ESCOM

ELECTRICAL SAFETY COMMITTEE

GUIDELINES AND BEST PRACTICES FOR SAFE OPERATION OF PORTABLE BATTERY- OPERATED POWER TOOLS

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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			
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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.

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1 INTRODUCTION

The safe use of portable power tools and their associated batteries is critical for maintaining a productive and hazard-free workplace. Improper handling, storage, or operation of these tools can lead to serious injuries, equipment damage, or fire. With the increasing prevalence of rechargeable battery-powered equipment, clear guidance is necessary to ensure consistent and safe practices across all work areas.

1.1 Purpose

The purpose of this document is to establish a standardized guidelines and best practices for the selection, operation, required training, storage, maintenance, transportation and disposal of portable power tools and associated batteries. It aims to raise awareness of the common hazards, promote safe behaviors, and reduce risks associated with electrical, mechanical, and thermal incidents.

1.2 Scope

This guideline applies to all organizations, workplaces, suppliers and individuals involved in the use, maintenance, supervision, and regulation of portable power tools and associated batteries. It covers:

- Cordless power tools commonly used in industrial, commercial, and domestic settings.
- Batteries of various types (including lithium-ion and nickel-cadmium), addressing safe charging, handling, storage, transportation, recycling and disposal.
- General safety measures, inspection protocols, emergency response considerations, and incident reporting.

The guidance complements existing applicable law, occupational safety standards requirements, and international best practices. It serves as a reference for employers, employees, regulators, and the general public to ensure safe, efficient, and responsible use of portable power tools and batteries.

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
HAC	Hazardous Area Classification
IEC	International Electrotechnical Commission (global standards body for electrical/electronic technologies)
JASTRe	Jabatan Alam Sekitar, Taman dan Rekreasi (Department of Environment, Parks, and Recreation)
NEC	National Electrical Code
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 GENERAL REQUIREMENT FOR ELECTRICAL SAFETY

3.1 Portable power tools shall be Class II (double insulated) equipment only, unless otherwise approved by Electrical Authority.

3.2 For charging purposes, it shall be connected to the power supply via a 30 mA Residual Current Device (RCDS) or an isolating transformer.

3.3 Perform a pre-use inspection before starting work (refer to *Appendix 2* – Power Tool Inspection Checklist).

3.4 Supervisors shall ensure all portable electrical equipment is inspected and tested at regular intervals, not exceeding 6 months.

3.5 Proof of inspections and testing shall be attached as a tag on the equipment.

3.6 When handling or working with portable power tools, minimal PPE shall include but no limited to:

i) Safety goggles or face shield
ii) Insulated gloves
iii) Safety shoes

Additional PPE for battery-related works:

i) Long-sleeved clothing or apron (especially for dismantling)

ii) Respirator (for dismantling lead-acid or damaged lithium-ion batteries) Mask (if handling corroded or leaking batteries)

iii) Anti-static mat or wrist strap (when handling lithium-ion batteries)

3.7 All power tools shall be fitted with a hold-to-run (operator presence) switch. Override of this switch is prohibited to avoid uncontrolled operation.

3.8 Use only certified devices and power banks (e.g., CE, UL, or IEC marked).

3.9 Do not disassemble, crush, drop, or puncture casings, as internal cells may ignite.

3.10 Do not modify power tools and equipment.

3.11 Store batteries and portable devices away from water, direct sunlight, sparks, and high humidity.

3.12 Maintain good housekeeping: keep tools organized, properly stored and segregated.

3.13 Removal and replacement of portable power tool batteries shall be in accordance with manufacturer instructions must only be done.

3.14 The use of portable power tools in potentially hazardous facilities requires a valid work permit or procedure appropriate to the area/company, including gas testing (Refer to organisation policy with respect to use of portable tools in hazardous area).

4 SAFE OPERATION OF PORTABLE TOOL

4.1 Pre-Operation Checks

Before using any portable power tools, ensure the following:

4.1.1 Inspect the tool for physical damage: cracks, loose parts, exposed wires or worn components.

4.1.2 Check the power cord and plug for wear, fraying or damage.

4.1.3 Ensure the tool is clean and free of dust or debris.

4.1.4 Verify that all safety guards, covers and switches are in place and functional.

4.1.5 Confirm the tool is rated for the voltage supply available.

4.1.6 Test the tool on a known safe circuit before use.

4.1.7 Check battery terminals for corrosion, debris or damage.

4.1.8 Ensure the battery is fully charged and securely locked into the tool.

4.1.9 Confirm that safety guards and switches are functional.

4.1.10 Verify the correct bit, blade, or accessory is installed and tightened.

4.2 Personal Protective Equipment (PPE)

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

4.2.1 Eye and face protection: Safety goggles or face shield

4.2.2 Hand protection: Insulated gloves if working near live circuits

4.2.3 Gloves with good grip and cut resistance

4.2.4 Hearing protection: Earplugs for operating loud tools

4.2.5 Footwear: Non-slip footwear

4.2.6 Respiratory protection: Dust mask or respirator (if cutting or grinding) or working in dusty environments

4.3 Emergency Procedures

Establish clear procedures such as:

4.3.1 In case of electric shock: Immediately disconnect power, disconnect battery and seek medical help.

4.3.2 For tool malfunction: stop use, tag as “Out of Service,” and report to supervisor.

4.3.3 Fire hazard: use appropriate fire extinguisher (Class C for electrical fires), and in case of battery fires: use a Class D or lithium-rated fire extinguisher.

4.4 Maintenance & Inspection Schedule

4.4.1 Weekly; visual inspection of all tools and batteries.

4.4.2 Monthly; functional testing and cleaning.

4.4.3 Annually; electrical safety testing (continuity, insulation resistance) as well as battery health check and performance test.

4.4.4 Immediately: tagging and removal of defective tools or batteries.

4.5 Battery Handling & Charging

4.5.1 Check for damage: Inspect battery casing for cracks, swelling, or leaks.

4.5.2 Clean terminals: keep battery contacts free of dust, corrosion, or moisture.

4.5.3 Verify compatibility: Use only manufacturer-approved batteries and chargers.

4.5.4 Charge batteries in a dry, ventilated areas away from flammable materials.

4.5.5 Do not overcharge or leave batteries unattended while charging.

4.5.6 Store batteries at room temperature - avoid extreme heat or cold.

4.5.7 Damaged or swollen batteries shall not be used or charged.

4.5.8 Designated charging area: Charge batteries in a dry, ventilated space away from flammable materials.

4.5.9 Avoid heat: Never charge near heat sources or in direct sunlight.

4.5.10 Use the original charger and cable or manufacturer-approved alternatives.

4.5.11 Charge in a cool, ventilated area - never under pillows or inside bags.

4.5.12 Unplug when fully charged to prevent overheating or swelling.

4.5.13 Avoid daisy-chaining (charging one power bank with another).

5 PRESERVATION, STORAGE AND TRANSPORTATION

It is important to follow manufacturer instruction as per tool user manual. As a guidance, below are necessary action to be taken.

5.1 Preservation

5.1.1 Before storing, wipe down tools to remove dust, debris, and grease. Avoid making them excessively wet.

5.1.2 For long-term storage, remove the battery to prevent accidental activation and battery drain.

5.1.3 Store all necessary accessories, such as chargers and spare blades, with their tools in the original cases to prevent loss.

5.1.4 Place silica gel packs inside toolboxes to absorb moisture and prevent rust.

5.2 Storage and transportation

5.2.1 Tools and batteries shall be stored in a clean, dry area to prevent deterioration.

5.2.2 It is recommended to store tools in original cases or protective sheaths, hang them, or store them in an organized manner to prevent stacking and inadvertent damage.

5.2.3 Tools should be returned to their designated storage location after use.

5.2.4 Tools shall be stored so they do not create an overhead hazard.

5.2.5 Store battery packs away from other metal objects like paper clips, coins, keys, nails, screws, or other small metal objects. These things can make a connection from one terminal to the other, shorting the battery terminals together and causing burns or fire.

5.2.6 Store the battery pack away from extreme temperature conditions.

5.2.7 Keep tools out of the reach of children and people unfamiliar with the tools.

5.2.8 A “Defective, Do Not Use” tag shall be attached to the tool/equipment if the inspection due date has lapsed, or equipment is found unsafe to use.

5.2.9 Always transport and store batteries as instructed in the instruction manual of manufacturer.

5.2.10 Tape battery terminals before transporting used batteries.

5.2.11 Never store swollen, leaking, or corroded batteries with healthy ones.

5.2.12 During transport, comply with international dangerous goods standards (UN3480/UN2794, etc.) where applicable.

5.2.13 Keep fingers away from the switch button while carrying the tool.

5.2.14 Use insulated packaging, battery cases, or original packaging for transport.

5.2.15 Keep tools in a safe place to prevent damage and potential injury.

6 DISPOSAL REQUIREMENTS

6.1 Irreparable or defective portable tools should be removed for disposal or recycle at the appropriate local facilities.

6.2 Batteries of portable tools should be disposed separately as per guideline of battery disposal.

7 TRAININGS AND COMPETENCE REQUIREMENTS

7.1 Read and understand the manufacturers instruction and manual.

7.2 Ensure user know how to operate the portable power tool or equipment,

7.3 Supervisors and team leaders shall ensure staff is competent to operate tools and equipment.

7.4 Workers must be trained in:

7.4.1 Electrical hazards and safe handling of batteries.

7.4.2 Proper PPE selection and use.

7.4.3 Emergency procedures (firefighting, chemical exposure response)

7.4.4 Waste segregation and disposal requirements.

7.5 Refresher training for workers should be conducted periodically or whenever new types of batteries/tools are introduced.

8 SAFETY GUIDELINES FOR BATTERY OPERATED POWER TOOLS IN HAZARDOUS AREAS

Using battery-powered tools in hazardous areas—such as locations with flammable gases, vapors, dust, or combustible fibers—requires strict safety protocols to prevent ignition and ensure compliance with international standards. Here's a comprehensive guide:

8.1 Hazardous Area Classification

Before using any tool, confirm the area's classification:

- Zone 0 / Class I, Division 1: Continuous presence of explosive gases.
- Zone 1 / Class I, Division 2: Occasional presence.
- Zone 2 / Class II, Division 2: Rare or abnormal presence.

Each zone dictates the type of equipment permitted.

8.2 Tool Selection Criteria

- Explosion-proof or intrinsically safe tools only.
- Must be certified for the specific hazardous zone (e.g., ATEX, IECEx, UL).
- Battery tools must use sealed, non-sparking lithium-ion packs with thermal protection.
- Avoid tools with exposed brushes, motors, or metal parts that can spark.

8.3 Electrical Safety Measures

- Use low-voltage tools ($\leqslant$ 50 V) where possible.
- Cables must be armoured or shielded, with flame-retardant insulation.
- Chargers shall be connected via a suitably rated 30 mA Type A RCD, with tripping performance compliant with IEC 61008.
- Avoid extension cords unless rated for hazardous use.

8.4 Battery Tool Precautions

- Charge batteries outside hazardous zones.
- Inspect for swelling, damage, or heat before use.
- Never open battery packs or modify internal components.
- Store in anti-static containers away from flammable materials.

8.5 Operational Controls

- Conduct a gas test before starting work.
- Use hot work permits if ignition risk exists.
- Keep a fire extinguisher (Class D or ABC) accessible and nearby.
- Maintain continuous ventilation to disperse fumes.
- Assign a fire watch during and after tool use.

8.6 Maintenance & Inspection

- Inspect tools before and after each use.
- Clean with non-static cloths—no solvents or compressed air.
- Replace worn brushes, seals, or batteries only with certified parts.
- Record usage in a hazardous area logbook.

8.7 Practical Safety Guidelines (from industry best practices)

- Use tools with three-prong grounding plugs or double insulation, (BS1363).
- Inspect cords and plugs for damage before each use.
- Avoid using tools in wet conditions unless rated for it.
- Wear appropriate PPE: gloves, goggles, and hearing protection.
- Disconnect power before changing accessories.
- Keep cables away from sharp edges, oil, and hot surfaces.
- Use rubber mats or platforms when working in damp environments.

9 REFERENCES

1. Workplace Safety and Health Act (Chapter 277)
2. Workplace Safety and Health (Construction) Regulations
3. ESCOM/2024/02, Rev 1.0 - Guidelines and Best Practices for Portable Appliance Testing
4. IGN 02/2019, Rev. 1.0 - Guidance to Workplace Safety & Health in Construction
5. IGN 2021/IGN/09, Rev 0.2 - Guidance for Toolbox Talk
6. IGN/2020/03, Rev 1.0 - Guidance to Permit to Work

7. IGN 02/2021 - Guidance to Personal Protective Equipment (PPE)

8. IGN 04/2020 - SHENA Guidance to Risk Management

9. IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements.

10. IEC 60446: Basic and safety principles for man-machine interface, marking, and identification - Identification of equipment terminals, conductor terminations, and conductors.

11. IEC 61010-1: Safety requirements for electrical equipment for measurement, control, and laboratory use - General requirements.

12. IEC 62133-2: Safety requirements for portable sealed secondary lithium cells and for batteries made from them – Use in portable applications.

13. IEC 62619: Safety requirements for secondary lithium cells and batteries for industrial applications.

14. JASTRE: Pollution Control Guidelines for Industrial Development in Brunei Darussalam

15. JASTRE: Recommended procedures for disposal of waste batteries

16. IEC 60079 Series – Equipment for explosive atmospheres

17. IEC 62841 – Safety of battery-operated hand-held tools

18. IEC 60745 – Safety of hand-held motor-operated electric tools

19. IEC 62133 – Safety requirements for portable sealed batteries

20. OSHA 1910 Subpart ‘S’ – Electrical safety standards

21. OSHA 29 CFR 1910 – Electrical Safety Standards

22. ATEX Directive (EU) – Equipment used in explosive environments

23. NFPA 70 (NEC) – National Electrical Code for hazardous locations

24. Brunei EAPSR Guidelines – Safety requirements for electrical appliances

25. ESCOM Guidelines and Best Practices for Portable Appliance Testing-ESCOM/2024/02, Revision 1.0

APPENDIX A: TYPES OF PORTABLE BATTERY-OPERATED POWER TOOLS

No.	Category	Function	Tools sample
1	Drills	Most versatile power tools, with options ranging from cordless drills to hammer drills to make holes and drive screws	
2	Circular Saws	Cutting straight lines across a variety of materials	
3	Sanders	Smoothing surfaces efficiently on wood, metal or plastic	
4	Jigsaws	Cutting curved and complex shapes in wood and metal	
5	Impact Drivers	Designed to handle tough screw driving jobs with more torque	
6	Grinders	Cutting, grinding, and polishing, useful in metal fabrication and construction work	
7	Miter Saws	Making precise crosscuts and miter cuts	

8	Chainsaws	Cutting down trees or large branches	
9	Nail Guns	driving nails into wood or other materials	
10	Blower	Cleaning debris, dust or leaves at dry surfaces	
11	Grass trimmer	Trimming grass and small branches	

Note: The images included in this appendix is for reference and illustrative purposes only.

APPENDIX B

Equipment Type : _____

Model/Manufacturer : _____

Serial Number : _____

No.	Inspection No.	Description	Pass	Fail	Not Applicable
1	Visual condition	Tool is free from physical damage, deterioration, or uncertified modifications.	☐	☐	☐
2	Hold-to-run control	Power tool is equipped with a hold-to-run (operator presence) control switch; the tool stops immediately when released.	☐	☐	☐
3	Equipment certification	Tool bears valid certification marks (e.g.Conformité Européenne, Underwriters Laboratories, International Electro technical Commission, or other approved national certification).	☐	☐	☐
4	Power cord & plugs	No signs of overheating, loose connections, exposed wires, or cuts on power cords and plugs.	☐	☐	☐
5	Protection devices	Shutoff switch, residual current device (RCD), and protection relay operate correctly.	☐	☐	☐
6	Insulation resistance	Insulation resistance test performed for Class I and Class II equipment; results are within acceptable limits.	☐	☐	☐
7	Battery condition	Battery casing is intact, with no swelling, leakage, or corrosion observed.	☐	☐	☐
8	Labels and markings	Safety labels, voltage/current ratings, and warning stickers are legible and intact.	☐	☐	☐
9	Accessories and guards	Protective guards, covers, and tool accessories are securely fitted and functional.	☐	☐	☐