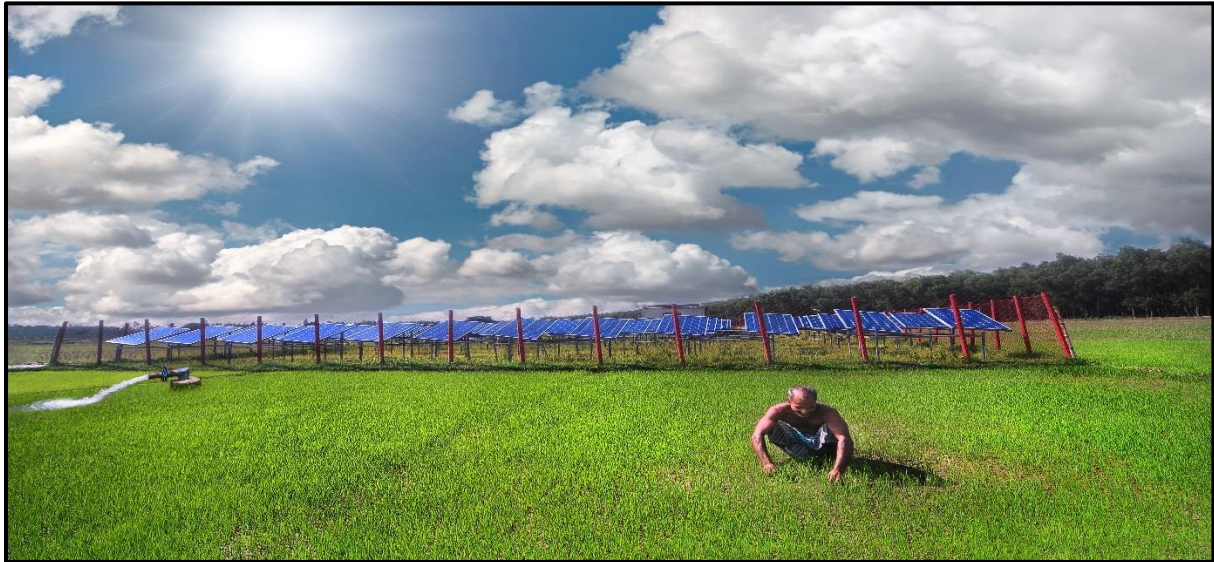


IDCOL Technical Standard for Solar Irrigation Pump (SIP) **Under “Ownership Model”**



➤ Configuration of approved packages:

Program	Daily water output (Lt/day)	Maximum TDH (m)	Minimum PV capacity (kWp)		Minimum pump capacity (kW)*
			DC pumping system	AC pumping system	
IDCOL small SIP	100,000	15	1.8	2.0	1.1
	200,000		3.5	4.0	2.2
	300,000		5.5	6.0	3.0
	500,000		9.5	10.0	5.5

*All submersible pumps

➤ Technical Standards for equipment

1. Pump & Motor

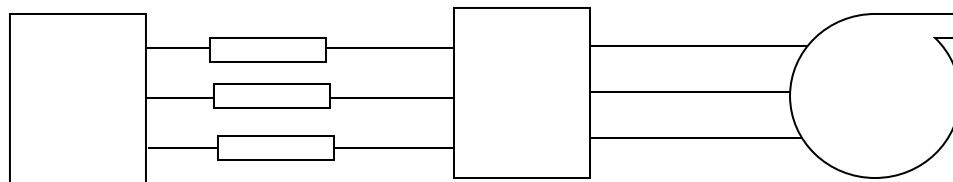
- The pump may be submersible;
- Both AC & DC pumps are eligible;
- The impeller of the pump must not be non-metallic.
- Required minimum insulation of motor is “F” class.
- The motor power factor should be at least 0.8
- The minimum combined efficiency of pump-motor must be tested at pump’s rated frequency (50/60) & evaluated against below mentioned benchmark.

Table 1

Capacity of pump (kW)	Minimum combined efficiency of pump & motor (%)
Up to 2.5	40.0
Above 2.5 kW-below 3 kW	42.5
From 3 kW-5 kW	45.5
Above 5 kW	47.5

- The relevant combined efficiency test should be conducted with a complete pumping system package (pump, motor & controller) with the name plate rating parameters like voltage, power at a definite TDH;
- Each of the complete pumping system package (pump & controller) should be tested separately & the suppliers would not be allowed to interchange components among approved packages while taking part in quotation submission process;
- Test report should explicitly denote brand & model number of pump & controller.

Test set up:



3 Phase
Variac

10 ohm resistors
(20A rating)

MPPT
Inverter

Motor pump (8-10 kW)

Test guideline:

- Tests will be conducted at 3 frequencies i.e. 30, 40, 50 for a 50 Hz rated pump, while at 40, 50, 60 for a 60 Hz rated pump;
- Suppliers must declare TDH against which tests will be conducted to the testing authority i.e. BUET prior to testing. Suppliers must test the pump at its BEP (Best Efficiency Point)
- A decreasing trend is expected in combined efficiency with the decrease in testing frequency.

Test procedure:

- The voltage of the variac should be varied to control the input power to the inverter. I
- Inverter will try to maximize the power to the pump and will vary the speed to match the corresponding power input to the inverter.

- A lower variac voltage will lower the power to the inverter and the speed should be reduced.
- Higher variac voltage will make the inverter to run the pump at a higher speed. For lower power pump, the 10 ohm resistors should be replaced by resistor values given below

Table 2

Pump capacity	Resistor (Ohms)
5 kW-7.9 kW	15-18
3 kW-4.9 kW	20-25
1 kW-2.9 kW	30-40

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 IP41. 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;
- The controller must be tested and certified against efficiency from IDCOL accredited testing center i.e. (BUET).

3. PV panels

- The following are applicable standards for PV modules:
- International Electro Technical Committee (IEC) 61215:2005: Crystalline Silicon Terrestrial PV Modules Design Qualification and Type Approval
- IEC 61646: Thin Film Silicon Terrestrial PV Modules Design Qualification and Type Approval
- IEC 61701 Ed 2.0: Salt mist corrosion testing of PV Modules.
- IEC 61730 for safety equipment.
- The photovoltaic module should have a peak power output of at least 250Wp.
- All modules must be product tested and certified from IEC accredited laboratories. IEC 61215 (Or IEC 61646, whichever applicable) and IEC 61730 are

mandatory for PV modules. IEC 61701 will be applicable for PV module installation in coastal areas.

- Each module must be factory equipped IP65 junction box with terminal strip that allows safe and long lasting wiring connection to the module. Where applicable, protective diodes should be used to avoid the effect of partial shading. Factory test report of the PV module must be provided during supply of product.
- Each module must have permanent labeling indicating at a minimum: Manufacturer, Model Number, Serial Number, Peak Watt Rating, Voltage and Current at peak power, Open Circuit Voltage, Short Circuit Current and Cell Efficiency of each module.
- Power tolerance must be positive for each of the PV modules.
- Module efficiency ($\eta\%$) should be minimum 15% at STC.
- Fill Factor (FF) should be more than 70%.

Test guideline:

Test report for 2 (two) samples of each model from Bangladesh University of Engineering and Technology (BUET) or United International University (UIU). Test Report should include the following data at STC:

- I-V and P-V characteristics
- Output (Wp)
- Open circuit voltage (Voc)
- Short circuit Current (Isc)
- Voltage at Maximum Power (Vmp)
- Current at Maximum Power (Imp)
- Module efficiency ($\eta\%$)
- Fill Factor (FF)
- Maximum System Voltage (V)

➤ **Warranty Provisions:**

- **Pumping system (Controller & Pump) :** 5 years of replacement warranty
- **Pumping system performance warranty :** 100 % output warranty for 5 years
- **PV panels :**

A. Ten (10) Year Limited PV Module Warranty

PV Modules(s) should be warranted to be free from the defects and/or failures specified below for a period not exceeding ten (10) years from the date of sale to the original customer:

1. Defects and /or failures due to manufacturing;
2. Defects and/or failures due to materials;
3. Cracking of the front glass surface due to foreign objects inside the glass; or
4. Non-conformity with specifications due to faulty manufacturing and/or inspection processes.
5. If the PV Module(s) fails to conform to this warranty, PV module(s) should be immediately replaced.

B. Limited Power Output Warranty

Any power loss is due solely to defects in materials or workmanship; IDCOL demands the warranty of the power output of each type of PV Modules(s) as follows:

IDCOL demands that if, (a) within the first ten (10) years from the date of sale to the customer, the PV Modules(s) exhibits a power output of less than ninety percent (90%) of the original minimum rated power specified at the time of sale, or (b) within twenty (20) years from the date of less than eighty percent (80%) of the original minimum rated power specified at the time of sale, manufacturer will repair, fix (by putting additional panel) or replace the PV Modules(s) at their own cost or refund the Purchase Price taking into account a yearly depreciation of five percent (5%) of the panel price. In case of the refund of the depreciated price of the panel, the panel will remain with the user and company will not take it from him/her. The period of power output warranty for these replaced modules(s) will be equal to the remaining warranty period of the originally supplied module(s).