

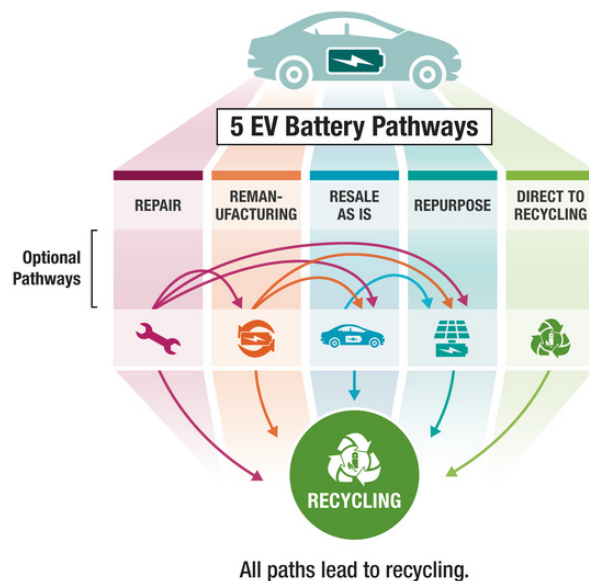


EV BATTERY SHIPPING GUIDELINES

IDENTIFICATION, COLLECTION, AND TRANSPORTATION

The information herein is provided as a resource; it is not a directive. It is the responsibility of the shipper (employed by the company holding the battery) to have knowledge of and be aligned with the regulations, including but not limited to, identifying the EV battery, deciding on its disposition, and signing the bill of lading. This guide is not a replacement for the standard operating procedures of your company or that of the service provider being contracted to manage the EV battery logistics. Call2Recycle is not responsible for errors in judgment on behalf of the shipper as a result of reading this document.

EV BATTERY PATHWAYS



Source: Call2Recycle®

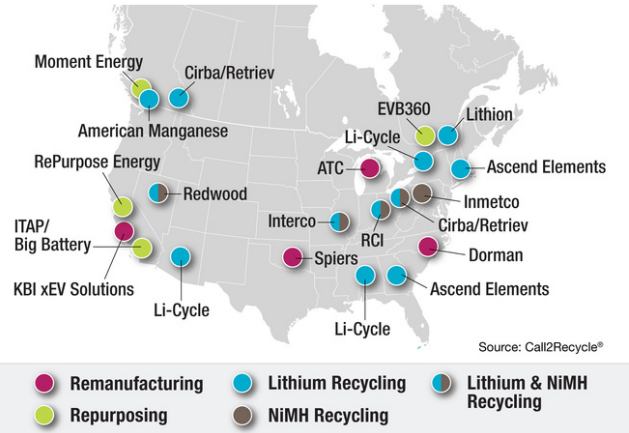
- 1 **Repair** is done at the dealership and is not an option for auto dismantlers, recyclers, and shredders.
- 2 **Remanufacturing** of end-of-vehicle life EV battery by a known company for reuse in similar vehicle from which it came.
- 3 **Resale** of end-of-vehicle life EV battery in an 'as is' state to a 3rd party.
- 4 **Repurposing** of end-of-vehicle life EV battery by a known company for an alternative use other than what the batteries was original intended for.
- 5 **Recycling** of end-of-life and damaged-defective batteries by a professional battery recycling company.

EV BATTERY DESTINATIONS

Companies performing various EV battery services.

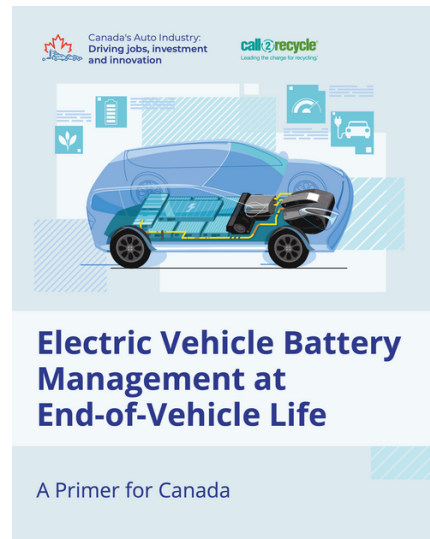


North American EVB Management Sites



REGULATORY REQUIREMENTS

Please read Section 4 of the [Primer on page 29, titled Rules and Requirements Governing the Management of EV Batteries in Canada](#), for an explanation pertaining to the regulations governing shipping EV batteries in Canada.



EV BATTERY IDENTIFICATION

- **Look for the battery label and identify the:**
 - chemistry.
 - vehicle make, model, year.
 - battery serial number or similar identifying number.
- Measure the battery width, length, height and the battery weight (if possible).

This information is important for two reasons:

1. Identifying chemistry and vehicle helps decide which remanufacturer, repurposer, or recycler to ship to.
2. Battery size and weight play a factor in shipping container size (if needed) and transportation costs.

EV BATTERY DISPOSITION: END-OF-LIFE VS. DAMAGED-DEFECTIVE

Transport Canada (TC) requires the shipper to identify if the battery is end-of-life (EOL) or damaged-defective (DD). The shipper is the individual employed by the company shipping the battery who is required by law to make the final decision if the battery is end-of-life or damaged-defective, and is also the person required by law to sign the bill of lading.

Damaged characteristics:

- Dents, punctures, cracks in battery out shell.
- Water damage including water coming out from within the battery pack*.
- Corrosion on the terminals.
- Broken terminals.
- Loose wiring from inside the battery pack.
- Signs of tampering.

* If the electric vehicle and/or battery pack has been damaged due to flooding from a natural disaster (salt water or fresh water) do not attempt to charge or drive the vehicle/battery. Call first responders as the battery pack may now be at risk of a thermal event.

Defective characteristic:

- The battery management system is giving a readout code.

Thermal event batteries are classified as damaged-defective, however, have different characteristics:

- Burnt marks and/or soot
- Swelling
- Melted plastic
- Hot to touch
- White/grey smoke
- Sweet bubble gum type of smell
- Crackling sound
- Flames

End-of-life battery definition:

- A used EV battery that has come to the natural end of its in-vehicle life. This battery has no signs of thermal events, damage, or defects.

EV BATTERY PACKAGING

Regulatory requirements pertaining to EV batteries:

TDG Regulations: [Part 5 – Means of Containment](#)

Small Means of Containment:

Transport Canada classifies ‘small means of containment’ as being a volume of less than 450 litres. These types of containers would include drums, barrels, boxes, and crates. Many HEV and PHEV batteries could be shipped using a Small Means of Containment. Further, if a larger EV battery is disassembled to modules and the modules ship in 205 litre drums, this type of shipment may also fall into the definition of small means of containment.

[Section 5.12](#) of the TDG Regulations indicates that when NiMH and Li-ion EV batteries (Class 9) are transported in small means of containment, it must be done in compliance with [Packing Instruction 801 of Transport Canada Standard TP14850E](#).

Large Means of Containment:

Most EV batteries from full-battery electric vehicles require a large means of containment (defined as having a volume greater than 450 litres), but the identification of a specific container is not as straightforward as with small means of containment. TDG Regulation Section 5.14 directs shippers to follow standards CGSB-43.146 (Canadian General Standards Board) and CSA B621 (Canadian Standards Association). However, means of containment built to these two standards are often not suitable for EV batteries. Therefore, to transport EV batteries in Canada, a company may need to apply to Transport Canada for an Equivalency Certificate (EC) to permit the use of a non-standardized means of containment such as those depicted below.

Information on obtaining an equivalency certificate can be found on the Transport Canada website. ([Equivalency certificate applications](#) – and access can be made using the following web portal [Approvals - Login \(tc.gc.ca\)](#), or via email at tdgpermits-permistmd@tc.gc.ca).

Call2Recycle’s Permit with Transport Canada

When shipping with Call2Recycle, end-of-life EV batteries containing a hard outer shell on all 6 sides may be shipped on a pallet at Call2Recycle’s discretion. Damaged-defective-recalled EV batteries require a packing group 1 rated container and may further require some form of fire-retardant material at Call2Recycle’s discretion.

Examples



Pallet use at Call2Recycle’s discretion when the end-of-life EV battery has a hard out shell on all sides.



Packing group 1 multiple reuse steel container lined with fire retardant material for damaged-defective-recalled EV batteries. Wood variations also permitted.

PACKING EV BATTERIES

Guidelines for packing end-of-life EV battery packs include but are not limited to:

1. Taping the terminals.
2. Strapping the EV battery to the pallet or within a packing group 2 container.
3. Placing the bill of lading, Class 9 placard, and permit numbers on each battery pack.

Guidelines for packing damaged-defective EV battery packs include but are not limited to:

1. Taping the terminals.
2. Placing the EV battery into a packing group 1 container.
3. Laying a fire blanket over the EV Battery, or skip step 3 and use step 5 instead.
4. Strapping the EV battery within the container to avoid shifting.
5. Use of fire-retardant material around the EV Battery inside the container.
6. Placing the bill of lading, Class 9 placard, and permit numbers on the shipping container.

Guidelines for packing end-of-life EV battery modules include but are not limited to:

1. Taping the terminals on each module.
2. Gently layering the modules in either a packing group 1 or 2 drum or;
3. Gently layering the modules in either a packing group 1 or 2 container with straps to hold the modules in place or;
4. If the modules have a hard out shell on all 6 sides and are large enough for securely strapping to a pallet, use of a pallet may be an option.
5. Placing the bill of lading, Class 9 placard, and permit numbers on the drum, container, or pallet.

Guidelines for packing damaged-defective EV battery modules include but are not limited to:

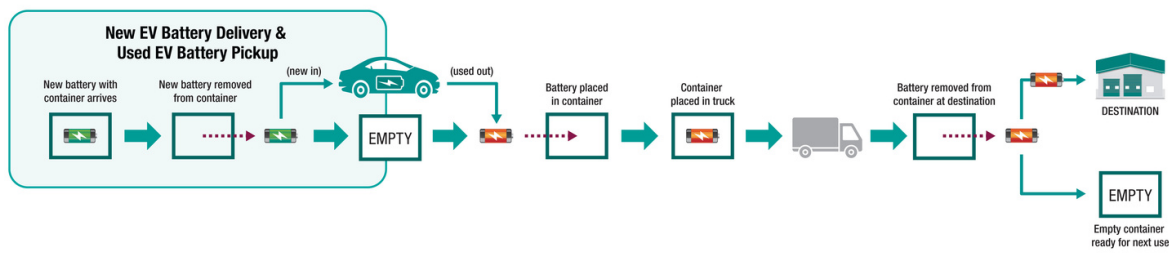
1. Taping the terminals.
2. Gently placing the EV battery modules into a packing group 1 vented drum, along with fire retardant, in a continually layered format (building a battery parfait) or;
3. Gently layering the modules in a packing group 1 container with straps to hold the modules in place and use of fire-retardant material around the EV battery modules inside the container.
4. Placing the bill of lading, Class 9 placard, and permit numbers on the drum or shipping container.

Transportation requirements pertaining to lithium cells and batteries:

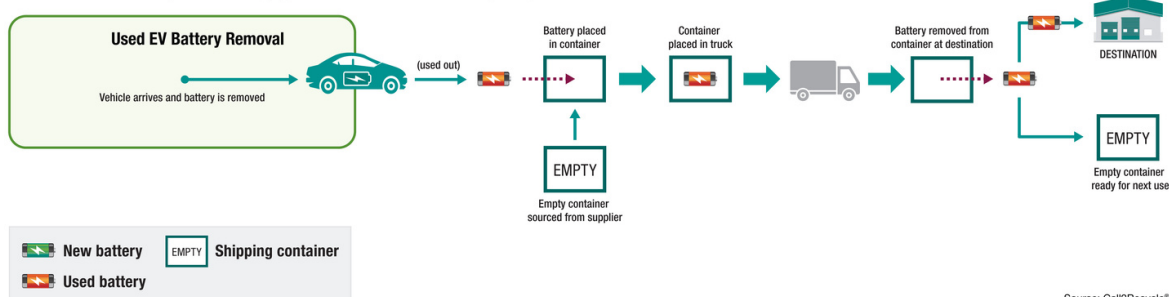
- The batteries must ship with a carrier approved for transporting dangerous goods
- The driver of the vehicle must be a trained Hazmat Employee as required by TC.
- Shipping containers need to be arranged for and managed in a manner similar to the example in this next graphic, all in alignment with [Transportation of Dangerous Goods Regulations](#). Management of shipping containers will play a significant role in minimizing costs associated with handling end-of-life EV batteries.

The Logistics of EV Battery Shipping Containers

Scenario A: Battery Exchange (e.g. Dealership)



Scenario B: Battery Removal (e.g. auto dismantler & recycler)



Source: Call2Recycle®

Training and Signing Bill of Lading

[Part 6 of the TDG Regulations](#) requires that a person who handles, offers for transport (including signing the bill of lading), or transports dangerous goods, be adequately trained, and hold a valid training certificate. A person who does not have proper training and/or a valid training certificate may perform these activities in the presence and under direct supervision of a properly trained person who holds a valid training certificate. In addition, specific training requirements or exemptions are set forth and may be specified in an Equivalency Certificate.

A person is considered to be properly trained if they have sound knowledge of all the topics listed in [sections \(a\) to \(m\) of Part 6.2 Adequate Training](#) of the regulations, particularly as it relates to that individual's duties and to the dangerous goods they are handling and/or offering for transport.

ABOUT CALL2RECYCLE

Call2Recycle is the leading North American battery recycling network for industry, committed to the safe and responsible collection, transportation, sorting, and recycling of batteries and related devices, whether they are at end-of-life, damaged or defective, or recalled.

As non-profit organizations in both the United States and Canada, the companies have collectively recycled more than 209M pounds / 94M kilograms of batteries safely and responsibly since 1994.

The organizations bring a full spectrum of services to approximately 400 companies spanning diverse industries - household battery, hearing aid, power tool, cell phone, laptop, outdoor power equipment, electric bicycle, and electric vehicle. Companies choose to work with Call2Recycle for its effective cost management, safety-focused approach, and regulatory compliance expertise.

Call2Recycle Canada, Inc. is headquartered in Toronto, Ontario, while Call2Recycle, Inc. is headquartered in Atlanta, Georgia.

For more information:

- Call2Recycle Canada: www.call2recycle.ca/ev
- Call2Recycle US: www.call2recycle.org/ev