4 WAYS TO OPTIMIZE ELECTROLYTE VAPOR DETECTION DESIGN IN LI-ION BATTERY RACKS

Lithium-ion (Li-ion) battery energy storage systems (BESSs) are the unsung heroes of the green transition. From containerized, modular stationary solutions to large built environments, Li-ion battery racks make large-scale deployment of renewable energy possible, anytime, anywhere.

But this transformative technology comes with unique fire risks, which demand special attention. This is where electrolyte solvent vapor detection comes in. Here are four key considerations to optimize the design of an electrolyte vapor detection system for Li-ion battery racks.

1. KNOW YOUR BATTERY RACK

Knowing a BESS inside out is key to designing an optimized off-gas detection system.

There are three main types of Li-ion BESSs:

- Containerized – battery racks within shipping containers.
- Modular – battery racks within small pods.
- Built Environment – battery racks within a room or a building.

Battery racks come in two main categories: open frame or cabinet. Specific rack designs, however, will often have different requirements depending on the manufacturer. A trained fire engineering consultant will help you design an off-gas monitoring system that matches your battery rack brand and model.

2. DON'T FALL FOR FALSE POSITIVES

Identifying any locations where external air may enter the BESS is vital. These can include personnel entry points and HVAC supply points.

Keeping on top of these locations is key to avoiding false positives from your electrolyte vapor monitoring system, which may be triggered by external contaminants.

Reference sensors, located near outside air entry points throughout the battery system, will enable you to eliminate false positives.

Sensors should always be positioned in a way that allows fresh air to pass over the sensing face. Once again, seek the advice of a trained consultant to find the best locations for your sensors.

3. GO WITH THE FLOW

Rack-level air flow is another key design consideration. Battery modules are often equipped with cooling fans that, combined with the BESS HVAC, generate air movement through the battery rack.

The rack-level air flow coincides with the so-called hot and cold aisles of the HVAC system. Cool air is introduced in the cold aisle passing through the battery modules/rack while hot air is expelled into the hot aisle and exhausted via the HVAC system.

Remember: electrolyte vapor monitoring sensors should always be installed in the hot aisles while reference sensors should be located in the cold aisles.

4. BURST WITH SAFETY

Sealed battery modules may be equipped with pressure burst discs. These devices are designed to release electrolyte solvent vapors that may be generated during abuse of the battery cells.

The monitoring sensors should always be installed on the same side of the rack where the burst discs reside. The sensors will then be optimally placed to detect off gas and prevent thermal runaway.

We have now introduced you to some of the most important considerations when designing an electrolyte solvent vapor monitoring system for battery racks. We always recommend that you partner with a trusted and trained fire engineering supplier to ensure the system design is optimized for your specific BESS.

For more information on how to install and use off-gas detection effectively, download our LI-ION TAMER RACK MONITOR DESIGN GUIDE here.