



**Syama Prasad Mookerjee Port
[erstwhile KOLKATA PORT
TRUST]**



HALDIA DOCK COMPLEX
AN ISO-9001:2015 ORGANISATION
**Office of Plant & Equipment
Division, Operational Administrative
Building (1st floor),
P.O. & P.S. Haldia, Dist. Purba
Medinipur West Bengal,
India. Pin- 721 604**

No. SE (E)/927/P&E/463

Dated 27.09.2022

‘REQUEST FOR SUBMISSION OF BUDGETARY OFFER’

Subject: Enquiry for obtaining budgetary quotation for “Design & Engineering, Procurement, supply, Installation , Testing & Commissioning including Warranty obligation with 5 (five) years Comprehensive Operation & Maintenance of cumulative 150 KWp Grid-Tied Solar PV Power Plants at various Premises of Haldia Dock Complex , SMP Port , District: Purba Medinipur, West Bengal

Haldia Dock Complex(HDC), Syama Prasad Mookerjee Port Kolkata (SMPK) [erstwhile Kolkata Port Trust] intends to develop a cumulative 150 KWp (75 KWp, 60KWp & 15KWp) Grid –Tied Solar PV Power Plant at HDC,SMPK , District: Purba Medinipur, West Bengal, PIN: 721604.

The Scope of work and Technical Specification, Special Terms & Conditions & Bill of Quantities for the subject project work , are enclosed herewith as Annexe- I, Annexe-II & Annexe-III respectively for ready reference please.

Budgetary offers (as per the enclosed Bill of Quantities), along with comments / suggestions (if any), are invited from experienced / reputed firms, for the subject work, within 17.10.2022.
Enclo: As stated

Division	P&E
Tender no.	SDM(P&E)/
E-tender No.	
Description	Enquiry for obtaining budgetary quotation for “Design & Engineering, Procurement, supply, Installation , Testing & Commissioning including Warranty obligation with 5 (five) years Comprehensive Operation & Maintenance of cumulative 150 KWp Grid-Tied Solar PV Power Plants at various Premises of Haldia Dock

	Complex , SMP Port , District: Purba Medinipur, West Bengal
Submission date &time	17.10.2022 up to 14.00 hours
Opening Date &time	17.10.2022 up to 14.30 hours
Remarks , if any	

Sr. Dy. Manager (P&E)
Haldia Dock Complex
Syama Prasad Mukherjee Port

Scope of Work & Technical specification

Scope of Work:

The Scope of work for the work of “**Design & Engineering, Procurement, supply, Installation , Testing & Commissioning including Warranty obligation with 5 (five) years Comprehensive Operation & Maintenance of cumulative 150 KWp Grid-Tied Solar PV Power Plants at various Premises of Haldia Dock Complex , SMP Port , District: Purba Medinipur, West Bengal**” will include but not limited to the followings:

- (a) Design of the system
- (b) Obtaining technical approval from the HDC-SMPK
- © Timely procurement and transportation to site in properly packed condition of all equipment, materials and miscellaneous item required to complete the project
- (d) Receiving, unloading and transportation at site
- (e) Safe storage
- (f) Dismantling of the damaged MMS, solar modules, cables etc. from the roof and transportation of the same to location specified by HDC-SMPK.
- (g) Roof treatment of the terrace/roof
- (h) Final check-up of equipment, commissioning, and putting the system into successful functional operation.
- (i) Installation, testing and commissioning of power plants
- (j) Preparing commissioning certificate
- (k) Training of HDC-SMPK personnel and handing over of power plants
- (l) Providing of routine and breakdown maintenance of PV Power Plants
- (m) Fulfilment of Warranty obligation as may arise.
- (n) Comprehensive maintenance of the Solar PV power plants for 10 years

The work is to be executed on Turnkey Basis. The HDC-SMPK will not supply any material.

Item wise description of the work/job involved under the Scope of Work are as given below:

Sl. No.	Item Description	Quantity
I	Supply Items	
1	PV Array of minimum capacity 75 KWp/60 KWp/15 KWp as per reference Sl. no. 2.0 &3.0 of Technical Specification	3 Set
2	PV Module Mounting Structure and structure accessories as per reference Sl. no. 4.0 of Technical Specification	3 set
3	PV Array Junction Boxes (AJB) as per reference Sl. no. 5.0 of Technical Specification	3 Set
4	Grid Connected String Inverter of nominal capacity 75 KWp/60 KWp/15 KWp as per reference Sl. no. 6.0 of Technical Specification	3 Set
5	Web enable online data logger and Remote Monitoring Unit including all Remote Monitoring Arrangement with Data cable from Data Logger to the existing location of the Modem at installation site etc. as per reference Sl. no. 7.0 of Technical Specification	3 Set
6	Inverter Combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	3 Set
7	Grid Interfacing LT panel as per reference Sl. no. 9.0 of Technical Specification	3 Set

8	Plant Metering arrangement as per reference Sl. no.10.0 of Technical Specification	2 Set
9	Export Import Energy Meter as per reference Sl. no.11.0 of Technical Specification	3 Set
10	Control cables and wiring as per reference sl. no.12.0 of Technical Specification. This item cot is excluding the item mentioned under reference Sl. no.13.0 of Technical specification.	3 Set
11	Supply of 3.5 core 35 Sq. mm. XLPE Insulated Armoured Copper Power cable from Inverter Combiner Panel to Grid Interfacing LT panel to point of Common Coupling (supply mains) as per reference Sl. no. 13.0 of Technical specification	2 Set
12	Supply of equipment and Array structure earthing materials for earthing systems as per reference Sl. no.14.0 of Technical Specification	3 Set
13	Supply of required plumbing materials for PV array cleaning arrangement as per reference Sl. no.15.0 of Technical specification	3 Set
14	Supply of Fire Extinguishers as per reference Sl. no. 16.0 of Technical specification	3 Nos.
15	Supply of spares, tools & measuring instruments as per reference Sl. 17.0 no. of Technical Specification	3 Set
16	Supply of signage as per reference Sl. no. 18.0 of Technical Specification	3 Set
17	Supply of required civil work materials required for the PV solar Power plants as may be required to comply with the Technical specification	3 Set
II	Service Items	
18	Receiving and loading from source , transportation, unloading at sites, stacking and safe storage with proper security arrangement of the materials with pilfer-proof arrangement with suitable insurance till commissioning and handing over of the project	3 Job
19	Dismantling of the damaged MMS, solar modules, cables etc. from the roof and transportation of the same to location specified by HDC-SMPK.	3 Job
20	Design, Installation, Testing & Commissioning of the Solar PV Power Plants	3 Job
21	Roof treatment of the terrace/roof	3 Job
22	Training of HDC-SMPK Personnel & documentation	3 Job

Comprehensive Maintenance:

All the equipments (except the SPV Modules for which the performance guarantee period is 25 years) will be provided with Comprehensive Maintenance for 10(five) years from the date of commissioning. The equipments or components, or any part thereof, so found defective during Comprehensive Maintenance period will be forthwith repaired or replaced within the scope of warrantee obligation to the satisfaction of the HDC-SMPK.

a)Routine maintenance: In order to carry out routine maintenance of the power plant, the contractor will provide all labour, material, consumables etc. within the scope of maintenance service. Routine maintenance will include but not limited to the followings:

- i) Checking and tightening of all electrical connections
- ii) Checking and tightening of mechanical fittings

- iii) Checking and restoring of earthing system,
- iv) Dusting and cleaning of Inverter and other electrical equipments
- v) Routine maintenance as recommended by the Original Equipment Manufacturer
- vi) Fortnightly washing / cleaning of 75 KWp SPV Modules installed at Operational Administrative Building, Chiranjibpur and monthly washing / cleaning of 60 KWp SPV Modules installed at DAV Public School Building, Haldia Township & 15 kWp SPV Modules installed at SMPK Guest House, Haldia Township..

b) Breakdown maintenance:

Breakdown maintenance will include but not limited to the followings:

- i) Breakdown maintenance will mean the maintenance activity including repairs and replacement of any component or equipment of the power plant, which is required to be carried out as a result of any sudden failure/breakdown of that particular component or equipment while the plant is running.
- ii) The contractor will be responsible to carry out breakdown maintenance of the power plant and will provide the required manpower, materials, consumables, components or equipment etc. for breakdown maintenance.
- iii) The contractor will undertake necessary maintenance/ troubleshooting work of the Solar PV Power Systems. Down time will not be more than 03 (three) working days from time of occurrence or reporting.
- iv) Each and every complaint communicated by any means either from Purchaser or User, the contractor will acknowledge the complaint by providing specific complain registration number in order to track the response of the complaint.
- v) If the Contractor fails to complete the maintenance work within the stipulated dates as communicated by the Engineer of the contract, the Contractor shall pay as compensation to the Trustees as a penalty of Rs 1000.00 per day or part thereof. Provided always that the amount of such compensation shall not exceed 10% of the said value of work.
- vi) Without prejudice to any of their legal rights, the Trustees shall have the power to recover the said amount of compensation/damage from any money due or likely to become due to the Contractor. The payment or deduction of such compensation/damage shall not relieve the Contractor from his obligation to complete the work or from any of his other obligations/liabilities under the contract and in case of the Contractor's failure and at the absolute discretion of the Engineer of the contract, the work may be ordered to be completed by some other agency at the risk and expense of the Contractor, after a minimum three days notice in writing has been given to the Contractor by the Engineer of the contract or his Representative

c) Maintenance Report:

Maintenance register must be maintained at site. However quarterly maintenance report along with the monthly generation statement submitted by the contractor to HDC-SMPK on quarterly basis as per approved format of HDC-SMPK.

Technical specification:

1) Equipment and materials for Grid Connected Solar PV Power Plants:

The equipment and materials for Grid Connected Solar PV power Plants will include, but not limited to the following:

- a) PV Modules (Crystalline Silicon Preferably Poly Crystalline)
- b) PV Module Mounting Structure
- c) PV Array Junction Box
- d) Grid-Tied String Inverter
- e) Web based Online Data logger and Remote Controlling Unit
- f) Inverter Combiner LT Panel
- g) Grid Interfacing LT Panel
- h) Export Import Energy meter
- i) Cables and wires
- j) Earthing System arrangement
- k) Fire Extinguisher
- l) Recommended spares, tools and tackles
- m) Signage
- n) Project Document
- o) Periodic Operation Maintenance Logbook, Maintenance Manual & Equipment Manual

2) Solar PV Modules: The proposed PV modules must be manufactured in India. The PV modules must qualify to the latest edition of IEC PV module qualification test or equivalent BIS standards i.e. IEC 61215/IS 14286, IEC61853-Part I/IS 16170-Part 1 & Part 2 and IEC 62804(PID) . The proposed PV module must have Test Certificate issued from accredited Test Laboratories of MNRE, Government of India under JNNSM Programme or IEC accredited Test Laboratories.

The cells of the modules will be crystalline silicon preferably poly-crystalline silicon. The capacity of the module will be considered as per the declared capacity in the published Technical Brochures of the PV Module Manufacturer.

PV modules of capacity 35KWp or above having 60/72 cells is to be used. However, no mismatch in PV Modules type will be allowed. Manufacturer of the proposed PV modules must have the ISO 9001: 2008 or ISO 14001.

Each PV module used in this solar power project must use an RF Identification Tag. The information must be mentioned in the RFID used on each module as per guideline of MNRE Government of India under JNNSM Programme.

Performance Warranty: The manufacturer should warrant the output of Solar Modules for at least 90% of its rated power after initial 10 years and 80 % of its rated power after 25 years from the completion of the trial run. If modules fail to exhibit such power in the prescribed time span, the contractor will either deliver additional modules to replace the missing power output with no change in area or replace the modules with no change in area of land used, at owner's option.

The desired specification of the PV module will include, but not limited, the followings.

Sl. No.	Item Description	Desired Specification
1.0	PV Cell	Crystalline Silicon. Poly Crystalline Silicon preferable.
1.1	Module rating at STC	330Wp/350Wp/375Wp/380Wp/400Wp without any negative tolerance. Module may of 60 cells or 72 cells.
1.3	Module Efficiency	Minimum 16 %

1.4	Fill Factor	Minimum 75 %
1.5	Withstand Voltage	1000 V DC
1.6	Module Glass Type	High transmission, low iron, tempered & textured glass.
1.7	Module Glass Thickness	Minimum 3.2 mm
1.8	Module Junction Box Protection level	IP 65 or above
1.9	Number of Bypass Diode	Minimum 3
1.10	Bypass Diode System Voltage	1000 V DC
1.11	Module Frame Type	Anodized aluminum frame

3) Solar PV Array:

The desired specification of the PV module will include, but not limited, the followings

Sl. No.	Item Description	Desired Specification
1.1	Nominal capacity	i) Minimum 15 KWp for 15 KWp Solar PV Plant ii) Minimum 60 KWp for 60 KWp Solar PV Plant iii) Minimum 75 KWp for 75 KWp Solar PV Plant
1.2	PV Module interconnection connector	MC-4/Tyco or equivalent
1.3	PV Module Interconnection cable and Array cable	PV 1-F Standard/NEC Standard Use-2 or RHW-2 type
1.4	PV array string voltage	Compatible with the MPPT channel of the inverter

4) PV Module Mounting Structure: Structural design must include, but limited to, the following:

- i) The Module Mounting Structure must be made of MS as per IS Standard (latest edition).
- ii) Weight of the metallic part of PV array Structure excluding nuts & bolts must be minimum same weight of PV module of the total PV module.
- iii) The installed Structure along with Solar PV modules should be capable of withstanding wind load of 200 Km/hour. The design should be certified by reputed institutes viz IIT Kharagpur, IIT Madras, IEST, Shibpur etc.
- iv) All structures including any metallic part thereof must be protected against any corrosion. The structure must also be compatible with materials used in the module frame, fasteners, fixtures, nuts, bolts or any similar nature of metallic components required for completion of the job.
- v) The array structure will be made of hot dip galvanized MS structure of minimum galvanizing thickness of 80 micron.
- vi) Structures will be supplied complete with all members to be compatible for allowing easy Installation.
- vii) Module Mounting Structure will have to be designed and fabricated with tilt angle not less than the latitude of the installation place.
- viii) The structure will be designed for easy and simple mechanical and electrical installation. It will support Solar PV modules at the mentioned orientation and absorb & transfer the mechanical loads to the ground or any suitable/existing strength structure as deemed fit. There will be no requirement of welding or complex machinery at the installation site.
- ix) Nuts & bolts of array structure

Usage Location	Type of nuts & bolts
PV Module fixing nuts and bolts with the PV Module Structure	Stainless Steel
All other nuts and bolts of PV Module Mounting Structure	MS Chrome Plated(GI)

- x) All fasteners, fixtures for supporting conduits will be made with stainless steel or aluminum.
- xi) Supporting structures including mobile mounting structures will have to be adequately protected against all climatic conditions. The array structure will support Solar PV modules at a given orientation, absorb, and transfer the mechanical loads to the columns or any suitable structure as deemed fit.
- xii) The supplier will specify installation details of the PV modules and the support structures with appropriate diagrams and drawings.
- xiii) Detailed engineering, drawings, specification and instructions for civil and other related structural works will be prepared by the contractor/architectural firm for erection and installation of the PV Array structure. Prior approval is to be taken from HDC-SMPK before execution of the work.

5) PV Array Junction Box (AJB): PV Array Junction Box (AJB) will have to be used for termination of string prior to connecting array with the inverter. There shall be two Array Junction Box, in case the inverter is located elsewhere away from PV array. Minimum one PV array junction box will be against each inverter. The desired specification of the PV Array Junction BOX and accessories shall include but not limited to the following:

Sl. No.	Item Description	Desired Specification
1.0	Enclosure Material	Polycarbonate
1.1	Enclosure Degree of protection	IP 765 with UV protection
1.2	Enclosure Withstanding Voltage	1000 V DC
1.3	Enclosure Withstanding Temperature	100 Degree Celsius
1.4	Enclosure Accessories mounting arrangement	DIN rail or as suitable
1.5	Enclosure Front Cover	Transparent
1.6	Enclosure numbers of string entry	As may be required
2.0	Cable entry and exit	
2.1	Position	Bottom for cable entry and exit
2.2	Type of connector for cable entry and exit	MC-4 /Tyco Connector(PV array string cable)
2.3	Cable gland	Earthing cable entry
3.0	Surge Protection Device(SPD) Type	DC
3.1	SPD Protection class	Type 2
3.2	SPD Rating(8/20)	20kA
3.3	SPD Number of set	As may be required as per string design (minimum 1 set against each MPPT channel)
4.0	Fuse with fuse-holder type	Glass fuse for PV use only
4.1	Fuse Position	Positive and Negative terminal for each series string
4.2	Fuse Rating	Current: Minimum 1.25 times the rated short circuit current of the series string
5.0	Earthing position	Terminal blocks shall have to be provided for earthing
6.0	Terminals, lugs and busbar	Tinned copper

6) Grid Connected Inverter: The power from PV array shall be fed into grid through grid –tied string Inverter. The number & minimum capacity of the String Inverter for the Solar PV plants will be as given below.

Size of Solar PV Plant	Number & capacity of String Inverter
15 KWp	One, Minimum capacity 15 KVA, 3 phase , 415 V, 50 HZ, AC
60 KWp	Three, Minimum capacity 20 KVA, 3 phase , 415 V, 50 HZ, AC
75 KWp	Three, Minimum capacity 25 KVA, 3 phase , 415 V, 50 HZ, AC

The string inverter to be supplied should be field-proven in Indian context and must have good record of accomplishment for satisfactory operation for at least six months. In this respect performance certificate from any user must have to be submitted in due course (during finalization of inverter). The inverter to be supplied must have technical service support setup in India and there should be factory-testing facility in India for Routine Test. String Inverters should comply with applicable IEC/equivalent BIS Standard for efficiency measurements and environmental tests as per standard codes IEC 61683/IS 61683, IS 16221(Part 2) , IS 16169 and IEC 60068-2(1,2,14,30) /equivalent BIS standard, IEC 61227 or equivalent(Islanding Prevention Measurement) The proposed PV String Inverter must have Test Certificate issued from accredited Test Laboratories.

Bidder should furnish Authorization letter from Inverter Manufacturer/Authorized Service provider, authorizing the bidder to bid in this specific tender.

Desired specification of String Inverter will include but not limited to the following:

Sl. No.	Item Description	Desired Specification
1.0	Inverter Type	Grid connected String Inverter
1.1	Inverter Usage	Specially used for PV system
1.2	Aggregated PV array connectivity capacity	i) 15 KWp for 15 KWp Solar PV Plant ii) 60 KWp for 60 KWp Solar PV Plant iii) 75 KWp for 75 KWp Solar PV Plant
1.3	Protection class	IP 65(Outdoor type) IP 54(Indoor type)
1.4	Temperature	0 degree to 55 degree Celsius
1.5	Cooling	Natural/ forced cooling
1.6	Type of fixing	Wall mounted/Floor mounted
2.0	MPPT Voltage range	Compatible with the array voltage
2.1	Total number of MPPT) One or more for 15 KWp Solar PV Plant ii) Two or more for 60 KWp Solar PV Plant iii) Two or more for 75 KWp Solar PV Plant
3.1	AC active power	i) 15 KW at unity power factor for 15 KWp Solar PV Plant ii) 20 KW at unity power factor for 60 KWp Solar PV Plant iii) 25 KW at unity power factor for 75 KWp Solar PV Plant
3.2	AC Grid Connection	3 Phase 400 V + N , 50 Hz
3.3	Grid Voltage Tolerance range	As per prevailing grid code
3.4	Grid Frequency Tolerance range	As per prevailing grid code
3.5	Output AC waveform	Pure Sine wave
3.6	THD	As per prevailing grid code
4.0	Efficiency	Minimum 95 %
4.1	Sleep Mode consumption	Less than 10W
5.0	DC Side protection	i)Reverse Polarity Protection ii) Reverse current to PV array protection iii) Overcurrent protection
6.0	AC side protection) DC injection to grid protection ii) Over voltage and Under voltage iii) Over Current iv) Over and under grid frequency protection v) Anti islanding protection
7.0	Isolation switch	PV array Isolation switch (DC). If DC isolating Switch is

		not provided in the Inverter, contractor will provide the same separately nearer to the inverter.
8.0	Ground fault detection device (RCCD)	To be provided for transformer less inverter. Rating will be as suitable for the inverter
9.0	Interface Communication Protocol	Suitable port must be provided in the inverter for i) On site upgrade of software ii) Onsite dumping data iii) Compatible to web based remote monitoring system
10.0	Web monitoring	Matched with the monitoring and data logging system

7) Web enable online Data Logger and Remote Monitoring Unit:

- i) Web enable Data logging system may be an integrated part of the inverter or a separate unit.
- ii) The Data Logger should have the provision of recording electrical parameters on DC and AC side at different stages to study performance of system as well as to study status of the system at a particular instant. The Data Logger should have required transducer to monitor and record the required system data.
- iii) Web based Remote Monitoring system must be compatible with Data Logger.
- iv) The other required accessories, hardware and compatible software will have to be provided as an integrated part of the system to monitor the real time data (maximum 20 minutes delay) through webserver. The Data Logger will continuously send data to the server.
- v) The system can be monitored from anywhere through Internet without installing any specific application software. The server will not be provided by HDC-SMPK.
- vi) The rental charges and other charges of the IP address, data storage space in the host server and free access of the data through web for a period of five (5) years will be included in the quoted price.
- vii) The contractor will supply and install data cable with required switch or router having sufficient number of port from the web –enabled Data logger up to the existing/future internet facility at the project site for data communication to web. HDC-SMPK will provide the Internet connectivity.
- viii) In case the data cable is to be laid at outdoor for a significant distance, SPD (surge Suppressing Device) suitable for communication network must be provided at suitable locations in sufficient numbers.
- ix) The Data logger and Remote Monitoring Unit is not inbuilt in the inverter then Data logger and Remote Monitoring Unit must be put into a poly carbonate enclosure having transparent front panel.
- x) The web based monitoring system should have the provision of graphical representation of at least following data.

Sl. No.	Operating Parameter	Desired Specification
1	Input Data	PV Power, PV Energy
2	Inverter Output Data	Export Power, Export Energy.

8) Inverter Combiner LT Panel:

The output of the string Inverter will be terminated in a Panel styled as **Inverter Combiner LT Panel**.

Desired specification of **Inverter LT Panel** will be included but not limited to the following:

Sl. No.	Item Description	Desired Specification
1.0	Enclosure Type	Double door sheet steel (16 SWG) , powder coated , dust and vermin proof horizontal/vertical enclosure
1.1	Enclosure Degree of protection	IP42/43 for indoor type or IP 65 for outdoor type
1.2	Enclosure type of fixing	Wall mounted

1.3	Enclosure Accessories mounting arrangement	DIN rail or as suitable
1.4	Number of entry and exit	As may be required
2.0	Number of Incoming MCB (Inverter Side)	2(Two) nos.
2.1	Type of Incoming MCB	4 Pole
2.2	Rating of Incoming MCB	63 A, 415 V, 10 kA
3.0	Number of Outgoing MCCB(Grid side)	i) 1 no. for 15 KWp Solar PV Plant ii) no. for 60 KWp Solar PV Plant iii) no. for 75 KWp Solar PV Plant
3.1	Type of Outgoing MCCB	4 Pole
3.2	Rating Outgoing MCCB	i) 63 A,415 V, 30 kA for15 KWp Solar PV Plant ii) 125 A,415V , 30 kA for 60 KWp Solar PV Plant & 75 KWp Solar PV Plant
4.0	Number of Surge Protection Device	i) 1 no. for 15 KWp Solar PV Plant ii) 3 nos. for 60 KWp Solar PV Plant & 75 KWp Solar PV Plant(One number against each inverter)
4.1	Usage of SPD as declared by Manufacturer	AC use only
4.2	SPD Protection class	Type 2
4.3	Number of Set of SPD	1 set
4.5	SPD Rating	20 kA(Minimum)
5.0	Indicator	R, Y , B
6.0	Earthing position	Terminal blocks will have to be provided for earthing.

9) Grid Interfacing LT Panel: Output of the Inverter Combiner LT panel will be terminated to a **Grid Interfacing LT Panel**. The Grid Interfacing Control Panel will be installed nearer to the feeder pillar panel. The Grid interfacing panel will be installed in a separate outdoor type Feeder Pillar Housing to protect the control panel from rainwater, dust and vermin.

Desired specification of each **Grid interfacing LT Panel** will include, but not limited to, the following:

Sl. No.	Item Description	Desired Specification
1.0	Enclosure type	Double door sheet steel (16 SWG) , powder coated , dust and vermin proof horizontal/vertical enclosure
1.1	Enclosure type of fixing	Wall mounted/Structure mounted type
1.2	Enclosure Degree of protection	IP-42/43
1.3	Enclosure Accessories mounting arrangement	DIN rail or as suitable
2.0	Incoming MCB for 15 KWp Solar PV Plant	
2.1	Number	1
2.2	Type	4 Pole
2.3	Rating	63 A 415 V 10kA Characteristics
3.0	Incoming MCB for 60/75 KWp Solar PV Plant	

3.1	Number	2
3.2	Type	4 Pole
3.3	Rating	415 V, 63 A, 10kA
3.0	Isolator for 60 KWp Solar PV Plant & 75 KWp Solar PV Plant	
3.1	Rating	150A
3.2	Type	TPN
3.3	Handle	To be provided
2.4	Indicator	R, Y, B
3.0	Bus bar position	In the Busbar chamber
3.2	Busbar Rating	i) 3 Phase Neutral 63 A, 415 V for 15 KWp Solar PV Plant ii) 3 Phase Neutral 100 A, 415 V for 60 KWp Solar PV Plant & 75 KWp Solar PV Plant
3.3	Busbar Type	Copper
3.4	Busbar Termination Point	6 set Minimum
4.0	Busbar Earthing provision	Terminal Blocks will have to be provided for Earthing

10) Plant Metering Arrangement:

The Plant metering system may be included in the Grid interfacing LT Panel. The metering system will include but not limited to the following:

Sl. No.	Parameter	Desired Specification
1.0	Metering Arrangement	
1.1	Instantaneous measuring parameter	Voltage, current
1.2	Type of meter	Electronics
1.3	Type of Meter Display	LED/LCD

11) Export Import Meter:

One Export Import Energy Meter will be installed at a suitable location before Point of Common Coupling (PCC) with grid side. The meter must be put within a Polycarbonate enclosure with transparent front cover. The enclosure should be of IP 54 protection. The meter to be supplied must be tested and calibrated

The capacities of the whole current Export Import Meter will be as given below:

- a) For 15 KWp Solar PV Plant: 3 Phase 4 wire 415 V AC 3X (10A-60A)
- b) For 60 KWp Solar PV Plant: 3 Phase 4 wire 415 V AC 3X (20A-100A)
- c) For 75 KWp Solar PV Plant: 3 Phase 4 wire 415 V AC 3X (20A-100A)

12) Control cables & Wiring:

The Specification of wiring material of PV Power plant will include, but not limited to, the following:

Sl. No.	Item Description	Desired Specification
1.0	DC cable for Array field	
1.1	Conductor	Tinned annealed stranded flexible copper according to IEC 60228 Class 5
1.2	Standard	PV-1F / 2 PfG 1169/08.2007 / VDE Standard E PV 01:2008-02 /Equivalent
2.0	AC cable	
2.1	Rated Voltage	1.1 KV
2.2	Construction	

2.2.1	Conductor	Copper
2.2.2	Insulation	XLPE
3.0	PVC Conduit Tees , Bends etc.	
3.1	Standard	ASTM D1785 uPVC
3.2	Ambient Temperature	0 degree to 50 degree Celsius
3.3	Type	UV stabilized , temperatures, Shock proof chemical resistant

Guideline of Cabling:

- i) The Buried Cables must be run through GI conduit in the cable is unarmored.
- ii) The cable must be laid through PVC conduit or GI pipe on roof and indoor. In case of using metallic pipe as conduit, proper grounding of the conduit must be done.
- iii) Conductor size of cables and wires will be selected based on efficient design criteria. The wiring size of will be designed such that maximum voltage drop at full power
 - a) From the PV Array to Inverter(s) should be less than 2%.
 - b) From Inverter to AC Grid interfacing panel should be less than 3%.
- iv) Cable terminations will be made with suitable cable lugs etc. crimped properly and cables will be provided with dry type compression glands wherever they enter junction boxes/ panels/ enclosures at the entry & exit point of the cubicles. The panels’ bottoms should be properly sealed to prevent entry of snakes/lizard etc. inside the panel. All cables will be adequately supported. Outside of the terminals / panels / enclosures, will be protected by conduits. Cables and wire connections will be soldered, crimp-on type or thimble or bottle type.
- v) Only terminal cable joints will be accepted. Cable joint to join two cable ends will not be accepted.
- vi) All cable/wires/control cable will be marked with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.
- vii) All cable will be suitable marked or coded for easy identification. Cables and wires will confirm to the relevant standards suppliers to specify the specification.
- viii) GI cable tray with perforation of suitable size must be used for laying of cable on the floor or Roof.
 - ix) All fasteners will be made of Stainless steel or Aluminum.
- x) Minimum 2 number loop for underground cable laying and one number loop for other cable termination must be provided at the start and end of each span.

3) Power Cable from Inverter Panel to Grid Interfacing Panel up to Point of Common Coupling:

- i) For 60KWp/75 KWp Solar PV Power Plant: Supply laying fixing of 3 ½ core 1.1 kV Grade armoured, XLPE insulated, minimum 35 sq.mm. Copper cable comply with the design and guideline as per Technical Specification clause No 12.0 from Inverter Panel to Grid interfacing Panel to Point of Common Coupling (Supply Mains). This also includes laying, Glanding, termination of cable in all complete.
- ii) For 15 KWp Solar PV Power Plant: Supply laying fixing of 4 core 1.1 kV Grade armoured, XLPE insulated, minimum 6 sq.mm. Copper cable comply with the design and guideline as per Technical Specification clause No 12.0 from Inverter Panel to Grid interfacing Panel to Point of Common Coupling (Supply Mains). This also includes laying, Glanding, termination of cable in all complete.

14) Equipment and Array Structure earthing:

i) Equipment grounding(Earthing) will connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV panel mounting structures in one long run. The grounding wire should not be switched, fused or interrupted.

- ii) Earth bus bar of galvanized (Hot Dip) MS flat 25 mm x 6 mm on wall having clearance of 6 mm from wall including providing drilled holes on the busbar complete with GI bolts, nuts, washers, spacing insulators etc. as required.
- iii) Connecting the equipment to earth bus bar including S & F GI (Hot Dip) wire of size as below on wall/floor with staples buried inside wall/floor as required and making connection to equipment with bolts, nuts, washers, cable lugs etc. as required and mending good damages Solid GI wire of 4 SWG or 20 mm x 3 mm galvanized (Hot Dip) MS flat as per suitability.
- iv) Array Structure must have multiple earth connectivity as may be required with 20 mm x 3 mm galvanized (Hot Dip) MS flat on wall/floor with GI saddles as required and connection to equipment incl. drilling holes, with bolts, nuts, washers etc.
- v) The complete earthing system will be electrically connected to provide return to earth from all equipment independent of mechanical connection.
- vi) Test point will be provided for earth pits.
- vii) Earthing system design should be as per the standard practices.
- viii) Type of Earthing – Pipe Earthing
- ix) The Code of Practice for Earthing will be IS 3043 (latest edition).
- x) Necessary provision will be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- xi) Minimum four (04) numbers of earth pit.
- xii) Earthing Pit Cover needs to be provided. Masonry enclosure on the top of the earth electrode of overall size 50 cm x 50 cm x 25 cm deep (below Ground level) complete with cemented brick work (1:6) of 25 cm width duly plastered with cement mortar (inside) CI hinged inspection cover of size 36.56 cm x 35.56 cm with locking arrangement.

15) PV Array Cleaning Arrangement: Necessary equipment is to be provided at site to facilitate easy cleaning of the PV Array. Water line with necessary numbers of outlet is to be laid down in the array field for cleaning of the PV Module. The water line is to be connected to the suitable nearest point of water source. The whole work will be executed within the contract value.

16) Fire Extinguisher: One number portable fire extinguisher suitable A, B, C type fire extinguisher of 5 kg with fixing arrangement on wall. The fire extinguisher should be of IS 13849 standard.

17) Spares, Tools and Measuring Instruments: The minimum number and different type of recommended spares, tools and measuring instruments must be supplied under this project within the contract value. Any special tool, spares, measuring instruments if required as may be will be provided by the contractor.

The tools and measuring instrument will be included but not limited to the following:

Sl. No.	Description	Quantity
01	Digital Multi-meter to measure DC and AC parameters	1 No.
02	Tool Kit comprises of at least following tools: (i) Screw driver set ,ii)Pliers & iii)Box ranges Set	1 Set

18) Project information Signage: The Signage will be made up of metallic base of 12 SWG of minimum size 4'x 3' with suitable frame. The Signage will provide the details of the project as approved by HDC-SMPK. The font size on the signage has to be big enough so that everyone can read it easily. The Signage will be fixed up two (02) prominent place of the project area.

Schematic Diagram: Schematic Diagram of Installation must be provided on a display board made up of metallic base 12 SWG of minimum size 3'x 2' with suitable frame as approved by HDC-SMPK. The schematic diagram must be fixed up at any prominent place of installation.

Equipment labeling: Labeling of all major Equipment have to be made in metallic base plate.

Safety Signage: Safety Signage must be provided mentioning the level and type of voltage and symbols as per IE Rule at different position as may be required.

Codes and Standards: All equipment and materials to be furnished under this specification will be designed, manufactured and tested in accordance with the latest revisions of the relevant Indian Standard (IS)/IEC/MNRE as applicable. The electrical installations will meet the requirements of Indian Electricity Act, and Indian Electricity Rules as amended up-to-date and the applicable section of the latest revision of the relevant IS Code of Practice.

List of Approved Makes:

Sl. No.	Item Description	Name of Manufacturer/make
1	Surge Protection Device (SPD)	OBO Betterman/Dehn/CITEL/ABB or equivalent make (as per acceptability of HDC-SMPK)
2	Enclosure of Array Junction Box (AJB)	Hensel/Spelsberg/ABB/Ensto or equivalent make (as per acceptability of HDC-SMPK)
3	Fuse with fuse Holder	Cooper Bussman/ Ferazz Shamut or equivalent make (as per acceptability of HDC-SMPK)
4	MCB & MCCB of Inverter Combiner LT Panel	ABB/L&T/Siemens/ Schneider Hager/Legrand /Havells /Crabtree or equivalent (as per acceptability of HDC-SMPK)
5	Isolator of Grid Interfacing LT panel	ABB/L&T/Siemens/ Schneider/Hager/Legrand /Havells /Crabtree or equivalent (as per acceptability of HDC-SMPK)
6	CT/PT	Kappa/Servo/AE/Kalpa or equivalent (as per acceptability of HDC-SMPK)
7	Meter (Voltmeter /Ammeter)	L&T/Siemens/Schneider/Secure or equivalent (as per acceptability of HDC-SMPK)
8	Export Import Energy Meter	L&T/Genus/Secure or equivalent (as per acceptability of HDC-SMPK)
9	DC cable	Lapp/Top Solar /Nexans /Schneider /Polycab or equivalent (as per acceptability of HDC-SMPK)
10	AC cable	RR Kabel/Polycab/Lapp/Havells/Mescab or equivalent (as per acceptability of HDC-SMPK)
11	PVC Conduit, Tee, Bends etc.	Oriplast/Supreme

12	GI pipe	Tata/Jindal/Bansal
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Annexe-II

Special Terms & Conditions

1.0 Location of Installations:

The locations for installation of Solar PV Power plants and the proposed capacity of the plants are as given below

- a) Operational Administrative Building, Chiranjibpur: 75 KWp
- b) DAV Public School Building, Haldia Township: 60 KWp
- c) HDC-SMPK Guest House, Haldia Township: 15 KWp

2.0 **Cost consideration of additional work:** If the cost of any additional work required to be executed at any site could not be derived from the obtained rate of different items against this tender, the cost of additional work will be considered at per CPWD (Govt. of India) Schedules (latest) rate.

3.0 **Completion Time: The** work must be completed within **120 (one hundred and twenty) days** from the date of handing over of site. **Bar Chart** for execution of the total work (from commencement to completion of work, indicating individual activities with commencement & completion date for each activity) should have to be submitted by the contractor **within 15 (Fifteen) days** from the date of placement of the order. The Bar Chart shall be used for monitoring of progress of the work.

4.0 Approval:

Design and Drawing: The contractor will obtain approval for all the designs associated with civil, mechanical and electrical work which includes design of foundation, structure cable sizing, fabrication work, layout design, wiring diagram etc. prior to the execution of work & for this purpose the contractor will submit all design & drawing for obtaining approval from HDC-SMPK.

Materials: Contractor will obtain approval for the materials deliverable under the project.

Field Proven Inverter: The proposed string inverter must be field proven in Indian atmosphere. The inverter of the proposed manufacturer must have been used in any project anywhere in India and in operation for 6 months with certified performance report.

5.0 **Insurance:** The contractor must be responsible for transportation of material, loading and unloading, safe storage at site including its security and will hand over the complete system after commissioning. The contractor shall have to take appropriate insurance, to take care of any eventuality that may occur till commissioning of the power plant. Contractor will be solely responsible for recovery of any losses or damages or death or injury of their personal or others, if occur, during execution of work irrespective of insurance is done or not by the contractor.

6.0 **Defect Liability Period:** The contractor must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract. The warrantee period of the complete PV Systems will be **60 calendar months** from the date of commissioning. However, the modules will have Performance Guarantee for 25 years with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period & not more than 10% after 10 years period as per

guideline of MNRE, Govt. of India.

The equipment or components, or any part thereof of the Power Plant, if so found defective during warrantee period, the contractor will remain liable to repair or replace immediately under warrantee obligation to the satisfaction of the HDC-SMPK in order to ensure trouble free operation of the Power Plant.

In case of PV Module, the contractor has to transfer Performance Guarantee Certificate from the original manufacturer to the HDC-SMPK for subsequent arrangement.

In order to ensure satisfactory performance of the Power Plant, the contractor should take up periodic maintenance as may be required and attend breakdown maintenance as and whenever required within the warrantee period and scope under warranty obligation.

Within the scope of warranty, the Contractor will repair or replace of any defective part of the Plant & Equipment supplied, Works done and services rendered under the Contract and render periodic maintenance as a preventive measure to up keep performance of the power plant and also to attend breakdown maintenance as and whenever needed.

7.0 Price: The quoted price will remain firm during pendency of contract. However, GST will be paid at actuals. Prices will be quoted and payable in Indian Rupees only.

8.0 Handing Over:

The work will be taken over by HDC-SMPK upon successful completion of all tasks to be performed at site(s) on equipment supplied, installed, erected, commissioned and run **successfully for 30 days** by the contractor. During handing over of complete project work, the contractor will submit the followings for considering final payment.

- i) All As-Built Drawings & Design of the power plant
- ii) Detailed Engineering Document with detailed specification, schematic drawing, Design and test results, manuals for all deliverable major items, operation, Maintenance & Safety Instruction Manual and other information about the project
- iii) Bill of materials
- iv) Inventory of spares at projects sites
- v) Completion certificate and agreement as per prescribed format provided by HDC-SMPK

9.0 Terms of Payment:

Proposed payment schedule proposed is as given below:

Sl. No.	Work Head	Pattern of release of payment
A	Installation, testing and Commissioning of the PV power plants	

(i)	Delivery of materials at site	70% cost of supplied items will be paid on production of requisite documents along with custodian certificate
(ii)	Installation & commissioning & Performance testing, users' training & observing the performance of the system for 30 days from the date of commissioning & handing over of Power Plant	20% of cost of the supply items and 90% of the service items under installation and commissioning of the Power Plants so that the total amount paid will stand to 90% of the total project cost.
(iii)	Observing the performance of the system for 300 days from the date of commissioning & handing over of the Power plants	Balance 10 % of cost of both the supply items and the service items
B	Comprehensive Maintenance of Solar PV Power Plants	100% of the yearly maintenance charge shall be released at the end of each year subject to satisfactory performance during the year.

Note:

- 1) HDC-SMPK will arrange for payment after joint inspection by representatives of Contractor & HDC-SMPK. Contractor will prepare progressive bill and payment will be made based on Invoice and records of joint measurement.
- 2) All payments are subject to Security Deposit clause.

10.0 SECURITY DEPOSIT: The Contractor shall have to deposit a sum of 3% of the contract value in the form of Demand draft / Banker's Cheque issued by any Nationalized Bank/ Scheduled Bank in India, as Security Deposit, within 15 days from the date of placement of order. Otherwise, the contractor may submit to General Manager (Engg.) a Performance Bond in the form of Irrevocable Guarantee from any Nationalized Bank/ Scheduled Bank in India as Security Deposit within 15 days from the date of placement of order, in the Proforma annexed to SMPK General Condition of Contract for a sum equivalent to 3 % of the contract value, which shall be valid till successful expiry of the Defect Liability Period, with a claim period of three months thereafter. The Bank Guarantee shall be valid till successful expiry of the Defect Liability Period, with a claim period of three months thereafter In all cases, any dispute regarding the Bank Guarantee will be adjudicated under the jurisdiction of Kolkata High Court. Interest / charge, whatsoever in nature, shall not be paid by HDC-SMPK on the amount of Security Deposit.

Failure of the successful tenderer to submit the required Security Deposit shall constitute sufficient grounds for termination of the contract and forfeiting the Earnest Money Deposit.

The contractor is required to revalidate the Security Deposit Bank Guarantee, till 3 (three) months after expiry of the defect liability period/ extended defect liability period or contractual obligations, as per provisions of the contract.

The Security Deposit Bank Guarantee shall be liable to be forfeited at the option of

the HDC- SMPK , if the Contractor fails to carry out the work or to perform/ observe any of the conditions of the Contract. HDC-SMPK shall be at liberty to deduct/ recover any of their dues from the Security Deposit Bank Guarantee.

The cost of obtaining security deposit bank guarantee or any other Bank Guarantee and/ or the revalidation thereof whenever required has to be borne by the Contractor and it shall be their sole responsibility to arrange for timely revalidation of such Bank Guarantee, failing which and for non-fulfilment of any contractual obligation by the contractor, General Manager (Engg.), HDC and/ or HDC-SMPK shall be at liberty to raise claim/ demand under the Security Deposit Bank Guarantee and encash the same unilaterally. Interest/ charge of whatsoever in nature shall not be paid by HDC-SMPK , on the amount of Security Deposit Bank Guarantee held by HDC-SMPK at any stage.

Security Deposit for maintenance period:

i) 3 % of the Contract Value excluding GST during guarantee period of 60 months for Complete project.

(ii) 3 % of Maintenance contract value excluding GST for a period of 60 months after completion of 60 months' guarantee period for complete project.

11.0 WAY BILL: For bringing the materials at site, for interstate transfer of materials, if Way Bill is required, the same will be provided by HDC-SMPK , on written request from the contractor. However, the contractor has to plan the transportation of materials, so as to minimize the use of way bills.

12.0 PACKING & FORWARDING: The contractor should take adequate care during packing and forwarding of different components, parts of the lift and its accessories so that the same are not damaged/ dented during transportation towards site of work, from outside locations. The contractor should arrange safety and security of the materials, under his custody at site of works, at his own risk, cost and arrangement. The above terms and conditions should be read in conjunction with other terms and conditions as detailed in the enclosed General Conditions of Contract, Special Notes, Scope of Work, Technical Specification, Bill of Quantities and all other stipulations of the Tender Document.

Annexe-III

Design & Engineering, Procurement, supply, Installation , Testing & commissioning including Warranty obligation with 5 (five) years Comprehensive Operation & Maintenance of cumulative 150 KWp Grid-Tied Solar PV Power Plants at various Premises of Haldia Dock Complex , SMP Port , District: Purba Medinipur, West Bengal

Bill of Quantities (BOQ)

Sl. No.	Description of the work	Quantity	Unit	Unit Rate (without GST) Rs.	Total Amount (without GST) Rs.
<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
	<u>Part –I: Supply Items</u>				
A	75 KWp Grid Connected Solar PV Power Plant.				
1	Supply of PV Array of minimum capacity 75 KWp as per reference clause no.2.0 &3.0 of Technical Specification	1	Set		
2	Supply of PV Mounting Structure& Structure Accessories as per reference Sl. no. 4.0 of Technical Specification	1	Set		
3	Supply of PV Array Junction Boxes (AJB) as per reference Sl. No.5.0 of Technical Specification	3	Set		
4	Supply of Grid Connected String Inverter of nominal capacity of 25 KVA as per reference Sl. no. 6.0 of Technical Specification	3	No.		
5	Supply of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data cable from Data logger to the existing location of the Modem at installation site etc. as per reference Sl. no.7.0 of Technical Specification	1	Set		
6	Supply of Inverter combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	1	Set		
7	Supply of Grid –Interfacing LT panel as per reference Sl. no. 9.0 of Technical	1	Set		

	Specification				
8	Supply of plant metering Arrangement as per reference Sl. no. 10.0 of Technical Specification	1	Set		
9	Supply of Export Import Energy Meter as per reference Sl. no.11.0 of Technical Specification	1	No.		
10	Supply of control cables & wires as per reference Sl. no. 12.0 of Technical Specification	1	Lot		
11	Supply of 3.5 core 35 Sq. mm. XLPE Insulated Armoured Copper Cable from Inverter Combiner LT Panel to Grid-Interfacing LT panel to Point of Common Coupling (Supply Mains) as per reference Sl. no. 13.0 of Technical Specification	100	Meter		
12	Supply of Equipment and Array Structure earthing materials as per reference Sl. no. 14.0 of Technical Specification	1	Lot		
13	Supply of required plumbing materials and equipment for array cleaning arrangement as per reference Sl. no. 15.0 of Technical Specification	1	Lot		
14	Supply of Fire Extinguisher as per reference Sl. no. 16.0 of Technical Specification	2	No.		
15	Supply of spares, tools and measuring instruments as per reference Sl. no.17.0 of Technical Specification	1	Set		
16	Supply of Signage as per reference Sl. no. 18.0 of Technical Specification	1	Lot		
B	60 KWp Grid Connected Solar PV Power Plant.				
1	Supply of PV Array of minimum capacity 60 KWp as per reference Sl. no. 2.0 &3.0 of Technical Specification	1	Set		
2	Supply of PV Mounting Structure& Structure Accessories as per reference Sl. no. 4.0 of Technical Specification	1	Set		
3	Supply of PV Array Junction Boxes (AJB) as per reference Sl. No.5.0 of Technical Specification	3	Set		
4	Supply of Grid Connected String Inverter of nominal capacity of 20 KVA as per reference Sl. no. 6.0 of Technical Specification	3	No.		

5	Supply of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data cable from Data logger to the existing location of the Modem at installation site etc. as per reference Sl. no. 7.0 of Technical Specification	1	Set		
6	Supply of Inverter combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	1	Set		
7	Supply of Grid –Interfacing LT panel as per reference Sl. no. 9.0 of Technical Specification	1	Set		
8	Supply of plant metering Arrangement as per reference Sl. no. 10.0 of Technical Specification	1	Set		
9	Supply of Export Import Energy Meter as per reference Sl. No.11.0 of Technical Specification	1	No.		
10	Supply of control cables & wires as per reference Sl. no. 12.0 of Technical Specification (This item cost is excluding the item mentioned under Sl. no. 13 of Technical specification).	1	Lot		
11	Supply of 3.5 core 35 Sq. mm. XLPE Insulated Armoured Copper Cable from Inverter Combiner Lt Panel to Grid-Interfacing LT panel to Point of Common Coupling (Supply Mains) as per reference Sl. No.13.0 of Technical Specification	100	Meter		
12	Supply of Equipment and Array Structure earthing materials as per reference Sl. no. 14.0 of Technical Specification	1	Lot		
13	Supply of required plumbing materials and equipment for array cleaning arrangement as per reference Sl. no.15.0 of Technical Specification	1	Lot		
14	Supply of Fire Extinguisher as per reference Sl.no. 16.0 of Technical Specification	2	No.		
15	Supply of spares, tools and measuring instruments as per reference Sl. no. 17.0 of Technical Specification	1	Set		
16	Supply of Signage as per reference Sl. no. 18.0 of Technical Specification	1	Lot		

C	15 KWp Grid Connected Solar PV Power Plant.				
1	Supply of PV Array of minimum capacity 15 KWp as per reference Sl. no. 2.0 &3.0 of Technical Specification	1	Set		
2	Supply of PV Mounting Structure& Structure Accessories as per reference Sl. no. 4.0 of Technical Specification	1	Set		
3	Supply of PV Array Junction Boxes as per reference Sl. no. 5.0 of Technical Specification (AJB)	1	Set		
4	Supply of Grid Connected String Inverter of nominal capacity of 15 KVA as per reference Sl. no. 6.0 of Technical Specification	1	No.		
5	Supply of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data cable from Data logger to the existing location of the Modem at installation site etc. as per reference Sl. no. 7.0 of Technical Specification	1	Set		
6	Supply of Inverter combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	1	Set		
7	Supply of Grid –Interfacing LT panel as per reference Sl. no. 9.0 of Technical Specification	1	Set		
8	Supply of Export Import Energy Meter as per reference Sl. no. 10.0 of Technical Specification	1	No.		
9	Supply of control cables & wires as per reference Sl. no. 11.0 of Technical Specification.(This item cost is excluding the item mentioned under Sl. no. 12.0 of Technical specification.)	1	Lot		
10	Supply of 4 core 6 Sq. mm. XLPE Insulated Armoured Copper Cable from Inverter Combiner Lt Panel to Grid-Interfacing LT panel to Point of Common Coupling (Supply Mains) as per reference Sl. no. 13.0 of Technical Specification	100	Meter		
11	Supply of Equipment and Array Structure earthing materials as per reference Sl. no. 14.0 of Technical Specification	1	Lot		

12	Supply of required plumbing materials and equipment for array cleaning arrangement as per reference Sl. no. 15.0 of Technical Specification	1	Lot		
13	Supply of Fire Extinguisher as per reference Sl. no. 16.0 of Technical Specification	1	No.		
14	Supply of spares, tools and measuring instruments as per reference Sl. no. 17.0 of Technical Specification	1	Set		
15	Supply of Signage as per reference Sl. no. 18.0 of Technical Specification	1	Lot		
Sub-Total (Part-I)					
<u>Part –II: Service Items</u>					
A	75 KWp Grid Connected Solar PV Power Plant.				
1	Design of 75 KWp Solar PV Power Plant	1	Job		
2	Installation of PV array of minimum capacity 75 KWp as per reference Sl. no. 2.0 &3.0 of Technical Specification	1	Job		
3	Installation of PV Module Mounting Structure & Structure Accessories as per reference Sl. no. 4.0 of Technical Specification	2	Job		
4	Installation of PV Array Junction Boxes (AJB) as per reference Sl. no. 5.0 of Technical Specification	3	Job		
5	Installation of Grid Connected String Inverter of nominal Ac capacity of 25 KVA as per reference Sl. no. 6.0 of Technical Specification	3	Job		
6	Installation of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data logger able from Data logger to the existing location of the Modem at site etc. as per reference Sl. no. 7.0 of Technical Specification	1	Job		
7	Installation of Inverter Combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	1	Job		
8	Installation of Grid Interfacing LT Panel as per reference Sl. no. 9.0 of Technical Specification	1	Job		
9	Installation of Plant Measuring	1	Job		

	Arrangement as per reference Sl. no. 10.0 of Technical Specification				
10	Installation of Export Import Energy Meter as per reference Sl. no. 11.0 of Technical Specification	1	Job		
11	Laying & termination of control cables & wires as per reference Sl. no. 12.0 of Technical Specification. (This item cost is excluding the item mentioned under Sl. no. 13.0 of Technical Specification.	1	Job		
12	Laying & termination of Power Cable of 3.5 Core 35 sq.mm XLPE insulated armored copper cable from Inverter Combiner LT panel to Grid interfacing LT Panel to Point of Common Coupling (Supply Mains) as per reference Sl. no. 13.0 of Technical specification of 75 KWp PV power plant	100	Meter		
13	Installation of equipment and array structure earthing materials for earthing systems as per reference Sl. no. 14.0 of Technical Specification	1	Job		
14	Installation of required plumbing materials & equipment for PV array cleaning arrangement as per reference Sl. no. 15.0 of Technical Specification	1	Job		
15	Installation of Fire Extinguisher as per reference Sl. no. 16.0 of Technical Specification	2	Job		
16	Installation of signage as per reference Sl. no. 17.0 of Technical Specification	1	Job		
17	Necessary civil works for the PV Power plant Project to comply with the Technical specification of 75 KWp Solar PV Plant	1	Job		
18	Dismantling of the damaged MMS, solar modules, cables etc. from the roof and transportation of the same to location specified by HDC-SMPK.	1	Job		
19	Roof-treatment of the terrace/roof	1	Job	Not to be quoted	
20	Training of HDC-SMPK personnel & Documentation	1	Job		
B	60 KWp Grid Connected Solar PV Power Plant.				
1	Design of 60 KWp Solar PV Power Plant	1	Job		

2	Installation of PV array of minimum capacity 60 KWp as per reference Sl. no. 2.0 & 3.0 of Technical Specification	1	Job		
3	Installation of PV Module Mounting Structure & Structure Accessories as per reference Sl. no. 4.0 of Technical Specification	1	Job		
4	Installation of PV Array Junction Boxes (AJB) as per reference Sl. no. 5.0 of Technical Specification	3	Job		
5	Installation of Grid Connected String Inverter of nominal Ac capacity of 20 KVA as per reference Sl. no. 6.0 of Technical Specification	3	Job		
6	Installation of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data logger able from Data logger to the existing location of the Modem at site etc. as per reference Sl. no. 7.0 of Technical Specification	1	Job		
7	Installation of Inverter Combiner LT Panel as per reference Sl. no. 8.0 of Technical Specification	1	Job		
8	Installation of Grid Interfacing LT Panel as per reference Sl. no. 9.0 of Technical Specification	1	Job		
9	Installation of Plant Measuring Arrangement as per reference Sl. no. 10.0 of Technical Specification	1	Job		
10	Installation of Export Import Energy Meter as per reference Sl. no. 11.0 of Technical Specification	1	Job		
11	Laying & termination of control cables & wires as per reference Sl. no. 12.0 of Technical Specification. (This item cost is excluding the item mentioned under sl. no. 13.0 of Technical Specification.)	1	Job		
12	Laying & termination of 3.5 Core 35 sq.mm XLPE insulated armored copper Power Cable from Inverter Combiner LT panel to Grid interfacing LT Panel to Point of Common Coupling (Supply Mains) as per reference Sl. no. 13.0 of Technical specification of 60 KWp PV power plant as per reference Sl. no. 13.0 of Technical Specification	100	Meter		

13	Installation of equipment and array structure earthing materials for earthing systems as per reference Sl. no. 14.0 of Technical Specification	1	Job		
14	Installation of required plumbing materials & equipment for PV array cleaning arrangement as per reference Sl. no. 15.0 of Technical Specification	1	Job		
15	Installation of Fire Extinguisher as per reference Sl. no. 16.0 of Technical Specification	2	Job		
16	Installation of signage as per reference Sl. no. 17.0 of Technical Specification	1	Job		
17	Necessary civil works for the PV Power plant Project to comply with the Technical specification of 60 KWp Solar PV Plant	1	Job		
18	Dismantling of the damaged MMS, solar modules, cables etc. from the roof and transportation of the same to location specified by HDC-SMPK.	1	Job		
19	Roof-treatment of the terrace/roof	1	Job	Not to be quoted	
20	Training of HDC-SMPK personnel & Documentation	1	Job		
C	15 KWp Grid Connected Solar PV Power Plant.				
1	Design of 15 KWp Solar PV Power Plant	1	Job		
2	Installation of PV array of minimum capacity 15 KWp as per reference clause no.2.0 &3.0 Technical Specification	1	Job		
3	Installation of PV Module Mounting Structure & Structure Accessories as per reference clause no. 4.0 Technical Specification	1	Job		
4	Installation of PV Array Junction Boxes (AJB) as per reference clause no. 5.0 Technical Specification	1	Job		
5	Installation of Grid Connected String Inverter of nominal Ac capacity of 25 KVA as per reference clause no. 6.0 Technical Specification	1	Job		
6	Installation of Web enable online Data Logger and Remote Monitoring Unit including all Remote Monitoring arrangement with Data logger able from Data logger to the existing location of the	1	Job		

	Modem at site etc. as per reference clause no. 7.0 Technical Specification				
7	Installation of Inverter Combiner LT Panel as per reference clause no. 8.0 Technical Specification	1	Job		
8	Installation of Grid Interfacing LT Panel as per reference clause no. 9.0 Technical Specification	1	Job		
9	Installation of Export Import Energy Meter as per reference clause no. 11.0 Technical Specification	1	Job		
10	Laying & termination of control cables & wires as per reference Sl. no. 12.0 Technical Specification. (This item cost is excluding the item mentioned under reference Sl. no. 13.0 of Technical Specification.)	1	Job		
11	Laying & termination of Power Cable of 4 Core 6 sq.mm XLPE insulated armored copper cable from Inverter Combiner LT panel to Grid interfacing LT Panel to Point of Common Coupling (Supply Mains) as per reference Sl. no. 13.0 of Technical specification	100	Meter		
12	Installation of equipment and array structure earthing materials for earthing systems as per reference Sl. no. 14.0 of Technical Specification	1	Job		
13	Installation of required plumbing materials & equipment for PV array cleaning arrangement as per reference Sl. no. 15.0 of Technical Specification	1	Job		
14	Installation of Fire Extinguisher as per reference Sl. no. 16.0 of Technical Specification	1	Job		
15	Installation of required plumbing materials & equipment for PV array cleaning arrangement as per reference Sl. no. 17.0 of Technical Specification	1	Job		
16	Installation of signage as per reference Sl. no. 18.0 of Technical Specification	1	Job		
17	Necessary civil works for the PV Power plant Project to comply with the Technical specification of 15 KWp Solar PV Plant	1	Job		
18	Dismantling of the damaged MMS, solar	1	Job		

	modules, cables etc. from the roof and transportation of the same to location specified by HDC-SMPK.				
19	Roof treatment of the terrace/roof	1	Job	<u>Not to be quoted</u>	
20	Training of HDC-SMPK personnel & Documentation	1	Job		
	Sub-Total (Part-II)				
	Part-III: Comprehensive maintenance				
1(a)	Comprehensive Maintenance of 150 KWp Solar PV plants during first year	1	LS		
1(b)	Comprehensive Maintenance of 150 KWp Solar PV plants during second year	1	LS		
1(c)	Comprehensive Maintenance of 150 KWp Solar PV plants during third year	1	LS		
1(d)	Comprehensive Maintenance of 150 KWp Solar PV plants during fourth year	1	LS		
1(e)	Comprehensive Maintenance of 150 KWp Solar PV plants during fifth year	1	LS		
1(f)	Comprehensive Maintenance of 150 KWp Solar PV plants during sixth year	1	LS		
1(g)	Comprehensive Maintenance of 150 KWp Solar PV plants during seventh year	1	LS		
1(h)	Comprehensive Maintenance of 150 KWp Solar PV plants during eighth year	1	LS		
1(i)	Comprehensive Maintenance of 150 KWp Solar PV plants during ninth year	1	LS		
1(j)	Comprehensive Maintenance of 150 KWp Solar PV plants during tenth year	1	LS		
	Sub-Total (Part-III)				
	Total (Part-I+ Part-II+Part-III)				