

TECHNICAL SPECIFICATIONS OF 10KWp GRID TIED WITHOUT BATTERY SOLAR PVPOWERPLANT

The Solar Photovoltaic Power Plant consists of SPV Array, Module Mounting Structure, Solar Grid Tied Inverter consisting of Maximum Power Point Tracker (MPPT), Control & Protections , inter connection cables, Junction Boxes, switches etc.

Entire Power generated from Solar PV is directly fed into the utility grid through NET metering. In case of grid disturbance or grid failure, the Solar PV array has no way of providing power, the Inverter will automatically disconnect itself from the conventional Grid (Anti-Islanding protection). The power generated from the solar PV system shall be used for captive electrical consumption of bank building and the contractor shall be responsible for Liaoning for installation of NET meter. Any expenses for installation of NET Meter shall be payable extra by the owner/bank.

All the components of the Power Plant should confirm to MNRE, Govt. of India, latest BIS, IEC or international specifications wherever such specifications are available and applicable.

Bidders are advised to visit and survey the site at their own interest to estimate the site conditions and accordingly bid.

The proposed 10kWp Grid tied solar PV system with-out Battery Back-up shall consist of:

1.SOLAR PHOTOVOLTAIC MODULE:

1.1	Type of material	Poly/Multi crystalline Silicon
1.2	Make of Module	Reputed
1.3	Country	India
1.4	IEC/equivalent Standards	BIS a) The PV Modules must conform to the latest edition of the IEC/equivalent BIS Standards for PV Module design qualification and type approval: IEC 61215/IS14286. b) In addition, the modules must conform to IEC61730 Part1-requirements for construction & Part 2-requirements for testing for safety qualification or Equivalent IS (Under Dev.).
1.5	Cell of efficiency	>12-13% and should give good performance at the local isolation level.
1.6	Rating of individual module	≥ 300 Wp
1.7	PV Array Capacity	Minimum 10KWp
1.8	Solar Module frame material	Corrosion resistant materials, preferably anodized Aluminum.
1.9	Protection devices	a) Against surges hold be provided b) Low voltage drop by-pass diode should be provided.
1.10	Junction Box	The module should be provided with 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, weather proof lid with captive screws and cable gland entry points or may be sealed type and should confirm IP65 enclosure.
1.11	IV Curve under STC	Should be laminated at the back side of the module.
1.12	Identification traceability:	& As trip containing the following details should Be laminated inside the module so as to be clearly visible from the front side: a) Name of the Manufacturer or distinctive Logo b) Model or Type No. c) Serial No. d) Year of make.

1.13	RFID	<p>In addition, each SPV module should have a RF Identification(RFID)tag containing following information inside the module laminate:</p> <ul style="list-style-type: none"> a) Name of the manufacturer of PV Module b) Name of the Manufacturer of Solar cells c) Month and year of the manufacture (separately for solar cells and module) d) Country of origin(separately for solar cells and module) e) I-V curve for the module f) Peak Wattage, I_m, V_m and FF for the module g) Unique Serial No and Model No of the module h) Date and year of obtaining IECPV module qualification certificate i) Name of the test lab issuing IEC certificate j) Other relevant information on traceability of solar cells and module as per ISO9000 series.
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2. JUNCTION BOXES (JBs):

- 2.1. The junction boxes are to be provided (Only in case the features are not inbuilt inside the Inverter) in the PV array for termination of connecting cables. The JB's shall be made of GRP/FRP/Powder Coated Aluminum /cast aluminum alloy 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. Single/ double compression cable glands should be used.
- 2.2. Copper bus bars /terminal blocks housed in the JB with suitable Termination threads conforming to IP65 standard and IEC62208 Hinged door with EPDM rubber gasket to prevent water entry. Provision of earthings should be provided. It should be placed at 5 feet height or above for ease of accessibility.
- 2.3. Each Junction Box shall have High Quality suitable capacity Metal Oxide Varistors (MOVs)/SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups.
- 2.4. 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.
- 2.5. All fuses shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

3. ARRAY / MODULE MOUNTING STRUCTURE:

3.1	Make	Reputed
3.2	Country of origin	India
3.3	Location	RCC Roof mounting
3.4	Materials & Hardware	a) Hot dip galvanized MS mounting structures shall be used for mounting the modules /panels/arrays. Each structure should have

		<p>Angle of inclination as per the site conditions to Take maximum solar isolation. Alternatively, aluminum structure specially designed and manufactured by an experienced company for solar module mounting can be used which can with stand the mentioned wind speed.</p> <p>b) The mounting structure & foundation shall be so designed to withstand the wind speed of maximum 150 Km per hour. It may be ensured that the design has been certified by a recognized lab/Institution in this regard. Suitable fastening arrangement such as grouting and clamping should be provided to secure the installation against the specific wind speed.</p> <p>c) The mounting structure steel should be as per latest IS 2062:1992 and galvanization of the mounting structure should be in compliance with latest IS 4759.</p> <p>d) Structural material shall be corrosion resistant and electrolytic ally compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection to wards rusting need to be provided either by coating or ionization.</p> <p>e) The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module.</p> <p>f) 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. However, grouting of the structure should be made with 1:2:4 (1 cement:2 river sand:4 Jhamabrick/stone aggregate of 20mm nominal size) cement concrete of size not less than 500mm X 500mm X 500mm.</p> <p>g) The minimum clearance of the structure from the roof level after mounting the Solar modules should be 300 mm from ground/roof. The existing foundations shall have to be used without harming the roof.</p> <p>h) The array structure shall be grounded properly using maintenance free earthing kit suitable for mounting over building terrace/ground.</p>
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4. AC DISTRIBUTION BOARD (ACDB):

- 4.1. AC Distribution Panel Board (DPB) shall control the AC power from PCU/Inverter, and should have necessary surge arrestors etc.
- 4.2. Suitable capacity MCBs/MCCB shall be provided for controlling the AC power output along with necessary surge arrestors.
- 4.3. All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/ IS 60947 part I, II and III
- 4.4. The changeover switches, cabling work should be under taken by the bidder as part of the project.

- 4.5. All the Panel's shall be metal clad, totally enclosed , rigid, floor/ wall mounted, air-insulated, cubical type suitable for operation on single phase,230volts,50Hz.
- 4.6. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius,80 percent humidity and dusty weather.
- 4.7. All indoor panels will have protection of IP54 or better. All outdoor panels will have protection of IP65 or better.
- 4.8. Should conform to Indian Electricity Act and rules (till last amendment).
- 4.9. Allthe230 volt devices/ equipment like bus support insulators, circuit breakers, SPDs, VTs etc., mounted inside the switch gear shall be suitable for continuous operation and satisfactory performance under $\pm 10\%$ variation in supply voltage & $\pm 3\text{Hz}$ variation in supply frequency.
- 4.10. All components should be of ISI Marked.
- 4.11. Self test report / certificate of ACDB should be submitted before commencement of supply of materials.

6.SOLAR INVERTER:

6.1	Make of Inverter	ABB/DELTA/KACO/POWERONE
6.2	Country of origin	India
6.3	Nominal Capacity	Minimum10KVA
6.4	IEC/BIS Standards	
	Inverter	1. EfficiencyMeasurements:IEC61683/IS61683a and must conform to the relevant National/ International Electrical Safety Standards. 2. EnvironmentalTesting:IEC60068-2(1,2, 14, 30) /Equivalent BIS Std.
	Charge Controller /MPPT Unit	1. Design Qualification: IEC 62093 and must conform to the relevant National/ International Electrical Safety Standards. 2. EnvironmentalTesting:IEC60068-2(1,2, 14, 30) /Equivalent BIS Std. [NOTE: In case if the Charge controller is in-built in the Inverter ,no separate IEC62093 test is required but must additionally conform to the relevant National/ International Electrical Safety Standards wherever applicable]

6.5	Switching element	IGBT/MOSFET
6.6	Control	Microprocessor/DSP
6.7	Input voltage	a) <i>From PV Array: As per DC string</i> from Solar PV Array(300Wpor higher capacity Solar Modules be connected in appropriate series ¶llel combinations so that the Array capacity is minimum20KWp.) b) <i>From Battery Bank:</i> 48 Volt,100AH c) <i>From AC Source:</i> 415V($\pm 10\%$),3 ph,50 Hz($\pm .5$ Hz).
6.8	Nominal AC Output Voltage and frequency from Inverter	415 V,3phase,50Hz
6.10	Ambient temperature	-20°C to +50°C
6.11	Humidity	0-95% non-condensing
6.12	Protection of enclosure	a) Indoor :IP 21asperIEC529 b) Outdoor:IP65 as perIEC529
6.13	No-load losses	<1%of the rated power
6.14	Inverter efficiency (minimum)	>95%at full load, 0.8PF
6.15	Total Harmonic Distortion (THD)	<3%
6.16	Power Factor	>0.90
6.17	Protection	a) Short Circuit b) Deep discharge of batteries c) Over charging (Automatic trickle charge mode on full charge) d) Input surge voltage e) Over current(Load) f) Battery reverse polarity g) Solar array reverse polarity
6.18	Indication (LED / LCD indication)	a) String on b) Mains on c) In put on d) Control on e) Charger on f) Battery charge percentage g) Charger overload h) Battery on trickle i) Battery disconnected/Fault battery j) Low Solar Power k) System fault l) Charger over temperature m)Input over/ under voltage(for AC)

6.19	Standard front LED display(minimum but not exhaustive one)	a) Load, voltage, current, PF, and Inverter b) Solar Charging Current c) Battery Voltage, current, temperature d) Instantaneous and cumulative energy output from Inverter e) Instantaneous and cumulative energy drawn from grid f) Kind of fault with audio signal
6.20	Front panel metering (minimum but not exhaustive one)	a) Solar ampere meter b) Battery amps meters c) Solar volt meter d) Battery voltmeter e) Energy meter(Inverter output)
6.21	Overload capacity	150 % of the continuous rating for 30 seconds
6.22	Automatic mode of operation	a) Under light load conditions and with the battery in a full state of charge, the available solar power will supply the load via Inverter. b) Under medium and heavy load conditions, solar power is used to charge the battery as fast as required and the excess solar power feed the load via Inverter. c) Under low/no solar power, battery will feed the load. d) In case of low battery and no solar power, grid will feed the load as well as charge the battery.

7.BATTERY BANK: Not Applicable.

8 .REMOTE MONITORING UNIT: The Power Plant should have suitable in-built instrumentation for remote monitoring of its Real Time Status. Power Plants shall be capable of transmitting its monitor able parameters over GSM/CDMA/GPRS/TCPIP Network and conform to respective standard protocols. The data from the RMU at the inverter will be transmitted to a central server placed at vendor end and the processed data should be accessible to SBI through pass word protected internet gate way. The data transmission shall take place at nominal 4 (four) to 6 (six) hours interval. It will be the responsibility of the vendor to automatically host the data. All related run time expenses including necessary SIM cards, SMS charges, charges to the Service Provider etc. .for the specified period (5 years warranty / guarantee) shall be borne by the successful bidder.

Suggestive list of the events/parameters for monitoring:

- 8.1. Site Name
- 8.2. Firm ware Version,
- 8.3. Inverter Capacity & Battery Bank Voltage,
- 8.4. Inverter Status,
- 8.5. Date & time (Date in 24hrs. format)
- 8.6. PV Voltage,
- 8.7. PV Current,
- 8.8. Cumulative Solar Energy,
- 8.9. Input Voltage,

- 8.10. Input Frequency,
- 8.11. Output Voltage,
- 8.12. Output Frequency,
- 8.13. Output Current,
- 8.14. Output Power factor,
- 8.15. Output Power,
- 8.16. Battery Voltage
- 8.17. Load %,
- 8.18. Cumulative Output Active kWh,
- 8.19. Cumulative Output apparent kVAh,
- 8.20. Energy Meter reading.

9. PROTECTIONS: The system should be provided with all necessary protections like earthing, lightning as follows:

10.1. LIGHTNING PROTECTION:

10.1.1. The SPV power plant shall be provided with lightning & Overvoltage protection.

10.1.2. The main aim in this protection shall be to reduce the overvoltage to a tolerable value before it reaches the PV or other subsystem 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. The protection against induced high-voltages shall be provided by the use of Metal Oxide Varistors (MOVs) and suitable earthing such that induced transients find an alternate route to earth.

10.2. **SURGE PROTECTION:** Internal surge protection shall consist of three MOV type surge-arrestors connected from +ve and -ve terminals to earth.

10.3. **EARTHING PROTECTION:** Each array structure of the PV Module, PCU, ACDB, DCDB, Lightning Arrester etc. should be grounded/earthed properly as per IS:3043-1987. 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.

11. **CABLES:** Cables of appropriate size to be used in the system shall have the following characteristics:

- 11.1. Standard: 1.1 KV grade conforming IEC60227/IS694 and IEC60502 / IS1554(Pt .I&II). Temp . Range: -10°C to +80°C Excellent resistance to heat, cold, water, oil, abrasion, UV radiation Flexible, 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(2%).
- 11.2. For the DC cabling, XLPE or XLPO insulated and sheathed, UV-stabilized single core multi stranded flexible copper cables shall be used. Multi- core cables shall not be used.
- 11.3. For the AC cabling, PVC or XLPE insulated and PVC sheathed single or multi-core multi stranded flexible copper cables shall be used. Outdoor AC cables shall have a UV-stabilized outer sheath.
- 11.4. The cables (as per IS) should be insulated with a special grade PVC compound formulated for outdoor use. Outer sheath of cables shall be electron beam cross linked XLPO type and black in colour.
- 11.5. The DC cables from the SPV module array shall run through a UV-stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5 mm.
- 11.6. Cables and wires used for the interconnection of Solar PV modules shall be provided with solar PV connectors (MC4) and couplers.

- 11.7. All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50cm; the minimum DC cables size shall be 4.0mm² copper, the minimum AC cable size shall be 4.0mm² copper.
- 11.8 Cable Routing/ Marking: All cable/wires are to be routed in a GI/PVC cable tray and suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable easily identified. In addition, cable drum no./Batch no. to be embossed/printed at every one meter.
- 11.9. Cable Jacket should also be electron beam cross-linked XLPO, flame retardant, UV resistant and black in colour.
- 11.10. All cables and connectors for use for installation of solar field must be of solar grade which can withstand harsh environment conditions including high temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack from moss, microbes for 25 years and voltages as per IEC standards. DC cables used from solar modules to array junction box shall be solar grade copper with XLPO insulation and rated for 1.1KV as per relevant standards only.
- 11.11. The total voltage drop on the cable segments from the solar PV modules to the solar grid Inverter and to battery bank shall not exceed 2.0%.
- 11.12. The total voltage drop on the cable segments from the solar grid Inverter to the building distribution board shall not exceed 2.0%.

12. **DANGER BOARDS AND SIGNAGES:** Required quantity of Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Text of the signage to be finalized in consultation with SBI.

13. **SAFETY MEASURES:** 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 guide lines etc.

14. cost included for necessary arrangement for tapping the water from the available source for washing the modules on regular basis.

PRICE BID

TENDER INVITING AUTHORITY : State Bank of India

NAME OF ITEM: **“DESIGN, SUPPLY AND INSTALLATION, TESTING AND COMMISSIONING OF 10KWP GRID CONNECTED ROOFTOP SOLAR POWER PLANT (WITHOUT BATTERIES) WITH NET METERING AT ROOF TOP OF STATE BANK OF INDIA SALT LAKE EC BRANCH (Br Code 9985) [BANK OWN PREMISES] ON TURN-KEY BASIS AS PER THE SPECIFICATIONS MENTIONED AT ANNEXURE - I OF THIS NIT INCLUDING 5 (FIVE) YEARS WARRANTY / GUARANTEE AND OPERATION & MAINTENANCE CONTRACT FROM THE DATE OF COMMISSIONING OF THE PLANT.”**

NIT No:

BIDDER NAME:

NAME OF BRANCH WITH BR CODE:

Sl. No.	Description	Rate (Rs)	Total Qty.	Total Amount Without GST (Rs)	GST Amount (Rs)	TOTAL Amount with GST (Rs)
01	Supply of 10kwp Grid Tied Solar PV Power Plant With Net Metering Provision on turn-key basis as per the specifications mentioned at Annexure-I of this NIT including 5 (five) years Warranty/Guarantee and Operation & Maintenance Contract from the date of commissioning of the plant		01 Set			
02	Installation and commissioning of 10kWp Grid Tied Solar PV Power Plant With Net Metering Provision on turn-key basis as per the specification mentioned at Annexure-I of this NIT including 5 (five) years Warranty/Guarantee and Operation & Maintenance Contract from the date of commissioning of the plant		01 (LS))			
Total(01+02): Rs. Only						

NOTE: This page is for information only. Vendors are requested to submit price bid in online mode only through service provider website <https://www.tenderwizard.com/SBIETENDER>.