



# Storage and management of waste batteries - guideline

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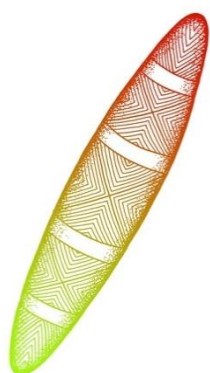
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### Introduction

Collecting and recycling waste batteries is an important service provided by local government and businesses. All waste batteries are considered electronic waste (e-waste) and are banned from landfill.

This guideline applies to waste and resource recovery facilities such as e-waste transfer stations, materials recycling facilities and reprocessing facilities that receive, store or transport waste batteries.

The guideline is designed to help people in management or control of waste batteries. It explains how to manage the collection and storage of different types of waste batteries.



### Batteries and their risks

There are many types of batteries in use today. The chemistry and properties of a battery varies depending on the type. This means that different types of batteries have unique **hazards** and **risks** to human health and the environment.

It is important that you understand the specific risks of harm from the types of waste batteries.

Batteries can be combustible, flammable, corrosive and toxic to the environment and human health. They can emit gases, leak fluids, produce sparks and be an ignition source.

You have a duty to eliminate or minimise these risks to human health and the environment, so far as reasonably practicable.



Have you heard about the Australian Battery Stewardship Scheme? The stewardship scheme will work to help improve national waste battery management, resource recovery, and workplace safety. Joining the stewardship scheme can help you meet your environmental obligations. For more information on how to join the stewardship scheme, visit the [Battery Stewardship Council website](#).

## EPA regulation of batteries as e-waste

Environment protection laws in Victoria require you to take proactive steps to manage risks of harm from pollution and waste. This includes the Environment Protection Act 2017 (EP Act) and Environment Protection Regulations 2021 (EP Regulations). Table 1 below shows some of your key regulatory requirements.

Table 1: Requirements that apply to the management of waste batteries.

Your environmental requirements	
<p><b>The EP Act</b></p> <p><b>General Environmental Duty (GED)</b></p> <p><b>&amp;</b></p> <p><b>Priority waste duty</b></p> <p><b>&amp;</b></p> <p><b>Reportable priority waste duty</b></p>	<ul style="list-style-type: none"> <li>The EP Act outlines your broad duties</li> <li>The <a href="#">GED</a><sup>1</sup> applies to any person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste. The person must minimise their risks of harm so far as reasonably practicable.</li> <li>This includes a person or business that accepts e-waste (waste batteries of any type) or specified e-waste (e.g. rechargeable batteries) for collection, storage, handling, transport, or reprocessing.</li> <li>Most batteries are classified as a priority waste (EPA waste classification: e-waste, waste code T300) and have waste duties<sup>2</sup> as they apply to your activities.</li> <li>Lead-acid batteries (waste code D220) and nickel-cadmium batteries (waste code D150) are classified as reportable priority waste.</li> </ul> <p>For businesses handling small quantities of lead-acid or nickel-cadmium batteries please see <a href="#">EPA's website</a> for up to date information on EPA's expectations for management and transport requirements.</p>
<p><b>EP Regulations (including Permissions)</b></p>	<ul style="list-style-type: none"> <li>The EP Regulations apply alongside the EP Act by providing certainty and detail on how to fulfil obligations.</li> <li><a href="#">Permissions</a> (e.g. licences, permits, registrations) allow you to legally receive waste and recycling materials at your facility. They also ensure certain standards and conditions are met at your facility.</li> <li>An AO2b licence permission is required when reprocessing specified e-waste at a design capacity of more than 500 tonnes per year.</li> <li>An AO2c registration permission is required when reprocessing specified e-waste at a design capacity of less than 500 tonnes per year.</li> <li>An A13 permission waste and resource recovery permission (licence, permit or registration depending on scale and types of waste received) is</li> </ul>

<sup>1</sup> This duty refers to s25 *General environmental duty* in Environment Protection Act 2017 (EP Act)

<sup>2</sup> These duties refer to s135 *Duty of persons involved in transporting industrial waste* and s139 *Duties of persons managing priority waste* of the EP Act.

	required for the receipt, storage and processing of many waste types, including non-specified e-waste (non-rechargeable batteries).
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**Note:** The Waste Management Policy (e-waste) and the Waste Management Policy (Combustible Recyclable and Waste Materials) were previously used to regulate waste batteries as part of the Environment Protection Act 1970. From 1 July 2021, refer to Table 1 to understand your legal duties and requirements.

## WorkSafe regulation of batteries and dangerous goods

Batteries such as lithium, alkaline, nickel cadmium, and lead-acid are classified as Dangerous Goods under the [Victoria Dangerous Goods Act 1985](#).

The storage and transportation of dangerous goods are regulated by WorkSafe under:

- **Storage** by the [Dangerous Goods \(Storage and Handling\) Regulations 2012](#); and the Dangerous Goods (Storage and handling) Amendment (Notification) Regulations 2021; and
- **Transport** by the [Dangerous Goods \(Transport by Road or Rail\) Regulations 2018](#) and the [Australian Code for the Transport of Dangerous Goods by Road and Rail \(ADG Code\)](#).

## Managing your risks

Managing risks from waste batteries at your facility is an ongoing responsibility. Undertaking a risk assessment will help you understand how to manage your hazards and risks.

The method for assessing and controlling risk has four steps (see Figure 1). This method is a continuous process which returns to step 1 after a control is put in place. Refer to [Assessing and controlling risk: a guide for business](#) (EPA publication 1695) for more guidance on completing and documenting your risks.



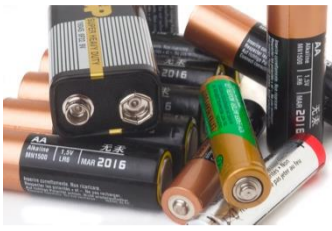












Figure 1: Steps in controlling hazards and risks

Step	Action	Description
1	<b>Identify hazards</b>	Identify all hazards (e.g. fire, chemical spill) from waste batteries that could cause harm to human health and the environment.
2	<b>Assess risks</b>	Asses the risk, based on the likelihood of the hazard causing harm, and the consequence of that harm.
3	<b>Implement controls</b>	Implement suitable control measures, based on what is reasonably practicable for your business, with the aim of choosing the highest level of protection and reliability.
4	<b>Check controls</b>	Check controls regularly to make sure they are working, well maintained, effective and remain the most appropriate option. This process includes monitoring control measures and identifying any changes that may need to be made to improve their effectiveness.

Refer to Table 2 on the next page for information on hazards and risks of different battery types. Provide this information to employees and persons undertaking an activity related to the management and storage of waste batteries.

Completing a risk assessment will help you identify and implement controls based on your facilities' site-specific risks. You can implement other controls not covered in this guide, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment as far as reasonably practicable.

Table 2: Battery types, hazards, chemistry, and specific storage requirements.

Battery type	Typical uses	Hazards	Chemicals and metals of concern	Photos	Recommended storage container
<b>Alkaline</b>	Flashlights, cameras, portable radios, audio players, and toys.	Corrosive, respiratory, eye and skin irritation	Manganese, potassium hydroxide, zinc		<b>200L container</b> 
<b>Button batteries</b>	Hearing aids, pacemakers, camera, calculators, watches	Ignition source (short circuit)	Lithium, copper, nickel, potassium/sodium hydroxide, silver, zinc, mercury		<b>Maximum of 30kg in container</b> 
<b>Lithium and lithium-ion<sup>1,2</sup> batteries (small and large)</b>	Small appliances, cameras, computers, electric vehicles, medical equipment, mobile phones power tools, watches.	Ignition source, combustible, potential toxic gas release in combustion scenarios	Lithium, iron, cadmium, cobalt, manganese		<b>Maximum of 30kg in container</b> 
<b>Nickel metal hydride</b>	Rechargeable appliances such as portable power tools, hand held vacuums	Potential gas release under combustion	Nickel		<b>200L container</b> 
<b>Nickel-cadmium batteries</b>	Rechargeable appliances such as portable power tools, hand held vacuums	Toxic metals, corrosive, can react with air under combustion	Nickel, cadmium		<b>200L container</b> 
<b>Mixed batteries (e.g. containers with alkaline, lithium and others)</b>	Varies depending on batteries in mixed load. Typically made up of 70-80% alkaline Batteries, plus lithium and nickel based batteries.	Varies depending on batteries in mixed load. Can be an ignition source toxic metals, corrosive, flammability.	Varies depending on batteries in mixed load. Can be all of the chemicals listed above.		<b>Maximum of 30kg in container</b> 
<b>Used lead acid</b>	Automotive, marine, industrial applications	Toxic metals, corrosive	Sulfuric acid, lead		Store upright on a pallet (no more than two layers of batteries). Secure with non-conductive strapping for transport.

**Notes:**

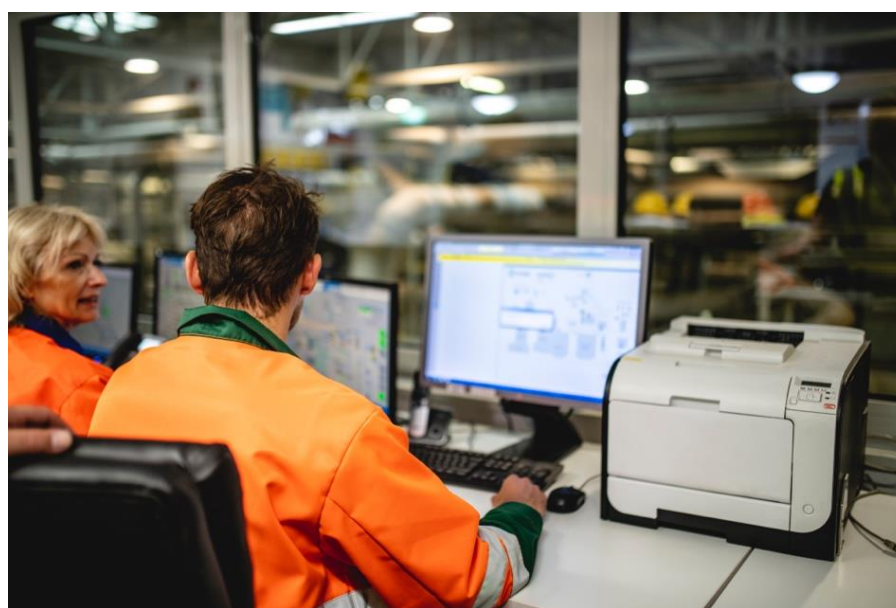
1. It may not just be the battery cell itself, but also components where batteries cannot be easily physically separated from the product and/or casing. This may also include portable chargers, power banks, handheld equipment, video game consoles, laptop batteries, mobiles, pads, e-books, devices that charge via USB connection.
2. May also include rechargeable batteries, which are specified electronic waste as per the EP Regulations.
3. General battery storage and management practices discussed in this guideline should be considered across all battery types in addition to the storage recommendations listed in this table.



### General storage controls

Your collection and designated storage areas should have controls in place to manage the risks from waste batteries. **General storage controls** you should consider at your facility include:

- adequate ventilation
- signage to indicate battery storage
- mixed loads of batteries may require dangerous goods labels for Class 8 (e.g. some batteries other than lithium) and Class 9 (e.g. lithium batteries)
- impermeable floor and wall surfaces
- weatherproof coverings
- containment measures (e.g. bunded area) to prevent harmful chemicals or materials from entering stormwater drains
- sort batteries according to their particular chemistry
- collection units and aggregated e-waste stacked to prevent risk of falling objects
- an easily accessible emergency spill kit
- routine inspection and housekeeping procedures to ensure collection units are not overflowing and that waste streams are separated as required.








**Note:** If you have an EPA permission, refer to the specific conditions relating to requirements at your facility. You will have to comply with these as part of your permission.

Refer to [Dangerous Goods \(Storage and Handling\) Regulations 2012](#), [Dangerous Goods \(Storage and Handling\) Amendment \(Notification\) Regulations 2021](#) and the [Code for Practice-Storage and Handling of Dangerous Goods 2013](#) which provides regulatory requirements including notification obligations and practical risk control measures for occupiers of premises where dangerous goods are stored and handled.

## Container and detailed storage controls

Storing waste batteries in the appropriate containers will help you prevent or minimise harmful materials in batteries from entering the environment. **Container storage controls** you should consider at your facility include:

<p>Protect battery terminals or loose wires using non-conductive tape</p>	
<p>Use containers with adequate ventilation (e.g. venting cap, container is not air tight).</p> <p>Use plastic or cardboard UN approved containers for battery storage at your facility. Refer to the ADG Code packing instruction (P909) for a list of acceptable containers for the transport of batteries. Avoid storing batteries in metal containers as this could lead to a fire risk.</p>	
<p>Put electrically non-conductive and non-combustible cushioning material (e.g. sand, vermiculite) to fill empty space between the cells or batteries in the packaging.</p>	
<p>If using metal storage containers, line or fit them with an electrically non-conductive lining material (e.g. plastic bag).</p>	

 <p><b>Further information</b></p>	<p>For more detail on storage and containment measures refer to <a href="#">Liquid storage and handling guidelines (publication 1698)</a> and AS/NZS 5377: 2013 Collection, storage, transport and treatment of end-of-life electrical and electronic equipment.</p>
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## Fire controls

Some types of batteries can release dangerous amounts of heat, emit flammable gas and be an ignition source or fire risk if not managed appropriately.

You should consider the following controls to manage fire risks from batteries:

- Batteries stored separately from other e-waste and combustible or flammable items.
- Well ventilated, non-combustible collection containers and storage and handling areas away from ignition sources.
- Batteries stored in a cool and dry area, out of direct sunlight or in areas where batteries could overheat.
- Fire detection and appropriate response equipment.
- Unobstructed access to serviceable dry powder fire extinguishers near battery storage
- Clear paths of travel with unobstructed exits for staff and personnel.
- Security onsite at all times.
- Containment measures to capture firewater in the event of a fire.
- Appropriate PPE and first-aid equipment for staff handling waste batteries.
- An emergency management plan that has been reviewed and regularly tested with staff.

Refer to [Management and storage of combustible recyclable and waste materials – guideline](#) (EPA publication 1667) for more detailed measures on storing and processing combustible and recyclable waste (e.g. waste batteries).

 <p>Further information</p>	For further reading, Chapter 4, 5, and 6 of the <a href="#">Management and storage of combustible recyclable and waste materials - guideline</a> has information on controlling fire hazards and risks, effective storage management of combustible and recyclable waste materials, fire protection systems, and emergency management planning.
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## Moving batteries around your facility

It is important to handle or move waste batteries with care. This can help you avoid puncturing or damaging batteries. If you are moving containers or loading waste batteries at your facility with plant equipment, you should have a clear procedure or work instruction that outlines how to perform this work.

Make sure your employees are trained in the procedure or work instruction and understand how to complete the tasks safely, according to your procedures.

## Leaking or damaged batteries

Leaking or damaged batteries have greater potential to leak chemicals and create a fire risk in facilities. Damaged batteries can sometimes take hours or long periods of time to ignite after being damaged. When handling batteries you could look for any batteries that appear to be damaged or leaking. Leaking or damaged batteries should be separated from mixed battery storage and individually protected. When handling batteries wear the appropriate personal protective equipment.

## Lithium-ion batteries

Lithium-ion batteries have a greater fire risk compared to other battery types. They are classified as Class 9 dangerous goods under the [ADG Code](#).

Due to their fire risks and potential to release extreme amounts of heat, there is a need to store and handle lithium-ion batteries with more care. Detailed information on risks and hazards of lithium-ion batteries can be found in their SDS.



Lithium-ion batteries should be stored with the controls listed in the *Managing battery collection and storage* section of this guideline. Use UN approved containers for sorted and unsorted collections. To protect against short circuiting and the dangerous release of heat, protect battery terminals or loose wires using non-conductive tape. Fill containers with electrically non-conductive material (e.g. sand, vermiculite).

The total weight of the containers with smaller packaged lithium-ion waste batteries (eg. camera, computer, mobile phone) **should not be more than 30kg**.

Larger lithium batteries (e.g. electric vehicles) may require storage and packaging on wrapped pallets due to their size and weight.

Storage facilities and reprocessors should consider keeping lithium-ion batteries at least 10 m from any other dangerous goods or other materials that are combustible or flammable. Close contact with these materials could increase the likelihood of ignition and spread of a fire. Separation distances will vary depending on the size of your storage and footprint of your building. You may need additional separation for larger stockpiles of lithium-ion batteries. In facilities where space is limited, you should aim to use other engineering controls to reduce your fire risk. Use your site risk assessment to help you determine the appropriate risk-based controls.

Damaged, defective or leaking lithium batteries should always be individually protected and packaged. Refer to **packaging instruction P908 Part 4: Packing, Tank, Container, Vehicle, and Equipment Provisions** in the [ADG Code](#) for more information on how to package damaged or defective lithium batteries.

## Mixed loads of waste batteries

You may often receive and manage mixed loads of waste batteries. A mixed load is where different types of handheld waste batteries (e.g. alkaline, lithium, etc) are in one container. Mixed loads may contain various hazards that could lead to risks of harm.

The ADG code classifies mixed loads with lithium waste batteries as Class 9 dangerous goods. This means if you are packing a mixed load with lithium batteries for transport, you will need to follow the packing instruction P908 in the [ADG Code](#).

## Used lead acid batteries (ULAB)

Used lead acid batteries (ULAB) are Class 8 (corrosive) dangerous goods under the [ADG Code](#). When handling ULAB batteries wear the appropriate personal protective equipment. This includes acid resistant gloves and safety glasses, and safety boots. ULAB's are also heavy. You should have procedures for lifting and handling them at your facility.

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You should store ULAB batteries separate from other types of batteries on a plastic pallet or container. If using a pallet, Store ULAB batteries upright with no more than two layers of batteries. For transport, use clear plastic stretch wrap to wrap the batteries and secure tight with non-conductive strapping. You should always use pallets or containers that are in good condition.

## Transporting waste batteries

Refer to the [ADG Code](#) for specific requirements for packaging and transporting of batteries such lead acid, lithium, and mixed battery loads. It is your responsibility to take reasonable steps to make sure that the waste you produce will be transported to and received at a place that is [authorised to receive it](#).

Lead-acid batteries and nickel-cadmium batteries<sup>3</sup> are classified as reportable priority waste when consigning for transport and have additional requirements. In this case, the waste classification is as follows:

- lead-acid batteries: lead and lead based compounds, waste code D220.
- nickel-cadmium batteries: cadmium and cadmium compounds, waste code D150.

When giving your reportable priority waste to a transporter, you will need to fill out a waste transaction record in EPA's online [Waste Tracker database](#). Waste Tracker verifies your waste is being taken to a lawful place and is transported appropriately to the facility.

If you are transporting waste batteries, you need to ensure that e-waste loads are secure before transporting. You should also minimise damage or breakage. Non-combustible and electrically non-conductive cushioning material must be used to minimise the effects of vibrations and shocks, and to prevent movement of the cells or batteries within the package during transport.

The transport of "controlled waste" to another state or territory is governed by the [National Environment Protection \(Movement of Controlled Waste Between States and Territories\) Measure](#) (NEPM). If your waste batteries are being transported out of Victoria, they may be controlled waste.

Controlled waste requires a consignment authorisation before it can leave the state. A consignment authorisation approves the movement of waste to the receiving facility. Refer to Schedule A and B of the NEPM for a list of controlled waste.

If controlled waste is moving from Victoria to another state or territory you will have to use [EPA Victoria's waste tracking system](#) and a permitted vehicle. You will be able to attach a record of your issued consignment authorisation in waste tracker to verify your waste is being taken to a lawful place.

Contact the environment agency of the relevant state or territory for more advice on applying for a consignment authorisation and to understand their waste tracking requirements.

	Australian Capital Territory: <a href="http://www.environment.act.gov.au/">http://www.environment.act.gov.au/</a> and <a href="http://www.act.gov.au/">http://www.act.gov.au/</a>
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<sup>3</sup> For businesses handling a small number of lead-acid or nickel-cadmium batteries please see [EPA's website](#) for up-to-date information on EPA's expectations on the use of waste tracker for these two types of batteries.

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<b>Further information</b>	New South Wales: <a href="https://www.epa.nsw.gov.au/">https://www.epa.nsw.gov.au/</a> and <a href="https://www.nsw.gov.au/">https://www.nsw.gov.au/</a> Northern Territory: <a href="https://ntepa.nt.gov.au/home">https://ntepa.nt.gov.au/home</a> and <a href="https://nt.gov.au/">https://nt.gov.au/</a> Queensland: <a href="http://www.ehp.qld.gov.au/">http://www.ehp.qld.gov.au/</a> and <a href="https://www.qld.gov.au/">https://www.qld.gov.au/</a> South Australia: <a href="http://www.epa.sa.gov.au/">http://www.epa.sa.gov.au/</a> and <a href="http://www.sa.gov.au/">http://www.sa.gov.au/</a> Tasmania: <a href="http://epa.tas.gov.au/">http://epa.tas.gov.au/</a> and <a href="http://www.tas.gov.au/">http://www.tas.gov.au/</a> Western Australia: <a href="http://www.epa.wa.gov.au/">http://www.epa.wa.gov.au/</a> and <a href="https://www.wa.gov.au/">https://www.wa.gov.au/</a>
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## For further reading

[Australian Battery Recycling Initiative Guidelines](#)

[Australian Code for the Transport of Dangerous Goods by Road and Rail \(ADG Code\)](#)

[Code for Practice-Storage and Handling of Dangerous Goods 2013](#)

[Dangerous Goods \(Storage and Handling\) Regulations 2012](#)

[Occupational Health and Safety Act and Regulations](#)

[Compliance Code: Hazardous manual handling](#) (WorkSafe Victoria)

[Sample lithium-ion safety data sheet \(40 volt lithium-ion battery pack\)](#)

AS/NZS 5377 Collection, storage, transport and treatment of end-of-life electrical and electronic equipment.

AS/NZS 4681 The storage and handling of Class 9 (miscellaneous) dangerous goods and articles.

AS/NZS 3833 The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers.

AS 3780 The storage and handling of corrosive substances.