ESCOM
ELECTRICAL SAFETY COMMITTEE

GUIDELINES AND BEST PRACTICES FOR BATTERY DISPOSAL AND RECYCLING

DOCUMENT NO: ESCOM/2026/03, REVISION 1.0

What is ESCOM?

The Safety, Health and Environment National Authority (SHENA) and Autoriti Elektrik Negara Brunei Darussalam (AENBD) established the Electrical Safety Committee or “ESCOM” in January 2023; with the objectives of promoting regulatory compliance and raising electrical safety standards within Brunei Darussalam.

Who are the ESCOM members?

The Electrical Safety Committee (ESCOM) comprises representatives and industry experts drawn from relevant government institutions and private organisations, collectively bringing extensive technical experience in electrical engineering, safety management, and industry practice.

ESCOM is **chaired by a representative from the Safety, Health and Environment National Authority (SHENA)**, with a **Deputy Chairperson appointed in accordance with the Committee’s Terms of Reference**. Subject matter experts from regulatory bodies, utilities, and industry may be invited to participate in specific working groups or provide technical input where required.

ELECTRICAL SAFETY BEST PRACTICES			
DOCUMENT TITLE	**GUIDELINES AND BEST PRACTICES FOR BATTERY DISPOSAL AND RECYCLING**		
REFERENCE NUMBER	**ESCOM/2026/03**	**REVISION NO.**	**1.0**
NEXT REVIEW DATE	**AS REQUIRED**		

AUTHORS		
Haji Ibrahim Bin Haji Mohamad Hashim	ESCOM Core Member	Politeknik Brunei (School of Science and Engineering)
Awang Mohammad Marzuki bin Haji Awang Ahmad	ESCOM Core Member	SHENA Enforcement Division
Ahmad Shafudean bin Kamaruddin	Member	Hibiscus EP (Brunei) B.V
Mohd Nurol Isnon bin Ismail	Member	Hibiscus EP (Brunei) B.V
Haji Nordin bin Saban	Member	EX-TG Zones Consultant and Services
Md Yusri Abdullah Manggau	Member	EX-TG Zones Consultant and Services
Tan Hui Yen	Member	Brunei Shell Petroleum
Abdul Wafiy bin Abdullah Komiti	Member	Brunei Methanol Company
REVIEWERS		
Dr. Ir. William Voon	ESCOM Core Member	Berakas Power Company Sdn Bhd (BPC)
Noramizah binti Haji Marali	ESCOM Core Member	SHENA
Ong Pei Ying	ESCOM Secretary	SHENA

CONTRIBUTORS
Other members of the Electrical Safety Committee (ESCOM) who provided inputs, technical comments and support during the development of this document.

ISSUE DATE	19th May 2026		
ESCOM CHAIRPERSON			
NAME	Ir. Haji Noryasmin bin Haji Mohd Noor	**SIGNATURE**	

Disclaimer:

This document was developed to provide guidance and recommendations, as well as to serve as an industry reference for best practices with the aim of improving electrical safety practices. This Guideline and Best Practices is not a statutory document and does not create or replace any legal obligations under the Workplace Safety and Health Act (Chapter 277) or its subsidiary regulations. In the event of any inconsistency, the provisions of the WSHA and its subsidiary regulations shall prevail. Accordingly, this document should not be construed as implying any liability nor should it be taken to encapsulate all the responsibilities and obligations of the law.

TABLE OF CONTENTS

LIST OF TABLES

1 INTRODUCTION

Batteries are critical for powering a wide range of equipment — from portable tools and communication devices to vehicles, backup systems, and industrial installations. However, improper handling, storage, or disposal of batteries can lead to serious hazards including electric shock, fire, explosion, or chemical leakage, and may also cause environmental contamination.

With the growing use of both rechargeable and single-use batteries, it is essential to establish clear and consistent guidance on their safe management throughout their lifecycle.

This document serves as a guidance and reference for safe handling, segregation, temporary storage, and preparation of batteries for eventual recycling or disposal through authorized channels once suitable infrastructure or export channels are available.

1.1 Purpose

The purpose of this document is to establish a standardized approach for the safe management of all types of batteries used in workplaces and households. It aims to:

1.1.1 Promote safe practices during the handling, storage, recycling and transportation of batteries;

1.1.2 Prevent incidents arising from electrical, chemical, or thermal hazards;

1.1.3 Define safe interim measures for collection, segregation, containment and temporary storage of used batteries;

1.1.4 Prepare organizations and individuals for recycling and disposal programs once national facilities are established; and

1.1.5 Support environmental protection and compliance with recognized international standards and best practices.

1.2 Scope

This guideline applies to all organizations, workplaces, and individuals involved in the use, maintenance, storage, and end-of-life management of batteries, regardless of type, size, or application. It covers:

1.2.1 Primary (single-use) and secondary (rechargeable) batteries including, but not limited to, lithium-ion, nickel-cadmium, nickel-metal hydride, lead-acid, and alkaline chemistries;

1.2.2 Automotive, industrial, and portable batteries used in vehicles, equipment, instrumentation, and backup systems; unless defined specifically by manufacturer.

1.2.3 Procedures for safe handling, inspection, labelling, segregation, and temporary storage including transportation prior to recycling or disposal; and

1.2.4 Emergency response and incident reporting requirements related to battery leaks, fires, or damage.

This document complements existing workplace safety laws, hazardous materials handling requirements, and national environmental guidelines. It serves as a reference for employers, employees, regulators, and the general public to ensure that all batteries are managed responsibly and safely for disposal and recycling.

Table 1-1: Battery Classification

Battery Type	Examples	Applications	Photo
Lead-acid	Car battery, UPS battery	Automotive, UPS systems, emergency lighting	
Lithium-ion (Li-ion)	Laptop battery, phone battery	Laptops, mobile phones, power tools	
Nickel-Cadmium (NiCd)	Cordless drill battery	Cordless phones, power tools, medical devices	
Nickel-Metal Hydride (NiMH)	AA rechargeable battery	Digital cameras, toys, cordless phones	
Alkaline	AA, AAA disposable batteries	Remote controls, flashlights, clocks	
Zinc-Carbon	9V battery, D-cell	Low-drain devices like remote controls	

Battery Type	Examples	Applications	Photo
Silver Oxide	Watch battery	Watches, hearing aids, calculators	
Mercury	Old button cell	Older button cells, some medical devices	

Note: The images included in the table above is for reference and illustrative purposes only.

2 ABBREVIATIONS

BMS	Battery Management System
CE	Conformité Européenne (European conformity mark showing compliance with EU safety standards)
EAPSR	Environmental, Pollution Control, and Safety Regulations
IEC	International Electrotechnical Commission (global standards body for electrical/electronic technologies)
JASTRe	Jabatan Alam Sekitar, Taman dan Rekreasi (Department of Environment, Parks, and Recreation)
Ni-Cd	Nickel–Cadmium battery
NiMH	Nickel–Metal Hydride battery
PPE	Personal Protective Equipment
UL	Underwriters Laboratories (U.S. testing and certification organization for product safety)

3 STORAGE AND TRANSPORTATION

Batteries contain harmful chemicals that, if not handled and stored correctly, can leak and cause damage to your health and surroundings.

One of major risks associated with the transportation of batteries and battery-powered equipment is short-circuit of the battery as a result of the battery terminals coming into contact with other batteries, metal objects or conductive surfaces.

3.1 Proper storage of used batteries is important to:

3.1.1 Protect the environment from harmful chemical leakage

3.1.2 Prevent fire hazards and electrical emergencies

3.1.3 Facilitate efficient recycling and responsible waste management

3.2. Safety precautions to be practiced when storing used batteries.

3.2.1 Keep batteries away from children and pets

3.2.2 Avoid storing batteries in extreme temperatures

3.2.3 Store batteries in a well-ventilated area

3.2.4 Keep batteries in their original packaging or use insulating materials

3.2.5 Separate different types of batteries

3.2.6 Label containers properly

3.2.7 Avoid storing damaged or leaking batteries

3.2.8 Never dispose of batteries in the trash

3.3 Packaged batteries or cells must be separated in a way to prevent short circuits and damage to terminals. They must be packed in a strong rigid outer packaging unless when contained in equipment, the battery is provided equivalent protection by the equipment in which it is contained. Sturdy, leak proof containers made of nonconductive materials, like plastic, are ideal for transporting batteries because they resist leaks and external impacts. Labelling containers clearly warn anyone handling it.

4 PERSONAL PROTECTIVE EQUIPMENT (PPE)

All personnel must use appropriate PPE shall include but no limited to:

4.1 Safety googles or face shield

4.2 Insulated gloves nitrile or rubber gloves

4.3 Chemical resistant Apron

4.4 Mask (if handling corroded or leaking batteries)

4.5 Fire resistant long-sleeved clothing

4.6 Respirator (if dismantling lead-acid or damaged batteries)

5 SAFE HANDLING GUIDELINES

5.1 Do not disassemble or puncture the casing – internal cells can ignite.

5.2 Avoid dropping or crushing the device.

5.3 Keep away from heat sources, sparks, and open flames.

5.4 Never mix battery types during storage or transport.

5.5 Store in a cool, dry, well-ventilated area.

5.6 Label damaged or expired batteries clearly.

5.7 Do not mix battery types (e.g., alkaline with lithium).

5.8 Store in original packaging or battery cases to prevent short circuits.

5.9 Keep away from heat, moisture, and metal objects (like keys or coins).

5.10 Inspect for leaks or corrosion before use.

5.11 Keep away from water, direct sunlight, and high humidity.

6 DISMANTLING PREPARATION

6.1 Always refer and comply to manufacturer battery dismantling manual.

6.2 Work in a dedicated, ventilated area with fire suppression fire extinguisher nearby.

6.3 Ensure tools are non-conductive (plastic or insulated metal).

6.4 Disconnect power sources and remove battery from tool.

6.5 Verify battery type and manufacturer guidelines before dismantling.

6.6 Place the battery on a non-conductive surface.

6.7 Use plastic tools to open the casing and never with metal.

6.8 Do not puncture or crush the battery core.

6.9 Separate components (casing, anode, cathode, electrolyte) into labelled containers.

6.10 Neutralize any leaked electrolyte with baking soda (alkaline) or vinegar (acidic).

7 EMERGENCY PROCEDURES

7.1 Thermal runaway or fire: Use Class D or lithium-rated extinguisher. – never water.

7.2 Chemical exposure: Flush skin/eyes with water for 15 minutes; seek medical help.

7.3 Short circuit: Isolate battery and remove conductive materials immediately.

7.4 Leakage: Avoid contact. Wash skin with soap and water. Ventilate area.

7.5 Inhalation: Move to fresh air and seek medical attention.

7.6 Swelling or smoke: Isolate the power bank in a fire-safe container.

7.7 Chemical leak: Avoid contact; ventilate area and wash skin immediately.

8 DISPOSAL AND RECYCLING

8.1 Never incinerate or dispose of batteries in regular trash.

8.2 Transport to certified e-waste or battery recycling facility.

8.3 Follow Brunei's EAPSR and national hazardous waste regulations.

8.4 Tape terminals of used batteries and power banks to prevent short circuits during transport.

8.5 Recycle through certified e-waste centers or contact JASTRe for drop-off locations.

8.6 Educate personnel on proper battery handling and disposal procedures.

8.7 Dispose only through certified e-waste or battery recycling facilities.

8.8 Store separately from other recyclables and flammable materials.

8.9 Return used batteries and power banks to approved collection points (e.g., JASTRe e-waste drop-off centers).

Table 8-1: Battery Waste Management

Battery Type	Disposal Method	Reference
Lead-acid	Recycle at licensed hazardous waste or battery recycling facility	- JASTRe - Basel Convention - IEC 62902
Lithium-ion (Li-ion)	Recycle at e-waste or battery recycling centers; do not incinerate	
Nickel-Cadmium (NiCd)	Recycle at hazardous waste collection sites due to cadmium toxicity	
Nickel-Metal Hydride (NiMH)	Recycle at battery recycling centers	
Alkaline	Dispose in regular trash if allowed locally, or recycle if facilities exist	
Zinc-Carbon	Dispose in regular trash or recycle if available	
Silver Oxide	Recycle due to silver content and potential mercury presence	
Mercury	Hazardous waste disposal only; do not incinerate or landfill	

9 COMPLIANCE REFERENCES

1. Workplace Safety and Health Act, Chapter 277
2. IEC 62133 – Safety for portable sealed batteries
3. IEC 60086 – Safety standards for primary batteries
4. UN 38.3 – Transport of lithium batteries
5. OSHA 1910.178 – Battery handling safety
6. Brunei EAPSR Guidelines – Energy Appliance and Product Safety Requirements
7. List of Recycling Companies Registered under Department of Environment, Parks and Recreation, Ministry of Development (Refer to table 3 or JASTRe website)

Table 9-1: List of recycle companies

No.	Name of Company	Address	Communication
1.	IMAA MAYA RECYCLING & SERVICES SDN BHD	Lot.20 (DARe), Simpang 41-12-48, Kawasan Perindustrian Mulaut, Mukim Kilanas.	8631601 / 7195683 Email: v8aimster@gmail.com
2.	PERUSAHAAN HJ YUSOF BIN HJ TENGAH DAN ANAK-ANAK	No.344, Kampong Tempuas Ugas, Danau, Tutong	8830932 Email:rahman.hjyusof@gmail.com
3.	SURESH GUNA SDN BHD	LTS/163/1995, Simpang 41-12-62, Jalan Kilanas, Kg Mulaut.	8757678 Email: sureshgunasdnbhd@gmail.com
4.	MECH & TECH SDN BHD	Plot 17 & 18, (DARe), Mulaut Industrial Park, Simpang 41-12-48, Jalan Mulaut Kilanas, BG2121.	2265440 / 7338845 / 7219394 Email: mechtech.brunei@gmail.com
5.	SAI SURYA SDN BHD	Unit No.5, Blok I, Simpang 113, Ban 5, Kampong Mulaut Sengkurong	7157354 Email: surya7592@gmail.com
6.	CIC ENVIRONMENTAL SERVICES SDN BHD	Lot 5169, Simpang 144, Jalan Maulana, Kuala Belait, KA1531	3330266 / 8716573 Email: arief.razak@cicgrp.com

Disclaimer: Recycled electric vehicle (EV) batteries are not covered in this document.