ENVIRONMENTAL COMPLIANCE AND SAFETY IN THE BATTERY ROOM

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INTRODUCTION

Stationary lead-acid battery systems are used extensively for uninterrupted power supplies and in facility emergency power systems. The sulfuric acid and lead used in many of these batteries is classified as a hazardous material due to its corrosivity. The resultant battery electrotype is also considered a hazardous material for this same reason. Electrolyte is a sulfuric acid and water solution.

Companies that routinely handle and use hazardous materials recognize the hazards and liabilities involved and respond accordingly. They take appropriate steps to prevent injury to both their workers and to the environment. However, companies sometimes fail to consider batteries a hazardous material. In addition, these companies are often unaware of specific government codes and regulations pertaining to stationary battery systems.

A literature search was conducted in order to help companies identify applicable regulations/guidelines governing lead-acid battery systems. The search focused on spill control, neutralization requirements, maintenance, installation, and also included regulations that address the use and storage of liquid hazardous materials.

DISCUSSION

Building and Fire Codes.

Three organizations develop and publish requirements for adoption and use by fire departments and building officials throughout the United States. The International Conference of Building Officials (ICBO) publishes the "Uniform Codes", the Building Officials and Code Administrators International, Inc., (BOCA) publishes the "National Codes" and the Southern Building Code Congress International, Inc. (SBCCI) publishes the "Standard Codes". Of these three model codes, only the Uniform Codes specifically address spill control requirements for stationary lead-acid battery rooms. These codes are currently under scrutiny to become unified.

The 1996 Accumulative Supplement released by ICBO, includes the addition of Article 64, Stationary Lead-Acid Battery Systems to the Uniform Fire Code. This article is applicable to battery systems having a liquid capacity of more than 100 gallons. Each rack of batteries or group or group of racks is to be provide with a liquid tight 4-inch spill control barrier and have an approved method to neutralize spilled electrolyte. Proper ventilation is addressed. This method must be capable of neutralizing a spill from the largest to a pH between 7.0-9.0. If an individual lead-acid battery has a liquid capacity greater than 20 gallons, compliance with Article 80 of the Uniform Fire Code is also required.

Article 80 addresses handling/storage requirements of hazardous materials, in particular, Section 80.314 for corrosives. The primary requirement is for a secondary containment system which can consist of either recessed floors or liquid tight raised sills. The containment area has to contain the spill from the largest single container plus the design flow rate of the automatic fire extinguishing water to be contained can be (if required) for a period of 20 minutes. The volume of the fire extinguishing water to be contained can be calculated using either: the area of the room, the area were the material (i.e. batteries) is located or the system design area, whichever is smaller. A method to detect any leaks into the secondary containment area is also required, the preferred method is visual inspection.

The 1996 supplement also adds section 304.8 to the Uniform Building Code that states "Stationary lead-acid battery systems used for facility standby, emergency power or uninterrupted supplies shall be installed and maintained in accordance with the Fire Code."

The National Building Code (Section 41) and National Fire Code (Chapter 23) addresses the use and storage of hazardous materials. The building code requires the use of controls to prevent hazardous materials from entering or leaving a process area. The control method used has to contain the spill itself and any fire protection water. Section307.8.13 of the National Building Code specifically states that stationary batteries used for facility emergency power, uninterrupted power supply or telecommunication facilities (provided that safety venting caps are used and proper room ventilation is provided) shall not be classified in Use Group H (high hazard occupancy) but should be classified in the use group which they most nearly resemble. However, hazardous material in any quantity should conform to Section 417 of the building code and fir prevention code. The National Fire Prevention Code requires the spill control method to include either a liquid tight floor recessed a minimum of 4 inches or a 4 inch raised liquid tight sill. Drainage of spills and fire protection water can be directed to a neutralizer or treatment system. This system must be able to handle the worst case spill from the largest container plus the volume of fire protection water over the minimum design area for a period of 20 minutes. The use of the above requirements is applicable when the volume of hazardous material exceeds certain exempt amounts: 500 gallons for inside storage (unprotected by sprinklers) or 1000 gallons if protected by sprinklers.

The Standard Fire Prevention Code (Chapter 22) and The Standard Building Code (Section 407) both call out requirements for the storage of liquid hazardous materials. A method to control spills and to contain or drain off spills and fire protection water that is discharged into the storage system is required. Requirements for the spill control method include a 4-inch raised liquid tight sill. Drainage of spills and fire protection water can be directed to a neutralizer or treatment system. This system must be able to handle the worst case spill from the largest container plus the volume of fire protection water over the minimum design area for a period of 20 minutes. However, Chapter 22 of The Standard Fire Prevention Code does exempt stationary batteries (for facility emergency power, uninterrupted power supplies or telecommunication facilities) from the above requirements, provided that safety vent caps are used and sufficient room ventilation is provided. The ventilation has to provide a vapor-air mix, which is less than 25% of the lower explosive limit.

Federal and State Regulations/Codes

The Occupational Safety and Health Administration Standard 1926-441, Batteries and battery charging, requires the battery system (unsealed type) to be arranged to prevent electrolyte from going into other areas. The racks and trays used to hold the batteries are to be resistant to the electrolyte. The floors are to be of an acid resistant construction unless they are protected from acid accumulation. There also should be a method available to neutralize any spilled electrolyte.

The California Code of Regulations, Title 22 and The Code of Federal Regulations, Title 40 are both identified in the literature results even though these regulations apply to the handling of hazardous waste. There inclusion is only for reference purposes and should be considered as guidelines for those companies practicing good corporate citizenship. Both regulations require the use of liquid tight containment systems to contain any material that may leak and hold the material until the leak is detected and removed. The volume of the containment structure should be sufficient enough to contain10% of the volume of all the containers or the volume of the largest container, whichever is greatest. The base shall also be designed to drain and remove liquids resulting from leaks/spills or the containers protected from contact with accumulated liquids.

Organizations/Institutes

The Institute of Electrical and Electronics Engineers Standards 1187-1996 and 484-1996 suggest facilities have provisions for neutralizing and containing spilled acid electrolyte in accordance with governmental regulations. Personnel protection equipment is required for maintenance and installation of batteries. Equipment addressed is eye protection, body protection, and a means to clean up a spill.

The American Society for Testing and Materials has two standards for cleaning concrete and masonry units prior to the application of coatings. Coatings that are used to protect the concrete from either chemical attack or to make the concrete liquid tight to prevent the release of materials. This information is included should selected spill containment setup incorporate a coating material.

CONCLUSION

Stationary lead acid battery systems are specifically identified and regulated in Building and Fire Codes, the OSHA standard, and by Institutions. Many of the other codes/regulations while not specifically addressing lead acid battery systems do regulate the handling and use of hazardous materials (which includes battery electrolyte). There is common elements among these codes regarding spill control and neutralization requirements; however, there are also specific exceptions. The intent of the article was to help companies become aware of the various regulations that specifically apply to the use of stationary, lead acid battery systems or to the use and handling of hazardous materials in general. Companies can use and build on this information to help insure their overall regulatory compliance.