

1. The DC Engine Starting System shall be an integrated system containing batteries, chargers, DC disconnects, engine starting power redundancy, and communications. Acceptable types shall be Stored Energy Systems (SENS) SuperTorque 8ZR or equivalent.
 - A. Batteries
 - 1) The batteries shall be nickel-zinc chemistry.
 - 2) The battery system shall be sized to meet NFPA 110 engine cranking requirements of 6x consecutive 15s engine crank sequences.
 - 3) The temperature range shall be 5°C to 50°C (minimum).
 - 4) The battery shall have a service life expectancy of greater than 10 years.
 - B. Charging System
 - 1) The battery charging system shall function automatically and shall be designed for nickel-zinc batteries.
 - 2) The battery charging system shall fully recharge the battery system in less than 8 hours.
 - 3) The battery charging system shall operate with a 110-240VAC single-phase input.
 - 4) The battery charging system shall be temperature compensated and shall prevent all over-charging at elevated temperatures.
 - C. DC Disconnects
 - 1) DC disconnects shall be provided for each battery bank.
 - 2) The disconnects shall have lock out tag out capability and be user-accessible.
 - 3) The disconnects shall be rated for all applicable engine starting currents.
 - D. Redundancy
 - 1) The system shall provide full engine starting power redundancy including:
 - a) Redundant Battery Banks
 - b) Each battery bank shall have a designated charging system.
 - c) Each battery bank shall have a dedicated DC disconnect.
 - d) In cases where the engine has a single engine starting power input, isolated battery coupling shall be provided. This function is commonly referred to as a best battery selector (BBS) system.
 - 2) The system shall provide engine DC alternator power feed redundancy. A single engine DC alternator input shall be preconfigured to charge two isolated battery banks simultaneously.
 - 3) The system shall provide engine control power redundancy. A power feed from each isolated battery bank shall be coupled with isolation to a single connection, ensuring that the engine control panel received isolated redundant power from each battery bank.
 - E. Communications
 - 1) The DC Starting System shall provide visual indication of overall system health for each battery bank including:
 - a) DC Battery Voltage
 - b) Charging Current
 - c) Alarm Indication
 - d) Status

- 2) The DC Starting System shall provide remote communications including:
 - a) 5x Form-C relay contacts
 - b) Modbus TCP/IP communications

F. System Integration

- 1) The entire system shall be packaged together for industrial engine starting environments.
- 2) All power conductors shall be designed to all applicable NEC and UL standards.

G. Agency Approvals

- 1) The system shall be UL Listed, UL1973 preferred.
- 2) The system shall comply with all applicable NEC requirements.

END OF SPECIFICATION