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UPS SYSTEMS BATTERY ROOM SAFETY ISSUES

At the heart of any UPS system supporting a mission critical facility is the battery.

IEEE, OSHA, EPA, NEC, NFPA, and many more agencies, committees and groups offer safety recommendations regarding the design, construction, maintenance and monitoring of battery rooms.

Even though a data center may hire consultants and companies to help design, construct and maintain their UPS systems and battery rooms, knowing and understanding proper design and maintenance issues go a long way towards ensuring that systems perform up to expectations and supported the facility through any and all power outages.

Mission Critical Facility Battery Room Safety Issues

Battery Rack/Trays/Cabinet Issues: Battery racks and cabinets should be designed and installed to accommodate the weight and size of the batteries ordered and the quantity to be installed. Battery racks are required to be rigid and substantial and made of either metal that is covered with a corrosion-resistant material or nonconductive materials such as fiberglass. Trays are frames, such as crates or shallow boxes made of wood or other nonconductive materials, which are constructed or treated to resist deterioration.

Flooring Issues: Is the flooring able to structurally handle the weight of the racks of batteries?

Ceiling Issues: Preferably the battery room ceiling should be flat to ensure that the release of hydrogen gas cannot be trapped in pockets.

Fire Compartmentalization Issues: Battery rooms should be isolated from each other into fire compartmentalized rooms, away from each other and other equipment and staffing areas by a fire wall rated at two hours.

Fire Detection and Suppression System Issues: Individual battery rooms should be treated as separate zones for fire detection and suppression purposes.

Fire Protection Issues: Carbon Dioxide portable fire extinguishers should be provided and accessible.

Grounding Issues: All battery racks and cabinets associated with UPS systems should have NEC code green wire grounds linking all battery racks.

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UPS SYSTEMS

BATTERY ROOM SAFETY ISSUES (CON'T)

Mission Critical Facility Battery Room Safety Issues

Light Fixtures: Waterproof fixtures with flameproof construction are recommended and should be fixed to a wall or suspended more than 50 cm from the ceiling, but not directly above the batteries or charging units. Light fixture should be closed or sealed to prevent accumulation of gas.

Hoisting Equipment Issues: Electrical hoisting equipment should be used with non-conductive hoisting belts.

Battery Room EPO Systems Issues: Battery rooms should be equipped with an Emergency Power Off (EPO) system that can disconnect power in the room from the UPS common battery buss or individual UPS module.

Battery Remote Monitoring Alarm System Issues: When possible, battery systems should be equipped with remote monitoring systems. Without these systems, battery problems might not be known until power failures, leading to potential battery failures.

Temperature Control Issues: For optimal battery performance, battery room temperature should be maintained at a constant 77° F. Temperatures below 77° F increase a batteries life but decrease performance during heavy discharge. In room temperatures above 77° F battery performance increases but life decreases.

Ventilation Systems Issues: the battery rooms should be designed with an adequate exhaust system, providing for continuous external ventilation of the battery room to prohibit the buildup of potentially explosive hydrogen gas. Remember both VRLA – Valve Regulated Lead Acid (dry cell) and VLA – Flooded (wet cell) batteries; vent hydrogen gas (VRLA vents less than a VLA). Hydrogen gas is lighter than air and highly flammable, (remember the Hindenburg). If not properly ventilated, Hydrogen gas will rise to the ceiling and collect wherever possible. Each battery room should have a hydrogen gas detection system to detect hydrogen gas buildup.

Spill Containment Issues: Spill containment must be provided to adequately contain potential acid spills from cracked or leaking batteries. Adequate quantities of absorbent materials and acid neutralizing agent should be maintained in the room for use in spill containment and cleanup operations. If you don't already have one, consider getting a "Spill Kit".

Eye Wash & Deluge Shower Station Issues: Every battery room should have a combination eye wash/deluge shower station to provide a means of decontaminating personnel exposed to and contaminated by battery acid. These shower stations should have a water flow alarm that is monitored in a remote station such as a guard desk or master control room that is occupied 24x7. If a person is exposed to battery acid they need to be able to enter the shower and stay in there for a few minutes without having to leave to call for help. Also, as a safety measure, you should test the shower and alarm system every month.

Proper Protective Equipment Issues: Anyone working in and around batteries should wear eye protection and proper personal protection equipment (PPE).

There are many different rules, regulations and standards affecting UPS system batteries. Some address the battery while others address the room or associated equipment. When in doubt always consult an expert. But always act safety first and approach the backup battery for what it is, an important yet potentially dangerous part of a mission critical facility.

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