INDUSTRY GUIDANCE

TRANSPORTING HIGH ENERGY BATTERIES FOR RECYCLING

Revised January 27, 2023

U.S. Transport Regulation	AIR *(IATA)*	VESSEL *(IMDG)*	GROUND *(49 CFR)*
Rechargeable Battery *(Shipped Fully Regulated)*	Forbidden	> 100 Wh	> 300 Wh
Special Permits *(Regulatory relief)*			> 300 Wh to < 3600 Wh
		Maximum Watt Hour Rating	

U.S. OVERVIEW

- Under DOT Title 49 CFR § 173.185, lithium ion batteries not exceeding 300-watt hours and not more than 30 kg (66 pounds) per package can be shipped via ground transportation under Hazmat exception rules that allow the shipper to forego many of the fully regulated shipping requirements (e.g. shipping papers, marking, labelling, documentation, emergency response information and training).
- At end-of-life, batteries rated at greater than 300 Wh require specialized UN tested and certified packaging and training to ship for final disposition; whether for recycling or return to the manufacturer for evaluation, these batteries must be shipped fully regulated.
- Without a DOT Special Permit, shipping batteries rated at greater than 300 Wh for recycling requires fully regulated hazardous materials shipping.
- Very few collection sites are well-versed in how to compliantly manage greater than 300 Wh batteries, which includes labeling, packaging, and employee training. Navigating the complex regulations and requirements can be complicated and time-consuming.
- Any employee involved in offering hazardous materials for transportation must be trained and certified to legally perform the functions they are responsible for performing (e.g., completing shipping papers, packaging hazardous materials, marking and labelling packages).
- Fully regulated products are not covered in this document and require training.

BACKGROUND

Industry information has been compiled to assist in the end-of-life recycling and transporting of “high energy” lithium ion batteries (i.e., batteries rated at greater than 300 Wh per battery).

Outdoor Power Equipment Institute (OPEI) is an international trade association representing the manufacturers and their

suppliers of all power sources including battery and electric products, non-road gasoline powered engines, personal transport & utility vehicles, golf cars and consumer and commercial outdoor power equipment (OPE). Our industries products are core critical to the landscape, forestry, and constructions industries.

The Power Tool Institute (PTI) is the leading organization for power tool safety resources, information, and education, including the Take Charge of Your Battery campaign. Its members represent market leading brands of portable and stationary power tools.

Manufacturers from these industries continue to partner with industry stewards (i.e. Call2Recycle, CIRBA). Through effective educational and communication programs we continue to help drive proper recycling efforts. For instance, the extensive and successful *Avoid the Spark…Be Battery Safety Smart* ™ communications program implemented through Call2Recycle has been both pro-recycling and pro-safety.

However, getting high energy batteries to the last step in a circular economy comes with various technical and economic challenges. As these industries continue to shift into higher energy batteries, the need to properly care for these batteries at the end-of-life grows as well. Especially as there are increasing demands for raw material supplies and rare earth metals.

Today's regulations limit an end user's ability to easily transport these batteries back to manufacturers or potential recycling partners unless there are proper drop-off locations with certified vendors. Through industry outreach we are learning of new developments that may fill these transportation gaps in the future. However, this will take time and may require special packaging that could be restricted by yet another watt hour ceiling limitation.

This document provides a summary of transportation regulations for shipping high energy lithium ion batteries and the current limited options for transporting such batteries. Recommended steps outline how industry can close the gap for proper end-of-life management but concerns on economies of scale remain relevant.

REGULATION RESOURCES AND SUMMARY

The United States Department of Transportation (DOT) hazardous materials

regulations (HMR) classifies lithium ion batteries as Class 9 miscellaneous hazardous materials, one of nine hazard classes that present a hazard during transportation. Title 49 CFR § 173.185 Code of Federal Regulations provides the legal requirements for the shipment of lithium cells and batteries (including lithium ion and lithium metal) to, from and within the U.S. by air, vessel and ground (highway and rail). Guidance has been published by PHMSA, which addresses the transportation of end-of-life batteries and damaged and defective lithium batteries.

Air and vessel shipments must also meet the requirements of the IATA Dangerous Goods Regulations (air) and the *International Maritime Dangerous Goods (IMDG vessel) Code*. The shipment of lithium ion batteries are subject to strict hazardous materials shipping requirements, including those regarding shipping papers, marking, labeling, placarding, emergency response information and training as set forth in Part 172 of 49 CFR (Subparts A through I).

HMR also authorize lithium ion batteries to be transported in accordance with the International Civil Aviation Organization's (ICAO Annex 18) Technical Instructions on the Safe Transport of Dangerous Goods by Air (ICAO TI) when shipped aboard aircraft. This international regulation includes provisions for the classification of dangerous goods, circumstances when dangerous goods are forbidden on passenger or cargo airplanes, hazard communication and packing instructions which specify maximum quantities of dangerous goods per packaging.

Title 49 CFR § 173.185(c) provides significant exceptions for the ground shipment (highway or rail) of smaller lithium cells or batteries. Specifically, the ground shipment of lithium ion batteries rated at less than or equal to 300 Wh are not subject to the shipping papers, marking, labeling, placarding, emergency response information and training requirements or the UN performance packaging requirements contained in § 173.185(b)(3)(ii) and (iii). To qualify for this particular exception, each package cannot exceed 30kg (66 lbs.). Each outer packaging of lithium ion batteries must still display the lithium ion battery mark shown in § 173.185(c)(3) and "LITHIUM BATTERIES – FORBIDDEN FOR TRANSPORT ABOARD AIRCRAFT AND VESSEL" mark described in § 173.185(c)(1)(iii). However, such shipments are not treated as fully regulated Class 9 hazardous materials and the shipper is not

required to be hazmat shipper trained to offer the package for transport.

Per § 173.185(d), ground shipments of lithium ion batteries for disposal or recycling qualify for the previously noted exceptions provided by § 173.185(c) for lithium ion batteries with a Watt Hour rating not exceeding 300 Wh. However, 49 CFR does not provide any additional relief when it comes to the shipment of lithium ion batteries exceeding 300 Wh for reverse logistics or recycling.

To date, without a DOT Special Permit, shipping lithium ion batteries rated at greater than 300 Wh for recycling requires fully regulated hazardous materials shipping. There are Special Permit(s) issued by PHMSA for lithium ion batteries exceeding 300 Wh, though there are multiple companies approved for Special Permits that allows 300-3600 Wh per package.

Exceptions

The U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration (PHMSA) has issued the following Special Permits for limited relief:

- Call2Recycle: Special Permit 20851

- KULR Technology: Special Permits 21167, 21139, and 21193

- Packaging and Crating Technologies, LLC: Special Permits 21307 and 21018

- Americase: Special Permit 16011

Additional Regulation Resources

Safety Advisory Notice for the Transportation of Lithium Batteries for Disposal or Recycling

Title 49 – Transportation

Guide to Developing a HAZMAT Training Program

UPS High Energy Lithium Ion Battery Flow Chart (Figure 8)

NEXT STEPS

Presently, the transportation of high energy lithium ion batteries is determined by individual industry participants. As battery sizes and formats continue to evolve, it will make it difficult for recycling vendors to create a universal solution. Participants can perform these recommendations to help address the growing concerns around transporting high energy batteries.

- Manufacturers can work together with recycling vendors and packaging manufacturers who receive special DOT

permits or support vendors to continue pursing different DOT options for regulation updates (e.g., Damaged Containers, Watt Hour thresholds, and how to resolve any specific rising issues).
- Manufacturers and industry to stress the importance of high energy battery recycling options with national retailers. Retailers already perform reporting and training on rechargeable batteries.
- Approach other battery recycling vendors for potential “Take-Back” programs.

Current market solutions will require extra resources. Long-term recommendations will require additional industries involvement to grow the overall demand in such “take-back” programs.

- Determine a vendor model for shared cost recycling programs (similar to current programs with less than or equal to 300 Wh).
- Train individual networks to accept, store, and transport high energy batteries. Vendor models options could provide the necessary widespread hazmat training.

INDUSTRY SOLUTIONS

Call2Recycle, Inc.

https://www.call2recycle.org/

Call2Recycle can currently recycle batteries rated at less than or equal to 300 Wh which does not require the shipper to be hazmat trained and certified, provided thatCall2Recycle offers packaging and packing instructions for drop-shipping batteries. Their special permit allows shipments of lithium ion batteries rated at greater than 300 Wh (and rated up to 3600 Wh) with a battery charge indicator - as long as they are marked, labeled and placarded as fully regulated Class 9 hazardous materials, but the shipments are not subject to the shipping papers, emergency response information and training requirements. Importantly, this allows non-hazmat trained shippers to offer packages containing batteries rated up to 3600 Wh for transporting via ground shipment within the U.S.

A multi-state volunteer program is being developed for retailer collection offers an easy, convenient, and free way for consumers to recycle their high energy batteries. Once the retailer/shipper is trained, they will automatically receive a special battery recycling kit for end-of-life and damaged/defective usage. Industry program participants that support the

program can take advantage of education materials, safety training, and continuous program support.

Cirba Solutions

https:/www.cirbasolutions.com/

Cirba Solutions offers a customized program for single or bulk shipments of lithium ion batteries. These programs require fully regulated documentation and labeling except when utilizing special permit approved packaging.

KULR Technology Group

https://www.kulrtechnology.com/safe-case/

KULR offers a safe and reusable packaging solution for transporting end of life and damaged or defective batteries up to 2.5KWh per case. Additional efforts are being made to address batteries up to 10KWh and more.

ADDITIONAL RESOURCES

- OPEI
  https://www.opei.org/battery-basics/
- PTI
  https://www.powertoolinstitute.com/
- PRBA
  https://www.prba.org/lithium-battery-transport-information/
- IATA Lithium Battery Guidance Document
  https://www.iata.org/en/programs/cargo/dgr/lithium-batteries/
- Lion Technology
  https://www.lion.com/catalog/courses/hazmat-ground-shipper-certification-(dot)-initial

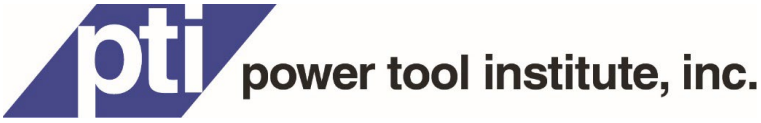
COMPILED BY

1605 King Street

Alexandria, VA 22314

PH: 703.549.7600

https://www.opei.org/



1300 Sumner Avenue

Cleveland, OH 44115

PH: 216.241.0105

https://www.powertoolinstitute.com/