

Unidirectional LED based solar light (Torch)

Specifications of White LED (W-LED) based Unidirectional Solar light (Torch) with moderate light output in a directional spread covering a range of 140 degree

DEFINITION:

Light Emitting Diode (LED) is a solid state device which emits light when an electric current passes through it. A Unidirectional LED based solar light (Torch) is a lighting system consisting of PV module, LED(s), battery and electronics, all placed in a suitable housing, made of metal, plastic or fiber glass. The battery is charged by electricity generated through the PV module. The Solar light is basically a portable lighting device suitable for either indoor or outdoor lighting, covering a full range of **140 degrees**. A LED based solar light system aims at providing solar electricity for operating LED lights for specified hours of operation per day.

The broad performance specifications of white light emitting diode (LED) lighting source based solar light are given below.

BROAD PERFORMANCE PARAMETERS

Light Source

White Light Emitting Diode (W-LED), dispersed soothing to Eyes by using proper optics and diffuser

Light Out put

Minimum level of illuminance from W-LED solar light

S.No.	Distance	When detector is horizontal to center point of bottom of light source	When detector is at right to center point of bottom of light source
1	1 feet	95 Lux	230Lux
2	2 feet	16 Lux	85 Lux

3	3 feet	4.5Lux	40 Lux
4	4 feet	1.5 Lux	20 Lux
5	5 feet	0.5 Lux	12 Lux

1. Mounting of light	Top or base mounted
2. PV Module	1.5 to 2 Wp under STC
3. Wattage of Led	0.6 - 0.8 W
4. Battery	Lead acid Sealed maintenance free or Ni MH/ Lithium Ion/ LiFP, with a capacity of maximum 2 AH at voltages at 6 V @ C/20
5. DoD	75% or equivalent capacity
6. Electronics	Min 85% total efficiency
7. Average duty cycle	4-5 hours a day
8. Light Uniformity	The light on the edges of the entire 140 degree spread should not reduce more than 30 % of the light as specified above
9. Autonomy	Minimum of 2 days (Minimum 8 operating hours per Permissible discharge

OTHER DETAILS :

DUTY CYCLE :

The Unidirectional LED based solar light (Torch) system should be designed to operate for average 4-5 hours a day, under average daily insolation of 5.5 kWh /sq.m on the module surface.

LIGHT SOURCE :

- The light source will be of white LED type. Single lamp or multiple lamps

can be used. 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 throughout 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 (including IESNA LM-80 report) 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 Unidirectional LED based solar light (Torch) may not be tested by the test centre

BATTERY :

- Lead acid Sealed maintenance free or Ni MH or Lithium Ion, with a capacity of maximum 2 AH, at voltages upto 6 V @ C/20, Max conforming to latest International/BIS standards should be used. 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. 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.
- At least 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.(In case of Li-ion/NiMH/LiFP the DoD may be up to 90%)

ELECTRONICS :

- The total electronic efficiency should be at least 85%.
- Electronics should operate up to 6 V and should have temperature compensation for proper charging of the battery throughout the year.
- The light output should remain constant with variations in the battery voltages.
- 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 61215:2005 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.
- 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 centre at the time of system qualification. The specified module wattage should be at the applicable load voltage. **In case of thin film modules for each model the modules should fulfill the wattage criterion after light soaking degradation.**
- The open circuit voltage of the PV modules under STC should be sufficient enough to charge the battery.
- 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.
- Proper protection 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:

- 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.
- There will be a Name Plate on the system body which will give:
 - a. Name of the Manufacturer or Distinctive Logo.
 - b. Model Number
 - c. Serial Number
 - d. Year of manufacture

QUALITY AND WARRANTY:

- Components and parts used in Unidirectional LED based solar light (Torch) 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.
- The PV module will be warranted for a minimum period of 20 years from the date of supply and the Unidirectional LED based solar light (Torch) 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 home system. The following minimum details must be provided in the Manual:
 - i. About Photovoltaic cells.
 - ii. About White LED solar home lighting system - its components and expected performance
 - iii. 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.
 - iv. 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
 - v. About battery
 - vi. Clear instructions about mounting of PV module
 - vii. About electronics
 - viii. About charging and significance of indicators

- ix. DO's and DONT's
- x. Clear instructions on regular maintenance and trouble shooting of solar home system
- xi. Name and address of the person or service centre to be contacted case of failure or complaint

Note: Applicant should note that these technical specs may be further fine-tuned in the next stage of selection process on the basis of discussion with the shortlisted parties.