

# **BIDDING DOCUMENTS**

**FOR**

**DESIGN, MANUFACTURE, SUPPLY, ERECTION, TESTING AND  
COMMISSIONING ALONG WITH OPERATION AND  
COMPREHENSIVE MAINTENANCE CONTRACT OF 5 YEARS  
FOR 100 kW<sub>p</sub> GRID INTERACTIVE SPV POWER PLANT**

**AT**

**MCM DAV COLLEGE FOR WOMEN, SECTOR- 36A, CHANDIGARH**

*MCM DAV COLLEGE FOR WOMEN*

*SECTOR-36A, Chandigarh.*

*Telephone no. 01722603355*

Mail: [principal\\_mcmdavcollege@yahoo.com](mailto:principal_mcmdavcollege@yahoo.com)

## NOTICE INVITING TENDER

### MCM DAV COLLEGE FOR WOMEN, SECTOR -36 A CHANDIGARH

**NIT No: - MCM/SPV/2017**

Tenders are hereby invited by PRINCIPAL, MCM DAV COLLEGE FOR WOMEN from manufacturers of SPV module/ System Integrators having specific experience of supply, installation, testing & commissioning of SPV Power Plants in Chandigarh under CREST.

Scope of Work	Design, manufacture, supply, erection, testing and commissioning along with operation and maintenance of 5 years for 100 kWp Grid Interactive rooftop Solar Photovoltaic Power Plant and Power Evacuation on LT side at Electrical panel room.
Estimated Cost	Rs 55 Lacs
Time Limit	1 month from the date of placement of work order
Tender Available Date	27.03.18
Date and time of opening of tender	17.04.18 at 2:30 pm
Place of opening of tender	Principal, MCM DAV College for Women, Sector 36 A, Chandigarh-160036
Tender last date for submission of documents	17.04.18 before 12:00 noon
POSTAL ADDRESS (The address at which the tender is to be submitted)	Principal, MCM DAV College for Women, Sector 36 A, Chandigarh-160036

## **Minimum Eligibility Criteria**

- Vendors should be registered with CREST Chandigarh.
- Minimum aggregate capacity of Solar Power Plant Installation in Chandigarh should not be less than 300kWp.
- Company Service centre should be within 50 km range.
- Vendor should not be blacklisted in any Government or private sector.
- Vendor should be MNRE channel Partner.

## **SPECIAL CONDITIONS**

- The following instructions must be carefully observed by all the Vendors. Tenders not strictly in accordance with these instructions shall be liable to be rejected.
- The rates shall be quoted in figure as well as in words.
- Installation will be done in four phases and payments will be done accordingly.
- Each bidder is required to deposit tender fee of Rs. 1000/- along with the tender.
- Telegraphic tenders shall not be accepted.
- The College reserves the right to modify the schedule of requirements, technical particulars and the specifications at any time and to place the order as a whole or in parts, and to reject any or all the tenders without assigning any reasons. The College will not be responsible for and will not pay for expenses for losses that may be incurred by vendors in the preparation of the tenders.
- The successful vendor shall be called upon to enter in an agreement on prescribed form. The Contract would be of the nature of individual work contract and College is not bound to issue Form D etc which is not subject to any sales tax or furnishing of Form D by the College. Vendor is also responsible for Liaising with Government department and get all clearance required for SPV system on behalf of college.
- The Principal of MCM DAV COLLEGE FOR WOMEN reserves the right to any omission/modification in the load of SPV power plant to be installed

## **Payment terms**

The price quoted shall be on turnkey basis and should be inclusive of all duties and taxes including GST, freight or any other tax on material in respect of this contract shall be payable by the Contractor and MCM COLLEGE will not entertain any claim whatsoever in respect of the same.

The tenderer shall acquaint with the work and working conditions at site and locality. No claim shall be entertained on this issue after the offer has been submitted. Once the firm has submitted the bid, it shall be presumed that they have inspected the site and work conditions.

**The terms of payment shall be as under:-**

**50% along with Work order, 40 % After Installation & Commissioning, Balance 10% against release of Subsidy amount by CREST.**

### **COMPLETION PERIOD:-**

The time allowed for completion of work shall be one month from the written order to commence the work. However the firm will quote the minimum time/period of completion.

### **COMMISSIONING:-**

The complete SPV Power Plant will be deemed to have been completed and commissioned when each of the sub-system is individually commissioned, tested and after concluding the satisfactory performance of the same.

## **Material**

The material to be used in the manufacture of the equipment to be supplied against contract shall be of the good quality conforming to BIS/foreign standard and carry certification/making wherever applicable. The firm/agency shall be solely responsible for the procurement of material required for the purpose.

### **GUARANTEE:**

The SPV module shall be guaranteed life of 25 years and all other equipments shall be guaranteed for a period of 10 years from the date of taking over the installation by the College against unsatisfactory performance and/or break down due to defective design, workmanship of material. The equipments or components, or any part thereof, so found defective during guarantee period shall be forthwith replaced free of cost to the satisfaction of the College Principal.

## Technical specifications

**Due  
on:-**  
09.04.18

**Approx. Amt: - Rs. 55 Lac**

**Time Limit: - 2 months.**

### Name of the Work:

Design, manufacture, supply, erection, testing and commissioning along with operation and maintenance of 5 years for 100 kwp Grid Interactive rooftop Solar Photovoltaic Power Plants and Power Evacuation on LT side at Electrical panel room in MCM COLLEGE BUILDING.

1.	Details for the SPV Power Project:-	100 kWp Roof top Grid Interactive Solar Power Plant
i)	Scope of Work	Design, manufacture, supply, erection, testing and commissioning along with operation and maintenance of 5 years for 100 kwp Grid Interactive rooftop Solar Photovoltaic Power Plants and Power Evacuation on LT side at Electrical panel room in MCM COLLEGE BUILDING
ii)	Roof Top	As per site available
iii)	Ambient Temp	45° c (Max)
iv)	Latitude	30° 40' N
v)	Longitude	76° 47'E
vi)	Elevation	238 Mtr. Above mean sea level
vii)	Tilt Angle	As per roof / space available
viii)	Feeding point	LT panel adjoining Electrical room
	<b>NOTE:-</b> BIDDER MUST VISIT THE SITE BEFORE QUOTING THE RATES , OTHERWISE IT WILL BE ASSUMED THAT THE PARTY HAS ALREADY VISITED THE SITE BEFORE QUOTING THE TENDER, AN UNDERTAKING TO BE FURNISHED ACCORDINGLY	

## **Solar Photovoltaic Modules**

Each solar PV plant array capacity should not be less than the capacity of the same SPV Plant capacity and total aggregate SPV array capacity should not be less than 300 Wp. The Photovoltaic modules must be tested **& approved by one of the IEC authorized test centers, Test Certificates can be from any of the NABL / BIS accredited testing / calibration laboratories.**

The module type must be qualified as per IEC 61215(Second Edition). In addition PV modules must qualify to IEC 61730 Part I to II for safety qualification testing. SPV module conversion efficiency should not be less than 16.0% under STC. The SPV Modules to be supplied should be tested from MNRE.

The module shall have warranty of 25years with degradation of power generated not exceeding 20% of the minimum rated power over the 25 years period and not more than 10% after 10 years period.

## **IDENTIFICATION AND TRACEABILITY**

Each PV module used in any solar power project must use a **RF Identification Tag (RFID)**, which must contain the following Information.

- i. Name of the manufacturer of PV Module
- ii. Name of the manufacturer of solar cells
- iii. Month and year of the manufacturer (separately for solar cells and modules.
- iv. Country of Origin (separately for solar cells and modules
- v. I-V Curve for the module
- vi. Peak wattage ,  $I_m$  ,  $V_m$  and FF for the module
- vii. Unique Serial No and Model No of the Module
- viii. Date and year of obtaining IEC PV module qualification certificate.
- ix. Name of the test lab issuing IEC certificate

## **SPV PANEL ARRAY STRUCTURES**

The supplier shall specify installation details of the PV modules and the support structures with appropriate diagrams and drawings. Such details shall include, but not limited to the following:

- Determination of true south at the site;
- Array tilt angle to the horizontal, with permitted tolerance;
- Details with drawings for fixing the modules;
- Details with drawings of fixing the junction/terminal boxes;
- Interconnection details inside the junction/terminal boxes;
- Structure installation details and drawings;
- Electrical grounding (earthing);
- Inter-panel/Inter-row distances with allowed tolerances; and
- Safety precautions to be taken.

- The array structure shall support SPV modules at a given orientation to absorb and transfer the mechanical loads to the roof properly. The portion of array structure if any lying within the column shall be of GI of superior quality. All nuts and bolts shall be of very good quality stainless steel. Strict care should be taken during execution to avoid any damage to the roof surface of the buildings and to ensure no leakage should occur.
- Wherever required, Suitable number of PV panel structures shall be provided. Structures shall be of flat-plate design and can be with combination of I, C and L sections as per structure design requirement.
- Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Galvanizing should meet ASTM A-123 hot dipped galvanizing or Anodized Aluminum material with thickness of 5mm for front and back legs and rafter. Thickness of Purlin should be 3mm..
- GI structures with adequate strength and in accordance with relevant BIS standards shall be used with proof that the design of the structure can withstand a wind speed upto 170KM per hour.
- Structures shall be supplied complete with all members to be compatible for allowing easy installation at the rooftop site.
- Each structure should have angle of inclination as per the site conditions to take maximum insolation.
- Each panel frame structure be so fabricated as to be fixed on the rooftop column/wall structures.
- The structures shall be designed for simple mechanical and electrical installation. There shall be no requirement of welding or complex machinery at the installation site. If prior civil work or support platform is absolutely essential to install the structures, the supplier shall clearly and unambiguously communicate such requirements along with their specifications in the bid. Detailed engineering drawings and instructions for such prior civil work shall be carried out prior to the supply of Goods. All nuts and bolts shall be of very good quality stainless steel except foundation bolts which will be of MS (GI Coated).
- The entire structure should be able to sustain the wind speed upto 170KM/Hr.
- If, possible, 4 Ft. offset from boundary of rooftop from all sides should be kept while installing structure for modules.
- The vertical section and base plate of module mounting structure should be of minimum 3 mm thickness in case of GI structure.
- No damage in any way should be caused to the building rooftops while installation of SPV Power Plant. If any damage done it will wholly be the responsibility of the bidder and cost shall be recovered from the vendor.

## String Inverter for 100 kWp Grid Interactive SPV Power Plant:

*The String Inverter should not be less than 100 KVA, should be provided to convert DC power produced by SPV modules, in to AC power. Grid interactive solar inverter with a highly efficient conversion unit having following*

### Specifications:

Type	Self commuted, current regulated, high frequency IGBT based with Trench Gate Structure
Output voltage	3 phase, 400 V AC (+12.5 %, - 20 % V, AC)
Frequency	50 Hz $\pm$ 1 Hz
Continuous rating	Not less than 25kVA
DC input Operating range	200 V to 1000V nominal
Total Harmonic Distortion	less than 3 %
Data Logger	Inbuilt
Operating temperature Range	0 to 55 deg C
Housing cabinet	PCU to be housed in suitable cabinet with minimum IP65 standard
Inverter efficiency	>95 % at full load
Power Control	MPPT

**The bidder shall use the original parts in case of any fault in the PCU/Inverter during the O&M period of 5 years. In case the original part/parts are not available with the manufacturer of the PCU/Inverter (Based on certificate from the manufacturer), the bidder shall use the new parts of other standard brands available in the market.**

### Other important Features/Protections required in the PCU

- Authentic tracking of the solar arrays maximum power point tracking (MPPT).
- Array ground fault detection.
- LCD and piezoelectric keypad operator interface Menu driven
- Automatic fault conditions reset for all parameters like voltage, frequency and/or black out.
- MOV and gas filled spark gap technology type surge arresters on AC and DC terminals for over voltage surge protection from any source.
- PCU should be rated to operate at 0 to 55 deg. Centigrade above ambient temp
- All parameters should be accessible through an industry standard communication link.
- The PCU should go in sleep mode when there is no grid supply.
- The string inverter should have display of adequate size on its front panel to show various parameters.



Since the PCU is to be used in solar photo voltaic energy system, it should have high operational efficiency. The idling current at no load must not exceed 2 percent of the full-load current.

A suitable Surge Protection Device separately at output (A.C. side) shall be provided for SPV Power Plant.

The PCU output shall be 400V, AC, 50 Hz 3 phase.

The PCU shall include appropriate self protective and self diagnostic features to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the PCU, including commutation failure, shall be cleared by the PCU protective devices and not by the existing site utility grid service circuit breaker.

The PCU shall go to shut down/standby mode, with its contacts open, under the following conditions before attempting an automatic restart after an appropriate time delay; in sufficient solar power output etc.

### **Insufficient Solar Power Input**

When the power available from the PV array is insufficient to supply the losses of the PCU, the PCU shall go to a standby/shutdown mode. The PCU control shall prevent excessive cycling during rightly shut down or extended periods of insufficient solar radiation.

The power conditioning units / inverters should be applicable IEC/ equivalent BIS standard for efficiency measurement and environmental testing as per standard code IEC 61683 and IEC 60068 2(6,21,27,30,75,78). The charge controller/ MPPT units should qualify IEC 62093 and IEC 60068 2 (6, 21, 27, 30, 75, 78). The junction boxes/ enclosures should be IP 65.

The PCU's should be tested from the MNRE approved test centers / NABL /BIS accredited testing-calibration laboratories. In case of imported power conditioning units, these should be approved by international test houses. Party must supply and upload the test report of PCU /inverter along with the tender document.

### **Utility-Grid Over or Under Frequency**

The PCU shall restart after an over or under frequency shutdown when the utility grid voltage has returned to the within limits for minimum of two minutes.

The PCU generated harmonics measures at the point of connection to the utility services when operating at the rated power shall not exceed a total harmonic current distortion of 3 percent, a single frequency current distortion of 3 percent and single frequency voltage distortion of 1 percent, when the first through the fiftieth integer harmonics of 50 Hz are considered.

The PCU Power factor at the point of utility service connection shall be 0.95 lagging or leading when operating at above 25 percent of the rated output, but may be less than 0.95 lagging below 25 percent of the rated output.

The high voltage and power circuits of the PCU shall be separated from the low-voltage and control circuits. All conductors shall be made of standard copper.

The PCU shall withstand a high voltage test of 2000 V rms, between either the input or the output terminals and the cabinet (chassis).

Full protection against accidental open circuit and reverse polarity at the input shall be provided.

The PCU shall not produce Electromagnetic Interference (EMI) which may cause malfunctioning of electronic and electrical instruments including communication equipment, which are located within the facility in which the PCU is housed.

The PCU shall have an appropriate display on the front panel to display the instantaneous AC power output and the DC voltage, current and power input. The display shall be visible from outside the PCU enclosure. Operational status of the PCU, alarms, trouble indicators and ac and the dc disconnect switch positions shall also be communicated by appropriate messages or indicator lights on the front cover of the PCU enclosure.

#### **Electrical safety, Earthing and Protection:**

**Internal Faults:** In built protection for internal faults including excess temperature, commutation failure, overload and cooling fan failure (if fitted) is obligatory.

**Over Voltage Protection:** Over Voltage Protection against atmospheric lightning discharge to the PV array is required. Protection is to be provided against voltage fluctuations in the grid itself and internal faults in the power conditioner, operational errors and switching transients.

**Earth fault supervision:** An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.

**Cabling practice:** Cable connections must be made using PVC Cu cables, as per BIS standards. All cable connections must be made using suitable terminations for effective contact. The PVC Cu cables must be run in GL trays with covers for protection.

Fast acting semiconductor type current limiting fuses at the main bus-bar to protect from the grid short circuit contribution.

The PCU shall include an easily accessible emergency OFF button located at an appropriate position on the unit.

The PCU shall include ground lugs for equipment and PV array grounding. The DC circuit ground shall be a solid single point ground connection.

All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed, and painted or otherwise suitably protected to survive a nominal 10 years design life of the unit.

The PCU enclosure shall be weatherproof and capable of surviving climatic changes and should keep the PCU intact under all conditions. The String Invertors, it should be minimum IP65 standard and it will be installed as per the manufacturer design for which prior approval.

Components and circuit boards mounted inside the enclosures shall be clearly identified with appropriate permanent designations, which shall also serve to identify the items on the supplied drawings.

All doors, covers, panels and cable exists shall be gasketed or otherwise designed to limit the entry of dust and moisture. All doors shall be equipped with locks. All openings shall be provided with grills or screens with openings no larger than 0.95 cm.

The design and fabrication of the PCU should bear the site temperature ( $0^{\circ}$  to  $70^{\circ}$  C), incident sunlight and the effect of ambient temperature on component life shall be considered carefully. Similar consideration shall be given to the heat sinking and thermal for blocking diodes and similar components.

### **Factory Testing:**

Preparation of all controls, protective and instrumentation circuits shall be demonstrated by direct test if feasible or by simulation operation conditions for all parameters that cannot be directly tested.

Operation of start up, disconnect and shutdown controls shall also be tested and demonstrated. Stable operation of the PCU and response to control signals shall also be tested and demonstrated.

Factory testing shall include measurement of phase currents, efficiencies, harmonic content and power factor.

A factory Test Report (FTR) shall be supplied along with the unit. The FTR shall include detailed description of all parameters tested qualified and warranted.

### **Operating Modes:**

The following operating modes are to be made available:

Night or Sleep mode: Where the inverter is almost completely turned off, with just the timer and control system still in operation, losses should not exceed 4 watts.

**In case of Grid Failure, the PCU should go in sleep mode/ turned off immediately.**

Standby mode: Where the control system continuously monitors the output of the solar generator until pre-set value is exceeded (typically 20 watts)

Operational or MPP tracking mode: The control system continuously adjust the voltage of the generator to optimize power available. The power conditioner must automatically re-enter stand-by mode when input power reduces below the standby mode threshold. Front Panel display should provide the status of the PCU, including AC Voltage, Current, Power output & DC Current, Voltage and Power input, pf and fault Indication (if any).

**Power Conditioning Unit for 100 kWp Standalone SPV Plant**

The power conditioner unit not less than 100 KVA (at minimum 0.8 power factor) should be provided to convert DC power produced by SPV modules, in to AC power. A multi function power conditioning system combining the functionality of a grid interactive solar inverter with energy export facility and a highly efficient conversion unit having following

### **Specification**

Type	: Self commuted, current regulated, high frequency IGBT based with Trench Gate Structure
Output voltage	: 3 phase, 415 V ac (+12.5 %, - 20 % V ac)
Frequency	: 50 Hz $\pm$ 1 Hz
Continuous rating	: 20 KVA
DC input Operating range	: 0 V to 400V nominal
Total Harmonic Distortion	: less than 3 %
Operating temperature Range	: 0 to 55 deg C
Housing cabinet	: PCU to be housed in suitable switch cabinet, With minimum IP 51 degree of ingress protection
Inverter efficiency	: >90 % at full load.

### **Other important Features/Protections required in the PCU**

- Authentic tracking of the solar arrays maximum power operation voltage (MPPT).
- Array ground fault detection.
- LCD and piezoelectric keypad operator interface Menu driven
- Automatic fault conditions reset for all parameters like voltage, frequency and/or black out.
- MOV type surge arresters on AC and DC terminals for over voltage protection from lightning-induced surges.
- PCU should be rated to operate at 0 to 55 deg. Centigrade above ambient temp
- All parameters should be accessible through an industry standard communication link.
- Overload capacity (for 30 sec) should be 200 % of continuous rating

Since the PCU is to be used in solar photo voltaic energy system, it should have high operational efficiency. The idling current at no load must not exceed 2 percent of the full-load current.

The PCU shall include appropriate self protective and self diagnostic features to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the PCU, including commutation failure, shall be cleared by the PCU protective devices and not by the existing site utility grid service circuit breaker.

The PCU shall not produce Electromagnetic Interference (EMI) which may cause malfunctioning of electronic and electrical instruments including communication equipment, which are located within the facility in which the PCU is housed

The PCU shall have an appropriate display on the front panel to display the instantaneous AC power output and the DC voltage, current and power input. The display shall be visible from outside the PCU enclosure. Operational status of the PCU, alarms, trouble indicators and ac and the dc disconnect switch positions shall also be communicated by appropriate messages or indicator lights on the front cover of the PCU enclosure.

The PCU shall include an easily accessible emergency OFF button located at an appropriate position on the unit.

The PCU shall include ground lugs for equipment and PV array grounding. The DC circuit ground shall be a solid single point ground connection in accordance with WEC 69042.

All exposed surfaces of ferrous parts shall be thoroughly cleaned, primed, and painted or otherwise suitably protected to survive a nominal 25 years design life of the unit.

The PCU enclosure shall be weatherproof and capable of surviving climatic changes and should keep the PCU intact under all conditions in the room where it will be housed. The PCU shall be located indoor and should be floor mounted. Moisture condensation and entry of rodents and insects shall be prevented in the PCU enclosure.

Components and circuit boards mounted inside the enclosures shall be clearly identified with appropriate permanent designations, which shall also serve to identify the items on the supplied drawings.

The design and fabrication of the PCU the site temperature ( $0^{\circ}$  to  $70^{\circ}$  C), incident sunlight and the effect of ambient temperature on component life shall be considered carefully. Similar consideration shall be given to the heat sinking and thermal for blocking diodes and similar components.

## **Codes and Standards**

The quality of equipment supplied shall be controlled to meet the guidelines for engineering design included in the standards and codes listed in the relevant ISI and other standards, such as:

IEEE 928 Recommended Criteria for Terrestrial PV Power Systems.

IEEE 929 Recommended Practice for Utility Interface of Residential and Intermediate PV Systems.

IEEE 519 Guide for Harmonic Control and Reactive Compensation of Static Power Controllers.

National Electrical NEPA 70-(USA) or equivalent national standard.

National Electrical Safety Code ANSI C2- (USA) or equivalent national standard

The Solar power generated at different rooftops of individual each SPV Power Plant will be collected at one central point in the same building from where it will be fed on LT side(415V).

If required, any protection device/ adapter panel/breaker/switchgear/metering compartment box be provided to terminate each SPV Power Plant output on LT side will be provided by the bidder.

#### **Surge Protection Device (SPD)**

There should be a separate Array Junction Box with Metal Oxide Varistors (MOV) based Surge Protection Device with fuses to be provided for each string inverter on D.C. Side.(IEC61643-1:International Standards for low voltage).

Further, on A.C. Side, the Surge Protection Device should be provided in ACDB, besides the existing SPD device in PCU.

#### **COMMON AC DISTRIBUTION PANEL BOARD (ACDPB)**

- Common AC Distribution Panel Board (DPB) shall control the AC power from inverter. AC Distribution panel (ACDP) should consist of appropriate size of MCCB/MCB with appropriate breaking capacity as incomer and suitable numbers of MCCB with appropriate size breaking capacity out going switches. The panel should be provided 3 Phase copper bus bar of suitable capacity.
- Common AC DPB shall have the arrangement for measuring all electrical quantities such as Voltage, Current, Frequency, of different feeder line & energy supplied to the main or different feeder. DPB shall have the provision of visual indication of existence of power input & output through MIMIC diagram. Common ACDPB shall have sheet iron enclosure of dust & vermin proof & shall have adequate cooling arrangement. The bus-bars are to be made of copper of desired size. Design & Drawing is to be submitted before manufacturer assembly on installation for obtaining necessary approval from CEO, CREST.
- The 3- Phase bi-directional Energy Meter is to be installed in ACDPB as Solar meter.

## **CABLES**

- ISI marked **as per given brands** PVC insulated Copper Cond. Cable of various sizes As per load requirement for connecting all the modules / arrays to Jn. Boxes and from Junction boxes to inverter and inverter to ACDB.
- Wires: Only solar copper wires of appropriate size **based on load requirements** of reputed make as specified in DNIT shall have to be used on the DC side. However on A.C side of after ACDB, aluminum cables of appropriate size can be used.
- PVC/XLPE insulated armoured sheathed cables required for the plant will be provided by the manufacturer. All cable schedules/ layout drawings have to be got approved from the purchaser prior to installation).
- Cables Ends: All connections are to be made through suitable cable/lug/terminals; crimped properly & with use of Cable Glands.
- Cable Marking: All cable/wires are to be marked with proper manner by good quality ferule or by other means so that the cable can be easily identified.
- Cu/Al PVC insulated armoured sheathed cables required for the plant will be provided by the manufacturer. However Cables for both D.C/A.C as per brands and specifications mentioned can be used. All cable schedules/ layout drawings have to be got approved from the purchaser prior to installation.

## **LIGHTNING PROTECTION**

There shall be the required number of suitable lightning arrestors installed in the array area. Lightning protection shall be provided by the use of metal oxide arrestors and suitable earthing such that induced transients find an alternate route to earth. Protection shall meet the safety rules as per Indian Electricity Act.

## **EARTHING PROTECTION**

Each array structure of the PV yard should be grounded/ Earthing properly as per IS:3043-1987. In addition the lightning arrester/masts should also be provided inside the array field. Provision should 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. Earth Resistance should be tested in presence of the representative of Department after earthing by calibrated earth tester. PCU, ACDB and Module Structure should also be earthed properly.

## **COMPREHENSIVE MAINTENANCE**

All the equipments (but in case of SPV Modules the guarantee period is 25years) shall be provided with comprehensive Maintenance for 5 years against unsatisfactory performance and/or break down due to defective design, workmanship of material. The equipments or components, or any part thereof, so found defective during Comprehensive Maintenance period shall be forthwith repaired or replaced free of cost to the satisfaction of the Engineer-in-charge.

## **JET PUMP 1/2 HP (CROMPTON/ KIRLOSKOR)**

As per site requirement, 1/2HP BIS approved surface pumps shall be installed for each SPV Power Plant. Suitable numbers of water outlets shall be provided through B-class ISI Marked GI Pipes for cleaning of the modules.

## **FIRE EXTINGUISHER**

As per requirement, Fire Extinguisher



**TECHNICAL BID and FINANCIAL BID IN SEPARATE SEALED ENVELOPES**

**TECHNICAL BID FORMAT**

All pages of the Technical Bid shall be organised section-wise, annexed with proof documents, serially numbered and stitched/or spiral bound intact and submitted) Loose pages shall not be accepted.

**1. GENERAL PARTICULARS OF TENDERER**

S. No.	PARTICULARS	TO BE FURNISHED BY THE TENDERER
1)	Name of Firm	
2)	Postal Address	
3)	E-mail address for communication	
4)	Telephone/ Fax No.	
5)	Name, designation, address, contact number and Email of the representative of the tenderer to whom all references shall be made.	
6)	Nature of the firm (Individual/ Partnership/Consortium/ Pvt. Ltd /Public Ltd. Co. /Public Sector, etc.) Attach attested copy of Registration & Partnership deed/ Memorandum of Association V	
7)	Amount and particulars of the Earnest Money	
8)	PAN NO (Copy of certificate to be enclosed)	
09)	Service Tax Registration No., VAT/TIN/ GRN No. CST No. (copies of certificates to be attached)	
10)	Has the Tenderer/firm ever been debarred by any institution for	

13)	Any other information attached by the Tenderer (Details of Annexure / page no. where its enclosed)	
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**DETAILS ABOUT THE COMPONENTS TO BE USED**

S. No	Description	Name of Manufacturer(s)	Manufacturing Plant address
1	Solar PV Modules		
2	GridTied Inverter/PCU		

Enclose the Data Sheets of Solar PV Modules and Grid Tied Inverters proposed to be used

**DETAILS OF EXPERIENCE**

Please fill in information about off grid Solar PV Systems installed in the last three years.

Sl. N	Description	FY 2012-13	FY 2013-14	FY 2014-15	FY 2015-16
1	Grid Connected Solar PV Plants in kWp				
2	Total Aggregate Project Cost in Rs.				

**DETAILS ABOUT THE BLACKLISTING, IF ANY**

Information on litigation history in which Bidder is involved.

- 1) *Whether black listed/ Debarred/Suspended from execution of work.*
- 2) *Other litigations. If any including Court litigations Arbitrations etc.*

Department and concerned officer	Other party (ies)	Case dispute	of	Amount involved	Remarks showing present status
1	2	3		4	5

Signature:

Name of the authorised person:

Designation:

Name and Address of

Bidder Stamp of bidder:

## **Undertaking by the Tenderer**

I/We, .....have gone through carefully all the tender conditions and solemnly declare that I/We will abide by any panel actions such as disqualifications or blacklisting or termination of contract or any other action deemed fit, taken by, the College against us, if it is found that statements, documents, certificates produced by us are false/fabricated.

**Signature of tenderer**