

**FIELD CLUB,**

**UDAIPUR**

**TENDER SPECIFICATIONS**

**ROOFTOP SOLAR SYSTEM**

**OVERVIEW**

Field club is planning to install a solar system within its premises to achieve various benefits such as saving in electricity costs and using eco-friendly Renewable energy.

Solar energy is today the best option considering the various benefits it brings and also since it is having long life.

Further with continuously rising electricity costs it will help in achieving long term savings for the club and help improve cash flow.

Given below are the technical specifications and qualification criterion for the same.

Considering the long term nature and expected life of 30 to 35 years, It is very important that the technical specs are followed as mentioned below.

## **BILL OF MATERIAL**

The vendor will have to supply and install as per best engineering practices following items :-

<b>Sr.No.</b>	<b>Particulars</b>	<b>Units</b>	<b>Quantity</b>
1	Solar Photovoltaic Modules High efficiency Crystalline silicon Half cell type 550Wp each or higher	KWp	158
2	DC Cabling from Solar modules upto solar inverter	Lot	1
3	Solar On-grid Inverter	Set	1
4	AC LT Panel	Nos	1
5	Solar meter with MIP box	Set	1
6	NET meter	Nos	1
7	Solar Mounting Array structure	Lot	Suitable for above system
8	AC Cabling from solar system upto designated termination point	Lot	Suitable for above system
9	Fixing works of Module mounting structure	Lot	1
10	Earthing system and LA for above	Lot	Suitable for above system
11	Safety arrangements on rooftop (walkway and lifeline)	Lot	1
12	Water piping on Rooftop	Lot	1
13	Liasoning with AVVNL and Electrical Inspector for achieving net metering	Job	1

## TECHNICAL SPECIFICATIONS FOR ITEMS MENTIONED in BOM above

### **Solar Photovoltaic Modules:**

The PV modules used should be from Indian manufacturers only.

The modules should be of **crystalline** technology made with **144 Half cells**.

The module efficiency should be **21%** or greater and it should have a fill factor of 0.7 or higher.

Each module should be of **550Wp or higher Wattage**.

Make of Solar module should be in existence making solar modules since at least **10 years in solar modules**.

The Front glass should be of 3.2mm or higher thickness tempered glass.

The frame should be of Anodized Aluminium of minimum 30mm thickness or higher.

It should have a Junction box at back with in-built bypass diodes and of dust , water proof IP67 type or better. It should have solar cable leads with MC4 compatible connectors.

Only positive power tolerance modules shall be supplied. **No negative tolerance** modules to be used.

The solar module should have a power temperature coefficient of less than  $-0.40 \% / C$ .

The modules shall have product quality warranty of **10 years** and linear power output warranty of 25 years with maximum 80% degradation at end of 25 years.

Each PV module used in any solar power project must use an RFID identification Tag (RFID). The RFID can be inside or outside the module laminated, but must be able to withstand harsh environmental conditions. It must contain the following information;

- I. Name of the manufacturer of PV Modules and solar cells
- II. Month and year of the manufacturer (separately for solar cells and modules).
- III. I-V Curve for the module
- IV. Peak wattage,  $I_m$ ,  $V_m$ ,  $V_{oc}$ ,  $I_{sc}$  and FF for the module. V. Unique Serial No and Model No of the Module

### **Solar on-grid inverter :**

The system shall also include a solar on-grid inverter to convert DC into AC supply. The output from inverter should be three phase, 400/415VAC, 50Hz output. It should have peak efficiency of 98% or higher.

Inverter should have multiple MPPT feature, RS485 modbus port, DC disconnection switch inbuilt.

Inverter selection should be done carefully so that total output AC power rating of inverters is **NOT MORE THAN 1.30 DC to AC ratio**.

### **Meters and accessories**

Vendor has to provide both solar and net energy meters as per AVVNL norms.

A) solar meter with class 0.5s or 1s accuracy of Secure / L&T make only along with suitable MIP enclosure

B) Net meter with class 0.5s or 1s accuracy of Secure / L&T make only

All relevant terminations and cable connections in meter to be provided by vendor.

### **Solar Mounting Array Structure:**

The structures provided shall be of Aluminium extruded type / Galvanized Steel .

Structural materials shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. In case of Galvanizing should meet ASTM A-123 hot dipped galvanizing or equivalent which provides at least spraying thickness of 70 microns as per IS 5909, if steel is used.

The structures shall have minimum roof clearance of 60mm from top of roof sheet and be designed to allow easy replacement and maintenance of any module.

The mounting structure should be designed to withstand wind loads upto 120 kmph. Further the structure should provide a minimum gap between PEB roof top trough and solar module bottom frame of at least 65mm or higher.

Necessary **structural certificate** will have to be provided for the structure by vendor.

**Module mounting structure Fixing is in scope of vendor / bidder**

The roof will be of PEB shed type and vendor has to arrange proper fixing of the solar module mounting structure to the roof.

The fixing of mounting structure will have to be done by **NON-drilling / NON-rivet / NON-penetrative** technology only. This is to avoid water leakages in future.

### **DC Cabling and connectors**

The solar modules should be interconnected with Solar PV cable of 4 sq. mm or higher for each individual strings.

It should have be approved from TUV / VDE for complying to EN50618. The cable should be of minimum 4 sq. Mm. Conductor cross section.

The solar cable should be rated for 1500 VDC with maximum voltage of 1.8 KVDC from Lapp / Leoni makes only.

MC4 compatible solar connectors to be used for solar DC cables from Solar panels to Solar inverter.

All connections should be properly terminated, soldered and/or sealed from outdoor and indoor elements.

All DC Cables should be routed through outdoor suitable FRP / Hot dip GI cable trays

### **AC Cabling**

AC Cabling from solar AC LT panel onwards will be XLPE, Aluminium, 3C/3.5C with size of 185 sq.mm or higher.

AC Cables shall be of reputed makes only i.e. KEI / Havells / Finolex / Universal / Apar.

All terminations should be through properly sized lugs and glands

### **AC LT Panel**

Vendor has to provided an AC LT panel after solar inverter with following features.

Should be made of CRCA powder coated sheet steel.

It should have separate MCBs / MCCBs if multiple inverters are being used on Both incomer and Outgoing. In case of single inverter it will have single MCCB.

Current rating of MCCBs/MCBs to be at least 20% higher than AC output current rating of inverter.

All MCBs / MCCBs to be of suitable rating from makes Legrand / L&T / Schneider / ABB / Siemens makes only. Ics to Icu ratio of MCCB should be 1:1.

Should have SPD Type 2 from reputed makes only.

Should have a multifunction LCD display energy meter from Secure / Socomec/ Rishabh / L&T makes only along with suitable rating CTs of 0.5s accuracy.

### **Earthing and Lightning protection**

Vendor will have to supply chemical maintenance free earthing (3mtr length copper rod) specially for solar system. The earthing should be done to a depth of 3 mtr. Minimum 2 nos or more of earthing pits for solar plant to be provided.

Earthing connections should be through GI strip or insulated Copper wire of suitable rating.

Lightning arrestor to be provided with a separate dedicated earthing of chemical maintenance free earthing (3mtr length copper rod).

### **Online web monitoring facility**

Vendor will have to provide an online web monitoring facility so as to view solar plant performance data including inverter wise performance, energy and power trends and graphs, report generation, etc. including subscription for life, inverter warranty to be 10 years.

### **Water piping**

Vendor will have to supply and install water pipeline on solar modules rooftop area for regular cleaning.

Pipes and fittings should be of UPVC type only.

Various water tapping points to be provided for drawing water.

Material should be from reputed makes only i.e. Supreme / Astral / Finolex / Apollo.

### **Safety arrangements**

Safety is of great importance to avoid harm to manpower during cleaning and maintenance. Accordingly following have to be provided on rooftop.

Walkways so that manpower can move easily on rooftop for regular cleaning. It should be of FRP type with minimum thickness of 30 mm and of minimum width of 300mm or higher.

Further safety lifeline will have to be provided on rooftop. The lifeline should be designed in such a way that the whole roof is covered by manpower while being linked to lifeline.

Lifeline should be from following makes = 3M / Karam only.

### **Liasoning with AVVNL and Electrical inspector for achieving net metering**

Vendor will have to take complete responsibility for ensuring liasoning with AVVNL / other govt departments so as to achieve net metering.

Any govt fees / meter testing charges / security deposit / receiptable expense will be paid by Field club.

### **Warranty**

Solar modules should carry a **25 years linear power output warranty** and **10 years product warranty** against any manufacturing defects.

Solar inverters should carry **5 years** on-site warranty against any manufacturing defects.

All other items should carry a **5 year** on-sitewarranty.

### **Vendor should meet following eligibility criterion**

Should have dedicated permanent service center in Udaipur and have at least 2 engineers and should also maintain necessary spares in stock here.

Bidder firm should be incorporated and also Shouldbe in solar field since minimum of 4 years or more.

Should have completed at least 5 solar on-grid projects of 50 KW or higher in Udaipur district. These projects should be in satisfactory operation since more than 1 year. Vendor has to provide reference of such customers in below format table.

Preference will be given for manufacturer of solar module / solar inverter in tender.

Should have completed a minimum of 1 MWp of projects as a turnkey vendor on all India basis.

### **Routine operation and maintenance**

Post installation vendor will have to provide regular cleaning, washing and routine maintenance in case of Annual maintenance contract being provided to vendor.

Solar modules should be cleaned at least twice a month by vendor.

### **Field club scope will be limited to following :-**

Paying any Govt. – AVVNL - CEIG fees / security deposit / receiptable expenses  
Providing suitable MCCB at termination panel .

Providing water supply at rooftop single point.  
Providing rooftop access / ladder.

**Commercial Terms and conditions**

- a) The price quoted in table below should be inclusive of GST. (GST input to be provided to Field club.)
- b) Price should be inclusive of delivery to site and complete design, engineering, loading, unloading will be in vendor scope.
- c) Delivery and installation should be completed within 16 weeks from order.
- d) Payment for project cost will be 45% advance with order. 40% will be paid upon delivery of material. Remaining 15% amount will be paid within 15 days after satisfactory installation and commissioning and achieving net metering and Electrical inspector approvals.
- e) Payment for annual charges will be paid on half year basis in advance.
- f) Offer should be valid for 30 days from date of tender opening.



**DETAILS TO BE FILLED BY VENDOR**

<b>Details</b>	<b>Particulars to be filled by vendor</b>
Name of bidder	
Office Address	
GST no	
PAN No	
Date of Incorporation / registration of firm	

**TECHNICAL CHECKLIST**

**(to be filled by vendor)**

<b>S. No.</b>	<b>Technical particular</b>	<b>Vendor details (TO BE FILLED / TICKED)</b>
1	Solar Photovoltaic module technology should be mono Crystalline silicon PERC type with HALF-CELL technology	Yes / No
2	Make, model and Wattage of solar module offered ?	
3	Efficiency of solar module	_____ %
4	Mention solar module certification body. (Solar module offered should be certified by TUV rheinland / UL Labs / TUV Sud)	
5	Solar Module should be 144 half cells module of monocrystalline silicon type	Yes / No
6	Mention number of years since offered solar module is being sold in India market	_____ years
7	Solar module should have IP68 or better junction box behind with bypass diodes in-built	Yes / No

--	--	--

8	Total number of solar modules offered (Quantity to be mentioned)	
9	Power output Warranty for Solar PV Module	____ Years
10	Solar module should have MC4 compatible connectors	Yes / No
11	Solar module Structure type and clearance from roof top trough (in mm)?	
12	Describe Proposed method for Fixing of solar mounting structure ? should be by Non-drilling / non-penetrative method only	
13	Solar On-grid inverter to be with 3 phase, 400/415v, 50hz output	Yes / No
14	Solar on-grid inverter design DC to AC ratio ?	
15	Solar inverter should have DC disconnection switch	Yes / No
16	Solar inverter Peak efficiency and Euro Efficiency ?	
17	Make of solar meter and Net meter offered	
18	Make and size of solar cable ?	
19	Make, Type and size of AC cable?	
20	Make of AC Low voltage Switchgear ?	
21	Make of multifunction energy meter ?	
22	Accuracy class of CT in AC LT panel ?	
23	Make and type of water pipeline ?	
24	Make of safety lifeline ?	
25	Type of earthing pit and length of earthing rod ?	
26	Number of earthing pits offered ?	
27	Lightning arrestor offered (Yes / no) ?	
28	Year and month of establishment of bidder ?	
29	Years of experience in solar photovoltaic systems ?	

30	Bidder to mention address of service center in Udaipur ?	
31	Is bidder a manufacturer of solar module or solar inverter	Yes / No
32	Has bidder done projects in Udaipur district as EPC solution provider for solar on-grid systems ?	Yes / No
33	Total solar photovoltaic system capacity installed by bidder in MWp ?	
34	Number of engineers permanently stationed in Udaipur ?	

### **DEVIATIONS LIST**

**(Any deviations in tender conditions to be filled by vendor below)**

<b>S. No.</b>	<b>Tender clause</b>	<b>Deviation to be mentioned by vendor</b>
1		
2		
3		
4		
5		

**VENDOR CLIENT REFERENCE LIST TO BE PROVIDED**

**(for SOLAR On-grid systems of capacity more than 50 KWp in Udaipur.)**

<b>S. No.</b>	<b>Name of client</b>	<b>Address</b>	<b>Capacity (KWp)</b>	<b>Month and year of installation</b>	<b>Contact person name and contact no</b>
1					
2					
3					
4					
5					
6					
7					
8					

--	--	--	--	--	--

**PRICE SCHEDULE**  
**(To be filled by vendor)**

**Part 1 = PROJECT COST**

<b>S. No.</b>	<b>Particulars</b>	<b>Price in Rupees (figures) (Inclusive of GST)</b>	<b>Price in Rupees (words) (Inclusive of GST)</b>
1	Price for supply and installation of complete solar system 158KWp as mentioned above		

**Part 2 = Annual Operation and maintenance cost**

<b>S. No.</b>	<b>Particulars</b>	<b>Price in Rupees (figures) (Inclusive of GST)</b>	<b>Price in Rupees (words) (Inclusive of GST)</b>
1	Price for regular cleaning and maintenance of solar system on per annum basis alongwith escalation if any		