

Design of Small Solar Home System (SSHS)

Nominal system voltage: 12 Vdc.

Nominal system capacity: 10 Wp to 21 Wp

SSHS Design

Type: 1	Type: 2
System Capacity: 10 Wp to 15 Wp	System Capacity: 16 Wp to 21 Wp
Load Type: LED lamp (fixed) + 1 no. movable LED lantern (optional)	Load Type: CFL lamp (fixed) + 1 no. movable LED lantern (optional)
Maximum Load size: Should not exceed 50% of panel capacity	Maximum Load size: Should not exceed 50% of panel capacity
System autonomy: 3 days	System autonomy: 3 days

SSHS Component specifications

Photovoltaic Module

- Photovoltaic (PV) module must be tested and certified from an accredited testing and certification organization. PV module should have IEC/IEEE/PV GAP recommended certificates.
- Each module must be labeled with indicating at a minimum: Manufacturer, Model number, Serial number, Peak Watt rating, Voltage and Current at peak power, Open Circuit Voltage and Short Circuit Current.

Battery

- The battery should be 12 Vdc
- Minimum size of the battery should be 18 Ah @ 10 hr
- Battery should be thick/tubular plate maintenance-free/vented type

Charge Controller

- Maximum current handling capacity should be 5A
- Maximum self current consumption 10 mA
- The charge controller set points must be factory preset with the set points applicable to the specified battery characteristics
- Must be capable of handling 130% of the module's rated short circuit current for on-hour duration.
- The model number, serial number, rated voltages and currents and set points should be noted on the charge controller case.
- Battery, high voltage disconnect 14.3 ± 0.2 volts, or as specified by the manufacturer
- The load must be controlled by a low voltage disconnect (LVD) device. The controller must be capable of handling at least 150 percent of the maximum expected continuous load (e.g. assuming all end use devices are simultaneously on). It should be factory preset to disconnect and reconnect voltages corresponding to the safe operation of the battery under ambient temperature conditions. For example, a disconnect voltage of 11.6 Vdc ± 0.1 Vdc and reconnect voltage of 12.6 Vdc ± 0.2 Vdc is suitable.

LED lamp /Lantern (Fixed/Movable)

- Minimum power (w) of LED lamp/Lantern should be 1 watt
- Minimum lumen output of LED Lamp/lantern should be 35 lumen/watt.
- LED should provide minimum 80% of the initial lumen output after 5000 hours.
- Color of LED light must be white.
- Number of LED cluster in each lamp/lantern should not be more than 12 LEDs/watt
- LED controller card should be connector type and should be easily replaceable
- Movable lamp/lantern should have built-in rechargeable storage battery of appropriate capacity. Minimum size of the battery will be 1.5 Ah per wattage of LED lantern.
- Over the voltage range of 11.3-14.4 V, the current to the LEDs must not exceed by more than 15% of the rated current.
- The efficiency of the LED controller circuit must remain above 75%.

** Fixed LED lamp/lantern should not be placed at a height more 6 feet from the ground.

CFL (Compact Fluorescent Lamp)

- Maximum power output will be 5 W
- Rated voltage: 12V
- Minimum Lamp efficacy 35 lumen/Watt
- Rated efficiency of CFL will be over the range -2.5% to +20% of rated capacity
- Minimum striking voltage should be at least 90% of rated input voltage
- Maximum operating voltage will be at least 125% of the rated voltage
- Minimum operating frequency should be 20 kHz
- Electrical waveform will be symmetrical in time over voltage range of 11-12.5 Vdc at ambient temperature 25°C
- Maximum crest factor must be less than 2
- Inverter electrical efficiency must be greater than 80% from 11-13.3 V.
- Inverter should have reverse polarity protection
- Inverter should have protection against open circuit voltage conditions. Maximum input current draw under open circuit voltage conditions should not be more than 100 mA.
- Minimum life time should be 8,000 hours

Warranty

- **PV module:** PV module should be warranted for at least 10 years and must not experience more than 20% of the rated capacity reduction in output over its warranty period.
- **Battery:** For thick plate battery, warranty should be given for at least 3 years, for tubular plate battery, warranty should be given for at least 5 years.
- **Charge Controller:** Charge controller should be warranted for at least 3 years
- **LED:** Each LED should be warranted for at least 5 years and LED controller circuit should be warranted for 2 years.
- **Built-in rechargeable battery for LED Lantern:** In case of movable lamp/lantern, built-in rechargeable battery should be warranted for at least 1 year.
- **CFL:** CFL should be warranted for at least 1 year.

** Other technical standards (such as PV module installation, system wiring, system protection, monitoring, component documentation, operation and maintenance etc.) would remain as same as Technical Specifications for Solar Home System