| Tender No : TPCODL/P&S/1000000294/2022-23 | | | | | |
|---|---|---|---|---|---|
| Empanelment of vendors for design, survey, supply, installation, testing, commissioning & 5 years comprehensive maintenance of distributed grid-connected solar PV power plants for solarisation of grid connected individual pumps under KUSUM Scheme – Component C | | | | | |
| Replies to Pre Bid Queries | | | | | |
| **Sl. No.** | **Clause No** | **Page No** | **Clause Details** | **Query** | **TPCODL Replies to Queries** |
| 1 | 2.9 | 41 | The Empanelled Vendor shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 10 years from the date of commissioning for projects. | CMC is mentioned for 5 Years,but here warrantee is asking 10 Years. Request you to delete 10 years maintenance | CMC will be initially for a period of 5 years and extendable by another 5 years. Warranties will be as under:<br>Solar Panels-25 Years<br>Inverter/PCU-10 Years<br>Other Components-5 Years |
| 2 | 2.10.1.Vi | 41 | If bidders fail to comply with DCR, ALMM and other mandatory requirements as per the relevant guidelines prescribed by MNRE, GoI and their amendments issued from time to time.Penalties may lead to the encashment of Partial/full Performance Bank Guarantee and subsequently debarring or blacklisting from the future Tenders by the Implementing Agency. | As per MNRE Order No:32/645/2017-SPV Division,dated:01.08.2022, DCR is waived off up to 20.06.2023 | As per Tender Documents |
| 3 | 2.9 | 41 | WARRANTEES AND GUARANTEES<br>The Empanelled Vendor shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 10 years from the date of commissioning for projects | As per the Ministry of New Renewable Energy Ministry Warranty and Guaranty will be for only 5 Years. Request you to revise for 5 Years.Upon 5 Years AMC contract will be done with the farmer on cost basis | Is already Clarified above |
| 4 | 2.8.3 &2.8.4 | 41 | The bidder shall also take appropriate insurance during O&M period, | The installations will be in the fields of the Farmers where is there is no security for entire field in night times.Insurance agencies does not covering the insurance for like the fields where there is no 24/7 security. Request you to remove this Insurance | The Bidder shall consider appropriate Insurance at the time of instalation and also during O&M period for a tenure of 5 years |
| 5 | 2.12.2 IX | 42 | Co-ordination with Owner / DISCOM / CEI as per the requirement for Joint Metering Report (JMR). The person in charge present at site from bidder's side shall take a joint meter reading in the presence of the farmer as per billing cycle. Furnishing generation data each month to Implementing Agency positively by 1st week of every month for the previous month. Failure to adhere may result in non-disbursal of CFA. | This job comes under Discom Agency and we are giving the Mobile application about generation of Power to farmer and we are not at all resposible for this as per the Net metering agreement Discom and Farmer are the main parties. | Smart Meters will be installed to capture the generation and export of power. In case of failure of smart meter or communication error, JMR will be taken by the DISCOM in presence of the farmers. |
| 6 | 2.12.6 | 43 | The bidder shall use the original parts in case of any fault in the PCU/Inverter during the AMC period of 10 years. In case the original part/parts are not available with the manufacturer of the PCU/Inverter (Based on certificate from the manufacturer), the bidder shall use the new parts of other standard brands available in the market or will use the repaired parts | Upon the 5 years cost basis AMC will be provided as the suppliers of the Major components are not giving warranty beyond 5 years | Is already Clarified above |

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| 7 | 21.2 | 78 | In case of energy generation corresponding to the average of surrounding 10 such locations is less or less than the Guaranteed CUF, whichever is higher, the Discom shall recover an amount at the rate of Rs. 7.00 per kWh from the Bidder for such shortfall at the end of the contract year to compensate the same to the Agriculture Consumer | Where as if customer gets generation more than CUF then Discom will pay the excess cuf amount to Bidder Vice Versa, is not possible. So request you to delete the clause | During comissioning of the plant the vendor must show a CUF of not less than 14%. Then such CUF checks will be carried out every 6 months in presence of the vendor and the farmer. During such checks if the CUF goes below 14% under normal conditions, the Discom shall recover an amount at the rate of Rs. 7.00 per kWh from the Bidder for such shortfall at the end of the contract year to compensate the same to the Agriculture Consumer |
| 8 | 2.5 | 40 | Operation & Maintenance of Solar PV Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU) spares, consumables & otherparts for a period of 10 years projects. | We request you to keep O&M Period as 5 Years from the date of commissioning/handover. | Is already Clarified above |
| 9 | 2.8.3 | 41 | The bidder shall also take appropriate insurance during O&M period. | We request you to remove Insurance during O&M period from Bidder's scope. | Is already Clarified above |
| 10 | 2.9 | 41 | The Empanelled Vendor shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 10 years from the date of commissioning for projects. | We request you to keep Warranty Period as 5 Years from the date of commissioning/handover. | Is already Clarified above |
| 11 | 7 | 55 | Earnest Money Deposit | Kindly confirm under Consortium out of 2 Bidders, 1 Bidder being MSME can claim EMD Exemption through its Udyam Registration Certificate. | Only the lead member can clain exemption. |
| 12 | 24.5 | 38 | Performance Bank Guarantees | Kindly confirm that any of the 2 Bidders under Consortium can submit Performance Guarantees for I&C and O&M period. | Lead member only. |
| 13 | 24.5 | 38 | Performance Bank Guarantees | Further request you to kindly take 3% PBGs instead of 5% for both I&C and O&M. | As per tender documents |
| 14 | | 30 | General condition/Technical Eligibility | whether Solar Inverter Manufacturer also allowed for this bidding process ? As Inverter /Controller also a major component to this project | Not allowed as per MNRE sanction order. |
| 15 | | 30 | General condition/Technical Eligibility | Being a MSME player and registerd with NSIC .NSIC declared manufacturer component (Solar Pumping) whether will be considered to be bidded singly without JV help from other .manufacturer of ALMM. | Only module manufactuerers and pumnp manufacturers can participate singly or in consortium with other vendors. |

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| 16 | 4.3 | PDF Docs Page no. 27 of 132 | In case of a Bidding Consortium, the lead member must be a manufacturer of solar PV modules or solar water pumps and meet all Financial Eligibility criteria such as Annual turnover or Net worth as indicated in Clause 5.5.2 while all other participating members of the consortium must individually fulfil all other technical eligibility criteria.<br><br>In case bidding consortium, a Consortium Agreement along with Resolution shall be furnished as per the Format-10. | We presume that it could be a typo-error as mentioned Format-10 in both cause no. 4.3 and 4.4 for Consortium agreement. Instead it must be Format-9 as per Section – V Formats of your tender document, please confirm.<br><br>Further, Criteria of PV or Pump manufacturer or the Credential of supply & installation of 200kW on-grid system must be a Technical Eligibility of the bidder(s).<br><br>In other hand, 1) Tender clauses no. 4.4 and 2) Paragraph-3 in the Format-9 of consortium agreement draft are together stated that a bidder(s) would be allowed for consortium to fulfill technical eligibility.<br><br>Hence, clauses as indicated at Sl. No. 2 to 5 of our given list of queries are conflicting with each other.<br><br>Kindly review the above point to clarify which must allow any Prospective Installer(s) who can fulfill Financial Eligibility Criteria of your tender to participate as bidder in this important tender. In that case the Installer(s) should participate as 'Lead Member' if comes in consortium with PV or Pump manufacturer(s) as 'Technical Member' specially to fulfill the above two Technical Criteria, kindly confirm. | In case of bidding consortium/JVs of system integrators or manufacturer of solar modules/pumps, the lead member can either of them. However, lead member has to fulfill all the eligibility criteria as per tender. |
| 17 | 4.4 | PDF Docs Page no. 27 of 132 | Financial Consortium is not allowed in this Bidding Process. Consortium is only permitted for Technical partnership as per Format- 10. | | As per Tender Conditions |
| 18 | 9 | PDF Docs Page no. 30 of 132 | The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power Projects having aggregate capacity not less than 200 KWp that should have been commissioned in the last 5 years prior to the date of submission of bid by the bidder. | | As per Tender Conditions |
| 19 | Paragraph 3 at FORMAT-9 of CONSORTIUM AGREEMENT | PDF Docs Page no. 95 of 132 | "WHEREAS the RFP documents stipulates that the Lead Member may enter into a Technical Consortium Agreement with another Company / Corporate entity to fulfil the Technical Eligibility Criteria as stipulated in the RFP document." | | As per Tender Conditions |
| 20 | 2.5 | 40 | Operation & Maintenance of Solar PV Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU) spares, consumables & other parts for a period of 10 years projects. | We request you to keep O&M Period as 5 Years from the date of commissioning/handover. | Is already Clarified above |
| 21 | 2.8.3 | 41 | The bidder shall also take appropriate insurance during O&M period. | We request you to remove Insurance during O&M period from Bidder's scope. | Is already Clarified above |
| 22 | 2.9 | 41 | The Empanelled Vendor shall provide warrantee covering the rectification of any and all defects in the design of equipment, materials and workmanship including spare parts for a period of 10 years from the date of commissioning for projects. | We request you to keep Warranty Period as 5 Years from the date of commissioning/handover. | Is already Clarified above |

| Sl. No. | Clause No | Page No | Clause Details | Query | TPCODL Replies to Queries |
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| 23 | 7 | 55 | Earnest Money Deposit | Kindly confirm under Consortium out of 2 Bidders, 1 Bidder being MSME can claim EMD Exemption through its Udyam Registration Certificate or we have to separately submit Bid Security declaration. | Lead member's status will only be taken in to account |
| 24 | 24.5 | 38 | Performance Bank Guarantees | Kindly confirm that any of the 2 Bidders under Consortium can submit Performance Guarantees for I&C and O&M period. | Lead member only. |
| 25 | 1.3 | 8/132 | In case the farmers is inclined to avail loan, the vendor must help him in getting her/his loan application sponsored by the respective DISCOM to the designated bank and provide other necessary support for early sanction of the loan. | Request to bring this clause under the scope of the respective DISCOM | DISCOMs will certainly do their due dilligence . Vendors may support in their own interest |
| 26 | 1.7 | 8/132 | The vendor shall complete the work of site survey, design, supply, civil work, erection, testing and commissioning including grid connectivity of SPV grid connected Power Plant within 4 (four) months from the issuance of the LoA. | Kindly provide clarity on the timeline to complete the work | As per tender document. |
| 27 | Bid information Sheet | 12/132 | Total timeline for the above Scope of Work up to Commissioning of project is 6 (Six) Months from the date of issuance of LoA. | | As per tender document. |
| 28 | Bid information Sheet | 11/132 | Bidders must submit their bids for all the capacities of solar power plants as shown in the above table. Bidders , however, have the choice to bid for any or all the DISCOMs subject to their fulfilling other eligibility criteria. | Request to permit selection of categories intersted to bid | As per tender document. |
| 29 | Bid information Sheet | 12/132 | EMD shall be exempt for MSMEs registered in the State of Odisha | Request to exempt MSMEs of any state with UDYAM registration, from submission of EMD | As per tender document. |
| 30 | 4.3 | 27/132 | In case of a Bidding Consortium, the lead member must be a manufacturer of solar PV modules or solar water pumps and meet all Financial Eligibility criteria such as Annual turnover or Net worth | Request to allow bidders who fullfil the financial eligibility criteria individually to form a JV, which will allow the partners to internally choose the lead partner. Additionaly, kindly include controller manufacturers as well in the list of eligibile manufacturers | Is already Clarified above |
| 31 | 9 | 30/132 | FOR GENERAL BIDDERS:<br>The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power Projects having aggregate capacity not less than 200 KWp that should have been commissioned in the last 5 years prior to the date of submission of bid by the bidder. As supporting document(s), the bidder must submit scanned copy of the Commissioning certificate and Work order/ Contract/ Agreement/ from the Client/ Owner. | Request to reduce the aggregate experience in Grid connected Solar PV Power Projects to 100kW | As per tender document. |
| 32 | 24.5 | 38/132 | Performance Bank Guarantee for Installation and Commissioning (I&C): The bidder shall furnish the performance bank guarantee for installation and commissioning based on the allocated capacity.<br>PBG amount = INR [Insert the Amount (cost discovered)] Lakhs X 5% X Allocated Capacity in KWp. | Request to kindly reduce the PBG from 5% to 3% by considering the office memorandum issued by the Ministry of Finance-No.F.9/4/2020-PPD | As per tender document. |
| 33 | | | Performance Bank Guarantee for Operation and Maintenance: The bidder shall furnish the performance bank guarantee for O&M based on the installed capacity.<br>PBG amount = INR [Insert the Amount (cost discovered)] Lakhs X 5% X Installed Capacity in kWp | | As per tender document. |

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| 34 | v. | 53/132 | At any step during the selection of Successful Bidder(s) in accordance with the provision laid down in RFP, the TPCODL reserves the right to increase/decrease the Tender Capacity of the capacity indicated to achieve the balance Tender Capacity | Request to increase/decrease the Tender Capacity of the capacity on mutual consent | As per tender document. |
| 35 | 2.4-i | 53/132 | Implementing Agency reserves the right to increase/decrease the Bidder(s) Allocated Capacity at the sole discretion of Implementing Agency. | | As per tender document. |
| 36 | 5.1 | 55/132 | The net amount of project cost (i.e. project cost - subsidies) shall be paid by the concerned famers to any of the empanelled vendors as per the following methodology 100% payment after commissioning of the plant and injection of power to the grid. | Request collection of net project cost from the farmers to come under the scope of the respective DISCOM | This is only for self finance cases. In case of bank finance the entire amount will be released through banks only. |
| 37 | 2.5 | 40/132 | Operation & Maintenance of Solar PV Power Plant would include wear, tear, overhauling, machine breakdown, insurance, and replacement of defective modules, invertors / Power Conditioning Unit (PCU) spares, consumables & other parts for a period of 10 years projects. | Request to clarify the on the O&M period | Is already Clarified above |
| 38 | 2.12.1 | 42/132 | The bidder shall be responsible for all the required activities for successful operation and maintenance of the solar PV power plants for a period of 5 years from the date of commissioning of the plant. | | Is already Clarified above |
| 39 | 2.12.6 | 43/132 | The bidder shall use the original parts in case of any fault in the PCU/Inverter during the AMC period of 10 years. | | As per tender document. |
| 40 | 4.1.12 | 67/132 | All solar panels shall be easily accessible for cleaning and the Agriculture Consumer shall not be inclined to climb on the MMS or PV modules for cleaning the PV modules. | Bidder request to clarify the requirements. | As per tender document. |
| 41 | 4.1.16 | 67/132 | Cutting, Welding, drilling etc. at site is not allowed for MMS. Bidder shall carry out all correction in structure (if required) at his works. If any cutting, welding, drilling is required to be done after material arrived at site then material shall be againsent for hot dip galvanization. No zinc spray shall be allowed on the MMS. | Bidder shall be allowed to apply the Zinc spary. As many sites are in unaccessable area, Zinc spary shall be allowed to manage the site constrain. | Zinc spray shall not be allowed at site. Bidders can make slots instead of holes so that hole matching will not be a problem. |
| 42 | 4.1.17 | 67/132 | The structure shall be designed for simple mechanical and electrical installation. It shall support SPV modules at a given orientation and tilt, absorb and transfer the mechanical loads to the ground properly. | Bidder proposing fixed tilt Ground mount system. | Agreed |
| 43 | 15.1.4 (a) | 76/132 | The Bidder is responsible for the detailed soil investigation and subsequent foundation design of the structures in the plant. Minimum 5 (five) numbers of soil exploration is to be carried out for each feeder. | Bidder request to clarify the requirements. | As per tender document. |
| 44 | 15.1.4 (b) | 76/132 | The foundation shall be design in accordance to recommendation and results of soil investigation reports and mounting structure shall be designed for maximum wind speed of 200KM/hr and relevant IS | Clause 4.1.2 mentioned as 180kmph whereas Clause 15.1.4 mentioned as 200kmph. As the wind code is recommends 180kmph for odisha, Bidder shall be allowed to follow 180kmph. | As per tender document. |
| 45 | 15.1.4 (c) | 77/132 | The MMS foundation shall be constructed using RCC concrete pilefoundation of required diameter and depth based on approved design | Bidder shall be allowed to use Steel Column embeded PCC pile fo the foundation. | Refer Indicative Structural Drawing attached. |

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| 46 | 15.1.14 (d) | 77/132 | The elevated structure has to be securely anchored to the supporting surface, also bolted with anchor bolts of appropriate strength for elevated structures mounted on RCC surfaces. | Bidder request to clarify the requirements. Is there any installation on the RCC surface...? Is there any elevated strucutre is required...? | Ground mounted Structures only allowed. |
| 47 | General | General | Kindlly clarify on pump working mechanism | Request to clarify | Not in the scope |
| 48 | General | General | Replacement of existing Pump | Scope to be defined | Not in the scope |
| 49 | General | General | How will the DISCOM will ensure about unbalancing of the grid phase voltages/ supply failure/ phase failure that restricts the energy feeding and grid synchronization with the inverters. And weak GSM network for remote monitor system for performance monitoring | Request to clarify | As per MNRE Guidelines |
| 50 | 2.2.2 | 61/132 | The manufacturer of the PV module shall have supplied net PV modules of a capacity more than 5 MW in other projects, and the same shall be successfully performing for over 1 year prior to the date of submission of the Bid | Kindly allow minimum 1MW successfully performing for atleast 1 year | As per tender document. |
| 51 | 2.2.2 | 61/132 | The PV modules to be employed shall be indigenously manufactured and shall fulfil MNRE's criteria of domestic content requirement to avail its capital subsidy as per Scheme | Request to clarify if we can use non-DCR cells | As per MNRE Guidelines |
| 52 | 2.2.3 | 61/132 | PV modules shall consist of 72 numbers of solar cells, each with a dimension of 156 mm x 156 mm and shall have a minimum capacity of 300 W at STC. | Request to remove the restriction on 72 cells as 300W does not require 72 cells | As per tender document. |
| 53 | 2.2.4 | 61/132 | The rated power of solar PV module shall have maximum tolerance upto +3%. No negative tolerance in the rated capacity of solar PV module is allowed. | We request you to kindly remove this clause | As per tender document. |
| 54 | 3.1.1 | 63/132 | Make of only those Grid-tie Inverters which are commissioned for more than 1 MW capacity in other solar PV projects in India and operational for more than 1 (year) shall be considered | Request to consider minimum 500kW & additionally please clarify if imported solar inverters can be considered | As per tender document. |
| 55 | Annexure S | 129 | Release of CFA | Request you to release 60%CFA against material supplies to site | As per MNRE Guidelines |
| 56 | 21 | 77 | If the down time period for any beneficiary complaint exceeds 72 hours and the bidder fails to make the plant operational, a penalty for the time period exceeding 72 hours, as per the below mentioned schedule shall be deposited by the bidder to the concerned AO of circle / as decided by DISCOM | System breakdowns occur due to farmer error and natural disasters, as well as grid issues on occasion.Please waive the penalty clause. | As per Tender Conditions. Any site specific arising out of this condition will be setelled as per DISCOMs discretion. |
| 57 | 7 | 55 | MSMEs are exempted from submission of Bid Security /EMD / Bid Bond and "Bid Security Declaration Letter" on non-judicial stamp paper. | Please allow MSME exemption for outside states in addition to Orissa State holders. | As per tender document. |
| 58 | 5 | 54 | CFA DISBURSEMENT & PAYMENT CLAUSES: | Please allow us to take 30% (bank loan amount) and 10% farmer share when the bank disburse sanction letter is issued to farmer. | 30% Payment to be released after successful installation of the project.<br>60% Payment to be released after grid conectivity and achievement of COD.<br>10% Payment will be released at rate of 2% per year for a period of 5 years on successful completion of AMC. |
| 59 | 6 | 38 | PBG amount = INR [Insert the Amount (cost discovered)] Lakhs X 5% X Allocated Capacity in KWp.** | We request you that implement the reduction in PGB from 5% to 3% as per Govt of Odisha No.8475 dated:05/4/2022 for this project as well. | As per tender document. |
| 60 | 7 | 38 | ** Performance Bank Guarantee for MSME registered in the State of Odisha shall be 25% of the value normally prescribed. | Please apply the same clause to outside MSME registered units as well. | As per tender document. |

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| 61 | | Technical Specification / Clause No-9.0 (Point -i) /Page no.29 | Qualification Requirement / Eligibility Criteria-<br>i. Certificate of incorporation clearly indicating that the bidder is a manufacturer of solar PV modules or solar water pumps. | Requst to change or add System integrator with Manufacuturer | Is already Clarified above |
| 62 | | Technical Specification / Clause No-NA /Page no.30 | Technical Eligibility Criteria : (For General Bidders) -<br>The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power Projects having aggregate capacity not less than 200 KWp that should have been commissioned in the last 5 years prior to the date of submission of bid by the bidder. As supporting document(s), the bidder must submit scanned copy of the Commissioning certificate and Work order/ Contract/ Agreement/ from the Client/ Owner. The bids of only those bidders who qualify the minimum technical eligibility criterion shall be considered for evaluation. | Requst to change or add capacity not less than 100 Kwp. that should have been commissioned in the last 5 years prior to the date of submission of bid by the bidder. | As per tender document. |
| 63 | | Technical Specification / Clause No-13.0 /Page no.31 | E-Tender / Sub clause- Submission of Bid -Parts (First Part) | EMD Bidsecurity Declaration offline / online Submission? Clarify on this | All the documents is neede to be submitted through Online Only, However EMD BG is needed to be submitted in hard copy. |
| 64 | | 30 | TECHNICAL ELIGIBILITY CRITERIA:<br>FOR GENERAL BIDDERS:<br>The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power<br>Projects having aggregate capacity not less than 200 KWp that should have been commissioned in the last<br>5 years prior to the date of submission of bid by the bidder. As supporting document(s), the bidder must<br>submit scanned copy of the Commissioning certificate and Work order/ Contract/ Agreement/ from the<br>Client/ Owner. The bids of only those bidders who qualify the minimum technical eligibility criterion shall<br>be considered for evaluation. | FOR STATE REGISTERED MSME:<br>Sir Kindly Consider for state registered MSME bidder. 1-<br>The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power<br>Projects having aggregate capacity not less than 50 KWp that should have been commissioned in the last<br>5 years prior to the date of submission of bid by the bidder. As supporting document(s), the bidder must<br>submit scanned copy of the Commissioning certificate and Work order/ Contract/ Agreement/ from the<br>Client/ Owner. The bids of only those bidders who qualify the minimum technical eligibility criterion shall<br>be considered for evaluation<br>OR<br>2- The Bidder should have designed, supplied, installed & commissioned Grid connected & Off-grid Solar PV Power<br>Projects having aggregate capacity not less than 100 KWp that should have been commissioned in the last<br>5 years prior to the date of submission of bid by the bidder.<br>OR<br>3-Exempt from the technical eligibility criteria like financial eligibilty requirments. | As per tender document. |
| 65 | 4.1 | 26 | 4.1 As per MNRE OM No 32/645/2017 dated 8th November 2019<br>Only manufacturers of solar PV modules or manufacturers of solar water pumps would be allowed to participate in the bidding process | With reference to DIPP rules mentioned regarding the experience and financial eligibility,<br><br>Will the DIPP registered EPC startup which are non-manufacturer of either solar panel or solar water pump be allowed based on exemption category. | Is already Clarified above |

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| 66 | 9 | 30 | TECHNICAL ELIGIBILITY CRITERIA:<br>FOR GENERAL BIDDERS:<br>The Bidder should have designed, supplied, installed & commissioned Grid connected Solar PV Power Projects having aggregate capacity not less than 200 KWp that should have been commissioned in the last 5 years prior to the date of submission of bid by the bidder. As supporting document(s), the bidder must submit scanned copy of the Commissioning certificate and Work order/ Contract/ Agreement/ from the Client/ Owner. The bids of only those bidders who qualify the minimum technical eligibility criterion shall be considered for evaluation. | With reference to DIPP rules mentioned regarding the experience and financial eligibility,<br><br>Will the DIPP registered startup be exempted from the prior experience off 200 kWp SITC of grid connected solar PV projects | As per tender document. |
| 67 | 9 | 31 | Vendors registered with DIPP under Renewable Energy sector are eligible to participate in the Tender in line with Office Order of Department for Industrial Policy & Promotions issued vide no. 12 (11)/2017-SI dated 22.06.2017, which says that Central Ministries/ Departments may relax condition of prior turn over & prior experience in Public procurement subject to meeting of quality & technical specifications by Startups | Reference for 2nd query | Will Not be allowed to participate |
| 68 | Clause 2.5, Clause 2.9, Clause 2.12.6 | 40,41 & 43 | Warrantees & guarantees | In few parts of the tender warranty and servicing is mentioned for 10 Years instead of 5 years. O&M & warranty period to be confirmed. | Is already Clarified above |
| 69 | Clause 1.28 | Page 16 | “Inter-connection point / Delivery / Metering Point” | Net metering/Grid connectivity is under our scope and is an added cost. Maximum length of AC cable under TPSSL/EA’s scope to be defined by TPCODL.<br>The maximum spacing between over head poles to be defined TPCODL. Any additional wiring and pole erection beyond our limits shall be done at the cost of beneficiary. | As per tender document. |
| 70 | Clause 2.2.21 | Page 62 | Modules deployed must use a RF identification tag. The following information must be mentioned in the RFID used on each modules (This should be inside the laminate only and must be able to withstand harsh environmental conditions). | RFID for modules is inside lamination as per tender. Outside lamination RFID shall also to be permitted. | As per tender document. |
| 71 | Clause 3.1.4 | Page 63 | Grid-tie Inverter | Complete inverter parameter table needs to be revised. (Cell Miss match) | As per tender document. |
| 72 | Clause 3.1.4 | Page 63 | Grid-tie Inverter table | Point No.17, Nominal Voltage & Frequency for single phase system to be also mentioned. | As per tender document. |
| 73 | Clause 3.1.11 | Page 64 | The inverter shall be tropicalized and design shall be compatible with conditions prevailing at site. Provision of exhaust fan with proper ducting for cooling of inverter’s internal circuitry shall be incorporated in the inverter, keeping in mind the extreme climatic condition of the site. | Provision of Exhaust/cooling fans with ducting as mentioned in the tender should be optional. Inverter with 100% cooling through heat sink should be permitted by TPCODL. | Yes. All inverters shall be outdoor type only. |

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| 74 | Clause 3.1.29 | Page 66 | Inverter shall be capable to convert the DC using its MPPT feature to produce AC power as per following:<br>(a) The AC output voltage and frequency of the inverter must synchronize automatically to the exact AC voltage and frequency of the grid. Grid voltage shall be continuously monitored and in the event of voltage dip or rise above a pre-set value, the solar system shall be disconnected from the grid within the set time.<br>(b) Inverters shall have adjustable voltage setting and time settings. The output power factor shall be of suitable range to supply or sink reactive power. | The AC output voltage and frequency of the inverter must synchronize automatically to the exact AC voltage and frequency of the grid as mentioned in the tender. In Odisha, grid voltage dips up to 180V, only single phase solar inverters can operate in this voltage range. Three phase inverter voltage range is in between 280V to 480V. To be discussed with TPCODL. | The DISCOMs will identify feeders with voltage range between 280V to 480V. |
| 75 | Clause 3.1.29 | Page 66 | | Reactive power cannot be supplied /sinked by inverter. That clause to be deleted. | Agreed |
| 76 | Clause 7.1.16 | Page 71, | wiring for modules interconnection shall be in the GI/ HDPE/DWC Pipe of reputed make. | As per tender, the wiring for modules interconnection shall be in the GI/ HDPE/DWC Pipe of reputed<br>make- clarity required if this refers to conduiting of DC cables. PVC conduit pipes should be also allowed. | As per Tender Document |
| 77 | Clause 8.1.4 | Page 71 | The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. Two earth pits shall be provided for each lightening arrestor. Each lightning conductor shall be fitted with individual earth pit as per required Standards including accessories, and providing masonry enclosure with cast iron cover plate having locking arrangement, watering pipe using charcoal or coke and salt as required as per provisions of IS & Earth Resistance of Lightening System must be less than five (5) Ohm. | As per tender, Two earth pits shall be provided for each lightening arrestor. Also, each lightning conductor shall be fitted with individual earth pit as per required Standards- Clarity regarding the No. of earth pits for each LA to be provided. | There will be total three Earth Pits, one each for DC Side, AC Side and Lightning Arrestor. The lightning conductor shall be earthed through flats and connected to the earth mats as per applicable Indian Standards with earth pits. The lightning flats shall be for 25x3 mm or Equivalent. |
| 78 | Clause 9.1.4 | Page 72 | Interconnection Voltage level: All solar plant interconnection voltage level shall be at LT 415VAC, 3-phase, 50 Hz. | Please add interconnection voltage for single phase systems as 230VAC 50Hz. | Interconnection voltage for single phase systems will be 230VAC 50Hz. |
| 79 | Clause 10.1.7 | Page 73 | All the bolts of earthing system shall be of Stainless steel (SS) type. | HDG bolts in addition to SS bolts shall also be allowed for earthing. | As per Tender Document |
| 80 | Clause 10.1.8 | Page 73 | Minimum earthing conductor size shall be 50 x 6 Sq. mm for aluminium strips, or 6 mm2 for copper conductors. | As per tender minimum earthing conductor size allowed is 50 x 6 Sq. mm for aluminium strips, or 6 mm2 for<br>copper conductors, option for 12.5 Sq.mm. GI earthing wire to be also allowed. | Is already Clarified above |
| 81 | Clause 10.1.10 (K) | Page 73 | For 80mm dia electrode bore size should be 9 inch x 3.5/6.5 mtr depth. | For earthing our standard 14mm dia x 1.2m length copper bonded GI earth rod with chemical compounding and earthing kit shall be allowed instead of dia 80mm x 3m/6m asked in the tender. We shall provide our standard pump earthing kit used in KUSUM projects. | Allowed |
| 82 | Clause 12 | Page 74 | Solar Meter<br>Energy Meters to log the actual value of Energy generated by the PV system be provided. Energy meter if required with CT/PT shall be of 0.5 s accuracy class as per relevant specifications by MNRE/ Discom. | 0.5S class accuracy meters are not available in market for LT applications. Kindly consider class 1 accuracy meters. | Class 1 accuracy meters allowed for LT. |

| Sl. No. | Clause No | Page No | Clause Details | Query | TPCODL Replies to Queries |
|---|---|---|---|---|---|
| 83 | Clause 15.1.4 (b) | Page 76 | The foundations shall be designed considering the weight and distribution of the load of structure and its assembly. The foundation shall be design in accordance to recommendation and results of soil investigation reports and<br>mounting structure shall be designed for maximum wind speed of 200KM/hr and relevant IS. Seismic effect relevant to the seismic zone of the area and highest water logging level has to be considered while making the design of the foundation. | As per tender, mounting structure shall be designed for maximum wind speed of 200KM/hr and relevant IS considering the Seismic effect relevant to the seismic zone of the area and highest water logging level. However, as per clause 4.1.2, page no.66, maximum wind speed limit mentioned as 180 KMPH- clarity is required for the same. Also, Odisha state comes under Seismic Zone II as per IS 1893 and is relatively less prone to earthquake. Hence, seismic effect assessment requirement for foundation design shall be reconsidered by TPWODL. | Is already Clarified above |
| 84 | Clause 15.1.4 (d) | Page 76 | The elevated structure has to be securely anchored to the supporting surface, also bolted with anchor bolts of appropriate strength for elevated structures mounted on RCC surfaces. | RCC foundation for structures can be changed to normal pile foundation. | Is already Clarified above |
| 85 | Clause 21.2 | Page 78 | Generation Guarantee | Adjustment to be done for downtime due to theft, grid non availability, natural calamity and forced majeure for CUF computation and penalty calculations. | Is already Clarified above |
| 86 | Clause 2.1 (d) | Page 59 | IEC 62759-1<br>Photovoltaic (PV) modules - Transportation testing | IEC-62759-1 certification for module transportation testing is generally not available with manufacturers. | Can be Exempted |

**Annexure-I of Circular No. F. No. 41/3/2018-SPV Division dated 17.7.2019**

**MINISTRY OF NEW AND RENEWABLE ENERGY**

# SPECIFICATION FOR SOLAR PHOTOVOLTAIC WATER PUMPING SYSTEMS

## 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.

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

**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.

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

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

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

**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).

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

**SPV 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.

**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

### General

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.

A SPV Water Pumping system typically consists of:

*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;

**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)].

*SPV Controller See 2.8*

Note: Some controllers are inbuilt in the motors

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)

## 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 in the range of **900 Watts peak to 9000 Watts peak**, 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 200 Watts peak, with adequate provision for measurement tolerances. Use of PV modules with higher power output is preferred.

Modules supplied with the SPV water pumping systems shall have certificate as per IS14286/IEC 61215 specifications or equivalent National or International/ Standards. STC performance data supplied with the modules shall not be more than one year old.

Modules must qualify to IS/IEC 61730 Part I and II for safety qualification testing.

The minimum module efficiency should be minimum 15 percent and fill factor shall be more than 70 percent.

Modules must qualify to IEC TS 62804-1:2015 for the detection of potential-induced degradation - Part 1: Crystalline silicon (Mandatory in case the SPV array voltage is more than 600 V DC)

In case the SPV water pumping systems are intended for use in coastal areas the solar modules must qualify to IEC TS 61701:2011 for salt mist corrosion test.

The name plate shall conform the IS 14286/IEC 61215

Module to Module wattage mismatch in the SPV array mismatch shall be within ± 3 percent.

Variation in overall SPV array wattage from the specified wattages shall be within zero percent to +10 percent.

The PV Modules must be warranted for output wattage, which should not be less than 90% of the rated wattage at the end of 10 years and 80% of the rated wattage at the end of 25 years.

**Motor-Pump Set**

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 Ministry.

The "Motor-Pump Set" should have a capacity in the range of 1 HP to 10 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 ranging from 1 HP to 10 HP 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.

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.

**Module 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 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.

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.

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.

Details of Module Mounting Structure for different capacity of SPV pumps are attached at Annexure-I. These are indicative of minimum standards and an Implementing Agency may specify higher standards.

**SPV Controller**

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

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

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.

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.

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.

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.

**Earthing Arrangement**

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.

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

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.

A lightening arrestor shall be provided with every SPV Water Pumping System.

**Use of indigenous components**

It will be mandatory to use indigenously manufactured solar modules with indigenous mono/ multi crystalline silicon solar cells. Further, the motor-pump-set, controller and balance of system should also be manufactured indigenously. The vendor has to declare the list of imported components used in the solar water pumping system.

## 4. PERFORMANCE REQUIREMENTS

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 given in the Annexure II.

**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 III.

## 5. TESTS FOR HYDRAULIC AND ELECTRICAL PERFORMANCE OF PUMPSET

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

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

## 6. GUARANTEE OF PERFORMANCE

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.

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.

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

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

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 ($W_p$)

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)

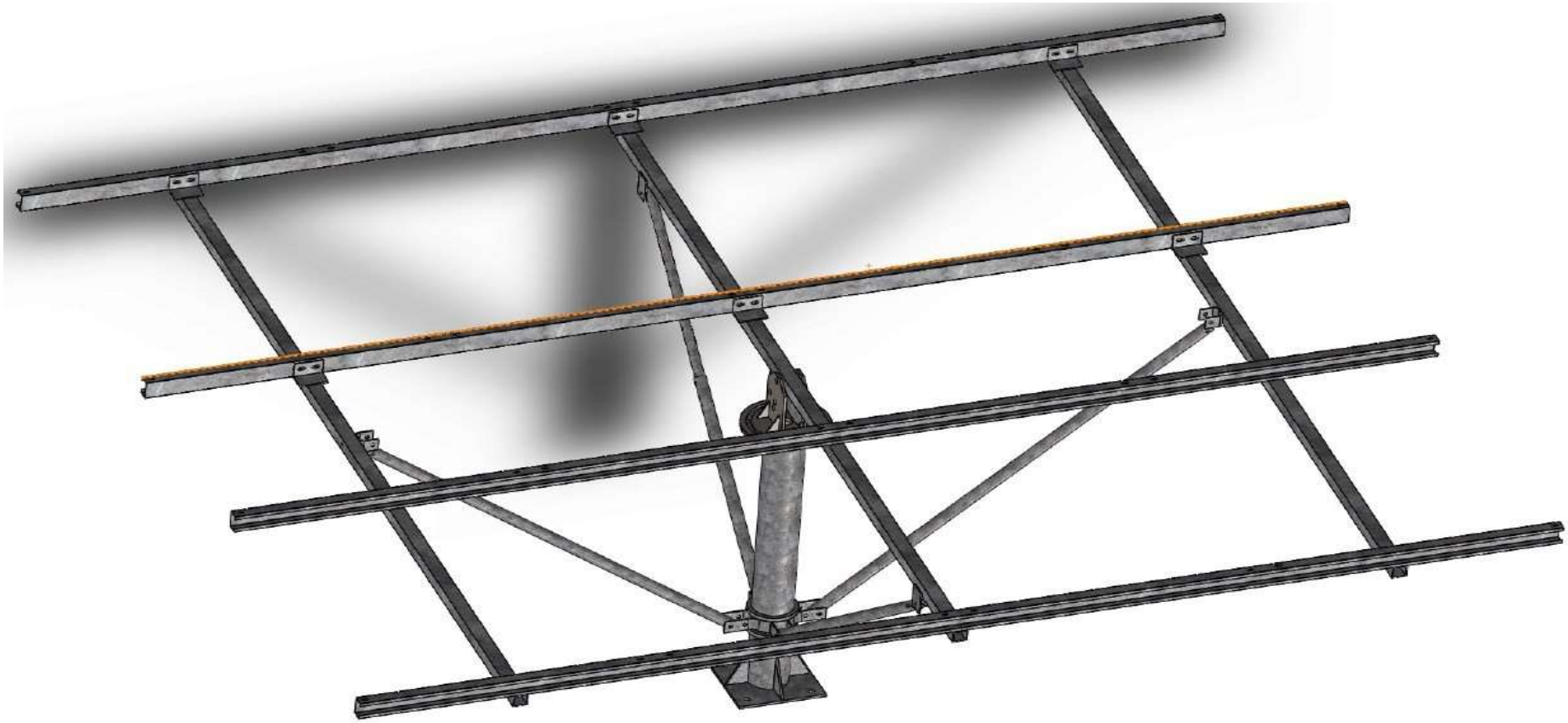
## 8. OPERATION AND MAINTENANCE MANUAL

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.

**Annexure-I**

# 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:**

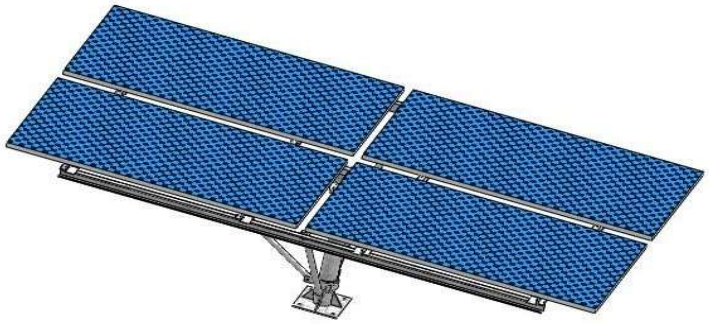
1. Standard MMS of 4 Modules for 1 HP
2. Standard MMS of 6 Modules for 2 HP
3. Combination of standard MMS of 4 Modules and 6 Modules for 3 HP
4. Combination of two standard MMS of 8 Modules for 5 HP
5. Combination of three standard MMS of 8 Modules for 7.5 HP

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 antitheft 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).



**4 Module MMS**

**6 Module MMS**

**8 Module MMS**

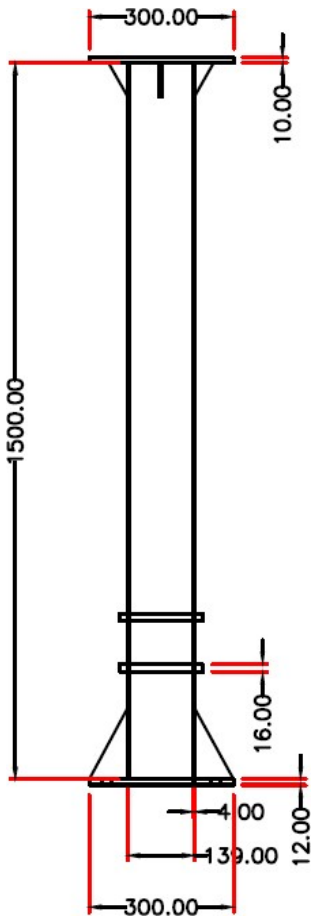
**Side view**

**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 ($CuSO_4$ Dip Test) **(IS 2633)**
        - **ii.** Mass of Zinc **(IS 6745)**
        - **iii.** Adhesion Test **(IS 2629)**

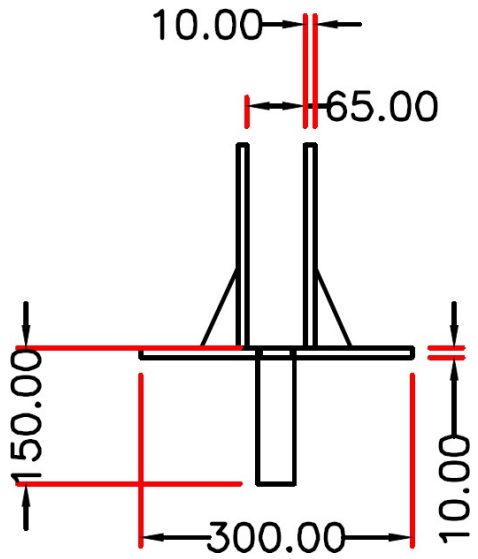
## Part1 – Mail Column

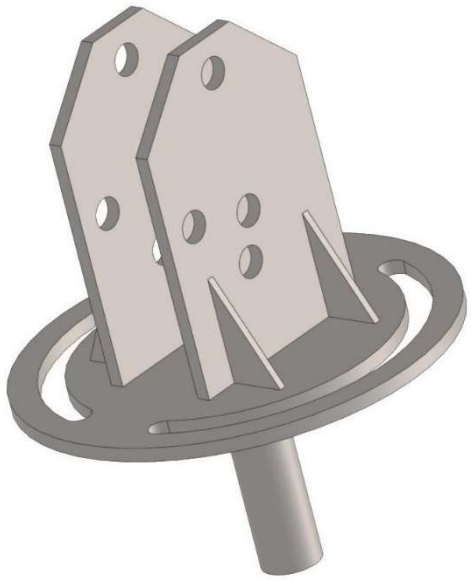



Notes: -

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

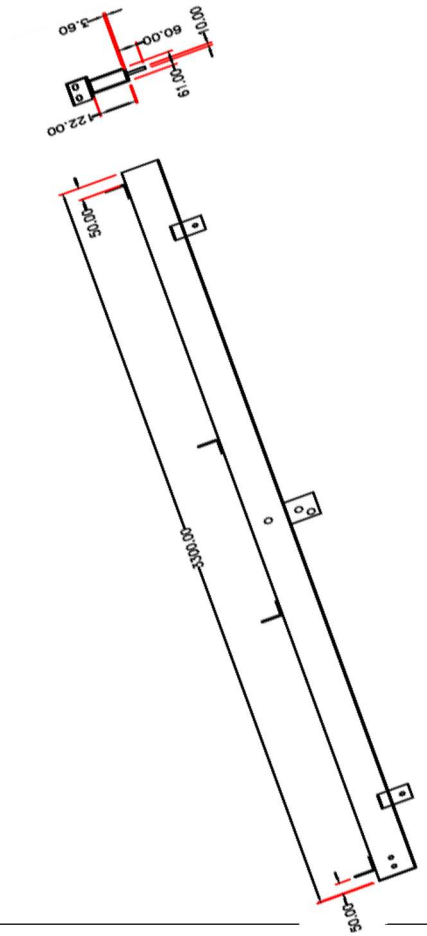


Notes: -

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.

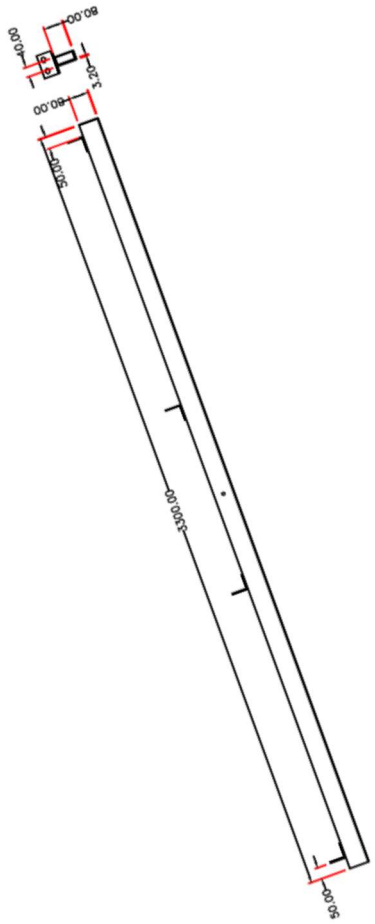
## Part 3 – Main Tube




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.

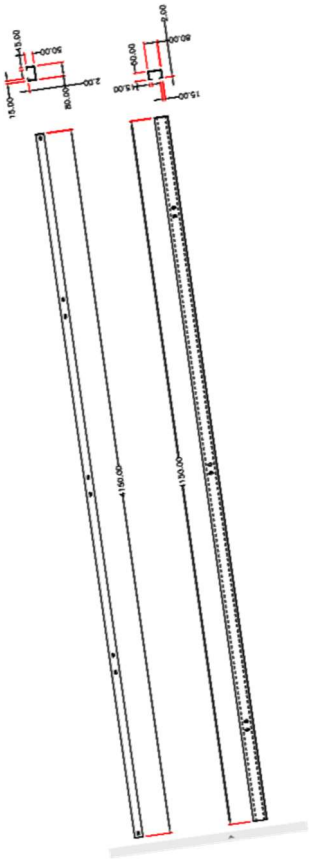
## Part 4 – Side Tube




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



Notes: -

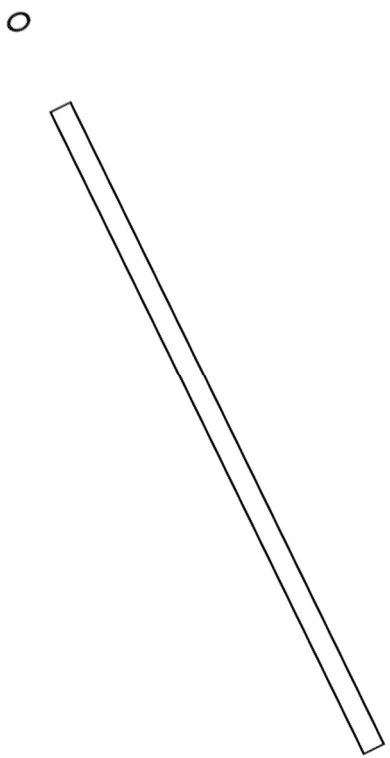
1. All Dimensions are in mm.
2. Mounting Purlin material grade should be E250 as per: - IS: 1079 / 2062 & IS: 811.

| Part 6 – Clamp with Blade | |
|---|---|
| |  |

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



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.

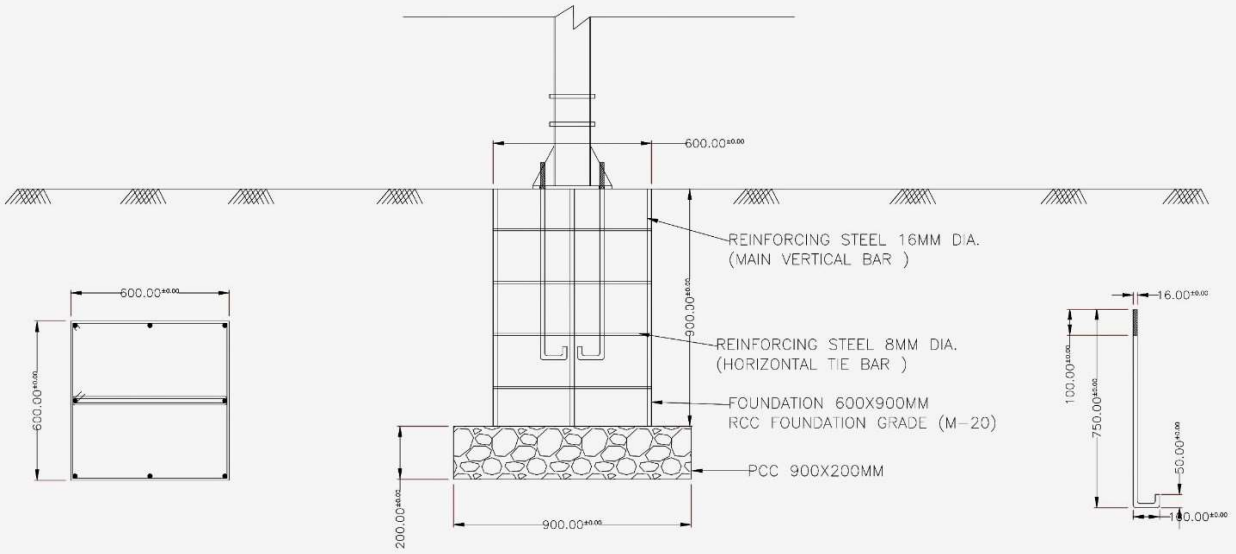
# Bill of Quantity for main parts of MMS for Solar Water Pumping System

| 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 | | | | |
|---|---|---|---|---|
| TMT BAR | LENGTH | WEIGHT | QUANTITY | TOTAL WEIGHT |
| 16 MM | 1000 MM | 1.578 KG | 8 PCS | 12.6 KG |
| 8 MM | 2400 MM | 0.950 KG | 4 PCS | 3.8 KG |
| 8 MM | 1250 MM | 0.500 KG | 4 PCS | 2 KG |

| BOM | | | | |
|---|---|---|---|---|
| BLOCK | WIDTH | LENGTH | HEIGHT | VOLUME |
| RCC COLUMN | 0.600 M | 0.600 M | 0.900 M | 0.324 CU.M |
| PCC | 0.900 M | 0.900 M | 0.200 M | 0.162 CU.M |

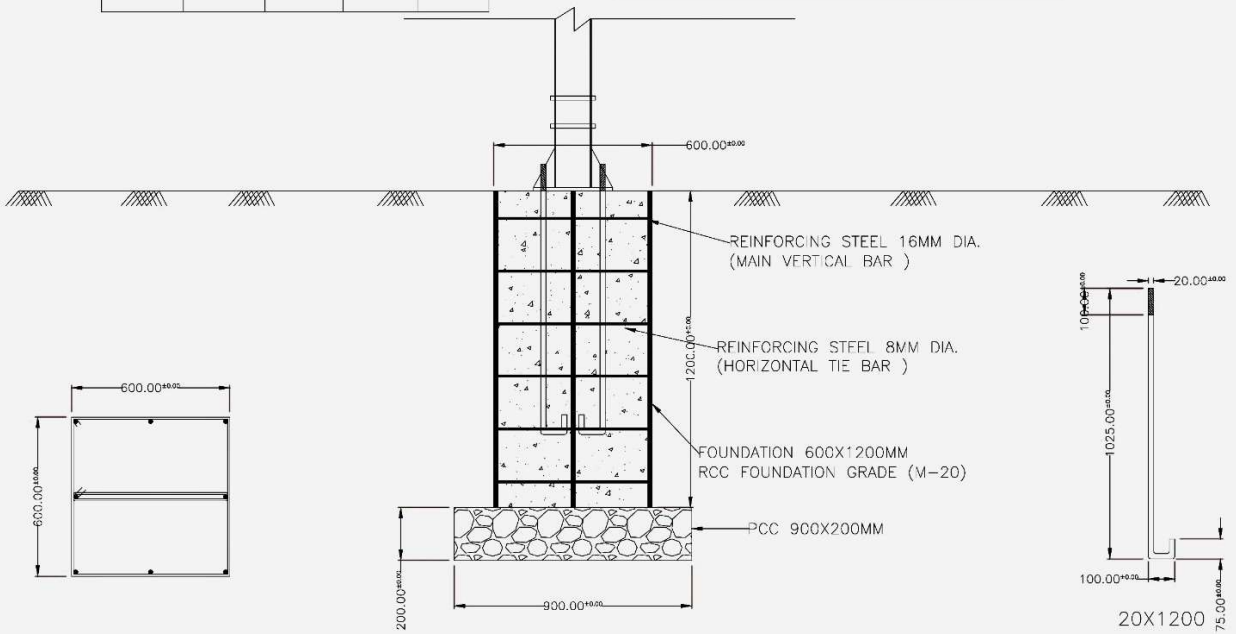



Note:-All dimensions are critical & in mm. Please maintain the dimensions. Welding dimension should be maintained 5 mm.

# FOUNDATION DESIGN FOR 8 MMS

| BOM | | | | |
|---|---|---|---|---|
| TMT BAR | LENGTH | WEIGHT | QUANTITY | TOTAL WEIGHT |
| 16 MM | 1300 MM | 2.05 KG | 8 PCS | 16.4 KG |
| 8 MM | 2400 MM | 0.950 KG | 6 PCS | 5.7 KG |
| 8 MM | 1250 MM | 0.500 KG | 6 PCS | 3 KG |

| BOM | | | | |
|---|---|---|---|---|
| BLOCK | WIDTH | LENGTH | HEIGHT | VOLUME |
| RCC COLUMN | 0.600 M | 0.600 M | 1.20 M | 0.432 CU.M |
| PCC | 0.900 M | 0.900 M | 0.200 M | 0.162 CU.M |







Note:-All dimensions are critical & in mm. Please maintain the dimensions. Welding dimension should be maintained 5 mm.

**ANNEXURE – II**

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.

**ANNEXURE – II (CONTD.)**

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.

**ANNEXURE – III**

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.

**ANNEXURE – III (CONTD.)**

Indicative Technical Specifications of Solar Deep well (submersible) 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** | **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) | 42000 (from a total head of 30 meters) | 63000 (from a total head of 30 meters) | 105000 (from a total head of 30 meters) | 63000 (from a total head of 50 meters) | 42000 (from a total head of 70 meters) | 100800 (from a total head of 50 meters) | 67200 (from a total head of 70 meters) | 43200 (from a total head of 100 meters) | 141750 (from a total head of 50 meters) | 94500 (from a total head of 70 meters) | 60750 (from a total head of 100 meters) | 189000 (from a total head of 50 meters) | 126000 (from a total head of 70 meters) | 81000 (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.