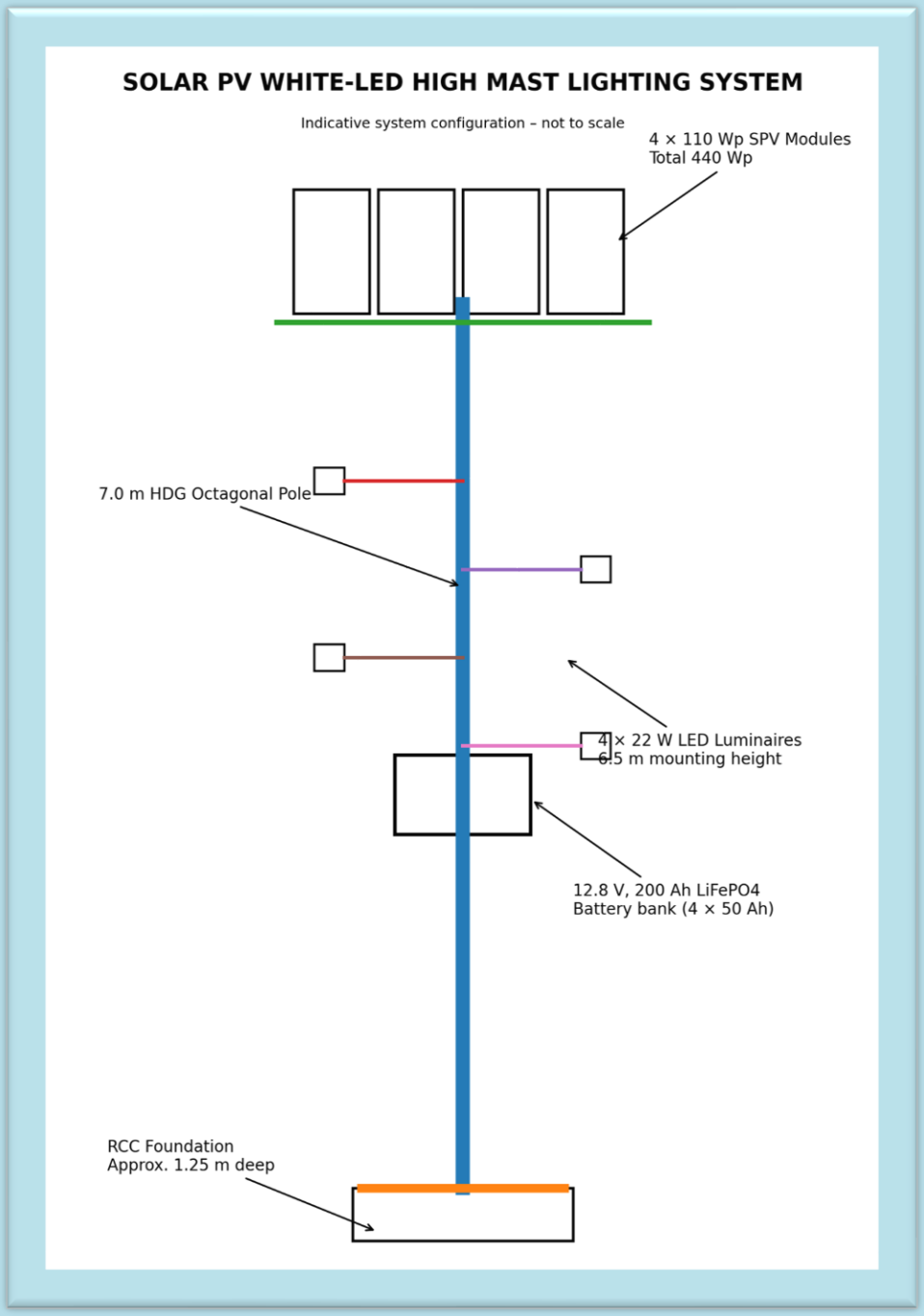
SOLAR PV WHITE-LED HIGH MAST LIGHTING SYSTEM

TECHNICAL CATALOGUE



1. **Product Overview:-**

The offered system is a Solar PV White-LED High Mast Lighting System configured in accordance with the technical requirements of the referenced tender. The system comprises indigenous PV modules, LiFePO4 battery bank, white LED luminaires, MPPT charge controller, galvanized pole, mounting structure, wiring and associated installation hardware.

Parameter	Tender-Compliant Configuration
Procuring / Rate Contract Item	Supply, Installation & Commissioning of Solar High Mast Lighting Systems with seven years warranty of complete system.
Quantity	3,000 Nos. on two-year Rate Contract basis.
Delivery	Anywhere in Haryana.
Delivery Period	Three months from placement of work order, including supply, installation and commissioning.
Warranty	Seven years for complete system; PV modules minimum 25 years as specified.

2. **System Key Highlights:-**

- 440 Wp solar PV array – 4 × 110 Wp indigenous crystalline-silicon modules.
- 12.8 V, 200 Ah LiFePO4 battery bank – 4 × 50 Ah units / 2,560 Wh total energy.
- 4 × 22 W white LED luminaires with minimum 3,000 lumens per luminaire.
- 7.0 m hot-dip-galvanized octagonal pole with approximately 6.5 m luminaire mounting height.
- Microcontroller-based MPPT charge controller with ≥90% PV charging efficiency.
- Automatic dusk-to-dawn operation with three-stage dimming.
- IP65 outdoor protection for luminaire and charge-controller/battery enclosure requirements.
- System designed for site installation conditions up to 180 km/h wind velocity as specified.
- Seven-year complete-system warranty and comprehensive maintenance requirements.

3. PV Module – Key Specifications:-

Parameter	Specification / Compliance
Technology	Crystalline silicon solar cells DCR & Non DCR
Module Rating	110 Wp each; 4 modules per system.
Efficiency	Minimum 19%.
Standards	BIS IS 14286 and IS 61730 Part-1 & Part-2; latest applicable MNRE specifications.
ALMM	Models and manufacturers to be included in the MNRE ALMM list and valid at time of supply.
Frame	Corrosion-resistant material, preferably anodized aluminium.
Junction Box	Weatherproof sealed type, IP65.
Tolerance	No negative tolerance on rated output power and efficiency.
Marking	Made in India, company/logo, model number, serial number and year of manufacture to be laminated inside module.

4. LiFePO4 Battery – Key Specifications

Parameter	Specification / Compliance
Configuration	12.8 V – 200 Ah LiFePO4 (4 × 50 Ah).
Cell	Prismatic LiFePO4 cells; minimum 3.2 V, 10 Ah & 50 Ah
BMS	Integrated Battery Management System for cell balancing, overcharge and over-temperature protection.
Certification	BIS certification to IS 16046 (Part-2):2018 from approved laboratory.
Energy	640 Wh per 12.8 V, 50 Ah unit; total system battery energy 2,560 Wh.
Cycle Life	More than 2,000 cycles under specified test condition.
Operating Range	Charging/discharging: 0–60°C as tabulated in the tender.
Voltage Range	10.5–14.6 V.
Charge Current	Rated 25 A; maximum charging current stated as 20 A in tender table.
Discharge Current	Maximum 25 A.
Cut-off	Discharge cut-off >10.5 V; over-charge cut-off 14.4 V ±0.2 V.
Charging Time	Approximately 5–5.5 hours.
Warranty	Seven years.
Enclosure	Hot-dip-galvanized, corrosion-resistant, IP65, anti-theft locking arrangement.

5. LED Luminaire – Key Specifications

Parameter	Specification / Compliance
Type	White LED, 4 × 22 W system configuration.
CCT	5500–6500 K.
Efficacy	LED efficacy >150 lm/W @350 mA; total luminaire efficacy ≥135 lm/W.
Luminous Output	Minimum 3,000 lumens per luminaire.
Input	12 VDC.
Driver	DC-DC driver as per IEC 62384; converter efficiency ≥90%.
LED Life	More than 50,000 hours.
Lumen Maintenance	Depreciation not more than 30% after 50,000 burning hours.
Housing	Pressure die-cast aluminium, outdoor IP65, heat-dissipation provisions, toughened clear glass/high-quality polycarbonate.
Protection	Input fuse protection and auto-resettable reverse-polarity protection.
Lighting Quality	Free from glare, flickering and UV emission; typical CRI 70%.
Standards	LM-80-08, LM-79-08 and type testing as per IS 10322 Part 5 Section 3 or IEC 60598-2-3.

6. Solar Charge Controller / MPPT

Parameter	Specification / Compliance
Type	MPPT – Maximum Power Point Tracking; microcontroller based.
Rating	10 A at related voltage.
PV Module Reference	110 Wp @ 16.4 V ±0.2 V; 36-cell configuration; Voc >21 V; Vmp 16.4 V ±0.2 V at STC without MPPT.
Efficiency	PV charging efficiency ≥90%.
Protections	PV/battery polarity reversal, over-current, short-circuit, deep-discharge, input surge and blocking diode protection.
Voltage Protection	Lower cut-off not less than 11.2 V; over-voltage cut-off 14.6 V.
Dusk-Dawn	Automatic switching using SPV module as sensor; designed to avoid false triggering from impulse lighting.
Self Consumption	Not more than 20 mA at rated voltage/current.
Indicators	Green LED for charging; red LED for deep discharge.
Standards	IEC 62093 and IEC 60068 as applicable.

7. Pole, Mounting & Civil Works

Parameter	Specification / Compliance
Pole	Hot-dip-galvanized iron octagonal pole, single length, 7.0 m height.
Material / Coating	BS EN 100025 and ISO 1461 referenced in tender.
Pole Dimensions	Minimum 75 mm top, 150 mm bottom, minimum 4 mm thickness.
Base Plate	260 × 260 × 18 mm, welded to pole.
Luminaire Height	Four LED luminaires mounted at approximately 6.5 m from pole bottom.
Module Frame	Galvanized metallic frame, fixed at 30° from horizontal and facing true south.
Wind Resistance	System installation to withstand storm/wind conditions up to 180 km/h.
Foundation	RCC foundation approximately 1.25 m deep and 0.5 m above ground; tender specifies 600 × 600 × 1250 mm foundation with 4/6/8 bolts of minimum 20 mm diameter.
Foundation Bolts	1200 mm long, 20 mm diameter as stated in installation section.

8. Cables, Enclosures & Standards

Parameter	Specification / Compliance
DC Cable	Twin-core PVC insulated, water- and UV-resistant copper cable, minimum 2.00 mm; EN 50618.
Luminaire / Controller Housing	IP65.
PV Standard	IEC 61215 Edition II / BIS 14286 and IEC 61730 Part-1 & Part-2.
Battery Standard	IS 16046 (Part-2):2018.
LED Standards	LM-80-08 and LM-79-08.
Traceability	HAREDA logo/marking on SPV panel, battery and LED lighting units; unique system ID permanently embossed/punched/riveted on pole and battery box.

9. Performance, Dimming & Illumination

Parameter	Specification / Compliance
Duty Cycle	Dusk-to-dawn operation with inbuilt dimming.
First 3 Hours	100% lighting; minimum 8.0 lux.
Next 3 Hours	60% lighting; minimum 5 lux.
Remaining Period	50% lighting; minimum 4 lux.
Colour	White, 5500–6500 K.
Average Lux	Minimum 8.0 lux.
Average / Minimum	Minimum 0.25.
Distribution	Lux level over 16 m radius should meet tender distribution requirement; higher light output preferred.

10. Warranty & Maintenance

Parameter	Specification / Compliance
Complete System	Seven years from commissioning/handing over against manufacturing, design and installation defects.
PV Module	Minimum 25-year warranty; output specified at 90% at 20 years and 80% at 25 years in the tender warranty section.
Maintenance	Comprehensive maintenance within warranty period by bidder or authorized dealer/service centre.
Quarterly Visits	Routine quarterly preventive maintenance visits.
Complaint Response	Complaint to be attended and system repaired/restored/replaced within 3 days; tender also specifies restoration within 72 hours.
Spares	Necessary maintenance spares for seven years trouble-free operation.
Service Passbook	Separate Service & Maintenance passbook as per HAREDA format.

11. Tender Compliance & Documentation Checklist

- Valid test report of one unit covering 110 Wp module, 22 W LED luminaire and 12.8 V 50 Ah LiFePO4 battery, issued by MNRE/BIS/IEC/NABL accredited laboratory on or after 01.04.2023.
- Make and model of module, battery and luminaire consistent with the submitted test report and sample.
- BIS certificates / applicable standards evidence for PV modules and LiFePO4 battery.
- MNRE ALMM compliance declaration and valid listing at time of supply.
- ISO 9001:2015 certificate from NABCB-accredited certification body in the field of quoted item.
- Manufacturer undertakings for solar module, lithium battery and luminaire where the bidder is a system integrator.
- Technical catalogue to be available on bidder website as required by the tender.
- Sample of one quoted system as specified in the tender.