

TECHNICAL SPECIFICATION FOR GRID TIED ROOFTOP SOLAR POWER PLANT

Supply, Installation, Testing & Commissioning of 10 kW (3-Phase) Grid-Tied Rooftop Solar Power Plant

1. Scope of Work

The work shall consist of design, supply, installation, testing, commissioning, synchronization with utility grid, obtaining statutory approvals, and successful operation of a **10 kW (Three Phase) Grid-Tied Rooftop Solar Power Plant** complete in all respects, including Solar PV Modules, Inverter, Module Mounting Structure, ACDB, DCDB, Earthing, Lightning Protection System, Cabling, Monitoring System and all associated accessories required for satisfactory operation.

The contractor shall be responsible for all liaison work with concerned authorities including DISCOM, CEIG, State Nodal Agency and other statutory authorities for successful commissioning of the system.

Excluded from contractor's scope:

- GEDA Application Fees
- Solar Connectivity Charges
- Meter Connectivity Charges
- Meter Testing Charges

2. Applicable Standards

The complete system shall conform to the latest editions of:

- MNRE Guidelines
- ALMM (Approved List of Models and Manufacturers)
- IEC 61215
- IEC 61730
- IEC 62804
- IEC 62109
- IEC 61683
- IEC 61727
- IEC 62116
- IEC 60364
- IS 14286
- IS 61730
- CEA Regulations
- CEIG Requirements
- DISCOM Requirements
- GEDA/MNRE Specifications

3. Solar PV Modules

General Requirements

- Solar Modules shall be ALMM approved.
- Mono Crystalline High Efficiency Technology.
- Total Installed Capacity: **10 kWp Minimum**
- Module wattage shall be selected to achieve minimum 10 kWp capacity.

Technical Specifications

Parameter	Requirement
Frame Material	Anodized Aluminum Alloy Frame with Twin Wall Profile
Front Cover	High Transmission Low-Iron Tempered Glass with AR Coating
Power Tolerance	0 / +5 W
Module Efficiency	18% to 21% or higher
Fill Factor	Minimum 75%
NOCT	Approx. 45°C
Temperature Coefficient	Better than or equal to -0.45% / °C
Junction Box	IP67, MC4 Compatible

Parameter	Requirement
Protection	Integrated Bypass Diodes
Quality Test	100% Electroluminescence (EL) Testing
Certification	IEC/MNRE/ALMM Approved

Energy Generation

The system shall generate an average of:

4 to 5 Units per kW per Day (Annual Average Basis)

The bidder shall guarantee system performance as per design calculations.

Warranty

- Product Warranty: Minimum 10 Years
- Linear Power Output Warranty: Minimum 25 Years

4. Grid-Tied Solar Inverter

The inverter shall be string type grid-interactive inverter suitable for rooftop solar applications.

Technical Specifications

Parameter	Requirement
Type	Grid Interactive String Inverter
MPPT Voltage Range	80 V – 1000 V
Maximum Efficiency	97.5% to 98.9%
Output Frequency	50/60 Hz
Operating Altitude	≤ 4000 m
Output Power Factor	Approximately 1
Output THDi	Less than 3%
Operating Temperature	-25°C to +60°C
Protection Degree	IP65 Minimum
Display	LCD Display
Monitoring	Mobile App & Web Monitoring

Integrated Protections

- Anti-Islanding Protection
- Input Reverse Polarity Protection
- Insulation Resistance Monitoring
- Residual Current Monitoring Unit (RCMU)
- Output Over Current Protection
- Output Short Circuit Protection
- Output Over Voltage Protection
- Surge Protection
- Ground Fault Protection

The inverter shall comply with IEC 62109, IEC 61727 and IEC 62116.

5. Data Logger and Monitoring System

The inverter shall be provided with:

- Wi-Fi Communication Facility
 - GPRS Communication Facility
 - Cloud Based Monitoring Portal
 - Mobile Application Monitoring
 - Remote Data Access
 - Daily, Monthly and Annual Generation Reports
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6. Module Mounting Structure (MMS)

The mounting structure shall be designed considering wind load, dead load and seismic conditions applicable to the site.

Material Requirements

- Seamless Box Pipe and/or C Channel Construction
- Hot Dip Galvanized Steel Structure
- Minimum Zinc Coating: 80 Microns
- Suitable for Rooftop Installation

Structure Design

The structure shall be capable of supporting:

- Solar Modules
- Cabling
- Earthing Conductor
- Sprinkler System (if any)
- Maintenance Load
- Wind Load

Foundation

The contractor shall provide:

- RCC Foundation/Base Plate Arrangement
- J-Bolts
- Anchor Fasteners
- Chemical Anchors where required
- Wall Mount Arrangement wherever applicable

Fasteners

All nuts, bolts, washers and hardware shall be:

SS 304 Grade Stainless Steel

7. DC Cabling

- UV Resistant Solar DC Cables
- Copper Conductor
- XLPO Insulation
- IEC Certified
- Suitable voltage rating for system voltage

Cable sizing shall ensure voltage drop within permissible limits.

8. AC Cabling

- Copper Conductor Armoured/Unarmoured Cable as required
- FRLS Insulation
- IS Marked

Voltage drop shall not exceed prescribed standards.

9. DC Distribution Board (DCDB)

The DCDB shall include:

- DC Isolator
 - String Monitoring (if required)
 - DC SPD Type-II
 - Fuse Protection
 - Suitable Enclosure IP65
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10. AC Distribution Board (ACDB)

The ACDB shall include:

- MCCB/MCB
- Surge Protection Device
- Energy Meter Interface
- Isolator

- Indication Lamps
- Protection Relays as required

Enclosure shall be IP65 rated.

11. Earthing System

The solar plant shall be provided with separate maintenance-free earthing system.

Minimum Earth Pits:

- Module Structure Earthing
- DC Earthing
- AC Earthing
- Lightning Arrester Earthing

Earth resistance shall be maintained as per MNRE/CEA norms.

12. Lightning Protection System

A complete Lightning Arrestor System shall be provided including:

- Air Terminal
- Down Conductor
- Earth Electrode
- Test Link

The system shall comply with relevant IS/IEC standards.

13. Testing & Commissioning

The contractor shall carry out:

- Insulation Resistance Test
- Continuity Test
- Earthing Test
- Inverter Functional Test
- String Performance Test
- Synchronization Test
- Generation Verification

All testing instruments shall be calibrated.

14. Documentation

The contractor shall submit:

- System Design Calculations
 - Single Line Diagram (SLD)
 - Structural Drawings
 - Datasheets of Major Components
 - Test Certificates
 - Warranty Certificates
 - Commissioning Reports
 - As-Built Drawings
 - Operation & Maintenance Manual
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15. Statutory Approvals & Liaisoning

The contractor shall carry out complete liaison work and obtain approvals from:

- State Nodal Agency
- DISCOM
- CEIG
- Any Other Statutory Authority

Necessary documents, drawings, reports and applications shall be prepared and submitted by the contractor.

16. Measurement

Measurement shall be made on completed and commissioned basis in **kWp (Kilowatt Peak)** of installed solar power plant.

17. Rate

The quoted rate shall include:

- Design
- Supply
- Transportation
- Loading/Unloading
- Installation
- Testing
- Commissioning
- Civil Foundation Work
- Cabling
- Earthing
- Lightning Protection
- Monitoring System
- Documentation
- Liaisoning Charges
- All Labour, T&P and Consumables

Unit: Per kWp

18. Brand

The work of supplying, installing, and commissioning the Solar Panel, including all associated ancillary works, shall be carried out using products manufactured by **Waaree Energies Ltd., Goldi, Tata Power Solar, Adani Solar, Rayzon Solar or an equivalent** manufacturer, subject to obtaining prior approval from the APMC.

Item Description:

Supply, Installation, Testing & Commissioning of 10 kW (3-Phase) Grid-Tied Rooftop Solar Power Plant complete in all respects as per technical specifications, drawings, MNRE/GEDA/DISCOM/CEIG requirements and directions of Engineer-in-Charge.