lithium-ion batteries only, not lithium-metal batteries. Your batteries will be labeled for their type.

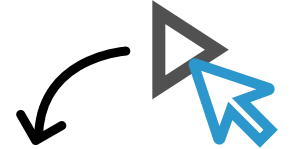


Lithium Batteries – Why the Concern?

Lithium Battery Dangers

- Lithium batteries are particularly dangerous because they can enter thermal runaway, which is uncontrolled energy release.
- Lithium batteries are a unique hazard because they can be both an ignition source of fire and a fuel for an existing fire. Please handle, store, and ship them carefully.
- Possible Dangers Include:
 - Overheat & self-ignition fire
 - Overpressure - rapid disassembly
 - Venting of toxic or flammable gas

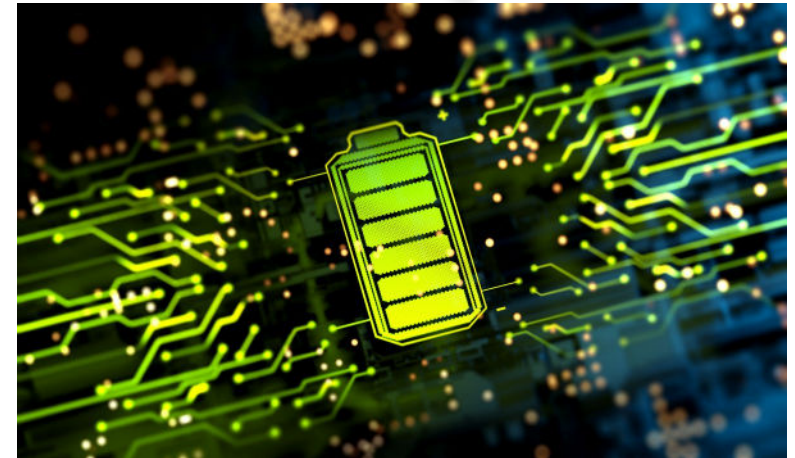
Watch to see the potential dangers that lithium batteries can cause.



Hazard Classification

HazMat Descriptions

- Based on battery chemistry and shipping configuration, the hazmat descriptions for lithium cells and batteries are:
 - UN 3480: Lithium-ion batteries
 - UN 3481: Lithium-ion batteries packed with equipment
 - UN 3481: Lithium-ion batteries contained in equipment
 - UN 3090: Lithium metal batteries
 - UN 3091: Lithium metal batteries packed with equipment
 - UN 3091: Lithium metal batteries contained in equipment
- Complete the labeling of the outer box based on the configuration of cells you are shipping at time of shipment. Refer to shipping instruction checklist.



Remember, only lithium-ion batteries can be shipped within SafeCASE. Not lithium-metal.

Transport and Storage Incidents

Lithium Fire Incidents

- Please follow proper shipping requirements to protect employees at other facilities and your shipping partner.



ESS Station in South Korea
Lithium battery fire



UPS Flight 6 Crash – Dubai
Autoignition of lithium batteries

Lithium-Ion Batteries

Shipping Batteries

- Only rechargeable lithium-**ION** cells and batteries (including those packed with or contained in equipment) are allowed to be shipped in SafeCASE!
- *NO LITHIUM METAL CELLS AND BATTERIES ALLOWED!**



Ground Transport Only



Never ship DDR batteries by air

Damaged Defective Recalled Batteries (DDR)

Signs of a DDR Battery

- Damaged, defective, or recalled (DDR) lithium batteries pose a higher risk of thermal runaway.
- Can Include:
 - Known manufacturer defect
 - Swelling
 - Hot to the touch
 - Significant dents in case
 - Punctured case
- If a cell is showing signs of active disassembly or thermal runaway, it cannot be shipped via any method and should be stored safely until energy content has dissipated.

*Note, it is forbidden to transport DDR batteries via air transport.

AIR TRANSPORT PROHIBITED



(f) *Damaged, defective, or recalled cells or batteries.* Lithium cells or batteries, that have been damaged or identified by the manufacturer as being defective for safety reasons, that have the potential of producing a dangerous evolution of heat, fire, or short circuit (e.g., those being returned to the manufacturer for safety reasons) may be transported by highway, rail or vessel only...

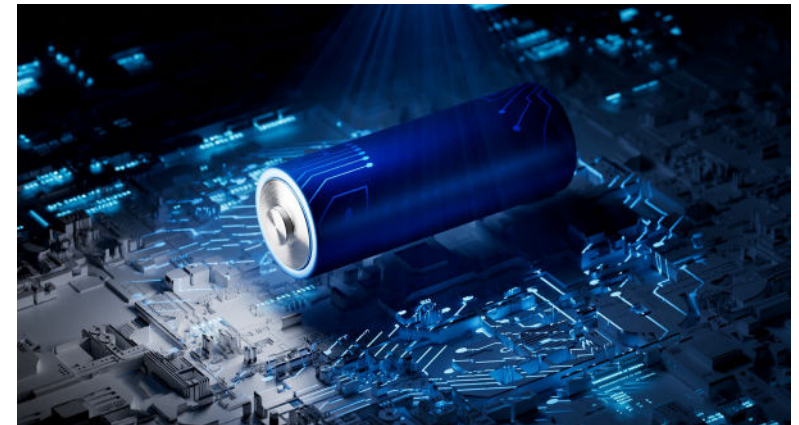
Shipping DDR Batteries

Special Permit 21693 Low Energy

- PHMSA (DoT) issued Special Permit 21693 to facilitate DDR shipments:
 - KULR CASE contains thermal runaway hazards (limit: 300 Wh)
 - *Packages may contain more than 1 cell or battery up to 300 Wh***
 - Outer box is a fiberboard box unless single piece is >30 kg*
 - Emergency response info (including phone number) printed on box
 - Cells/batteries must originally have been UN 38.3 tested
 - Not to be used internationally

*Refer to shipping instruction checklist.

**Allowed if under the watt hour and weight limit. Regulated shipping paperwork must accompany these shipments if shipping larger batteries.



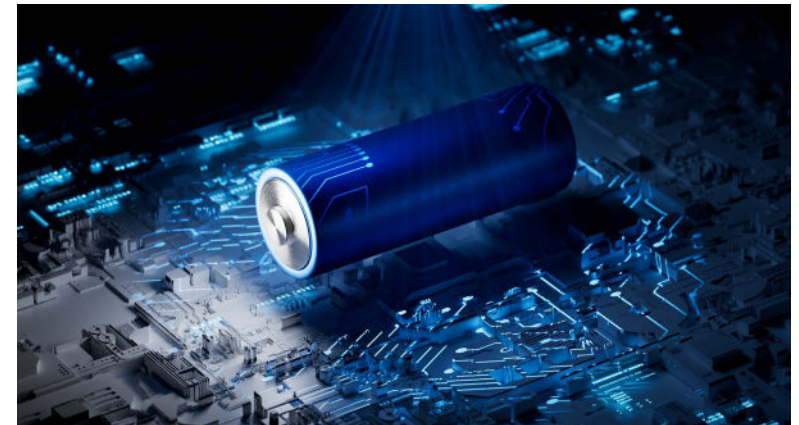
UPS accepted.

Shipping DDR Batteries

Special Permit 21193 High Energy

- PHMSA (DoT) issued Special Permit 21193 to facilitate DDR shipments:
 - KULR CASE contains thermal runaway hazards (limit: 2.5 kWh)
 - *Packages may contain more than 1 cell or battery up to 2.5 kWh**
 - Outer box is a UN4G fiberboard box, PG I-rated
 - Emergency response info (including phone number) printed on box
 - Cells/batteries must originally have been UN 38.3 tested
 - Not to be used internationally

*Allowed if under the watt hour and weight limit. Regulated shipping paperwork must accompany these shipments if shipping larger batteries.



Cannot use special permit 21193 to ship with UPS at this time.

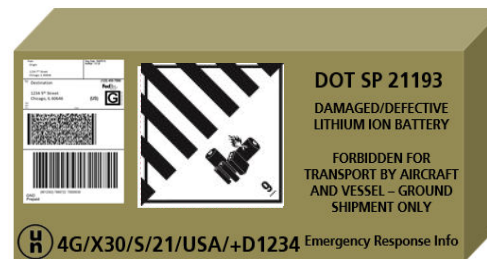
Shipping Labels – DDR Labeling

Low Energy (21693)

- Load cannot exceed 31.75 kg (*For UPS*).
- Maximum energy rating cannot exceed 300 Wh
- Box marked:
 - “DoT SP 21693”
 - Copy of permit attached
 - “Damaged/Defective Lithium Ion Battery”
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - Low Energy Sticker
 - **Lithium Battery Mark (3480 or 3481)**
 - Emergency Response Info
- Training required

High Energy (21193)

- Load cannot exceed 30 kg
- Maximum energy rating cannot exceed 2.5 kWh
- Box marked:
 - “DoT SP 21193”
 - Copy of permit attached
 - “Damaged/Defective Lithium Ion Battery”
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - **UN 3480 Class 9 Sticker (IATA)**
 - Emergency Response Info
 - Shipping papers & training required
 - Packing List must include the description “Contains damaged, defective, recalled lithium cells and batteries in accordance with DoT-SP 21193”



Your shipping partner will provide you with the following DDR labeling based upon your description of your batteries.

Refer to shipping instruction checklists for complete requirements.

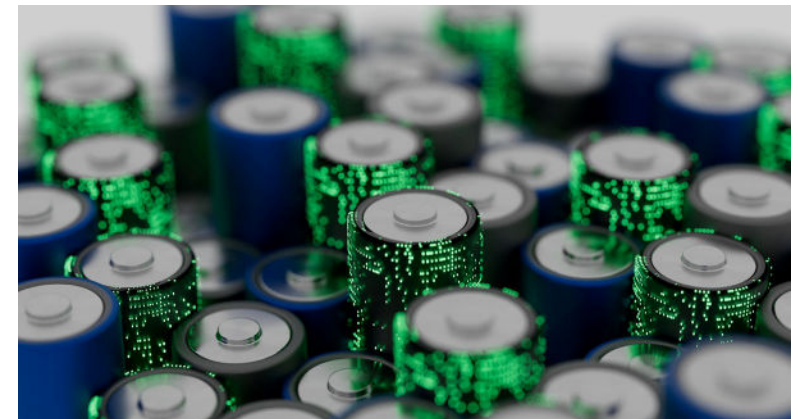
Recycling Batteries

Special Permit 21704 Low Energy

- PHMSA (DoT) issued Special Permit 21704 to facilitate shipments of batteries to recycling:
 - KULR CASE contains thermal runaway hazards (limit: 300 Wh)
 - *Packages may contain more than 1 cell or battery up to 300 Wh***
 - Outer box is a fiberboard box unless single piece is >30 kg*
 - Emergency response info (including phone number) printed on box
 - Cells/batteries must originally have been UN 38.3 tested
 - Not to be used internationally

*Then UN Box required

**Allowed if under the watt hour and weight limit. Regulated shipping paperwork must accompany these shipments if shipping larger batteries.



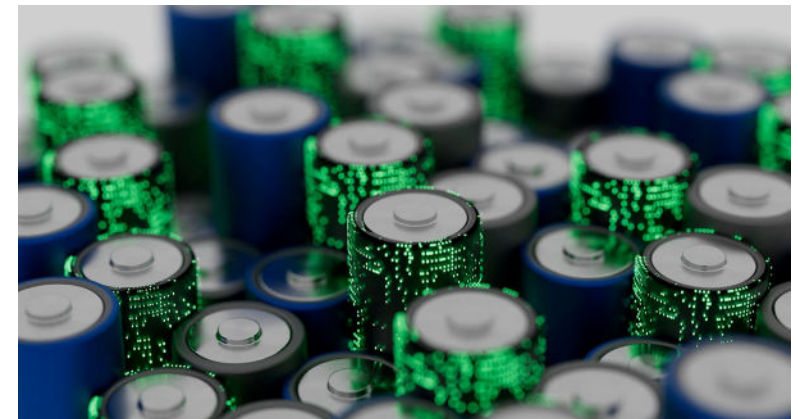
UPS accepted.

Recycling Batteries

Special Permit 21139 High Energy

- PHMSA (DoT) issued Special Permit 21139 to facilitate shipments of batteries to recycling:
 - KULR CASE contains thermal runaway hazards (limit: 2.5 kWh)
 - *Packages may contain more than 1 cell or battery up to 2.5 kWh**
 - Outer box is a UN4G fiberboard box, PG I-rated
 - Emergency response info (including phone number) printed on box
 - Cells/batteries must originally have been UN 38.3 tested
 - Not to be used internationally

**Allowed if under the watt hour and weight limit. Regulated shipping paperwork must accompany these shipments if shipping larger batteries



Cannot use special permit 21139 to ship with UPS at this time.

Shipping Labels – EOL/Recycling Labeling

Low Energy (21704)

- Load cannot exceed 31.75 kg (For UPS).
- Maximum energy rating cannot exceed 300 Wh
- Box marked:
 - “DoT SP 21704”
 - Copy of permit attached
 - “Recycled Lithium Batteries”
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - Low Energy Sticker
 - **Lithium Battery Mark (3480 or 3481)**
 - Emergency Response Info
- Training required

High Energy (21139)

- Load cannot exceed 30 kg
- Maximum energy rating cannot exceed 2.5 kWh
- Box marked:
 - “DoT SP 21139”
 - Copy of permit attached
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - **UN 3480 Class 9 Sticker (IATA)**
 - Emergency Response Info
 - Shipping papers & training required
 - Packing List must include the description “Lithium batteries intended for recycling in accordance with DoT-SP 21139” and “Forbidden for Transport by Aircraft and Vessel”



Your shipping partner will provide you with the following labeling based upon your description of your batteries.

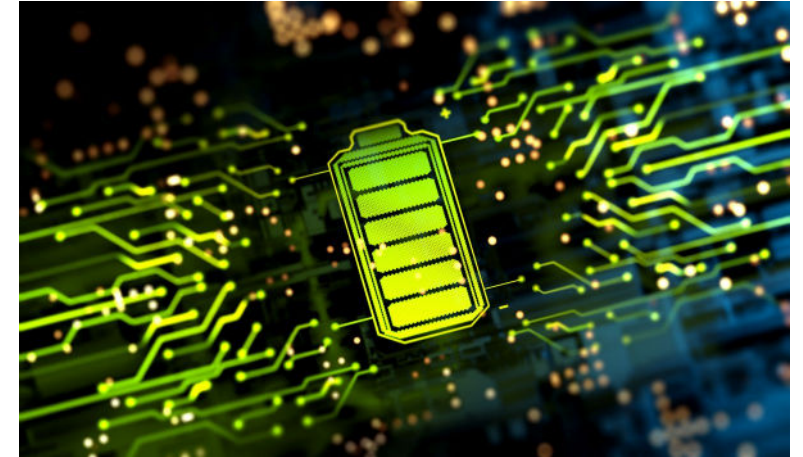
Refer to shipping instruction checklists for complete requirements.

Shipping Prototypes (Low Production)*

Special Permit 21167

- PHMSA (DoT) issued Special Permit 21167 to facilitate prototype battery shipments:
 - KULR CASE contains thermal runaway hazards (limit: 2.5 kWh)
 - Outer box is a UN4G fiberboard box, PG I-rated
 - **“For transportation aboard aircraft, the aggregate energy content of each inner package may not exceed 2.5 kWh.”**
 - Not to be used internationally
 - Training & shipping papers needed!

* “Low production” is defined as a production run of not more than 100 cells or batteries annually of a particular type.



Shipping Labels – Prototype Labeling

Prototype (21167)

- Load cannot exceed 35 kg
- Maximum energy rating cannot exceed 2.5 kWh
- Box marked:
 - “DoT SP 21167”
 - “Prototype Lithium Ion Batteries”
 - Copy of permit attached
 - “Cargo Aircraft Only - Forbidden for Transport By Vessel”
 - **UN 3480 Class 9 Sticker (IATA)**
 - Emergency Response Info
- Shipping papers & training required
- Dangerous Good Declaration will cite Packaging Instruction 910.



This permit has highly technical requirements and should only be used by shippers trained and experienced with battery regulations.

Refer to shipping instruction checklists for complete requirements.



UPS Accepted Permits - Shipping Label Requirements

If you shipping via UPS, you need to call the HMSC at 800-554-9964 to get details on the agreement. Having a hazmat or DG contract with UPS is not sufficient, as it is a separate program.

Low Energy (21704)

- Load cannot exceed 30 kg (For UPS).
- Maximum energy rating cannot exceed 300 Wh
- Box marked:
 - “DoT SP 21704”
 - Copy of permit attached
 - “Recycled Lithium Batteries”
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - Low Energy Sticker
 - **Lithium Battery Mark (3480 or 3481)**
 - Emergency Response Info
- Training required

Low Energy (21693)

- Load cannot exceed 30 kg (For UPS).
- Maximum energy rating cannot exceed 300 Wh
- Box marked:
 - “DoT SP 21693”
 - Copy of permit attached
 - “Damaged/Defective Lithium Ion Battery”
 - “For Ground Transportation Only - Forbidden for Transport By Aircraft and Vessel”
 - Low Energy Sticker
 - **Lithium Battery Mark (3480 or 3481)**
 - Emergency Response Info
- Training required

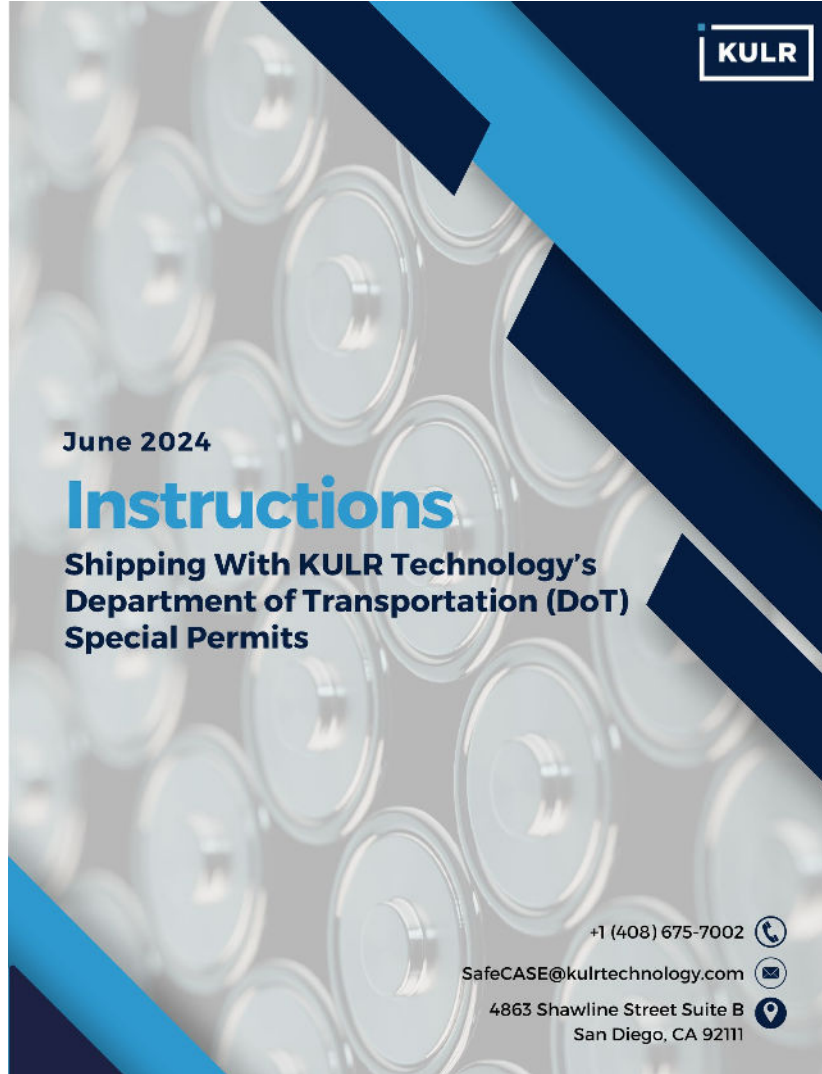
Your shipping partner will provide you with the following labeling based upon your description of your batteries.



Refer to shipping instruction checklists for complete requirements.

Shipping Matrix – Quick Guide

Click here →



Hazmat Trainings By Tier

Tier 1: Shipping, Handling & Closure Training

- <https://www.kulrtechnology.com/wp-content/uploads/2024/06/Tier-1-Shipping-Handling-Closure-Training-SafeX.pdf>

Tier 2: Online Training and Quiz Handling & Closure

- <https://hazmatsafety.com/>

Tier 3: Fully Regulated Hazmat Training

- <https://hazmatsafety.com/>

Documentation For Prototype Shipping (Use When Needed)

Shipping Paper Contents

- Your shipping partner will provide proper documentation. Shipments of hazmat must be accompanied by a shipping paper that contains:
 - Basic Description of Hazardous Material
 - UN Number, Proper Shipping Name, Hazard Class, PG
 - Number and Type of Packages
 - Net Quantity (Weight) of Hazmat Shipped
 - Emergency Response Phone Number
 - Emergency Response Information
 - Shipper's certification

The image shows a sample of a shipping paper for hazardous materials. The form is titled "HAZARDOUS MATERIALS FOR SHIPPERS GUIDE" and includes fields for shipper and recipient information, a "HAZARDOUS MATERIALS" section with a red dashed circle around it, and a "SHIPPER'S CERTIFICATION" section at the bottom. The FedEx logo is visible in the top right corner.

*Note: You must maintain a copy of each shipping paper at least two (2) years.

Documentation For Prototype Shipping (Use When Needed)

SHIP FROM				Bill of Lading Number:		
Company A 123 Main Street Milwaukee, WI 53201						
SHIP TO				Carrier Name:		
Company B 1234 Fake St. Minneapolis, MN 55404				Trailer number: Serial number(s):		
Special Instructions:						
EMERGENCY CONTACT PHONE NUMBER: +1 (414) 555-1231						
CARRIER INFORMATION						
Package				LTL Only		
Qty	Type	Weight	HM (X)	Commodity Description		NMFC No. / Class
1	Fiberboard Box (4G)	15 lbs.	X	UN3480, Lithium ion batteries, 9 ERG Page 147		
Shipper Signature/Date				Carrier Signature/Pickup Date		
→ <i>John Smith</i>						
This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation				Carrier acknowledges receipt of packages and required placards. Carrier certifies emergency response information was made available and/or carrier has the DOT emergency response guidebook or equivalent documentation in the vehicle. Property described above is received in good order, except as noted.		

Total Weight of Battery

Number & Type of Packages

Shipper's Certification

Emergency Response Phone

Basic Description

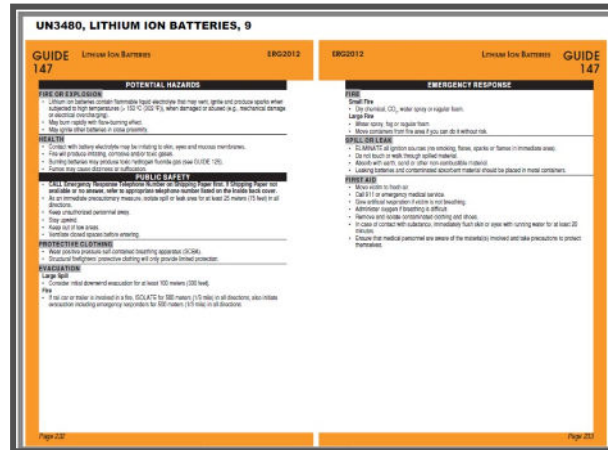
Emergency Response Info

Documentation For Prototype Shipping (Use When Needed)

Emergency Response

- Information is required whenever a shipping paper (e.g. Shipper's Declaration) is needed:
 - Written Form (SDS, ERG Page, Other)
 - Emergency Response Telephone Number

1



2



+1 (800)255-3924

ERG Page 147

Facility Management

Best practices for managing your facility for safely preparing batteries for shipping:

Entry/Exits/Plan

- Keep exits clear of any obstructions, allowing easy egress.
- Store batteries away from any exits or exit doors, minimum of 5 feet.
- Have a fire safety plan with emergency response actions to be taken upon detection of a fire or possible lithium fire.

Safety Equipment

- Your indoor area should be protected by a fire alarm system, utilizing air-aspirating smoke detectors or radiant energy-sensing fire equipment.
- Your facility should have an automatic sprinkler system, with fire detection.

Storing Batteries

- No more than 15 cubic feet of lithium-ion batteries should be stored in containers.
- Containers should be open-topped and constructed of noncombustible materials or approved for battery collection.
- Individual containers or group of containers shall be separated by not less than 3 feet of open space, or 10 feet of space that contains combustible materials.
- Containers shall be located not less than 5 feet from exits or exit access doors.
- Where feasible, reduce the state of charge of batteries to 30% or less.

Permissions

- Permits may be required for sites that store more than 15 cubic feet of lithium-ion batteries. (NFPA Regulation 322).

Handling a Hot Battery

Hot Battery Situation

- Lithium-ion batteries can become hot. As soon as it has been determined that a hot battery situation exists:
 - Completely evacuate all personnel from the area.
 - The area should be secured so that no unnecessary persons enter.
 - If it is safe to do, before evacuating the area, quickly determine if an external short-circuit is present and remove it as quickly as possible.
 - Note that some cell chemistries may enter a thermal runaway reaction above a certain temperature; thus, a cell may continue to gain heat and there may be a cascade to other cells.
 - The area should remain evacuated until the cell has cooled to room temperature.
 - Using appropriate personal protective equipment and after the hot battery has cooled to normal temperature, the cell should be removed from the work area and disposed of appropriately.

Emergency Response

Guidelines for Emergency Response

- The Lithium-ion batteries may be flammable, especially if damaged, abused, short circuited, overcharged, or left at high temperatures, and may release dangerous gases.
- The following are some guidelines for emergency response:
 - Lithium-ion battery fires are some of the most difficult fires to suppress.
 - Lithium-ion batteries may ignite other batteries in close proximity.
 - Fumes may cause damage to respiratory tract, eyes, and skin, and may likewise be flammable and explosive.
 - In the event of a lithium-ion battery leak or overheating, isolate the battery or place in a metal receptacle filled with sand or water.
 - Do not approach a battery that is leaking or overheating unless properly protected.
 - Burning batteries may vent violently or emit projectiles. If a battery is burning, do not attempt to handle it.
 - Batteries can usually be isolated in a metal receptacle, with the use of protected fire resistant and heat insulated gloves or tongs. Always wear eye protection when approaching.
 - Keep unauthorized personnel away. Ventilate closed spaces before entering.
 - Evacuate as needed to protect employees from hazardous fumes and smoke.
 - Small lithium-ion battery fires can be extinguished with ordinary extinguishing agents (ABC extinguishers).
 - Small lithium-ion fires can be extinguished with Halon or CO2 extinguishes as recommended agents.
 - Dry chemical or water-based extinguishers are not as effective but may also be used.
 - Cold water can be used to cool the fire to avoid re-ignition.
 - Gel-based extinguishers such as Fire Ice are effective at cooling and suppressing fires. If other combustibles catch fire as a result of the lithium-ion battery, then use the appropriate extinguishing agent to douse these secondary fires.
 - It's important to address each type of fire with the appropriate extinguishing agent.

Cleanup Procedures – Leaking Lithium-Ion Batteries

Protocol

- Only trained/qualified personnel should cleanup from lithium-ion battery incidents:
 - Contact the battery's Original Equipment Manufacturer (OEM) to request any cleanup protocols.
 - Wear appropriate personal protective equipment (e.g., gloves, safety glasses).
 - Place leaking cell in a sealable plastic bag and cover with a mixture of neutralizing agent (soda ash or baking soda) and absorbent material (vermiculite). Double-bag the leaking cell and seal the bag.
 - Absorb/neutralize any spilled electrolyte with absorbent material and neutralizing agent.
 - Collect the contaminated absorbent into a sealable bag.
 - After removing the cells and any absorbent/neutralizing materials, the areas can be cleaned with water or an ammonia-based cleaner.
 - Place all waste materials in an appropriate container.

First Aid

What To Do

- In case of contact with lithium-ion battery electrolyte, gases, or combustion byproducts, the following should be considered:
 - Warn others and report the emergency.
 - Evacuate to a safe area.
 - Attend to any person that has been exposed to the material, if safe to do so.
 - Wait for further instructions from the Emergency Coordinator.
 - Move victim to fresh air.
 - Call 911 or emergency medical service.
 - Give artificial respiration if victim is not breathing.
 - Administer oxygen if breathing is difficult.
 - Remove and isolate contaminated shoes and clothing.
 - In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
 - Ensure that medical personnel are aware of the material(s) involved and take precautions to protect them.

Emergency FAQs SafeX Training

These FAQs provide a quick reference guide to managing lithium-ion battery fires and related emergencies, ensuring safety and compliance with best practices and regulations.

- <https://www.kulrtechnology.com/wp-content/uploads/2024/06/Emergency-FAQ-SafeX-Training.pdf>

Thank You!

Thank you for safely shipping your batteries using SafeCASE. You should be **emailed** a copy of these slides upon completion of this training. If you do not receive them, please **contact KULR**, and we will email them to you. We look forward to partnering for battery safety.

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