

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

QUOTATION CALL FOR

SUPPLYING, INSTALLING, TESTING, AND COMMISSIONING OF TOTAL 12 NOS OF 12 WP CAPACITY SOLAR STREET LIGHTS AT VARIOUS LOCATIONS OF GRAMPANCHAYAT KONDALWADI TAL. SHIRALA DIST SANGLI.

Quotation Ref. No: 2024/DOK/Technical/Desk -1/Quotation/GPK



DIVISIONAL OFFICE
MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR
MAHARASHTRA, KOLHAPUR

(A Government of Maharashtra Institution)

Address: C.S.NO. 249/A - 1/55, EWARD, MHADA COMPLEX, NAGALA PARK,
NEAR ZILAPARISHAD, KOLHAPUR-416003 (M.S)

Contact No. 0231-2680009,

Email: medakolhapur@mahaurja.com

Website (for Tender): <https://mahatenders.gov.in>

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

Quotation Call

To,
(Contractors/Suppliers)

Sub: SUPPLYING, INSTALLING, TESTING, AND COMMISSIONING OF TOTAL 12 NOS OF 12 WP CAPACITY SOLAR STREET LIGHTS AT VARIOUS LOCATIONS OF GRAMPANCHAYAT KONDAIWADI TAL. SHIRALA DIST SANGLI – Invitation to Quote

With reference to subject matter, we would like to invite your quote in sealed condition for undertaking the work with given technical specifications and technical standards with following terms and conditions –

• **Details and Dates: -**

Sr.No.	Name of Site	Solar Street light Capacity	Nos	Project Cost (Inclusive of all taxes and charges)
1	Grampanchayat Kondaiwadi , Tal.Shirala Dist. Sangli	12 Wp	12	2,95,750/-
9	Date and time for submission of quotation.		From 05/08/2024; 10:00 Hrs to 12/08/2024 18:00 Hrs	
10	Date and time for opening of quotation.		13/08/2024; 10:00 Hrs	
11	Security Deposit		10,000/- (to be deposited online in favor of Maharashtra Energy Development Agency, Kolhapur)	
12	Address for communication and for quotation opening		Maharashtra Energy Development Agency, Divisional Office Kolhapur SR.No. 249/A-1/55, E Ward, MHADA complex, Nagala Park, Near Zilla Parishad, Kolhapur-416003	
13	Site location		Grampanchayat Kondaiwadi, Tal.Shirala, Dist. Sangli	

1. ELIGIBILITY CRITERIA –

The contractor shall be eligible to quote for this work provided fulfilment of following.

1. Shall have a registered firm/company with GST registration.
2. Shall provide brief information in prescribed format (enclosed).
3. Shall not be black listed in any govt. dept. and/or other organizations in and outside the state.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

4. Shall provide documentary proof about having experience of supply, installation, testing and commissioning of minimum cumulative 15 Nos of Solar Street Lights through Government Scheme or at Government Office /Institute which is installed, commissioned & working successfully.
5. Shall have an annual average turnover of Rs. 20 lakh per year for FY 2021-22 and 2022-23 duly certified by chartered accountant.
6. Shall provide self-attested copy of IT returns for FY 2021-22 and 2022-23 (Assessment year 2022-23 and 2023-24).
7. Professional Tax Certificates for the FY 2021-22 and 2022-23. Professional Tax must be deposited before the date of publication of quotation. Any certificate of tax deposited after the date of publication of quotation shall not be considered valid.
8. Shall have arrangement of providing after sales service within Kolhapur division.

2. TERMS AND CONDITIONS –

- 1) Location/Area for installation of Solar Street Lights shall be assigned immediately by the user agency to the selected contractor to get the work done in stipulated time.
- 2) The installation of Solar Street Lights should be done in excellent manner and meet technical standards prescribed by the MEDA.
- 3) As per the technical criteria set by the Ministry of New and Renewable Energy, Govt. of India the solar modules should fulfill the IEC standards and shall be procured from manufacturer providing module with RFID tag.
- 4) The contractor shall provide valid test certificate of Battery and LED from manufacturer.
- 5) The contractor shall provide Solar Modules from the approved Manufacturers which are enlisted in the MNRE's ALMM list.
- 6) The solar module should be engraved with name of company supplying the same along with installation date etc.
- 7) The contractor should provide appropriate tools and equipment's to the workmen and ensure that those are in proper working condition and the workmen use the appropriate tools and take precaution "PLEASE NOTE THAT ANY ACCIDENT TO THE WORK MEN / PUBLIC / ANIMALS / PROPERTY BOTH MOVABLE AND IM-MOVABLE SHALL BE ENTIRE AND SOLE RESPONSIBILITY OF THE BIDDER AND ANY PROCEEDING ARISING OUT OF THE SAME SHALL BE AT THE BIDDER'S RISK AND COST, MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA) OR USER AGENCY ALONG WITH THEIR EMPLOYEES WILL NOT BE RESPONSIBLE FOR ANY SUCH INCIDENT".
- 8) The successful contractor shall be responsible for providing insurance for the labour/material etc used in the said work. Also, the successful contractor shall be responsible for making

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

PF/ESIC/Insurance and other necessary government payments to the workers as per the Labour Act.

- 9) If the Solar Street Lights does not function as per given standards then the loss incurred shall be borne by the supplier and paid Grampanchayat Kondaiwadi, Tal.Shirala, Dist. Kolhapur.
- 10) If contractor fails to complete the work then Security Deposit will be forfeited and contractor shall be blacklisted.
- 11) Contractor shall give training of system operation to a person duly nominated by user agency and same shall be informed to divisional office Kolhapur.
- 12) The contractor shall successfully complete the project within timeframe set out by the MEDA. For this purpose, contractor shall provide Activity Bar Chart within a week time after issue of Work Order.
- 13) The contractor shall provide the user manual, warranty card to the user agency and copy of same shall be provided to MEDA Kolhapur.**
- 14) The contractor shall visit the site and ensure scope of work before submission of quote against the enquiry. In this context, the contractor should submit the Site Visit Report in given prescribed format along with this quote.
- 15) The work being of limited nature and to seek prompt after sales service the contractor within Kolhapur division will be preferred while allotting the work against the invited quotes. Required proof in this matter need to be submitted by concerned contractor along with quote.
- 16) The Contractor shall provide the detailed information about Company/firm in attached format (Contractor's Information sheet)
- 17) The contractor shall submit their quotation in two different sealed envelopes i.e. First envelop shall contains documents as per the technical eligibility criteria and Second envelop shall contain Financial details (quoted rate).**
- 18) The contractor shall mention the subject on each sealed envelope i.e Technical Envelop and Financial Envelop.**
- 19) The financial envelop of technically qualified contractor shall only be opened.**

3. INSURANCE:

1. The contractor shall provide insurance coverage ex-factory until commissioning of project and acceptance for replacement or repair of any part of the consignment due to natural calamity, theft, fire and Vandalism.
2. It is the responsibility of successful contractor to draw the insurance of SPV system in the name of MEDA from the date of commissioning up to 05 Years period covering the natural

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

calamity, theft, fire and vandalism of project. The Successful contractor should pay the necessary insurance premium for the said project.

3. In case one year of insurance is submitted against the work order. Letter from the insurance company mentioning their inability to provide 05 years of insurance shall be submitted by the contractor to our office. Moreover, the successful contractor has to give undertaking to provide ensure that the successive insurance before the expiry of each insurance period.
4. Insurance has to be drawn in the name of MEDA Kolhapur on behalf of user agency (name of the user agency to be mentioned in insurance policy). Any complaint registered due to natural calamity, theft, fire and Vandalism by user agency shall be attended by the contractor for settling the claims from user agency.
5. *In case of any loss encountered by the project due to Natural calamity, theft, fire and Vandalism etc. the contractor shall be responsible for filing the insurance claim towards loss attained by the project with the respective insurance company and ensure to get compensation.*

4. COMPREHENSIVE MAINTENANCE CONTRACT (CMC)

1. The complete and commissioned Solar Street Lights must be guaranteed against any manufacturing/ design/ installation defects for a minimum period of 5 years.
2. PV modules used in Solar Street Lights must be guaranteed for their output peak watt capacity, which should not be less than 90% at the end of 12 years and 80% at the end of 25 years.
3. During the CMC period, MEDA shall have all the rights to cross check the performance of the Solar Street Lights. MEDA may carry out the frequent inspections of the Solar Street Lights installed. If during such inspection, if any part is not found as per the specified technical parameters, MEDA will take the necessary action. The decision of MEDA in this regard will be final and binding on the contractor.
4. Successful contractor shall have to provide office address and name of technical person with contact who is operating in Kolhapur district/division for timely maintenance of SPV system.
5. During the CMC period, timely cleaning of SPV panels (once in fortnight) of system shall be binding on the user agency.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

6. After site visit the contractor shall submit plant visit report to MEDA which duly certified by authorized person of the concern user agency.
7. If any problem occurs in working of Solar Street Lights then successful contractor shall attend the system and rectify the problem immediately.
- 8. User Agency shall be responsible to provide security for the project after commissioning of the systems.**
9. After the completion of the CMC period (after 05 Years) User Agency shall be completely responsible for the maintenance/repair etc. of the systems.
10. In case if contractor fails to provide service during the CMC period, the Performance Bank Guarantee and Security Deposit shall be forfeited and contractor shall be blacklisted.

5. TERMS OF PAYMENT:

- A. 80% of the total cost will be released after successful installation of the systems duly certified by contractor, Officer of MEDA & authorized person of User Agency along with submission of Joint Inspection Report ,Photos, Tax Invoice, Insurance policy documents (covering Natural calamity, theft, fire and Vandalism) effective from date of commissioning up to the CMC period i.e. for 5 Years, Warranty Cards,Manuals,List of Solar Modules numbers,Test Reports also an undertaking of CMC for 5 years from date of commissioning of project need to be submitted.
- B. 20% of the total cost shall be released on after commissioning of system and receipt of two months successful performance report which should be duly certified by the contractor, Officer of MEDA & authorized person of User Agency and submission of performance bank guarantee of 10 % of total project cost from any Nationalized/Scheduled Bank valid for period of 5 years from date of commissioning of project.

6. DEDUCTION:-

- i. The TDS at the source will be deducted as per the Govt. rule and regulations.
- ii. MEDA will issue necessary certificates of TDS deduction.
- iii. C / 'D' form will not be issued by MEDA.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

7. BILLS TO BE ON PRINTED FORM (TAX INVOICE) :

- The contractor shall submit the Tax Invoice in terms of the 70:30 ratio for basic amount i.e. 70% for goods and 30% for services, respectively by adding applicable GSD on renewable energy projects (i.e. 12% GST on Goods and 18% GST on Services).
- The contractor shall submit the two separate Tax Invoices of 80% and 20% amount while releasing the 80% and 20% payment respectively.(Do not submit the Tax Invoice of 100% amount while releasing the first stage 80% payment)

8. SECURITY DEPOSIT –

- i. A sum of **10,000 /-** shall be deposited by the selected contractor as security deposit by online mode in favor of 'Maharashtra Energy Development Agency, Kolhapur on or before issuing of Work Order.
- ii. Failure to comply with the terms of security deposit shall result into cancellation of work order without any further reference to the Contractor and the EMD shall be forfeited.
- iii. The security deposit shall be liable to be forfeited wholly or partly at the sole discretion of the MEDA, if the Contractor either fails to execute the work of above projects or fails to fulfil the contractual obligations or fails to settle in full his dues to the MEDA.
- iv. If the contractor fails to execute the work in given time or terminates the order prematurely then the security deposit shall be forfeited and contractor shall be blacklisted and no excuses will be entertained.
- v. The security deposit shall be returned to the contractor without interest after successful commissioning (i.e. all work is completed as per terms and conditions of work order) of system and receipt of two month successful performance report duly signed by user agency, MEDA official and representative of the contractor.

9. PENALTY –

- A penalty of 1/2% of the total project cost shall be imposed on the contractor against a delay of one week in project completion subject to a maximum of up to 10% of the total project cost. In case the penalty exceeds 10% of the total project cost, the given order will be canceled & the security deposit will be forfeited and the contractor shall be blacklisted.

10. TIME FRAME:

- The successful contractor shall be required to commission the project within 30 Days from the date of issue of work order.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

11. EXTENSION :

- If project is not completed within the given time frame due to any inevitable reasons then contractor shall seek the time extension for the project at least 07 Days in advance before expiry of project completion period (30 Days) by giving satisfactory reasons for same. **However if the time extension is not taken before the project completion period then the penalty clause of work order shall be effective till the request is applied for the extension with MEDA.**

12. STAMP DUTY :

- The successful contractor has to pay the applicable stamp duty as per Maharashtra Stamp Act clause 10. D. (1) to the Stamp Collector Kolhapur against this work contract and the receipt of same has to be produced along with the invoice to our office.

13. SITE VISIT :

The contractor shall visit the site & carryout the survey along with officials of user agency (as mentioned in scope of work) and upload the site visit report along with photographs (with Lat. And Long.) Indicating that the survey is carried by the contractor as per given format.

14. CHECK LIST OF DOCUMENTS TO BE FURNISHED WITH QUOTATION –

- PAN and GST Details.
- Copy of IT Returns.
- Professional Tax Certificates
- Declaration on company letter head.
- Contractors Information Sheet.
- Annual Turnover Certificate.
- Work Experience Details.
- Site Visit Report.(in format)

We look ahead to seek your sealed quotation on or before 12/08/2024 till 18 Hrs.

Thanking you,

Sd/-

Divisional General Manager
MEDA, Divisional Office, Kolhapur

Encl. :-

1. Contractor Information Sheet.
2. Declaration Format.
3. Annual Turn Over certificate format.
4. Site Survey Form.
5. Technical Specifications of Solar Street Lights.

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

CONTRACTOR'S INFORMATION

Sr.No	Particulars	
1	Name of Firm	
2	Details of Mailing Address	
3	Firm Status (PSU/Incorporate/Ltd/Pvt.Ltd/LLP/Partnership/Proprietary)	
4	Name & Designation Of Contact Person	
5	Contact No.	
6	E-mail Address for correspondence	
7	Firm website Address	
8	Firm registration No/ROC Establish Year of firm	
9	PAN No.	
10	GST No.	
11	Turnover (in Rs.) for FY 2021-22 and 2022-23	
12	Skilled manpower	
13	*Experience in Solar Street Lights	

Authorised Sign and Stamp

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DECLARATION

(On company's letter head)

To,

Divisional General Manager,

Divisional Office Kolhapur

Maharashtra Energy Development Agency

(A Government of Maharashtra Institution)

Address: C. S. No. 249/A – 1/55, E Ward, Mhada Complex, Nagala Park, Near Zilla Parishad,
Kolhapur - 416003

Respected Sir/Madam,

1. We have carefully read and understood all the terms and conditions of the quotation and hereby convey our acceptance to the same.
2. The information / documents furnished along with our offer are true and authentic to the best of my knowledge and belief, We are well aware of the fact that furnishing of any false information/ fabricated document would lead to rejection of our quotation at any stage besides liabilities towards prosecution under appropriate law.
3. We have apprised our self fully about the job to be done during the currency of the period of agreement and also acknowledge bearing consequences to of non-performance or deficiencies in the services on our part.
4. We have no objection, if enquiries are made about the work listed by us.
5. We have not been barred or blacklisted by any Government Agency / Department/ PSU or any such competent Government authority, organization where we have worked. Further, if any of the partners/directors of the organization /firm is blacklisted or having any criminal case against them, our quote shall not be considered. At any later point of time, if this information is found to be false, Divisional General Manager, Divisional Office Kolhapur, Maharashtra Energy Development Agency, may terminate the assigned contract immediately.
6. We have not been found guilty by a court of law in India for fraud, dishonesty or moral turpitude.
7. We agree that the decision of Divisional General Manager, MEDA, Divisional Office Kolhapur, in selection of quotation and shall final and binding to us.

For

(Company Name)

Name of signing authority / Designation / Place / Date

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Annual Turnover

Each Contractor must fill in this form including private/public limited company.

- Annual Turnover Data for the FY 2021-22,2022-23
- Name of Company :

Year	Rs in Lacs
2021-22	
2022-23	

The information supplied should be the Annual Turnover of the Contractor in terms of the amounts billed to clients for each year for work in progress or completed.

Signature of Applicant

Certified by Applicant's Auditor

(Affix Stamp)

MAHARASHTRA ENERGY DEVELOPMENT AGENCY, KOLHAPUR

SITE VISIT REPORT

(To be submitted on letterhead of contractor)

Date: _____

To,
The Divisional General Manager,
Divisional Office Kolhapur,
Maharashtra Energy Development Agency
(A Government of Maharashtra Institution)
Address: C. S. No. 249/A– 1/55, E Ward, Mhada Complex, Nagala Park, Near Zilla
Parishad, Kolhapur – 416003.

Sub. : Site Visit Report for Supplying, Installing, Testing, and Commissioning of Total 12 Nos of 12 Wp Capacity Solar Street Lights at Various Locations of Grampanchayat Kondaiwadi Tal. Shirala Dist Sangli.

Ref.: Quotation Call No.Date:

Sir,

This has reference to above referred quotation call for Supplying, Installing, Testing, and Commissioning of Total 12 Nos of 12 Wp Capacity Solar Street Lights at Various Locations of Grampanchayat Kondaiwadi Tal. Shirala Dist Sangli.

I / We hereby declare that we have visited the site.

I / We have made my ourselves acquainted with site conditions, approach to site, requirement of area, availability of water, requirement of grid connectivity from MSEDCL and requirement of all quotation conditions etc.

I / We have verified all details required to execute the project.

I / We have no problems in undertaking the project and complete them in the given time period.

Thanking you

Yours faithfully,
(Signature of Contractor)

Name of Contractor -----

Designation -----

Seal:

Signature of User Agency authorities.

Seal:.....

TECHNICAL SPECIFICATIONS FOR 12 W WHITE-LED BASED SOLAR STREET LIGHTING SYSTEM

Sr. No	Components	Specification for Solar street light fitting
1.	PV module	75 Wp under STC
2.	Battery	Minimum 12.8V, 30 AH capacity Lithium Ferro Phosphate battery.
3.	Light Source	<p>White Light Emitting Diode (W-LED)</p> <p>12 Watt, W-LED luminaire, dispersed beam, soothing to eyes with the use of proper optics and diffuser.</p> <p>LED Chip should be compliance to IES: LM-80 (Approved Method for Measuring Lumen Maintenance of LED Light Sources and LED lumen depreciation time to L70). Test report for same should be submitted.</p>
4.	Light Out put	<p>The luminaire must use high efficacy W-LED with minimum 135 lumens per watt (and UV free). [A certificate to be submitted by the System supplier to the Test Lab during certification]</p> <p>For single light level:</p> <p>Minimum 24 Lux when measured at a point 4 meters below the light. The illumination should be uniform without dark bands or abrupt variations, and soothing to the eye. Higher light output will be preferred.</p> <p>For Multiple Light levels:</p> <p>The luminaire should have two levels of light to take care of different lighting needs during the night. Minimum 24 Lux when measured at a point 4 meters below the light (at'' High'' illumination level). The illumination Should be uniform without dark bands or abrupt variations. Minimum 12 Lux at lower illumination level. (Higher light output will be preferred)</p> <p>The luminaire shall be tested for Electrical, Photometry and Color parameters as per IES LM-79:2008 or IS: 16106:2012 for following performance parameters like:</p> <ol style="list-style-type: none"> 1) Total luminous flux: ≥ 1500 lm. 2) Luminous efficacy (i.e. system efficacy): ≥ 125 lm/W. 3) Color Temperature: Between 5500 K to 6500 K.

		<p>4) $CRI \geq 70$</p> <p>5) Luminous intensity distribution should follow the batwing patterns in polar curves.</p> <p>6) Require validation report using .ies file, which is generated during luminous intensity distribution test and using maintenance factor 0.9 and pole height of 4m., Road width 5m and Pole span 15m. The average illuminance level and uniformity should comply with requirement as per IS 1944, wherever applicable.</p> <p>7) The luminaire should be tested for all type tests as per IS 10322 Part 5 Sect 3 or IEC 60598-2-3 standards.</p>
5	Mounting of light	Pole height 5 m above the ground level and 1 m below the ground. Luminaire shall be at least 4.5 m above the ground level.
6	Electronics Efficiency	Overall total Efficiency of the Electronics should be Minimum 90%
7	Duty Cycle	<p>Dusk to dawn:</p> <p>First 4 Hours full light (Min. 24 Lux), rest of the time at lower light (50%, Min. 12 Lux) level.</p> <p>(Higher light output will be preferred)</p>
8	Autonomy	3 days or Minimum 36 operating hours per permissible discharge with fully charged Lithium-Ferro Phosphate Battery.
9	Ingress Protection – IP	Optical and Control gear compartment - IP 65 / IP 66
10	Impact resistance of casing	$\geq IK 08$
11	Radiated Emission Test	As per CISPR-15
12	ESD (Electro Static Discharge) and Radiated susceptibility test	As per IEC 61547

TECHNICAL DETAILS:

PV MODULE

- i. Indigenously manufactured PV module should be used.
- ii. The PV module should have crystalline silicon solar cells and must have a certificate of testing conforming to IEC 61215 Edition II / BIS 14286 from an NABL or IECQ accredited Laboratory.
- iii. The power output of the module under STC should be a minimum of 75Wp.
- iv. The module efficiency should not be less than 14 %.
- v. The terminal box on the module should have a provision for opening it for replacing the cable, if required.
- vi. There should be a Name Plate fixed inside the module which will give:
 - a. Name of the Manufacturer or Distinctive Logo.
 - b. Model Number
 - c. Serial Number
 - d. Year of manufacture
- vii. A distinctive serial number starting with NSM will be engraved on the frame of the module or screen printed on the tedlar sheet of the module.

BATTERY

- i. Minimum 12.8V, 30 AH capacity Lithium Ferro Phosphate Battery.
- ii. Battery pack should have proper 'Battery management System' (BMS) for cell balancing, over charge and over temperature protection.
- iii. Battery should conform to the latest BIS/ International standards.

LIGHT SOURCE

- i. The light source will be a white LED type.
- ii. The colour temperature of white LED used in the system should be in the range of 5500°K–6500°K.
- iii. W-LEDs should not emit ultraviolet light.
- iv. The light output from the white LED light source should be constant throughout the duty cycle.
- v. The lamps should be housed in an assembly suitable for outdoor use.
- vi. The temperature of heat sink should not increase more than 20°C above ambient temperature during the dusk to dawn operation.

ELECTRONICS

- i. The total electronic efficiency should be at least 90 %.

- ii. Charge controller should be MPPT Type.
- iii. Electronics should operate at an appropriate voltage suitable for proper charging of the battery.
- iv. No Load current consumption should be less than 20 mA.
- v. The PV module itself should be used to sense the ambient light level for switching ON and OFF the lamp.
- vi. The PCB containing the electronics should be capable of solder free installation and replacement.
- vii. Necessary lengths of wires/cables, switches suitable for DC use and fuses should be provided.

ELECTRONIC PROTECTIONS

- i. Adequate protection is to be incorporated under “No Load” conditions e.g. when the lamp is removed and the system is switched ‘ON’.
- ii. The system should have protection against battery overcharge and deep discharge conditions.
- iii. The System should have protection against short circuit conditions.
- iv. Protection for reverse flow of current through the PV module(s) should be provided.
- v. Adequate protection should be provided against battery reverse polarity.
- vi. Load reconnect should be provided at 80% of the battery capacity status.

MECHANICAL COMPONENTS

- I. A corrosion resistant metallic frame structure should be fixed on the pole to hold the SPV module.
- II. The frame structure should have provision so that the module can be oriented at the suitable tilt angle.
- III. Pole should be Hot dip galvanized pipe as per IS1161 & IS4736 i.e. Class B.
- IV. Pole height 5 m above the ground level and 1 m below the ground. Luminaire shall be at least 4.5 m above the ground level.
- V. The pole should have the provision to hold the luminaire.
- VI. The battery shall be either included in the luminaire enclosure, which should be water proof (IP 65) and corrosion resistant or outside the luminaire enclosure in a vented, acid proof and corrosion resistant, hot dip galvanized metallic box (IP 65) with anti-theft locking arrangement for outdoor use.

INDICATORS

- The system should have two indicators, green and red.
- The green indicator should indicate the charging under progress and should glow only when the charging is taking place. It should stop glowing when the battery is fully charged.

- Red indicator should indicate the battery “Load Cut Off” condition.

QUALITY AND WARRANTY

- i. The street lighting system (including the battery) will be warranted for a period of five years from the date of supply.
- ii. The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.
- iii. The Warranty Card to be supplied with the system must contain the details of the system.

OPERATION and MAINTENANCE MANUAL

An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the Solar Street Lighting System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaics.
- A small write-up (with a block diagram) on Solar Street Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-80 report) of W-LEDs used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module (s) and lamp housing assembly on the pole.
- Clear instructions on regular maintenance and troubleshooting of the Solar Street Lighting System.
- DO's and DONT's.
- Name and address of the contact person for repair and maintenance, in case of non-functionality of the solar street lighting system.

List of BIS standards applicable for components of Solar PV Applications

Sl. No. (1)	Product (2)	Indian Standard Number (3)	Title of Indian Standard (4)
1.	Crystalline Silicon Terrestrial Photovoltaic (PV) modules (Si wafer based)	IS 14286	Crystalline Silicon Terrestrial Photovoltaic (PV) modules - Design Qualification And Type Approval
2.	Thin Film Terrestrial Photovoltaic (PV) Modules (a-Si, CiGs and CdTe)	IS 16077	Thin-Film Terrestrial Photovoltaic (PV) Modules - Design Qualification and Type Approval
3.	PV Module (Si wafer and Thin film)	IS/ IEC 61730 (Part 1) IS/ IEC 61730 (Part 2)	Photovoltaic (PV) Module Safety Qualification Part 1 Requirements for Construction Photovoltaic (PV) Module Safety Qualification Part 2 Requirements for Testing
4.	Power converters for use in photovoltaic power system	IS 16221 (Part 1) IS 16221 (Part 2)	Safety of Power Converters for use in Photovoltaic Power Systems Part 1- General Requirements Safety of Power Converters for Use in Photovoltaic Power Systems Part 2- Particular Requirements for Inverters
5.	Storage batteries	IS 16270 IS 16046	Secondary Cells and Batteries for Solar Photovoltaic Application General-Requirements and Methods of Test Standard for Lithium ion battery
6.	LED Lights & Luminaires	IS 16101 IS 16102 IS 16103 IS 16107	General Lighting - LEDs and LED modules – Terms and Definitions Self-Ballasted LED Lamps for General Lighting Services Led Modules for General Lighting Luminaires Performance