

Request for Clarification (RfC) & Response

Subject: Solar Street Lights

RfC Reference: RfC01

General

The specification information provided here supersedes the information provided in the specification in Annex A for Item Reference SD LOT6-63: Stand Alone Solar Street Light.

Query - RfC01 -01

Wattage of LED Street Light - There is not mentioned whatever the light should be LED or Other and also not mentioned the wattage that you need.

NRC Response:

- a. LED Light should be provided.
- b. Power consumption of the LED light should be 30 watt minimum
- c. The Luminous efficiency of the LED Lights used should be minimum 90 lumen/watt
- d. LED lights should be "White" with a Colour Rendering Index (CRI) of minimum 70
- e. LED should provide minimum 80% of the initial lumen output after 3 years (or 5000 hours considering the lower value of usage).
- f. Over the input voltage range of 10.0-14.2 V for LED with Lithium Iron Phosphate Batteries), input power of the LEDs must not vary by more than 15% of the rated power.
- g. Temperature of the heat sink of the driver circuit of the LED luminaries should be tested and at still air condition, increase in temperature of the heat sink should not be more than 20 Degree Celsius after one hour operation.
- h. LEDs must be permanently engraved with model number in the body.
- i. LED to come with 2 year warranty

Query - RfC01 -02

2. Wattage of Solar Photo Voltaic Panel- There is not mentioned the wattage of Solar Photo Voltaic Panel. Only mentioned the size. But size is not enough to select exact solar panel for the light system. In high efficient solar module, we get higher wattage having lower size solar panels. So it is important to mention the exact wattage of solar module for your lighting system. Also you can mention what type module do you need poly crystalline or mono crystalline

Response:

- a. "0.63m2 photovoltaic panel surface installed at the top"- specification related to size of panel in Annex A is no longer valid and is superseded by the information here. Size of panel to be selected by tenderer based on

requirements of system and information given in this clarification.

Information on selection should be provided by tendered in "Alternative Specification" column. Structural design of foundation must consider worse case loading.

- b. The following are acceptable standards for PV modules:
 - I. International Electrotechnical Committee (IEC) 61215: Crystalline Silicon Terrestrial PV Modules Design Qualification and Type Approval.
 - II. IEC 61646: Thin Film Silicon Terrestrial PV Modules Design Qualification and Type Approval IEC 60904 -1: Photovoltaic Devices Part 1 Measurement of PV Current-Voltage Characteristics
 - III. IEEE 1262: Recommended Practice for Qualification of Photovoltaic Modules
 - IV. PV GAP Recommended Standards are preferred
- c. The photovoltaic array will consist of one or more flat-plate photovoltaic modules. Each module should comprise of no less than 36 series-connected single or poly-crystalline silicon solar cells. Flat plate thin-film modules could also be used.
- d. The photovoltaic module should have a peak power output of at least 10 Wp, and be sized appropriately for the requirements of this specification.
- e. All modules must be product tested and certified.
- f. Each Module must be factory equipped with weatherproof junction box with terminal strip that allows safe and long lasting wiring connection to the module. Where applicable, protective diodes should be used to avoid the effect of partial shading.
- g. Each module must be labelled 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 of each module.
- h. Photo voltaic module to be used to be easily sourced in Bangladesh. Tenderer to advise brand and type in tender.
- i. Photo voltaic module to come with 2 year warranty minimum.

Query - RfC01 -03

3. Battery Size- There you did not mention the size of battery. As you mentioned you need back-up for 6 hours, we can evaluate the battery sizing but better if you know what size battery do you need and do you prefer lithium ion battery or lead acid battery.

Response:

- a. Battery: Battery should be LiFePO₄
- b. Battery depth of discharge (DOD) should be minimum of 90%.

- c. The maximum permissible self-discharge rate is 5% of rated capacity per month at 25°C.
- d. For PbA batteries cycle life of battery (i.e., before its residual life drops below 80% of the rated AH capacity), at 25°C must exceed 1500 cycles with discharged down to an average depth of discharge (DoD) of 70% at the discharge rate of 10 hours.
- e. The inter-cell connection should not be exposed.
- f. Size of the battery in Ah should not be more than 1.5 times of panel size in Watt peak i.e for 50Wp panel battery size should not be more than 75Ah.
- g. For batteries of 30 Ah and above, battery capacity will not be less than 90% of the rated for the first two years and will not be less than 80% of the rated for the next three years. For batteries below 30Ah, the capacity will not be less than 90% of the rated for first year and will not be less than 80% for the next two years.
- h. Battery to be used to be easily sourced in Bangladesh. Tenderer to advise brand and type in tender.
- i. Photo voltaic module to come with 2 year warranty minimum.

Query - RfC01 -04

4. Charge Controller- There you did not mention anything/size of required charge controller. We can evaluate the size according to your solar and battery size. If you know, then please let us know the size of charge controller.

Response:

- a. Charge controller should be integrated with the system with MPPT
- b. Self-consumption should be less than 0.5% of the total power requirement
- c. The charge controller set points must be factory present with the set points applicable to the specified battery characteristics. Charge Controllers should be dust and termite proof.
- d. The charge controller input current rating has to be greater than 120% of the module's rated short circuit current.
- e. Maximum current draw of the controller, when no LED's are lit should not exceed 20 mA and 50mA with LED.
- f. The model number, serial number, rated voltages and current, and set points should be printed on the visible side of the charge controller casing.
- g. Battery, high voltage disconnect 14.2+/-0.2 volts for Lithium Iron Phosphate Batteries. Charge controller specifications must include the type of the battery to be used with it.

- h. Reverse current leakage protection is required. Blocking diodes or logic-derived methods are both acceptable. If blocking diodes are used, they must exhibit a low forward voltage drop.
- i. The system must be protected against damage caused by short circuit at panel terminals and load terminals when battery is connected to the charge controller, and reverse polarity of battery or panel connections. Over-current protection must be provided. Lighting induced surge protection is recommended.
- j. Some means must be provided to safely disconnect the battery and the module during servicing of repair by a technician.
- k. The load must be controlled by a low voltage disconnect (LVD) device. The LVD 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 10+/- 0.2 Vdc for Lithium Iron Phosphate Batteries and reconnect voltage of 13.0 +/- 0.2 VDC for Lithium Iron Phosphate Batteries could be required, following this requirement.
- l. Each charge controller should be capable of handling at least 120 percent of the rated current at PV, battery and load terminals for at least 1 hour without being damaged. Overload of Charge Controller will be the actual current that exceeds 120% of the rated current.
- m. Charge controller should be capable of withstanding 25V at PV terminal when battery and load is disconnected.
- n. The technical specification of the charge controller must mention the input voltage range (PV Panel side), input current (PV panel side), battery nominal voltage, LVD, HVD, rated output current (load side).
- o. The panel must have reverse polarity protection, output short circuit and over load protection.
- p. Efficiency of the charge controller should be at least 90%.

Query - RfC01 -05

5. Integrated Lighting System: There are many integrated LED lighting system that has LED light, Battery and Charge Controller in integrated way below the LED Light panel, not separately, those are very easy to use and less possibility to steal the battery from the pole. But you mentioned to have battery separately on the pole. Can we participate with the integrated LED lighting system?

Response:

- a. NRC would welcome tenders that consider integrated LED lighting system also.

Other System Requirements – RfC01-OSR01:

Structure

- a. 6m height of street light column
- b. Structural design of foundation must consider worse case loading.
- c. Wind Speed 160km/hour
- d. Very low soil stress (floats) have been taken also into account too.
- e. The pole foundation is to be 2 foot x 2 foot in plan reinforced concrete base embedded 3' depth below the ground. Concrete shall be Class A-4 and achieve a 28 Cylinder Strength in kg/cm² of 170 as a minimum, the indicative mix ratio would be 1:2:4 (cement:coarse aggregate:sand). Overall depth of foundation to be determined by tenderer as part of structural design.
- f. Battery to be installed within steel case.
- g. Column to be mild steel 127mm in diameter, 20foot in length, minimum thickness of hollow section mild steel to be 6.4mm.
- h. All steel to be painted in two coats of white paint, and one coat of iron oxide primer.

Other System Requirements – RfC01-OSR02:

- a. Charging time should be 8 hours
- b. Discharging time is minimum of 12 hours
- c. Street light to include sensor so that it can be installed such that the operator can either set it to be operated automatically at night, or through a timer function.
- d. Ventilation is mandatory in the system to avoid early degradation of the battery.
- e. System should be developed to work in ambient temperature of 15°C – 45°C and 100% relative humidity (RH)
- f. System must be IP 65 protected.
- g. System should be installed in a way which can be easily dismantled, maintained and replaced, if needed.
- h. Centralised system voltage can be high voltage DC (up to 125V) or 230V AC.

General Requirements – RfC01-GR01:

- a. Contractor to supply, install, and test solar street lighting.
- b. The Contractor must be qualified and must have all the necessary licences and permits in order to legally operate in Bangladesh.
- c. The Contractor will perform all work necessary in order to install the solar lighting. The installation of the light poles will require a reinforced concrete

foundation, and the foundation structural design can be based upon the information given in this specification.

- d. Contractor to guarantee function of all items (in addition to warranties for components specified in this specification) for period of 6 months, and include in tendered price service of items at 6 months, and replacement of any components that do not perform to the specification.