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FACTSHEET:
SAFEBOX



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Smart Transport Container for Second-Life Lithium-Ion Batteries

About REBELION

REBELION addresses the waste management challenges of lithium-ion batteries from electric mobility, promoting recycling as a sustainable solution to recover valuable raw materials and support circular battery value chains.

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Key insight

Smart container for spent cells and battery modules with thermal barriers, gas extraction and real-time sensors to stop thermal-runaway propagation. Compatible with UN-certified 1200x800 mm HDPE pallets and existing logistics chains.

MODULAR

Equipped with **removable insulation panels** for thermal containment, internal structure can be adapted to module dimensions and cargo characteristics.

ADVANCED SENSORS

Equipped with advanced sensors for gases, smoke and thermographic cameras for opmised **early detection of thermal events.**

VENTILATION AND PRESSURE RELIEF

Proactive mitigation against thermal runaway fire risks. Pressure relief and optimized gases evacuation to avoid explosions.

REMOTE MONITORING AND ALARM SYSTEM

Prepared for **remote monitoring** of sensors reading. **Alarm system** with GPS and automatic e-call to first responders.

Why it matters

Transporting spent lithium-ion batteries poses significant safety risks, as a single cell can enter thermal runaway and cause toxic, explosive fires. Current logistics solutions rely mainly on passive steel drums, which cannot detect temperature increases or gas accumulation. To address this challenge, we developed a **lightweight, stackable container compliant with UN Type III standards.**

The system combines passive thermal insulation, active gas extraction, and real-time temperature and gas monitoring. When abnormal conditions are detected, the control system automatically activates venting and provides early warnings, allowing operators to respond before an incident escalates. By improving safety during transport, the solution supports the large-scale reuse of second-life batteries while **protecting people, infrastructure and assets.**

What are we developing

A “smart” container built on a standard UN-certified 1200 x 800 mm HDPE pallet that incorporates:

- Internal mineral-board insulation that physically separates battery modules,
- Embedded temperature and gas sensors,
- An active, low-power extraction vent that removes hazardous gases on-board,
- A simple-to-use control script to monitor data and trigger venting automatically.

The innovation lies in the **hybrid safety approach** - selective passive segmentation plus an automatic, lightweight active extraction system - all packaged in a logistics-ready, modular pallet, which incorporates **early warning and an advanced alarm system.**



How it works

Based on a certified container (UN-type III standards), an alarm system is activated in case of a safety event.

1 **LOADING:** Battery modules are stored in **insulated compartments** separated by passive thermal barriers.

2 **MONITORING:** **Integrated sensors in optimized locations** continuously read temperature and gas concentrations.

3 **DETECTION:** If a cell exceeds pre-set thresholds, the control script flags a **warning**.

4 **ACTIVE EXTRACTION:** The system opens the **low-weight vent** to purge gases, preventing pressure build-up and event propagation.

5 **ALARM ACTIVATION:** An **alarm system** with integrated GPS and automatic e-call to first responders is triggered.

Key benefits

Significant benefits across all dimensions: fully compatible with current standards and practices, it boosts safety in transport and storage without sacrificing payload capacity, all while keeping costs under control.

INDUSTRIAL

Fits existing lightweight pallet-handling equipment; fully **stackable** and **modular** for **various payloads**.

ENVIRONMENTAL

Enables safe reuse of second-life batteries, reducing waste and supporting **circular-economy targets**.

SAFETY

Prevents thermal-runaway spread and gas explosions through combined **passive/active protection**.

ECONOMIC

Low tare weight cuts shipping costs; **standardized design** reduces manufacturing and certification expenses.

Key figures



FOOTPRINT AND MATERIAL

Standard Euro-pallet size (1200mm x 800mm) in lightweight, impact-resistant, UN-certified (HDPE).



MODULARITY

Up to 12 battery modules per container (configurable).



SAFETY PERFORMANCE

Passive insulation plus active venting meets UN-type III transport requirements.



FAST ANSWER

Alarm triggered in few seconds after a 10 °C abnormal local temperature rise or gas occurrence.



IOT READY AND CONFIGURABLE

Easy monitoring and configurable to custom needs.



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Discover more at:

> REBELION-PROJECT.EU



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