FORMAT NO. : CEL/FR/MMD/03(01)

CENTRAL ELECTRONICS LIMITED
(A Public Sector Enterprise)

TENDER DOCUMENT

For

"Rate Contract for Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone Off Grid Solar Photovoltaic Water Pumping Systems in Madhya Pradesh basis including complete system warranty and its operation & maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme"

Tender No. C-2(b)/RC/0700/4611/2020 dated 03.05.2020

Assistant General Manager (Materials)
Materials Management Division
Central Electronics Limited,
4, Industrial Area, Saur Urja Marg, Sahibabad – 201 010 (UP) INDIA
Tel. No. 0091-120-2895145 Fax No. 0091-120-2895148 Email: mmd@celindia.co.in Website: www.celindia.co.in

FORMAT NO. : CEL/FR/MMD/TN/03(01)

CENTRAL ELECTRONICS LIMITED

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Tel. No. 0091-120-2895145 Fax No. 0091-120-2895148
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TENDER NOTICE

Tender No. C-2(b)/RC/0700/4611/2020 Date: 03.05.2020

Central Electronics Limited invites ONLINE bids (Technical & Price) from eligible bidders which are valid for a minimum period of 180 days from the date of opening for "Rate Contract for Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone Off Grid Solar Photovoltaic Water Pumping Systems in Madhya Pradesh basis including complete system warranty and its operation & maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme".

Scope of Tender	**"Rate Contract for Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone Off Grid Solar Photovoltaic Water Pumping Systems in Madhya Pradesh basis including complete system warranty and its operation & maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme"**
Earnest Money Deposit	**Rs.5,00,000/- (Rupees Five Lakhs Only)**

Interested parties may view and download the tender document containing the detailed terms & conditions, free of cost from the website www.etenders.gov.in or www.celindia.co.in.

Bids are to be submitted ONLINE Only.

Please see document control Sheet at Annexure-1

FOR CENTRAL ELECTRONICS LIMITED

Sd-

Assistant General Manager (Materials)

Materials Management Division

FORMAT NO. : CEL/FR/MMD/03(01)

TENDER DOCUMENT for Tender notice No.C-2(b)/RC/0700/4611/2020 dated 03.05.2020

Important Instructions: -

1. **The following documents/Annexures are part of tender:**
   - **a. Tender notice**
   - **b. Document Control Sheet** — **Annexure -1**
   - **c. Eligibility Criteria**
   - **d. Scope of Work & Technical Specifications** — **Annexure - A**
   - **e. Special Terms and Conditions** — **Annexure-A**
   - **f. Price bid**
     [Price Bid to be filled ONLINE in the separate BOQ file only (Refer Annexure 2)]
   - **g. Commercial terms & conditions** — **Annexure-B**
   - **h. Format for submission of Vendor Data** — **Annexure-C**
   - **i. Tender acceptance letter** — **Annexure-D**
2. **Quotations shall be liable to be rejected if there is/are any deviation(s) from the specifications.**
3. **Escalation in price (except where price variation clause is applicable), deviation from delivery schedule, terms and conditions will not be permitted in your quotation. Statutory Taxes & Duties should be shown separately from the price.**
4. **Catalogue, literature, specification details should accompany the quotation. Incomplete quotations are liable to be rejected.**
5. **Any deviations whether technical or commercial stated anywhere in the bid shall not be taken into account and may render the bid non-responsible and liable to be rejected.**
6. **Vendor Data should be submitted in the Format for submission of Vendor Data as per Annexure C.**
7. **Quotation should be submitted in TWO Packet System.**
8. **Bids should be submitted in ONLINE only. Following are to be submitted in your bid:**

   a) **Technical Bid:**

      i. **Earnest Money Deposit RTGS/NEFT acknowledgement or EMD exemption certificate.**
      ii. **Documents required as per eligibility criteria given in the tender.**
      iii. **Filled up Format for Submission of Vendor Data as per format at Annexure C.**
      iv. **Tender acceptance letter as per format at Annexure D.**

   b) **Price Bid: Prices to be filled ONLINE in the separate BOQ file only.**

Annexure-1

Document Control Sheet & Important dates

Tender Reference No.	**C-2(b)/RC/0700/4611/2020**
Name of Organization	**Central Electronics Limited**
Tender Type (Open/Limited/EOI/Auction/Single)	**Open**
No. of Packets	**Two**
Tender Category (Services/Goods/Works)	**Goods**
Type/Form of Contract (Work/Supply/ Auction/Service/Buy/Empanelment/Sell)	**Supply**
Payment Mode (Online/Offline)	**Online/Offline**

Date of Issue/Publishing	**03/05/2020 (18:00 Hrs)**
Document Download/Sale Start Date	**03/05/2020 (18:00 Hrs)**
Document Download/Sale End Date	**25/05/2020 (14:30 Hrs)**
Bid submission Start Date	**03/05/2020 (18:00 Hrs)**
Last Date and Time for Submission of Bids	**25/05/2020 (14:30 Hrs)**
Date and Time of Opening of Bids	**25/05/2020 (15:00 Hrs)**

THIS IS AN OPEN TENDER.
BIDS TO BE SUBMITTED ONLINE ONLY.

Please read the instructions for Online Bid Submission given in the last three pages of this tender document

ANNEXURE A

Rate Contract for Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone **Off Grid Solar Photovoltaic Water Pumping Systems** in Madhya Pradesh basis including complete system warranty and its operation & maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme

ELIGIBILITY CRITERIA

In order to be eligible to participate in the tender, the bidder must fulfill the following eligibility criteria. Any discrepancy or departure from the same shall make the bidder ineligible for participating in the tender:

Sr. No.	Eligibility Criteria	Complied/ Not Complied
1	The bidder should have experience in executing contract of 150 Nos. of Solar water pumping system (Installed and Commissioned) from in last 3 financial years in India for any government/semi-government/PSU/NSE-BSE Listed company/private companies/institutions under programme by MNRE/SNA/PSU's/Any other Government agency. Copies of orders and certificates indicating its successful execution to be enclosed.	
2	Bidder must have cumulative turnover of Rs. 7.5 crores in the last three financial years (FY 16-17, FY 17-18 & FY 18-19) - Copies of the audited balance sheet and profit & loss account must be submitted along with the technical bid.	
3	The bidder should have the valid Test certificate in the name of CEL (with CEL make Solar Modules) of the 1 HP DC and 7.5 HP AC Solar Water Pumping system (As per latest MNRE specifications) from NISE or any other lab accredited by NABL for testing of Solar Water Pumping system as per latest MNRE specifications and testing procedure. The Test Report in the name of CEL or Receipt of submission of samples at laboratories should be submitted along with the bid. In case of non-availability of Original test certificate, Bidder shall submit the acknowledge Receipt/certificates at the time of bid submission from testing labs as mentioned above. But in that case bidder should submit the test report/certificate within 7 days from the date of empanelment	
3	The bidder must be company registered under GST in the state of Madhya Pradesh. All compliance of GST is to made by bidder. Copy of the certificate to be enclosed. In case, bidder doesn't have the GST registration in the state of Madhya Pradesh, bidder shall submit the undertaking that GST registration certificate of Madhya Pradesh state will be provided within 10 days from the date of purchase order.	
4	Bidder must submit an undertaking on the letter head of their company that they will open atleast one authorised service centre in each operational district of MP state within 10 days from the date of PO by CEL as per tender terms and conditions.	
5	The firm must not have been debarred / blacklisted / defaulted by any Govt. Dept., agency, PSUs / institution / agencies / autonomous organizations. **"Bidder shall submit a duly notarized undertaking/self-certificate by an authorized person of the bidder's company/firm as per the format given in the tender".**	

6	It is a zero-deviation tender. Undertaking to be submitted regarding the compliance/acceptance of all the technical specifications and terms & conditions of the tender documents and its corrigendum(s), if any.	
7	"Manufacturer Authorization certificate from OEM of Pump as per the format given in the tender must be submitted along with the bid".	

Note :

1. Each page of the technical specification of tender submitted should be signed by the legally empowered and designated person of the tenderer otherwise tender shall be treated as invalid and rejected.
2. Company reserves the right to carry out technical capability/ infrastructure assessment of the Bidders by factory/office inspection or by any other means and company's decision shall be final in this regard.
3. Deviations or exceptions if any must be clarified mentioned and submitted.
4. The bidder shall submit all necessary documentary evidence to establish that the Bidder meets the above qualifying requirements.

SCOPE OF WORK (ANNEXURE-I):

The Scope of Work of a bidder shall include to Design, Manufacture, Supply, Erection, Testing and Commissioning of BOS for Stand-alone **Off Grid Solar Photovoltaic Water Pumping Systems** in Madhya Pradesh basis including complete system warranty and its repair and maintenance for 5 Years under MNRE off- grid and decentralized solar PV applications scheme: as per MNRE specifications and applicable BIS standards for implementation after aggregating the demand from the State on behalf of CEL. Bidder should follow Guidelines for the implementation of PM-KUSUM scheme issued by MNRE on 22-07-2019 and its subsequent amendment(s).

The scope of work covers:

A. Supply and Manufacture:

1. The selected vendor shall be responsible for design, supply, installation and commissioning of BOS for SPWPS (Except supply of SPV Modules) along with 5 years of repair and maintenance. To ensure timely maintenance of SPWPS, apart from training a local person and making available necessary spare parts & tools in each block, the vendor shall have one authorized service center in each operational district and a help line(s) in English/Hindi or Regional language of the state where such SPWPS are installed.
2. The successful bidder(s) should submit Data Sheet, General Technical Particular (GTP), Design & General Arrangement (GA) drawing of the system (As provided by SNA's) along with Bill of Quantity (BOQ) for CEL/SNA's approval before supply/PDI. Also, bidder has to take drawing approval for the complete system from SNA's within 7 days from the issuance of Purchase order.
3. Each pump should be marked with Toll Free No. of successful bidder operating in English/Hindi or Regional language of respective state and specific pump numbers and the Pump No. must have been captured by CEL/SNA's Web based Application (as per instruction of CEL) at the time of installation at site. The bidder has to develop and maintain a toll free number for Central Electronics Limited for the said project and has to maintain it for warranty and O&M period. No extra payment will be made for this.

During the time of PDI of each component, test report of equipment's, warranty certificates and calibration certificates should be provided by the bidder. Also, bidder should submit module structure wind withstand capacity certificate from certified Architecture Engineer for wind speed of 150 Km/hour. Successful bidder has to submit the PDI request within one week from the date of clearance (site allocation) given by CEL/SNA's. PDI will be conducted. PDI will be conducted at manufacturing units of major components like Solar Pumps, Controllers etc.

Identifying the beneficiaries (Market Mode), all the expenses incurred towards the marketing off SWPS

will be borne by the bidder. Site survey for installation of Solar Water Pumping system, checking of bore well/yield etc. prior to execution and intimating CEL about the date and time of commencement of work

Safe Transportation & storage of all materials supplied by bidder as well as CEL material to the site. In case of any losses, theft or damage of material (CEL's and their own), the contractor shall alone be responsible to make alternate arrangement for completion of the project within contractual delivery, commissioning & handing over of systems within quoted price. CEL shall in no way, whatsoever, responsible to compensate the contractor in this account.

The Module are supplied by CEL, if Module is found defective during the warranty period of 5 years the same shall be made available at CEL, Sahibabad by the contractor and the repaired materials shall be transported back to the site from CEL, Sahibabad by the contractor.

Supply of the complete systems, including all necessary components, sub-components, spares, tools, tackles etc. as per technical specifications given in this document including packing, forwarding, safe storage, handling, commissioning, trial and performance testing, handing over, insurance, Training, required documentation and realisation of payment from End customer (Any other work or activity not mentioned in the tender document but necessary for installation & successful operation of solar water pumping system will be in the scope of bidder).

Installation of the solar PV water Pump, solar PV array etc. as per the technical specifications and standards of the EOI document and testing the same in the presence of the authorised technical persons of CEL/user.

Civil work for installation/grouting of SPV pole/mounting structure/Electrical work etc. shall be scope of Contractor. It should have proper foundation as the steel structure of solar panel has to withstand wind of up to 150 km/hr. velocities. A certificate for civil work (such as installation of mounting structure of solar pump etc.) will have to be provided by Contractor, from any certified civil engineer certifying that it will withstand wind speed of 150 km/hr in all weather conditions. All the Civil work for PV poles and foundations and platforms for Pedestal works related with installation, commissioning of system.

All arrangements at sites, required tools, labour work, engagement of labour, civil construction work etc. all other required work for successful implementation of project on turnkey basis.

Bidder needs to submit documentary evidence that components should be indigenously manufactured for the supplied systems.

C. Installation & Commissioning:

1. Installation and commissioning of solar photovoltaic water pumping system (as mentioned by BOQ) shall be done by the successful bidder (s) as per the details provided by CEL/Customer. The vendors shall co-ordinate with CEL for repair,operation and maintenance of SPWPS for 5 yrs.
2. Successful bidder has to submit monthly consent of beneficiaries in CEL favors to SNA on behalf of CEL in coordination with CEL for which SNA's will give **Notice To Proceed** and for this, successful bidder shall complete the Supply, installation , testing, and Commissioning of SPWPS within 75 days of issuance of NTP/PO whichever is earlier.
3. Bidder should conduct site survey and provide DPR (Daily Progress Report) as per the requirement of CEL.
4. Action plan should be submitting to CEL including complete details of team, resources, service centers in each district within 7 days of acceptance of demand from CEL.
5. Intimation to be given to CEL/customer before one week of Pre-Dispatch inspection call and should submit complete warranty and test certificates of each lot at the time of inspection.
6. Submission of installation reports as per the format given by CEL/Customer on weekly basis.
7. Submission of completion reports of each district to CEL/SNA's within one week of 100 % completion of work as per allocation in each district.
8. Successful bidder should submit monthly and quarterly progress reports online to CEL/SNA's.
9. Bidder shall comply with all applicable regulatory and statutory norms. Bidder has to obtain approval/NOC (where ever required) on behalf of CEL from appropriate Govt. authority for implementing the project in each selected village.

10. Successful bidder should have finalized sub-bidders and purchase order (P.O.) on all materials such as structures, Pump, Controller, etc. within 7 days from the date of purchase order and unpriced P. O. copies will be submitted to CEL within 7 days from date of issue of Purchase order. Successful bidder should commission minimum pumps/ quarter as mentioned in the tender documents. Bidder has to obtain handing over certificates/ installation completion letters/ certificates from respective village panchayats/ Local Govt. Bodies in parallel with installation (as per prescribed format and requirement of respective district administration else prescribed format of CEL/SNA's may be adopted).
11.Each SPWPS is to be provided with a colored metallic sticker duly riveted displaying required details as provided by CEL/customer.
12. Successful bidder should submit the Certificate (as per prescribed format-to be provided by CEL/SNA) and photographs of each SPWPS installed which must show complete installation setup with beneficiary, Pump number etc.
13. Successful bidder has to ensure working of minimum 95% of total installed SPWPS at any point of time.

Technical Requirements and testing:
1. Systems installed under this Programme should meet technical specification and construction standards as specified by BIS and MNRE from time to time as given in the tender documents. Non-compliance will be taken seriously to the extent of blacklisting of the vendor.
2. Only indigenously manufactured PV modules and Pumps should be used in the Programme. '**Made in India'** to be mentioned on pumps. The balance of system should also be manufactured indigenously. The bidder has to declare the list of imported components used in the manufacturing of solar water pumping system.
3. Interpretation of the Guidelines: In case of any ambiguity in interpretation of any of the provisions of these guidelines, the decision of the Ministry shall be final.
4. Review of Guidelines: The Guidelines would be reviewed by an Internal Review Committee Chaired by Secretary in MNRE and modifications therein would be incorporated by the Ministry.
5. Systems installed under this Programme should also follow Office Memorandum F.No. 146/57/2018-P&C of Ministry of New & Renewable Energy, Government of India dated 11.12.2018.

D. Operation & Maintenance (O&M), Training, Awareness and sensitization:
1. Successful bidder should keep necessary spare parts (min 2% of allotted quantity of each component of the complete system at the service center at each district and should ensure proper maintenance of SPWPS to 5 years from the date of installation of each SPWPS. Bidder should also ensure to provide local training to local persons regarding proper maintenance of the SPWPS. Bidder should submit bi-weekly maintenance report to CEL/SNA's as per prescribed format provided. Also should provide quarterly inspection report of the installation as per prescribed format provided by CEL/Customer.
2. Any complaint registered/ service calls received should be attended at the earliest and the system should be repaired/ restored/ replaced within 3 days from the date of complaint received/informed to the bidder.
3. The installation data should be punched in the Web Application Platform to be developed by SNA's as per the terms and conditions provided by MNRE. Implementing Agency will develop the web application.

4. The Ministry officials or designated agency may inspect the ongoing installation or installed plants. In case the installed systems are not as per standards, non-functional on account of poor quality of installation, or non-compliance of maintenance, the Ministry reserves the right to blacklist the vendor.
5. Bidder has to submit an Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with each solar photovoltaic water pumping system to the beneficiary. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaic.
  A small write-up (with a block diagram) on solar photovoltaic water pumping system - its components, PV module, electronics and expected performance.

- A simple single line diagram (SLD) depicting the electrical circuits and control mechanism
- Type, Model number, Voltage & capacity of the motor, used in the system.
- The make, model number, country of origin.
- Significance of indicators.
- Clear instructions on regular maintenance and trouble-shooting of the solar photovoltaic water pumping system
- Preventive maintenance schedule
- Detail information about warranty coverage
- DO's and DONT's.
- Name and address of the contact person for repair and maintenance, in case of non- functionality of the solar photovoltaic water pumping system.
- Description of frequent faults of PV module and pump and its remedy.
- Minimum 10 hard copies (to be printed in booklet form) kept at each service center. Also, to be provided to CEL/Customer/SNA as and when required.

6. The Operation & Maintenance (O&M) cost of the system shall be as per tender specs. The bidder shall provide repair and maintenance of the system for 5 years.

7. Successful bidder shall do the preventive maintenance including cleaning of solar panel at the interval of every 4 months from the date of last SPWPS at each district and should submit the report in prescribed format to CEL/SNA's on behalf of CEL.

8. If complaint is not rectified within 3 days from the date of complaint received/informed to the bidder, in that case after 3 days INR 100 per pump/day penalty will be imposed, for first 3 days and thereafter Rs. 500/ per pump/day shall be imposed till the SPWPS put back to satisfactory working condition. This amount shall be recovered from running bills or CPG of the bidder.

Customer/CEL/SNA shall give preference domestically manufacturers as per Policy Notification no. F.No.33 (3)/2013-IPHW dated 22.05.14 of Department of Electronics & Information Technology, provided they meet all terms and conditions of tender on price, quality, supply schedule, branding, etc.

Detailed Test certificate for SPWPS being offered meets Technical Specifications as per RfP. Agreed. Sample copy of batch test report specifying all the required tests will be reported with each consignment.

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9. Successful bidder shall submit the detailed report and short 5-minute high definition video per district including local training, awareness and sensitization campaigns, Methodology for sustainable maintenance for further five years to the beneficiaries with relevant photographs.

E. Completion Time:

Successful bidder should ensure to complete the project as per Clause C and instruction of CEL/SNA's.

The implementation work on ground should start within 10 days from the date of Notice To Proceed from CEL/SNA's.

Successful bidder shall submit the un-priced P. O. copies of Pumps, wires / cables etc. to CEL within 7 days from the date of Purchase order. (Not applicable in case bidders itself manufacturing all the items.)

In case un-priced PO copies within 7 days not submitted, CEL may, cancel the contract and award the same quantity to another bidder.

In order to achieve the target, suitable number of teams (one team with minimum of three members) must be deployed by the bidder.

Time Schedule includes the time required for mobilization as well as testing, rectifications if any, retesting and completion in all respects to the entire satisfaction of Engineer-in-charge designated by SNA's.

F. Evaluation Criteria and Selection of Bidders:

Design, Manufacture, Supply, Transport, Installation, Testing and Commissioning of Solar Photovoltaic Water Pumping Systems with a Remote Monitoring Facility with repair and maintenance period of 5 Years as per Technical Specification in Annexure-II. Techno-commercially qualified bidders having the lowest price for each capacity of Solar water pumping system including supply, installation & commissioning including comprehensive AMC as specified in price bid shall be considered as L-1 bidder for that capacity. Both prices bids shall be evaluated separately. GST will not be considered for evaluating the L1 price. All the bidders qualifying this Tender for rate contract option to be opened for more parties criteria shall be placed as equal. Eligible bidder in each type shall be invited to match the lowest financial bid to become qualified bidder(s) and eligible for empanelment. Maximum L1 to L5 bidder shall be empanelled. However, Letter of Award (LoA) shall be issued only to L1 and L2 bidders. Rest of the empaneled bidders shall be considered for placement of LoA later in case the performance of the L1 and L2 bidders is not satisfactory. In this regard, final decision shall be taken by CEL management.

After award of LoA Successful bidders will co-ordinate with SNA in co-ordination with CEL and arrange list of prospective beneficiaries from SNA on behalf of CEL and get the consent from beneficiaries in CEL favors on behalf of CEL. After submission of beneficiaries consent and clearance from SNA, accordingly CEL will issue **PO** to the successful bidder for the installation of Solar Photovoltaic Water Pumping Systems (SPWPS). The successful bidder shall co-ordinate with CEL/customer for repair and maintenance of SPWPS for a period of five years from the date of commissioning.

CEL reserves the right to divert the awarded quantity of successful bidder if the bidder does not perform as per the requirement of tender within the schedule time frame at the sole discretion of CEL. In such event, the relevant clause mentioned in General Terms & Conditions shall apply.

CEL reserves the right to increase the total order quantity of any successful bidder by 50% and award the same to any successful Bidders at same rate & Terms and Conditions. In case of any ambiguity in interpretation of any of the provisions of the tender, the decision of “CEL” shall be final and binding on the bidders.

Central Electronics Limited, (CEL) reserves the right to alter and/ or modify the terms, reject any or all tenders without assigning any reason thereof. The decision of CMD, CEL will be final and binding on the Bidders.

CEL reserves the right to divert the awarded quantity of successful bidder to third party if the bidder does not perform within one month as per the schedule on the risk and cost of the bidder.

Further, in case an successful bidder is not able to supply quantity allocated to them as per scheduled timelines, CEL reserves the right to shift the part/full quantity to other successful bidder who has matched the price or retender the same,

G. Liquidated damages

In case of any delay in the execution of the order or delay in maintenance beyond the stipulated time schedule decided including any extension permitted in writing, CEL reserves the right to recover from the bidder a sum equivalent to 0.5 % of the value of the delayed SPWPS installation or on the unexecuted portion of the work for each week of the delay and part thereof subject to a maximum of 5 % of the total value of the contract on back to back basis.

Alternatively, CEL reserves the right to purchase of the material and completion of the works including maintenance from elsewhere at the sole risk and cost of the successful bidder/ contractor and recover all such extra cost incurred by CEL in procuring the material from resources available

including encashment of the bank guarantee or any other sources etc. Further, if any extra cost is incurred by CEL due to delay in work completion by the party beyond the completion time as per PO, the same shall be recovered from the party's Invoice/BG etc.

Alternatively, CEL may cancel the order completely or partly without prejudice to his right under the alternatives mentioned above.

J. WARRANTY AND MAINTENANCE:

1. The complete Solar Photovoltaic Water Pumping System and display board / Name Plate (as per instructions of CEL) shall be warranted and maintained for 5 years from the date of installation.
2. The maintenance service provided shall ensure proper functioning of the system as a whole. All preventive/routine maintenance and breakdown/corrective maintenance required for ensuring maximum uptime shall have to be provided by the Contractor.
3. Successful bidder, on whom letter of award is placed, is to ensure all safety guidelines, rules and regulations, labour laws etc. Successful bidder indemnifies CEL/customer for any accident, injury met by its labour, employee or any other person working for him. Any compensation sought by its labour, employee or any other person working for him shall be paid by successful bidder as per settlement solely. CEL/Customer has no role to play in this matter.
4. Successful bidder is to submit interchangeability certificate for its product supplied for replacement during warranty and maintenance period and even when it is purchased from open market. In case due to change in technology, the supplied product is not available during warranty/ maintenance period than the improved version of product can be used in warranty/ maintenance period with same or improved technical parameters or the combination thereof after written communication of Engineer in Charge of CEL at same cost & terms and conditions. Successful Bidder, on whom letter of award has been placed, has also to confirm that the prices of improved version of product are not lesser than the original product or its parts in comparison.
5. Local representative of bidder should meet governing authorities of each block and should submit the minutes of meeting to SNA's on behalf of CEL on quarterly basis.

The Bidder shall be deemed to have examined the Bid document, to have obtained his own information in all matters whatsoever that might affect carrying out the Works in line with the Scope of Work specified in the document at the offered rates and to have satisfied himself to the sufficiency of his Bid. The bidder shall be deemed to know the scope, nature and magnitude of the work and requirement of materials, equipment, tools and labour involved, wage structures and as to what all works he has to complete in accordance with the Bid documents irrespective of any defects, omissions or errors that may be found in the Bid documents.

In case of poor performance/poor quality of material, CEL reserves the right to short close / terminate the contract and award the work to third party at risk and cost of bidder.

K. TRANSPORTATION, DEMURRAGE, WHARFAGE, ETC.:

Contractor is required under the Contract to transport the Goods to place of destination defined as Site.

Subsequent to an order being placed against bidder's quotation, received in response to this 'enquiry', if it is found that the materials supplied are not of the right quality or not in accordance with our specifications (required by us) or received in damaged or broken conditions, not satisfactory owing to any reason of which we shall be the sole judge, CEL/CEL's Customer shall be entitled to reject the materials, cancel the contract and buy our requirement from the open market / other sources and recover the loss, if any, from the supplier reserving to ourselves the right to forfeit the security deposit, furnished by the supplier against the contract. The supplier will make his own arrangements to remove the rejected material within a fortnight of instruction to do so. Thereafter material will lie entirely at the supplier's risk and responsibility and storage charges, along with any other charges applicable, will be recoverable from the supplier.

CEL reserves the right to accept or reject any quotation in full or in part without assigning any reason thereof. We also reserve the right to split and place order on more than one suppliers.

The bidder should not have been black-listed by any Central / State Government or Public Sector Undertakings. If at any stage of tendering process or during the currency of the contract, any suppression / falsification of such information is brought to the knowledge, CEL shall have the right to reject the proposal or terminate the contract, as the case may be, without any compensation to the bidder & forfeiture of EMD/CPG.

ANNEXURE II

A. TECHNICAL SPECIFICATIONS OF SOLAR WATER PUMPING SYSTEM

General Specifications of SPV Pumping Systems shall be in accordance with prevailing guidelines of MNRE; however the specifications of some components are also mentioned as follows –

1.SCOPE

These specification covers design qualifications and performance specifications for Centrifugal Solar Photo Voltaic (SPV) Water Pumping Systems to be installed on a suitable bore-well, open well, water reservoir, water stream, etc., and specifies the minimum standards to be followed under New Scheme for Farmers launched by Government of India on 8.3.2019.

2.TERMINOLOGY

In addition to the terminology specified in **3** of IS 5120 and IEC 62253, the following shall also apply.

2.1 Static Water Depth — It is the depth of water level below the ground level when the pump is not in operation.

2.2 Draw-Down — It is the elevation difference between the depth of static water level and the consistent standing water level in tube well during operation of pump set.

2.3 Submergence — It is the minimum height of water level after drawdown above the pump suction casing.

2.4 Manometric Suction Lift — Manometric suction lift is the vacuum gauge/suction manometer reading in meter of water column when pump operates at suction lift.

2.5 Static Suction Lift — Static suction lift/head is the vertical distance between sump water level and center of pump inlet.

2.6 Daily Water Output — It is the total water output on a clear sunny day with three times tracking SPV panel, under the "Average Daily Solar Radiation" condition of 7.15 KWh / m^2 on the surface of SPV array (i.e. coplanar with the SPV Modules).

2.7 Wire to Water Efficiency — It is the combined system efficiency of SPV Converter/Controller with Inbuilt MPPT mechanism, Pump set and piping.

2.8 Pump Controller— Pump Controller converts the DC voltage of the SPV array into a suitable DC or AC, single or multi-phase power and may also include equipment for MPPT, remote monitoring, and protection devices.

2.9 Maximum Power Point Tracker (MPPT) — MPPT is an algorithm that is included in the pump controller used for extracting maximum available power from SPV array under a given condition. The voltage at which SPV array can produce maximum power is called 'maximum power point' voltage (or peak power voltage).

3. CONSTRUCTIONAL FEATURES

3.1 General

3.1.1 SPV Water Pumping System set uses the irradiance available through SPV array. The SPV array produces DC power, which can be utilized to drive a DC or an AC pump set using pump controller.

3.2 A SPV Water Pumping system typically consists of:

3.2.1 *Pump Set*

Pump set may be of any one of the following types:

i) Mono-set pump;
ii) Open well submersible pump;
iii) Submersible pump;
Pump can be submersible or surface depending upon the existing pump.

3.2.2 Motor
The motor of the pump set may be of the following types:
i) AC Induction Motor.
ii) DC Motor [PMSM/BLDC/SRM (with brush or brushless)].
3.2.3 *SPV Controller See 2.8*
Note: Some controllers are inbuilt in the motors
Controller:
Controller should be of the approved make and it should be in accordance with the electrical parameters of the Motor/Pump. Controllers should be fixed in suitable IP 54 Box with the provision of SPD as per norms of SNA. Controller must have Remote Monitoring Arrangement as per MNRE guidelines. Contractor shall have to provide a link for monitoring of installed SPV Pumps. Other detailed specifications of Controller are as per below table:
Specifications of Controller/Drive for Solar Water Pumping Systems

Sl. No	Requirement	Specifications
1	*Controller Power Capacity to drive the Pump*	Controller Power Capacity should match to Solar Panels Power Capacity, not Pump Capacity. Example: For **5HP** Project, As per MNRE Specs, Panels should be minimum **4800W**, Controller capacity also should be minimum **4800W** only.
2	*Point Tracking (MMPT)*	Should track power only and not Voltage at Maximum power point
3	*Enclosure*	The Controller must have **IP54** protection or must be housed in a cabinet having at least **IP54** protection.
4	*DC Circuit Breaker Disconnect Switch*	Should be between Solar panels and controller
5	*GSM/GPRS*	Controller shall be integrated with GSM/GPRS gateway with Geo tagging. GSM/ GPRS Charges to be included in the Costing till the end of Warranty period of the Pump set
6	*Protections*	x Dry Run x Open Circuit x Short Circuit x Reverse Polarity x Over Load x Over Temperature x Motor Jam Detection and Automatic Unjam with minimum **1.5 times** of rated motor current for at least **30sec**.
7	*Display of Controller/ Drive*	Controller must have **LCD Display**. All Parameters and Faults/Protections should be clearly indicated on Display such as if controller shutdown with short circuit, it must clearly indicate on display as "Short Circuit" (No short cuts such as F1, F2 or any other indications). Below parameters must be appear on Display ON/OFF Status - x Solar DC Voltage in Volts x Solar DC Current in Amps x DC Energy in Kwh x Output Currents in Amps (minimum **2-Phases**) x Rotating Frequency in Hz

		x All Faults/Protection Status x Cumulative Total Water Output in litres x Pump On/Off Status
8	*Data maintenance*	All parameters (as detailed above in item 7) from the Controller shall be pushed to Bidder's cloud/web server for every 15 minutes and the same to be maintained for the entire warranty period. The access of this server shall be provided to CEL/SNA's on their request. Remote monitoring shall be inline with new technical specification of solar water pumping system issued by MNRE in 2019 and it's subsequent amendments. Requirements of remote monitoring system must be as mentioned in the tender documents.

3.2.4 Provision for remote monitoring for the pumps must be made in the pump controller through an integral arrangement having following basic functions:
Controller must be assigned with a unique serial number and its live status must be observed remotely on online portal through login credentials.
Live status must indicate whether controller is ON/ OFF
The parameter i.e. the water output, water flow rate, in fault condition, array input voltage/ current, power and motor frequency should at logged at an interval of 10 minutes
Controller must have a back up to store the data locally (at least for 1 year)

3.3 Solar Photo Voltaic (SPV) Array

SPV arrays contains specified number of same capacity, type and specification modules connected in series or parallel to obtain the required voltage or current output. The SPV water pumping system should be operated with a PV array minimum capacity as mentioned in the tender document, measured under Standard Test Conditions (STC). Sufficient number of modules in series and parallel could be used to obtain the required voltage or current output. The power output of individual PV modules used in the PV array, under STC, should be a minimum of **300 Watts peak**, with adequate provision for measurement tolerances.

Note: The SPV modules shall be supplied by CEL at a centralised location in the state of Madhya Pradesh as decided by CEL.

3.4 Motor-Pump Set

3.4.1 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

3.4.2 The "Motor-Pump Set" should have a capacity of 1 HP and 7.5 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 have a capacity of 1 HP for 1 HP Solar water pumping system and 7.5 HP for 7.5 HP Solar water pumping system should be AC/DC. 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.

3.4.3 The pump and all external parts of motor used in submersible pump which are in contact with water, should be of stainless steel of grade 304 or higher as required. The motor- pump set should have a 5 years warranty and therefore, it is essential that the construction of the motor and pump should be made using parts which have a much higher durability and do not need replacement or corrode for at least 5 years of operation after installation.

3.4.5 The suction/ delivery pipe shall be of HDPE or uPVC column pipes of appropriate size, electric cables, floating assembly, civil work and other fittings required to install the Motor Pump set. In case of HDPE pipes the minimum pressure rating of 8 kg/sqcm-PE100 grade for pumps up to 3 HP, 10 kg/sqcm-PE100 grade for 5 HP pumps and further higher minimum pressure rating for above 5 HP as appropriate shall be used.

3.5 Module Mounting Structures and Tracking System

3.5.1 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 raw material used and process for manufacturing of module mounting structure including welding of joints should conform to applicable IS. The module mounting structure should be hot dip galvanized according to IS 4759. Zinc content in working area of the hot dip galvanizing bath should not be less than 99.5% by mass.

3.5.2 To enhance the performance of SPV water pumping systems arrangement for seasonal tilt angle adjustment and three times manual tracking in a day should be provided. In order to make structure rigid, the gap between Telescopic pattern supports should be minimal, further, for bearing of center load of whole structure only pins should be used instead of threaded bolts.

3.5.3 The general hardware for structure fitment should be either SS 304 or 8.8 grade. Modules should be locked with antitheft bolts of SS 304 Grade. Foundation should be as per the site condition, based on the properties of Soil. Foundation can be done either with the help of 'J Bolt' (refer IS 5624 for foundation hardware) or direct pilling, it should be decided as per the site and relevant IS i.e. IS 6403 / 456 / 4091 / 875 should be referred for foundation design.

3.5.4 Details of Module Mounting Structure for different capacity of SPV pumps are attached in the tender documents. These are indicative of minimum standards and an Implementing Agency may specify higher standards.

3.6 SPV Controller

3.6.1 Maximum Power Point Tracker (MPPT) shall be included to optimally use the power available from the SPV array and maximize the water discharge.

3.6.2 The SPV Controller must have IP (65) protection or shall be housed in a cabinet having at least IP (65) protection.

3.6.3 Adequate protections shall be provided in the SPV Controller to protect the solar powered pump set against the following:

a) Dry running;
b) Open circuit;
c) Accidental output short circuit;
d) Under voltage;
e) Reverse polarity;
f) SPD to arrest high current surge; and
g) Lightening arrestor.

3.6.4 A good reliable DC Circuit Breaker as per IS/IEC 60947-2 suitable for switching DC power ON and OFF shall be provided in the SPV Controller.

3.6.5 All cables used shall be as per IS 694. Suitable size of cable shall be used in sufficient length for inter-connection between the SPV array to SPV Controller and the SPV Controller to solar powered pump set. Selection of the cable shall be as per IS 14536.

3.6.6 Controller shall be integrated with GSM/GPRS Gateway with Geo tagging. GSM/ GPRS Charges to be included in the Costing till the end of Warranty period of the Pump set.

3.7 Earthing Arrangement

3.7.1 Earthing of the motor shall be done as per IS 9283 in accordance with the relevant provisions of IS 3043. Separate earthing shall be provided for Controller, pump and SPV array.

3.7.2 For safety purpose, it shall be ensured during installation that the earthing is capable of taking care of leakage current.

3.7.3 In case of uPVC/HDPE pipes used as discharge pipe, a separate non-corrosive, low resistance

conductor from motor earth terminal to control panel earth terminal shall be provided for earthing.
3.7.4 A lightening arrestor shall be provided with every SPV Water Pumping System.

3.8 Use of indigenous components

The motor-pump-set, controller and balance of system should be manufactured indigenously. The vendor has to declare the list of imported components used in the solar water pumping system.

4. PERFORMANCE REQUIREMENTS

4.1 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 :

For D.C. Motor Pump Set:

i) 110 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 meter (Suction head, if applicable, maximum of 7 meter) and with the shut off head being at least 12 meter.
ii) 55 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 meter (Suction head, if applicable, up to a maximum of 7 meters) and with the shut off head being at least 25 meter.
iii) 38 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 meters and the shut off head being at least 45 meter.
iv) 23 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 meter and the shut off head being at least 70 meter.
v) 15 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 meters and the shut off head being at least 100 meter.
vi) 10.5 liters of water per watt peak of PV array, from a Total Dynamic Head of 100 meters and the shut off head being at least 150 meter.

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 as mentioned below:

For A.C. Induction Motor Pump Set:

i) 99 liters of water per watt peak of PV array, from a Total Dynamic Head of 10 meter (Suction head, if applicable, maximum of 7 meters) and with the shut off head being at least 12 meter.
ii) 49 liters of water per watt peak of PV array, from a Total Dynamic Head of 20 meter (Suction head, if applicable, up to a maximum of 7 meters) and with the shut off head being at least 25 meter.
iii) 35 liters of water per watt peak of PV array, from a Total Dynamic Head of 30 meter and the shut off head being at least 45 meter.
iv) 21 liters of water per watt peak of PV array, from a Total Dynamic Head of 50 meter and the shut off head being at least 70 meter.
v) 14 liters of water per watt peak of PV array, from a Total Dynamic Head of 70 meter and the shut off head being at least 100 meter.
vi) 9 liters of water per watt peak of PV array, from a Total Dynamic Head of 100 meter and the shut off head being at least 150 meter.

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 in the Annexure.

5. TESTS FOR HYDRAULIC AND ELECTRICAL PERFORMANCE OF PUMPSET

5.1 The motor-pump set shall be tested independently for hydraulic and electrical performance as per the relevant IS specification including following test

a) Constructional requirements/features
b) General requirements
c) Design features
d) Insulation resistance test
e) High voltage test

f) Leakage current test

5.2 Testing of SPV Water Pumping Systems shall be done as per procedure specified by the MNRE.

6. GUARANTEE OF PERFORMANCE

6.1 The SPV Water Pumping Systems shall be guaranteed for their performance of the nominal volume rate of flow and the nominal head at the guaranteed duty point as specified in 7**.1** under the "Average Daily Solar Radiation" condition of 7.15 KWh/m^2 on the surface of SPV array (i.e. coplanar with the Photo Voltaic (PV) Modules). 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.

6.2 Solar Photo Voltaic Water Pumping Systems shall be guaranteed by the manufacturer against the defects in material and workmanship under normal use and service for a period of at least 60 months from the date of commissioning.

6.3 Sufficient spares for trouble free operation during the Warrantee period should be made available as and when required.

7. MARKING AND PARAMETERS TO BE DECLARED BY THE MANUFACTURER

7.1 The motor pump-set and Controller used in SPV Water Pumping Systems shall be securely marked with the following parameters declared by the manufacturer:

7.1.1 Motor Pump-set

a) Manufacturer's name, logo or trade-mark;
b) Model, size and SI No of pump-set;
c) Motor Rating (kW / HP);
d) Total head, m, at the guaranteed duty point;
e) Capacity (LPD) at guaranteed head;
f) Operating head range, m;
g) Maximum Current (A);
j) Voltage Range (V) and;
k) Type - AC or DC Pump set; &
l) Photo Voltaic (PV) Array Rating in Watts peak (Wp)

7.1.2 Controller

a) Manufacturer's name, logo or trade-mark;
b) Model Number;
c) Serial Number;
d) Voltage Range;
e) Power Range in kW for Controller; and
f) Current rating (A)

8. OPERATION AND MAINTENANCE MANUAL

8.1 An Operation and Maintenance Manual, in English and the local language, should be provided with the solar PV pumping system. The Manual should have information about solar energy, photovoltaic, modules, DC/AC motor pump set, tracking system, 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. Helpline number and Name and address of the Service Centre and contact number of authorized representative 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.

9. OTHER ACCESSORIES:

i. **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.

10. COMPREHENSIVE OPERATION AND MAINTENANCE

i. The Contractor should provide 5 years comprehensive maintenance of the Solar Photovoltaic Water pumping system set, which shall include corrective maintenance as well as routine service visits during guarantee period.

ii. The service personnel of the Supplier shall make routine maintenance visits monthly for the first year and quarterly thereon till the completion period of comprehensive maintenance. The report has to be maintained. Apart from the monitoring, regular periodical maintenance of system has to be done. The report has to be maintained in a prescribed table format in a register maintained at the site which should contain Month, Inspection Date, Action taken against the Defects found in the System and Remarks of the representative of households along with signatures of both service Engineer and the farmer/ beneficiary.
iii. The deputed personnel shall be in a position to check and test all the equipments regularly, so that preventive actions, if any, could be taken well in advance to save any equipment from damage.
iv. Normal and preventive maintenance of the Solar Photovoltaic Water pumping systems such as cleaning of module surface, tightening of all electrical connections, changing of tilt angle of module mounting structure, cleaning & greasing of motor pump sets, changing filters etc. are also the duties of the deputed personnel during maintenance visits.
v. During operation and maintenance period of the Solar Photovoltaic Water Pumping Systems, if there is any loss or damage of any component due to **miss management or miss handling** or due to any other reasons pertaining to the **deputed personnel**, what-so-ever, the supplier shall be responsible for **immediate replacement or rectification**. The damaged component may be repaired or replaced by new component.
vi. The maintenance shall include replacement of any component irrespective of whether the defect was **a manufacturing defect or due to wear and tear**.

11. Performance Testing:-

i. After successful completion of performance test only, the bidder shall actually be eligible for his opening of financial bid. Failing which his price bid shall not be opened & he shall disqualify from further bidding process.
ii. Performance test will be carried out by Bidder in presence of SNA's representative.
iii. CEL/Customer will identify the site for testing of Solar Water Pumping System.
iv. CEL/Customer will certify the performance test and will be the final authority.
v. Bidder shall make complete necessary arrangement for performance testing of Solar Water Pumping System along with complete set of Apparatus, Equipment, Battery, Mobile, LED Bulbs etc. in all.

The result of performance test with **± 15 % variation** in the above indicative technical specifications will be accepted.

Specifications for Dual Axis Manual Tracking Type Module Mounting Structure (MMS) for Solar Water Pumping System

Standard MMS for 4, 6 and 8 solar modules have been specified. These standard MMS may be used in combinations for different capacities of solar water pumping systems as follows:

1. Standard MMS of 4 Modules for 1 HP
2. Standard MMS of 6 Modules for 2 HP
3. Combination of standard MMS of 4 Modules and 6 Modules for 3 HP
4. Combination of two standard MMS of 8 Modules for 5 HP
5. Combination of three standard MMS of 8 Modules for 7.5 HP

and so on….

Specifications of main parts used in MMS are given below:

1. *Centre Shaft:* - Centre shaft used in structure should be of minimum 139 OD with minimum thickness of 4 mm with base plate minimum 10 mm thickness if used and foundation hardware should be as per IS 5624. For system without base plate i.e. direct pilling is should be as per the site condition based on the properties of Soil and refer (IS 6403 / 456 / 4091 / 875) for foundation design.

2. Rafters: - The Main and secondary rafter used in structure should be of either SHS & RHS pipe sections.

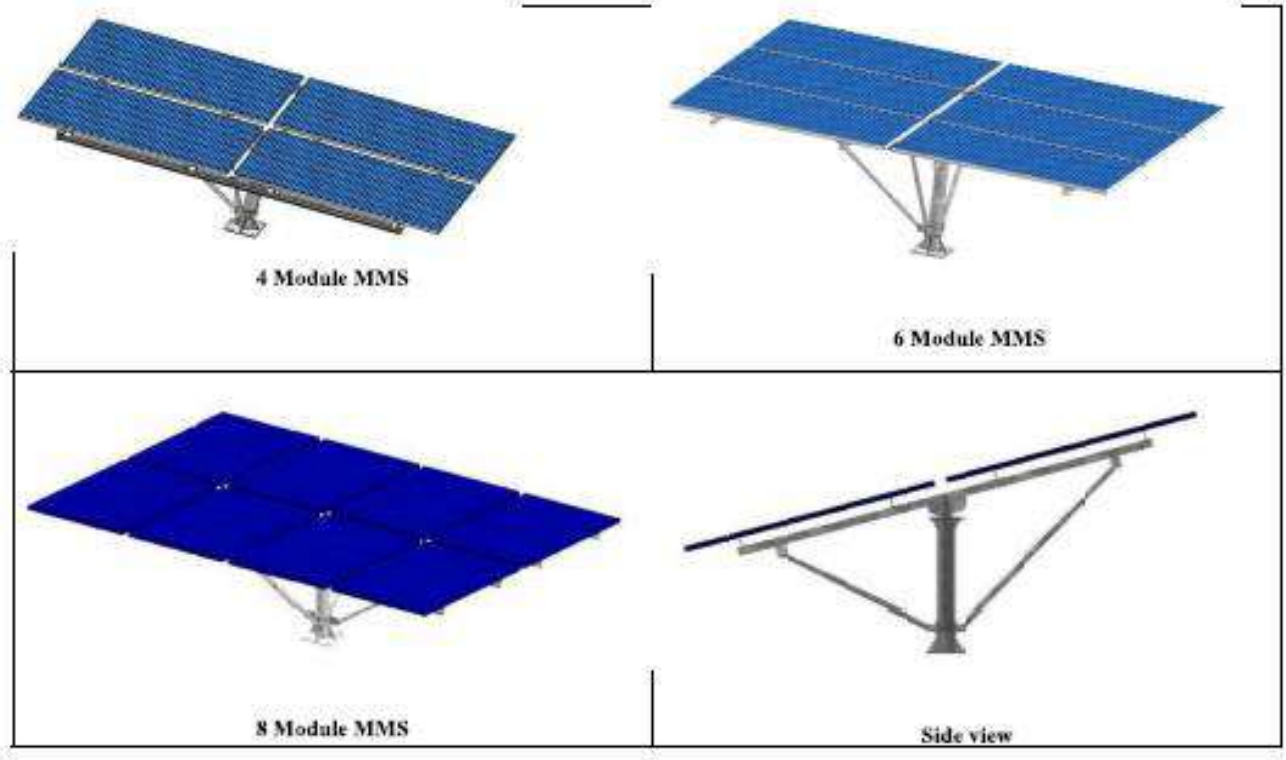
3. Purlin: - Mounting Purlins used in the structure should be made of Cold form steel section as per IS 1079 with minimum thickness of 2mm.

4. Provision for Seasonal Tilt: - In one structure at least four telescopic supports (three may be used in MMS for 4 modules) either round hollow sections or square hollow section to be provided to support the mounting structure.

5. *Provision for Daily Tracking*: - Provision for Daily tracking should be provided by the way of providing min. 8 mm thick metal sheet with precision cut grooves.

6. *Module Locking System*: - Modules should be locked with anti-theft bolts of SS 304 Grade.

7. *General Hardware for Structure Fitment*: - Either SS 304 or 8.8 grade hardware should be used for fitment.
8. *Hot Dip Galvanizing*: - All structure parts should be hot dip galvanized according to IS 4759.
9. *Tolerance for fabrication*:- Tolerance for fabrication of steel structure should as per IS 7215.
10.*Welding*: - Welding should be done as per IS: - 822 & grade of welding wire should be (ER70S-6).

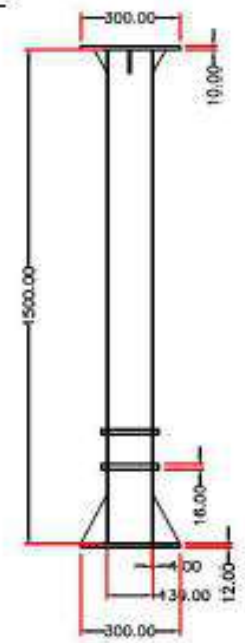


Raw material test certificates (MTC) of all types of raw material used in dual axis manual tracking type MMS as per appropriate IS code should be submitted along with dispatch documents.

Tests to be performed on Dual Axis Manual Tracking Type MMS for Solar Water Pumping System: -
1. For ascertaining proper welding of structure part following should be referred.
a. Weld wire grade should be of grade **(ER 70 S - 6)**
b. D.P. Test (Pin Hole / Crack) **(IS 822)**
2. For ascertaining hot dip galvanizing of fabricated structure following should be referred: -
a. Min coating required should be as per IS 4759.
b. Testing of galvanized material.
i. Preece Test (CuSO4 Dip Test) **(IS 2633)**
ii. Mass of Zinc **(IS 6745)**
iii. Adhesion Test **(IS 2629)**

Part1 – Mail Column

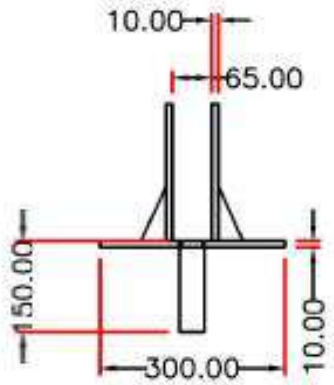
Part1 – Mail Column



Notes: -
1. All Dimensions are in mm.
2. Main Column material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 2 – Top Plate

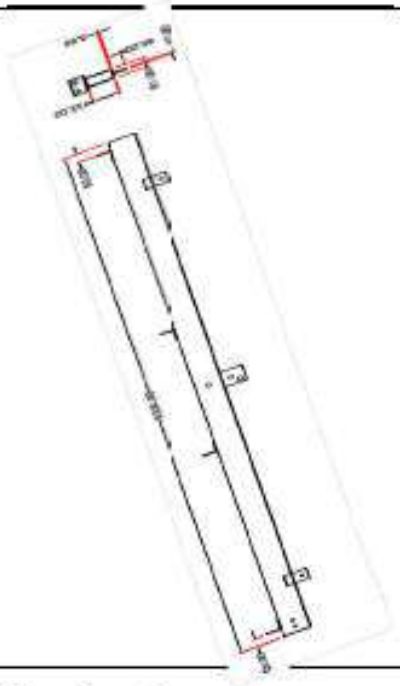
Part 2 – Top Plate



Notes: -
1. All Dimensions are in mm.
2. Top Plate material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 3 – Main Tube

Part 3 – Main Tube



Notes: -

1. All Dimensions are in mm.
2. Main Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 4 – Side Tube

Part 4 – Side Tube

Notes: -

1. All Dimensions are in mm.
2. Side Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 5 – Purlin

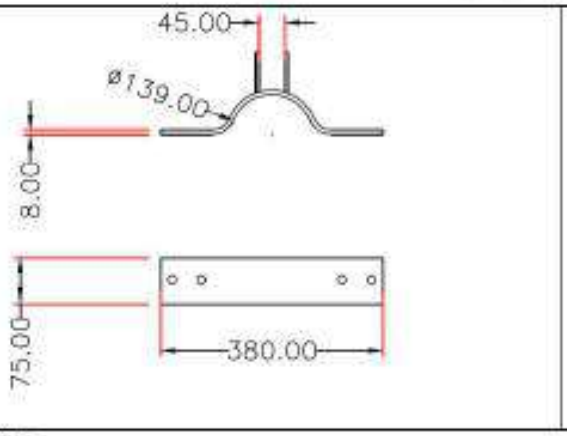
Part 5 – Purlin

Notes: –

1. All Dimensions are in mm.
2. Mounting Purlin material grade should be E250 as per: – IS: 1079 / 2062 & IS: 811.

Part 6 – Clamp with Blade

Part 6 – Clamp with Blade

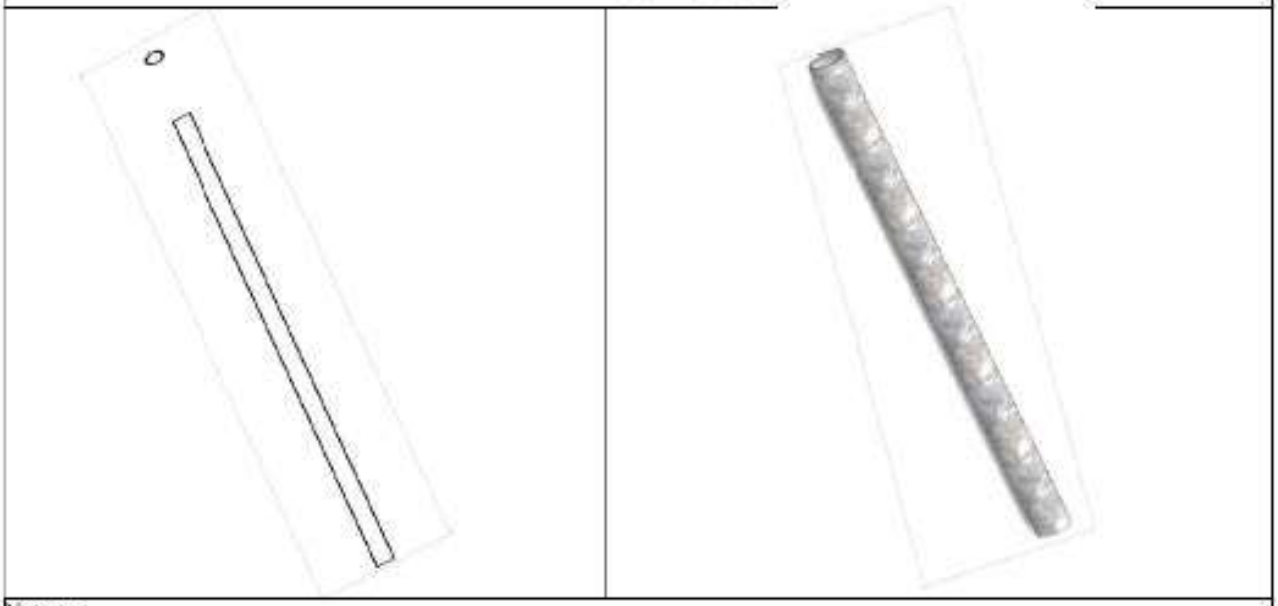


Notes: –

1. All Dimensions are in mm.
2. Clamp with Blade material grade should be as per: – IS: 1079 & E250 as per: – IS: 2062.

Part 7 – Supporting Pipes

Part 7 – Supporting Pipes



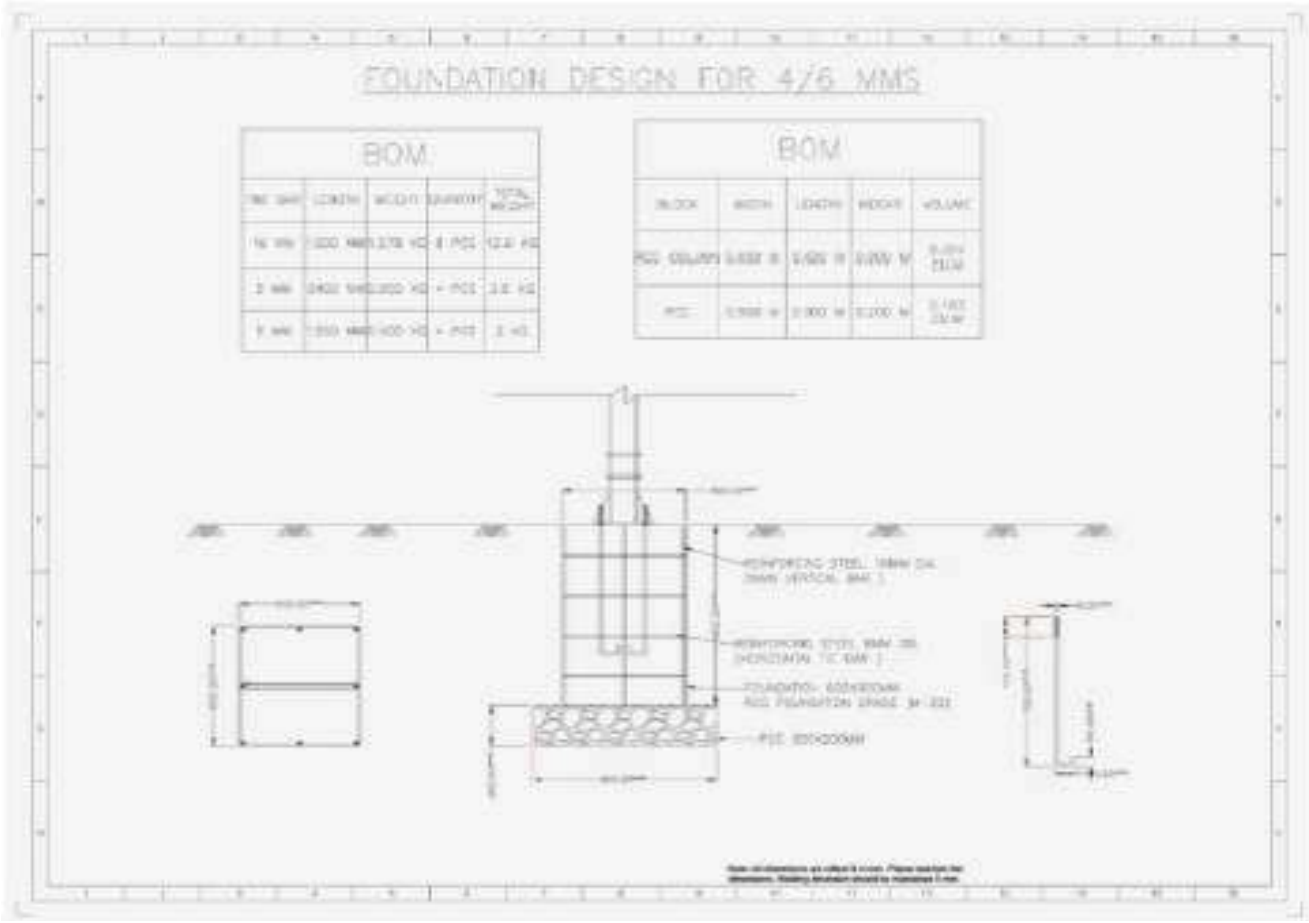
Notes: -

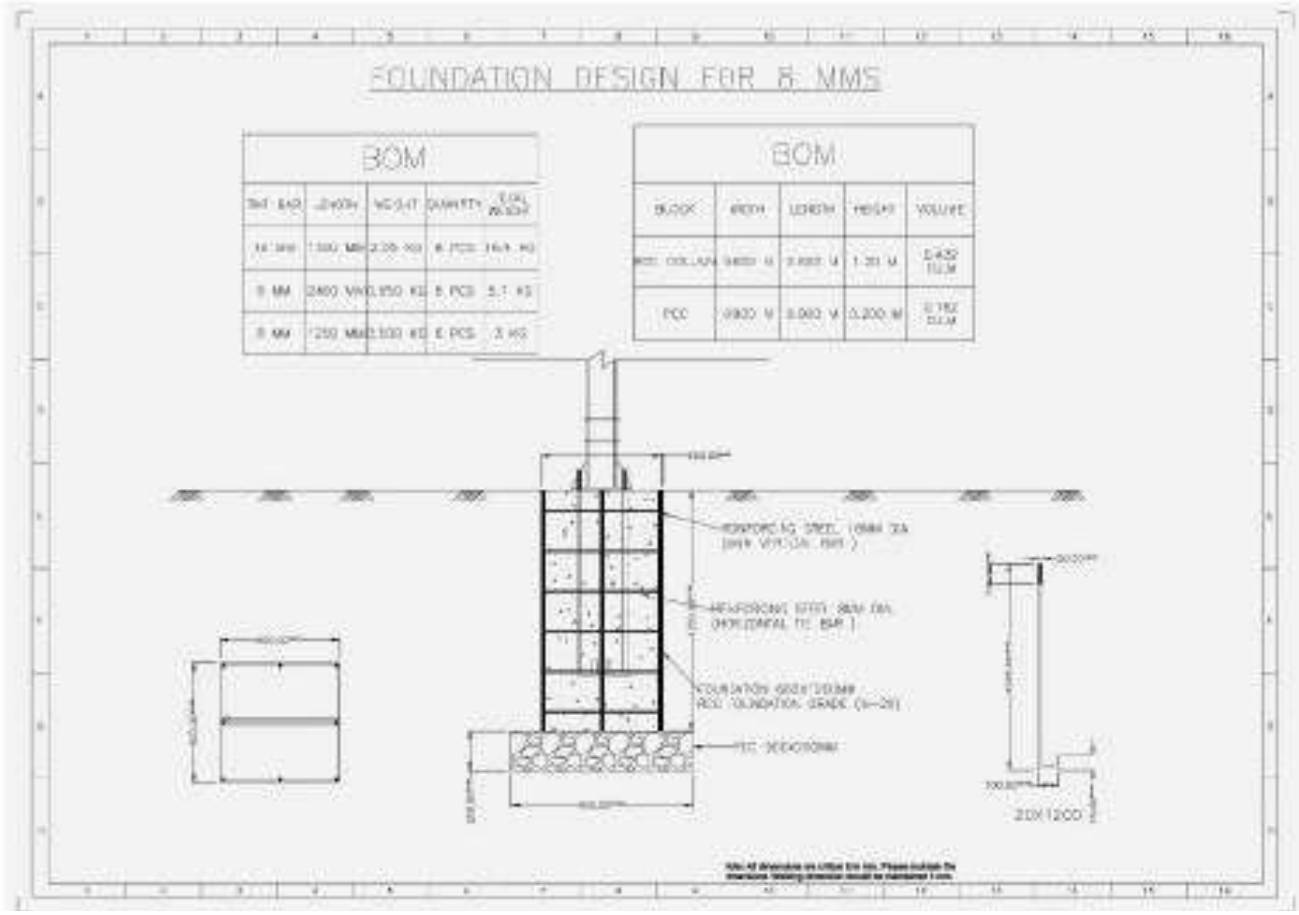
1. All Dimensions are in mm.
2. Supporting Pipes material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Note: The MMS design specified by the MNRE in the Technical Specification issued in 2019 shall be followed. However, in case of any change in MMS design having improved design features than MNRE specified design, the vendor shall submit a certificate to this effect from recognized structural engineering institutions like IIT Roorkee, IIT Madras, etc.

Bill of Quantity for main parts of MMS for Solar Water Pumping System

SR. NO.	PART NAME	CROSS SECTION DETAIL	LENGTH (MM)	QUANTITY PER SET
A	**Common for MMS for 4, 6 and 8 Modules**			
1.	MAIN POLE	139 OD	1500	1
2.	TOP PLATE	300 OD	--	1
3.	CLAMP WITH BLADE	75X8	380	2
4.	SUPPORTING PIPES	41 OD & 33 OD	--	6
B	**Different for MMS for 4, 6 and 8 Modules**			
5.	MAIN TUBE			
	4 and 6 Module	60X60X3.6	3300	1
	8 Modules	122X61X3.6	3300	1
6.	SIDE TUBE			
	4 and 6 Module	50X50X3.6	3300	2
	8 Modules	80X40X3.2	3300	2
7.	MOUNTING PURLIN			
	4 Module	80X50X15X2	2050	4
	6 Module	80X50X15X2	3100	4
	8 Modules	80X50X15X2	4150	4


FOUNDATION DESIGN FOR 4/6 MMS
BOM
BOM


FOUNDATION DESIGN FOR 8 MMS
BOM
BOM
BLOCK
WIDTH
LENGTH
HEIGHT
VOLUME
PCC
200X12CO

Indicative Technical Specifications of Shallow Well (Surface) Solar Pumping Systems with D.C. Motor Pump Set with Brushes or Brushless D.C. (B.L.D.C.)

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII
PV array (Wp)	900	1800	2700	2700	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	12	12	12	25	12	25	45	12	25	45	12	25	45
Water output * (Liters per day)	99000 (from a total head of 10 meters)	198000 (from a total head of 10 meters)	297000 (from a total head of 10 meters)	148500 (from a total head of 20 meters)	528000 (from a total head of 10 meters)	264000 (from a total head of 20 meters)	182400 (from a total head of 30 meters)	742500 (from a total head of 10 meters)	371250 (from a total head of 20 meters)	256500 (from a total head of 30 meters)	990000 (from a total head of 10 meters)	495000 (from a total head of 20 meters)	342000 (from a total head of 30 meters)

* 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, maximum 7 meters.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4 (i.e. Performance 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.

Indicative Technical Specifications of Solar Deep well (submersible) Pumping Systems with D.C. Motor Pump Set with Brushes or Brushless D.C. (B.L.D.C.)

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII	Model-XIV
PV array (Wp)	1200	1800	3000	3000	3000	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	45	45	45	70	100	70	100	150	70	100	150	70	100	150
Water output * (Liters per day)	45600 (from a total head of 30 meters)	68400 (from a total head of 30 meters)	114000 (from a total head of 30 meters)	69000 (from a total head of 50 meters)	45000 (from a total head of 70 meters)	110400 (from a total head of 50 meters)	72000 (from a total head of 70 meters)	50400 (from a total head of 100 meters)	155250 (from a total head of 50 meters)	101250 (from a total head of 70 meters)	70875 (from a total head of 100 meters)	207000 (from a total head of 50 meters)	135000 (from a total head of 70 meters)	94500 (from a total head of 100 meters)

* 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 4 (i.e. Performance 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.

Indicative Technical Specifications of Shallow Well (Surface) Solar Pumping Systems with A.C. Induction Motor Pump Set

Description	Model-I	Model-II	Model-III	Model-IV	Model-V	Model-VI	Model-VII	Model-VIII	Model-IX	Model-X	Model-XI	Model-XII	Model-XIII
PV array (Wp)	900	1800	2700	2700	4800	4800	4800	6750	6750	6750	9000	9000	9000
Motor Pump-set capacity (HP)	1	2	3	3	5	5	5	7.5	7.5	7.5	10	10	10
Shut Off Dynamic Head (meters)	12	12	12	25	12	25	45	12	25	45	12	25	45
Water output * (Liters per day)	89100 (from a total head of 10 meters)	178200 (from a total head of 10 meters)	267300 (from a total head of 10 meters)	132300 (from a total head of 20 meters)	475200 (from a total head of 10 meters)	235200 (from a total head of 20 meters)	168000 (from a total head of 30 meters)	641025 (from a total head of 10 meters)	330750 (from a total head of 20 meters)	236250 (from a total head of 30 meters)	890000 (from a total head of 10 meters)	441000 (from a total head of 20 meters)	324000 (from a total head of 30 meters)

* 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, maximum 7 meters.
2. For higher or lower head / PV capacity, or in between various models; water output could be decided as per the clause 4. (i.e. Performance 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.