

Safety and Maintenance

High Voltage!

- Electricity does not warn you before shocking you
- High voltage shocks can kill you
- Turn everything off before you touch the system



Personal Protective Equipment

Use Personal Protective Equipment such as hardhats, safety glasses, safety shoes, or gloves when handling solar equipment



Thermal Runaway

- Cells can rapidly heat and release electrolytes, flames, and dangerous fumes in inappropriate conditions
- Solar modules should not exceed 25 C
- Heat adds resistance to the current, so for every degree above 25 C the performance will drop by 0.5%
- Read the manual for appropriate operating temperatures

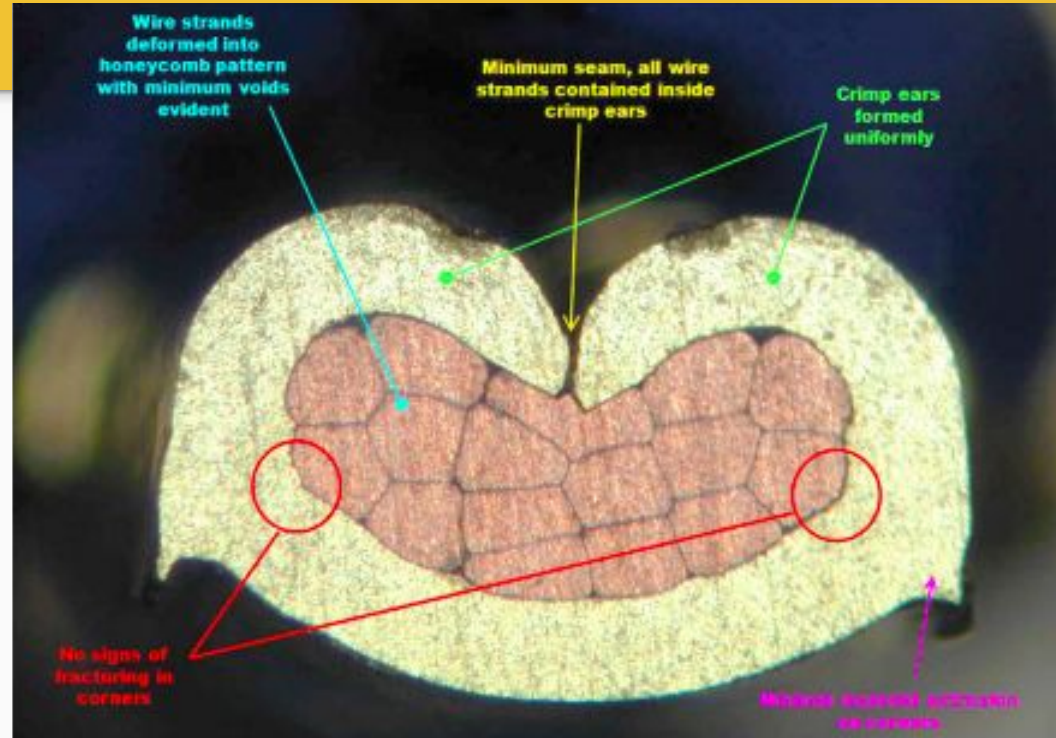
Batteries

- If there is liquid near batteries, assume it is battery acid
 - Do not touch the liquid! It will burn skin and clothes
 - Dab a cloth in a solution of baking soda mixed with water to clean off the top of the battery
- Batteries are capable of overheating but come with protective equipment that protects it from extreme voltage, current, or incompatible temperatures

Crimped Cables

Good

- Poorly crimped cables can potentially spark or short circuit acting as a possible fire starter
- If cables must be cut, use a high-quality crimper tool



Weather

- If high wind speeds occur, make sure the foundation is secure!
- Earthquakes can cause electrical wiring to tear away from the system which can lead to a short circuit and could turn into a fire
 - Run electrical wiring through a flexible conduit between large structures that can easily move
- If there are lightning storms a few times a year, use lightning protection devices
 - Devices encourage the strike to travel through a predetermined path



Animals



- Be careful if an elephant walks by the solar array, it might think the solar array is a lake and will attempt to sit on it
- Bird droppings can shade solar modules
- Rats or other rodents can chew wires
 - Possible falling leaves on those wires can cause fires
 - Cage off the edge of rooftop PV arrays if there are concerns about rodents



Please Remember..

- Have a partner check your work and watch for risk
- Read the manual
- Safety is the most important thing!



Operation and Maintenance of the System

- Important to do once a year
- Identifies problems that can come from age or the environment to help insure that the system is functioning



Module Maintenance

- Dust on the modules reduces the production of the system
 - Regularly clean off modules if in an area without regular rainfall
- Do not pour cold water on hot modules
 - Temperature difference could shock and crack the glass
- For rooftop arrays, check drainage and watertight seals



Battery Examination

- Inspect the area for liquid
- Check to see if the sides of the battery are bloated
 - Could be a sign of undercharging, over-discharging and/or sulfate build-up
- Test the voltage between the batteries and between battery cells to ensure minimal voltage differences



Inverter and Charge Controller Examination

- Clean air filters of the cabinet if accessible
- Both electronics tend to overheat
 - Use fans to prevent overheating, make sure to examine the fans yearly
- Check fuses, circuit breakers, and lightning arrestors
- Test for continuity on the system ground and equipment ground
- Most inverters and charge controllers last for 10 years

Inverter and Charge Controller Examination

- DC Over Voltage
 - Measure the voltage of the PV combiner box to check if voltage exceeds the input of charge controller or inverter
- AC Under/Over Voltage
 - Disconnect all AC sources and test the AC voltage
 - If it is within range, manually restart the inverter
 - If out of range, call the inverter manufacturer

Tools

Kill A Watt Meter



- Measures the power of individual equipment to help determine your consumption per device and possible voltage drops
- Calculates kWh, W, V, A, Hz, VA, PF
- Only plugs into the AC outlet after the inverter

Tools

Multimeters



- Measures voltage, current, and resistance
- Checks for continuity of the circuit

Tools

Clamp Meter



- Equipped with a clamp to measure current indirectly
- Clamps allow measurements to be taken without interrupting the circuit

Tools

Angle Gauge



Determines the actual tilt of the solar array or roof pitch

Tools

Solar Pathfinder (Hardware or App)



Sun Tracker AR 4+

Sunrise, sunset and position

Zuzana Eskinasi

★★★★★ 3.3, 6 Ratings

Free · Offers In-App Purchases

- Measures the path of the sun and the shade in a particular location
- Helps to determine what the PV production will be

Tools

Hydrometer



- Measures the specific gravity in flooded lead-acid batteries
- Gravity helps to determine the voltage of each cell
- Large voltage differences indicate a malfunctioning or dead battery

Tools

Cable Crimper



- Used to join two metallic ends such as a connector to the end of a cable, or a cable to another cable