**RAJASTHAN ELECTRONICS & INSTRUMENTS LIMITED, JAIPUR**

**(An ISO 9001 : 2015& 14001 : 2015 "Mini Ratna" Public Sector Enterprise)**

**2, KANAKPURA INDUSTRIAL AREA, SIRSI ROAD,**

**JAIPUR-302034**

Tel No: 0141- 2471083

E-mail: sr.nirmal@reil.co.in. website: www.reiljp.com

**RATE CONTRACT FOR**

**"Survey , Identification, Supply, Erection, Testing and Commissioning including warranty, Comprehensive operation & maintenance of Grid- Connected Rooftop Solar Plant of various capacities of Grid Connected Rooftop Solar plant in the UT of Jammu & Kashmir from regular/registered vendors"**

**TENDER NO. REIL/RE/21-22/PP/083 dated 22.02.2022**

**Important Dates**

| | |
|---|---|
| **Broad Scope** | Identification of rooftops/beneficiaries which includes Survey , Identification, Supply, Erection, Testing and Commissioning including warranty, Comprehensive operation & maintenance of Grid- Connected Rooftop Solar Plant of various capacities of Grid Connected Rooftop Solar plant in the UT of Jammu & Kashmir<br>Total timeline for the above Scope of Work up to Commissioning of project is **4 Months** from the date of the Letter of Allocation (LoA). |
| **Online Bid submission Deadline** | Date: **03-03-2022**<br>Time:16:00 Hrs. |
| **Date of Techno-Commercialbids opening** | Date and Time: **04-03-2022** at 16:00 Hrs.<br>Venue: REIL, Kanakpura Industrial Area, Sirsi Road, Jaipur |
| **Date of opening of Price bids** | Shall be intimate separately to successful bidder |
| Contact Person(s) for Technical Queries | 1. Sh. Amitabh Sharma, DGM (RE), amitabh.sharma@reil.co.in<br>2. Sh. Himanshu Sharma, Sr. Engineer (RE), himanshu.sharma@reil.co.in , +91-7340064963 (M) |
| Contact Person(s) for Tender related Queries | 1. Sh. S .R. Nirmal, DGM (MM), sr.nrimal@reil.co.in, 0141- 2471083 |

**Kindly note that only online bid will be considered against this tender.**

# NOTICE INVITING TENDER NO. REIL/RE/21-22/PP/083

This is a Notice Inviting Tender (NIT) for Survey, Identification, Supply, Erection, Testing and Commissioning including warranty, Comprehensive operation & maintenance of Grid- Connected Rooftop Solar Plant of various capacities of Grid Connected Rooftop Solar plant in the UT of Jammu & Kashmir from regular/registered vendors as per description and terms & conditions specified hereinafter:

**1.2 E-Tendering Procedure:** The work shall be carried out through submission of online tenders only. No offer in physical form will be accepted and any such offer if received by REIL will be out rightly rejected. Tender documents can be downloaded from our website www.reiljp.com or website of CPPP www.eprocure.gov.in. Final bids are to be submitted on website www.eprocure.gov.in. Any changes modification in the tender enquiry will be intimated through above websites only. Tenderer are therefore, requested to visit our Website regularly to keep themselves updated.

The bidder should have a valid Digital Signature certificate issued by any of the valid certifying Authorities to participate in the online tender.

The bids shall be uploaded in electronic form only through e-tendering system on website www.eprocure.gov.in .

**Note: e- Procurement system does not allow submission of documents after due date of tender. Incomplete form or non-submission of documents to verify details may results into rejection of your offer and no communication shall be done for submission of documents.**

**Price Bid:-** Price Bid format given with tender is to be uploaded after filling all relevant information like basic prices, taxes & duties. The Price bid should be uploaded strictly as per the format available with the tender failing which the offer is liable for rejection (remaining or changing format of price sheet will not be accepted by system). REIL reserve the right to distribute the work.

**Annexure-I**

# RAJASTHAN ELECTRONICS & INSTRUMENTS LIMITED, JAIPUR

## Process Compliance Form

(Tenders are required to print on their company's letter head and signed, stamp before uploading).

To

**Deputy General Manager (MM)**
**M/s Rajasthan Electronics & Instruments Limited**
**2, Kanakpura Industrial Area, Sirsi Road,**
**Jaipur-302034**

**Sub:- Acceptance to the process related Terms and Conditions for the e-Tendering**

Dear Sir,

**This has reference to the Terms & Conditions for e-Tendering mentioned in the tenderNo.:- REIL/RE/21-22/PP/083**

We here by confirm the following:-

1) The undersigned is authorized representative of the company.
2) We have carefully gone through the NIT, Tender Documents and the Rules governing the e-tendering as well as this document.
3) We will honor the Bid submitted by us during the e-tendering.
4) We undertake that if any mistake occurs while submitting the bid from our side, we will honour the same.
5) We are aware that if REIL has to carry out e-tender again due to our mistake, REIL has the right to disqualify us for this tender.
6) We confirm that REIL shall not be liable & responsible in any manner whatsoever for my/our failure to access & submit offer on the e-tendering site due to loss of internet connectivity, electricity failure, virus attack problem with the PC, digital signature certificate or any other unforeseen circumstances etc.

With regards

Signature with company seal

Name:
Designation:
E-mail Id:

## SECTION – 1

## SCOPE OF WORK

Scope of work Survey, Identification, Supply, Erection, Testing and Commissioning including warranty, Comprehensive operation & maintenance of Grid- Connected Rooftop Solar Plant of various capacities of Grid Connected Rooftop Solar plant in the UT of Jammu & Kashmir conforming to technical specification of tender documents.

The following material will be supplied for Roof Top Grid Connected SPV Power Plant **by M/s REIL Jaipur:**

| S. No. | Description of Work |
|---|---|
| 1. | Raging fro, 300Wp-335Wp SPV Modules with MC4 Connector |
| 2. | String Inverters with Data logger |

The above materials shall supplied by REIL at successful bidder's go dawn in Jammu.

# Contractor's Scope

- ✓ Identification of prospective beneficiaries and providing necessary assistance to the prospective beneficiary in submitting online applications for installation of RTS project.
- ✓ Obtaining Net-metering approval from concerned DISCOM/designated agency for providing grid connectivity/ net-metering.
- ✓ Submission of proposal with all required documents to REIL for sanctioning of the project. The project shall NOT be registered in absence of the following:

a) Location coordinates where system is to be installed.
b) Copy of the latest electricity bill.
c) One color passport size photo & Aadhaar Card of the Beneficiary
e) Amount of Beneficiary Share in the form of Demand draft in favour of CEO, Jammu& Kashmir Energy Development Agency or e-transfer in JAKEDA‟s bank account.
f) Design Documents of the project
   i. Array Layout
   ii. Shadow Analysis Report
   iii. Electrical Single Line Diagram
   iv. Detailed Bill of Material (Item, specification, make, model, quantity)
   v. Declaration that the Beneficiary‘s electrical system is feasible and fit forinterconnection of solar power plant‘s functioning.
g) Supply of Module Mounting Structures, Cables, DCDB, ACDB, earthing kit, LA, energy meters and other necessary items as per the specification given in the tender documents.

h) Any other items which will required for commissioning of the project, shall be supplied by successful bidder without any additional cost.

Execution of the work shall be carried out in an approved manner as per the technical specification of RFP. In case of any dispute, relevant MNRE/BIS/ISI/NABL/ISO/ IEC/IS specification shall be followed and work shall be carried out to the reasonable satisfaction of the engineer in charge.

The vendor shall complete the work of Design, supply of BoS , civil work, erection, testing and commissioning of SPV grid connected Power Plant within **4 months** from the issuance of the sanction letter or the last date of the project timeline specified by REIL. In event of failure to install and commission the RTS system within the mentioned timeframe, the entire Performance Bank Guarantee for I&C will be forfeited and may also lead to disqualification of the vendor at the sole discretion of REIL. The penalty for non-completion will be on pro-rata basis.

The work covers Design, supply of BOS, installation, commissioning and Comprehensive Maintenance Contract (CMC) for 05 (Five) Years. Empanelled vendors shall establish a service Centre to cater the 05 Years CMC. All the material required for the installation of Solar Power Plant as per the work order issued shall be kept at site in custody of the vendor, REIL shall not be responsible for any loss or damage of any material during the installation. The vendor shall be responsible and take an insurance policy for transit-cum-storage-erection for all the materials.

The vendor shall have to a godown facility in Jammu City. REIL shall supply and handover Inverter and Modules at vendor's godown only. The transportation charge for vendor's godown to beneficiary shall be in scope of vendor's only. REIL shall not be responsible for any loss or damage of supplied material after delivery at godown. The vendor shall be responsible and take an insurance policy for transit-cum-storage-erection for all the materials.

The vendor shall take entire responsibility of electrical safety of the installations including connectivity with the grid and follow all the safety rules and regulations applicable as per Indian Electricity Act-2003 and prevailing CEA guidelines and amendments, it shall be responsibility of the vendor to take NOC from concerned authority and engage person as per provisions as per in CEA Rules and Regulations.

The Empanelled vendor shall ensure proper safety of all the workmen, material, plants and equipment belonging to him/her. In case any accident occurs during the construction / erection or during guarantee period for work undertaken by Empanelled Vendor thereby causing any minor or major or fatal accident will be the responsibility of the Empanelled Vendor. The successful Vendors shall follow and comply with the employer's safety rules relevant provisions of applicable laws pertaining to the safety of workmen, employees, plant and equipment. The Empanelled Vendors must adhere to the Operation and Maintenance procedure given in Annexure-C of this document.

Invoice of the BoS billed to the REIL along with following documents :-

1. Photograph of the system with placard held by the beneficiary and representative of REIL/JAKEDA showing the name of the beneficiary & official of REIL/JAKEDA. registration number and system capacity.
2. Certificate of the beneficiary that the system is installed and commissioned in all respect with the date of commissioning, system and invertors capacity, etc. and that he has been provided the 05 (Five) Year Warranty Card and the O&M Manual. Overwritten certificates/ documents shall be out rightly rejected and will not be processed for any claim.
3. Self-certified copies of documents will be submitted in support of claims made by the Empanelled Vendors.
4. Third party Inspection may also be carried for release of payment (2nd Installment of Payment). Third party Inspection will be carried out by the Agency nominated by REIL. The charges for the same will be borne by empanelled vendor.

This scheme with an aggregate capacity of 500 kW only envisages installation of grid-connected Rooftop solar projects on the roofs of consumers as specified by MNRE vide Order No. 318/331/2017 – Grid Connected Rooftop Dated 20th August 2019 and their amendments issued from time to time i.e. broadly in following categories:

| Category | Coverage of Buildings |
|---|---|
| Residential | All types of Residential buildings and Group Housing Societies/Residential Welfare Associations (GHS/RWA) |

**PROJECT COST**

The Project cost shall include all the costs related to above Scope of work. Bidder shall quote for the entire facilities on a "single responsibility" basis such that the total Bid Price cover shall the obligations mentioned in the Bidding Documents in respect of Design, Supply of BOS, Erection, Testing and Commissioning of project. The Bidder has to take all permits, approvals and licenses, insurance etc., provide training and such other items and services required to complete the scope of work mentioned above.

The price quoted is on lump sum turnkey basis including all taxes & duties applicable and the bidder is responsible for the total scope of work described as above.

The project cost shall remain firm and fixed and shall be binding on the Successful Bidder till completion of work. No escalation will be granted on any reason what soever. The bidder shall not be entitled to claim any additional charges, even though it may be necessary to extend the completion period for any reasons what so ever.

The cost shall be inclusive of all duties and taxes, insurance etc. The prices quoted by the firm shall be complete in all respect and no price variation/adjustment shall be payable.

The Project cost shall be specified by the successful Bidder' quote @ Rs/Wp (Watt peak) for each project. The project cost shall be in accordance with all terms, conditions, specifications and other conditions of the Contract as accepted by the REIL and incorporated into the Rate Contract order.

The Vendor shall be responsible and take an Insurance Policy for transit- cum- storage-cum-erection for all the materials to cover all risks and liabilities for supply of materials on site basis, storage of materials at site, erection, testing and commissioning.

The Vendor shall also take insurance for Third Party Liability covering loss of human life, engineers and work men and also covering the risks of damage to the third party / material/ equipment/ properties during execution of the Contract. Before commencement of the work, the Successful bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of Successful bidder.

**SPV Modules and String Inverters shall be provided by REIL.**

The bidders shall quote price of the complete package essentially covering -—design, supply of BOS, erection, testing and commissioning including warranty and 05 years of comprehensive operation & maintenance of grid-connected rooftop solar PV plant. For the purpose of this tender, the components of a Grid Connected Rooftop Solar PV System shall essentially comprise but not be limited to module mounting structures of minimum 300mm ground clearance at the lowest point from the roof surface, total Cable/wiring up to 30 m in length, cable conduits, required array junction boxes, DC distribution box, AC distribution box, various connectors, nut- bolts, net/Solar meter, civil and mechanical works, Protection-Earthing, lightning, surges, drawling & manual and other miscellaneous works. The price shall also be inclusive of all taxes, duties and transit insurance of all components, inclusive of GST (Goods and Services Tax which is presently 13.8%). The bidders shall quote price of the complete package essentially covering -—design, supply of BOS , erection, testing and commissioning including warranty and 05 years of comprehensive operation & maintenance of grid-connected rooftop solar PV plant.

## PERFORMANCE BANK GUARANTEE (PBG)

**Performance Bank Guarantee for Installation and Commissioning (I&C):** The bidder shall furnish the performance bank guarantee of **10% amount of contract value** for installation and commissioning based on the allocated capacity.

The PBG shall be submitted within 15 days from the date of issue of LOI/LOA/Work Order, whichever is issues first, and be valid for 6 months. Bidders should submit Single PBG based on the allocated capacity. The Performance Bank Guarantee shall be released after completion of the empanelment period (commissioning of allotted capacity) with the compliance of entire obligations in the contract.
Further, any delay in submission of PBG for I&C period beyond 30 days, REIL at its sole discretion may cancel the allocated capacity. Such Vendors (who have not submitted PBG shall be debarred from participating in REIL's future tenders for a period as decided by Competent Authority. Part PBG shall not be accepted.

Note:-

1. The bidders, who have already worked with REIL for more than 2 years, may submit an undertaking on their letterhead to hold the payment equal to PBG amount up to the commissioning of the allotted capacity.
2. The bidder, who has newly empanelled with REIL but no business done with REIL, shall have to submit the PBG as per the PBG clause.

**The PBG shall be forfeited or hold payment shall be deducted as follows without prejudice to the Bidder being liable for any further consequential loss or damage incurred to the Plant.**

i. If the Empanelled Vendor is not able to commission the projects to the satisfaction of REIL/nominated agency, PBG (for I&C period) amount on pro-rata basis by the empanelled vendor shall be 100% encashed.

ii. In all the above cases corresponding unidentified/non-commissioned capacity shall stand cancelled.

## INSURANCE

The Empanelled Vendor shall be responsible and take an Insurance Policy for all the materials to cover all risks and liabilities for supply and storage of materials at site, installation, testing and commissioning. However, this shall not include insurance of commissioned plant after handing over to the beneficiary.

Before commencement of work, the Empanelled Vendor shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. The Empanelled Vendor will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, Bankruptcy etc., shall be the responsibility of bidder.The bidder shall also take appropriate insurance during O&M period.

## WARRANTEES AND GUARANTEES

The Empanelled Vendor shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 5 years from the date of commissioning for projects.

## TYPE AND QUALITY OF MATERIALS AND WORKMANSHIP

The design, engineering, manufacture, supply, installation, testing and performance of the equipment shall be in accordance with latest appropriate IEC/ Indian Standards as detailed in the Section- III (Technical specifications) of the bid document.

The specifications of the components should meet the technical specifications mentioned in Section III. Any supplies which have not been specifically mentioned in this Contract but which are necessary for the design, engineering, manufacture, supply & performance or completeness of the project shall be provided by the Bidder without any extra cost and within the time schedule for efficient and smooth operation and maintenance of the SPV plant.

## OPERATION & MAINTENANCE (O&M) GUIDELINES TO BE MANDATORILY FOLLOWED BY BIDDERS.

The bidder shall be responsible for all the required activities for successful operation and maintenance of the Rooftop Solar PV system for a period of 5 years from the date of commissioning of the plant. Below mentioned guidelines, shall be followed for O&M practices, which is not limited to

i. O&M of Solar Power Plant shall be compliant with grid requirements to achieve committed energy generation.
ii. Deputation of qualified and experienced engineer/ technicians till the O&M period atproject site as & when required.
iii. Quarterly checks of the Modules, PCUs and BoS shall be carried out as a part of routine preventive and breakdown maintenance.
iv. Immediate replacement of defective Modules, Invertors/PCUs and other equipment as and when required.
v. Supply of all spares, consumables and fixtures as required. Such stock shall be maintained for all associated equipment and materials as per manufacturer/ supplier‘s recommendations.

If negligence/ mal-operation on part of the Bidder's operator results in failure of equipment, such equipment should be repaired/ replaced by the Bidder free of cost. A maintenance record register is to be maintained by the operator/technician/bidder with effect from Commissioning, regular maintenance work carried out as well as any preventive and breakdown maintenance along with the date of maintenance, reasons for the breakdown, duration of the breakdown, steps taken to attend the breakdown, etc.

If any jobs covered in O&M Scope as per RFP are not carried out by the contractor/ Bidders during the O&M period, the designated Official shall take appropriate action as deemed fit. JAKEDA reserves the right to make surprise checks/ inspection visits at its own or through authorized representative to verify the O&M activities being carried out by the Bidder. Failure to adhere to above guidelines will result in penal action including debarring from participation in next tender.

If Bidders are fail to comply with the O&M guidelines, it may lead to the encashment of Performance Bank Guarantee and subsequently debarring or blacklisting from the future State/Central Government Tender**.**

## METERING AND GRID CONNECTIVITY

Metering and grid connectivity of the Solar Rooftop Plants under this scheme would be the responsibility of the Empanelled Vendor in accordance with the terms and conditions laid down in bid document and prevailing guidelines/regulation of State Electricity Regulatory Commission (SERC)/ Central Electricity Authority (CEA) and issued amendments.

## PLANT PERFORMANCE EVALUATION

The Empanelled Vendor shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning as per the radiation levels of the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning acceptance to qualify for release of CFA. The PR will bemeasured at Inverter output level during peak radiation conditions.

## PROGRESS REPORT

The bidder shall submit the monthly progress report to REIL in Prescribed Performa during the period of installation. REIL will have the right to depute its representatives to ascertain the progress of contract at the premises of works of the empanelled vendors.

### Submission of Project Completion Report (PCR)

The Empanelled Vendor shall submit the Project Completion Report in (soft copy and signed copy) after commissioning of the project as per the Scope of RFP to REIL as per the Format given in **Annexure J**. Non submission of the report shall be considered as

–Breach of Contract‖ and shall attract punitive actions as per the relevant provisions of the Contract including non-release of funds. However, the decision of Engineer–in -charge shall be final in this regard.

### Submission of O&M Report (OMR)

The bidder shall submit the quarterly O&M Report mandatorily to REIL as per the Format enclosed at Annexure H. Non submission of the report shall be considered as

―Breach of Contract‖ and shall attract punitive actions as per the relevant provisions of the Contract including non-release of payment. However, the decision of Engineer–in -charge shall be final in this regard.

## PROJECT INSPECTION

All project progress will be monitored by REIL and the projects can be inspected for quality at any time during commissioning or after the completion of the project by officer(s) from REIL/or any agency/ experts designated / authorized by MNRE and/or REIL from time to time. REIL shall depute a technical person from its officeor from list of empanelled experts/ agencies updated from time to time for inspection, third party verification, monitoring of system installed to oversee the implementation as per required standards. The cost of inspection at the time of commissioning shall be borne by the vendor. However, if the project is not found to be installed in an appropriate manner, all arrangement for the next visit of the authorized representative of the implementing agency shall be made by the vendor. There shall be no separate charges/fees for the inspections. The inspection shall be broadly governed by the following mechanism:

After complete installation of the system, the Bidders shall immediately intimate to implementing agency in writing for such inspections. The material/installation found sub-standard or faulty is to be replaced by the bidder with new material as per the specifications. The systems shall be offered for inspection again after necessary rectification. Expenses for such re-inspection shall be borne by the Bidders. REIL at its discretion may also pick up samples from the lot of systems being supplied by the vendor at random from the warehouse for quality check only. The samples picked up will be tested for acceptance test as decided by REIL at MNRE/ Government approved laboratory in presence of representatives of supplier and REIL as per relevant IEC/IS/BIS/ DISCOM specifications.

the test results will be binding on the suppliers and REIL, in general will not allow re- sampling. If the material fails in any of the acceptance tests carried out, those components that fail the test shall be rejected, and the Bidder shall have to supply and install the new component as per the specifications. The loss of generation during such time when the system is taken away for testing shall be at the cost of the Bidder, who shall compensate the Beneficiary for such loss of generation as per the pro-rata PR as per RFP.

**Net metering of Power :**

The Successful bidder shall bear the entire cost of metering arrangement provided including its accessories. The fee and other charges such as security deposit payable to office of DISCOM & Electrical inspector will be payable by beneficiary separately. The installation of meters including CTs & PTs, wherever applicable, shall be carried out by the Successful bidder as per the procedures in vogue of the Discom(s) with their permission.

**PLANT PERFORMANCEEVALUATION:**

REIL shall monitor the performance of the grid connected SPV Power Plants as per feasible subject to availability of proper measuring equipment being in vogue in DISCOM as under :

The successful bidders shall be require to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the DNI level for the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning acceptance to qualify for release of payment against commissioning. Minimum CUF of 15% should be maintained for a period of 5 years for release of performance related security deposit. For CUF less than 15%, the penalty can be imposed for the loss of energy generation @ APP of DISCOM for that year subject to force majeure conditions. The Successful bidder should send the periodic plant output details to REIL for ensuring the CUF. The PR will be measured at Inverter output level during peak radiation conditions. The PR and CUF will be evaluated considering 100% grid availability.

## SECTION – 2

## EXPERIENCE AND COMPETENCE

## TECHNICAL CAPABILITY

Following are the required for considering responsiveness of the bidders. To substantiate this, necessary documents, certificates shall have to be attached with the proposal.

1. The bidder should be a Company / Firm / Corporation / LLP in India having experience in Installation, Commissioning & maintenance of SPV Systems.
2. The Bidder should having experience in I&C work for cumulative of 200 kWp SPV Systems.
3. The bidder should be registered in REIL for installation-Commissioning of SPV systems.
4. PAN & GST registration -
5. The firm must have valid PAN No and GSTIN No.
6. Copy of PAN card and GSTIN Registration are required to be submitted with the bid.
7. The bidder should be registered in REIL for I&C of SPV system.

## FINANCIAL CAPABILITY

Following are required for considering responsiveness regarding financial capability of the bidders:

1. Minimum Annual Average Turnover (MAAT) in solar field of the bidder for last three financial years **(2018-19, 2019-20 & 2020-21)** should be at least Rs. **10.00 Lakh**.

2. Bidder should submit following documents along with Technical bid:-
   i. Balance sheet for FY 2018-19, 2019-20, 2020-21.
   ii. Turnover and net worth value duly certified by CA.
   iii. Photocopy of the last Three years Income Tax Return.
   iv. Experience in Installation, Commissioning and maintenance of SPV Power Plant Systems. (Kindly attach verified documents such as I&C and maintenance certificate.
   v. Photocopy of GST, PAN no.
   vi. Declaration that firm is not blacklisted by any government department/ PSU.

   Any other relevant documents

## SECTION – 3

## PRICE SCHEDULE

A. **Supply of BOS, Installation – Commissioning and 5 years warranty, Comprehensive operation & maintenance of Grid Connected SPV Power Plant.**

The bidder shall quote their rates / costs for Identification of rooftops/beneficiaries which includes Design, Supply of BoS, Transportation, Storage, Insurance, Installation – Commissioning and 5 years warranty, Comprehensive operation & maintenance of Grid Connected SPV Power Plant including all taxes etc. in format as per **online only.** It will be mandatory for Bidders to quote their prices.

The defect liability period shall be 5 years from date of commissioning of project.

If the prices are quoted anywhere in Cover-I and/or Cover-II (Technical Bid) by any bidder, their offer will be summarily rejected. The capacity may increase/decrease as per the requirement. REIL have sole discretion in this matter.

**SIGNATURE OF AUTHORISED**

**SIGNATORY WITH SEAL**

## SECTION – 4

## COMPLETION PERIOD

REIL proposes to take up work of SPV Grid connected SPV systems installation under this programme as detailed at section-1 and allocations of PV capacity shall be carried out and completed within **4 months** from the date of issue of Rate Contract. The firm shall submit bills to respective Officers in charge on monthly basis along with required papers.

The extension of time period for implementation of the programme is solely on the discretion of the tendering authority.

## SECTION-5

## TECHNICAL SPECIFICATIONS FOR GRID CONNECTED SPV SYSTEMS

**The proposed projects shall be commissioned as per the technical specifications given below. Any shortcomings will lead to cancelation of payment in full or part as decided by REIL.**

### 1. DEFINITION

A Grid Tied Solar Rooftop Photo Voltaic (SPV) power plant consists of Module Mounting Structure, Controls &Protections, interconnect cables, earthing, energy meters and switches. PV Array is mounted on a suitable structure. Components and parts used in the SPV power plants including the metallic structures, cables, junction box, switches, etc., should conform to the BIS or IEC or international specifications, wherever such specifications are available and applicable.
Solar PV system shall consist of following equipments/components.

- Mounting structures.
- Junction Boxes.
- Earthing and lightening protections.
- IR/UV protected PVC Cables, pipes and accessories.
- Solar Meter and Bi-directional Energy Mater with boxes.

### 2. ARRAYSTRUCTURE

- 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 work.
- Module mounting structures can be made from three types of materials. They are Hot Dip Galvanized Iron, Aluminium and Hot Dip Galvanized Mild Steel (MS). However, MSwill be preferred for raised structure.
- MMS Steel shall be as per latest IS 2062:2011 and galvanization of the mounting structure shall be in compliance of latest IS 4759. MMS Aluminium shall be as per AA6063 T6. For Aluminium structures, necessary protection towards rusting need to be provided either by coating or anodization.
- All bolts, nuts, fasteners shall be of stainless steel of grade SS 304 or hot dip galvanized, panel mounting clamps shall be of aluminium and must sustain the adverse climatic conditions. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts.
- The module mounting structures should have angle of inclination as per the site conditions to take maximum insolation and complete shadow-free operation during generation hours. However, to accommodate more capacity the angle of inclination may be reduced until the plant meets the specified performance ratio requirements.
- The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed. The PV array structure design shall be appropriate with a factor of safety of minimum 1.5.
- The upper edge of the module must be covered with wind shield so as to avoid build air ingress below the module. Slight clearance must be provided on both edges (upper & lower) to allow air for cooling.

- Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The Empanelled Agency shall be fully responsible for any damages to SPV System caused due to high wind velocity within guarantee period as per technical specification.
- The structures shall be designed to allow easy replacement, repairing and cleaning of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Necessary testing provision for MMSto be made available at site.
- Adequate spacing shall be provided between two panel frames and rows of panels to facilitate personnel protection, ease of installation, replacement, cleaning of panels and electrical maintenance.

The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.

The Rooftop Structures maybe classified in three broad categories as follows:

**i. Ballast structure**

- The mounting structure must be Non-invasive ballast type and any sort of penetration of roof to be avoided.
- The minimum clearance of the structure from the roof level should be in between 70- 150 mm to allow ventilation for cooling, also ease of cleaning and maintenance of panels as well as cleaning of terrace.
- The structures should be suitably loaded with reinforced concrete blocks of appropriate weight made out of M25 concrete mixture.

**ii. Tin shed**

- The structure design should be as per the slope of the tin shed.
- The inclination angle of structure can be done in two ways-
- Parallel to the tin shed (flat keeping zero-degree tiling angle), if the slope of shed in Proper south direction
- With same tilt angle based on the slope of tin shed to get the maximum output.
- The minimum clearance of the lowest point from the tin shade should be more then 100mm.
- The base of structure should be connected on the Purlin of tin shed with the proper riveting.
- All structure member should be of minimum 2 mm thickness.

**iii. RCC Elevated structure: It can be divided into further three categories:**

Minimum Ground clearance (300MM – 1000 MM)

a. The structure shall be designed to allow easy replacement of any module and shallbe in line with site requirement. The gap between module should be minimum 30MM.
b. Base Plate – Base plate thickness of the Structure should be 5MM for this segment.
c. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
d. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C- Channel section. The minimum section should be 70MM in Web side (y-axis) and40MM in flange side (x-axis).
e. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.

f. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should beSS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

g. For single portrait structure the minimum ground clearance should be 500MM.

**B. <u>Medium Ground clearance (1000MM – 2000 MM)</u>**

a. Base Plate – Base plate thickness of the Structure should be Minimum 6MM for this segment.
b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C- Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

**C. <u>Maximum Ground clearance (2000MM – 3000 MM)</u>**

a. Base Plate – Base plate thickness of the Structure should be minimum 8 MM for this segment.
b. Column – Structure Column thickness should be minimum 2.6MM in square hollow section (minimum 50x50) or rectangular hollow section (minimum 60x40)or 3MM in C-Channel section.
c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
e. Front/back bracing – The section for bracing part should be minimum 3MM thickness.

**D. <u>Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade Super elevated structure (More than 3000 MM)</u>**

**<u>Base structure</u>**

a. Base Plate – Base plate thickness of the Structure should be 10MM for this segment.
b. Column – Structure Column minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
c. Rafter - Structure Rafter minimum thickness should be minimum 2.9MM insquare hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
d. Cross bracing – Bracing for the connection of rafter and column should be of minimum thickness of 4mm L-angle with the help of minimum bolt diameter of 10mm.

**<u>Upper structure of super elevated structure</u> –**

a. Base Plate – Base plate thickness of the Structure should be minimum 5MM for this segment.

b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

If distance between two legs in X-Direction is more than 3M than sag angle/Bar should be provide for purlin to avoid deflection failure. The sag angle should be minimum 2 MM thick, and bar should be minimum 12Dia.

Degree - The Module alignment and tilt angle shell be calculated to provide the maximum annual energy output. This shall be decided on the location of array installation.

Foundation – Foundation should be as per the roof condition; two types of the foundation can be done- either penetrating the roof or without penetrating the roof.

a. If penetration on the roof is allowed (based on the client requirement) then minimum 12 MM diameter anchor fasteners with minimum length 100MM can be use with proper chipping. The minimum RCC size should be 400x400x300 cubic mm. Material grade of foundation should be minimum M20.
b. If penetration on roof is not allowed, then foundation can be done with the help of ‗J Bolt' (refer IS 5624 for foundation hardware). Proper Neto bond

solution should be used to adhere the Foundation block with the RCC roof. Foundation J - bolt length should be minimum 12MM diameter and length should be minimum 300MM.

**a) <u>Material standards:</u>**

- Design of foundation for mounting the structure should be as per defined standards which clearly states the Load Bearing Capacity & other relevant parameters for foundation design (As per IS 6403 / 456 / 4091 / 875).
- Grade of raw material to be used for mounting the structures so that it complies the defined wind loading conditions (As per IS 875 - III) should be referred as follows (IS 2062 – for angles and channels, IS 1079 – for sheet, IS 1161 & 1239 for round pipes, IS 4923 for rectangular and square hollow section)
- Test reports for the raw material should be as per IS 1852 / 808 / 2062 / 1079 / 811.
- In process inspection report as per approved drawing & tolerance should be as per IS 7215.
- For ascertaining proper welding of structure part following should be referred:
- D.P. Test (Pin Hole / Crack) (IS 822)
- Weld wire grade should be of grade (ER 70 S - 6)
- For ascertaining hot dip galvanizing of fabricated structure following should be referred: -
- Min coating required should be as per IS 4759 & EN 1461.
- Testing of galvanized material
- Pierce Test (IS 2633)
- Mass of Zinc (IS 6745)

- Adhesion Test (IS 2629)
- CuSO4 Test (IS 2633)
- Superior High-Grade Zinc Ingot should be of 99.999% purity (IS 209)(Preferably Hindustan Zinc Limited or Equivalent).
- Foundation Hardware – If using foundation bolt in foundation then it should be as perIS 5624.

b) Design Validation- The Structure design and drawing should be duly verified by a licensed Structural designer before installation for all types of structure arrangements including the extension made, as per specification.

### 3. JUNCTION BOXES(JBs)

**i.** The junction boxes are to be provided in the PV array for termination of connecting cables. The Junction Boxes (JBs) shall be made of GRP/FRP/Powder Coated aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JBs shall be such that input & output termination can be made through suitable cable glands. Suitable markings shall be provided on the bus-bars for easy identification and cable ferrules will be fitted at the cable termination points for identification.

**ii.** Copper bus bars/terminal blocks housed in the junction box with suitable termination threads Conforming to IP 65 or better standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry, Single /double compression cable glands should be provided.

**iii.** Polyamide glands and MC4 Connectors may also be provided. The rating of the junction box shall be suitable with adequate safety factor to interconnect the Solar PV array.

**iv.** Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

**v.** Junction boxes shall be mounted on the MMS such that they are easily accessible and are protected from direct sunlight and harsh weather.

### 4. DC DISTRIBUTIONBOARD:

i. May not be required for small plants, if suitable arrangement is available in the inverter.
ii. DC Distribution Box are to be provided to receive the DC output from the PV array field.
iii. DCDBs shall be dust & vermin proof conform having IP 65 or better protection, as per site conditions.
iv. The bus bars are made of EC grade copper of required size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the inverter along with necessary surge arrestors. MCB shall be used for currents up to 63 Amperes, and MCCB shall be used for currents greater than 63 Amperes.

## 5. AC DISTRIBUTION PANELBOARD:

i. AC Distribution Panel Board (DPB) shall control the AC power from inverter, and should have necessary surge arrestors, if required. There is interconnection from ACDB to mains at LT Bus bar while in grid tied mode.
ii. All switches and the circuit breakers, connectors should conform to IEC 60947:2019, part I,II and III/ IS 60947 part I, II and III.
iii. The isolators, cabling work should be undertaken as part of the project.
iv. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air -insulated, cubical type suitable for operation on *1-ϕ/3-ϕ*, 415 or 230 volts, 50 Hz (or voltage levels as per CEA/State regulations).
v. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
vi. All indoor panels will have protection of IP 54 or better, as per site conditions. All outdoor panels will have protection of IP 65 or better, as per site conditions.
vii. Should conform to Indian Electricity Act and CEA safety regulations (till last amendment).
viii. All the 415 or 230 volts (or voltage levels as per CEA/State regulations) AC devices / equipment like bus support insulators, circuit breakers, SPDs, Voltage Transformers (VTs) etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions.
    **i.** Variation in supply voltage: as per CEA/State regulations
    **ii.** Variation in supply frequency: as per CEA/State regulations

The inverter output shall have the necessary rated AC surge arrestors, if required and MCB/ MCCB. RCCB shall be used for successful operation of the PV system, if inverter does not have required earth fault/residual current protection.

## 3 Protections

The system should be provided with all necessary protections like earthing, Lightning, and Surge Protection, as described below:

### i. Earthing Protection

i. The earthing shall be done in accordance with latest Standards.
ii. Each array structure of the PV yard, Low Tension (LT) power system, earthing grid for switchyard, all electrical equipment, inverter, all junction boxes, etc. shall be grounded properly as per IS 3043-2018.
iii. All metal casing/ shielding of the plant shall be thoroughly grounded in accordance with CEA Safety Regulation 2010. In addition, the lightning arrester/masts should also be earthed inside the array field.
iv. Earth resistance should be as low as possible and shall never be higher than 5 ohms.
v. For 10 KW and above systems, separate three earth pits shall be provided for individual three earthings viz.: DC side earthing, AC side Earthing and Lightningarrestor earthing.

**ii. Lightning Protection**

i. The SPV power plants shall be provided with lightning & over voltage protection, if required. The main aim in this protection shall be to reduce the overvoltage to atolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array shall be suitably protected against Lightning by deploying required number of Lightning Arrestors (LAs). Lightning protection should be provided as per NFC17-102:2011/IEC 62305 standard.

ii. The protection against induced high-voltages shall be provided by the use of Metal Oxide Varistors (MOVs)/Franklin Rod type LA/Early streamer type LA.

iii. The current carrying cable from lightning arrestor to the earth pit should have sufficient current carrying capacity according to IEC 62305. According to standard, the minimum requirement for a lightning protection system designed for class of LPS III is a 6 $mm^2$ copper/ 16 $mm^2$ aluminum or GI strip bearing size 25*3 mm thick). Separate pipe for running earth wires of Lightning Arrestor shall be used.

**iii. Surge Protection**

i. Internal surge protection, wherever required, shall be provided.

ii. It will consist of three SPD type-II/MOV type surge arrestors connected from +ve and –ve terminals to earth.

## 6. INTEGRATION OF PV POWER WITH GRID:

The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, or low or high voltage, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes into service PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4 pole isolation of inverter output with respect to the grid/ DG power connection need to be provided.

## 7. CABLES

i. All cables should conform to latest edition of IEC/equivalent BIS Standards alongwith IEC 60227/IS 694, IEC 60502/IS 1554 standards.

ii. Cables should be flexible and should have good resistance to heat, cold, water, oil, abrasion etc.

iii. Armored cable should be used and overall PVC type _A' pressure extruded insulation or XLPE insulation should be there for UV protection.

iv. Cables should have Multi Strand, annealed high conductivity copper conductor on DC side and copper/FRLS type Aluminium conductor on AC side. For DC cabling, multi-core cables shall not be used.

v. Cables should have operating temperature range of -10°C to +80°C and voltage rating of 660/1000 V.

vi. Sizes of cables between array interconnections, array to junction boxes, junction boxes to Inverter etc. shall be so selected to keep the voltage drop less than 2% (DC Cable losses).

vii. The size of each type of AC cable selected shall be based on minimum voltage drop.However; the maximum drop shall be limited to 2%.

viii. The electric cables for DC systems for rated voltage of 1500 V shall conform to BIS17293:2020.

ix. All cable/wires are to be routed in a RPVC pipe/ GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable is easily

identified.

x. All cable trays including covers to be provided.

xi. Thermo-plastic clamps to be used to clamp the cables and conduits, at intervals not exceeding 50 cm.

xii. Size of neutral wire shall be equal to the size of phase wires, in a three phase system.

xiii. The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.

## 8. CONNECTIVITY

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the RERC regulation for Grid connectivity and norms of DISCOM and amended from time to time.

i. The maximum permissible capacity for rooftop shall be 1 MW for a single net metering point.

ii. Utilities may have voltage levels other than above, DISCOMS may be consulted before finalization of the voltage level and specification be made accordingly.

iii. For large PV system (Above 100 kW) for commercial installation having large load, the solar power can be generated at low voltage levels and stepped up to 11 kV level through the step up transformer. If the transformer is required, the cost of the same will be borned by beneficiary separately and will not be the part of project cost.

## 9. TOOLS & TACKLES ANDSPARES:

i. After completion of installation & commissioning of the power plant, necessary tools &tackles are to be provided free of cost by the bidder for maintenance purpose. List of tools and tackles to be supplied by the bidder for approval of specifications and make from REIL.

A list of requisite spares in case of PCU/inverter comprising of a set of control logic cards, IGBT driver cards etc. Junction Boxes. Fuses, MOVs /arrestors, MCCBs etc along with spare set of PV modules be indicated, which shall be supplied along with the equipment or can be maintained atSuccessful bidder end. A minimum set of spares shall be maintained in the plant itself or can be maintained at Successful bidder end for the entire period of warranty and Operation & Maintenance which upon its use shall be replenished.

## 10. DANGER BOARDS ANDSIGNAGES

Danger boards should be provided as and where necessary as per IE Act/IE rules as amended up to date. Three signage shall be provided one each at battery –cum- control room, solar array area and main entry from administrative block.

## 11. FIREEXTINGUISHERS:

The firefighting system for the proposed power plant for fire protection shall be consisting of:

a) Portable fire extinguishers in the control room for fire caused by electrical short circuits

b) Sand buckets in the controlroom

c) The installation of Fire Extinguishers should confirm to TAC regulations and BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the Roof or site where the PV arrays have beeninstalled.

## 12. DRAWINGS &MANUALS:

**i.** Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied to beneficiaries. Bidders shall provide complete technical datasheets for each equipment giving details of

the specifications along with make/makes in their bid along with basic design of the power plant and power evacuation, synchronization along with protection equipment. Approved ISI and reputed makes for equipment be used.

**13. PLANNING ANDDESIGNING:**

- The bidder should carry out Shadow Analysis at the site and accordingly design strings & arrays layout considering optimal usage of space, material and labor. The bidder should submit the array layout drawings along with Shadow Analysis Report to REIL for approval.
- REIL reserves the right to modify the landscaping design, Layout and specification of sub-systems and components at any stage as per local site conditions/requirements.
- The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The bidder submit three sets and soft copy in CD of final drawing for formal approval to proceed with construction work.

**14. DRAWINGS TO BE FURNISHEDBY BIDDER AFTER AWARDOF CONTRACT**

The Contractor shall furnish the following drawings /documents with each Power Plant.

i. O&M Manual/ User Manual
ii. General arrangement and dimensionedlayout
iii. Schematic drawing showing the requirement of SV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, metersetc.
iv. Structural drawing along with foundation details for thestructure.
v. Itemized bill of material for complete SV plant covering all the components and associatedaccessories.
vi. Layout of solar Power Array
vii. Shadow analysis of theroof

**15. SOLAR PV SYSTEM ON THE ROOFTOP FOR MEETINGTHE ANNUALENERGYREQUIREMENT**

The Solar PV system on the rooftop of the selected buildings will be installed for PV capacity permissible by Discom as per regulation issued by State Electricity Board/norms.

**16. SAFETYMEASURES:**

The bidder shall take entire responsibility for electrical safety of the installation(s) including connectivity with the grid and follow all the safety rules &regulations applicable as per Electricity Act, 2003 and CEA guidelines etc.

**Note: The Technical Standards for Grid Connected SPV Rooftop Plants are revised/updated time to time by Ministry of New and Renewable Energy, New Delhi, the same will also be applicable on issuance of revised / updated standards by MNRE.**

## QUALITY CERTIFICATION, STANDARDS AND TESTING FORGRID-CONNECTED ROOFTOPSOLAR PV SYSTEMS/ POWER PLANTS

Quality certification and standards for Grid-Connected Rooftop Solar PV Systems are essential for the successful mass-scale implementation of this technology. It is also imperative to put in place an efficient and rigorous monitoring mechanism, adherence to these standards. Hence, all components of Grid-Connected Rooftop Solar PV System/ Plant must conform to the relevant standards and certifications given below:

| | |
|---|---|
| **Surge Arrestors** | |
| BFC 17-102:2011 | Lightening Protection Standard |
| IEC 60364-5-53/ IS 15086-5 (SPD) | Electrical installations of buildings - Part 5-53: Selection and erection of electrical equipment - Isolation, switching and Control |
| IEC 61643-11:2011 | Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods |
| **Cables** | |
| IEC 60227/IS 694,<br>IEC 60502/IS 1554 (Part 1 & 2)/IEC69947<br>(as applicable) | General test and measuring method for PVC (Polyvinyl chloride)insulated cables (for working voltages up to and including 1100 V, and UV resistant for outdoor installation) |
| BS EN 50618 | Electric cables for photovoltaic systems (BT(DE/NOT)258),<br>mainly for DC Cables |
| **Earthing/ Lightning** | |
| IEC 62561 Series (Chemical earthing) (as applicable) | IEC 62561-1<br>Lightning protection system components (LPSC) - Part 1: Requirements for connection components IEC 62561-2<br>Lightning protection system components (LPSC) - Part 2:<br>Requirements for conductors and earth electrodes<br>IEC 62561-7<br>Lightning protection system components (LPSC) - Part 7:<br>Requirements for earthing enhancing compounds |
| **Junction Boxes** | |
| IEC 60529 | Junction boxes and solar panel terminal boxes shall be of the thermoplastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use |

| | |
|---|---|
| **Energy Meter** | |
| IS 16444 or as specified by the DISCOMs | A.C. Static direct connected watt-hour Smart Meter Class 1 and 2 - Specification (with Import & Export/Net energy measurements) |
| **Solar PV Roof Mounting Structure** | |
| IS 2062/IS 4759 | Material for the structure mounting |

Note- Equivalent standards may be used for different system components of the plants.

## SECTION- 6

## PAYMENT TERMS

The approved vender having Rate Contract with REIL will arrange installation of system.
After installation of system the vender will submit claim of payment with required documents. REIL officer/authorized person will verify the installed system as per conditions of the Rate Contract.

**i. Supply of BOS, Installation – Commissioning and 5 years warranty, Comprehensive operation & maintenance of Grid Connected SPV Power Plant.**

i. 50% Payment – After supply of complete material at site (in the scope of bidder) and submission of PDI Report, material receipt duly signed by customer / beneficiary/authorized agency.

ii. 40% Payment - Payment of contractor shall be released after successfully installation - commissioning of SPV Plant(s) and submission of commissioning certificate duly signed and stamped by the customer/REIL Engineer in -charge along with photographs of the installation with Beneficiary/customer/Authorized Agency & release of REIL payment against supply and I&C of systems. (10% payment shall be hold and release after successfully completion of 1$^{st}$ year O&M period)

iii. 10% Payment – 2% Payment shall be released at the end of each year for a period of 5 years. The year shall be started from the date mentioned in completion certificate from beneficiary / customer.

The Works related to SPV Power Plant shall be carried out by contractor during Defect liability period. REIL shall have rights to carried out the work during Defect liability at contractor's Risk and Cost in case of not performing the work by contractor within stipulated time period

## GENERAL TERMS & CONDITIONS OF THE CONTRACT

1) **AMENDMENT**
Except as otherwise provided herein, no addition, amendment to or modification of the Contract shall be effective unless it is in writing and signed by and on behalf of both parties.

2) **SEVERABREILITY**
In the event that any or any part of the terms conditions or provisions contained in the Contract shall be determined invalid, unlawful or unenforceable to any extent such term, condition or provision shall be served from the remaining terms, conditions and provisions that shall continue to be valid and enforceable to the fullest extent permitted by law.

3) **CONFIDENTIAL TREATMENT**
It is understood and agreed that data, know-how and other such proprietary information that was provided or will be provided by either party, will remain confidential.

4) **RELATIONSHIP OF THE PARTIES**
REIL relationship with Vendor will be that of a Business Associate, and nothing in this Contract shall be construed to create a relationship, joint venture, partnership.

5) **INDEMNITY**
REIL and the Vendor will indemnify, defend, and hold harmless each other and its divisions, successors, subsidiaries and affiliates, the assigned of each and their directors, officers, agents and employees from and against all liabilities, claims, losses, and damages of any nature, including, without limitation, all expenses (including attorney's fees), cost, and judgments incident there to REIL and REIL's obligations under this indemnity will survive the expiration, termination, completion or cancellation of this Contract or an order hereunder.

6) **FORCE MAJURE**
REIL and the Vendor shall not be under any liability to each other or to any other party in any way whatsoever for the destruction, damage, delay or any other matters of the nature arising out of reasons beyond the control of either party, including but not limited to a war, rebellion, civil commotion, strikes, lock-outs and industrial disputes; fire, explosion, earthquake, Act of God, flood, drought, bad weather, requisitioning or other act or order by any government department, council or other constituted body, and similar other reasons.

7) **RESTRICTIN ON EMPLOYMENT**
Both the parties have agreed that they will not recruit any members of staff of other party directly or indirectly.

8) **ARBITRATION**
All disputes arising out of this contract and questions relating to its interpretation etc. shall be referred to the contract committee headed by ED/GM and if not resolved shall be referred to the sole arbitration of Managing Director, Rajasthan Electronics & Instruments Ltd., for his decision, which shall be final and binding on both parties. The Venue of Arbitration proceedings shall be at Jaipur.

9) **RISK AND COST**
In the event of failure on the part of the contractor in the supply, installation and commissioning of goods and services, which is required in view of the pending orders, REIL shall be entitled to cancel the remaining order and procure the outstanding quantity through other sources at risk and costs of the contractor.

**10) TERMINATION OF CONTRACT:**

REIL shall be entitled to terminate this Contract, in the event of any or all or any of the following events, with a written notice of 15 days with due consent of the Vendor:-

i. has abandoned the Contract
ii. has without valid reason failed to complete the projects in respect of the contract.
iii. persistently fails to execute the Contract in accordance with the Contract or persistently neglects to carry out its obligations under the Contract without just and proper cause.

**11) DURATION OF CONTRACT**

This contract shall take effect on the day of execution of this contract and shall endure for the period of 5 year from date of commissioning and hand over the Power Plant(s) to beneficiary and renewable as per mutual agreement.

**12) GOVERNING LAW**

This contract and its validity, interpretation and performance will take effect and be governed under the laws of India. Venue in any action in law or equity arising from the terms and conditions of this contract shall be the court of appropriate jurisdiction in Jaipur, Rajasthan (India)

**13) PREFERENCE TO MSE**

Preference to MSE will be given and procurement from SC/ST and Women Entrepreneurs shall be done as per the government guidelines. Start Ups are exempted from condition of prior turnover and prior experience subject to meeting of quality and technical specifications.

**14) CONTRACT:**

Before execution of the work, security deposit be submitted and a contract agreement for execution of the work shall be signed by the Vendor with REIL within 7 days of LOI from REIL. In case agreement is not executed within the stipulated time, earnest money will be forfeited.

**15) FORCE MAJEURE:**

i. Notwithstanding the provisions contained in the Bidding Documents; the Contractor shall not be liable to forfeit (a) Bid Security for delay and (b) termination of contract; if it is unable to fulfill its obligation under this Contract due to force majeure conditions.
ii. For purpose of this clause, "Force majeure" means an event beyond the control of the Contractor and not involving the Contractor's fault or negligence and not foreseeable, either in its sovereign or contractual capacity. Such events may include but are not limited to Acts of God, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes etc. Whether a "Force majeure" situation exists or not, shall be decided by REIL and its decision shall be final and binding on the Contractor. REIL may extend the date of completion for a further period corresponding to the period of force majeure.
iii. If a force majeure situation arises, the Contractor shall notify REIL in writing promptly, not later than 7 (seven) days from the date such situation arises. The Contractor shall notify REIL not later than 3 days of cessation of force majeure conditions. After examining the cases, REIL shall decide and grant suitable additional time for the completion of the work, if required.

## 16) OTHER TERMS & CONDITIONS:

i Compliance with Regulations and Indian Standard:- All works shall be carried out in accordance with relevant regulations, both statutory & those specified by the Indian standard related to the works covered by this specification. In particular the equipment and installation will comply with the following:-

a. Work man's compensation act.
b. Minimum wages Act.
c. Payment wages Act.
d. Contact Labour regulation & abolition Act.
e. ESI, PF & Bonus Act.
f. Regulation under Indian Electricity Rules,
g. Safety & electrical Standard as applicable

i Watch & Ward:-

The Vendor shall supply material (including REIL SPV Modules) from his godown for installation work at site, shall continue to be responsible for their safe custody till they are installed in position, tested, commissioned and handed over to beneficiaries as per format provided by REIL.

iii Vendor shall arrange for compliance with statutory provision of safety regulation and departmental requirements of safety codes in respect of labour employed on the work by the Vendor. Failure to provide such safety requirements would make the Vendor liable for penalty. The department will make arrangement for the safety requirements at the cost of the Vendor & recover the cost thereof from him.

iv Company shall not be held liable or responsible for any illness and for physical harm sustained by the Vendor authorized representative during the execution of this agreement as they will not be deemed in any manner as employee of the company.

v The Vendor authorized representative shall take due care in handling the SPV system under this contract. Unwarranted activities, if found any, the company shall be authorized to recover the same from the Vendor.

vi Correction, over-writing and alteration should be initialed and dated by the Vendor otherwise the bid is liable to be rejected. The bid shall be typed or written in ink. Unit rates should be mentioned in the specified format failing which the bids are not likely to be considered.

vii All Vendors shall therefore, furnish declaration that their firm is not involved in any litigation that may have an impact of affecting or compromising the delivery if services as required under this assignment. It is also to be declared that their firm has not been black listed by any Central/State/ Public Sector Under takings in India. The declaration should be verified by the Notary Public.

viii The Vendor shall sign these conditions on each page at the end in token of acceptance of all the terms and it would be attached with the bid along with the declaration mentioned in above. He should also sign at the bottom of each of the pages of his bid to be submitted.

ix The company reserves the right to visit and inspect any site under this contract at any time and if defects are noted, payments may be stopped / recovered from Vendor. The company reserves the right to terminate this contract without giving any notice, if in the opinion of the company, the performance of the Vendor is not found satisfactory and according to terms stipulated by this contract.

x The company shall be fully absolved from the third party claims and damages during the execution of the contract.

xi All disputes arising out of this contract and questions relating to its interpretation etc. shall be referred to the sole arbitration of General Manager (RE), Rajasthan Electronics & Instruments Ltd., for his decision, which shall be final and binding on both parties.

xii The contract agreement shall be executed at Jaipur and shall be subject to Jaipur court jurisdiction alone.

xiii The company shall deduct the TDS as per the Income Tax Act.

xiv The Vendor shall be fully responsible for all repairs of the defects in maintenance during the period under contract.

**Annexure -IV**

**RAJASTHAN ELECTRONICS & INSTRUMENTS LIMITED, JAIPUR**

Authorization Certificate

To

Date

DGM (MM),

Rajasthan Electronics & Instruments Limited,

2, Kanakpura Industrial Area,

Jaipur-302034

Rajasthan

Dear Sir,

We M/s. ……..are authorizing M/s. …….. to submit tender document in reference to your tender no **REIL/RE/201-22/PP/083 dated ……** for Identification of rooftops/beneficiaries which includes Design, Supply of BoS, Storage, Civil work, Erection, Testing & Commissioning of the Grid-connected rooftop solar PV project including comprehensive Operation and Maintenance (O&M) of the project for a period of 05 years for CAPEX Model after commissioning of project.

On behalf of company ……

Name and Designation

Signed and sealed (who has signed the tender)

**Annexure -V**

# Maintenance Certificate

Date-

Name of Site:-
Location of Site:-
Capacity of SPV Power Plant:-
Type of SPV Power Plant :- Grid Connected
Contact Person:-

| S.NO. | DESCRIPTION | STATUS | | | REMARK |
|---|---|---|---|---|---|
| 1. | Nos. of SPV Modules & Capacity | | | | |
| 2. | Cleaning of Modules on Date…… | | | | |
| 3. | Nos. of String Inverter & Capacity | | | | |
| 4. | Sr. No. of String Inverter | | | | |
| 5. | Nos. of Strings | | | | |
| 6. | Nos. of Modules in each String | | | | |
| 7. | Vmp & Imp of Strings | Nos. | Vmp | Imp | |
| | | | | | |
| 8. | Reading of String Inverters | Power (kW) | E-Today (kWh) | Cumulative (kWh) | |
| | | | | | |
| | | | | | |
| 9. | Solar Meter Details<br>Sr. No.<br>Make | ……..kWh | | | |
| 10. | Net Meter Details<br>Sr.No.<br>Make | Import kWh | Export kWh | Net kWh | |
| | | | | | |
| 11. | If/Any | | | | |

It is certified that the Grid Connected SPV Power Plant Capacity of …….kWp at …… (Location) is working satisfactory.

Signature of REIL Signature of Beneficiary

**RAJASTHAN ELECTRONICS & INSTRUMENTS LIMITED, JAIPUR**

**Check List**

| Sr. No. | Required Documents | Remark |
|---|---|---|
| 1. | Sealed and signed process compliance form. (Annexure-I) | |
| 2. | Sealed and signed scope of work (Annexure-II) | |
| 3. | Sealed and signed General terms & conditions of tender (Annexure-III) | |
| 4. | Authorization certificate ( Annexure-IV) | |
| 5. | Maintenance certificate format for maintenance period (Annexure – V) | |
| 6. | Check list (Annexure -VI) | |

**Annexure C**

## Operation and Maintenance Guidelines of Grid Connected PV Plants

1. For the optimal operation of a PV plant, maintenance must be carried out on a regular basis.
2. All the components should be kept clean. It should be ensured that all the components are fastened well at their due place.
3. Maintenance guidelines for various components viz. solar panels, inverter, wiring etc. arediscussed below:

### SOLAR PANELS

Although the cleaning frequency for the panels will vary from site to site depending on soiling, it is recommended that

i. The panels are cleaned at least once every fifteen days.
ii. Any bird droppings or spots should be cleaned immediately.
iii. Use water and a soft sponge or cloth for cleaning.
iv. Do not use detergent or any abrasive material for panel cleaning.
v. Iso-propyl alcohol may be used to remove oil or grease stains.
vi. Do not spray water on the panel if the panel glass is cracked or the back side is perforated.
vii. Wipe water from module as soon as possible.
viii. Use proper safety belts while cleaning modules at inclined roofs etc.
ix. The modules should not be cleaned when they are excessively hot. Early morning is particularly good time for module cleaning.
x. Check if there are any shade problems due to vegetation or new building. If there are, make arrangements for removing the vegetation or moving the panels to a shade-free place.
xi. Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.
xii. Never use panels for any unintended use, e. g. drying clothes, chips etc.
xiii. Ensure that monkeys or other animals do not damage the panels.

### CABLES AND CONNECTION BOXES

i. Check the connections for corrosion and tightness.
ii. Check the connection box to make sure that the wires are tight, and the water seals are not damaged.
iii. There should be no vermin inside the box.
iv. Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged,replace the wire
v. If the wire is outside the building, use wire with weather-resistant insulation.
vi. Make sure that the wire is clamped properly and that it should not rub against any sharpedges or corners.
vii. If some wire needs to be changed, make sure it is of proper rating and type.

## INVERTER

i. The inverter should be installed in a clean, dry, and ventilated area which is separatedfrom, and not directly above, the battery bank.
ii. Remove any excess dust in heat sinks and ventilations. This should only be done with adry cloth or brush.
iii. Check that vermin have not infested the inverter. Typical signs of this include
iv. Spider webs on ventilation grills or wasps‘ nests in heat sinks.
v. Check functionality, e.g. automatic disconnection upon loss of grid power supply, at leastonce a month.
vi. Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

## SHUTTING DOWN THE SYSTEM

i. Disconnect system from all power sources in accordance with instructions for all othercomponents used in the system.
ii. Completely cover system modules with an opaque material to prevent electricity frombeing generated while disconnecting conductors.
iii. To the extent possible, system shutdown will not be done during daytime or peakgeneration.

## INSPECTION AND MAINTENANCE SCHEDULE:

| Component | Activity | Description | Interval | By |
|---|---|---|---|---|
| PV Module | Cleaning | Clean any bird droppings/ dark spots on module | Immediately | Beneficiary |
| | Cleaning | Clean PV modules with plain water or mild dish washing detergent. Do not use brushes, any types of solvents, abrasives, or harsh detergents. | Fortnightly or as per the site conditions | Beneficiary |
| | Inspection (for plants > 100kWp) | Use infrared camera to inspect for hot spots; bypass diode failure | Annual | Technician |

| Component | Activity | Description | Interval | By |
|---|---|---|---|---|
| PV Array | Inspection | Check the PV modules and rack for anydamage. Note downlocation and serialnumber of damaged modules. | Annual | User/Technician |
| | Inspection | Determine if any new objects, such as vegetation growth, are causing shading of the, array and move them if possible. | Annual | User/Technician |
| | Vermin Removal | Remove bird nests or Vermin from array and rack area. | Annual | User/Technician |
| Junction Boxes | Inspection | Inspect electrical boxes for corrosion or intrusion of water or insects. Seal boxes if required. Check position of switches and breakers. Chec k operation of all protection devices. | Annual | Electrician |
| Wiring | Inspection | Inspect cabling for signs of cracks, defects, loose connections, overheating, arcing, short or open circuits, and ground faults. | Annual | Electrician |
| Inverter | Inspection | Observe | Quarterly | Electrician |
| Compon e Nt | Activity | Description | Interval | By |

| | | | | |
|---|---|---|---|---|
| | | Instantaneous operational indicators on the faceplate of the inverter to ensure that the amount of power being generated is typical of the conditions. Inspect Inverter housing or shelter for physical maintenance, if required. | | |
| Inverter | Service | Clean or replace anyair filters. | As needed | Electrician |
| Instrume n ts | Validation | Spot-check monitoring instruments pyrano meter etc.) with standard instruments to ensure that they are operational and within specifications. | Annual | PV Specialist |
| Transfor mer | Inspection | Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc. | Annual | Electrician |
| Tracker (if present) | Inspection | Inspect gears, gear boxes,bearings as required. | Annual | Technician |
| | Service | Lubricate tracker mounting bearings, gearbox as required. | Bi-annual | Technician |
| Plant | Monitoring | Daily Operation and Performance Monitoring | Daily | Beneficiary |
| Inverter | Inspection | Observe instantaneo us operational indicators on the faceplate of the inverter to ensure that the amount of power being generate dis- typical of the conditions.<br><br>Inspect Inverter housing or shelter for physical maintenance, if required. | Quarterly | Electrician |

| | | | | |
|---|---|---|---|---|
| Inverter | Service | Clean or replace any air filters. | As needed | Electrician |
| Instrume n ts | Validation | Spot – check monitoring instruments (pyranometer etc.) with standard instruments to ensure that they are operational and within specifications. | Annual | PV Specialist |
| Transfor mer | Inspection | Inspect transformer oil level, temperature gauges, breather, silica gel, meter, connections etc. | Annual | Electrician |
| Tracker (if present) | Inspection | Inspect gears, gear boxes,bearings as required. | Annual | Technician |
| | Service | Lubricate tracke r mounting bearings ,gearbox as required. | Bi-annual | Technician |
| Plant | Monitoring | Daily Operation and Performance Monitoring | Daily | Beneficiary |
| Spare Parts | Managemen t | Manage inventory of spare parts. | As needed | Site in charge |
| Logbook | Documentat ion | Document all O&M activities in a workbook available to all service personnel | Continuo us | Site in charge |

**Operation and Maintenance Guidelines of Grid Connected PV Plants**

i. Periodic cleaning of solar modules, preferably once every fortnight. As this task has to be done by the beneficiary, the vendors shall apprise the beneficiary on the importance and proper technique for cleaning.

ii. O&M of Solar Power Plant shall be compliant with grid requirements to achieve committed energy generation.

iii. Periodic checks of the Modules, PCUs and BoS shall be carried out as a part of routine preventive and breakdown maintenance.

iv. Immediate replacement of defective Modules, Invertors/PCUs and other equipment as and when required.

v. Supply of all spares, consumables and fixtures as required. Such stock shall be maintained forall

associated equipment and materials as per manufacturer/ supplier‘s recommendations.

vi. All the equipment testing instrument required for Testing, Commissioning and O&M for the healthy operation of the Plant shall be maintained by the Bidder. The testing equipment must be calibrated once every 2 years from NABL accredited labs and the certificate of calibration must be kept for reference as required.

vii. If negligence/ mal operation on part of the Bidder's operator results in failure of equipment, such equipment should be repaired/ replaced by the Bidder free of cost.

viii. If any jobs covered in O&M Scope as per RFP are not carried out by the contractor/ Bidders during the O&M period, the Engineer-In-Charge shall take appropriate action as deemed fit.

ix. JAKEDA reserves the right to make surprise checks/ inspection visits at its own or through authorized representative to verify the O&M activities being carried out by the Bidder. Failure to adhere to above guidelines will result in penal action including debarring from participation in next tender

**Annexure J**

## Project Completion Report for Grid-Connected Rooftop

| | | | |
|---|---|---|---|
| Financial year * : | | | |
| Approval No. * : | | | |
| Proposal Title : | | | |
| Installed by agency : | | | |
| | | | |
| Title of the Project* : | | SPV Capacity (kWp)*: | |
| Category of the organization/ beneficiary*: | | Name of the contact person* : | |
| Address of contact person* : | | | |
| State* : | | District/City*: | |
| Mobile* : | | Email*: | |
| Aadhaar Card Number (For Residential) Copy to be attached. | | Latitude: | |
| | | Longitude: | |
| Other info | | | |
| Electricity Distribution Company Name : | | Sanction Load | |
| Electricity consumer account no. as per electricity bill : | | | |

| **Technology Description & System Design /Specification** | | | |
|---|---|---|---|
| **(Compliance to BIS/ IEC Standards is mandatory – Attach Copies)** | | | |
| 1. Solar PV Module: | | | |
| Power of each PV Module / Nos.(Wp)* / Make | | | |
| Cumulative Capacity of Modules(kWp): | | | |
| Solar cell technology : | | Tilt Angle of Modules: | |
| Module efficiency (in Percentage) : | | Azimuth | |
| Indigenous or imported | | RFID passed inside or outside: | |
| **2. Inverters:** | | | |
| Type of inverter : | | | |
| Power of each PCU/ Nos. of inverters (kVA)* / Make | | | |

| | | | |
|---|---|---|---|
| Capacity/Power of PCU/inverters (kVA) : | | Type of Charge Controller / MPPT | |
| Inverter efficiency (Full load) : (in percentage) | | | |
| Grid connectivity level phase | Single Phase/ Three Phase | Grid connectivity level Voltage | 230 V/ 415 V |
| **3. Mounting Structures** | | | |
| Type | | Surface Finish | |
| Material | | Wind Speed Tolerance | |
| **4. Cables:** | | | |
| DC Cable Make & Size | | Length: | |
| AC Cable Make & Size (Inverter to ACDB) | | Length: | |
| AC Cable Make & Size (ACDB to Electric Panel) | | Length: | |
| Conductor | Multi strand high conductivity Copper | Insulation/sheath | PVC /XLPE Insulated |
| **5. JUNCTION BOX & DISTRIBUTION BOARDS** | | | |
| Type | weatherproof, dust & vermin proof | Nos.: | |
| Make | | | |
| **6. EARTHING & LIGHTNING PROTECTION** | | | |
| EQUIPMENT EARTHING | | | |
| AC (Nos.) | | Earth Resistance | |
| DC (Nos.) | | Earth Resistance | |
| LIGHTNING ARRESTORS (LA) | | | |
| Type | | | |
| LA (Nos.) | | Earth Resistance | |

**Annex:** Copy of System test & Earth test reports (annexed)

**(Signature of Vendor)**

**With Stamp**