

S.N.	DESCRIPTION	UNIT	QTY.	AMOUNT
1	Solar PV module, bifacial half cut, Mono half cut, at least 450Wp, efficiency at least 21%, IEC 61215-2:2021 certification	Wp	1	
2	Module mounting structure as per the specificaiton	kWp	1	
3	IP65 DC Combiner Boxes with 20A string fuse, 20A DC Breakers, 40kA/1000V DC, Type I+II SPD with earth bar	Set	1	
4	IP54 AC DB Box with 32A,25kA 4P MCCB, 40kA 3P+N Type I+II AC SPDs with earth bar, phase indicators etc. individually for incoming and outgoing circuits	Set	1	
5	5kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
6	10kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
7	15kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
8	15kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
9	20kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			

10	25kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
11	30kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
12	40kW VFD controller, 3-phase, hybrid type (Solar +Grid input) and a bypass function, with remote controller, advanced MPPT function, including SPD, MCB/MCCB, with protection function- dry run protection, low/over voltage protection, overload protection			
13	DC UV Standard multi strand cable 2 core 4 Sq. mm copper			
14	DC UV Standard multi strand cable 2 core 16 Sq. mm copper	Nos.	1	
15	DC UV Standard multi strand cable 2 core 10Sq. mm copper	Nos.	1	
16	DC UV Standard multi strand cable 2 core 6 Sq. mm copper	Nos.	1	
17	DC UV Standard multi strand cable 2 core 20 Sq. mm copper	Nos.	1	
18	DC UV Standard multi strand cable 2 core 25 Sq. mm copper	Nos.	1	
19	DC UV Standard multi strand cable 2 core 35 Sq. mm copper	Nos.	1	
20	DC UV Standard multi strand cable 2 core 50 Sq. mm copper	Nos.	1	
21	ABC cable connector 25sqmm	Nos.	1	
22	ABC cable connector 35sqmm	Nos.	1	
23	ABC cable connector 50sqmm	Nos.	1	
24	ABC cable suspension clamp	Nos.	1	
25	Solar grid-tied inverter, 5kW, 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years	Nos.	1	

26	Solar grid-tied inverter, 6kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years	Nos.	1	
27	Solar grid-tied inverter, 10kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years			
28	Solar grid-tied inverter, 12kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years			
29	Solar grid-tied inverter, 15kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years			
30	Solar grid-tied inverter, 25kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years	Nos.	1	
31	Solar grid-tied inverter, 50kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years	Nos.	1	
32	Solar grid-tied inverter, 100kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years	Nos.	1	

33	Solar grid-tied inverter, 150kW, 3-phase , 3-phase, IEC 62116:2014, IEC 61727:2004,The Inverter must have a rated AC output voltage of a) Three Phase 400±10% VAC (L-L), b) Single Phase 230±10% VAC (L-N) efficiency: at least 95% or above warranty: at least 5+5 years			
34	Lighting Arrester (Franklyn Type) complying with IEC 62305	Nos.	1	
35	Lightning arrester, ESE type, complying with IEC 62305 / IS 3043	Nos.	1	
36	IP54 AC DB Box with 50A,25kA 4P MCCB, 40kA 3P+N Type I+II AC SPDs with earth bar, phase indicators etc. individually for incoming and outgoing circuits	Nos.	1	
37	1-phase outdoor junction box Polycarbonate (PC) or FRP, IP 65 rated with terminal bolcks, neutral links and earth busbars, along with DIN rail for 6A, SP MCB, pole or wall mounting for light distribution	Nos.	1	
38	3-phase power supply, outdoor junction box Polycarbonate (PC) or FRP, IP 65 rated with terminal bolcks, neutral links and earth busbars, along with DIN rail for 6A SP MCBs, 30A MCCB, suitable size MCBs, pole or wall mounting for light distribution	Nos.	1	
39	cable lug, Cu.,			
40	Ring Type- 4 Sq.mm.			
41	Cu, Ring Type- 70 Sq.mm.			
42	Cu, Ring Type- 70 Sq.mm.			
43	Bi - Metallic Ring Type -35 Sq.mm, Long Barrel type			
44	Bi - Metallic Ring Type - 240 Sq.mm, Long Barrel type			
45	Al Ring Type - 35 Sq.mm, Long Barrel type			
46	Al Ring Type - 240 Sq.mm, Long Barrel type			
47	Al Ring Type - 400 Sq.mm, Long Barrel type			
48	Al Ring Type - 400 Sq.mm, Long Barrel type			
49	Al Ring Type - 300 Sq.mm, Long Barrel type			
50	32 mm for 1RX 4X 35 sqmm			
51	82 mm for 6RX 3.5X 400 sqmm			
52	70 mm for 6RX 3.5X 300 sqmm			
53	MC4 Connector, as per IEC 62852			

Technical Specifications

1. SOLAR POWER GENERATION COMPONENTS

The bidder shall clearly respond to the technical specifications and standards asked for the equipment's and rooftop system components in their technical proposal. The bidder shall provide the data sheet, product catalogue and technical specifications of all the indicated equipment's of power generation, transmission and distribution system including IV curve, efficiency curves, test certificates/reports, warranty assurance certificate, international standards that the proposed goods comply with.

1. Solar Photovoltaic (PV) Module

General Description

The total required PV array capacity must be at least 31 kWp (at three different locations). The PV modules shall comply with following standards and technical specifications.

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
1	Manufacturer Name/Brand/Model		
2	Manufacturer's experience in manufacturing PV modules: Minimum 10 years		
3	The manufacturer shall have: ISO 9001, ISO14001, OHSAS 18001 Certificates		
4	Peak Power of Individual Module under STC \geq 400 Watt-peak		
5	Capacity: As per the BoQ		
6	PV Module Efficiency: \geq 17%		
7	Cell type: Crystalline, bifacial, half-cut		
8	No. of Cells per Module: Minimum 72		

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
9	Junction Box Protection: IP67 or better according to IEC 60529		
10	Operating Temperature: Minimum range of -20°C to +50°C		
11	Nominal Module Operating Temperature: 42±3 °C		
12	System Voltage: Minimum 1000 VDC		
13	<p>A letter provided by principal PV module manufacturer in their letter head stating the warranty period for their PV module.</p> <p>Product Workmanship Warranty: ≥ 10 years</p> <p>Performance Guarantee:</p> <p>first year: ≥ 97% of STC power</p> <p>10 year: ≥ 90% of STC Power</p> <p>25 years: ≥ 80% of STC Power</p> <p>linear warranty ≤ 0.8% per year from year 2 and onwards</p>		
14	<p>Local Certification required:</p> <p>RETS Certificate (PIT Certificate must be submitted with Bid and RST Certificate must be submitted before testing & commissioning)</p>		
15	<p>International Certification:</p> <p>IEC 61215:2005 2nd Edition or</p> <p>IEC 61215-1:2016 and IEC 61215-2:2016 for Terrestrial photovoltaic (PV) modules - Design qualification and type approval – Part 1: Test</p>		

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
	<p>requirements and Part 2: Test Procedures.</p> <p>IEC 61730 for PV module safety qualification, IEC 62804 for detection of potential induced degradation (PID)</p> <p>The test certificates must be provided.</p>		
16	All PV modules offered for the project must be of same type, same model, same power rating and same manufacturer		
17	The Bidder must submit the technical datasheet of PV Module		

4. Three-phase grid tied Inverter

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
1	Inverter type: Three Phase Grid interactive, capable of net metering with anti-islanding function		
2	Rated Power: as per the boq		
3	AC output Voltage: Three Phase 415 Vac (L-L),		
4	Output Frequency: 50 Hz \pm 2%		
5	Peak efficiency: minimum 97%		
6	Total Harmonic Distortion (THD):		

	< 3%		
7	Power Factor: 0.85 to 0.99		
8	Protection class: IP65 or above		
9	Protection: DC breakers, surge protector, over-temperature, over current, anti-islanding, either in-built or external		
10	Operating Temperature: Minimum range of 0°C to +50°C		
11	Communication Interface: Modbus or RS232 or RS485 or Ethernet pack embedded, should communicate with other equipment and monitoring system		
14	International Certifications: IEC 61727 for utility interface IEC 62116 for islanding EN 50530 for efficiency The Test Certificates or Test Reports from IEC accredited independent laboratory must be provided. The inverter must be certified by Certification Body Testing Laboratory or National Certification Body enlisted in IECCE or IECRE website.		
15	The Bidder must submit the technical datasheet of PV inverter		

5. Support Structure for PV Modules

The support structure shall comply with the following standards and technical specifications.

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
1	Tilt angle and orientation: Optimum PV production angle at given latitude/longitude of the site, oriented towards south		
2	Mounting structure design and foundation or fixation mounting arrangements shall consider all static and dynamic loads suitable for site. Support structure design and foundation or fixation mounting arrangements should withstand wind speed up to 180 km/hr		
3	<p>The solar PV module structure must be made of MS hot dip galvanized suitable sections of rectangular tubes, angles and channels. The minimum standards to be followed are:</p> <p>Vertical leg (Main leg): Minimum 40mmx80mmx2mm Rectangular tube</p> <p>Rafter: Minimum 40mmx80mmx2mm Rectangular tube</p> <p>Purlins: Minimum 40mmx80mmx2mm Rectangular tube or</p> <p>Angles: Minimum 50mmx50mmx5mm</p> <p>Column bracing or supporting bracing: Minimum 40mmx40mmx5mm angle</p> <p>Base plate: 200mmx200mmx6mm</p>		

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
4	The mounting structure and its accessories shall be able to resist at least 20 years of outdoor exposure without suffering damage or corrosion.		
5	Applicable standards: IEC 62548 – PV Array Design ISO 7599 – Anodizing of Aluminum IS 875 (Part 3) – Wind Loads ASTM A653 – Galvanized Steel IS 1367 – Fasteners		
	Module mounting structure material: Rails: Aluminium Alloy 6005-T5 or 6063-T6, anodized minimum 15 microns Structural Members (GI): IS 2062 steel, hot-dip galvanized ≥80 microns Fasteners: Stainless Steel SS304 Clamps: Anodized aluminium or SS304		
6	Clearance: Minimum necessary clearance between roof level and bottom edge of the PV modules/arrays for inclined roof top system, must be at least 20cm for easy maintenances		
7	Roofing: The structure must not cause any damage to the roofing, (appropriate procedure must be applied) in case of roof-top system including suitable grouting etc. to prevent water leakage.		
8	Stainless Steel (SS 304) nuts & bolts should be used for fixing modules		

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
	with the structure. Stainless Steel (SS 304) or Galvanized bolts, nuts, fasteners, washers, mounting clamps should be used for fixing structure and compatible with materials which it is being fixed. In case of welding structure, the galvanization should be done after the fabrication work.		

6. DC Combiner Box

DC combiner box refers to the box where the PV modules/ strings are collected, and cables are routed towards Solar Charge Controller or PV inverter. The DC combiner box shall comply with the following standards and technical specifications.

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
1	The DC combiner box shall be rated for exterior installation suitable for the Site Conditions, shall be UV and weather resistant, and must be rated minimum for IP65 according to IEC 60529		
2	If number of strings into DC combiner box is more than two then DC box shall include the fuses reverse current to each string. String fuses shall be selected according to PV module manufacturer's recommendation on reverse current limit		

S.N.	Specifications Required	Specifications Offered with Compliance	Reference Document (Specify Document)
3	The system shall have DC isolation switch which can isolate the connection between PV array and the system. This isolation can be also within DC box.		
4	System must have appropriately sized surge protection device conforming to IEC 61643-11 and grounded adequately.		
5	DC box installation shall be protected from direct rain, Sun and dust and must have ingress protection level of IP65 or above		
6	All cables must be connected properly and cable entering/outings into/from the box must be sealed properly (use of cable glands, cables shoes, copper tube, thimble, cable ties) so that dust and insects, mice cannot enter the box		