



PURCHASE SPECIFICATION, GROUP: PHOTOVOLTAICS
DESIGN. SUPPLY AND I&C OF PLANT LIGHTING SYSTEM AT
50MW RAMAGUNDAM SOLAR PV PLANT, TELANGANA

PS-439-1285

REV NO: 00

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TECHNICAL SPECIFICATION

FOR

DESIGN, SUPPLY, INSTALLATION & COMMISSIONING OF PLANT
LIGHTING SYSTEM

AT 50MW RAMAGUNDAM SOLAR PV PLANT, TELANGANA

Revision details :

Prepared

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Date

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1.0 INTRODUCTION:

This technical specification provides BHEL's requirement for design, supply, installation and commissioning of plant lighting System at 50 MW Ramagundam Solar Photovoltaic (SPV) power plant for M/s SCCL, Telangana.

The Solar plant consists of 1 No. main control room and 9 Nos. Inverter rooms distributed in multiple plots. Length of peripheral road is 9.5KM. Length of Internal road is 4KM.

2.0 SCOPE OF SUPPLY AND INSTALLATION:

Sl.	Item Description	Quantity
1.	Design, Supply of Plant Lighting system	1 ST
2.	Installation and Commissioning of Plant Lighting system	1 ST

Plant lighting system shall consist of following components:

1. Lighting along the peripheral roads (2.5m width +shoulders width) - Length approx. 9.5KM
2. Lighting along the Internal roads (3.5m width + shoulders width) - Length approx. 4KM
3. 132KV Switchyard lighting- Switchyard size approx 25m X 70m. Pole height shall be minimum 9m for switchyard lighting
4. 33KV Transformer yards lighting at each inverter room- 2 transformer yards (size 6.5m X 7.5m approx.) in each inverter room, a total of 9 Inverter rooms.
5. 33KV Transformer yards lighting at Control room- 1 yard of size 7.5m X 24m approx.
6. Lighting at other installations- This shall additionally include lighting near main gates (6 main gates approx.), security room/cabins (12 nos approx.), Weather monitoring station, water storage tank/pump station (10 nos approx.), RO plant (25m X 25m approx.), storage yard.

3.0 ENCLOSURES TO THIS SPECIFICATION (FOR TENDER PURPOSE ONLY)

1	Tentative plant layout with peripheral, Internal roads, inverter rooms, Control room, Main gates
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AutoCAD will be shared based on request from vendor.

4.0 TECHNICAL DETAILS:

1. Standards and Codes

LED luminaires shall be tested at independent laboratory as per the following test standards:

LM79-08- Electrical and Photometric Measurements of Solid-State Lighting Products

LM 80-15- Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules

2. General specification

2.1 This specification covers design, supply and installation of uniformly Illumination system along the peripheral & internal roads, transformer yards, metering yards/ switchyard and other facilities including entry points/gate(s), security room, Security cabins, Weather monitoring station, pump station, RO plant inside the plant.

2.2 The Contractor shall furnish Guaranteed Technical Particulars of the LED luminaires, from renowned brands available in the market for approval.

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2.3 Lighting system shall work on the auxiliary supply from ACDB/ UPS DB. Auxiliary supply will be available in all Inverter rooms and control room. The Contractor shall provide minimum 20% of total lighting points as emergency lighting points, fed from UPS DB. Outdoor emergency lights shall be provided at each security room and all plant entry gates.

3. Lighting Levels

3.1 The average LUX level of 10 lm is to be maintained in metering yard/ switchyard. However, a lux level of 20 lm ((10+10) additional switchable on requirement only) is to be maintained in switchyard on transformer.

3.2 The lighting system of solar power plant shall be designed in such a way that uniform illumination is achieved. Average LUX level to be maintained in different areas shall be as under:

Area	Area LUX
Internal/Periphery Roads	4
Transformer yard/Switchyard	20
Other places	10

The lighting level shall take into account appropriate light output ratio of luminaires, coefficient of utilization maintenance factor (of 0.7 or less) to take into account deterioration with time and dust deposition. The ratio of Emin to Eavg should be at least 0.3

4. LED Luminaire for Outdoor Applications

4.1 LED luminaires shall meet the following parameters.

S.No	Parameter	Specified Value
i.	Input voltage	170-260 V
ii.	Input Frequency	50 Hz +/- 1 Hz
iii.	Power Factor	0.90 (Minimum)
iv.	Luminous efficacy	>90 lumens per watt
v.	Beam Angle	Minimum 120°
vi.	Total Harmonic Distortion	< 10 %
vii.	Working Humidity	10% - 90% RH (Preferably Hermetically sealed unit)
viii.	Degree of Protection	Minimum IP 65 (for Outdoor fixtures)
ix.	Luminaire Casing	Powder coated metal / Aluminium.
x.	Color Temperature	5700 K (cool day light)
xi.	Color Rendering Index	>65
xii.	Moisture protection in case of casing damage	IP 65 (driver unit shall preferably be totally encapsulated)

4.2 The LED luminaire (outdoor) housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.

4.3 The LED luminaire (outdoor) housing should be made of non-corrosive, high pressure, die-cast aluminium and the housing should be power coated grey, so as to ensure good weatherability. Each individual LED source should be provided with an asymmetrical distribution high reflectance aluminized reflector, which should ensure that the light distribution of the luminaire is suitable for road lighting applications (wide beam distribution) and should ensure high pole to pole spacing.

4.4 The luminaire should be provided with in-built power unit and electronic driver.

4.5 The luminaire should be suitable for standard street light poles and should be suitable for side entry and bottom entry (post top).

4.6 GI Lighting pole of suitable diameter capable of withstanding system and wind load, shall be provided with average Zn coating thickness of 80micron. The height of the lighting poles shall be considered suitably based on the place of installation. The light poles shall have loop in loop out arrangement for cable entry and light fixture / wiring protected with suitably rated MCB.

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4.7 The light pole shall be fixed in separate foundation. Foundation design shall be submitted for approval of BHEL/SECI. Excavation, casting of concrete foundation including coping, installation of lighting pole, cabling, earthing and final finishing of foundation for aesthetics is in the scope of vendor.

4.7 All outdoor lighting system shall be automatically controlled by synchronous timer or photocell. Junction box/DB shall be provided with timer/photocell. Provision to bypass the timer or photocell shall be provided.

4.8 Lighting panels shall be earthed by two separate and distinct connections with earthing system. Switch boxes, junction boxes, lighting fixtures, etc. shall be earthed by means of separate earth continuity conductor. Cable armour shall be connected to earthing system at both the ends. Proper earthing of light poles shall be ensured. All materials related to earthing of lighting poles will be supplied by vendor.

4.9 Junction box for lighting shall be made of fire retardant material. The degree of protection shall be IP55 for outdoor JB.

4.10 Cable terminations shall be made with suitable cable lugs & sockets etc. crimped properly and passed through brass compression type cable glands at the entry & exit point of the connector box and at the entry point to MCB distribution Box for controlling the yard lighting system.

4.10 Lighting cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits. Required quantity of DWC pipes will be supplied by vendor.

4.11 Cables: All Cables required for plant lighting system shall be supplied and installed by vendor. This includes cable from plant ACDBs located in control rooms and inverter rooms to lighting poles, lighting poles to lighting poles, lighting poles to luminaires. Specification of cable shall be as per relevant Indian standards.

4.12 Cabling shall be done in such a way that lights are distributed equally between R, Y and B phases. Sequence of poles shall be R,Y,B,R,Y,B,... and so on. Poles shall be painted with R,Y,B colour coding.

4.13 Cable trenches and laying of cables shall be as per IS: 1255. Cables shall be laid in buried cable trenches. Excavation, laying of cables and closing of cable trenches (including bricks) as per relevant Indian standards is in the scope of vendor.

All related supplies, installation including trenches, civil works etc. for lighting system shall be in scope of vendor. All necessary labour, machinery, tools, instruments shall be in vendor scope.

5.0 COMMISSIONING

After completion of installation, vendor shall commission the lighting system and demonstrate the operation of complete system to BHEL/ Customer representatives at site. Original warranty certificates from OEM to be handed over to BHEL.

For all the items, makes shall be proposed by vendor and shall be subject to approval by BHEL/SECI.

6.0 SPARES

1. Luminaires with lights for all types -2% each type, rounded off to next integer
2. Junction boxes- 2% each type

7.0 Documents to be submitted along with offer

1. Vendor shall confirm NIL deviation to BHEL specification.