National Bank for Agriculture and Rural Development (NABARD)
Odisha Regional Office, Ankur 2/1, Nayapalli,
Bhubaneswar, Odisha - 751015

Email- dpsp.bhubaneswar@nabard.org

National Bank for Agriculture and Rural Development (NABARD) invites e- tenders for Design, Supply, Installation, Testing and Commissioning of 30 KWh Grid Interactive Solar Photovoltaic (SPV) based Roof Top Solar Power System (RTSP) in the parking area of NABARD Officers' Quarter, BDA Colony, Chandrsekharpur Bhubaneswar 751016Tenderers are advised to submit e-tender (e-bids) through GeM portal only.

Date of issue of tender document	17.11.2023
Date and time of pre bid meeting	24.11.2023 at 15.00 hrs
Due date and time for submission of e-tender	04.12.2023 by 15:00 hrs
Date and time of opening technical bids	04.12.2023 at 15:30 hrs
Date and time of opening price bids	Will be announced later
Earnest Money to be deposited	Rs. 22800/-
RMD	5% of final quoted amount shall have to be deposited with NABARD, till the completion of Defect Liability Period of 05 years from day of the completion of the project.

Sign and seal of tenderer

Ref No.NB.ODRO.DPSP/ 1057 /NBOQ renovation/2023-24 17/11/2023

Tender for Design, Supply, Installation, Testing and Commissioning of 30 KWh Grid Interactive Solar Photovoltaic (SPV) based Roof Top Solar Power System (RTSP) in the parking area of NABARD Officers' Quarter, BDA Colony, Chandrsekharpur Bhubaneswar 751016

1. Description of the project site

Open Roof terrace of the parking area of NABARD Officers' Quarter, BDA Colony, Chandrasekharpur Bhubaneswar 751016. Minor increase / decrease in the area will be considered, if required for installation of Solar Panels.

2. Scope of work

Designing of details of Solar power plant, placement of equipment and cable layout etc. along with all accessories/ components	Design and Delivery of SPV equipment materials for the captioned work to NABARD's site at NABARD Officers' Quarter, BDA Colony, Chandrasekharpur Bhubaneswar 751016, building, including packing, handling, transporting, clearing, loading/unloading etc. at site. 2. Erection, testing & commissioning of cyclone resistant Solar Power System as per technical specifications, obtaining operating approval from Electrical inspectorate / Power distribution/CREST/Electricity Department company etc. and handing over the System to NABARD for use. 3. Providing all inclusive service including all spares, etc. during warranty and defect liability period of solar power plant and subsequent operational and Maintenance service Contract for the committed period of 5 years from the date of handing over of the installation to the NABARD. 4. All engineering, equipment, labour, and permits required for satisfactorily completion of System installation work as per Specification. 5. The work of concrete pedestal, supporting frame, cabling, inverter, etc. is to be included.

	6. Any other ancillary work, related to but not mentioned above, required for satisfactory completion of the job. 7. Obtaining all statutory permissions / licence from appropriate authority for connection to the grid and incorporating the same in their record. 8. The tenderer should indicate in his tender the complete description of the major items of this work all relevant brochures/literature etc. with Technical Bid. 9. The tenderer shall carefully check the specifications and shall satisfy himself that the equipment offered is suitable as per the enclosed Technical Specifications and shall take full responsibility for the efficient operation of the equipment offered. 10. Tenderer shall supply all tools, plants, labour and consumables etc. as required for installation, testing and commissioning of the system. 11. The tenderer shall state clearly in his tender the standard tools, spare parts which he will supply free of cost when installing the system and handover the same to NABARD after completion of the work. 12. The details of major items may be given in the Annexure attached with Pre-bid clarifications. The other items may be as approved by MNRE or competent authority. 13. The successful tenderer shall submit, in duplicate, on receipt of acceptance of the tender, detailed working drawings and specifications showing the complete details of all work required. He will be held responsible for any discrepancies, errors, omissions and commissions in the drawing or particulars submitted by him, if found later during the defect liability period and specify the same and execute the work at no extra cost to NABARD.

	14. The successful tenderer on completion of the work shall furnish three sets of schematic diagram, physical layout drawings and maintenance manuals and a detailed list of all the components. 15. The Contractor shall carry out all the work strictly in accordance with drawing, details and instructions of NABARD's representation. If in the opinion of NABARD, nominal changes have to be made to suit the site condition and with the prior approval in writing of NABARD, they desire the Contractor to carry out the same, the Contractor shall carry out the same without any extra charge. 16. The tenderer must obtain for himself on his own responsibility and at his own expense, all the information which may be necessary for the purpose of making a tender and for entering into a contract and must examine the drawings, inspect the site of the work, and acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto. NABARD's decision in such cases shall be final and shall not be open to arbitration. 17. A Schedule of Probable Quantities in respect of each work and Specifications accompany these Special Conditions at page No. 8 to 10. The Schedule of Probable Quantities is liable to alteration by omissions, deductions or additions at the discretion of NABARD as per the need. Each tender should contain not only the rates but also the value of each item of work entered in a separate column and all the items should be totalled in order to show the aggregate value of the entire tender. 18. The rates quoted in the tender shall include all charges for scaffoldings, watching and lighting by night as well as day including Saturdays/Sundays and holidays, protection of all other erections, matters or things and the Contractor shall take down and remove any or all such centering, scaffolding etc. and also any cost involved in getting permission, liaison with on grid purchasing agency etc. as occasion shall require or when ordered so to do, and fully reinstate

	and make good all matters and things disturbed during the execution of work and to the satisfaction of NABARD. 19. Guarding and protecting of solar power plant equipment shall be responsibility of the tenderer from the date of commencement of work at site. 20. The contractor shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause of delays may be, including delays arising out of modifications to the work entrusted to him or in any sub-contract connected therewith or delays in awarding contracts for other trades of the project or in commencement or completion of such works. NABARD does not accept liability for any sum besides the tender amount, subject to such variations as are provided for herein. 21. The successful tenderer is bound to carry out all items of work necessary for completion of the job even though such items are not included in the quantities and rates. Schedule of instruction in respect of such additional items and their quantities will be issued in writing by NABARD. 22. The successful tenderer must co-operate with the other contractors appointed by NABARD so that the work shall proceed smoothly without delay. He should make his own arrangement for storage in the space allowed in the site (no charges will be taken for this space) and protection of all materials supplied by him. The contractor has to provide the bird spikes on the top of the solar panels to avoid bird droppings. 23. The work has to be carried out by causing least inconvenience to residents. Sharp items, spikes, nails, etc. should be immediately removed from common areas. 24. The contractor must bear in mind that all the work shall be carried out strictly in accordance with the specifications made by NABARD and also in compliance of the requirement of the local

	public authorities and to the requirements of the Electrical Inspectorate and any other Acts/ Rules/ Regulations and no deviation on any account will be permitted. 25. The successful tenderer shall liais for obtaining license for the solar power plant, if any, along with all the documents on behalf of NABARD and pay necessary inspection fee levied by the Government and/or any other authorities and obtain necessary approval as required and also conduct such tests as are called for by the regulation of the authorities without any extra cost to NABARD. Follow up with the authorities has to be carried out by the tenderer. The inspection / statutory fee will be reimbursed by NABARD to agency against the receipts from respective department for the completely installed Solar System only. No other fee etc., will be reimbursed by NABARD to the agency.
Taxes & Insurance	The prices quoted for supply of equipment shall be deemed to have included all taxes, custom duty, excise duty, octroi, local levies, GST) or any other taxes/duties imposed by /State Government/ Local Bodies/ Central Government, charges for labour, transport, insurance charges for transit, shipment, packing, freight from the factory to the destination site, handling, clearing, installation, and commissioning charges, labour cess, insurance charges for storage, erection, testing and commissioning, CAR policy (1.25 times the Contract Value), workmen compensation and third party liability etc. to commence from the 02 days after the date of Work Order from NABARD till the Solar power plant is finally handed over to NABARD. If the tenderer fails to include such taxes and duties in the tender, no claim thereof will be entertained by NABARD afterwards. As per laws, income tax, GST TDS, TDS etc. will be deducted at source and a certificate for the same will be issued to the contractor. The Bank will not issue C/D forms or any kind of form for obtaining concessions, input credit etc. in taxes/duties etc. Each GST invoice issued should quote base value and GST separately for GST calculations.

	2. The tendered rates shall be firm and shall not be subject to any variations, on account of fluctuations in the market rate or any other source.
Terms of Payment	The payment for the works to be executed under this contract shall be made as follows subject to statuary deductions. No variation in the mode of payment will be acceptable. 1) 60% of the quoted rates after receipt of the material at site and on submission of the following documents: (a) Manufacturer's Inspection and Test Certificates (b) Contractor's Certificate that all components, parts, sub systems, consumables etc. for successful installation, commissioning and testing of the systems including maintenance have been received at site in good condition and if any shortfall is noticed during installation, commissioning and testing they will be supplied free to the Bank. (c) Policies of insurance covering all the risks during transit, storage , installation, commissioning ,testing and handing over including third party liabilities and fire as mentioned in tender document. 2) Balance 25% of the quoted rates against erection and testing, commissioning and handing over subject to receiving clearance and certificates from Competent State Licensing / inspecting authority or any other competent authority/ statutory bodies. The inspection will be carried out by local distribution licensee. 3) Balance 15% of the quoted rates after commissioning and handing over of the entire system. Security Deposit/ Retention Money Deposit (RMD) @ 5 % will be retained and paid after 5 year of defect liability period from the date of virtual completion. No payment will be made without valid insurance policies.
Contract Agreement	The Contract shall come into full force and effect on the date of issue of the Work Order. The costs of stamp duties and similar charges (if any) imposed by law in connection with the Contract Agreement shall be borne by the Contractor.

Confidentiality	The Contractor shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out obligations under it or to comply with applicable Laws. The Contractor shall indemnify NABARD for any loss suffered by them as a result of disclosure of any confidential information. The Contractor shall not publish, permit to be published, or disclose any particulars of the Works in any trade or technical paper or elsewhere without the previous agreement of NABARD.
Time Period for completion	The period for completion of the work is 2 months from date of work order.
General terms	1. Each page of the application shall be stamped and signed by authorized signatory of the firm/agency/contractor as a token of acceptance or of self-certification. The authorized person shall have necessary authorization / power of attorney to do so. 2. If the space in the application form is insufficient for furnishing full details, such information may be supplemented on a separate sheet of paper stated therein the part of the proforma and serial number of relevant row. Separate sheet shall be used for each part. 3. NABARD reserves the right to verify any or all the documents furnished by the Tenderers/applicant/agency/firm with any authorities. NABARD also reserves the right to cancel any or all the applications without assigning any reason thereof. 4. Clarifications regarding applying for tender , if any required, may be obtained from Asst. General Manager, NABARD, Odisha RO, Bhubaneswar by sending email to dpsp.bhubaneswar@nabard.org. 5. No mobilization advance will be given by NABARD, so necessary financial resources will be mobilized by agency/contractors. 6. Rates for Tender shall be quoted as per the stipulated technical specifications and in accordance with terms & conditions of tender and visiting the sites. Quoted rates shall be inclusive of all applicable taxes, latest minimum wages and other charges for providing

	necessary tools etc. Contractor shall ensure the desired quality in the work. 7. Interest free initial **EMD (Earnest Money Deposit) amount of Rs.22800/- shall be deposited in designated Account No. NABADMN05, IFSC: NBRD0000002,** before the last date of submission of tender. EMD amount of unsuccessful bidders will be refunded. The EMD of successful bidder will be adjusted towards 5% interest free RMD amount which will be deducted from first bill. The RMD (Retention Money Deposit) amount will be refunded after completion of defect liability period. After depositing the EMD amount, the tenderers are advised to send an email to dpsp.bhubaneswar@nabard.org with the details of the transaction. MSMEs as defined in MSE Procurement Policy issued by GoI or bidders who are registered with Central Procurement Organisation or empanelled with NABARD itself are exempt from submitting the EMD, a copy of the registration certificate needs to be uploaded in the Technical Bid. 8. Validity of submitted tender will of 03 months from the date of opening of price bid. The work will be awarded on the basis of Least Cost System (LCS) on total quoted amount. 9. All the disputes will be settled amicably or through arbitration as per Arbitration and Conciliation Act with amendments upto 2019. 10. Successful bidder has to give Indemnity Bond to NABARD and Contractors All Risk (CAR) policy in joint name of NABARD which will be 1.25 times of quoted tender amount for capital cost of the Solar Power System.
Experience criteria	One similar work during last 7 years (ending 31.03.2023) with annual contract value (costing individually) not less than Rs. Rs.9.12 Lakh or Two similar works during last 7 years (ending 31.03.2023) with annual contract value (costing individually) not less than Rs. Rs.5.70 lakh

	or Three similar works during last 7 years (ending 31.03.2023) with annual contract value (costing individually) not less than Rs.4.56 Lakh
Special terms	1. In the event of the bidder / tenderer quoting "NIL" charges in Price Bid for comprehensive AMC contractor profit & overhead charges, the bid shall be treated as unresponsive and will not be considered. The Bank does not bind itself to accept such abnormally quoted bid. 2. The rates quoted by the tenderer/bidder should be able to demonstrate the capability of the tenderer/bidder to deliver the contract at the offered price. Abnormally low bids/rates will be subject to analysis by the Bank. If required, the Bank may call written clarification from the bidder, including detailed price analysis of the bid price in relation to scope, schedule, allocation of risks and responsibilities and any other requirements of the bid document and tenderer/bidder shall have to furnish Rate Analysis for the scrutiny of rates by the Bank within a stipulated time. The Bank reserves the right to reject the bid if bid is found to be abnormally low to deliver or perform the contract terms & conditions. The appointed contractor is required to execute the work as per the proforma/specifications of MNRE and approved make/brands. 3. The estimated cost of the work is about Rs.11.40 lakh. 4. Contractor shall follow the prescribed formats/procedures for official documentation like registers, etc. as stipulated/required. 5. Rates are to be quoted inclusive of all prevailing taxes, levies like GST, etc. and as per scope of Tender, BOQ and after visiting the site. 6. Bidder may specify particulars of the other statutory payments, if any. If the Bidder doesn't quote for the other statutory payments. Then responsibility of such payments will be borne by the bidder

	himself and NABARD will not be responsible for the same and will not entertain any claims thereon in this regard. 7. The contractor has to quote for all the items of BOQ in Price Bid. Incomplete BOQ will not be considered. No conditional bid/offer will be accepted. 8. The rates have to be quoted by including GST even if the contractor is not registered with GSTN. 9. The contractor will comply all the Labour Law requirements and maintain the muster roll, wage register and license (if applicable) etc. and produce the same in the NABARD Office. If required, the contractor shall submit the necessary information/ data to the concerned statutory authorities and bank officials in the desired format for verification /checking or signing in these documents. All the payment to the workmen/labour shall be made by the contractor and it is his responsibility. 10. The quantities of material (mentioned in price bid) are indicative subjected to variation as per the requirement of execution. In case of change in quantities pro rata payment will be made by NABARD.

3. Technical specification

Grid connected solar PV	1. A Grid Tied cyclone resistant Solar Rooftop Photo Voltaic (SPV) power plant consists of PV array, Module Mounting Structure, Power Conditioning Unit (PCU) consisting of Maximum Power Point Tracker (MPPT), Inverter, and Controls & Protections, interconnect cables, Junction boxes, Distribution boxes and switches. 2. PV Array is mounted on a suitable structure. Grid tied SPV system is without battery and should be designed with necessary features to transfer to grid. 3. 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. 4. Solar PV modules consisting of required number of Crystalline PV cells- Grid interactive power conditioning unit with proper monitoring system. Mounting structures (1.8 mm or more thick HDPGI with Galvanisation of 150 microns or more) Concrete Pedestal made of M20 grade (or 1 cement: 1.5 sand : 3 Coarse aggregate ratio) concrete. 5. Earthing and lightening protections: IR/UV protected PVC Cables (1500 Vand standard make), pipes (BIS mark) and accessories. The bottom of the Panel shall be above 0.6 m or more above from roof surface and inclination as per location of Bhubaneswar. 6. SPV modules: The total Solar PV array capacity shall be as specified in price schedule and shall be assembled with minimum 545 Wp (with minimum of 24V) Mono/Poly Crystalline MNRE approved Tier 1/Class A solar modules with 60/ 72 cells with minimum 15% Module Efficiency. The modules should be tested and certified by a Govt. of India authorized test centres or should

	conform to relevant IEC standard as per MNRE guidelines. Offered module shall have a power output warranty of 90% of the rated power for 10 years. The rated output power and Efficiency of each supplied & installed module shall not be less than the specified power rating and Efficiency of the modules, in any case. Every module should have suitable by-pass diode at its terminal box. The SPV Modules must be installed in such a way so as to deliver proper voltage and current to ensure desired power output as per specifications of MNRE for the size of SPVPP ordered. 7. Identification and traceability: Each PV module must use a RF identification tag (RFID), which must contain the following information: • Name of the manufacturer of PV Modules (should be made in India). • Name of the Manufacturer of Solar cells. • I-V curve for the module. • Peak Wattage, Im, Vm and FF for the module. • Unique Serial No and Model No of the module. • Date and year of obtaining IEC PV module qualification certificate. • Name of the test lab issuing IEC certificate. • Other relevant information on traceability of solar cells and module should be as per ISO 9000 series. 8. PCU/Inverter: 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 should also be DG set interactive, if necessary. Inverter output should be compatible with the grid frequency. PCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown. 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. Built-in meter and data logger shall be provided.

Switching devices	IGBT/MOSFET
Control	Microprocessor /DSP
Nominal AC output voltage and Frequency	415V, 3 Phase, 50Hz (In case single phase inverters are offered, suitable arrangement for balancing the phases must bemade.)
Output frequency	50 Hz
Grid Frequency Synchronization Range	+ 3 Hz or more
Ambient temperature considered	-200 C to 500 C
Humidity	95 % Non-condensing
Protection of Enclosure	IP-20(Minimum) for indoor. IP-65(Minimum) for outdoor.
Grid Frequency Tolerance range	+ 3 or more
Grid Voltage tolerance	-2%
No-load losses	Less than 1% of rated power
Inverter efficiency(minimum)	>93% (In case of 10 kW or above within-built galvanic isolation) >97% (In case of 10 KW or above without in-built galvanic isolation)
Inverter efficiency (minimum)	> 90% (In case of less than 10 kW)
THD	< 3%
PF	> 0.9

9. The PCU shall have anti islanding protection in conformity to IEEE 1547/UL 1741/ IEC 62116 or equivalent BIS standard.

10. Frequency Range and Anti-Islanding measures at the point of connection to The Utility services should follow the latest CEA

	(Technical Standards for Connectivity Distribution Generation Resources) Guidelines. 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 Standard. The 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. The PCU/ inverters should be tested from the MNRE approved test centres/ NABL/ BIS/IEC accredited testing- calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses. 11. Module Mounting Structure (Mms) should be installed along with the hot dipped galvanized 1.8 mm or more thick HDPGI with Galvanisation (of 150 microns or more) array support structure for mounting of SPV modules at site. The panel frame structure should be capable of withstanding a minimum wind load of 200 Km per hour, after grouting and installation. MMS should be sturdy & designed to assist SPV Modules to render maximum output. The hardware (fasteners) used for installation of SPV Modules & MMS should be of suitable Stainless Steel (SS 304). Its size should be with reference to the specifications of the selected make SPV modules. The junction boxes shall be made up of Poly Carbonate/PP/ABS (as approved by MNRE) with dust, water and vermin proof. It should have with proper locking arrangements.
Protection and safety	Both AC & DC lines should have suitable MCB/MCCB, Contractors, SPD, HRC Fuse etc to allow safe start up and shut down before & after string inverter installed in the system. String inverters should have protections for overload, surge current, high Temperature, over/ under voltage and over/ under frequency & reverse polarity.

	The complete operation process & safety instructions should printed On the sticker & suitably passed on the near inverters. The SPV Power Plant should be provided with lightening and over voltage protection. The principal aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub-systems components. The source of over voltage can be lightening or any other atmospheric disturbance. The Lighting Arrestor (LA) is to be made of 1¼" diameter (minimum) and 12 feet (minimum) long GI spike on the basis of the necessary meteorological data of the location of the projects, if it is required or the existing may be used. Necessary foundation for holding the LA is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Each LA should have dedicatedly earthed through suitable size earth bus with earth pits. The earthing pit shall have to be made as per IS 3043. LA shall be installed to protect the array field, all machines and control panels installed in the control rooms. Number of LA shall vary with the capacity of SPV Power Plant & location. Number of LA should be in such a manner that total layout of solar modules should the effective coverage of LA's. Inverter should have safety measures to protect inverter from reverse short circuit current due to lightening or line faults of distribution network. Inverter shall be placed in the given enclosure room. Each array structure of the PV yard shall be grounded properly. In each array every module should be connected to each other with copper wires, lug teethed washers addition the lightening arrestor/masts shall also be provided inside the array field. Provision shall be kept for shorting and grounding of the PV array at the time of maintenance work. All metal casing/shielding of the plant should be thoroughly grounded in accordance with Indian Electricity Act/IE rules as amended up to date. The earthing pit shall be made as per IS: 3043. All the array structures, equipment, inverters & control systems shall be compulsorily connected to the earth. Number of earthling shall vary with the capacity of SPV Power Plant & soil resistivity of location. Earthing of system should be

	certified by Class I Electrical contractor. Aluminium Strips / wires shall be used for earthing connection from pit to panel etc. (G.I. wires shall not be used). LA should be installed to protect the array field & machines installed in the control rooms.
Insurance of workers	Successful bidder has to mandatorily submit proof of insurance cover of the workers engaged in the work as per Govt. regulations before starting the work.
AC Combiner Box (ACCB)	This shall consist of box of AC combiner cum grid interphase panel of good quality PC/PP /ABS or suitable powder coated metal casing. One Electronic Energy Meter (0.5S Class) as per CSERC/requisite authority regulation to record generations details (should have facility of storing one year generation data), ISI make, Three Phase duly tested by CSPDCL/ competent authority (Meter testing Division) with appropriate CT, of good quality shall have to be installed in ACCB suitable placed (in such a manner that if required it can be sealed by requisite authority to measure the transaction of power daily generated from SPV Power Plant, as per its Rooftop Notification. Proper rating MCCB & HRC fuse and AC SPDs should be installed to protect feeders from the short circuit current and surges as per the requirement of the site & instructions/guidelines of MNRE. Separate rotary AC Isolator Switch of suitable rating, for Grid Connectivity/Disconnection, should have to be installed outside each ACCB with locking arrangements. A CCB should be designed in such a way that Solar Generation meter and CTs of it, can be sealed by competent/requisite authority.
Cables/Wire	All cables should be of copper as per IS/BIS and should be grade as per requirement. All connections should be properly made through suitable lug/terminal crimped with use of suitable proper cable glands. The size of cables/wires should be designed considering the line loses, maximum load on line, keeping voltage drop within permissible limit and other related factors. The cable/wire should be of BIS/ISO mark for overhead distribution, as approved by MNRE. For normal configuration the minimum suggested sizes of cables are: Module to module/SJB/AJB-4 sq mm (single core)

	AJBs to MJBs/DCDB -10/16 sq mm (two core), with respect to current ratings of designing MJBs to DCCB - minimum 25 sq mm (single core) or as per design & rating DCCB to Inverter - minimum 25 sq mm (single core) or as per design & rating Inverter to ACCB - as per design & rating The size & rating of the cables may vary depending on the design & capacity of SPV Power Plant. Bidder should compulsorily use the design & rating of the cables as approved by MNRE prior to the installation. Note – Only in case, the size of cable is more than 25 mm, then aluminum 04 core armoured cable may be used. Cable Tray: All the cables should be laid in appropriate cable tray as per the requirement of the site, No cable should be laid directly on ground or wall cable tray should be laid such that there is gap of at least four inches above ground/roof/wall.
Manual Disconnection Switch	It should be provided to isolate the system from Grid which should be outside of ACCB.
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. Energy meter, as per CSERC/competent authority notification should also be installed, if required.
Solar Meter	Energy Meters to log the actual value of Energy generated by the PV system be provided. Energy meter if required with CT/PT should be of 0.5 accuracy class. It should have one year recording facility.

Schedule of quantities

Quality certification, standards and testing for Grid connected Rooftop Solar 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:

Solar PV Modules/Panels	
IEC 61215/ IS14286	Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
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 (NH3) 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
IEC 62804	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation. IEC TS 62804-1: Part 1: Crystalline silicon (mandatory for applications where the system voltage is > 600 VDC and advisory for installations where the system voltage is < 600 VDC)
IEC 62759-1	Photovoltaic (PV) modules – Transportation testing, Part 1: Transportation and shipping of module package units
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 requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)
	Photovoltaic (PV) modules – Transportation testing, Part 1: Transportation and shipping of module package units

IEC/IS 61683 (as applicable)	Photovoltaic Systems – Power conditioners: Procedure for Measuring Efficiency (10%, 25%, 50%, 75% & 90-100% Loading Conditions)
BS EN 50530 (as applicable)	Overall efficiency of grid-connected photovoltaic inverters: This European Standard provides a procedure for the measurement of the accuracy of the maximum power point tracking (MPPT) of inverters, which are used in grid- connected photovoltaic systems. In that case the inverter energizes a low voltage grid of stable AC voltage and constant frequency. Both the static and dynamic MPPT efficiency is considered.
IEC 62116/ UL 1741/ IEEE 1547 (as applicable)	Utility-interconnected Photovoltaic Inverters - Test Procedure of Islanding Prevention Measures
IEC 60255-27	Measuring relays and protection equipment – Part 27: Product safety requirements
IEC 60068-2 (1, 2, 14, 27, 30 & 64)	Environmental Testing of PV System – Power Conditioners and Inverters • IEC 60068-2-1: Environmental testing - Part 2-1: Tests - Test A: Cold • IEC 60068-2-2: Environmental testing - Part 2-2: Tests -Test B: Dry heat • IEC 60068-2-14: Environmental testing - Part 2-14: Tests - Test N: Change of temperature • IEC 60068-2-27: Environmental testing - Part 2-27: Tests - Test Ea and guidance: Shock • IEC 60068-2-30: Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) • IEC 60068-2-64: Environmental testing - Part 2-64: Tests -Test Fh: Vibration, broadband random and guidance
IEC 61000 – 2,3,5 (as applicable)	Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) testing of PV Inverters
IS/IEC 60947 (Part 1, 2 & 3), EN 50521	General safety requirements for connectors, switches, circuit breakers (AC/DC): • Low-voltage Switchgear and Control-gear, Part 1: General rules • Low-Voltage Switchgear and Control-gear, Part 2: Circuit Breakers • Low-voltage switchgear and Control-gear, Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units

	• 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	
IEC 62305-4	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)/ IEC 69947	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), mainly for DC cables
Earthing /Lightning	
IEC 62561 Series (Chemical earthing)	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	Junction boxes and solar panel terminal boxes shall be of the thermo-plastic 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. In case of clarification following person/agencies may be contacted.

Declaration by the Contractor:

We / I have read and understood the Technical specifications for the said contract and we / I have taken into account the above while quoting the rates. We / I accept all the above points without any reservation from our / my side, in all respects.

Signature:

Place:
Date : **Seal**

Price Bid (Schedule of Quantity)

Tender for Design, Supply, Installation, Testing and Commissioning of 30 KWh Grid Interactive Solar Photovoltaic (SPV) based Roof Top Solar Power System (RTSP) in the parking area of NABARD Officers' Quarter, BDA Colony, Chandrasekharpur Bhubaneswar 751016

Item Number	Item Title	Item Description	Item Quantity	Unit of Measure	Delivery Period (In number of days)
1	Solar SPV Module	OnGrid Solar Rooftop Photovoltaic Power Plant 30KW- 3 Phase (545- 554 watt, 24V)	56	Complete Set as per tender	60
2	Supply installation of BOS items	Design, Supply, Installation, Testing & Commissioning Inverter, Junction Box ACDB Lightening Arrester earthing Cable Module	1	As per system design	60
3	Installation and Commissioning work	Electrical and civil work and liasioning	1	As per system design	60
4	Netmetering	Installation of net meter	2	As per system design	60
5	Comprehensive management	Five years maintenance period	1	Complete Set as per tender	60

Note-

1. Rate quoted includes all costs including profit, taxes etc.
2. Any change in quantity the pro-rata will be considered.
3. If there is discrepancy in the rates quoted in words and figures, then the rate indicated in words treated as final.
4. Approved Brands of MNRE & reputed brands like Tata, Waaree, Goldi, Growatt, etc. or equivalent brands.

Accepted all terms & conditions of Price bid/Technical Bid

Place :
Date : (Signature of the Tenderer)
Address : Name and Seal