DETAILED TECHNICAL SPECIFICATIONS AND DESCRIPTION

for

Supply and installation of 15 kW ground-mounted hybrid solar PV system for water pump at Barubeda village, Ranchi (Jharkhand).

Quantity – 01 UNIT

A. Solar PV Modules

- **Bluebird Solar:** mono-perc solar PV panel; total 28 modules
- Individual Solar PV Module of capacity 550Wp
- Peak Power @ STC: 550W,
- Open circuit voltage @ STC: 49.70V
- Short circuit current @ STC: 13.83 A
- Junction box: IP68, Split Junction Box with 3 individual bypass diodes
- Maximum System voltage: 1500V DC
- Operating temperature range – 40°C to + 85 °C
- Warranty: 12 years' product warranty; Performance Warranty: Linear Power Warranty for 30 years with 2% for 1st year degradation and 0.55% from year 2 to 30 year
- Mounting both horizontal and vertical assembly, Connections Connector Type-MC4, connecting cables are included.
- Module efficiency Greater than 19%

B. Power Conditioning Unit (PCU):

- The PCU consist of a charge controller and a bi-directional inverter which have their dc terminals connected to the dc bus output of the battery.
- **Deye 3 phase hybrid solar inverter**: 02 Nos.
- The inverter operates independently in both in grid connected and islanded mode and it automatically switches the modes as per the user settings
- Rated Capacity of each inverter: 8 kW
- Solar PV array input 160-800V
- Charge controller MPPT
- MPPT Voltage Range 200-650V
- Battery input voltage 40-60V
- Output current waveform Pure sine wave
- Load Power Factor 0.8 Lagging (reactive power generating) to 0.8 leading (reactive power consuming)
- Output Rated Voltage 230/400 V AC
- Total Harmonics Current Distortion < 3% (of nominal power)
- Inverter efficiency > 92%
- Operating modes
    - Stand-alone.
    - Grid interactive.
    - Off-line,
- Operating temperature 0 - 50 degrees C

C. Junctions boxes or combiners

- Dust, water and vermin proof junction boxes of adequate rating and adequate terminal facility made of fire-resistant Plastic (FRP) for wiring.
- Each solar array with fuses of adequate rating to protect the solar arrays from accidental short circuit.
- Array /Module Junction box IP 68 (weather resistant)

D. Earthing kit

- Earthing: essential for the protection of the equipment & manpower. Two main grounds shall be done:
  - System earth
  - Equipment earth
- The provision for lightning & surge protection of the SPV power source & Hybrid inverter shall be made
- In case the SPV Array cannot be installed close to the equipment to be powered & a separate earth it to be provided for SPV System, then it shall be ensured that all the earths are bonded together to prevent the development of potential difference between any two earths.
- Earth resistance shall not be more than 5 ohms. It shall be ensured that all the earths are bonded together to make them at the same potential.
- The Earthing conductor shall be rated for the maximum short circuit current & shall be 1.56 times the short circuit current.
- The area of cross-section shall not be less than 1.6 sq mm in any case.

E. Module Mounting structure

- The SPV array shall consist of PV modules fixed on mounting structure made of hot dip galvanized MS angles & Pipes. All nuts & bolts shall be made of good quality stainless steel SS304.
- The SPV module: suitable number of crystalline silicon solar cells connected in series and hermetically sealed with high transmission toughened glass on top and suitable lamination material on back using state-of-the-art technology.
- The laminates: framed using anodized aluminum channels.
- All materials: a proven history of reliable and stable operation in external outdoor applications.
- A terminal block fixed on the frames: provided for taking the electrical output.
- The SPV array: mounted south facing on support structure on the ground with approx. 29-31 Deg tilt.
- The minimum clearance of the lowest part of the module structure and the developed ground level $\leq$ 500 mm.
- The array structure: grounded properly using maintenance free earthing kit as per IS: 3043-1987, tested & certified by CPRI
- **The mounting structure: withstand draft up to 200km/hr from back side of the panel**

F. Power cables

- Power Cables of adequate rating for interconnection of
  - Modules/panels within PV array
  - PV Array & DCDB
  - Other auxiliary use
- Cable: 1.1 grade, heavy duty, stranded copper/ aluminium conductor, PVC type A insulated, galvanized steel wire/ strip armoured, flame retardant low smoke (FRLS) extruded PVC type ST-1 outer sheathed.
- The cables: in general conform to IS-1554 P+I & other relevant standards.
- The permissible voltage drop from the SPV Generator to the Hybrid inverter ≤ 2% of peak power voltage of the SPV power source (generating system).
- In the light of this fact the cross-sectional area of the cable chosen is such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.
- All connections: properly terminated, soldered and/or sealed from outdoor and indoor elements.
- Relevant codes and operating manuals: comply
- Extensive wiring and terminations (connection points) for all PV components as needed.

A. Transportation, supply, installation of system, and related civil works

- Transportation and supply of the items mentioned in this documents at the remotely located site: Barubeda village, Ranchi (Jharkhand)
- Installation of 15 kW ground-mounted hybrid solar PV system, and related workmanship
- Related civil works

B. Operation, Maintenance & Warranty/Guarantee

- Operation, maintenance, and performance warranty/guarantee for the system from the date of successful installation and commissioning (as per the specification)
- The Solar PV panels Warranty: at least 10 years' product warranty; Performance Warranty: Linear Power Warranty for 30 years with 2% for 1st year degradation and 0.55% from year 2 to 30 year
- The 3 phase hybrid inverter warranty of minimum 5 years.
- The mechanical structures, electrical works including power conditioners/ 3 phase hybrid inverter/distribution boards/ etc. and overall workmanship of the Solar PV: warranty against any manufacturing/ design/ installation defects for a minimum period of 5 years.
- The warranty: Against breakages during transit, malfunctions, non-fulfilment of guaranteed performance and breakdowns due to manufacturing defects or defects that may arise due to malfunctioning of electrical / electronic components of the system **but do not include** physical damages by the end users.
- Others - All the applicable certifications, testing certificates and regulations: fully comply for all the items supplied and the installation and commissioning of the whole system mentioned in this document.