

	PRINCETON PLASMA PHYSICS LABORATORY ES&H DIRECTIVES		
	ES&HD 5008 SECTION 2, CHAPTER 14 Battery Banks		
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Chapter 14 BATTERY BANKS

14.1 DESCRIPTION

This section covers rechargeable storage battery banks that are used for the storage of electrical energy. These criteria are not limited to batteries of a particular voltage and energy rating, since the nature of the associated electrical hazards is similar for any battery size, except that the severity of the hazard increases with increased battery rating.

14.2 TYPES OF HAZARDS

- A. Accidental grounding of one polarity of a battery bank can create a hazardous voltage between the ungrounded polarity and ground.
- B. Accidental shorting of the exposed terminals or cables of a battery can result in severe electric arcing, causing burns and electric shock to nearby personnel and/or damage to equipment.
- C. Hydrogen gas generated during the charging of some types of batteries can create fire and explosion hazards.
- D. Exposed terminals of a battery bank may present electric-shock hazards.
- E. Batteries, especially those with sealed cells, may explode if they are shorted or charged at excessively high rates.
- F. Electrolytes are highly corrosive and can produce severe burns on contact.

14.3 DESIGN AND CONSTRUCTION CRITERIA

- A. Battery installations shall conform to the requirements in NEC Article 480, NFPA 70E, Chapter 3, Article 320, NESC Section 14, and OSHA 29 CFR 1926.403.
- B. An electrical system ground is not required with battery circuits. A ground detector should be used to indicate and/or annunciate an accidental ground. Metal raceways and cable trays used for battery circuits and battery racks shall be grounded in accordance with NEC Article 250.
- C. Batteries shall be mounted to allow safe and convenient access for maintenance.
- D. Lockable doors shall be provided to rooms or protective enclosures containing battery banks accessible only to qualified persons.

- E. Deluge safety showers and eye-wash stations shall be provided in close proximity to battery banks.
- F. Per NESC, rule 14, adequate ventilation shall be provided in battery rooms to prevent liberated hydrogen gas from exceeding a 1 percent concentration (25 percent of the lower-explosive limit). Failure of ventilation system to limit hydrogen accumulation shall be annunciated.
- G. Floors to be acid-resistive materials or paint. Provisions shall be made to contain electrolyte.
- H. Space shall be provided above cells to allow for operation of lifting equipment when required.
- I. Vapors given off in battery storage rooms are very corrosive; all wiring and conduits shall be suited to withstand the corrosive effects of vapors. Steel conduits shall be zinc coated and painted with asphalt type paint.

14.4 OPERATING CRITERIA

- A. Battery bank connections shall be maintained clean and tight to prevent excessive heating due to contact resistance.
- B. Battery connections shall not be disconnected when current is flowing because a hazardous arc could occur.
- C. Proper protective equipment shall be worn when manipulating liquid-filled storage batteries. Chemical splash goggles, with face shield, neoprene gloves and apron are considered adequate. Determine the location of the nearest safety shower and/or eye bubbler before beginning work.
- D. Safety signs shall be posted at the entrances, both inside and outside of each battery bank or room to alert personnel of potential hazards.
- E. Tools used for working on batteries shall be insulated and non-sparking.
- F. Battery banks are to be arranged so that temperature stratification will not result in over-or-under charging.
- G. All cables shall be clamped and have sufficient support so that no strain is imposed on the cable or connections. (See NFPA 70E Chapter 3, Article 320.3)