Room Standards Z4040 Battery Charging Rooms

### PART 1 - GENERAL

#### 1.01 OVERVIEW

- A. This document addresses minimum code requirements, guidelines, regulations and provides design and construction criteria for battery charging operations at the University of Texas M.D. Anderson Cancer Center (Owner). This includes, but is not limited to, rooms designated for charging portable floor scrubbing machines, UPS battery rooms as well as other spaces in which battery systems are permitted by Code to share with the equipment they support.
- B. Where the A/E considers that compliance is not possible, the A/E shall communicate such concerns in writing to the Owner's Project Manager and resolve all non-compliance issues in sufficient time during the design phase of the Project to meet contract schedule obligations.

### PART 2 - DESIGN CRITERIA

#### 2.01 CODES AND REGULATIONS

- A. The NFPA 101 Life Safety Code shall be adhered to for all life safety requirements.
- B. The Occupational Safety and Health Administration 29 Code of Federal Regulations (CFR) 1910.178 Powered Industrial Trucks and 29CFR1926.441 Batteries and Battery Charging shall be adhered to for eyewash/safety shower, ventilation and fire protection requirements.
- **C.** The NFPA 70 National Electrical Code shall be adhered to for the electrical design and installation of battery charging operations.

#### 2.02 LOCATION AND OCCUPANCY SEPARATION

- A. House battery systems in a noncombustible, locked room or space to prevent access by unauthorized personnel unless located in a separate equipment room accessible only to authorized personnel.
- B. Locate battery systems in a room separated from other portions of the building by a minimum of a 1-hour fire barrier. Provide fire barrier with higher rating, as required by Code, where project condition dictates.

#### 2.03 ACCESS DOORS

- A. Battery room doors shall open outward. Coordinate fire rating of the with fire rating of the wall.
- B. Provide access and entrance to working space around the battery as required by NFPA 70, Spaces about Electrical Equipment. Space equal to the width and depth of the equipment and extending from the floor to a height of 6-feet above the equipment or to the structural ceiling, whichever is lower, shall be dedicated to the electrical installation. Do not locate piping, ducts, leak protection apparatus, or other equipment foreign to the electrical installation in this zone.
- C. Passageways shall be of sufficient width to allow the replacement of all battery room equipment. The minimum aisle width shall be 36 inches.

# Element ZGeneral Design RequirementsRoom StandardsZ4040 Battery Charging Rooms

#### 2.04 CEILINGS AND FLOORS

- A. Slightly pitch battery room ceiling toward the exhaust air outlet Construct ceiling from gypsum board, plaster or other hard, continuous surface. Ensure that pockets of trapped Hydrogen gas do not occur, preventing the accumulation of an explosive mixture.
- B. Floors shall be of acid resistant construction or protected from acid accumulations.

#### 2.05 TEMPERATURE CONTROL AND MECHANICAL VENTILATION

- A. Air conditioning and ventilation systems must address health and safety as well as room temperature and performance requirements of the batteries and other equipment in the room. Exhaust air is necessary to remove the production of hydrogen gas which is produced during the battery charging process.
- B. For flooded lead-acid, flooded nickel-cadmium, and VRLA batteries, ventilation is necessary to remove accumulated explosive hydrogen gas produced by the battery charging process. The ventilation fan shall be continuously on during battery charging process with a ventilation rate of not less than 1 CFM/ft<sup>2</sup> of floor area of the room, or using battery manufacturer's recommendations, whichever is more stringent.
- C. Where mechanical ventilation is installed, the following shall be required:
  - 1. Interlock means shall be provided such that the initiation of battery charging process will automatically turn on the ventilation fan. A local manual override means shall be provided.
  - 2. Airflow sensors shall be installed to initiate an alarm if the ventilation fan becomes inoperative.
  - 3. Control equipment for the exhaust fan shall be located more than 6 ft from the battery and a minimum of 4 in. below the lowest point of the highest ventilation opening.
  - 4. Where mechanical ventilation is used in a dedicated battery room, all exhaust shall be directly to the outdoors.
  - 5. Fans used to remove air from a battery room shall be Class B spark resistant. If the fan and motor are located within the battery room or within the battery room exhaust air stream the fan motor, electrical disconnect switch shall meet explosion proof standards.
- D. The supply air in battery charging operations shall be approximately 95 percent of the exhaust ventilation rate to maintain slightly negative room pressure to prevent fumes and gases from migrating outside the room. Exhaust air shall not pass over electrical equipment unless the equipment is listed for the use. Supply air inlets shall be no higher than the tops of the battery cells and exhaust outlets at the highest level in the room.

#### 2.06 ELECTRICAL

A. Battery room lighting shall be installed to provide a minimum level of illumination of 30 footcandles. Luminaires shall not be installed directly over cells or exposed energized conductors and circuit parts. Switches for the controls of the luminaires shall be readily accessible.

# Element ZGeneral Design RequirementsRoom StandardsZ4040 Battery Charging Rooms

- B. Emergency illumination shall be provided for safe egress from the battery room.
- C. General-purpose outlets shall be installed for the maintenance of the battery. Generalpurpose outlets shall be installed at least 6 feet from the battery and a minimum of 4 in. below the lowest point of the highest ventilation opening.
- **D.** Ventilation fans serving battery charging areas shall be fed by emergency power.

#### 2.07 OTHER CONSIDERATIONS

- A. Fire alarm and fire protections systems shall be provided per MD Anderson Cancer Center standard.
- B. Metalwork, wiring and all other materials that may be exposed to corrosive solids, liquids or gases shall be corrosion resistant and suitable for battery charging operations.
- C. Provide eyewash, handwashing sink, and safety shower within 25 feet of battery charging operation.

Element ZGeneral Design RequirementsRoom StandardsZ4040 Battery Charging Rooms

## **PART 3 - DOCUMENT REVISION HISTORY**

Issue	Date	Revision Description	Reviser
	20190301	Original Issuance	
Rev. 1			
Rev. 2			
Rev. 3			
Rev. 4			
Rev. 5			

**END OF ELEMENT Z4040**