

Specification Requirement for 10 kW MicroGrid System

CONTENT

1. SCOPE
2. APPLICABLE STANDARDS
3. CLIMATIC CONDITIONS OF THE INSTALLATION
4. GENERAL TECHNICAL REQUIREMENTS
5. MARKING
6. TESTS
7. TYPE TEST CERTIFICATES
8. PRE-DISPATCH INSPECTION
9. INSPECTION AFTER RECEIPT AT STORES
10. GUARANTEE
11. PACKING
12. QUALITY CONTROL
13. TESTING FACILITIES
14. MANUFACTURING FACILITIES
15. DRAWINGS AND DOCUMENTS
16. SCHEDULE "B" DEVIATIONS

1. **SCOPE:**

The specification covers the designing, Supplying, Installing and Commissioning of Off Grid Mini Grid (power plant), assembly, stage inspection, final inspection and testing before dispatch, packing and delivery at destination stores by road transport, transit insurance of Solar PV Module, complete with all fittings, accessories, associated, equipment's and spares, etc.

2. **APPLICABLE STANDARDS:**

Required for its satisfactory operation shall conform to IEC 61215:2005 and IS 14286:2010 (with latest amendments). The Solar PV Module shall conform in all respects to highest standards of engineering, design, workmanship, this specification and the latest revisions of relevant standards at the time of offer and the employer shall have the power to reject any work or material, which, in his judgment, is not in full accordance therewith.

The PV modules must conform to the latest edition of the following IEC / equivalent BIS Standards for PV module design qualification and type approval:

Sl. No.	Standard	Description
1.	IS 12834 : 2013	Solar Photovoltaic Energy Systems- Terms, Definitions and Symbols
2.	IEC: 61215/IS: 14286	Crystalline silicon terrestrial photovoltaic modules – Design qualification and type approval.
3.	IEC: 61730 Part 1	Photovoltaic (PV) module safety qualification – Requirements for construction.
4.	IEC: 61730 Part 2	Photovoltaic (PV) module safety qualification – Requirements for testing.
5.	IEC: 61701/IS: 61701	Salt Mist Corrosion Testing of the module
6.	IEC: 62716	Test Sequence useful to determine the resistance of PV Modules to Ammonia

3. CLIMATIC CONDITIONS:

1	Maximum ambient temperature	50 deg C
2	Max. Daily average ambient temp	45 deg C
3	Min Ambient Temperature	0 deg C
4	Maximum Humidity	99.7%
5	Average Annual Rainfall	150cm
6	Average No. of rainy days per annum	140
7	Altitude above MSL not exceeding	1200m
8	Wind Pressure	300 Km/hr
9	Earthquakes of an intensity in horizontal direction	equivalent to seismic acceleration of 0.3g
10	Earthquakes of an intensity in vertical direction	equivalent to seismic acceleration of 0.15g (g being acceleration due to gravity)

TPCODL service area has heavy saline conditions along the coast and High cyclonic Intensity winds with speed up to 300 Kmph. The atmosphere is generally laden with mild acid, dust in suspension during the dry months, and is subjected to fog in cold months.

4. GENERAL TECHNICAL REQUIREMENTS:

The general Technical Parameters are given here under:

Section I - Designing, Supplying, Installing and Commissioning of Off Grid Mini Grid (power plant)			
Parameters	Plant 20 kW AC	Plant 15 kW AC	Plant 10 kW AC
Load Power (KWac)	20.1	15.075	10.05
Battery Backup (Hrs)	5	5	5
Solar Capacity (kWp)	48.60	36.72	24.84
Battery (48V) Advance VRLA AGM (AH)	3,000	2,000	1,500
No. of Panels (No's)	90	68	46
Inverter and CCU	- Suitably sized 48V dc hybrid bidirectional Inverter's system with 230V, 50 Hz Pure sine wave output - Independent MPPT charge controllers with paralleling capabilities, - the inverter shall have at least 300% surge capability for 3 Sec at rated operating temperature.		
Output Voltage	415 V, 3 phase 4 wire system		
Module Type and Size	Mono Crystalline 540 Wp modules and above		
MMS	- Fixed Tilt-20 Degree-200 kmph Ground-mount system HDG 120microns, (SS 304 fasteners) - GA drawings to be provided along with Bid		
MMS Foundation	- Pile/ open type RCC foundation suitable for 200 kmph wind speed to be provided by the bidder along with BID document. - Successful bidder if required shall conduct soil investigation and accordingly submit design for Pile/ Open type RCC foundation suitable for 200 kmph wind speed supported with STAAD report for further approval of TPCODL.		
Control room	- Suitably sized not less than 15 ft x 14 ft control room shall be made, construction drawings for the Civil works to be provided by the bidder along with bid document. - Type of Structure: RCC Framed Grade - M-20 Roof: RCC M-20 - Floor: Indian Patent Stone (IPS grade M-15) - Wall Finish: Cement Plaster (1:4) with internal Oil Bound Distemper paint and External Cement Based paint (Snowcem/equivalent) - Door & Window: Mild steel frame and shutter for Door and Windows including protective grill for Window.		

	Electrical : For Internal Exhaust Fan and LED Tube light 20w ; For External LED Bulb 9W
Monitoring System	Integrated remote monitoring and Control system
Other Parameters	- Convention spike type Lightning Arrestor for solar array area and type 2 Surge arrestor for all DCDB/ AJB and ACDB - Chemical earthing minimum 2 M, Qty can be designed to maintain the 5 Ohm of Earth resistance. - Lighting for solar power plant. - All cable lugs, bus bars excluding T&D line should be copper - Control room must be designed to accommodate all the equipment with air circulation system - Control room flooring shall be designed keeping the battery load as recommended by battery manufacturer - Manual Module Cleaning system should provide from nearest water tab area - Plant Boundary should be made by Barbed wire and cement pole. - Minimum height of plant boundary should be 2mtr. - One mild steel gate should be at main entrance of plant and the size of the gate should be 5ftx4ft. - All Civil Work including control room foundation, should be suitable for site soil condition and 200 kMPH wind speed
Designing, supplying, Installing & Commissioning-Ground Mount System	- Complete designing, supplying, installing & commissioning off grid solar plant - Complete project painting with necessary markers and signages - The agency shall deploy quality and safety personnel to ensure best quality and security during installation and commissioning. - The agency shall ensure checks of critical material at source - Galvanised (120 micron) PV structure should be installed

CHARGE CONTROLLER:

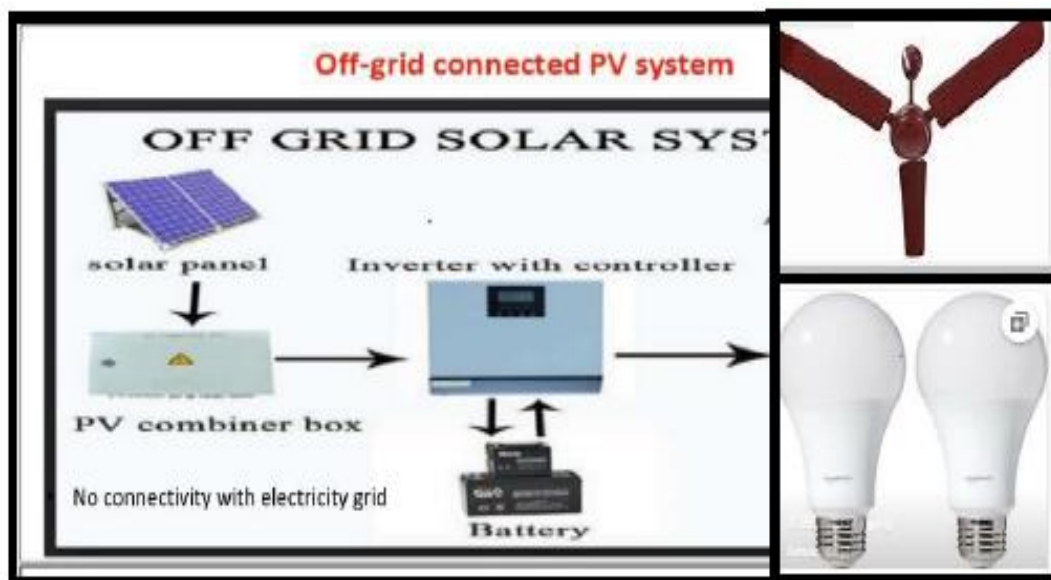
Status LED Indicators	Input Availability, Load Availability and Battery Condition
Ingress Protection	IP 20 with Ingress Protection

INDICATORS: The system should have following indicators:

- When Solar power is available to the panel - LED is ON, or else LED OFF
- The battery indicator should blink and indicate the charging under progress through sun-light
- The battery indicator should blink and indicate the charging under progress through grid
- The respective blinking of indicators (as per b & c above) should illuminate continuously ON when battery is fully charged
- When load is ON, an indicator must get switch ON
- Red indicator should indicate the battery 'Load Cut Off' condition

Section II - T&D and Metering - (To be decided during Pre-Bid Meeting)		
T&D	T&D line for each plant not exceeding length of 3 kms shall be suitably designed and constructed in joint consultation with TPCODL and qualified bidder	
	Description	Key Requirement
	Supply of Pole as per REC guidelines	Pre-Stressed Cement Concrete Electric Poles (PSC), 9mtr, 300 kg
	Installation of poles with concrete foundation as per REC guidelines	1500x 500x500 mm (Ref.drawing REC/DDUGJY/GEN/01)
	Cable Laying	AB Cable minimum size of (3x50+1x 35) sq.mm & (1x35+1x25) sq.mm
Meters	Qualified bidder shall provide single phase prepaid meters, the quantity and make and specs shall be decided in consultation with TPCODL & bidder which is suitable for the geography/ site.	
Power cable, Service cables and switch board	- Power cable: Ariel Bunched Conductor of a suitable size & capacity - Service Cable: 2 C x 4 sq mm, Al, Un-armoured cables up to length of 30 mtrs for pole or each house hold shall be provided by bidder - The bidder shall provide modular Switch Board with 3 switches, 1 five pin socket and 1 single pole MCB of 6 A rating, - All switches, sockets and MCB shall be BIS approved.	

Off Grid Connected PV system-



Guaranteed Technical Particular

S.N.	Description	Units/Nos	Requirement
1	Name of manufacturer/ Bidder		
2	Product Name		
3	Applicable standards		
4	Solar panel		Vikram, Adani, Trina, Longi, Renewsys, Waaree, or as per ALMM list of MNRE
	Name of Product		
	Company		
	Panel capacity	Panel	540W/
	Overall panel size		to be submitted by bidder
	Manufacturer of solar cell		Reputed
	PV Model Material		Mono crystalline
	Array Size		to be submitted by bidder

5	Inverter	1	48V dc hybrid Bidirectional (loss not more than 5%)
	Make		Havells, K-star, Fronious, Power one, Radius, Growatt, Sungrow, Polycab or as per ALMM list of MNRE
	Output voltage		415 V, 3 phase 4 wire system
	Surge capability		to be submitted by bidder
6	Charge control unit		to be submitted by bidder
7	Battery		48 V DC with back up of 5 hr capacity
	Make-		Exide, okaya, luminous, Amaraja, Amaron
	Ampere hour capacity	Ah	Submitted by bidder
8	Electric pole		9 Mtr PSC
9	AB Cable minimum size		(3x50+1x 35) sq.mm
			(1x35+1x25) sq.mm
10	Meter And Accessories cables		To submitted by bidder
	Meter Make		L&T, Secure, Genus, HPL
	Cables (AC/DC)		Havells/Polycab/LAPP
11	ACDB		As per specification define by MNRE
12	Array junction box/DCDB		L&T/CITEL/Havells/
13	Earthing and lightening arrestor		As per standard
Additional parameter to be provided during bid			

5. **MARKING:**

There should be a name plate fixed inside the module which will give:

- Name of the manufacturer or Distinctive Logo.
- Name of the Scheme
- Name of DISCOM/Power Department(TPCODL)
- Model Number
- Unique Serial Number
- Year of Manufacture
- A distinctive serial number starting with NSM will be engraved on the frame of the modules or screen printed on the tender sheet of the module.

6. TESTS:

The scope of supply includes the provision of type test. The equipment offered should have been successfully type tested within five years from date of tender and the designs should have been in satisfactory operation for a period not less than three years as on the date of order. Compliance shall be demonstrated by submitting, (i) authenticated copies of the type test reports and (ii) performance certificates from the users, preferably from Central Govt./State Govt. or their undertakings.

7. TEST CERTIFICATES: -

The Bidder shall furnish the type test certificates for the tests as per the corresponding standards. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, it shall be carried out without any cost implication to TPCODL.

8. PRE-DISPATCH INSPECTION:

The material shall be subject to inspection by a duly authorized representative of the TPCODL. Inspection may be made at any stage of manufacture at the discretion of the purchaser and the equipment, if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacturer to TPCODL's representative at all times when the work is in progress. Inspection by the TPCODL or its authorized representatives shall not relieve the bidder of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by TPCODL.

Following documents shall be sent along with material.

1. Test reports
2. MDCC issued by TPCODL
3. TPCODL Invoice in duplicate
4. Packing list
5. Drawings & catalogue
6. Guarantee / Warrantee card
7. Delivery Challan
8. Other Documents (as applicable).

9. INSPECTION AFTER RECEIPT AT STORE:

The material received at TPCODL store will be inspected for acceptance. The Engineer reserves the right to reject the material if on testing, the efficiency of panels is lower than the declared efficiency beyond tolerance limit as per IS /IEC or specified in technical particular from the guaranteed value including tolerance as per this specification and if any of the test results do not match with the values, given in the guaranteed technical particulars and as per technical specification.

10. GUARANTEE:

The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. PV Modules used in Solar Home Lighting System must be warranted for their output peak watt capacity, which Should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty-five (25) years.

Warrantee	• Overall: 5 years standard performance warranty • Battery: 5 years • Other Equipmengts: 1 year
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Comprehensive AMC should be for five years for entire product.

Bidder shall be liable to undertake to replace/rectify such defects at own costs, within mutually agreed time frame, and to the entire satisfaction of TPCODL, failing which TPCODL shall be at liberty to get it replaced/rectified at bidders risk and costs and recover all such expenses plus the company's own charges (@20% of expenses incurred), from the bidder or from the "Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for free replacement for another period of THREE years from the end of the guarantee period for any "Latent Defects" if noticed and reported by TPCODL.

11. PACKING AND TRANSPORT:

Supplier shall ensure that all material covered by this specification shall be prepared for rail/road transport (local equipment) and be packed in such a manner as to protect it from damage in transit. The bidder shall provide instructions regarding handling and storage precautions to be taken at site.

12. QUALITY CONTROL:

The bidder shall submit QAP indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished. The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/ Sub-supplier's works to carry out inspections.

13. TESTING FACILITIES:

Supplier/ Manufacturer shall have adequate in house testing facilities for carrying out all routine tests & acceptance tests as per relevant Indian standards.

14. MANUFACTURING FACILITIES:

The successful bidder shall submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer.

15. DRAWINGS AND DOCUMENTS:

- a) The contractor shall furnish, within fifteen days after issuing of Letter of Award, Six copies each of the following drawings/documents incorporating the Solar PV module rating and efficiency for approval:
 - i. Detailed overall general arrangement drawing showing front and side elevations and plan of the Module and all accessories with details of dimensions, net weights and shipping weights, etc.
 - ii. Name plate drawing and connection diagrams.
 - iii. Interconnection diagrams.
 - iv. Technical leaflets of major components and fittings.
 - v. As built drawings of schematics, wiring diagram etc.
 - vi. Completed technical data sheets.
- b) All drawings, documents, technical data sheets and test certificates, results calculations shall be furnished.
- c) Any Approval given to the detailed drawing by the Employers shall not relieve the contractor of the responsibility for correctness of the drawing and in the manufacture of the equipment. The approval given by the employer shall be general with overall responsibility with contractor.

Training- Bidder need to give adequate assistance after commissioning to the operation and maintenance team.

16. SCHEDULE "B" DEVIATIONS:

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications:

S.No.	Clause No.	Details of deviation with justifications

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature
Designation