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PMIC
Pakistan Microfinance Investment Company Limited

PRIME

Minimum Technical Standards for Solar Irrigation Pump (SIP)

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SCOPE

This document covers design qualifications and technical specifications for Solar Irrigation Pumping Solutions to be installed on existing bore hole, dug well etc., and specifies the minimum standards to be followed under the PRIME program.

General Description

1. The water pump may be surface mounted/submersible. Both AC & DC pumps are eligible.
2. The Solar Irrigation Pumping solutions comprises of PV Modules/Array with appropriate voltage and current level to operate the water pump, a controller/VFD unit and Balance of Systems.
3. The major components PV panel and pump controller/VFD shall be provided with a brochure/technical specification sheet from the principle manufacturer on the warranty and performance parameters, ratings. In addition, product certificates from recognized and accredited laboratory is recommended for each product.
4. Gross Head shall not be more than 100 feet for bore hole and dug well.
5. Before supply and delivery of the pumps, details for matching required specifications shall be provided to Pakistan Microfinance Investment Company (PMIC) for approval.
6. The water shall be used mainly for irrigation purpose.
7. The sizes of Water Pumps to be solarized are 5.5HP, 7.5HP and 10HP.

Scope of standardization

1. PV panels
2. Pump controller/Variable Frequency Drive (VFD)
3. Array Mounting structure

Equipment standardization

1. **PV Panels**

PV panels shall meet either the relevant following design qualification and type approval standards

- IEC 61215 Terrestrial photovoltaic (PV) modules - Design qualification and type approval

  and

  IEC 61730 Photovoltaic (PV) module safety qualification
- The photovoltaic module should have a peak power output of greater than 250Wp.
- Each module shall be marked with a serial number with the purpose of providing traceability to the manufacturer's name, factory, and date of manufacture.
- The module label must show the correct Certifier Mark (logo) corresponding to that on the test certificate supplied at the time of approval.

2. **Pump controller**

- Controller may be of VFD/Fixed frequency operated;
- The controller may have MPPT technology;
- The maximum allowable restarting time must be less than 120 seconds;
- It is recommended that the pump shall not start below 70 % of the rated voltage of motor;
- Controller having a minimum protection of IP20 may be allowed if it is enclosed by a controller box having a minimum protection of IP40. If the controller itself has an IP 41 protection, then no control box will be necessary;
- The controller should have short circuit and overload protection;
- Controller must have a minimum efficiency of 90 % at rated frequency;

3. <u>Array Mounting Structure</u>

- The Solar PV modules should be ground mounted with manual tracking.
- Design that can withstand weight of the modules and high wind velocities up to 150 km/hr
- The modules should be ground-mounted with silver painting or hot dip galvanized.
- The structure must be mounted such that the modules are at a tilt angle of 20 degrees to the horizontal facing the equator.
- There should be no shading from nearby trees or buildings in the solar module.

- All nuts and bolts should be made of very good quality and should be corrosion resistant.
- The structure should 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.

Warranty Provisions:

- Pumping Controller: 2 years warranty)
- Pumping system performance warranty: 100 % output warranty for 5 years
- PV panels: The PV modules must be warranted to retain at least 90 % of its rated wattage measured at STC for 10 years and 80% of the rated wattage at 20 years

Design qualifications for Solar Irrigation Pumping solutions

Specific Scenarios are presented for various configurations however actual scenarios shall be provided after the demand analysis and project specific requirements to be configured from the actual systems design and design parameters.

Minimum system configuration for Solar Irrigation Pumping Solutions

a) Solar based solution for 5.5 HP Water Pump

Solar PV Module Mono/poly crystalline **Individual module should be greater than 250 Wp*	5000	Wp
Solar Pump Controller	5	kW
Solar Array mounting structure	1	set
UV cable between solar array to junction box (JB) and from JB to pump controller.		M^2
Enclosure/cabinet for pump controller	1	
Cables, switches, Junction Boxes	1	Set
Earthing set and Lighting Arrestor	1	Set
Plumbing materials, pipes and Fittings	1	Set
PV and pump Installation accessories	1	Set
Spare Parts		Pcs.
Installation and testing commissioning		Set

b) Solar based solution for 7.5 HP Water Pump

Solar PV Module Mono/poly crystalline	7500	Wp
**Individual module should be greater than 250 Wp*		
Solar Pump Controller	7.5	kW
Solar Array mounting support structure	1	set
UV cable between solar array to junction box (JB) and from JB to pump controller		M^2
Enclosure/cabinet for pump controller	1	
Cables, switches, Junction Boxes		Pcs
Earthing set and Lighting Arrestor	1	Set
Plumbing materials, pipes and Fittings	1	Set
PV and pump Installation accessories	1	Set
Spare Parts		Pcs.
Installation and testing commissioning	1	Set

c) Solar based solution for 10 HP Water Pump

Solar PV Module Mono/poly crystalline	10000	Wp
**Individual module should be greater than 250 Wp*		
Solar Pump Controller/VFD	11	kW
Solar Array mounting support structure	1	set
UV cable between solar array to junction box (JB) and from JB to pump controller		M^2
Enclosure/cabinet for pump controller	1	
Cables, switches, Junction Boxes		Pcs
Earthing set and Lighting Arrestor	1	Set
Plumbing materials, pipes and Fittings	1	Set
PV and pump Installation accessories	1	Set
Spare Parts		Pcs
Installation and testing commissioning	1	Set