

1. PV panel assembly may consist of different number of modules with maximum of 10 PV modules.
2. Each panel assembly shall incorporate one bird repellent spike at a level higher than the panel upper edge. The location of the spike should be selected for minimum shadow effect.
3. Support structure of panel assembly shall be fabricated using corrosion resistant GI or anodized aluminum or equivalent metal sections.
4. Array support structure welded joints and fasteners shall be adequately treated to resist corrosion.
5. The support structure shall be free from corrosion when installed.
6. PV modules shall be secured to support structure using screw fasteners and/or metal clamps. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frames. Module fasteners / clamps shall be adequately treated to resist corrosion.
7. The support structure shall withstand wind loading of up to 150 km/hr. Bidder shall provide the test Certificate complying the requirement.
8. Adequate spacing shall be provided between any two modules secured on panel assembly for improved wind resistance.
9. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.
10. It is required to design the grid structure (on which PV module will be installed) in such a way that all loads are transferred to the existing columns of the buildings. Such grid design should be presented to ITI, which will be certified by structural engineers.
11. The panel assembly structure should be installed in a manner to leave sufficient space for repair and maintenance aspects of the rooftops, particularly for leakages.
12. Installation of panel assembly should not tamper with the water proofing of roofs.

4. Array Structure

1. Hot dip galvanized (minimum of 80 Microns) MS mounting structures may be used for mounting the modules / panels / arrays. Each structure should have angle of inclination



as per the site conditions to take maximum isolation. However to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance ratio requirements.

2. The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where a PV system is proposed to be installed. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed.
3. The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS4759.
4. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, and nuts and bolts. Aluminium structures also can be used which can withstand the wind speed of respective wind zone.
5. Necessary protection towards rusting need to be provided either by coating or anodization.
6. The fasteners used should be made up of stainless steel. The structures shall be designed to allow easy replacement of any module. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from the SPV panels
7. The bidder need to supply suitable structures based on the quality of roof and considering the load bearing capacity of the roof / civil structures of the proposed building.

5. Electrical:

1. HT distribution grid specifications 11 kV+/- 5%, 50Hz and frequency variation as per IE rules.
2. The output of the inverter shall be shall be fed into 11 kV HT 3phase AC HT grid supplied via step up transformer and HT circuit Breaker.
3. The inverter output shall be connected to HT line prior to the HT/DG changeover switch. The mandatory islanding protection provided by inverter shall isolate the Solar PV power plant.
4. The time of day (TOD)3phase,digital AC load energy meter shall be installed in



5. The Main Distribution Box to monitor energy drawn by building load and in the AC distribution box to monitor energy generated by Solar PV power plant.
6. The load energy meter operation shall be completely independent of the plant AC energy meter.
7. The energy meters shall be provided with communication interface and necessary data cables for remote monitoring.

6. Data Acquisition System

1. Data Acquisition System shall be provided for both Grid connected solar PV plants.
2. Computerized DC String / Array monitoring and AC output monitoring shall be provided as part of the inverter and /or string/array combiner box or separately.
3. String and array DC Voltage, Current and Power, Inverter AC output voltage and current, AC power ,Power Factor and AC energy and frequency shall be monitored.
4. The time interval between two sets of data shall not be more than 3 minutes. Data Acquisition System shall have real time clock, internal reliable battery backup and data storage capacity to record data round the clock for a period of minimum one year.
5. Computerized AC energy monitoring shall be in addition to the digital AC energy meter.
6. The date shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible .The data shall be represented in both tabular and graphical form.
7. All instantaneous data shall be shown on the computer screen.
8. Software shall be provided for USB download and analysis of DC and AC parametric data for the plant.
9. A desktop computer with latest configuration along with LCD Display (32|Min) shall be provided
10. Provision for internet monitoring and download of data shall be also incorporated.



11. Software for centralized internet monitoring system shall be also provided for download and analysis of cumulative data of the plant and the data of the solar radiation and environment monitoring system.
 12. A data logging system (Hardware and Software) for plant control and monitoring shall be provided.
 13. Remote Supervisory Control and data acquisition through SCADA or equivalent software at the purchasers location with latest software/hardware configuration and service connectivity for online / real time data monitoring/control complete to be supplied and operation and maintenance/control to be ensured by the supplier.
 14. **Disconnection and Islanding:** Disconnection of the PV plant in the event of loss of the main grid supply is to be achieved by in built protection within the power conditioner; this may be achieved through rate of change of current, phase angle, unbalanced voltage or reactive load variants.
 15. Operation outside the limits of power quality as described in the technical data sheet should cause the power conditioner to disconnect the grid. Additional parameters requiring automatic disconnection are:
Neutral voltage displacement Over current Earth fault and reverse power in case of the above, cases, tripping time should be less than (15 seconds Response time in case of grid failure due to switch off or failure based shut down should be well within seconds. In case of use of two PCUs capacity suitable equipment for synchronizing the AC output of both the PCUs to the ACDB/Grid should be provided. Automatic reconnection after the grid failure should restore.
 16. PCU shall have the facility to reconnect the PCU automatically to the grid, following restoration of grid, subsequent to grid failure condition. And also the facility to connect the system with load at grid failure condition for essential power supply.
 17. ITI must be provided with access to online monitoring of the system along with user authority.
 18. Suitable equipment for DG synchronizations shall be provided.
7. **Operating Environment**
- a. Temperature: 5 to 55 Deg .C.
 - b. Relative Humidity:100% @ 40 Deg .C



- c. Precipitation:2.46mm per day(Annual average)
- d. CleannessIndex:0.62(Annual average)
- e. Wind Speed: up to 150km/hr.
- f. Corrosion :high
- g. Dust :moderate to high
- h. Bird Interference :high
- i. Bird Droppings: frequent and large Trees: large and in abundance.

8. Connectivity

The maximum capacity for interconnection with the grid at a specific voltage level shall be as specified in the Distribution Code/Supply Code of the State and amended from time to time. Following criteria have been suggested for selection of voltage level in the distribution system for ready reference of the solar suppliers

Plant Capacity	Connecting voltage
Survey, Design, Fabrication, Supply, Installation, Testing and Commissioning of 1200 KWp Grid Connected Solar PV Power Plant GROUND MOUNTED Net-Metering with Zero Export Policy with 05 Years of Comprehensive, Operation & Maintenance Contract at ITI Limited, Mankapur ,Gonda 271308 (UP).	3 Phase/ 11KV

Utilities may have voltage levels other than above; DISCOMS may be consulted before Finalization of the voltage level and specification is made accordingly.

9. Testing ,Certification and Approval Schedule

All components, sub-assemblies and system test parameters shall be verified on site to ensure they meet the specifications.

A. Plant Power Performance Ratio Testing



The successful bidder shall be required to meet minimum guaranteed generation with Performance Ratio (PR) at the time of commissioning and related Capacity Utilization Factor (CUF) as per the GHI levels of the location during the O&M period. PR should be shown minimum of 75% at the time of inspection for initial commissioning acceptance to qualify for release of applicable incentive. Minimum CUF of 15% should be maintained for a period of 5 years. Correction shall be applied based on available solar radiation.

B. Plant Energy Performance Ratio Testing

The overall energy performance ratio of the system shall exceed 75%. (Sum total of the system energy losses shall not exceed 25%). For global solar insolation in the Plane of Array (PoA) of 5 kWh/m² (5 Peak Sun Hours) for the day. 1200kWp PV power plant AC energy output shall be minimum of 4500 kWh (1200kW x 0.75 x 5 hrs.) for the day.

10.Operation and Maintenance (O&M) Schedule

- i. Cleaning of solar PV modules with soft water ,wet and dry mops: Weekly
- ii. DC String /Array and AC Inverter monitoring: Continuous and computerized.
- iii. AC Energy monitoring: Continuous and computerized.
- iv. Visual Inspection of the plant :Monthly
- v. Functional Checks of Protection Components and Switchgear: Quarterly.
- vi. Spring Clean PV Array and Installation Area: Quarterly.
- vii. Inverter, transformer, data acquisition, energy meters and power evacuation checks: Half Yearly.
- viii. Support structure and terrace waterproofing checks: Yearly.
- ix. O&M log sheet shall be provided and maintained.
- x. The repair/replacement work shall be completed within 48 hours from the time of reporting the fault.
- xi. A half-yearly performance report of the plant inclusive of energy generation data shall be provided as per approved format. All recorded data for the first 5 years shall be preserved in both manual and computer format and submitted at hand over.

11.Comprehensive Maintenance Contract(CMC)



- (i) The complete Solar PV Power Plants must be guaranteed against any manufacturing / design/ installation defects for a minimum period of 5years.
- (ii) PV modules used in Solar PV Power Plants must be guaranteed for their output peak watt capacity, which should not be less than 90% at the end of 12 years and 80% at the end of 25 years.
- (iii) During the CMC period, ITI Ltd. will have all the rights to cross check the performance of the Solar PV Power Plants. ITI Ltd. may carry out the frequent inspections of the Solar PV Power Plants installed and randomly pick up its components to get them tested at Govt. / MNRE approved any test center. If during such tests any part is not found as per the specified technical parameters, ITI Ltd. will take the necessary action. The decision of ITI Ltd. in this regard will be final and binding on the bidder.

a. Warranties and Guarantees

1. **Inverter:** Workmanship /product replacement for 5 years,
2. **Power Evacuation and Metering Equipment:** Workmanship/ product replacement for 10 years,
3. **BoS :**Parts and Workmanship for 10 years,
4. **Power Plant Installation:** Workmanship for 10 years,
5. **PV Array Installation :**Structural for 30 years.
6. **Power Plant Power Performance Ratio:** min 75%
7. **Power Plant Energy Performance Ratio:**min.75%



APPENDIX- I (A)

Bidders Information Sheet

Bidder shall provide the information requested in the corresponding Information Sheet included here under.

Sr. No.	Particulars	
1.	Name & Mailing Address of firm	
2.	Contact Person Name, Designation & Contact No.	
3.	E-mail Address for correspondence	
4.	Firm Website Address	
5.	Firm Status (Private / PSU / Incorporate / Proprietor)	
6.	Establish Year of firm	
7.	PAN/ TAN No.	
8.	Firm Registration No / ROC	
9.	STR/ VAT / TIN No	
10.	Turnover 2017-18, 2018-19 & 2019-20 (in Lakhs)	
11.	Company Profile (<100 words)	
12.	Skilled manpower	
13.	Experience in SPV Power Plant (<100 words)	
14.	Experience in other solar projects (<100 words)	
15.	Solar related Product Range	
16.	Experience in Guarantee, Maintenance & After Sales Services (Years)	
17.	Accreditation	
18.	List of ISI, ISO, Other cert.	
19.	Technical specification for solar photovoltaic cell / panel / module- make	
20.	Technical specification for Battery-optional – quantity and make	
21.	Technical specification for Junction boxes- quantity and make	
22.	Technical specification for Inverter / Controller quantity and make	



Sr. No.	Particulars	
23.	Technical specification for Cables- quantity and make	
24.	Other Technical specification, if any	
25.	Has any Govt. / Under - taking ever debarred the company / firm from	
26.	Special Remarks, if any	
27.	Attached are copies of the necessary original documents.	
I.		
II.		
III.		

It is certified that the information provided above is true to the best of my knowledge and belief. If any information found to be concealed, suppressed or incorrect at later date, our tender shall be liable to be rejected and our company may be debarred from executing any business with ITI Ltd.

Date:

Signature of Bidder:

Name:

Designation:



APPENDIX- I(B)

Annual Turnover

Each Bidder must fill in this form including private/public limited company.

Annual Turnover Data for last 3 Years (FY 2017-18, 2018-19 & 2019-20)	
Year	Rs in Lac
2017-18	
2018-19	
2019-20	
Total	

The information supplied should be the Annual Turnover of the Bidder in terms of the amounts billed to clients for each year for work in progress or completed.

Signature of Applicant:

Signature & Seal of Practicing Chartered Accountant

Membership No.:

UDIN No: