European Bank
for Reconstruction and Development

BN16
Battery-powered tools

EBRD briefing note

November 2026

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Introduction

Battery-powered tools have transformed construction, maintenance and industrial work. Cordless drills, saws, grinders, breakers and site lighting remove trailing cables, reduce noise and exhaust emissions and cut many electrical risks. Their growth, however, has introduced a hazard that many workplaces have yet to control properly: the lithium-ion battery. Fires involving lithium-ion batteries are rising sharply worldwide, in workplaces, vehicles and waste streams, and they behave very differently from ordinary fires. A single damaged power-tool pack can fill a site cabin with flammable, toxic gas and flame in seconds.

Under EBRD Environmental and Social Requirement 4 (ESR 4): Health, safety and security, clients are expected to identify and assess the risks of the equipment they use and to apply the hierarchy of controls, including fire prevention and emergency preparedness. This note sets out good international practice for selecting, using, charging, storing, transporting and disposing of battery-powered tools and their batteries.

Why lithium-ion batteries are different

Lithium-ion cells store a large amount of energy in a small, sealed package containing a flammable electrolyte. If a cell is damaged, overheated, overcharged or defective, it can enter **thermal runaway**: a self-sustaining chemical reaction in which the cell heats itself uncontrollably, ignites neighbouring cells and releases intense heat, jets of flame and large volumes of toxic and flammable gases, including hydrogen fluoride. Water cooling can slow the spread, but the reaction generates its own oxygen and cannot simply be smothered. Packs that appear extinguished can re-ignite hours or even days later.

Risk assessment

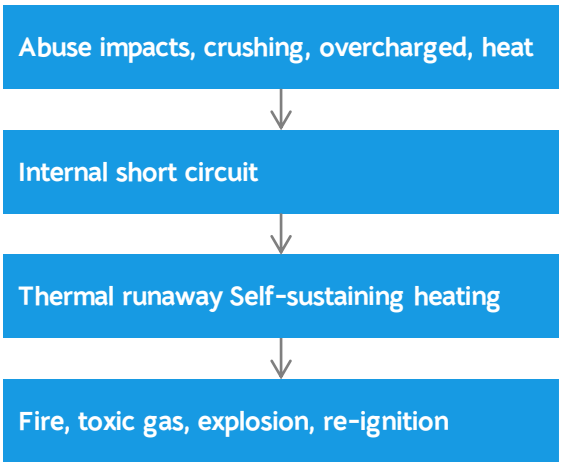
A risk assessment should be carried out before battery tools and charging arrangements are introduced, considering the hazards below:

Fire and thermal runaway: caused by physical damage (dropped or crushed packs, punctures from fixings), overcharging, charging damaged or wet packs, heat from sunlight or hot surfaces, or manufacturing defects.

Counterfeit and incompatible equipment: counterfeit batteries and cheap unbranded chargers frequently lack the protective circuitry of genuine products and are a leading cause of battery fires. Mixing packs and chargers from different systems defeats built-in protection.

Charging arrangements: unattended overnight charging, charging on combustible surfaces, in site offices, welfare cabins, sleeping accommodation or on escape routes, and overloaded sockets and damaged leads all increase the likelihood and consequence of fire.

Figure 1. Thermal runaway: why a damaged or abused lithium-ion battery is dangerous



Once thermal runaway starts, it cannot be stopped by removing the charger. Battery packs can re-ignite hours or days after the initial event.

Storage: large numbers of batteries stored together, in heat or direct sunlight, or alongside flammable materials, can turn a single cell failure into a major fire.

Damaged and end-of-life batteries: swollen, dented, punctured, overheating or leaking packs are unstable. Batteries thrown into general waste or mixed metal skips are a common ignition source in waste facilities.

Transport: loose batteries with unprotected terminals can short-circuit against tools and metal objects in vans and site boxes. The carriage of lithium batteries is regulated as dangerous goods above certain quantities.

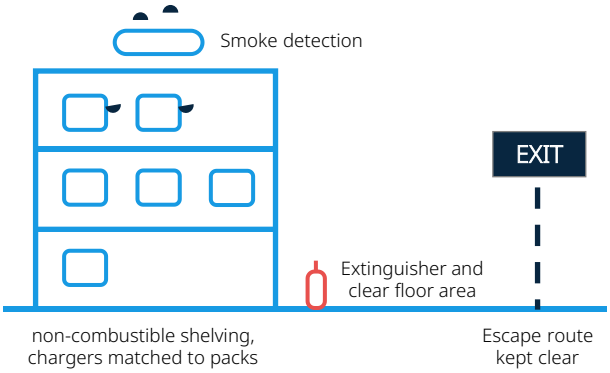
Tool hazards remain: a cordless grinder cuts, a cordless saw kicks back and a cordless nail gun fires exactly as its corded equivalent does. Battery power removes the cable, but not the mechanical, dust, noise and vibration hazards, and tools can start instantly: remove the pack before changing blades, discs or bits.

Control measures

Buy well: purchase tools, batteries and chargers from reputable manufacturers and authorised suppliers only. Use the battery and charger designed for the tool system. Reject counterfeit or unbranded packs, however cheap.

Charge safely: establish dedicated charging stations on non-combustible surfaces, away from flammable materials, escape routes, welfare and sleeping accommodation. Charge during working hours where people are present, or provide automatic smoke detection where out-of-hours charging is unavoidable. Do not cover chargers, daisy-chain extension leads or charge packs that are wet, hot or damaged. Remove packs once charged.

Figure 2. A safe charging station: dedicated, supervised and away from escape routes



Store correctly: store batteries in cool, dry, ventilated areas out of direct sunlight, ideally in metal cabinets or proprietary battery storage containers, with quantities kept to the minimum needed. Keep terminals protected and, for long-term storage, keep packs partly rather than fully charged.

Inspect and quarantine: check packs before each use. Take any pack that is swollen, cracked, leaking, unusually hot or that has been dropped or immersed out of service immediately. Quarantine suspect packs outdoors or in a fire-resistant container, away from buildings and combustibles, avoid a build-up and dispose of them through a competent battery recycler – never in general waste.

Plan for emergencies: include battery fires in the fire risk assessment and emergency plan. Instruct workers to raise the alarm and evacuate rather than fight a developing battery fire: the gases are toxic and cells can explode. Where extinguishers are provided for small incipient fires, workers must be trained in their limitations, and any pack involved must be treated as liable to re-ignite. Call the fire service for all battery fires.

Inform and train: brief all users on correct charging, storage, inspection and defect reporting. Include hired and subcontractor equipment in site rules, and check contractors' charging arrangements during inspections.

Never charge lithium-ion batteries unattended overnight in site cabins, offices or sleeping accommodation, and never on or near an escape route. A battery fire can make an escape route impassable in under a minute and toxic gas may be emitted before flames appear.

Summary

Before battery-powered tools are used, confirm whether:

- tools, batteries and chargers are genuine, compatible and from reputable suppliers
- a risk assessment has covered charging, storage, transport and disposal
- there is a dedicated charging station away from combustibles, welfare areas and escape routes
- charging is supervised, or covered by automatic detection
- batteries are inspected before use, and damaged packs quarantined safely

- batteries are stored cool, dry and in limited quantities
- terminals are protected during transport and dangerous goods rules are followed
- end-of-life batteries are sent to a competent recycler, never to general waste
- the fire risk assessment and emergency plan cover battery fires
- workers and contractors are trained in these rules.

References

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See also:

- BN05: Setting up a safe site
- BN12: Workplace risk assessment
- BN15: Hazardous materials management

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