Technical Directive Complementary to LEX 1.5.1: Use of Lithium Batteries

March 2025
Version 1.1

1. Scope

This document defines rules for the proper use of the following rechargeable batteries at EPFL:

- Lithium-ion batteries
- Lithium-polymer batteries
- Lithium-metal batteries

1.1 Aim

This document aims to :

- Limit the probability of thermal runaway of a lithium battery.
- Limit the spread of a fire caused by the thermal runaway of a lithium battery.

1.2 Definitions

Dans le texte les acronymes suivantes seront utilisés :

- BL: Lithium battery
- BLC: Commercial lithium battery
- BLN: Non-commercial lithium battery. Assembly of commercial cells or experimental cells.
- BLA: Commercial batteries whose properties, external protection, and/or original functionality have been altered.
- BMS: Battery Management System

2. Charging and storage

As a rule, the supplier's instructions for the proper use of lithium batteries (BL) must be followed.
The storage and charging of BL must be carried out away from any heat sources, flammable materials, and in a way that does not obstruct evacuation routes. It is essential to always avoid direct exposure to

sunlight and subjecting the battery to mechanical stress or vibrations. If possible, charging should be done on non-combustible surfaces.
The charging and storage of BL, regardless of their capacity and type, are strictly prohibited in ATEX-classified areas.
It is also strictly forbidden to charge BL inside EPFL buildings if the external protection is visibly damaged.
The charging and storage of lithium batteries in basements are allowed only if strictly necessary but remain strongly discouraged.

2.1 Charging batteries of electric bycicles, electrical scootes and electrical gyropodes

It is forbidden to charge the batteries of bicycles, scooters, and electric gyropods without supervision: if the batteries are left unattended for more than 30 minutes, the charging process must be temporarily interrupted.
For EPFL staff and students, an external charging station network is available (https://go.epfl.ch/borne_recharge).

2.2 Charging BL without BMS

The charging of BLs that are not integrated into a system with a BMS must be carried out exclusively with an appropriate and balanced charger if the battery contains multiple cells.
If a charger equipped with a temperature control system is available for this type of battery, its use is mandatory.
Charging outside of working hours may be carried out if strictly necessary but remains strongly discouraged.

2.3 Chargin other BL

For all other BLs, batteries sold with a charger must be charged exclusively using that charger. If such a charger is not provided, charge only with a charger suitable for the battery model and specifically designed for lithium batteries.
It is strictly forbidden to attempt to recharge single-use lithium batteries (e.g., button cell batteries).
In construction zones, unattended charging of tool batteries is prohibited outside of working hours.

2.4 Storage of BL

For a storage period exceeding two weeks, the supplier's instructions must be strictly followed.
In the absence of specific instructions, ensure that the battery is stored with a charge of approximately 50% of its total capacity. The storage conditions are detailed in Table 1.

<table>
<tr><th>Type of batterie</th><th>Total energy in the room (Wh)</th><th>Max Battery energy (Wh)</th><th>Number of batteries in the room</th><th>Storage only</th></tr>
<tr><td rowspan="6">BLC</td><td rowspan="3"><100</td><td rowspan="2">≤ 15</td><td>≤10</td><td>BL bag[1]</td></tr>
<tr><td>> 10</td><td rowspan="3">Fireballs
+ BL box[2]</td></tr>
<tr><td>≥ 15</td><td>-</td></tr>
<tr><td rowspan="3">≥ 100</td><td rowspan="2">≤ 500</td><td>≤20</td></tr>
<tr><td>> 20</td><td rowspan="3">Contact OHS</td></tr>
<tr><td>> 500</td><td>-</td></tr>
<tr><td>BLN et BLA</td><td>-</td><td>-</td><td>-</td></tr>
</table>

Table 1 : Precautions for BLs in the same room,

If it is necessary to contact OHS, open a safety ticket with the subject "lithium batteries."
For locations where BLA and/or BLN are present, the installation of specific fire extinguishers is mandatory and must also be requested via an intervention request[3].
The recommended fire extinguisher boxes, bags, and granules are listed on our website in the dedicated section.

2.5 Exemptions to Table 1

The types of BL in the following list are not subject to the restrictions of Table 1 :

- Laptop batteries
- Mobile phone batteries
- Tablet batteries
- Watch batteries (including smartwatches and pedometers)
- Uninterruptible Power Supplies (UPS)
- External batteries (Power banks)
- Batteries for commercial electric or hybrid vehicles, provided that the battery is installed in the vehicle.
- Electric pallet truck batteries
- Electric handling truck batteries
- Power tool batteries
- All small batteries with an integrated BMS enclosed in electronic devices.

[1] It is recommended not to exceed a maximum energy of 15 Wh per bag. Place the batteries in the bag in a way that does not create mechanical stress on them.
[2] There are several sizes of containers and bags available on the OHS-PR website. Ensure compliance with the total energy limit specified by the container manufacturer.
[3] The DI can only be performed by accredited users. Check with the unit administrator.

The exemption regime becomes void if the battery and/or the system using it is altered by modifications not approved by the system's supplier.

2.6 Particular cases

If the measures mentioned above are difficult to implement, please contact OHS (open a safety ticket with the subject 'lithium batteries') to discuss possible exemptions. If necessary, additional fire safety measures will be required.

3. What to do in case of BL thermal runaway

In case of a BL fire, immediately exit the room and call 115 (or 021 693 3000 from a mobile phone).
If appropriate extinguishing means are available in the room and the situation allows, attempt to extinguish the fire at the beginning without putting yourself in danger.

4. Disposal

If a BL reaches the end of its life, its external casing is damaged, or a swelling is clearly visible, the BL must be disposed of according to the following procedure:

- Cover any exposed electrodes with insulating tape. Completely wrap button cell batteries with insulating tape.
- If possible, pack the batteries separately in plastic bags.
- Take the battery to the central waste disposal facility (PL 0 04) or dispose of it in a designated container if available in the building. In Associate campus, contact the building's safety delegate.

5. Final dispositions

5.1 Entry into force

This directive entries into force on 28th January 2025.

Version	Modifications	Validation OHS	Validation DSE	Date
1.0	French version - L. Chevallier, E.Ripiccini, C. Tylle	S. Karlen	E. Du Pasquier	28.01.25
1.1	English version of French version 1.1 - E. Ripiccini	S. Karlen 2025-02-26 10:30 Stéphane Karlen	E. Du Pasquier 2025-02-26 10:21 Eric Du Pasquier	01.03.25