

CHAPTER 6

Batteries



A photovoltaic system array does not produce electricity unless the sun is shining on it. For a PV system to provide electrical power when the sun's rays are not available, storage batteries are used. Batteries are also used in a PV system to provide the needed amount of surge power for heavy electrical loads that a PV system array cannot provide. In this chapter, we discuss the different battery types commonly used in PV systems. Battery specifications and battery performance are covered in detail. Also, no coverage of batteries is complete without a discussion of battery safety, including the proper way to handle batteries during a PV system installation.

Glossary of Terms

absorption charging A charging stage that occurs after bulk charging that uses a lower charge current for a longer period of time to bring the state of charge up another 10 to 15 percent.

battery An electrochemical device that stores DC electricity in chemical form for later use.

battery bank Batteries connected together in a series or parallel configuration to deliver a desired voltage and current.

bulk charging A charging stage that uses a high charging rate to bring a battery up to a state of charge of about 80 to 90 percent.

charging The process of a battery receiving current from a charging source and transforming the electrical energy into chemical energy.

cutoff voltage The minimum manufacturer-specified battery voltage that still results in some usable battery capacity.

cycle One charge-discharge sequence of a battery.

days of autonomy The number of days that a battery bank can supply the electrical load without being recharged.

Objectives

Upon completion of this chapter, the student should be able to

- Identify different storage battery types used in a PV system.
- Demonstrate an understanding of how a typical PV system battery works.
- Test a battery with a voltmeter or a hydrometer to determine its state of charge.
- Connect battery banks to get a desired voltage and amp-hours.
- Demonstrate an understanding of safety precautions when installing and maintaining PV system batteries.