

Notice for Inviting Quotations

INIKEL/RED/2023-24/KCEAT- 100KW/ BOS installation/01 dated: 23.01.2024

INKEL Ltd. Invites sealed quotations from financially and technically sound reputed contractors for the Supply of BOS, Installation, Testing and Commissioning of Rooftop Solar power plants of cumulative capacity 110kWp (2 Nos of 50 KW Rooftop solar power plants including truss 3m height and Relocation of existing 1 Nos of 10KW Solar power plant) on building in Kelappaji College of Agricultural Engineering and Technology, Malappuram

Name of Work	Quotations invited for Supply of BOS, Installation, Testing and Commissioning of Rooftop Solar power plants of cumulative capacity 110kWp (2 Nos of 50 KW Rooftop solar power plants and 1 Nos of 10KW Solar power plant)
Date of publishing bid documents	22.01.2024
Last Date & Time of Submission of Quotation document	29.01.2024
Opening of Quotation Cover	30.01.2024, 2:00PM
Nature of Contract	Supply, Installation, Testing and Commissioning
Time of Completion of work	35 Days from the Date of WO
Tender Fee	Rs 2950/- including GST in the form of Demand Draft
Mode of Submission	Online as Password protected PDF to be sent to tenders.re@inkel.in

Eligibility Criteria

The bidder must fulfil the following eligibility criteria.

- The bidder must be registered under GST (Copy of GST certificate need to be submitted).
- The bidder must be KSEBL Licenced Electrical B class contractor or ANERT certified solar power plant installer. The document should be submitted along with the quotation.
- Bidder shall have experience in the execution of supply, Installation and Maintenance of grid connected / off-grid Solar Photovoltaic Systems of 66 kWp during last 3 financial years

Or

The bidder must have completed Solar installations of at least 50 kWp in Kerala.

The details of projects executed during period mentioned above should be listed. Copy of work orders and a certificate issued towards the satisfactory work completion to be furnished by the bidder. In absence of any one, it will not be considered for qualifying in technical bid.

The Scope of Work & Technical Specifications to be executed in site is attached in Appendix – 1

All the Quotation documents are to be submitted by email to tenders.re@inkel.in as password protected PDF file mentioning name of work.

The quotation shall be valid for 30 days reckoned from the date of opening of quotation. No correspondence would be made with the bidders once the quotation is submitted. The decision taken in the INKEL Committee will be final.

INKEL Ltd reserves the right to modify/cancel any or all quotations without assigning any reasons.

Site Details:- List of Locations where Solar Plants to be installed

Sl No	Site Name & Address	Location	Mounting type	Capacity (kWp)	Power Evacuation	NetMetering
1	Kelappaji College of Agricultural Engineering and Technology, Tavanur P O, Malappuram, Kerala 679573	Administrative Building	Sheeted Roof Top	50	LT connection at Administrative Building	LT
2	Kelappaji College of Agricultural Engineering and Technology, Tavanur P O, Malappuram, Kerala 679573	Administrative Building	Sheeted Roof Top	50	LT connection at Food Engineering Building	LT
3	Kelappaji College of Agricultural Engineering and Technology, Tavanur P O, Malappuram, Kerala 679573	Boys Hostel	Flat Roof	10	LT connection at Boys Hostel	LT

** Tentative Bill of Materials is attached as Appendix 1, Bidder Should visit sites and submit an actual BOM along with quote as per site conditions.

Further details can be had from the office of the General Manager – Renewable Energy Division, INKEL Limited, Door No. 7/473ZA – 5 & 6, 1st Floor, Ajiyal Complex, Kakkanad, Cochin, Pin: 682030 Phone: 0484-2978101,Ext code:300.

Bid Submission Checklist

The bidder shall submit the following:

1. The entire NIQ signed and sealed as a token of acceptance of terms and conditions.
2. Contact Form as per Appendix-2
3. Price Bid as per Appendix-3.
4. Copy of GST registration certificate.
5. Document to prove previous experience.
6. Copy of KSEBL Licensed Electrical B class contractor or ANERT certified solar power plant installer.
7. Documents to prove eligibility criteria

Sd/-
Managing Director

NIQ Annexures:

1. Appendix 1 - Scope of Work and Technical Specifications
2. Appendix 2 – Contact Form
2. Appendix 2 - Format for Price Bid

Appendix-1

Technical Qualification Requirement, Scope of Supply & Installation and Technical Specifications to be followed:

1. Technical Qualification Requirement

The details of technical qualification requirements are provided below. The bidders are required to furnish the required supporting documents along with the Bid.

SI No.	Criteria	Documents Required
1	Bidder shall have experience in the execution of supply, Installation and Maintenance of grid connected / off-grid Solar Photovoltaic Systems of 66 kWp during last 3 financial years OR The bidder must have completed Solar installations of at least 50 kWp in Kerala	The details of projects executed during period mentioned above should be listed. Copy of work orders and a certificate issued towards the satisfactory work completion to be furnished by the bidder. In absence of any one, it will not be considered for qualifying in technical bid.

2. Scope of Supply & Installation, Testing and Commissioning

- The successful bidder needs to make truss structure in the roof with minimum height of 3m and the roof need to be covered with Galvalume sheet of minimum thickness of 0.45mm or above maintaining a roof pitch of 1:12. The Solar PV modules are to be mounted above this roofing sheet and hence the detailed Engineering drawings of Purlins, Truss and rafters need to be submitted along with the agreement. The Pillar of the truss shall be designed such a way that it doesn't take over much of the usage area in the roof.
- Scope consists of Supply of BOS items, installation testing and commissioning of 1 number of proposed 50KWp Solar power plant on the sheeted rooftop in the administrative block and terminated at the administrative building consumer connection.
- Scope consists of Supply of BOS items, installation testing and commissioning of 1 number of proposed 50KWp Solar power plant on the sheeted rooftop in the administrative block and terminated at the Food Engineering building consumer connection.
- Scope consists of 1 number of 10KWp grid connected solar power plant on the administrative block is to be decommissioned and relocated to Boys hotel building inside the campus. The 10KW grid connected solar power plant is to be installed on the flat roof of the Boys hotel building without truss. All the works required for the shifting, reinstallation, including new wiring, replacement of DB's, Earthing, Lightning Protection and all other works required for the successful commissioning of the power plant is in the scope of the bidder
- The scope includes the Supply the balance of system (BOS) & Installation, Testing and Commissioning of Solar power plants mentioned above as per given Specifications and Standards.
- The access ladder, guard rails, and walkway etc are to be provided on the roof for accessing the PV modules for inspection and cleaning.
- INKEL will supply required number of Solar PV Modules and Solar Inverters at 1 Location (site details will be informed separately). KSEBL Fees (Feasibility& Registration) are also in the INKEL scope.
- Bidder shall supply balance of system (after INKEL's supply) for the Installation, Testing and Commissioning including submission of document and obtaining approvals from KSEBL for On-

Grid SolarPower plants as per given Specifications and Standards.

Schedule of Supply:

- The balance of system (BOS) should be delivered at 02 Locations in KCAET, Malappuram.
- Material delivery is to be completed in 15 days
- Bidder shall complete Installation, Testing and Commissioning of On-Grid Solar Power plants per given Specifications and Standards mentioned in this document.

Schedule of Installation, Testing and Commissioning:

- The bidder should complete the Installation, Testing and Commissioning of Solar Power plants within 35 days from the date of issue of work order.

3. Technical Specifications

3.1 System Components - Technical Compliance for System Components

S/N	System Component	Capacity/ rating	Minimum Technical Compliance
1	Cables	As required	IEC 60227 / IS 694 IEC60502 / IS 1554 (Pt. I & II)
2	Switches/ Circuit Breakers	As required	IEC 60947 part I, II, III / IS 60947 Part I, II, III
3	Connectors	As required	EN 50521
4	Surge Protection Device	As required	IEC 60364-5-53 / IS 15086-5 (Make: CITEL/Mersen/DEHN/Phoenix Contact)
5	Junction Boxes/Enclosures for Inverters/ Charge Controllers	As required	IP 54 (for outdoor) or IP 65 / IP 21(for indoor) as per IEC 529
6	Energy Meter for Recording Solar Electricity Generated & Two-way meter for Distribution Licensee grid connection (HT or LT as required)	As required	As per CEA Regulations; IEC 60687/ IEC 62052-11 / IEC 62053-22 / IS 14697
7	Lightning Protection	As required	As per IEC 62305 / IEC 62561
8	Electrical Grounding (Earthing)	AC and DC side	As per IS 3043

3.2 Module Mounting Structure (MMS) Supply & Installation

- Supply, installation, erection and acceptance of module mounting structure (MMS) with all necessary accessories, auxiliaries and spare part shall be in the scope of the Contractor.
- Design of the MMS shall take into consideration site conditions, soil report, loading data, wind data and design standards as per latest applicable IS standard.
- MMS shall be made of hot dip Galvanized steel per ASTM A123/ IS 4759. Minimum thickness of HDGI zinc coating shall be 80 microns at any point when measured. No averaging is allowed in the measurement of coating thickness. Necessary testing provision for MMS to be made available by Contractor at site.
- All bolts, nuts, panel mounting clamps fasteners shall be of stainless steel of grade SS304/ 8.8 grade HDG and must sustain the adverse climatic conditions.
- MMS shall be designed and positioned such that the PV modules are completely shadow-free solar during generation hours.
- All solar panels shall be easily accessible for cleaning and the beneficiaries shall not be inclined to climb on the MMS or PV modules for cleaning the PV modules.
- Civil foundation design for MMS shall be made in accordance with the IS and prevailing soil conditions with the help of Chartered Structural Designer having substantial experience in similar work.
- The Module Mounting Structure (MMS) shall be so as to allow easy replacement of any module by authorized personnel.
- MMS Foundation footing shall be designed to withstand the extreme weatherconditions in the area.
- The modules shall be mounted facing south at fixed tilt.

- PV fixation system shall be of proven design and subjected to Mechanical test to withstand unit failure conditions under static and fatigue conditions for wind speeds up to 150 km/hr.

Electrical Safety, Earthing and Protection

- Internal Faults: In built protection for internal faults including excess temperature, commutation failure, over load and cooling fan failure (if fitted) is obligatory.
- Over Voltage Protection: Over Voltage Protection against atmospheric lightning discharge to the PV array is required. Protection is to be provided against voltage fluctuations in the grid itself and internal faults in the power conditioner, operational errors and switching transients.
- Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.

3.3 Cabling Practice

- Cable Cabling is required for wiring from AC output of inverter/PCU to the Grid Interconnection point. It includes the DC cabling from Solar Array to AJB and from AJB to inverter input.
- All cables of appropriate size to be used in the system shall have the following characteristic:
 - ❖ Shall conform to IEC 60227 / IS 694 & IEC 60502 / IS 1554 standards.
 - ❖ Temperature Range: -10 degree Celsius to +80 degree Celsius
 - ❖ Voltage rating: 660/1000V
 - ❖ Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
 - ❖ Flexible
- Sizes of cables between any array interconnections, array to junction boxes, junction boxes to inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%).
- For the DC cabling, XLPE or XLPO insulated and sheathed, UV stabilized single core flexible copper cables shall be used; Multi-core cables shall not be used.
- For the AC cabling, PVC or XLPE insulated and PVC sheathed single or, multi-core flexible copper cables shall be used. Outdoor AC cables shall have a UV -stabilized outer sheath IS/IEC 69947.
- Wherever the cables pass through water, the marine grade cables shall be used
- All LT XLPE cables shall conform to IS: 7098 part I&II.
- The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%
- The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%
- Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers
- The minimum DC cables size shall be 4.0mm² copper; the minimum AC cable size shall be 4.0mm² copper / 6.0mm² aluminium. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires.
- Cable Marking: All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified. The following colour code shall be used for cable wires
 - ❖ DC positive: red (the outer PVC sheath can be black with a red line marking)

- ❖ DC negative: black
 - ❖ AC single phase: Phase: red; Neutral: black
 - ❖ AC three phase: phases: red, yellow, blue; neutral: black
 - ❖ Earth wires: green
- Cable conductors shall be terminated with tinned copper end ferrules to prevent fraying and breaking of individual wire strands. The termination of the DC and AC cables at the Solar Grid Inverter shall be done as per instructions of the manufacturer, which in most cases will include the use of special connectors.
 - All cables and connectors used for installation of solar field must be of solar grade which can withstand harsh environment conditions including high temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper (Cu) with XLPO insulation and rated for 1.8kV as per relevant standards only.
 - Bending radii for cables shall be as per manufacturer's recommendations and IS: 1255.
 - For laying/termination of cables latest BIS/IEC Codes/ standards shall be followed.

3.4 Surge Protection

- The system should have installed with Surge Protection Device (SPD) for higher withstand of the continuous PV-DC voltage during earth fault condition. SPD shall have safe disconnection and short circuit interruption arrangements through integrated DC in-built bypass fuse (parallel) which should get tripped during failure mode of MOV, extinguishing DC arc safely in order to protect the installation against fire hazards. The SPD should be provided in the AC Distribution Box as well.

3.5 Earthing

- The Solar PV Plant should have a dedicated earthing system. The Earthing for array and LT power shall be made as per the provisions of IS:3043-2018 "Code of practice for earthing (Second Revision)," that governs the earthing practices of a PV system and IS 732:2019 "Code of practice for electrical wiring installations (Fourth Revision)
- Earthing System shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV module mounting structures in one long run. The earth strips should not be bolted. Earthing GI strips shall be interconnected by proper welding.
- The earthing conductor should be rated for 1.56 times the maximum short circuit current of the PV array. The factor 1.56 considers 25 percent as a safety factor and 25 percent as albedo factor to protect from any unaccounted external reflection onto the PV modules increasing its current
- In any case, the cross-section area of the earthing conductor for PV equipment should not be less than 6 mm² if copper, 10 mm² if aluminium or 70 mm² if hot-dipped galvanized iron. For the earthing of lightning arrestor, cross-section of the earthing conductor should not be less than 16 mm² of copper or 70 mm² if hot-dipped galvanized iron. The complete Earthing system shall be mechanically & electrically connected to provide independent return to earth.
- Masonry enclosure with the earth pit of size not less than 400mm X 400 mm (depth) complete with cemented brick work (1:6) of minimum 150mm width duly plastered

with cement mortar (inside) shall be provided. Hinged inspection covers of size not less than 300mm X 300mm with locking arrangement shall be provided. Suitable handle shall be provided on the cover by means of welding a rod on top of the cover for future maintenance.

- Interconnected earth pit need to be provided in each location. Minimum required gap shall be provided in between earth pits as per relevant standard. Body earthing shall be provided in inverter, each panel frame, module mounting structure, kiosk and in any other item as required.
- Earth pit shall be constructed as per IS: 3043-2018. Electrodes shall be embedded below permanent moisture level. Earth pits shall be treated with salt and charcoal if average resistance of soil is more than 20-ohm meter.
- Earth resistance shall not be more than 5 ohms.
- In compliance to Rule 11& 61 Of Indian Electricity Rules,1956(as amended up to date),all non-current carrying metal parts shall be Earthing with two separate and distinct earth continuity conductors to an efficient earth electrode.
- The equipment grounding wire shall be connected to earth strip by proper fixing arrangement.
- Necessary provisions shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- For each earth pit, a necessary test point shall be provided.
- Total no of Earth pits required for solar plants shall be as per the Electrical Inspectorate norms.
- Minimum 4 Nos. of earth pits must be incorporated with each solar power plant.

3.6 Lightning Protection for PV Array

- The SPV power plant should be provided with lightning and over voltage protection. The source of over voltage can be lightning or other atmospheric disturbance. The lightning conductors shall be made as per applicable Indian Standards in order to protect the entire array yard from lightning stroke.
- The design and specification shall conform to IS/IEC 62305, “Protection against lightning” govern all lightning protection-related practices of a PV system.
- The entire space occupying SPV array shall be suitably protected against lightning by deploying required number of lightning arresters. Lightning protection should be provided as per IS/ IEC 62305.
- Lightning system shall comprise of air terminations, down conductors, test links, earth electrode etc. as per approved drawings.
- Conventional Lightning Arresters shall be used to protect entire solar module area.
- The protection against induced high voltages shall be provided by the use of surge protection devices (SPDs) and the earthing terminal of the SPD shall be connected to the earth through the earthing system.
- The EPC Contractor / Company shall submit the drawings and detailed specifications of the PV array lightning protection equipment to Employer for approval before installation of system.

3.7 AC Distribution Panel Board

- AC Distribution Board (ACDB) shall control the AC power from inverter and should have necessary surge arrestors.

- An ACDB panel shall be provided in between PCU and Utility grid. It shall have MCB/MCCB/ACB or circuit breaker of suitable rating for connection and disconnection of PCU from grid.
- The connection between ACDB and Utility grid shall be of standard cable/ Conductor with suitable termination. It shall have provision to measure grid voltage, current and power.
- The incomer shall be selected at required rating. The ACDB enclosure shall be of good protection and suitable for mounting on the trenches / on wall.
- All the 230 V AC devices/equipment like bus support insulators, circuit breakers, SFU isolators (if applicable), SPD, etc. mounted inside the switch gear shall be suitable for continuous operation
- Switches/ circuit breakers/ connectors meeting general requirements and safety measurements as per IS 60947 Part I, II, III and IEC 60947 part I, II and III.
- Junction boxes, enclosures, panels for inverters/ Controllers shall meet IP 54 (for outdoor) as per IEC 529.

3.8 DC Distribution Board

- DC bus/ cable which can handle the current and the voltage of inverter output safely with necessary surge arrester as per the relevant IS standards.
- DC panel should be equipped with an adequate capacity indoor DC circuit breaker along with control circuit, protection relays, fuses, annunciations and remote operating and controlling facility from the main control facility.
- DCDB shall have sheet from enclosure of water, dust and vermin proof, the busbar/ cables are to be made of copper of desired size. DCDB shall be fabricated to comply with IP 65 protection.

3.9 Cables, Switches and General Requirements

- PVC insulated copper cables with current rating suitable for AC and DC as per the National Electric Code, and meeting:
 - ❖ General Test and Measuring Method as per IEC 60189/ IS 694
 - ❖ PVC insulated cables for working voltages up to 1500 V and UV resistant for outdoor installation as per IEC 60502/ IS 1554 (Pt. I & II)
- Cable Marking: All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified.
- Switches/ circuit breakers/ connectors meeting general requirements and safety measurements as per IS 60947 Part I, II, III and EN 50521 for AC/DC.
- Junction boxes, enclosures for inverters/ charge controllers shall meet IP 54 (for outdoor)/ IP 21 (for indoor) as per IEC 529.
- All the civil construction works shall comply the relevant IS Codes/Standards.
- Contractor shall done solar modules cleaning arrangements by deploying sufficient water lines from available source.
- Ladder for accessing solar module area as required shall be done by the contractor.

3.10 AC/DC Wiring

- Before submitting the tender, actual measurement of cables required for wiring from AC output of inverter/PCU to load point should be calculated and this work is also included in the tender. The actual cable required from module to DC distribution board and DC distribution board to inverter input should be calculated and this work should be done as a part of Solar Power Plant installation.

3.11 Supply and Installation of Remote Monitoring device with sensors

- Pyranometer/ Solar cell-based irradiation sensor approved by INKEL shall be supplied and mounted in the plane of array as directed
- Integrated temperature sensors approved by INKEL for measuring the module surface temp & Ambient temperature sensor shall be supplied which is to be installed as directed
- Remote Monitoring device supply, Installation and necessary connections from sensors & Inverters including wires are in the scope of contractor.

3.12 Warranty

- 1 years warranty should be provided by the supplier for the system and components or part of the system has to be provided as applicable.
- The Warranty Card to be supplied with the system must contain the details of the all the components supplied, OEM Warranty if any including serial numbers.

3.13 Display Board

- The logo and details of the scheme as specified.

3.14 Standards

- The Design, Engineering, Manufacture, Supply, Installation, Testing and performance of the equipment shall be in accordance with latest appropriate IEC/ Indian Standards and as detailed in the Technical Specifications Section as per the MNRE / ANERT requirements of the bid document. The goods supplied under this contract shall confirm to the Standards mentioned, where appropriate Standards and Codes are not available, other suitable standards and codes as approved by the authoritative Indian Standards shall be used.

Appendix – 2
CONTACT FORM

Name of the Firm	
Complete Office Address with Phone Number and E-mail ID	
Type of Ownership	
GST No.	
PAN	
Year of Establishment	
Electrical Contractor License Details	
Name of Contact Person with Designation	
Mobile Number & E-mail ID of the Contact Person	

Name of Authorized Signatory:

Signature

Official Seal

Date:

Appendix – 3
(To be filled by bidder)

Price Details:

1. Price bid format

Sl No	Description	Quantity Req	Unit	Rate/kWp	Amount(Rs)
1	Supply of BOS materials for 110kWp at Kelappaji College of Agricultural Engineering and Technology, Malappuram	110	kWp		
2	Installation, Testing and Commissioning with Electrical inspectorate/KSEBL approvals if required for 110kWp at Kelappaji College of Agricultural Engineering and Technology, Malappuram	110	kWp		
3	Supply of materials for truss structure in the roof with minimum height of 3m and the roof need to be covered with Galvalume sheet of minimum thickness of 0.45mm or above maintaining a roof pitch of 1:12.	*1100	Sqm		
4	Installation of truss structure in the roof with minimum height of 3m and the roof need to be covered with Galvalume sheet of minimum thickness of 0.45mm or above maintaining a roof pitch of 1:12.	*1100	Sqm		
GST					
Total					

In words:

Terms and Conditions:

1. The above price inclusive of GST, all taxes and duties.
2. * The area mentioned for Truss is approximate only. Fixed rate for actual qty to be quoted at 3 & 4.
3. Supply of BOS items will be completed as per schedule of supply from the date of work order.
4. Installation, Testing and Commissioning will be completed as per schedule from the date of work order.
5. Payment terms :
 - i. 60% of the contract value shall be released against the supply of BOS items for solar power plant and Truss to site and submission of Original tax invoice.
 - ii. 30% of the contract value shall be released after the completion of installation Truss & solar power plant at sites in good condition verified by Senior Manager-Execution (INKEL LTD).
 - iii. 7% of the contract value shall be released on commissioning of solar power plant. All documents related to completion of work including connectivity certificate issued by KSEB shall be submitted.
 - iv. 3% of the contract value retained as security deposit. The security deposit shall be released after the warranty period.
 - v. Release of tax portion is only after the reception of Original tax invoice.
 - vi. Invoice for supply and installation can be raised on site to site basis and can be submitted for payment in groups of 5 or more as and when supply or installation are completed verified by project manager-solar.
6. **Warranty:** 1 year warranty should be provided by the supplier for the system and components or part of the system has to be provided as applicable. The Warranty Card to be supplied with the system must contain the details of the all the components supplied, OEM Warranty if any including serial numbers.

Bidder Name:

Signature

Official Seal

Date: