

PREMISES & ESTATE DEPARTMENT, SBI, LHO KOLKATA

INVITES ONLINE TENDER FOR

SUPPLY AND INSTALLATION OF ROOFTOP SOLAR POWER PLANT ON BANK’S OWN BUILDINGS – PROPOSED HYBRID TYPE OF SOLAR PLANT INSTALLATION WORKS AT SIX CENTRES LOCATED AT ANDAMAN & NICOBAR ISLANDS

Tender Submitted By:

Name of the Vendor:

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Address:.....

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GSTIN:..... **Date:**.....

Signature of Bidder with seal

**Assistant General Manager (P&E),
Premises & Estate Department,
9th Floor, “SAMRIDDHI BHAWAN”
State Bank of India, LHO KOLKATA,
1, STRAND ROAD, KOLKATA – 700 001,
WEST BENGAL.**

NOTICE INVITING TENDER

State Bank of India, Local Head office, Premises & Estate Dept. Kolkata invites two-bid online tenders for Supply, Installation, Testing & Commissioning of **8 KWp Roof Top Solar (PV) Power system with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank at Six sites (Portblair, Rangat, Mayabundar, Diglipur, Car Nicobar and Hut Bay) of SBI Branches located at Andaman and Nicobar Islands.** Tender will be called for quoting price for single 8KWp Hybrid Solar Plant unit and the same rate will be applicable for all six sites irrespective of location and distribution of works among L1 & L2 Vendors in the ratio 4:2, upon acceptance for execution of work at L1 rates by L2. In case, if L2 is not agreeing then all sites will be awarded to L1. Selection of sites among L1 & L2 will be decided by the Bank authorities. It is advised to visit the site before submitting the tender and the relevant cost of site visit shall be borne by the Vendor itself and no TA/DA will be paid. The other details of the tender are as under:

1	Scope of Work	<p>a) Supply, Installation, Testing and Commissioning of 8 KWp Roof Top Solar (PV) Power System (Mono C-Si PERC panel 545 watt or above) with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank with supply of suitable metal rack for placing Batteries (Batteries shall be of fully charged, not be more than three months older, and should mention Battery Sr. No., date, and year of manufacturing on each Batteries).</p> <p>b) Plant with SIM based remote monitor feature with one year recharge by vendor.</p> <p>c) Solar plate cleaning arrangement at rooftop with CPVC water pipe.</p> <p>d) Graph of hourly solar power generation, E-day, E-total (Kwh) solar power generation details on inverter LED display simultaneously must be available.</p> <p>e) For operation of load during shutdown or Breakdown of Inverter, Vendor is advised to supply a separate 100A Change Over Switch (COS) placed in a fabricated GI metal double door box made out of 16SWG GI sheet with powder coated and painted as per IE standards. The scope of work includes the cable connection work at COS, Inverter and Load.</p> <p>f) Vendor must provide free service maintenance for a period of 3 Years from the date of handing over as per the detailed scope of work in the technical specifications of Tender.</p>
2	Tenders shall remain valid for	90 days from the date of opening of tenders.
3	Time allowed for completion	45 days (including Sundays and Holidays) from the Date of Issue of the Work Order or the Site Handover Date, whichever is later.
4	Last date and time of submission of tender	2.00 PM on or before 21.02.2025
5	Date & Time of opening of Tender	3.00 PM on 21.02.2025 (In case the tender opening date is declared as holiday, the tender will be opened in the next working day at the same time)

6	Pre-Bid meeting	3.00 PM on 14.02.2025 Any queries related to Tender will be clarified on this day and the Venue will be: Premises & Estate Dept., 9th floor, Samriddhi Bhawan, #1, Strand Road, SBI, LHO, Kolkata-700001.
7	Estimated Amount for Single 8KWp Hybrid Solar Plant with Battery Backup	(Rs.9,76,000.00 + GST) x 6 No's
8	Earnest Money Deposit (EMD)	Rs. 59,000.00 (Rupees Fifty Nine Thousands only) (EMD for each site is Rs.9,800.00, so for all six sites is Rs.59,000.00) to be submitted in the form DEMAND DRAFT in FAVOUR " AGM (Premises & Estate), LHO, Kolkata and payable at Kolkata. Exempted for Micro and Small enterprises with uploading valid MSME/UDYAM registration certificate. EMD shall be kept within Envelope -1 (superscribed as Technical Bid) and shall be submitted Manually at Below address: Assistant General Manager (P&E), Premises & Estate Department,9th Floor, "SAMRIDDHI BHAWAN" State Bank of India, LHO KOLKATA, 1, STRAND ROAD, KOLKATA – 700 001, WEST BENGAL.
9	Eligibility Criteria	As mentioned below
10	Initial Security Deposit (ISD)	2% of contract value including EMD amount (without GST value) to be submitted in the form DEMAND DRAFT in FAVOUR " The AGM (Premises & Estate), LHO, Kolkata and payable at Kolkata . With-in 7 days from date of receipt of work order.
11	Security Deposit (SD)	a) 5% of contract value (without GST value) which shall be deducted from final bill. SD shall be released without interest after 60 months from date of COMMISSIONING subject to submission of satisfactory performance report and site handover report. b) Security deposit shall be forfeited, in case if Quarterly preventive checking not completed. Cleaning and preventive checklist duly signed by User (respective branch) to be submitted at this office timely after each service.
12	wats Liability period / Warranty period	The Solar PV Panels/ mechanical structures, power conditioners/ inverters/ charge controllers/ maximum power point tracker units and all allied equipment must be warranted against any manufacturing/ design/ installation defects for a period of 3 year from the date of completion (commissioning).
13	Liquidate Damages (LD)	0.5% per week subject to maximum 5% of contract value.
14	Place of opening of tender	The Asst. General Manager (P&E), 9th floor, Samriddhi Bhawan, #1, Strand Road, SBI, LHO, Kolkata-700001.
15	Contact person (SBI)	Manager (Electrical), Ph.9701472815 agmpre.lhokol@sbi.co.in

16	Availability of Tender Documents	Tender documents are to be downloaded from the Bank's website (www.sbi.co.in) or SBI e-Tender Portal www.tenderwizard.in/SBIETENDER
17	For e-Tender related queries	<p><u>Service provider :</u> M/s. Antares Systems Limited, Registered Office: #24, Sudha Complex, 3RD Stage, 3RD Block, Bangalore – 560079, Karnataka. Ph.: 080-49352000 / 40482000 Fax: 080-49352034 Help Desk: 9073677150 / 9073677151 / 9073677152 / 033 4604 6611 <u>Contact Persons:</u> <i>(On working days 9 AM to 6 PM)</i> 1. Mr.Kushal Bose Mobile No.: +91 7686913157 e-Mail: kushal.b@antaressystems.com 2. Mr. Siddhartha Mondal Mobile No.: +91 967460 8723 e-Mail: siddharthasundar.m@antaressystems.com</p>
18	To all Bidders for submission of Bids online	All the bidders are requested to ensure that they have a valid digital certificate well in advance to participate in the online event. All the Bidders are required to submit the Agreement Form (Annexure- I) duly signed to M/s Antares system Limited, Bangalore, before due date.
19	Terms and mode of payment	<p>No advance on materials / plant / machinery or mobilization advance shall be paid under any circumstances. Running Bills will be payable as stated below:</p> <p>i. 75% of total project cost against supply and installation of the solar plant on submission of test certificates with necessary documents showing requisite quality as mentioned in tender document.</p> <p>ii. 20% of total project cost against testing and commissioning following the submission of 1st month power generation report supported by the Hybrid solar inverter reading installed with the Solar Power Plant.</p> <p>iii. 5% of total project cost will be held with us as a Security Deposit for 5 years from the date of completion of work.</p> <p>iv. Payment shall be made by way of Electronic fund transfer and the bill will be paid by the SBI. Firm should furnish details of the bank, A/c no, IFSC code.</p> <p>v. Payments towards the above work shall be made by SBI. The GST Number of State Bank of India for K o l k a t a is 19AAACS8577K3ZK.</p>
20	Corrigendum	Corrigendum, if any, is to be followed as published in www.tenderwizard.in/SBIETENDER portal only.

21	Any additional Information	The estimated rates as per the Break-up Of Quantities (BOQ) uploaded in this tender are inclusive of materials, labour, wages, fixtures, transportation, installation, all taxes & charges, cost of the insurances as specified in the tender, cost towards testing of materials supplied, wastages, Octroi, machinery, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses to complete the work. However, GST on work value will be paid extra as applicable.
22	Distribution of work among L1 and L2 Vendors	Total six sites work will be distributed in the ratio of 4:2 among L1 and L2 Vendors, upon acceptance for execution of work at L1 rates by L2. In case, if L2 is not agreeing then all sites will be awarded to L1. Selection of sites among L1 & L2 will be decided by the Bank authorities.
23	Deduction of Income Tax and GST	A) TDS on Income Tax/GST will be deducted at source as per Govt. Guidelines. B) The contractor should comply with the following: i. Contractor should have GST Registration Number ii. Invoice should specifically/separately disclose the amount of GST levied at applicable rate as per GST provision iii. Contractor should timely file his GST return in accordance with GST provisions to enable the Bank to claim the credit of GST paid to the contractor.
24	Documents Required to be signed, scanned, and uploaded in the e-Tendering website during submission of Tender	<p>1. Signed & Stamped copy of all pages of Technical bid including Annexure-I.</p> <p>2. Declaration copy related reading, understanding and acceptance of all the pages of NIT</p> <p>No Hard copy of technical bid as well as price bid have to be submitted physically. Technical Bid as well as Price bid are to be submitted in online mode only. “Price bids of only successful bidders duly qualified in Technical scrutiny shall be opened “</p>
25	Any additional Information	The estimated rates as per the Break-up of Quantities (BOQ) uploaded in this tender are inclusive of materials, labour, wages, fixtures, transportation, installation, all taxes & charges, cost of the insurances as specified in the tender, cost towards testing of materials supplied, wastages, Octroi, machinery, temporary works such as scaffolding, cleaning, overheads, profit, statutory expenses, incidental charges and all related expenses to complete the work. However, GST on work value will be paid extra as applicable.

We strongly recommend the contractor to study the site condition & work scope of above-mentioned site before submitting the tender. The work shall be strictly executed as per the Bank's approved policy. Materials to be used for execution of the said work are to be approved by the bank prior to use. **State Bank of India has the right to accept / reject any / all tenders without assigning any reason.**

Sd/-

AGM (Premises & Estate)

IMPORTANT NOTES	
(a)	In case of any poor quality of work or substandard materials used for the purpose, shall be replaced as per instructions without any extra cost.
(b)	Any abnormal increase from the quoted price / cost in the tender will not be accepted.
(c)	The Bank reserves the right to reject any or all the tenders without assigning any reason whatsoever.
(d)	<p>Online Tenders are invited from the Eligible Bidders Part – I [Technical Bid] and Part – II [Price Bid], to be submitted online through the following portal: www.tenderwizard.in/SBIETENDER</p> <p style="text-align: center;">** Price Bid and technical bid shall not be accepted offline. Price Bid and technical bid can be submitted through online mode only *</p> <p>Part – I (Technical Bid): Technical Bid will be available online for downloading of documents in the portal as stated above including Annexure-I. and</p> <p>Part - II (Price Bid): This shall contain the Electronic format of Price Bid and shall submit the price in online. The contractors can view the Tender Opening Details through their respective log-in IDs on the above-mentioned e-Tendering Portal (Website).</p>
(e)	The Bidder is expected to examine all instructions, forms, terms and specifications in the bid documents. Failure to furnish all information required as per the Bid Documents or submission of bids not substantially responsive to the Bid Documents in every respect will be at the bidder's risk and shall result in rejection of the bid.
(f)	In case the date of opening of tenders is declared as a holiday, the tenders will be opened on the next working day at the same time. Again, corrigendum, if any, are to be followed from https://www.tenderwizard.com/ SBIETENDER.
(g)	No conditions other than mentioned in the tender will be considered, and if given they will have to be withdrawn before opening of the Price Bid.
(h)	Tenders submitted online without uploading " Signed & Stamped copy of all pages of Technical bid " shall be summarily rejected.
(i)	SBI has the right to accept / reject any / all tenders without assigning any reasons and no correspondence shall be entertained in this regard.
(k)	The intending bidders are to quote their offers item wise in all the items of price bid. If vendor fails to quote their price in any of the items of price bid, the price quoted by the vendor will be assumed as "Zero". Vendor will be bound to execute the work of the item & the work value of that item will be zero.
(l)	Contractors shall provide all labour and materials, tool and tackles including necessary scaffolding for proper execution of the work including curing etc.
(m)	5% of the value of the executed work will be retained as Security Deposit and will be refunded on satisfactory completion of Defect Liability Period from the date of completion of work. No interest shall be payable on Security Deposit.
(n)	Rates quoted shall be inclusive of providing necessary arrangements for satisfactory protection of furniture / flooring / electrical fittings / Bank's any other property during execution of the work.
(o)	Rates shall be inclusive of cost for disposing debris and any other unserviceable materials as per direction and inconformity with the Local or any other govt. authorities rules.
(p)	Rates shall be inclusive of cleaning of floors, making good to damaged floor, ceiling, walls, etc., after completion of work.

(q)	Apart from the above said, for operation of load during shutdown or Breakdown of Inverter , Vendor is advised to supply a separate 100A Change Over Switch (COS) placed in a fabricated GI metal double door box made out of 16SWG GI sheet with powder coated and painted as per IE standards. The scope of work includes the cable connection work at COS, Inverter and Load.
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Notes:-

- **Conditional tenders shall be summarily rejected.**
- **SBI reserves the rights to accept or reject any or all the tenders, either in part or whole without assigning any reason(s) for doing so and no claim/correspondence shall be entertained in this regard.**
- **Quantities are tentative and can increase or decrease the quantities of any item and contractor have to execute the same at the quoted rates.**

The Price bid should be submitted in online mode only as prescribed format given in our Service Provider's portal www.tenderwizard.in/SBIETENDER.

Yours Faithfully,

Sd/-

**Assistant General Manager (P&E)
SBI, P&E Dept., LHO Kolkata**

ELIGIBILITY CRITERIA

The following are the **Mandatory** eligible conditions:

1. The firm should be minimum **5 years old** as on **31st January 2025** and the copy of company's **certificate of registration** should be enclosed.
2. The applicant must have valid **PAN** and **GST No.**
3. Original Equipment Manufacturer / Authorized Dealers / Authorized Service Providers will be considered. The applicant should have sufficient number of technical and administrative employees. The applicant should submit a list of employees with contact details.
4. Wherever Authorised Distributors/service providers are submitting the bid, Authorisation Form /Certificate issued by the OEM/Original Service Provider pertaining to this work shall be submitted along with the details of OEM/Original Service Provider such as name, designation, address, e-mail Id and Phone No. are required to be furnished along with the bid. Failing to submit the above said will be treated as disqualified.
5. The applicant should have supplied similar rated capacity in PSU/ Nationalized Bank's/ State and Central Govt Organizations/ Insurance companies. The work order must be in the name of the applicant (OEM) and not through the dealers. The applicant must submit the completion certificate/ order copies from clients.
6. The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year (for FY 2021-22, 2022-23, 2023-24) must not be less than **17.50 lacs**. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period .
7. The applicant must have a valid digital certificate.
8. All pages of Technical Bid including Annexure-I, duly stamp and signed copy to be uploaded.
9. **Proof for Past Experience and Project Experience clause:** For fulfilling the experience criteria any one of the following documents may be considered as valid proof for meeting the experience criteria:
 - a. Contract copy along with Invoice(s) with self-certification by the bidder that service/supplies against the invoices have been executed.
 - b. Execution certificate / Completion certificate issued by client by mentioning the contract value and date of completion.
10. **Experience Criteria:** The Bidder or its OEM (themselves or through reseller(s)) should have regularly, manufactured, and supplied same or similar Category Products to any Central / State Govt Organization / PSU / Public Listed Company / Reputed Private Organisations. Copies of relevant contracts to be submitted along with bid in support of having supplied the items.

During the last **3 years** (from 01.02.2022 to 31.01.2025), executed successfully similar works individually costing as under, the cost shall be considered by excluding GST:

- (i) Three completed works of not less than 40% of estimated cost of Rs58.56Lacs (i.e Three single works shall be of **Rs.23.42Lacs** or above).

OR

(ii) Two completed work of not less than 50% of estimated cost each (i.e Two single works shall be of **Rs.29.28Lacs** or above).

OR

(iii) One completed work of not less than 80% of estimated cost (i.e Single work shall be of **Rs.46.84Lacs** or above).

Interested and eligible firms may submit the online applications dully filled with self-attested copies of all the necessary certificates and documents as per the enclosed checklist. The Bank reserves the right to accept or reject any or all applications without assigning any reason thereof.

TECHNICAL SPECIFICATIONS

1.1 INTRODUCTION:

In Hybrid - connected Solar Photo-Voltaic (SPV) systems, **solar energy is fed into the Battery Bank and then to building loads** that are connected to the public electricity grid through a service connection with surplus energy being fed into the grid and shortfall being drawn from the grid. **The Hybrid inverter should fulfill all technical requirements for grid connection, including the option to enable/disable export to the grid, preferred for off-Grid by disabling export to grid and enable option will be for future use.** Additionally, it should provide intentional islanding capabilities and have the facility to connect to a Battery Bank.

1.2 QUALITY AND WORKMANSHIP:

Solar PV modules are designed to last 25 years or more. It is therefore essential that all system components and parts, including the mounting structures, cables, junction boxes, distribution boxes and other parts also have a life cycle of at least 25 years. Therefore, all works shall be undertaken with the highest levels of quality and workmanship. During inspection of Bank Engineer and its representatives will pay special attention to neatness of work execution and conformity with quality and safety norms. Non-compliance works will have to be redone at the cost of the Installer.

1.21 SCOPE OF WORK

Online Tenders are invited for Design, Supply, Installation, Testing & Commissioning of individual- **8 KWp Roof Top Solar (PV) Power system with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank** at Six sites (Portblair, Rangat, Mayabundar, Diglipur, Car Nicobar and Hut Bay) of SBI Branches located at Andaman and Nicobar Islands under SBI Kolkata Circle.

1.22 SITE VISIT

The tenderer must obtain himself on his own responsibility and his own expenses all information and data which may be required for the purpose of filling this tender document and enter into a contract for the satisfactory performance of the work. The Tenderer is requested satisfy himself regarding the availability of water, power, transport and communication facilities, the character, quality and quantity of the materials, labour, the law-and-order situation, climatic conditions local authorities requirement, traffic regulations etc.

The tenderer will be fully responsible for considering the financial effect of any or all the factors while submitting his tender.

1.3 DEFINITION:

Hybrid Solar Rooftop Photo Voltaic (SPV) power plant with Battery Bank consists of SPV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Hybrid Inverter, Battery Bank and Controls & Protections, interconnect cables and switches. PV Array is mounted on a suitable structure. Components and parts used in the SPV power plants including the PV modules, metallic structures, cables, junction box, switches, PCUs 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 equipment's / components.

- Solar PV modules consisting of required number of **Mono C-Si PERC PV modules** with Linear performance warranty.
- Hybrid Inverter Unit shall be incorporated with 4G/5G SIM based Remote Monitoring System.
- Mounting structures.
- Junction Boxes.
- Earthing and lightning protections (both DC & AC sides).
- IR/UV protected PVC Cables, Pipes and accessories.
- Water pipeline with necessary pump etc. for cleaning of solar plates.
- Data acquisition system.

1.4 SOLAR PHOTOVOLTAIC MODULES:

1.4.1 The PV modules used must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards **Mono Perc C-Silicon** Solar Cell Modules IEC 61215/IS14286. In addition, the modules must conform to IEC 61730 Part-2-requirements for construction & Part 2 – requirements for testing, for safety qualification or equivalent IS.

- a) For the PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701/IS 61701.
- b) The total solar PV array capacity should not be less than allocated capacity (kWp) and should comprise of solar **Mono C-Si PERC** modules of minimum **545 watt or above** wattage. Module capacity less than minimum **545 watts** will not be accepted.
- c) Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.
- d) PV modules must be mandatorily tested and approved by one of the IEC authorized test centers.
- e) The module frame shall be made of corrosion resistant materials, preferably having anodized aluminum.
- f) The bidder shall carefully design & accommodate requisite numbers of the modules to achieve the rated power in his bid. Bank shall allow only minor changes at the time of execution.

1.4.2 **Other general requirement for the PV modules and subsystems shall be the Following:**

- a) The rated output power of any supplied module shall have tolerance of +/- 3%.
 - b) The peak-power point voltage and the peak-power point current of any supplied module and/or any module string (series connected modules) shall not vary by more than 2 (two) per cent from the respective arithmetic means for all modules and/or for all module strings, as the case may be.
 - c) The module shall be provided with a junction box with either provision of external screw terminal connection or sealed type and with arrangement for provision of by-pass diode. The box shall have hinged, weatherproof lid with captive screws and cable gland entry points or may be of sealed type and IP-65 rated.
 - d) IV curves at STC should be provided by bidder.
- 1.4.3 Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each modules (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).
- a) Name of the manufacturer of the PV module.
 - b) Name of the manufacturer of Solar Cells.
 - c) Month & year of the manufacture (separate for solar cells and modules).
 - d) Country of origin (separately for solar cells and module).
 - e) I-V curve for the module Wattage, I_m , V_m and FF for the module.
 - f) Unique Serial No and Model No of the module.
 - g) Date and year of obtaining IEC PV module qualification certificate.
 - h) Name of the test lab issuing IEC certificate.
 - i) Other relevant information on traceability of solar cells and module as per ISO 9001 and ISO 14001.

1.5. ARRAY/MODULE MOUNTING STRUCTURE:

In Case of Reinforced Concrete Roof:

- i. **Hot dip galvanized GI structures** shall be used for mounting the modules/ panels/arrays. Each structure will have angle of inclination as per the site conditions to take maximum insolation.
- ii. The Mounting structure must be Non-invasive Ballast Type and any sort of penetration of roof to be avoided. The design details are as follows:
 - a. The inclination of module should be within 10-15 degrees.
 - b. The upper edge of the module must be covered with wind shield so as to avoid bulk air ingress below the module. Slight clearance must be provided on both edges (upper & lower) to allow air for cooling.
- iii. The mounting structure should be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759.
- iv. The fasteners should be made up of stainless steel. The structures shall be designed

- to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels.
- v. The total load of the structure (when installed with PV modules) on the terrace should be less than 60 kg/m². The load shall be well distributed so that point loads are well within the limits.
 - vi. **The minimum clearance of the structure from the roof level should be in between 70- 150 mm.**
 - vii. The structures should be laid on the rooftop on weather resistant FRP mountings which should be non-penetrating type and proper drainage of rain water over terrace through the installation area should be maintained.
 - viii. The structures should be suitably loaded with reinforced concrete blocks of appropriate weight made out of M25 concrete mixture.
 - ix. Special care should be taken while designing all structures for modules to cater to heavy rainfall.
 - x. The array shall be located sufficiently inside the boundary wall of the terrace (parapet wall) and should not be projecting out. PV array shall be installed in the terrace space free from any obstruction and/or shadow. PV array shall be installed utilizing optimum terrace space to minimize effects of shadows due to adjacent PV panel rows.
 - xi. 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.
 - xii. Additional waterproofing shall be provided in the areas where RCC blocks are placed on the terrace.
 - xiii. The minimum clearance between lower edge of PV panel and terrace ground level shall be 150 mm to allow ventilation for cooling, also ease of cleaning and maintenance of panels as well as cleaning of terrace.
 - xiv. The PV array structure design shall be appropriate with a factor of safety of min. 1.5.
 - xv. Each array may be provided with two bird repellents spikes at a level higher than the upper edge of the array. The location of the spike should be selected for minimum shadow effect.
 - xvi. The support structure shall be free from corrosion when installed.
 - xvii. PV modules shall be secured to support structure using screw fasteners and/or metal clamps. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frames. Module fasteners/clamps shall be adequately treated to resist corrosion.
 - xviii. Adequate spacing shall be provided between any two modules secured on PV array for improved wind resistance.
 - xix. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.
 - xx. The structure should be appropriately designed to withstand high wind velocities up to **200 km per hour**. (The bidder is required to submit a certificate from an authorized chartered engineer with regards to the strength and durability of the structure)
 - xxi. **The total load of structure (when installed with PV modules) on the terrace should be less than 60 Kg/m². The load shall be well distributed, so that the point loads are well within the limits.**

In Case of Tin (Metal) / Asbestos Sheet Roof:

- i. **Hot dip galvanized GI structures or X-Long Rail U Cleat Structure or Similar suitable structure** shall be used for mounting the modules / panels / arrays as suitable to the existing structure of Building roof. Each structure will have angle of

inclination as per the site conditions to take maximum insolation.

1.6 JUNCTION BOXES (JBs):

- a. The junction boxes are to be provided in the PV array for termination of connecting cables. The J. Boxes (JBs) shall be made of GRP/FRP/Powder Coated Aluminum / cast aluminum alloy / PC with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cable lugs. The JB's shall be such that input & output termination can be made through suitable cable glands.
- b. Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single / double compression cable glands. Provision of earthing. It should be placed at 5 feet height or above for ease of accessibility.
- c. Each Junction Box shall have High quality Suitable capacity Metal Oxide Varistors (MOVs) /SPDs, suitable Reverse Blocking Diodes. Suitable earthing should be provided to SPD. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.
- d. 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.

1.7 DISTRIBUTION BOARD:

- i. Distribution panel to receive the DC output from the array field.
- ii. DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars are made of copper of desired size and suitable capacity.
 - a) Arrangement such as grouting, and calming should be provided to secure the installation against the specific wind speed. The vendor should provide concrete foundation 500mmx500mmx500mm to increase the strength. Non-invasive structures are recommended to avoid leakage in roof.
 - b) The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be complying of latest IS 4759.
 - c) Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection towards rusting need to be provided either by coating or anodization.
 - d) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels. Lay out should allow for easy access for panel cleaning.
 - e) Regarding civil structures the bidder need to take care of the load bearing capacity of the roof and need arrange suitable structures based on the quality of roof.
 - f) The total load of the structure (when installed with PV modules) on the terrace should be within permissible limit.
 - g) The minimum clearance of the structure from the roof level should be 300 mm.
 - h) CBs/MCCB shall be provided for controlling the DC power output to the PCU along with

necessary surge arrestors.

1.8 AC DISTRIBUTION PANEL BOARD:

a. Distribution Panel Board (DPB) shall control the AC power from PCU/ inverter and should have necessary surge arrestors. Interconnection from ACDB to mains at LT Bus bar while in grid tied mode.

b. All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS60947 part I, II and III.

c. The changeover switches, cabling work should be undertaken by the bidder as part of the project.

d. All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air - insulated, cubical type suitable for operation on three phase / single phase, 415 or 230 volts, 50 Hz.

e. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

f. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.

g. Should conform to Indian Electricity Act and rules (till last amendment).

h. All the 415 AC or 230 volts devices / equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

Variation in supply voltage	+/- 5 %
Variation in supply frequency	+/- 3 Hz

1.9. PCU/ ARRAY SIZE RATIO:

a) **Total Inverter capacity should be greater than or equal to the Rooftop Power Plant Capacity.**

b) **Maximum power point tracker shall be integrated in the PCU/inverter to maximize energy drawn from the array.**

1.10 PCU/ Inverter:

Hybrid Inverter

From Future Grid Connectivity Point of view it is proposed that a hybrid Inverter shall be utilized for Off Grid Solar Plant project. A Hybrid Solar PV power plant system comprises of C-Si (Crystalline Silicon) Solar PV modules with intelligent Inverter having MPPT technology and Intentional Islanding feature and associated power electronics, which feeds surplus generated AC power to the Grid and islands when the Grid is not available. During grid supply outage the system operates in off-grid mode using battery. Other than PV Modules and Inverters, the system consists of a Battery Bank, Module Mounting Structures, appropriate DC and AC Cables, Array Junction Boxes (AJB) / String Combiner Boxes (SCB), AC and DC Distribution Box, Lightning Arrester, Earthing Systems, etc.

The system should be capable for exporting surplus generated solar power into the Grid, whenever the Grid is available and islands/disconnect whenever the grid is not available. The Hybrid power plants shall be capable of giving a **Battery backup of 19000VAH**. The capacities of battery are defined above.

Note:-

1. The inverter KW rating shall be equal or more than the plant capacity in KW.
2. The Hybrid inverter, without grid connectivity, shall be capable of powering the load during the daytime through solar energy and at night via battery backup. The option for grid connectivity is reserved for potential future use. **However, the programming of Inverter may be changed as per the client requirement during commissioning of unit for opting preference for usage of source (Solar Power, EB Power & Battery Bank).**

Hybrid Inverter Specifications:

All the Inverters should contain the following clear and indelible Marking Label & Warning Label as per IS16221 Part II, clause 5. The equipment shall, as a minimum, be permanently marked with:

- a. The name or trademark of the manufacturer or supplier.
- b. A model number, name or other means to identify the equipment.
- c. A serial number, code or other markings allowing identification of manufacturing location and the manufacturing batch or date within a three-month time period.
- d. Input voltage, type of voltage (A.C. or D.C.), frequency, and maximum continuous current for each input.
- e. Output voltage, type of voltage (A.C. or D.C.), frequency, maximum continuous current, and for A.C. outputs, either the power or power factor for each output.
- f. The Ingress Protection (IP) rating.
- g. The Hybrid inverter output shall be 415 VAC, 50 Hz, 3 phase or 230 VAC, 50 Hz, 1 phase as per client requirement.
- h. The Hybrid inverter should fulfill all technical requirements for grid connection, **including the option to enable/disable export to the grid**. Additionally, it should provide intentional islanding capabilities and have the facility to connect to a Battery Bank.

The Hybrid inverter shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter's safe operating range due to internal or external causes. As SPV array produce direct current electricity, it is necessary to convert this direct current into alternating current and adjust the voltage levels to match the grid voltage. Conversion shall be achieved using an electronic Inverter and the associated control and protection devices. All these components of the system are termed the "Power Conditioning Unit (PCU)". In addition, the PCU shall also house MPPT (Maximum Power Point Tracker), an interface between Solar PV array & the Inverter, to the power conditioning unit/inverter. The Inverter output should be compatible with the grid frequency. Typical technical features of the inverter shall be as follows:

- Switching devices: IGBT.
- Control: Microprocessor /DSP.
- Nominal AC output voltage and frequency: 415V, 3 Phase, 50 Hz or 230 VAC, 50 Hz, 1 phase as per client requirement.
- Output frequency: 50 Hz.
- Grid Frequency Synchronization range: + 3 Hz or more.
- Ambient temperature considered: -20o C to 80o C.
- Humidity: 95 % Non-condensing.
- Grid Frequency Tolerance range: + 3 or more.
- Grid Voltage tolerance: - 20% & + 15 %.
- No-load losses: Less than 1% of rated power.
- Inverter efficiency (minimum): >93%.
- THD: < 3%.
- PF: > 0.95.

- a. Three phase PCU/ inverter shall be used with each power plant system (8KW and/or

above).

- b. PCU/inverter shall be capable of complete automatic operation including wake-up synchronization & shutdown.
- c. The output of power factor of PCU inverter is suitable for all voltage ranges or sink of reactive power, inverter should have internal protection arrangement against any sustainable fault in feeder line and against the lightning on feeder.
- d. Built-in meter and data logger to monitor plant performance through external computer shall be provided.
- e. The power conditioning units / inverters should comply with applicable IEC/ equivalent BIS standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683 and IEC 60068-2(1,2,14,30) /Equivalent BIS Std.
- f. The charge controller (if any) / MPPT units environmental testing should qualify IEC 60068-2(1, 2, 14, 30)/Equivalent BIS std. The junction boxes/ enclosures should be IP 65(for outdoor)/ IP 54 (indoor) and as per IEC 529 specifications.
- g. The PCU/ inverters should be tested from the MNRE approved test centers / NABL /BIS /IEC accredited testing calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses.
- h. Apart from the above said, for operation of load **during shutdown or Breakdown of Inverter**, Vendor is advised to supply a separate 100A Change Over Switch (COS) placed in a fabricated GI metal double door box made out of 16SWG GI sheet with powder coated and painted as per IE standards. The scope of work includes the cable connection work at COS, Inverter and Load.

1.11 **BATTERY- 19000VAH TGEL VRLA BATTERY BANK WITH METAL RACK:**

The Battery should be of TGEL VRLA type having capacity as motioned below at standard conditions. The battery Voltage & AH can be changed keeping the overall KVAH same. The voltage selection should be close to Vm of combinations of modules. The configuration of battery assembly should be as per requirement of capacity. The cell should be prismatic type having capacity not less than 100 Ah The other feature of the battery should be:

S. No.	Description	Specification
1.	Battery Configuration minimum cell capacity	19000VAH TGEL VRLA Battery Bank and number of batteries shall be dependent on the Battery specifications. However minimum Ah value of Battery should not be less than 100Ah.
2.	Working Temperature Range (both for charging & discharging)	0-55 Deg C
3.	Storage Temperature Range	@ 0-35 Deg- 6 months
4.	Cycle Life (Full charge to full discharge @ 25 deg C before capacity of battery falls below 70%)	≥ 6000 Cycles (25 deg C+ 2deg C, 0.5C/1C, 90% DOD 70%EOL)
5.	Battery Warranty	3 years.
6.	Protection	Battery bank protection panel shall be arranged

- **Suitable rack should be provided by the Vendor**

1.12 **DATA ACQUISITION SYSTEM / PLANT MONITORING:**

- i. Graphical representation of hourly solar power generation, with details of E-day, E- total

(Kwh) solar power generation details simultaneously on inverter LED display.

ii. Data Logging Provision for plant control and monitoring, time and date stamped system data logs for analysis with the high quality, Metering and Instrumentation for display of systems parameters and status indication to be provided.

iii. Data from the inverter shall be uploaded to internet via sim card based device. The monitoring details with login ID and password should be shared with the Bank.

iv. The following parameters are accessible via the operating interface display in real time separately for solar power plant.

1. AC Voltage.
2. AC Output current.
3. Output Power.
4. Power factor.
5. DC Input Voltage.
6. DC Input Current.
7. Time Active.
8. Time disabled.
9. Time Idle.
10. Power produced
11. Protective function limits (Viz-AC Over voltage, AC Under voltage, Over frequency, Under frequency ground fault, PV starting voltage, PV stopping voltage).

v. All major parameters available on the digital bus and logging facility for energy auditing through the internal microprocessor and read on the digital front panel at any time) and logging facility (the current values, previous values for up to a month and the average values) should be made available for energy auditing through the internal microprocessor and should be read on the digital front panel.

vi. Remote Monitoring and data acquisition through Remote Monitoring System software at the Bank location with latest software/hardware configuration and service connectivity for online /real time data monitoring/control complete to be supplied and operation and maintenance/control to be ensured by the supplier. Provision for interfacing these data on [NAME OF THE ORGANISATION] server and portal in future shall be kept.

1.13 POWER CONSUMPTION:

Regarding the generated power consumption, priority need to give for internal consumption first and thereafter any excess power can be exported to grid. Decisions of appropriate authority like DISCOM, state regulator may be followed.

1.14 PROTECTIONS:

The system should be provided with all necessary protections like earthing, Lightning, and grid islanding as follows:

1.14.1 LIGHTNING PROTECTION:

The SPV power plants shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable 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. Lightning protection should be provided as per IEC 62305 standard. Lightening conductor should be made of 25 mm dia 4000mm long GI spike as per Provision of IS 2309-1969. Necessary concrete foundation to be provided for holding Lightning conductor considering the wind speed. It should be earthed through 20x3 GI flat from pit with proper insulation. Height of Lightening conductor from array structure should be min 4 meter.

1.14.2 SURGE PROTECTION:

Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and –ve terminals to earth (via Y arrangement)/ SPD (type II). SPD should be provided in AC and DC side of solar PV system. It should have protection voltage of 2.5kv and nominal discharge current of 5kA (8/20) micro sec. SPD earthing terminals should be connected to earthing system. **Minimum one Copper plate earth pit to be provided for both Lightning and Surge Protection as per relevant IS code.**

1.14.3 EARTHING PROTECTION:

- a. Each array structure of the PV yard should be grounded/ earthed properly as per IS: 3043-1987. In addition, the lightning arrester/masts should also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of Bank engineer as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB should also be earthed properly. **Minimum 02 Nos. of GI pipe earth pit to be provided as per relevant IS code.**
- b. Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earthing points are bonded together to make them at the same potential.

1.15. Grid Islanding:

- a. In the event of a power failure on the electric grid, it is required that any independent power-producing inverters attached to the grid turn off in a short period of time. This prevents the DC-to-AC inverters from continuing to feed power into small sections of the grid, known as “Is- lands.” Powered islands present a risk to workers who may expect the area to be unpowered, and they may also damage grid-tied equipment. The Rooftop PV system shall be equipped with islanding protection. In addition to disconnection from the grid (due to islanding protection), dis- connection due to under and over voltage conditions shall also be provided.
- b. A manual disconnect 4pole isolation switch (MCB/ MCCB) as per max inverter output current beside automatic disconnection to grid would have to be provided at utility end to isolate the grid connection by the utility personnel to carry out any maintenance. This switch shall be locked by the utility personnel.

1.16 CABLES:

Cables of appropriate size to be used in the system shall have the following characteristics:

- i. Shall meet IEC 60227/IS 694, IEC 60502/IS1554 standards.
- ii. Temp. Range: –10oC to +80oC.
- iii. Voltage rating 660/1000V.
- iv. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation Flexible.
- v. Sizes of cables between 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. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use.

Cable Routing/ Marking: All cable/wires are to be routed in a GI cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified.

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

The ratings given are approximate. Bidder to indicate size and length as per system design requirement. All the cables required for the plant provided by the bidder. Any change in cabling sizes if desired by the bidder/approved after citing appropriate reasons. All cable schedules/layout drawings approved prior to installation.

Multi Strand, Annealed high conductivity copper conductor PVC type A pressure extruded insulation or XLPE insulation. Overall PVC/XLPE insulation for UV protection Armoured cable for underground laying. All cable trays including covers to be provided. All cables conform to latest edition of IEC/ equivalent BIS Standards as specified below: BoS item / component Standard Description Standard Number Cables General Test and Measuring Methods, PVC/XLPE insulated cables for working Voltage up to and including 1100 V, UV resistant for outdoor installation IS /IEC 69947.

The size of each type of DC selected shall be based on minimum voltage drop however the maximum drop shall be limited to 1%. 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%.

1.17 TOOLS & TACKLES AND SPARES:

Operation and maintenance guide and consumable spares like fuses should be provided by vendor.

1.18 DANGER BOARDS AND SIGNAGES:

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. Text of the signage may be finalized in consultation with Bank.

1.19 DRAWINGS & MANUALS:

Two sets of Engineering, electrical drawings and Installation and O&M manuals are to be supplied. Bidders shall provide complete technical data sheets 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.

- I. Approved ISI and reputed makes for equipment be used.
- II. For complete electro-mechanical works, bidders shall supply complete design, details and drawings for approval to Bank before progressing with the installation work.

1.20 PLANNING AND DESIGNING:

- i. The bidder should carry out the considering optimal usage of the space, material & labour. The bidder should submit the array layout, drawings along with shadow analysis report to Bank for approval. Bidders should submit detailed SLD for approval.
- ii. Bank reserves right to change/modify sub-systems and components at any stage as per the local site conditions/ requirements.

iii. The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any. The bidder shall submit three sets and soft copy in CD of final drawing for formal approval to proceed with installation work.

1.21 DRAWINGS TO BE FURNISHED BY BIDDER AFTER AWARD OF CONTRACT:

- i. The Contractor shall furnish the following drawings Award/Intent and obtain approval.
- ii. General arrangement and dimensioned layout Schematic drawing showing the requirement of SV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, meters etc. Structural drawing along with foundation details for the structure.
- iii. Itemized bill of material for complete SV plant covering all the components and associated accessories.
- iv. Layout of solar Power Array.

ARTICLES OF AGREEMENT

This AGREEMENT is made at on this day of..... between SBI, a body Corporate created under SBI Act 1955, having its Corporate Centre at State Bank Bhavan, Madame Cama Road, Mumbai 400 021 and one of the Circle office at #1, STRAND ROAD, KOLKATA – 700 001, WEST BENGAL, represented by authorized officer of SBI. (hereinafter called “the Employer”) on the one part and M/s _____ (proprietorship/partnership firm/Company), incorporated under the provisions of the Companies Act and having its registered office at _____ (hereinafter called “the Vendor”) represented by Shri who is authorized to enter this agreement by its Board of Directors on the other part.

AND WHEREAS the Employer has intention of engaging an empaneled Solar Power System vendor of SBI for execution of **Design, Supply, Installation, Testing & Commissioning of 8 KWp Roof Top Solar (PV) Power system with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank at Six sites (Portblair, Rangat, Mayabundar, Diglipur, Car Nicobar and Hut Bay) of SBI Branches located at Andaman and Nicobar Islands.**

AND WHEREAS the Employer had called for tenders from empaneled vendors of SBI across PAN INDIA for the proposed work as indicated in the scope of work and other documents attached to the tender.

AND WHEREAS the Vendor and others submitted the tenders and the Employer has awarded the contract relating to “**Design, Supply, Installation, Testing & Commissioning of 8 KWp Roof Top Solar (PV) Power system with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank at Six sites (Portblair, Rangat, Mayabundar, Diglipur, Car Nicobar and Hut Bay) of SBI Branches located at Andaman and Nicobar Islands**” as stated in the scope of work attached to the Tender Document to the Vendor.

AND WHEREAS both the parties to this agreement are desirous of recording the terms and conditions upon which the said services are to be rendered by the Vendor.

NOW IT IS HEREBY AGREED AS FOLLOWS:

1. In consideration of the said Contract Amount to be paid at the times and in the manner set forth in the said Conditions, the Contractor shall upon and subject to the said Conditions execute and complete the work shown upon the said Drawings and described in the said Specifications and the priced Schedule of Quantities.
2. The Employer shall pay to the Contractor the said Contract Amount, or such other sum as shall become payable, at the times and in the manner specified in the said Conditions.
3. The said Conditions and Appendix thereto shall be read and construed as forming part of this Agreement, and the parties hereto shall respectively abide by submit themselves to the said Conditions and perform the Agreements on their part respectively in the said Conditions contained.
4. The Plans, Agreements and Documents mentioned herein shall form the basis of this Contract.
5. This Contract is neither a fixed lump-sum contract nor a piece work contract but a contract to carry out the work as per enclosed schedule of Items and to be paid for according to actual measured quantities at the rates contained in the Schedule of Quantities or as provided in the said Conditions and approved by the SBI.
6. The Contractor shall afford every reasonable facility for the carrying out of all works relating to

Design, Supply, Installation, Testing & Commissioning of 8 KWp Roof Top Solar (PV) Power system with Hybrid Inverter of 48VDC (or as per manufacturer standards) with power backup of 19000VAH TGEL VRLA Battery Bank at Six sites (Portblair, Rangat, Mayabundar, Diglipur, Car Nicobar and Hut Bay) of SBI Branches located at Andaman and Nicobar Islands, in the manner laid down in the said Conditions, and shall make good any damages done to walls, floors, etc. after the completion of this work.

7. The Employer reserves to itself the right of altering the drawings and nature of the work by adding to or omitting any items of work or having portions of the same carried out without prejudice to this Contract.

8. Time shall be considered as the essence of this Contract and the Contractor hereby agrees to commence the work soon after the Site is handed over to him or from 7th day after the date of issue of formal work order as provided for in the said Conditions whichever is later and to complete the entire work within 45 days subject to nevertheless the provisions for extension of time.

9. All payments by the Employer under this Contract will be made by State Bank of India.

10. All disputes arising out of or in any way connected with this Agreement shall be deemed to have arisen at Kolkata and only the Courts in Kolkata shall have jurisdiction to determine the same.

11. That the several parts of this Contract have been read by the Contractor and fully understood by the Contractor.

IN WITNESS WHEREOF THE EMPLOYER and the Contractor have set their respective hands to these presents and two duplicates hereof the day and year first hereinabove written.

SIGNATURE CLAUSE

SIGNED AND DELIVERED by the

_____ By the (Employer)

Shri

.....

(Signature of Employer)

(Name and Designation)

In the presence of :

Shri / Smt

(Signature of Witness)

Address

.....

(Witness)

SIGNED AND DELIVERED by the

(Contractor)

(Signature of Contractors)

in the presence of :

Shri / Smt.

(Signature of Witness)

Address.....

1.22 Safety - 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.

QUALITY CERTIFICATION, STANDARDS AND TESTING FOR HYBRID ROOFTOP SOLAR PV SYSTEMS/ POWER PLANTS

Quality certification and standards for Hybrid rooftop solar PV systems are essential for the implementation of this technology. Hence, all components of Hybrid rooftop solar PV system/ plant must conform to the relevant standards and certifications given below:

Solar Monocrystalline PV Modules/ Panels	
IEC 61215/ IS 14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
IEC 61646 / Equivalent IS (Under Dev.)	Thin Film Terrestrial PV Modules
IEC 62108	Concentrator PV Modules & Assemblies
IEC 61701	Salt Mist Corrosion Testing of Photovoltaic (PV) Modules
IEC 61853- Part 1/ IS 16170: Part 1	Photovoltaic (PV) module performance testing and energy rating –: Irradiance and temperature performance measurements, and power rating
IEC 62716	Photovoltaic (PV) Modules – Ammonia (NH ₃) Corrosion Testing (As per the site condition like dairies, toilets)
IEC 61730-1,2	Photovoltaic (PV) Module Safety Qualification – Part 1: Requirements for Construction, Part 2: Requirements for Testing
Solar PV Inverters	
IEC 62109-1, IEC 62109-2	Safety of power converters for use in photovoltaic power systems – Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems; Part 2: Particular requirement for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Is-landing Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 / IEC 62093 (as applicable)	Environmental Testing of PV System – Power Conditioners and Inverters
Fuses	

IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): a) Low-voltage Switchgear and Control-gear, Part 1: General rules b) Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers c) Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units d) EN 50521: Connectors for photovoltaic systems – Safety requirements and tests
IEC 60269-6	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems
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, IEC 60502/IS 1554 (Part 1 & 2)/ IEC69947 (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 (BT(DE/NOT)258)	Electric cables for photovoltaic systems mainly for DC Cables
Earthing/ Lightning	
IEC 62561	Series (Chemical earthing) (as applicable)
IEC 62561-1	Lightning protection system components (LPSC) - Part 1: Requirements for connection components
IEC 62561-2	Lightning protection system components (LPSC) - Part 2: Requirements for conductors and earth electrodes
IEC 62561-7	Lightning protection system components (LPSC) - Part 7: Requirements for earthing enhancing compounds
Junction Boxes	
IEC 60529 IEC 529	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
IEC 62548	PV arrays – Design requirements

APPROVED MAKE

1	Solar PV modules (mono crystalline only)	Vikram Solar/ Waaree Solar/ Goldi Green Technologies/ Tata Power Solar Systems Ltd./ BEL/ BHEL/ Renewsys / REIL/ Adani/Blue Bird or equivalent MNRE ALMM approved
2	Inverters:	Statcon / Fuji / Power one / DELTA/ SMA / Deye/ Radius /Solar age /Polycab/ k solare/ Sungrow/Growatt or equivalent BIS approved / relevant IEC approved / MNRE Approved
3	DC cables	Havells/ Polycab/ KEI /Finolex/L&T/ KEI/ KEC/ UNIVERSAL / NICCO Equivalent
4	AC Distribution Board	Legrand/Schneider/ MDS/Hager/L&T/ABB or Equivalent BIS approved
5	DC Distribution Board	Legrand/Schneider/ MDS/ Hager/ L&T/ABB or Equivalent BIS approved
6	LV Switchgear	ABB/L&T/Schneider/ MDS or Equivalent approved
7	String Combiner Box	Robotina/Trinity Touch/Hensel/Cape Electric, AKG or Equivalent BIS approved
8	Weather Monitoring station	Pyranometer: Kipp & Zonnen or Equivalent
9	Energy Meter	Secure/L&T/Schneider/ABB or Equivalent
11	Connectors	MC4/or Equivalent
12	Surge protection (SPD)	MDS/ L&T/ Hager/ Schneider/ABB/Legrand/HPL or Equivalent
13	Solar Charge Controller	Morningstar/ Schneider/ Blue Sky/ Genasun/ Midnite Solar/ Outback Power/ Magnum Energy or Equivalent
14	Batteries	Deye/ Waaree/ Exide/ Luminous/ Amar Raja/ Okaya/ HBL/ NED/ MNRE Approved
<p>Important: Please Tick (/) the make of materials considered in the Tender. The vendor has to comply with all State & Central Government norms for choosing the make, supply and erection.</p>		

Note: -

1. The contractor should obtain prior approval from SBI before placing order for any specific materials. All materials should conform to relevant standards and codes of BIS. Materials with I.S.I. mark shall be used duly approved by the SBI Engineer.
2. Any material is found to be not up to the mark, the contractor will have to produce original bills/certificate from the manufacturer or his authorized Distributor for authenticity and genuineness of the material for consideration and as per make approved by the SBI. The same will not be considered for payment.

Signature of contractor With Seal