

Draft Specifications

WHITE LED BASED SOLAR LANTERN SYSTEM

Interested manufacturers/organizations may please get their samples tested at Solar Energy Center or ERTL, Kolkata latest by 31st January, 2009 and send a copy of the report to bhargava@nic.in

DEFINITION

Light Emitting Diode (LED) is a device which emits light when an electric current passes through it. A Solar lantern) is a lighting system consisting of a lamp, battery and electronics, all placed in a suitable housing, made of metal, plastic or fiber glass, and a PV module. The battery is charged by electricity generated through the PV module. The lantern is basically a portable lighting device suitable for either indoor or outdoor lighting, covering a full range of 360 degrees. A LED based solar lantern system aims at providing solar electricity for operating LED lights for specified hours of operation per day.

The broad performance specifications of a white Light Emitting Diode (LED) light source based solar lantern system are given below.

BROAD PERFORMANCE PARAMETERS

Light Source White Light Emitting Diode (W-LED), dispersed, soothing to eyes

Light Out put Minimum level of illuminance from WLED lantern

S.No	Distance	When detector is in horizontal to center point of bottom of light source	When detector is at right angle to the center point of bottom of light source
1	1 feet	32 Lux	105 Lux
2	2 feet	6.5 Lux	32 Lux
3	3 feet	3 Lux	16 Lux
4	4 feet	2 Lux	9.5 Lux
5	5 feet	1.5 Lux	6.5 Lux

Mounting of light	Top or base mounted
PV Module	between 2.5 to 5 Wp under STC
Battery	Lead acid Sealed maintenance free or Ni MH or Lithium Ion, with a capacity upto - 7 AH, at voltages up to 12 V @ C/20, Max DoD 75% or equivalent capacity
Electronics	Min 80% total efficiency
Average duty cycle	4 hours a day
Autonomy	Minimum of 3 days (Minimum 14 operating hours per permissible discharge)

It should be possible to charge the WLED solar lanterns through a central charging station also. For central charging the battery capacity may be for a maximum of 8 hours and the design battery voltage may be specified.

Other Details

DUTY CYCLE

The LED solar lantern system should be designed to operate for average 4 hours a day, under average daily insolation of 5.5 kWh /sq.m. on a horizontal surface.

LIGHT SOURCE

The light source will be of white LED type. Single lamp or multiple lamps can be used. Wider view angles preferred. The luminous performance of LEDs used should not be less than 55 lumen/watt. White colour, Higher light output will be preferred. The colour temperature of white LEDs used in the system should be in the range of 5500° K – 6500° K. Use of LEDs which emit ultraviolet light is not permitted.

- The light output from the white LED light source should be constant though out the duty cycle.
- The lamps should be housed in an assembly suitable for indoor and outdoor use.
- The make, model number, country of origin and technical characteristics of white LEDs used in the lighting system must be furnished to the test centers and to the buyers. In absence of this data the solar lantern may not be tested by the test center.

BATTERY

- (i) Sealed maintenance free battery. Battery should conform to latest BIS standards or international standards. A copy of the test certificate for the battery (including its make, country of origin and model number) used in the system should be provided to the test center and buyer.
- (ii) At least 75 % of the rated capacity of the battery should be between fully charged & load cut off conditions.

ELECTRONICS

- (i) The total electronic efficiency should be at least 80 %.
- (ii) Electronics should operate at 4.5/6/12 V and should have temperature compensation for proper charging of the battery through out the year.
- (iv) The light output should remain constant with variations in the battery voltages.
- (v) Necessary lengths of wires / cables, switches suitable for DC use and fuses should be provided.

PV MODULE

- The PV modules based on crystalline silicon solar cells or thin films may be used. In all cases a test report is required from authorized test center.
- The power out put of the PV module must be reported under standard test conditions (STC) at loading voltage. I_V curve of the sample module should be submitted to the test center at the time of system qualification testing.
- The open circuit voltage of the PV modules under STC should be at least Volts.
- The terminal box on the module should have a provision for opening for replacing the cable, if required.
- A strip containing the following details should be laminated inside the module so as to be clearly visible from the front side:
 - a) Name of the Manufacturer or distinctive Logo
 - b) Model or Type No.
 - c) Serial No.
 - d) Year of make

ELECTRONIC PROTECTIONS

- Adequate protection is to be incorporated under no load conditions, e.g. when the lamps are removed and the system is switched ON.
- The system should have protection against battery overcharge and deep discharge conditions. The numerical values of the cut off limits must be specified, while submitting the samples for the testing purposes.
- Fuses should be provided to protect against short circuit conditions.
- A blocking diode should be provided as part of the electronics, to prevent reverse flow of current through the PV module(s), in case such a diode is not provided with the PV module.
- Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

OTHER FEATURES

- (i) The system should be provided with 2 LED indicators: a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.
- (ii) There will be a Name Plate on the system body which will give:
 - Name of the Manufacturer or Distinctive Logo.
 - Model Number
 - Serial Number
 - Year of manufacture

QUALITY AND WARRANTY

- (iii) Components and parts used in White LED solar home lighting systems should conform to the latest BIS / international specifications, wherever such specifications are available and applicable. A copy of the test report / certificate stating conformity of BIS / international standards must be submitted to the test centre.
- (iv) The PV module will be warranted for a minimum period of 15 years from the date of supply and the White LED solar lantern system (excluding the battery) will be warranted for a period of at least 5 years from the date of supply. The battery should be warranted for a period of atleast two year.

DOCUMENTATION

- (v) An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the solar home system.

The following minimum details must be provided in the Manual:

- (a) About Photovoltaics
- (b) About White LED solar home lighting system - its components and expected performance
- (c) About PV module. In case of imported modules it is mandatory to provide a copy of the international product qualification certificate to the test centre.
 - (d) About White LED Lights. The make, model number, country of origin and technical characteristics of LEDs should be stated in the product data sheet and furnished to the test centres
- (e) About battery.
- (f) Clear instructions about mounting of PV module.
- (g) About electronics.
- (h) About charging and significance of indicators.
- (i) DO's and DONT's,
- (j) Clear instructions on regular maintenance and trouble shooting of solar home system.
- (h) Name and address of the person or service center to be contacted in case of failure or complaint.