Exhibit GBESS-JR-8

Georgia BESS Battery Safety and Recycling Information


GEORGIA
ENERGY
STORAGE

Battery Enclosure Example

Individual Battery Cabinets

~10’

Individual Battery Compartments

~25’

Safe by Design

Integrated Ventilation

Individual Fire Rated Cabinets

Fire Rated Steel Enclosure

24/7 Monitoring & Automatic Shut-off

Individual Fire Rated Compartments

Integrated Cooling System

No Accessible Interiors

Battery Cabinet Example

PowinEnergy

Powin Product Safety Guide:

Architecture and Methods

May 2020

powinenergy.com

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1.0 PURPOSE

This guide provides an overview of the safety measures taken by Powin to ensure the safety of Powin products. This guide is intended for use by Powin customers and regulatory personnel.

2.0 BUILDING IN SAFETY AT EVERY LEVEL

Powin believes that safety is achieved through careful design, simulation, and comprehensive testing at every level. Powin's design approach is iterative where requirements result in a design that is followed by simulations and prototyping until all the design criteria are met. The criteria/features described in this document include the following:

- Cell Level Safety
  - Safest chemistry in the industry
  - Partner with top-tier cell manufacturers known for quality, reliability, and innovation in safety
  - Detailed cell level monitoring (alarms, safety features etc.)
  - Certifications
- Module/Battery Pack Safety
  - Cooling scheme – CFD analysis
  - Battery Pack Controller – fans, enforcing setpoints
  - Active Balancing – design to minimize variations in cell properties over time.
- Stack Safety
  - String Controller
  - Active balance: run test using balancing circuits to identify loose connection and potential fire hazards over time. This process is unique to Powin products.
  - Certifications
- Enclosure Safety
  - Reliable Cooling: Dual Redundant HVAC
  - Gas Detection & Active Ventilation
  - Fire Detection & Suppression
  - Potter Fire Panel with 24-hr battery UPS backup
  - Redundant heat and smoke detection
  - Standpipes for Flooding
  - Us of UL9540A Large Scale Fire Testing to ensure safe designs Certifications
- Software Safety
  - StackOS
    - Battery Safety & Management
    - E-Stop
    - Battery Safety
    - Alarm/warning Configurations
  - Integration & Control

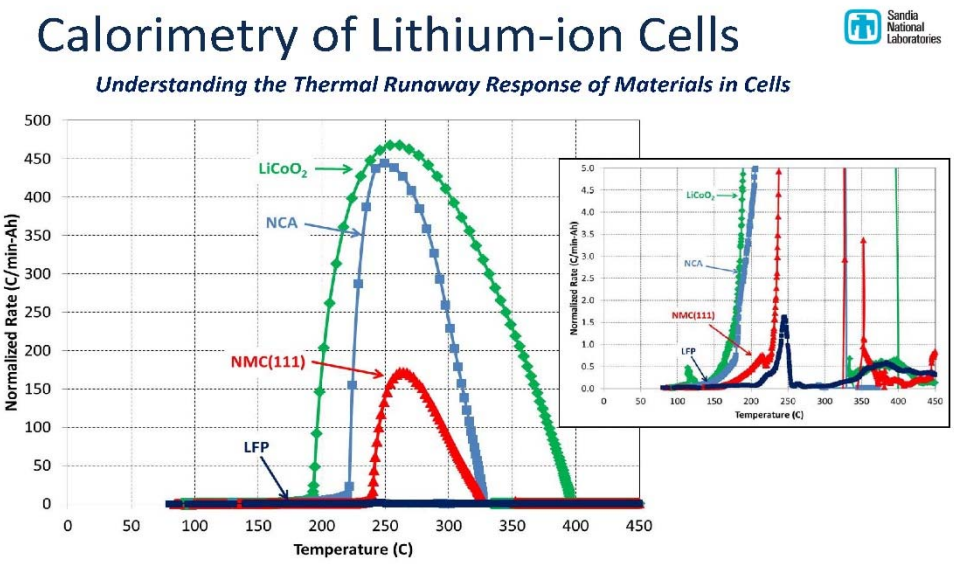
  - StackOS+
    - ~ High availability, low latency remote monitoring and control using secure AWS cloud infrastructure
    - ~ Analytics – identify issues in the field before the arise
  - Ironclad cyber security
  - Certifications & protocols

- Near-term Developments
  - First Responder HMI
- Optional accessories:
  - Manual Disconnect Switch
  - Deflagration Panels.

3.0 CELL-LEVEL SAFETY

3.1 Lithium-Ion Battery Chemistry

Powin has chosen the safest high capacity battery chemistry in the market today. This chemistry, known as Lithium Iron Phosphate or $LiFePO_4$. In comparison to the other popular high-volume battery chemistries such as the NCA and NMC batteries used mostly for EV automotive applications, the $LiFePO_4$ batteries are less energy dense but are safer. LFP cells exhibit thermal runaway at higher temperatures (250°C vs < 200°C).



Source: https://www.fire.tc.faa.gov/pdf/systems/Oct14Meeting/Orendorff-1014-SNL_Overview.pdf

Figure 1 Calorimetry of Lithium-Ion Cells

Table 1 Lithium Ion Battery Chemistry Comparisons

Lithium Iron Phosphate (LFP)	Lithium Metal Cathodes (LCO, NMC, NCA)
Lower parasitic load including air-conditioning due to lower thermal sensitivity	Better suited for high C Rate applications such as EVs.
Higher ambient condition tolerance	Dominant supply in automotive and consumer applications (diversified)
Less demanding fire suppression requirement, improved stability in fault conditions	Simpler SOC management as voltage changes more noticeably throughout the DOD range.
Less sensitive to volatile metal pricing like cobalt	Cobalt has supply chain challenges. (DRC is majority producer).
Degradation is not as sensitive to changes in application DOD usage therefore it has a simpler warranty provision for future operational uses.	More complexity in augmentation capacity strategies and warranty provisions

Table 2 Typical Powin Stack Cell: 280 Ah $LiFePO_4$

Typical Cell: 280 Ah $LiFePO_4$	6000 Cycles at 25°C, 80% DOD, 0.5P Rate
Voltage Range	2. 5 V to 3.65 V (Nom. Voltage = 3.2 V)
Typ. Charge and Discharge Rates	0.5 C Rate Typ.
Dimensions & Weight	72 mm x 174 mm x 207 mm, 5.5 Kg
Operating Temperature Range	-30°C to 60°C
Storage Temperature Range	-40°C to 60°C
Over Charge	HL3
Over Discharge	HL3
Drop	HL2
Crush	HL2
Short	HL2
Heating	HL3

Notes:

All test conditions according to GBT36276-2018.

HL2 = Cell damaged but no leaking, no venting, no fire, no flame, no rupture or no explosion

HL3 = No Venting, no fire, no flame, no rupture, no explosion. Venting but <50% of electrolytic weight.

3.2 Cell Level Monitoring

Each Lithium-Ion cell is prismatic, about and encased in a welded aluminum case. Eight of these cells are packed together and connected in series to form a module.

The Powin BESS is designed for indoor usage and to work only in the 25°C ± 5°C range. Temperatures beyond this are carefully monitored and can trigger actions to retain the safety and the reliability of the system. Overtemperature circuits activate to disconnect the Stack in case of abnormal temperatures.

3.3 Cell Certifications

All Powin cells are certified under UL1642, UL9540A, IEC62619, GBT 36276-2018, and UN38.3 (Cell Transportation Safety).

4.0 MODULES AND BATTERY PACK SAFETY

4.1 Powin Modules and Battery Pack Design

Careful design and testing have produced battery packs having excellent structural integrity to withstand the forces during charging and discharging UL9540 tests showed that if one battery cell is made to vent, it will not propagate to other cells in the module. The modules also meet the IEC61373 shock and vibration specification.

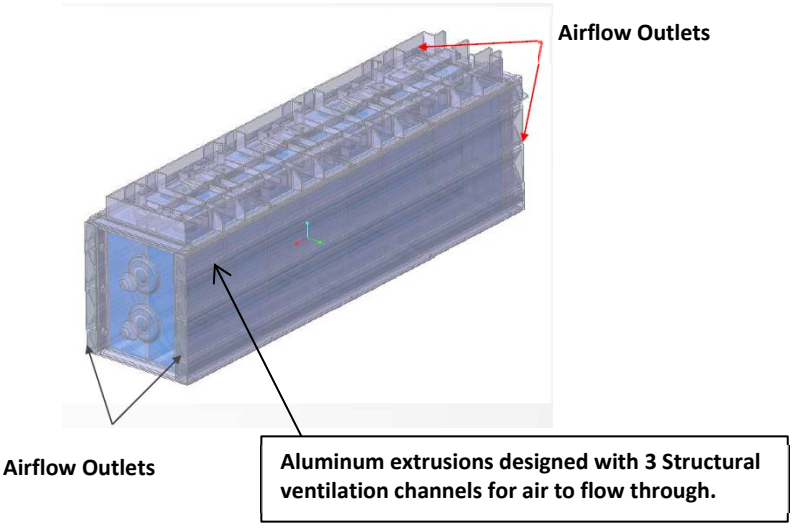


Figure 2 A Typical Powin Module is an 8S1P Design

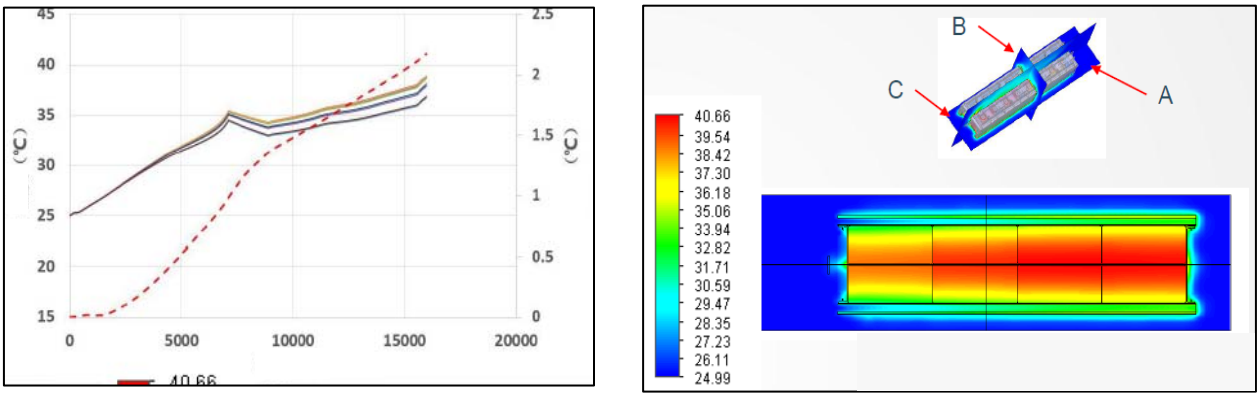


Figure 3 Computational Fluid Dynamics Module Simulation Results

4.2 Battery Pack Controller – Fans, Enforcing Setpoints, Active Balancing

Three modules are then placed in a tray to form a battery pack. The Battery Management System (BMS) provides data from every individual cell. This includes Voltage, Current, and Temperature data. The Powin Energy Active Balancing System maintains all the cells in the stack at the same level of charge. This reduces the chance of overcharging or undercharging an individual cell and therefore increases the safety and reliability of the product.

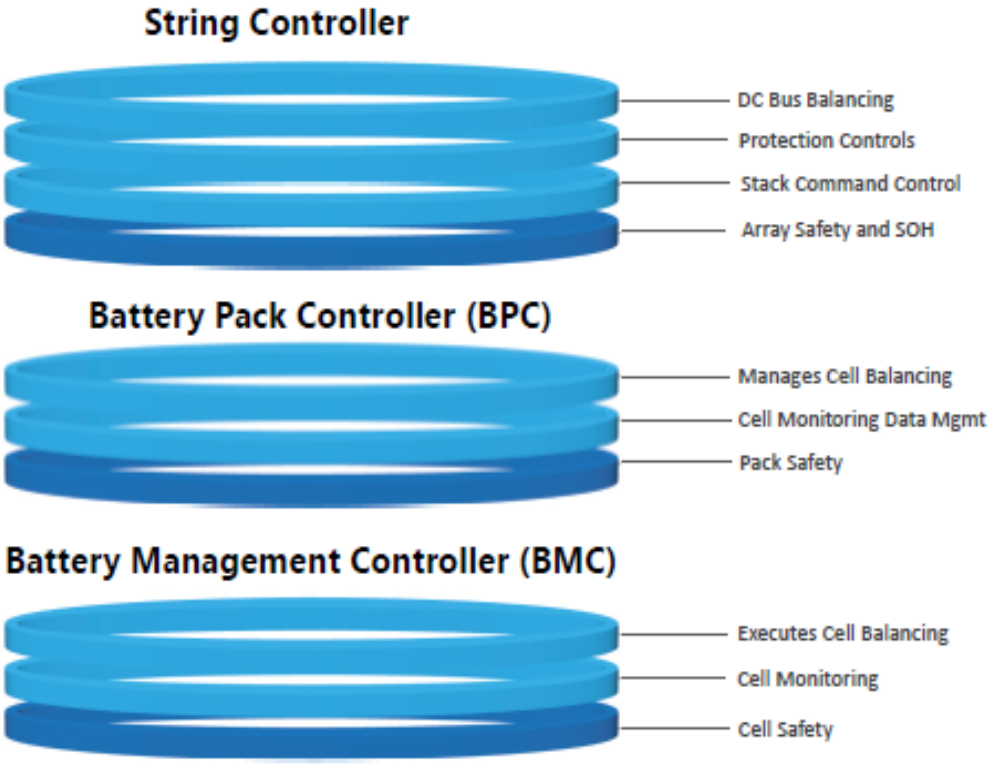


Figure 4 StackOS – A Layered Approach to Battery Safety

5.0 STACK SAFETY

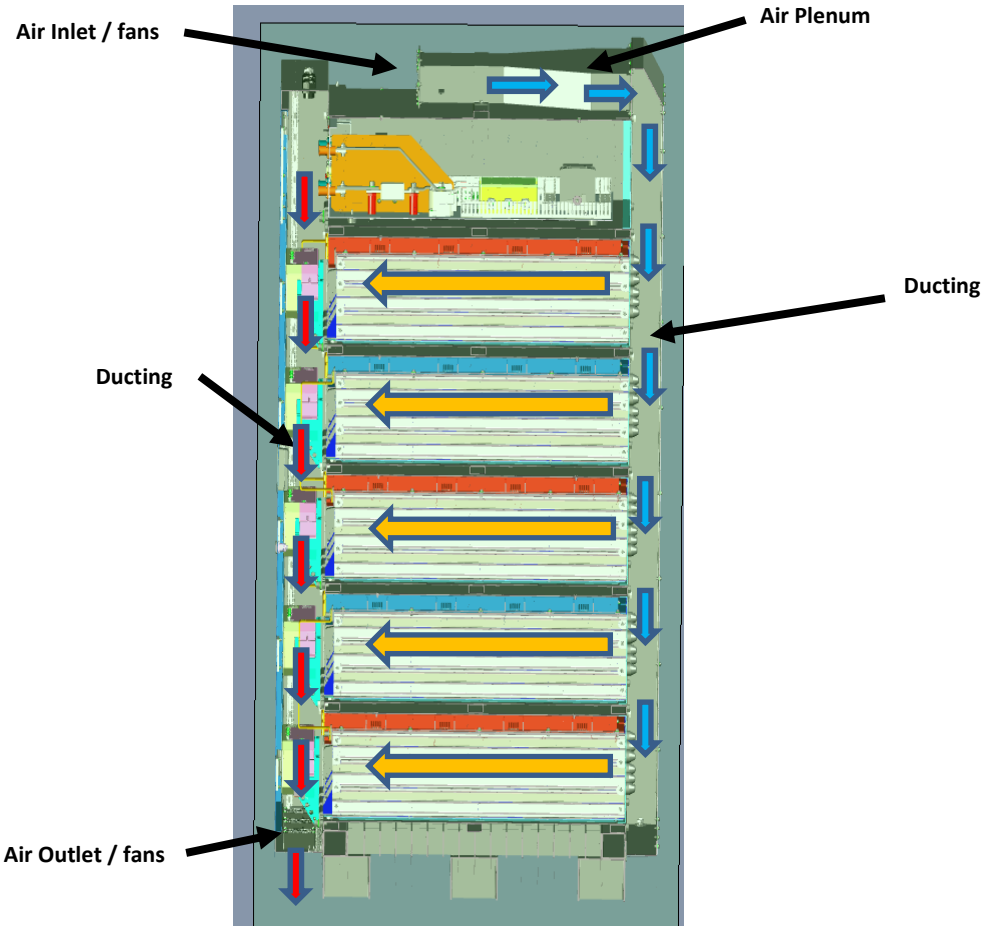


Figure 5 Stack Ventilation

5.1 String Controller

Multiple Fans are used in the Stack to provide up to 600 cfm of air throughout the stack. Therefore, the air inside the stack is replaced every six seconds.

Every Stack has a Stack Controller that includes appropriate DC switchgear to isolate and disengage the entire Stack as soon as abnormal operation is detected. For example, the Powin Stack225 has a 225 A fuse and 250 A/1000 V contactors built into the Stack.

Several steps are taken to ensure safety before adding a stack to the Energy Storage System. Before connecting the Stack to the DC Bus, care must be taken to ensure the following:

1. Manual switch is in place. This is the physical E-Stop Plug on the Stack Controller.
2. Permission granted by the Stack OS Software
3. Permission granted by the Stack Controller firmware (which uses rigid rules that cannot be overrun by the software to ensure safe operations)

5.2 Active Balancing

The brains of the Powin Stack is called the StackOS. This software runs on an application-specific computer integrated into the stack that is constantly monitoring the state of charge of each cell and adjusting it as necessary. A Powin proprietary algorithm uses the Active Balancing circuit to identify safety issues such as loose connections before the Stack can be turned on.

5.3 Hardware Safety Design

The Stack hardware is designed so that no single point failure can affect the safety of the Stack. The circuitry used for control and the circuitry used for monitoring the voltages are separate to eliminate single point failure. A CFMEA Analysis for the internal hardware is performed to enhance safety and reliability.

All Powin designs are UL991 compliant to guarantee hardware functional safety.

5.4 StackOS: Software Safety Design

The computer in the Powin Stack runs applications designed to ensure safety of the Stack. These applications are designed so that the Stack can be monitored and controlled from the Powin Cloud through the Powin Cloud User Interface. The computer communicates with the Powin Cloud using an Ethernet port. In case of loss of Ethernet signal, the computer defaults to stored values until internet communication is restored. With dual CPUs, 2GB RAM, and an 8GB Hard Disk Drive, the built-in computer has plenty of capacity to store historic data locally, provide detailed data for fault analysis, and be configured securely to provide any additional data etc.

The software in the Powin Stack meets the stringent UL1998 standard for functional safety for software in programmable components. Powin software is written in layers so that a change in one layer will not affect the function of any other layer.

There are three principal applications available pertaining to safety:

- E-Stop
- Battery Safety
- Config Commands

5.4.1 E-STOP

E-STOP is the application that monitors all the Open-Close Detectors crucial for the safety of the system. This includes the Fire Panels, the DC Cabinet door Alarm, the PCS E-STOP, and HVAC Alarm Signals. When such a signal occurs, this application:

- analyses the signal,
- informs the Powin Cloud about the status,
- turns off the HVAC as necessary,
- ceases the charge or discharge cycle of the PCS,
- opens all battery contacts,
- stops all active balancing, and
- sends status messages as programmed to the SCADA interface etc.

5.4.2 Battery Safety

This application monitors each and every individual cell in the Stack, taking hundreds of measurements every second. It looks at the voltage, the current, and the temperatures in the cell and makes sure that they are all within acceptable bands for the status of the battery at that time. In case an abnormal event is detected, it sends out messages to the Powin Cloud.

5.4.3 Config Commands

In this application, warnings, alarms, and shutdowns can be configured by the customer to provide greater safety by allowing the customer to integrate the Stack into the site-level monitoring and control system

5.5 StackOS+

Powin Energy's StackOS+ offers customers access to a high availability, low latency, remote monitoring system which uses the Powin Cloud. The Powin Cloud resides in the AWS Redshift Cloud Data Warehouse. Besides its use in Energy Flow Optimization, StackOS+ also allows analytics enabling the customer to identify problems before they occur. Another advantage of the StackOS+ is that it offers state of the art data security.

5.6 Stack Certifications

The StackOS software is certified to UL1998 Standard. The Powin Stack is certified to UL1973, UL991, UL9540 and IEC62619 standards.

6.0 ENCLOSURE SAFETY

6.1 Reliable Cooling

Powin Enclosures, which can hold up to 6 Stacks in a 20-foot Enclosure, 14 Stacks in a 40-foot Enclosure, and up to 20 Stacks in a 53-foot Enclosure, have a duct running across and above the Stacks that is ducted directly to the inlets of the stack, providing cooled or heated filtered air.

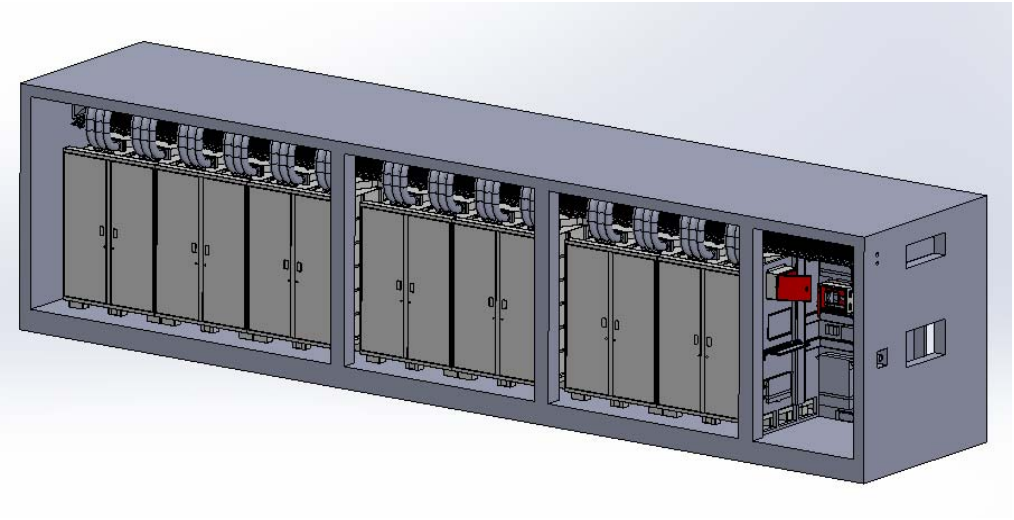
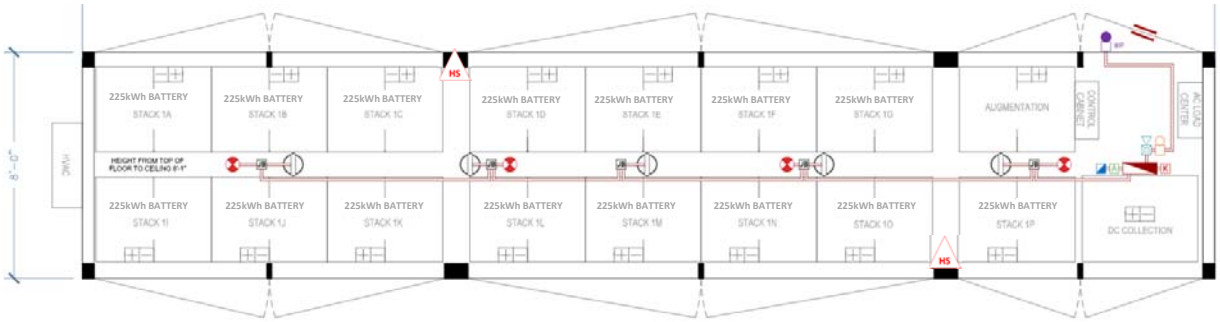


Figure 6 Powin Enclosures

6.2 Gas Detection and NFPA69 Compliant Explosion Prevention

There are two Hydrogen Sensors placed at strategic locations in every Powin Enclosure. Two sensors provide 1+1 redundancy and are directly tied into the HVAC system using a Potter Addressable Fire Control Panel. These sensors sense Hydrogen gas which forms over 50% of the gases during venting. If the Hydrogen concentration exceeds 1%, Emergency Venting takes place. This is well before the hydrogen reaches the 4.3% concentration required for a fire. When hydrogen gas is detected, the HVAC Economizer is bypassed and the two 6-ton HVAC units deliver 3800cfm of fresh air to evacuate dangerous gases inside the Enclosure. Extensive testing ensured that this level of venting eliminates the possibility of explosion.

ARRGH Hydrogen Sensor



NFPA 855 Compliant

- Electrically releasing Stat-X aerosol Fire Suppressant
- Pressure releasing deflagration valves
- Mechanical ventilation
- Potter Fire panel with 24-hour UPS backup
- Remote notification of fire suppression system activation
- Second stage fire suppression system through the standpipe

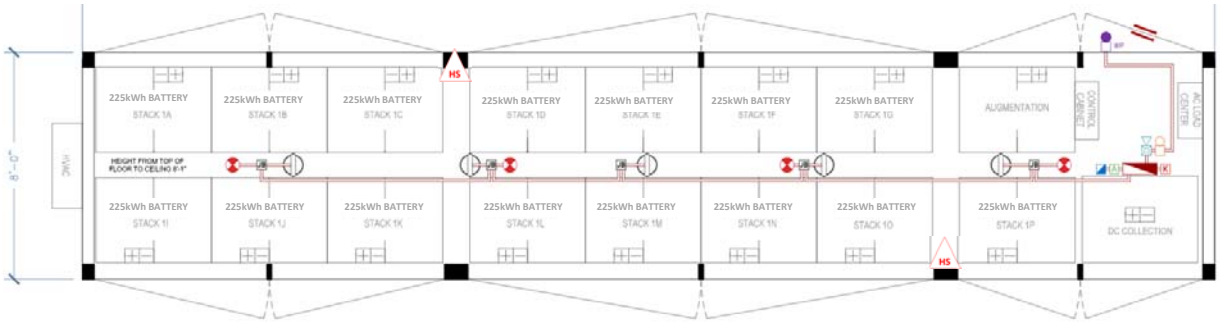
DEVICES

- STAT-X 1500 E Generator (x5)
- Door Warning Signs
- Release Control Panel
- Key Releasing Disable Switch
- Manual Pull Station
- Hydrogen Sensors (x2)
- LED lights (x8)
- Abort Switch
- Horn/Strobe
- Bell
- Strobe
- Photo/Heat Detector (x4)
- Junction Box (x5)
- Conduit

Figure 7 Safety Features in a typical 40 Foot Powin Enclosure

Powin uses the UL9540A large scale Fire Safety Testing to ensure safe design. For, example,

ARRGH Hydrogen Sensor



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- Horn/Strobe
- Bell
- Strobe
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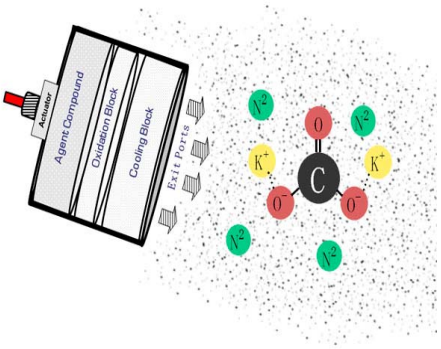
- Junction Box (x5)
- Conduit

Figure 7 shows a plan view of a typical 40 -foot Powin Enclosure that can hold up to 14 Stacks or 3.2 MWh of energy. The two Hydrogen Sensors shown here can detect hydrogen and then force the HVAC system to vent fresh air directly into the Stacks to prevent an explosion or fire. Hydrogen gas the largest component of cell thermal runaway venting. Integrating the hydrogen sensors directly into the Marvair Commstat HVAC system controls saves precious reaction time.

6.3 Fire Detection and Suppression

In case of a fire, every Powin Enclosure has a STAT -X Fire Suppression System that works be eliminating all the O, H and OH free radicals in the environment, causing the fire to be extinguished. This is accomplished by the injection of 1-2µm potassium particles that eliminates the free radicals.



1) **Stat-X agent & inert gas suspension** discharge fills hazard volume (particle size 1-2 micron)

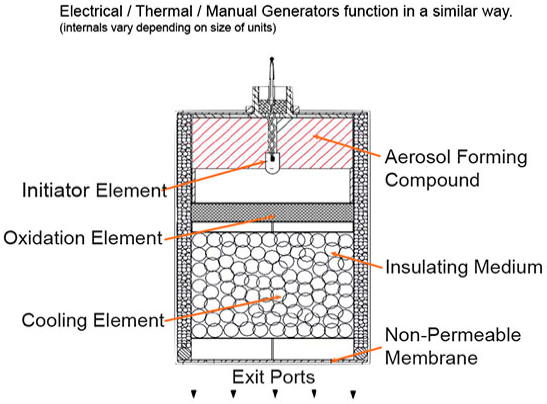


Figure 8 Fire Suppression System

Powin Enclosure Fire Protection System meets the new NFPA 855 Standard.

6.4 Standpipes for Flooding

Powin Enclosures also include two water standpipe connections that can be used to flood the containers to meet local codes and provide a backup to the aerosol system.

6.5 Enclosure Certifications

The Powin Enclosure is certified to ISO1496-1, NFPA855, UL9540A, UL991, and UL1998 standards.

7.0 NEAR-TERM DEVELOPMENTS

7.1 First Responder HMI

The local Human User Interface is a browser-based Graphical User Interface (GUI) intended for use by emergency First Responders. It supplies basic monitoring and control features intended for basic onsite situational awareness, testing, and putting the system into maintenance mode.

7.2 Optional Add-Ons

Two additional features are available as optional add-ons. They include the following:

- **Manual DC Disconnect**. A DC Disconnect Switch may be added between each stack and the Enclosure DC Busbar to isolate the stack in case of malfunction of the automatic disconnects.
- **Deflagration Panels**. NFPA 68 compliant deflagration panels protect against high pressures resulting from the unlikely event of an explosion. They safely vent and channel away dangerous pressures and gasses offering protection to people and objects in the vicinity of an enclosure during an event.

8.0 REFERENCES

The following documents were used as guidance in forming this Safety Guide.

- Fire Risk Assessment Report from Pacific Northwest National Laboratories (PNNL) Taken from BPA Report VI.
- Cell Manufacturer's UL1693, IEC62619 and UL9540A Test Reports
- CSA Report on UL9540 For the Powin Stack225.
- IFC 2012 Section 608
- Stack225 Arc Flash Safety Assessment Report.
- StackOS Product Manual

9.0 DEFINITIONS

The following terms and acronyms are used in this document.

Term	Definition
BESS	Battery Energy Storage System
BMS	Battery Management System
BPC	Battery Pack Controller
CFMEA	Concept Failure Mode Effect Analysis
CPU	Central Processing Unit
DC	Direct Current
HVAC	Heating, ventilation and cooling
ISO	International Standards Organization
NFPA	National Fire Protection Agency
OS	Operating System
PCS	Power Control System
RAM	Random Access Memory
SCADA	Supervisory Control and Data Acquisition
UL	Underwriters Laboratories

10.0 REVISION HISTORY

Name	Date	Reason for Changes	Version
V. Sukumar	2020.04.29	Initial Draft	0.02
C. Taylor	2020.04.30	Reformatted/edited by Tech Writer	A02
V. Sukumar	2020.05.04	Technical Review	B01
KJ Plank		Management Approval for Publication & Release	C01
V. Sukumar		Initial Publication	0

Powin Energy

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Service Bulletin: SB-003
July 13, 2020

Recycling Powin Battery Energy Storage System Products

1.0 PURPOSE

As part of Powin Energy's sustainability initiative we have placed emphasis on finding battery recycling partnerships in China. As a result, Powin offers an optional BESS Battery Recycle Program where Powin can contract to take back full systems or partial systems (e.g., Stacks) at system End-of-Life (EOL).

2.0 SCOPE

Powin's cell suppliers, eTrust Power Group LTD and CATL, both employ a closed loop recycling system. CATL has acquired a majority shareholding in Brunp, China's biggest battery recycling company, and is developing in-house capability to reuse and recycle li-ion batteries. Powin has a commitment with eTrust Power Group LTD to provide sustainable disposal of the battery stacks and cells, and will take back the battery cells (e.g., modules, racks) at EOL.

In addition, Powin's relationship with Beijing Saidemei Resources Recycling Research Institute Company Limited, a lithium battery recycling company in China, allows for access to Saidemei's state-of-the-art battery recycling line that can re-purpose batteries at EOL back to raw materials, which can be used to produce new cells with 90% of original capacity.

3.0 PROCEDURE

WARNING: Hazardous Voltage, Crush Hazards, and/or Arc Flash Hazards

DO NOT ATTEMPT TO DISASSEMBLE OR UNINSTALL POWIN BESS EQUIPMENT IN PREPARATION FOR RECYCLING. Preparing this equipment for recycling can create hazardous energy situations, crush hazards, and/or arc flash hazards. For this reason, this procedure must be performed by a qualified Powin Technician.

AVERTISSEMENT: Tension dangereuse, risques d'écrasement et / ou risques d'arc électrique

NE TENTEZ PAS DE DÉMONTER OU DE DÉSINSTALLER L'ÉQUIPEMENT POWIN BESS EN PRÉPARATION POUR LE RECYCLAGE. La préparation de cet équipement pour le recyclage peut créer des situations énergétiques dangereuses, des risques d'écrasement et / ou des risques d'arc électrique. Pour cette raison, cette procédure doit être effectuée par un technicien Powin qualifié.

Under the BESS Battery Recycle Program, Powin Energy, in conjunction with its cell suppliers, will breakdown EOL systems and prepare them for shipping back to the cell manufacturers where they will be re-incorporated into their closed-loop recycling system for recycling. The customer will be responsible for shipping costs back to the destination of Powin's choice.

4.0 CONTACT INFORMATION

For additional information regarding this program or for assistance to initiate this program, please contact Powin Customer Support:

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contact@powin.com