Consultant's Corner: Batteries and Charging Considerations

consultants corner

Batteries and charging considerations

A dependable starting system is essential for quick gen set start-up. Batteries are the most common power sources for starting systems, but they can be one of the easiest system components to overlook.

Battery considerations

Lead-acid batteries reach peak efficiency at 90 degrees F (32 C) As ambient temperature drops, ampere output and recharging efficiency decline, dropping to 40 percent of rated output at 0 degree F (-18 degree C).

Cold Cranking Ampere (CCA) rating is the best yardstick by which to measure a battery's capacity. It indicated the discharge rate (measured in amperes) a fully charged battery will maintain at 0 degrees F (-17.8 degree C) without terminal voltage dropping below 1.2 volts per cell. Table 1 shows the effects of colder temperatures on battery capacity.

Table 1
Ambient Temperature vs. Battery Output

F°	C°	Percent of 80° F (27° C) Ampere hours output rating
80	27	100
32	0	65
0	-18	40*

*Lead acid batteries are almost always used on gen sets due to their lower upfront cost and maintenance needs. However, nickel cadmium batteries are preferred in harsh environments or situations where they will likely be unused for lengthy periods. They also tolerate long overcharge intervals better than lead acid batteries, and offer a nearly constant voltage output throughout a discharge cycle.

Charging systems

Gen sets with engine mounted alternators cannot be relied upon to recharge batteries in standby situations. Charging systems must be used to maintain batteries while the unit is on standby, and fully recharge batteries if gen set cycle times are short.

Consider these factors when specifying a charging system:
1. Select a system that recharges batteries quickly in the constant current mode, then automatically switches to maintain charge in a constant voltage mode. Units should be able to recharge completely dead batteries or those with no open circuit voltage. Select a system that will float and equalize, which maintains charge with minimal water loss in cells.
2. Match charger capacity to the battery's ampere-hour (AH) capacity. Charger output should be between C/5 and C/20, where C equals the battery's AH capacity. For example, a 10 amp unit can charge batteries between 50 and 200 AH.
3. Consider units that offer short circuit protection. This prevents damage to any DC powered controls, and allows engine cranking without disconnecting the charger.
4. Specify diagnostic functions or alarms. An output voltage sensor is one of the best trouble indicators because it can detect power loss as well as overcharging problems. Consider a time delay on the voltage sensor to prevent false alarms caused by power drains from engine cranking.
5. Make sure chargers can withstand high transient response loads. Input voltage range minimum of +\- 5 Hz are acceptable.
6. Equipment should meet UL standards. Other industry standards to consider specifying: Transient Voltage Withstand Test per IEEE std. 472-1974 (ANSIc37.90A-1974). Other standards to assure performance, construction and safety: UL EGSMA BCES-1, NFPA-110 and NEMA PV-5.

Call us for help

We can assist you in identifying battery and charging needs for the installation you are specifying. Contact us for these or other specifications.