

**PART-G:  
SCOPE OF WORK AND TECHNICAL SPECIFICATION**

**(All the bidder are requested to go through scope and technical specification before the filing the any tender documents and to be submitted physically with technical bid document )**

**1. GENERAL PROJECT INFORMATION:**

The information given hereunder and provided elsewhere in this document is given in good faith by the GGRC but the bidder must satisfy himself regarding quantity and quality wise supply of Solar module / panel, Solar Photovoltaic (SPV) Pump and G.I. support structure and all aspects regarding commissioning of solar water pumping system and its maintenance services for **5 years** (It includes 5 years warrantee period) and no claim shall be entertained on the plea that the information supplied by the GGRC is erroneous or insufficient.

**2. SCOPE OF WORK COMPRISES AS UNDER:**

- (a) The Successful bidder will be registered as Solar Water Pump Supplier in GGRC . The solar water pump supplier identifies the Beneficiary farmer under the SMAM programme. The solar water pump supplier has to set up his own marketing network to promote solar water pump system among the farmers in the state. The bidder has to generate demand from farmers and submit his solar water pump application in GGRC for sanction of government contribution and further process as per the GGRC procedure.(Annexure-X)

**The programme is implemented in market oriented mode by GGRC. This may please be noted that GGRC does not provide any kind of list of potential farmers who are interested to install solar water pump**

- (b) Surveying, Designing and Supplying of Solar Photovoltaic (SPV) water pumping System
- (c) Installation and Commissioning of solar water pumping system and its maintenance and after sales services for 5 years. The successful bidder is also required to establish the customer care Center and toll free number and upload the data on GGRC website.

**3. SUPPLY OF SOLAR PHOTOVOLTAIC (SPV) WATER PUMPING TECHNICAL SPECIFICATION DETAILS**

**Minimum Technical Requirements for Design, Construction, Test procedure and Safety for Solar PV modules and Performance Standards for Solar PV pumping System up to 5 HP Technical Specifications of SPV Water Pumping System.**

- I. Solar photovoltaic (SPV) water pumping system consisting of:**
- i) PV Array

Capacity in the range of 200 Wp to 10 KWp.

PV array capacity for

-3 HP Pump is 2700 Wp (Minimum)

-5 HP Pump is 4800 Wp (Minimum)

PV Array Should be mounted on a suitable structure with a provision of tracking the sun as mentioned in the specification.

ii) Motor Pump set (Surface or Submersible):

D.C. Motor Pump Set (With Brushes or Brush less D.C.)

OR

A.C. Induction Motor Pump set with a suitable inverter.

iii) Electronics:

a. Maximum Power Point Tracker (MPPT)

b. Inverter for A.C. Motors (Appropriate Electronic Controller in Case of B.L.D.C)

c. Electronic Protections

iv) Interconnect Cables of suitable size, "On-Off" switch and LCD display showing following parameters: 1) Frequency of VFD (in case of AC) , 2) Voltage, 3)

Current, 4) Output Watt and 5) Cumulative KWH.

## II. Performance Specifications and Requirements (Duty Cycle).

Solar PV Water Pumps with PV array minimum capacity in the range of 900 Wp to 5 KWp to be installed on a suitable bore well/open well/water reservoir/water stream etc at location specified by farmer in the state of Gujarat.

Under the "Average Daily Solar Radiation" condition of 7.15 KWh/sq.m. on the surface of PV array (i.e. coplanar with the PV Modules), the minimum water output from a Solar PV Water Pumping System at different "Total Dynamic Heads" should be as specified below:

### A. For D.C. Motor Pump Set with Brushes or Brush Less D.C. (B.L.D.C.) :

i) 100 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 12 metres.

ii) 50 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 metres (Suction head, if applicable, up to a maximum of 7 metres) and with the shut off head being at least 25 metres.

iii) 35 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 metres and the shut off head being at least 45 metres.

iv) 21 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 metres and the shut off head being at least 70 metres.

v) 14 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 metres and the shut off head being at least 100 metres.

*vi) 9.5 liters of water per watt peak of PV array, from a Total Dynamic Head of 100 metres and the shut off head being at least 150 metres.*

The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.

Indicative performance specifications for the Shallow and Deep well SPV Water Pumping Systems are given as under.

**a) Indicative Technical Specifications as per MNRE/SMAM guideline for Shallow Well (Surface) D.C. Solar Pumping Systems**

With D.C. Motor Pump Set with Brushes or Brush Less D.C.(B.L.D.C.) Description	Model-III
PV array	2700 Wp
Motor capacity	3 hp
Shut Off Dynamic Head	25 metres
Water output *	135,000 litres per day from a total head of 20 metres

Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 KWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. Suction head, if applicable, minimum 7 metres.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause II. (i.e. performance specifications and requirements) specified earlier.
3. If submersible pumps are used in lieu of surface pumps, the water output must match that of the surface pumps as specified in this table.
4. Module mounting structure shall be MS hot dipped galvanised, with a facility of manual tracking at least three times a day.

**b) Indicative Technical Specifications as per MNRE/SMAM guideline for Deep well (submersible) D.C. Solar Pumping Systems**

With D.C. Motor Pump Set with Brushes or Brush Less D.C.(B.L.D.C.) Description	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII
PV array	3000 Wp	3000 Wp	3000 Wp	4800 Wp	4800 Wp	4800 Wp
Motor capacity	3 hp submersible with controller	3 hp submersible with controller	3 hp submersible with controller	5 hp Submersible with controller	5 hp Submersible with controller	5 hp Submersible with controller
Shut Off Dynamic Head	45 metres	75 metres	100 metres	70 metres	100 metres	150 metres

Water output*	105,000 litres per day from a total head of 30 metres	63,000 litres per day from a total head of 50 metres	42,000 litres per day from a total head of 70 metres	100,800 litres per day from a total head of 50 metres	67,200 litres per day from a total head of 70 metres	45,600 litres per day from a total head of 100 metres
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\* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 KWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause II. (i.e. performance specifications and requirements) specified earlier.
2. If surface pumps are used in lieu of submersible pumps, the water output must match that of the submersible pumps as specified in this table.
3. Module mounting structure shall be MS hot dipped galvanised, with a facility of manual tracking at least three times a day.

**B. For A.C. Induction Motor Pump Set with a suitable Inverter :**

- i) 90 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 metres (Suction head, if applicable, minimum of 7 metres) and with the shut off head being at least 12 metres.
- ii) 45 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 metres (Suction head, if applicable, up to a maximum of 7 metres) and with the shut off head being at least 25 metres.
- iii) 32 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 metres and the shut off head being at least 45 metres.
- iv) 19 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 metres and the shut off head being at least 70 metres.
- v) 13 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 metres and the shut off head being at least 100 metres.
- vi) 8.5 liters of water per watt peak of PV array, from a Total Dynamic Head of 100 metres and the shut off head being at least 150 metres.*

The actual duration of pumping of water on a particular day and the quantity of water pumped could vary depending on the solar intensity, location, season, etc.

Indicative performance specifications for the Shallow and Deep well SPV Water Pumping Systems are given as under.

**a) Indicative Technical Specifications as per MNRE/SMAM guideline for Shallow Well (Surface) A.C Solar Pumping Systems,**

With A.C. Induction Motor Pump Set and a suitable Inverter: Description	Model-III	Model-IV
PV array	2700 Wp	2700 Wp
Motor capacity	3 hp	3 hp
Shut Off Dynamic Head	15 metres	25 metres
Water output *	243,000 litres per day from a total head of 10 metres	121,500 litres per day from a total head of 20 metres

\* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the "Average Daily Solar Radiation" condition of 7.15 KWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. Suction head, if applicable, minimum 7 metres.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause II. (i.e. performance specifications and requirements) specified earlier.
3. If submersible pumps are used in lieu of surface pumps, the water output must match that of the surface pumps as specified in this table.
4. Module mounting structure shall be MS hot dipped galvanised, with a facility of manual tracking at least three times a day.

**b) Indicative Technical Specifications as per MNRE/SMAM guideline for Deep well (submersible) Solar A.C Pumping Systems:**

With A.C. Induction Motor Pump Set and a suitable Inverter: Description	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII
PV array	3000 Wp	3000 Wp	3000 Wp	4800 Wp	4800 Wp	4800 Wp
Motor capacity	3 hp submersible with controller	3 hp submersible with controller	3 hp submersible with controller	5 hp Submersible with controller	5 hp Submersible with controller	5 hp Submersible with controller
Shut Off Dynamic Head	45 metres	75 metres	100 metres	70 metres	100 metres	150 metres
Water output*	96,000 litres per day from a total head of 30 metres	57,000 litres per day from a total head of 50 metres	39,000 litres per day from a total head of 70 metres	91,200 litres per day from a total head of 50 metres	62,400 litres per day from a total head of 70 metres	40,800 litres per day from a total head of 100 metres

\* Water output figures are on a clear sunny day with three times tracking of SPV panel, under the “Average Daily Solar Radiation” condition of 7.15 KWh/ sq.m. on the surface of PV array (i.e. coplanar with the PV Modules).

Notes:

1. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause II. (i.e. performance specifications and requirements) specified earlier.
2. If surface pumps are used in lieu of submersible pumps, the water output must match that of the submersible pumps as specified in this table.
3. Module mounting structure shall be MS hot dipped galvanised, with a facility of manual tracking at least three times a day.

### **III. PV ARRAY**

The SPV water pumping system should be operated with a PV array capacity in the range of 200 Watts peak to 10000 Watts peak, measured under Standard Test Conditions (STC). Sufficient number of modules in series and parallel could be used to obtain the required PV array power output. The power output of individual PV modules used in the PV array, under STC, should be a minimum of 125 Watts peak, with adequate provision for measurement tolerances. Use of PV modules with higher power output is preferred.

Indigenously produced PV module (s) containing mono/ multi crystalline silicon solar cells should be used in the PV array for the SPV Water Pumping systems.

- i) Modules supplied with the SPV water pumping systems should have certificate as per IEC 61215 specifications or equivalent National or International/ Standards.
- ii) Modules must qualify to IEC 61730 Part I and II for safety qualification testing.
- iii) The efficiency of the PV modules should be minimum 14% and fill factor should be more than 70%.
- iv) The terminal box on the module should have a provision for “Opening” for replacing the cable, if required.
- v) There should be a laminated Name Plate fixed inside the module which will give:
  - a. Name of the Manufacturer or Distinctive Logo.
  - b. Model Number
  - c. Serial Number
  - d. Year of manufacture
- vi) Each PV module must have RF identification tag (RFID), which must contain the following information.
  - a. Name of the Manufacturer of PV module
  - b. Model or Type Number
  - c. Serial Number
  - d. Month and Year of Manufacture
  - e. I-V Curve for the Module
  - f. Peak Wattage of the Module at 16.4 volts.
  - g.  $I_m$ ,  $V_m$  and FF for the module
  - h. Unique Serial No. and Model No. of the Module

#### IV. MOTOR PUMP SET

- i) The SPV water pumping systems may use any of the following types of motor pump sets:
  - a. Surface mounted motor pump-set.
  - b. Submersible motor pump set.
  - c. Floating Motor Pump Set
  - d. Any other type of Motor pump set after approval from test centre of the Ministry of New and Renewable Energy, New Delhi
- ii) The "Motor Pump Set" should have a capacity of 3 HP and 5 HP and should have the following features:
  - a. The mono block DC/ AC centrifugal motor pump set with the impeller mounted directly on the motor shaft and with appropriate mechanical seals which ensures zero leakage.
  - b. The motor of the capacity should be AC, PMDC or BLDC type. The suction and delivery head will depend on the site specific condition of the field.
  - c. Submersible pumps could also be used according to the dynamic head of the site at which the pump is to be used.
  - d. The suction/Delivery Pipe (HDPE), electric cables, floating assembly, civil work and other fittings required to install the system.
  - e. Following details should be marked indelibly on the motor pumpset
    - a) Name of the Manufacturer or Distinct Logo
    - b) Capacity of Motor Pump
    - c) Model Number
    - d) Serial Number
    - e) Year of Manufacture
- iii) All parts of the pump and the motor of the submersible pumps should be made of stainless steel.
  - a. The manufacturers of pumps should self certify that, the pump and **all external parts of motor used in submersible pump which are in contact with water, are of stainless steel.** The pumps used for solar application should have a 5 years warranty so it is essential that the construction of the pump be made using parts which have a much higher durability and do not need replacement or corrode for at least 5 years.
- iv) *Provision for remote monitoring of the installed pumps must be made in the controllers or the inverters either through an integral arrangement or through an externally fitted arrangement. It should be possible to ascertain the daily water output, the power generated by the PV array, the UP TIME of the pump during the year, Number of days the pump was unused or under breakdown/repairs.*

SPV Water Pumping Systems shall have online Remote Monitoring Mechanism (RMM) and the SPV water pump supplier would make provision for monitoring the performance of SPV Water pump till the warranty period.

The channels for remote communication and other communication devices/equipment associated with RMM shall be provided by the SPV water Pump Supplier

The RMM should have following features:-

- a. Web portal to view on line data such as voltage, current, power, energy generated and pump on / off duration.
- b. Provision for Generation of various reports in the printable format
- c. Data shall be extracted locally and uploaded to the server in the event of loss of communication.
- d. Provision for Data export in standard format
- e. Historical data made available in server for report generation
- f. The sample log-book deployed for output data and performance of the SPV water pump:-

From DD/MM/YY to DD/MM/YY

S.no	Parameter Name	Unit	Result	Date (DD/MM/YY)
1	Maximum Voltage (Vmax)	Volt		
2	Maximum Current (I Max)	Amp		
3	Power Generated by PV Array(Pmax)	Watt		
4	Total Water Putput	Ltr		
5	Pump on/Off	On/Off/Error		

Note: - It is expected that the software shall be able to show the results of above listed parameters at a glance / individual as desired for a day / particular period.

## V. MOUNTING STRUCTURES and TRACKING SYSTEM.

The PV modules should be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour. The support structure used in the pumping system should be hot dip galvanized iron with minimum 80 micron thickness.

The structure design (along with the civil work) declared by the manufacturer should technically be full proof / sufficiently strong against the prevailing wind load. The manufacturing firm will be fully responsible for any damages caused by high wind velocity within guarantee period. The parameters of prevailing wind speed, soil conditions, load, and upward lift should be taken care of while preparing the design and the same is required to be mentioned on design.

The SPV water pump supplier shall ensure that mounting structure is efficient, strong enough to sustain load and is capable against high wind velocity. The standalone type cylindrical base panel mounting structure is would be used. The Antitheft bolts must be provided for fixing of solar panel with structure.

To enhance the performance of SPV water pumping system, manual tracking system must be provided so that the panel can be manually adjusted three times a day (east-south-west) to face the sun optimally. This adjustment could be done in the early morning, noon and afternoon time to increase total solar radiation on the solar panel surface substantially. This provision helps the motor pump-sets to start early in the morning and function efficiently till late in the afternoon, thereby increasing the total



output of the pumping system. Also, the arrangement for seasonal tilt angle adjustment should be provided to adjust the optimal tilt throughout the year.

## VI. ELECTRONICS AND PROTECTIONS

- i) Maximum Power Point Tracker (MPPT) should be included to optimally use the Solar panel and maximize the water discharge.
- ii) Inverter could be used, if required, to operate an A.C. Pump. The inverter must have IP 54 protection or must be housed in a cabinet having at least IP 54 protection or must be housed in a cabinet having at least IP 54 protection.
- iii) Controller for BLDC motor driven pumps, if required be used. The controller must have IP 54 protection or must be housed in a cabinet having at least IP 54 protection.
- iv) Adequate protections should be incorporated against dry operation of motor pump set, lightning, hails and storms.
- v) Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

## VII. EARTHING AND LIGHTNING PROTECTION:

**Earthing:** The array structure of the PV shall be grounded properly using adequate number of earthing kits. All metal casing or shielding of the pumping system shall be thoroughly grounded to ensure safety of the solar pumping systems.

**Lighting Arrester:** The SPV water pumping system should be provided with lightning and overvoltage protection. The principle aim in this protection is to reduce the over voltage to a tolerable value before it reaches the PV or other sub systems components. The source of over voltage can be lightning or another atmospheric disturbance. Necessary foundation for holding the Lightning Arrestors (LA) is to be arranged keeping in view the wind speed of the site and flexibility in maintenance in future. Suitable number of lightning arrestors will be provided in the array field.

Lighting & Over Voltage Technical Specifications	
Parameters	Specification
Diameter of pipe	1 ½ " diameter
GI Spike	5 feet long
Earth Pit	Maintenance free earthing
Color	Red/Blue/Black
Protection	Power Surges/ Lightning Strikes

## VIII. ON/OFF SWITCH

A good reliable switch suitable for DC use is to be provided. Sufficient length of cable should be provided for inter-connection of the PV array, Controller / Inverter and the motor pump set. Preferably the Inver/Controller should have a arrangement to switchover from solar to Grid connection and vice versa for easy operation.

## IX. LCD Display showing following parameters

- a) Frequency of VFD,
- b) Voltage,
- c) Current,
- d) Output Watt and

- e) Cumulative in KWH.
- X. Any other item not specifically mentioned in the specifications but which are required for Supply, Installation & Commissioning of Solar Water Pumping system are deemed to be included in the scope of the specification as per relevant and latest IS, IEC, MNRE guidelines, standards of Rural Electrification Corporation (REC) and specified by GGRCL unless specifically excluded.

Specification of all the items covered under this EoI is mentioned above. However, if any item is left out, standard specification of relevant and latest IS, IEC, MNRE, Rural Electrification Corporation (REC) and specified by GGRC will be applicable for the same.

#### **XI. WARRANTY**

The PV Modules must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. The whole system including submersible/ surface pumps shall be warranted for 5 years. Required Spares for trouble free operation during the Warrantee period should be provided along with the system.

#### **XII. OPERATION AND MAINTENANCE MANUAL**

An Operation and Maintenance Manual, in English and/or Vernacular language, should be provided with the solar PV pumping system. The Manual should have information about solar energy, photovoltaic, modules, AC motor pump set, mounting structures, electronics and switches. It should also have clear instructions about mounting of PV module, DO's and DONT's and on regular maintenance and Trouble Shooting of the pumping system. Name and address of the person or Centre to be contacted in case of failure or complaint should also be provided. A warranty card for the modules and the motor pump set should also be provided to the beneficiary.

#### **XIII. NOTES**

- i) Wherever the "Water table" or the level of water in the reservoir or the water source (e.g. Diggee) from which the water is to be pumped, is within 10 meters depth, 'Surface Motor Pump sets' should be preferred.
- ii) The type of pump set used must match the total dynamic head requirement of the site (i.e. the location at which it is installed). Moreover, it should be appropriately tested and certified by the authorized test centers of the Ministry to meet the performance and water discharge norms specified in section II above.
- iii) There should not be any compulsion to use only one or the other type of Motor-pump set. The beneficiary may select an appropriate Model (i. e. Capacity of PV Array and Type of Motor Pump Set) as per site requirement.

#### **XIV. NAME PLATE:**

Name Plate in Gujarati Language of size 2ft by 2 ft on iron plate is required to be prepared as per following details and required to be fixed on the system for every

installation.

<b>GGRC Prayojit "Surya Urja Sanchalit Tapak Sinchayi Paddhati "</b>	
1	Name of beneficiary (farmer)
2	Name of Village Taluka /District
3	Solar PV capacity in Wp and DC/AC submersible Pump capacity in HP
4	Pump head
5	Name of Supplier of the system
6	Address and Contact no of Supplier 's Service centre for informing faults in the system
7	Programme Implemented by Gujarat Green Revolution Co. Ltd, Vadodara

**(M) DURATION OF IDENTIFICATION OF BENEFICIARY FARMER, SURVEYING, DESIGNING, SUPPLYING, INSTALLATION AND COMMISSIONING:**

The Identification of beneficiary farmer, Surveying, Designing, Supplying, Installation and Commissioning of tentatively 500 numbers of Solar Photovoltaic (SPV) Water Pump System on farmer's field under Solar Photovoltaic (SPV) Water pumping System Component of "Sub-Mission on Agricultural Mechanisation (SMAM) Programme", Government of Gujarat in the Gujarat State is upto 31.03.2018 or closure of programme as announced by GGRC whichever is earlier. The implementation of programme will depend upon the availability of subsidy fund provided by Government of Gujarat.

**(N) QUANTUM OF WORK:**

Tentatively 500 nos. of SPV Pump Sets in financial year 2017-18 (i.e. tentative Quantity is 25 Nos. for 3 HP AC Surface/Submersible, 25 Numbers of 3 HP DC Surface/Submersible, 225 numbers of 5 HP AC Submersible and 225 numbers of 5HP DC Surface/Submersible. This Quantity and capacity of pump is only indicative figures which will change at the time of actual implementation of program.

**(O) LOCATION:**

At the selected Beneficiary farmers' field in entire state of Gujarat.

**(P) TECHNICAL BACK UP TO BENEFICIARIES:**

The Solar water pump supplier is has to provide the operational and maintenance manual of the system in Gujarati with farmer's friendly language. A onsite training to the beneficiaries farmer regarding all the aspects operation and maintance of the system is required to be conducted by the supplying firm.

**(R) SPECIFIC TERMS AND CONDITIONS WITH RESPECT TO WARRANTY / MAINTENANCE/TRAINING TO BENEFICIARY FARMER:**

**i. Warranty:**

The Warranty period for the components / equipment supplied is as per GGRC/SMAM/MNRE guidelines issued from time to time and for this EoI which

shall be **Five years** from the date of installation and handover to the farmer. Any equipment / component is found to have manufacture defect or poor workmanship within the warranty period, the SPV Water Pump system supplier shall replace the same with free of cost within five days of intimation from the beneficiary farmer. The SPV water pump has to provide a Warrantee card (As per Annexure XIII) to farmer and will submit its copy to GGRC.

In the event of any instrument / component getting broken or damaged during installation and trial run at the site before handing over the SPV Water Pump system to the farmer / applicant, SPV Water Pump system supplier shall replace the same free of cost.

**ii. Maintenance and Repairing Services:**

SPV Water Pump system Supplier shall provide maintenance and repairing services free of cost for a period of 5 year from the date of handling over the SPV Water Pump system. The SPV water pump system suppliers will also submit the regular maintenance and servicing report (Annexure XIV) after every six month from the date of Joint Commissioning till completion of warrantee period of 5 year

Except manufacturing defect, in case of any repair / replacement of fitting / spare parts during the period of 5 year from the date of handing over to the farmer, the SPV Water Pump system supplier will supply the same and recover the cost from the farmer/applicant as per the rates decided from GGRC. However, SPV Water Pump system Supplier must provide repairing services free of cost and ensure availability of fittings and spare parts of the total system within five days of getting the request from the farmers. This is to ensure optimal crop performance and system sustainability.

**iii. Training to the farmer / applicant**

It is obligatory on the part of SPV Water Pump system Supplier to provide operational and maintenance training along with operational manual to run SPV Water Pump system smoothly and trouble free.

- iv. The supplier company is expected to appreciate and understand the maintenance clauses with seriousness with the objective that the unit runs hassle-free and the farmer is not made to run from pillar to post for rectification in case of development fault (s) in the unit.
- v. Complaints about fault(s) received by desk, telephone, fax, email or whatever communication method shall be attended within forty eight hours b y site visit etc.
- vi. The supplier is expected to stock adequate spare parts so that unit becomes operational within 3 (Three) days of complaint. Defects should be resolved within three days from date of intimation by farmer. The contractor shall have to pay penalty at the rate of Rs.500/- per system (for 3 HP, 5HP) per day for not attending defects within three days.
- vii. In case the company fails to maintain a unit, the bank guarantee shall be invoked and the decision of the GGRC shall be final. Failure to maintain five or more units

in a year may also cause black listing of the company for future supplies and the decision of the respective GGRC shall be final.

- viii. The bidder is supposed to declare details of Solar Pump Models and Configuration as per the Technical *Annexure-VIII*.

**(S) INSURANCE OF THE SPV WATER PUMP SYSTEM AND LIFE OF BENEFICIARY FARMERS:**

GGRC appointed Insurance Agency will provide Insurance Coverage to the SPV Water Pump system as well as the life of the beneficiary farmers for the period of one year. The insurance coverage will start from the 1<sup>st</sup> date of subsequent month of date of Joint Commissioning and Trial Run and the handing over the SPV Water Pump system to the beneficiary farmers.

The Insurance premium will form a part of total SPV Water pump system cost which would be borne separately by farmer and deposited in GGRC. The annual charges of insurance premium as on date is 0.28% + applicable Tax (may change from time to time) on the value of each SPV water Pump system.

The farmer has choice to renew his insurance policy at his own discretion from insurance agency after the expiry of 1<sup>st</sup> year of insurance coverage.

I/we have read the scope of work and technical specification as above and agreed unconditionally.

Signature of Bidder:		
Name :		
Designation:		
Date:	Place:	Company's Round Seal:

**Note:**

- a) **This Part G: SCOPE OF WORK AND TECHNICAL SPECIFICATION documents need to be submitted in physical form in technical bid cover.**
- b) **Please sign and seal of company on each page of this document.**



**(The bidder should sign and accept this format and submit in online and physical mode)**

**APPLICABLE STANDARDS FOR SOLAR WATER PUMP COMPONENTS**

Minimum Technical Requirements / Standards for off-grid / Stand-Alone solar photovoltaic (PV) power plants / systems to be deployed under the National Solar Mission (as per MNRE ordered dated 16.06.10)

Item/component	Applicable IEC / equivalent BIS Standard		Confirm as per STD.
	Standard Description	Standard Number	
PV Modules: Crystalline Silicon Terrestrial PV Modules	Must conform to the latest edition of IEC / equivalent BIS Standards for module Design qualification and type approval.	IEC 61215 / IS14286 IEC 61730 Part 1 &2	Yes / No
Inverters*	Efficiency Measurements Environmental Testing	IEC 61683 IEC 60068 2 (6,21,27,30,75, 78)	Yes / No
Charge controller /MPPT Units*	Design Qualification Environmental Testing	IEC 62093	Yes / No
Storage Batteries	General Requirements & Methods of Test Tubular Lead Acid test.	IEC 61427 IS 1651/ IS 13369	Yes / No
Cables	General Test and Measuring Methods PVC insulated cables for working Voltages up to and including 1100 V- Do, UV resistant for outdoor installation	IEC 60189 IS 694/ IS 1554 IS / IEC 69947	Yes / No
Switches/ Circuit Breakers/Connecto rs	General Requirements Connectors-safety	IS / IEC 60947 part I,II,III EN 50521	Yes / No
Junction Boxes/Enclosure	General Requirements	IP 65 (for outdoor) / IP 21 (for indoor) IEC 62208	Yes / No
SPV System Design	PV Stand-alone System design verification	IEC 62124	Yes / No
Installation Practices	Electrical installation of buildings Requirements for SPV power supply systems.		

\*\* Also refer Addendum No. 32/49/2010-11-PVSE dated 19.08.2010  
Latest specifications / amendment in the standards if any accepted by MNRE will be allowed.