

480.3 Equipment. Storage batteries and battery management equipment shall be listed. This requirement shall not apply to lead-acid batteries.

As energy demands increase, many stationary battery types will be introduced into the electrical infrastructure. Standards exist for stationary batteries to support a practical and reasonable implementation of these technologies within the electrical infrastructure. This requirement does not require listing of battery systems in Article 480 — it only addresses listing of the batteries themselves, other than the lead-acid type, and battery management equipment (such as charge controllers).

480.4 Battery and Cell Terminations.

Δ (A) **Corrosion Prevention.** Where mating dissimilar metals, antioxidant material suitable for the battery connection shall be used where recommended by the battery manufacturer's installation and instruction manual.

(B) **Intercell and Intertier Conductors and Connections.** The ampacity of field-assembled intercell and intertier connectors and conductors shall be of such cross-sectional area that the temperature rise under maximum load conditions and at maximum ambient temperature shall not exceed the safe operating temperature of the conductor insulation or of the material of the conductor supports.

Informational Note: Conductors sized to prevent a voltage drop exceeding 3 percent of maximum anticipated load, and where the maximum total voltage drop to the furthest point of connection does not exceed 5 percent, may not be appropriate for all battery applications. IEEE 1375-2003, *Guide for the Protection of Stationary Battery Systems*, provides guidance for overcurrent protection and associated cable sizing.

(C) **Battery Terminals.** Electrical connections to the battery, and the cable(s) between cells on separate levels or racks, shall not put mechanical strain on the battery terminals. Terminal plates shall be used where practicable.

Informational Note: Conductors are commonly pre-formed to eliminate stress on battery terminations. Fine stranded cables may also eliminate the stress on battery terminations. See the manufacturer's instructions for guidance.

(D) **Accessibility.** The terminals of all cells or multicell units shall be readily accessible for readings, inspections, and cleaning where required by the equipment design. One side of transparent battery containers shall be readily accessible for inspection of the internal components.

480.5 Wiring and Equipment Supplied from Batteries. Wiring and equipment supplied from storage batteries shall be subject to the applicable provisions of this *Code* applying to wiring and equipment operating at the same voltage, unless otherwise permitted by 480.6.

480.6 Overcurrent Protection for Prime Movers. Overcurrent protection shall not be required for conductors from

a battery with a voltage of 60 volts dc or less if the battery provides power for starting, ignition, or control of prime movers. Section 300.3 shall not apply to these conductors.

The requirement to use Chapter 3 wiring methods is not applicable to battery-powered single conductors used to perform certain operational functions associated with a prime mover, such as for starting a stationary combustion engine that drives an electric generator. For example, if it is necessary to extend the conductors from the battery to the prime mover starting solenoid at a generator location, battery-powered conductors would not be required to have overcurrent protection and could be run as open, single conductors.

480.7 DC Disconnect Methods.

Δ (A) **Disconnecting Means.** A disconnecting means shall be provided for all ungrounded conductors derived from a stationary standby battery with a voltage over 60 volts dc. A disconnecting means shall be readily accessible and located within sight of the stationary standby battery.

Informational Note: See 240.21(H) for information on the location of the overcurrent device for battery conductors.

Battery systems need maintenance to remain functional. In some cases, such as in 700.3(C), the NEC® requires battery system maintenance. For maintenance to be performed safely on a stationary battery system, a readily accessible disconnect means located within sight of the battery system is required. It should be noted that the disconnecting means only isolates the batteries from the equipment and loads being supplied by the battery system. Similar to disconnecting means requirements in Article 690 for photovoltaic electric systems, it is recognized that the batteries, like the photovoltaic modules, cannot be shut down or de-energized. However, having a disconnecting means within sight of the power source minimizes the amount of line-side conductor that remains energized after the disconnecting means is turned off or put into the open position.

See also

240.21(H), which addresses the location of overcurrent protection devices for battery conductors

Δ (B) **Emergency Disconnect.** For one-family and two-family dwellings, a disconnecting means or its remote control for a stationary standby battery shall be located at a readily accessible location outside the building for emergency use. The disconnect shall be labeled as follows:

EMERGENCY DISCONNECT

This requirement applies only to the battery systems covered under the scope of Article 480 that are installed as a primary or standby power source at one- and two-family dwellings. If a battery-type energy storage system (ESS) is installed as a power source for a one- or two-family dwelling, the requirements of Article 706 apply to the installation.