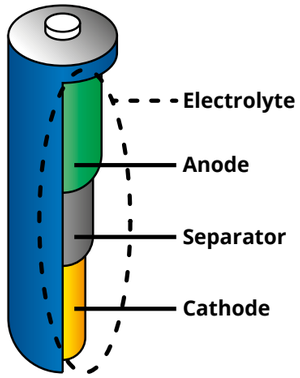
RANGE 790+LI

SECURITY FOCUS

RELATED RISKS WITH LITHIUM-ION BATTERIES

A LITHIUM-ION BATTERY, WHAT IS IT ?

A Li-ion battery, or Li-ion accumulator, consists of two electrodes (cathode and anode) and an electrolyte ensuring the ionic exchange of the system. During discharge (use) of the battery, the ions pass from the anode to the cathode.
During charging the reverse occurs. These two electrodes are isolated by a separator that prevents a short circuit.

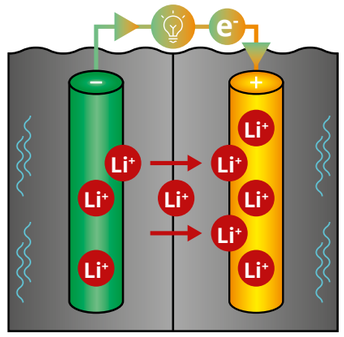


WHAT ARE THE DANGERS RELATED TO THESE BATTERIES ?

Among the 50 potential accident scenarios identified by INERIS (National Institute of Industrial and Risk Environment) throughout the various stages of the batteries life cycle, 12 were considered critical.
They notably relate to the storage, charging and use steps. The most problematic consequence of those risks are battery fire (or metal fire).
This is a significant risk because the fire caused by lithium-ion batteries cannot be put out in a conventional way, the battery itself generating the oxygen molecules and heat necessary for combustion. It can then only be switched off with the help of special powders, all in a confined environment (at the risk of the powder losing its efficiency).

WHERE DOES THOSE BATTERY FIRES COME FROM ?

- **By thermal runaway due to overload or exposure to excessive temperatures**
  A battery usually supplies the energy stored chemically during discharge in the form of electrical energy. However, it may be that not all the energy is supplied as electrical power, thus causes overheating that can reach up to 7 to 11 times the energy stored electrically. Given the structure of the battery, the reaction itself strengthens and causes critical overheating. The materials that make up the the battery also releases bound oxygen, which further fuels the fire.
- **By complete discharge**
  Complete discharge due to the non-use of the battery for too long periods of time can damage the battery. If it is then exposed to temperatures that are too cold, it can cause decomposition of the electrolyte liquid and the formation of inflammable gases. The absence of liquid breaks the battery protection, leading to a short circuit or fire.
- **By mechanical damage**
  Shocks or misuse can damage the internal structure of the battery and lead to deterioration of the battery separator, leading to a short circuit or a fire.



On the left, components of a Li-ion battery. On the right, principle of operation of a Li-ion battery when in use

HOW TO STORE THEM SAFELY ?

Storage recommendations depends on the size and power of the battery :

- **Low-power lithium batteries (less than 100 Wh per battery)**
  These are the small batteries contained in cellphones or computers for example. No special safety regulations apply here, in the way that all the manufacturer's instructions and safety locations are respected. For larger stored quantities (volume greater than 7 m3) the indications for lithium batteries of medium power apply.
- **Medium-power lithium batteries** (more than 100 Wh per battery and 12 kg gross weight per battery)
  Batteries in this category are used in electric bicycles, electric scooters, electric vehicles or various similar small vehicles. Those must be stored in separate fire resistant enclosures (e. g. a fire room or a safety cabinet). They must not be stored with other products and this area must be the subject of constant monitoring. For larger stored quantities (area occupied at 60 m2) the indications for high-power lithium batteries apply.
- **High-power lithium batteries** (100 Wh per battery and 12 kg gross per battery)
  Batteries in this category are mainly used in electric cars as well as in large stand-alone devices. Recommendations for the storage of medium-power batteries shall constitute the basis for reflection. However, securities must be implemented in a case by case after study. If the storage space is large, fire protection must be adapted. If the use of sprinklers is allowed, it must be as localized as possible and we will recommend separating the batteries and storing them in a confined environment that is able to prevent a fire.

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SAFETY CABINETS FOR LITHIUM-ION BATTERY STORAGE

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YOUR ECOSAFE RESELLER :

RANGE 790+LI

105 MINUTES SECURITY CABINETS FOR LITHIUM-ION BATTERY STORAGE

Visual alarm box and sound (VIG100)

Smoke detector (VIG100)

Moving by pallet truck (empty)

Sound and visual alarm (VIG100)

Automatic fire extinguisher (EX100LI) included with VIG100

PRISELI racks and shelves (E35LI)

▲ 795+LI + 4 x E35LI + B35 + VIG100 + 4 PRISELI + PACABLI

To ensure the safety of people and goods, we have created a safety storage solution for Lithium-ion batteries. Indeed lithium-ion batteries have the particularity to present many risks of which the most known and the most frequent is the thermal runaway which can be due to a rise of temperature of the environment, a shock, or a problem of assembly of the battery.

The consequence is that the battery can ignite dangerously and cause a fire.

Based on our experience and our know-how on the EN14470-1 European standard fire-proof cabinets, version 90 minutes, we offer several models of different sizes that can meet the most varied storage needs.

These cabinets can be equipped as needed, with perforated shelves (with high load capacity - 100kg per level E35LI) and retention trays (B35) in the lower part of the cabinet to prevent possible electrolyte leakage damages from the battery. There is also the possibility of recharging batteries stored via the rack 9 power strips ref. PRISELI to order with piercing option PACABLI.

The exceptional fire resistance of our cabinets (105 minutes under the European test) guarantees maximum safety. However, it is possible to further secure the storage by adding optional solutions such as :

- The internal safety extinguisher in the special lithium-ion battery cabinet ref. EX100LI
- Or the safety set including the extinguisher EX100LI, an audible and visual alarm, the smoke detector, the control box, all under the reference VIG100.

RANGE 790+LI

CONFORMITY

- Proven resistance of 105 minutes.
- Standardized pictograms in accordance with ISO 3864 and ISO 7010, Directive 92/58/EEC.

ADVANTAGES

- Reduces the risk of fire and explosion.
- Fire resistance of 105 minutes according to to the ISO curve n° 834.

PASSIVE SAFETY

- Double wall construction.
- Outer walls in 12 / 10th steel, white epoxy RAL 9010.
- Thermal insulation panels limiting thermal bridges.
- Signaling by standardized symbols.
- Fixing point for earthing link.

ACTIVE SECURITY

- Ventilation holes with ventilation outlet Ø 100 mm for possible connection.
- Ventilation ducts with hot-melt system to isolate the contents of the cabinet in case of fire.
- Thermodilating door seals.
- Doors with automatic closing and locking.

OPTIONS

- Perforated blue shelf with a load capacity of 100 kg (ref. E48LI and E35LI).
- Removable retention tray at the bottom (ref. B148 and B35).
- Automatic fire extinguisher at 79°C by special lithium thermal bulb ref. EX100LI
- Rack of 9 electrical outlets for refilling (order PRISELI - to order with PACABLI).
- Breakthrough for cable entry with fire protection (PACABLI code).
- Safety and alarm kit (VIG100 including visual and audible alarm, control box, auto-trigger smoke detector, EX100LI and PACABLI extinguisher).

◄ Automatic fire extinguisher with bulb 79°C (EX100LI)

NUDE CABINETS

Ref.	Designation	Outside Dim. H x W x D (mm)	Inside Dim. H x W x D (mm)	Empty weight excluding option
793+LI	Cabinet counter 2 doors to equip	1100 x 1137 x 670 (1)	820 x 1000 x 410	297
798+LI	Cabinet counter 1 door to equip	1100 x 635 x 670 (1)	820 x 490 x 410	182
794+LI	High cabinet 1 door to equip	1950 x 635 x 620 (2)	1620 x 490 x 410	287
795+LI	High cupboard 2 doors to equip	1950 x 1137 x 620 (2)	1620 x 1000 x 410	453

(1) Depth including the connecting sleeve at the back. Depth without sleeve : 620 mm
(1) Height including the connecting sleeve on the top. Height without sleeve : 1900 mm

PRE-EQUIPPED CABINETS

Ref.	Description	Outside Dim. H x W x D (mm)	Empty weight excluding option
795+LIA4	High cabinet 2 doors pre-equipped with 1 fire extinguisher EX100LI and 4 shelves E35LI	1950 x 1137 x 620 (2)	483
795+LIX4	High cabinet 2 doors pre-equipped with VIG100 and 4 shelves E35LI	1950 x 1137 x 620 (2)	488

COMPLEMENTARY ACCESSORIES

Ref.	Options : description	Weight (Kg)	For which cabinet(s)
E48LI	Perforated shelf width 490 x 380 x 25 mm	5	794+LI, 798+LI
E35LI	Perforated shelf width 1000 x 380 x 25 mm	7	793+LI, 795+LI
B48	Retention tray width 490 mm	5	794+LI, 798+LI
B35	Retention tray width 1000 mm	10	793+LI, 795+LI
EX100LI	79°C Special Lithium Battery Automatic Fire Extinguisher ø 85 x 155 mm	2	any model
PACABLI	Breakthrough for cable entry with fire-resistant cable	-	any model
PRISELI	Rack of 9 electrical outlets 450 x 50 x 50	0,5	any model
VIG100	Security and control kit including visual and audible alarm, control box, smoke detector, fire extinguisher EX100LI	5	any model
CDV-A	Steel ventilation box for external discharge	8	any model
KRC	Connection kit ; cabinet-box	1	any model
H50C	Labopur® recirculating air box	15	any model
CORG51	Versatile active charcoal filter for organic and corrosive vapors	9	any model