

SPECIFICATIONS OF WHITELED (W-LED) BASED SOLAR LANTERN

White Light Emitting Diode (W-LED) is a solid state device which emits light when an electric current passes through it. A Solar lantern is a lighting system consisting of PV module, W-LED(s), battery and electronics, all placed in a suitable housing and made of metal/ plastic or fiberglass. The battery is charged by electricity generated through the PV module. The lantern is basically a portable lighting System.

BROAD PERFORMANCE PARAMETERS

The broad performance specifications of a white light emitting diode (W-LED) light source based solar lantern system are given below:

Light Source W-LED luminaire, dispersed beam, soothing to eyes with the use of proper optics

Light Output Minimum level of illuminance from W-LED lantern should be as follows:

S No.	Distance in feet	When detector is in horizontal to center point of bottom of light source (in Lux)	When detector is at an angle of 90° to the center point of the bottom of light source (in Lux)
1	1	32.0	105.0
2	2	6.5	32.0
3	3	3.0	16.0
4	4	2.0	9.5
5	5	1.5	6.5

PV Module Between 3 to 5 Wp under STC

Battery Sealed maintenance free Lead acid or NiMH or Lithium Ion, with a capacity up to 7 AH, at voltages up to 12V @ C/20 rate of discharge. Max. DoD 75% or equivalent capacity

Electronics Min 85% total efficiency

Duty cycle 4 hours a day

Autonomy Minimum of 3 days (Minimum 14 operating hours per permissible discharge)

OTHER DETAILS

DUTYCYCLE

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 W -LED type. Single lamp or multiple lamps can be used. Wider view angles 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 W -LED light source should be constant throughout the duty cycle.
- The lamps should be housed in an assembly suitable for in door and outdoor use.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-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).

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 Centers

BATTERY

- (i) Sealed Maintenance Free (SMF) battery.
- (ii) Battery should conform to the latest BIS standards. In view of non-availability of adequate test facilities for testing as per BIS standard in the country, existing facilities of battery manufacturers will be utilized by way of periodic quality audit by MNRE/ BIS or their representative to ensure conformance to BIS standards.
- (iii) Also initially for a period of six months from the date of issue of these guidelines capacity test, charge efficiency test and charge retention tests as per BIS standards should be used to enable the programme to continue.
- (iv) It is also mandatory for the battery manufacturers/ bulk users to comply with batteries (Management and handling) Rules 2001 of MOEF, as amended from time to time.
- (v) 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.
- (vi) At least 75% of the rated capacity of the battery should be between fully charged and load cut off conditions.

ELECTRONICS

- (i) The total electronic efficiency should be at least 85%.
- (ii) Electronics should operate up to 12 V and should have temperature compensation for proper charging of the battery throughout the year.
- (iii) The light output should remain constant with variations in the battery voltages.
- (iv) Necessary lengths of wires/ cables, switches suitable for DC use and other protections should be provided.

PV MODULE

- The PV module (s) shall contain mono/ multi crystalline silicon or thin film solar cells. In case of crystalline silicon solar cell module it is required to have certificate for the supplied PV module as per IEC 61215 specifications or equivalent National or International/ Standards whereas in case of thin film solar cell module it is required to have certificate for the supplied PV module as per IEC 61646 specifications or equivalent National or International Standards. In case of thin film modules for each model the modules should fulfill the wattage criterion after light soaking degradation.

In case the supplied PV module is not a module of regular production of the manufacturer and does not have certificate as above, then the manufacturer should have the required certification for at least one of the irregular modules. Further, the manufacturer should certify that the supplied module is also manufactured using similar material, design and process as that of the certified PV module.

In case of imported modules it is mandatory to provide a copy of the international product qualification certificate to the test center.

- The power output 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 specified module wattage should be at the applicable load voltage.
- The load voltage of the PV module under STC should be sufficient enough to charge the battery in Indian environmental conditions.
- The terminal box on the module should have a provision for “Opening” for replacing the cable, if required.
- Identification and Traceability

Each PV module used in any solar power project must use an RF

Identification (RFID) tag. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions.)

- 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 over charge and deep discharge conditions. The numerical values of the cut off limits must be specified, while submitting the samples for the testing purposes.
- Proper protection should be provided 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 two 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 Lantern body which will give:
 - Name of the Manufacturer or Distinctive Logo.
 - Model Number
 - Serial Number
 - Year of manufacture

QUALITY AND WARRANTY

- (i) Components and parts used in White LED solar Lantern 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 Center.
- (ii) The PV module will be warranted for a minimum period of 20 years from the date of supply. 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 at least two years.

DOCUMENTATION

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the solar lantern system.

The following minimum details must be provided in the Manual:

- (a) About Photovoltaics.
- (b) A small write up (with a block diagram) on PV Module, electronics, lamp and battery.
- (c) About White LED solar lantern system - its components and expected performance
The make, model number, country of origin and technical characteristics of W- LEDs should be stated in the product data sheet
- (d) Clear instructions about mounting of PV module
- (e) About significance of indicators
- (f) DO's and DONT's
- (g) Clear instructions on regular maintenance and trouble shooting of solar lantern system
- (h) Name and address of the person or service center to be contacted in case of failure or complaint.