eTendering System Government of Kerala

Kerala Tenders

Tender Details

Date : 28-Apr-2025 02:57 PM

Print

Basic Details

Organisation Chain	ANERT		
Tender Reference Number	ANERT-MPM/6/2025-DE (MPM)		
Tender ID	2025_ANERT_761541_1	**Withdrawal Allowed**	Yes
Tender Type	Open Tender	**Form of contract**	EPC Contract
Tender Category	Works	**No. of Covers**	1
General Technical Evaluation Allowed	No	**ItemWise Technical Evaluation Allowed**	No
Payment Mode	Online	**Is Multi Currency Allowed For BOQ**	No
Is Multi Currency Allowed For Fee	No	**Allow Two Stage Bidding**	No

Payment Instruments

	S.No	Bank Name
Online Bankers	1	SBI MOPS

Cover Details, No. Of Covers - 1

Cover No	Cover	Document Type	Description
1	Fee/PreQual/ Technical/Finance	.pdf	Technical Bid
		.xls	Financial Bid

Tender Fee Details, [Total Fee in ₹ * - 2,950]

Tender Fee in ₹	2,950		
Fee Payable To	Nil	**Fee Payable At**	Nil
Tender Fee Exemption Allowed	Yes		

EMD Fee Details

EMD Amount in ₹	50,000	**EMD Exemption Allowed**	Yes
EMD Fee Type	fixed	**EMD Percentage**	NA
EMD Payable To	Nil	**EMD Payable At**	Nil

Work /Item(s)

Title	Design Supply Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office Lithium Ion Battery Backup and TopCon Panels Malappuram				
Work Description	Design Supply Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office Lithium Ion Battery Backup and TopCon Panels Malappuram				
Pre Qualification Details	Please refer Tender documents.				
Independent External Monitor/Remarks	NA				
Tender Value in ₹	20,60,000	**Product Category**	Solar Power Plants	**Sub category**	NA
Contract Type	Tender	**Bid Validity(Days)**	60	**Period Of Work(Days)**	NA
Location	Thanur Block Panchayat Office Malappuram.	**Pincode**	676302	**Pre Bid Meeting Place**	NA
Pre Bid Meeting Address	NA	**Pre Bid Meeting Date**	NA	**Bid Opening Place**	online
Should Allow NDA Tender	No	**Allow Preferential Bidder**	No		

Critical Dates

Publish Date	26-Apr-2025 04:00 PM	**Bid Opening Date**	06-May-2025 04:00 PM
Document Download / Sale Start Date	26-Apr-2025 04:00 PM	**Document Download / Sale End Date**	06-May-2025 03:00 PM
Clarification Start Date	NA	**Clarification End Date**	NA
Bid Submission Start Date	26-Apr-2025 04:00 PM	**Bid Submission End Date**	06-May-2025 03:00 PM

Tender Documents

NIT Document

S.No	Document Name	Description	Document Size (in KB)
1	Tendernotice_1.pdf	Tender Notice	763.31

Work Item Documents

S.No	Document Type	Document Name	Description	Document Size (in KB)
1	Tender Documents	TDThanur.pdf	Tender Document	2139.13
2	BOQ	BOQ_1239005.xls	Financial Bid	351.00

Tender Inviting Authority

Name	CEO ANERT
Address	Office of CEO, ANERT Law College Road, Vikas Bhavan. PO, Thiruvananthapuram - 695 033, Kerala

AGENCY FOR NEW & RENEWABLE ENERGY RESEARCH AND TECHNOLOGY (ANERT)
Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695 033;
www.anert.gov.in , projects@anert.in

E-TENDER DOCUMENT

Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.

Ref. No.: ANERT-MPM/6/2025-DE (MPM)

PART 1 – GENERAL CONDITIONS

Date of Publishing of Bids : - 26/04/2025

Last Date of Submission of Bids : - 06/05/2025

CONTENTS

E-TENDER NOTICE

Competitive e-tenders in one cover system with Price Bid in accordance with the ANERT approved technical specifications are invited from ANERT registered vendors for SPV Power plants for the ***Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.*** The-tender documents can be downloaded from the e-tendering website of Govt. of Kerala. Tender form will not be available in any other form.

Thiruvananthapuram

26/04/2025

Sd/-
Chief Executive Officer

TENDER ABSTRACT

Ref. No.	**ANERT-MPM/6/2025-DE (MPM)**
Name of Work	**Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.**
Building Site and Requirements	**Thanur Block Panchayat Office Buildings, Malappuram District.**
Estimate Cost for the Project	**Rs. 20,60,000/-**
Tender Fee (Non- Refundable)	**Rs. 2,950/- (incl 18% GST)**
EMD (Refundable)	**Rs. 50,000/-**
Download of Tender Form	http://www.etenders.kerala.gov.in
Last date of submission of Tender	06/05/2025 @ 03.00 PM
Date and Time of opening the Tender	06/05/2025 @ 04.00PM
Warranty period	5 years from the date of Commissioning
Availability of Tender Forms	Website http://www.etenders.kerala.gov.in
Place of opening of tender	Office of CEO, ANERT Law College Road, Vikas Bhavan. PO, Thiruvananthapuram - 695 033, Kerala

Thiruvananthapuram
26/04/2025

Sd/-
Chief Executive Officer

GENERAL TERMS AND CONDITIONS FOR E-PROCUREMENT

This e-Tender is being published for the Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram. The tender is invited in one cover system through e-procurement portal of Government of Kerala (www.etenders.kerala.gov.in). Prospective bidders willing to participate in this tender shall necessarily register themselves with above mentioned e-procurement portal.

The tender timeline is available in the critical date section of this tender published in www.etenders.kerala.gov.in

1. ONLINE BIDDER REGISTRATION PROCESS:

1.1 Bidders should have a Class III or above Digital Signature Certificate (DSC) to be procured from any Registration Authorities (RA) under the Certifying Agency of India. Details of RAs will be available on www.cca.gov.in. Once, the DSC is obtained, bidders have to register on www.etenders.kerala.gov.in website for participating in this tender. Website registration is a one-time process without any registration fees. However, bidders have to procure DSC at their own cost.

1.2 Bidders may contact e-Procurement support desk of Kerala State IT Mission over telephone at 0471- 2577088, 2577188, 2577388 or 0484 – 2336006, 2332262 - through email: helpetender@gmail.com/etendershelp@kerala.gov.in for assistance in this regard

2. ONLINE TENDER PROCESS:

The tender process shall consist of the following stages:

i. Downloading of tender document: Tender document will be available for free download on www.etenders.kerala.gov.in. However, tender document fees shall be payable at the time of bid submission as stipulated in this tender document.

ii. Pre-bid meeting: (not applicable)

iii. Publishing of Corrigendum: All corrigenda shall be published on www.etenders.kerala.gov.in and shall not be available elsewhere.

iv. Bid submission: Bidders have to submit their bids along with supporting documents to support their eligibility, as required in this tender document on www.etenders.kerala.gov.in. No manual submission of bid is allowed and manual bids shall not be accepted under any circumstances.

v. In case bidder encounters any technical issues pertaining to e-Procurement system while acting on the tender, computer screen shot of the error message with date & time stamp on the web-browser along with the query shall be e-mailed by the bidder to the help desk **(helpetender@gmail.com/ etendershelp@kerala.gov.in)**, for resolution of the problem. At the same time, problem must be intimated to the concerned Tender Inviting Authority via email.

vi. The time taken to ascertain, evaluate and suggest a solution for the problem reported by bidder may vary from case to case. Hence bidders are advised to submit the bid **at least 2 working days before the due date** and time of bid submission to avoid any last-minute issues that may come up.

vii. Opening of Bid and Bidder short-listing: The single cover bids will be opened, evaluated and shortlisted as per the eligibility. Failure to submit the required documents online will attract disqualification. Price bids of the eligible bidder's will open the same day of opening and the work will be awarded.

3. DOCUMENTS COMPRISING BID:

3.1 (a) The First Stage - Part-I Pre- Qualification cum Technical Bid with Commercial terms without Price Bid

Technical proposal shall contain the scanned copies of the following documents which every bidder has to upload:

Envelop -1 shall contain Part-I (this document in PDF form)/scanned copies of:

i. Tender documents downloaded (signed with office seal)

ii. Summary of Bid qualification requirement (Annexure A)

iii. Agreement in the prescribed format (Annexure B) on Govt. of Kerala stamp paper worth Rs.200/-

iv. Details of credit rating done, to prove the experience in executing similar orders

v. Bill of Material.

vi. Details of the technical offer, including test certificates.

vii. Details of site-specific additional costs required.

viii. Declaration by the bidder (format as in Annexure – C)

ix. Declaration of relationship with ANERT employee (format as in Annexure - D)

3.1 (b) The Second Stage (Financial Cover as per one cover system):

Envelop -2: shall contain the Price Schedule as per BOQ in Excel format for this tender to be downloaded from e-tender website, duly digitally signed by the tenderer/authorized signatory of the tender.

3.2 The department doesn't take any responsibility for any technical snag or failure that has taken place during document upload.

3.3 The Bidder shall complete the Price bid as per format given for download along with this tender.

Note: The blank price bid should be downloaded and saved on bidder's computer without changing file-name otherwise price bid will not get uploaded. The bidder should fill in the details in the same file and upload the same back to the website.

3.4 Fixed price: Prices quoted by the Bidder shall be fixed during the bidder's performance of the contract and not subject to variation on any account. A bid submitted with an adjustable/ variable price quotation will be treated as non - responsive and rejected.

4. TENDER DOCUMENT FEES AND EARNEST MONEY DEPOSIT (EMD)

4.1 The Bidder shall pay, a tender document fee of Rs. 2,950/- and Earnest Money Deposit or Bid Security of Rs. 50,000/-. The Bid security is required to protect the purchaser against risk of Bidder's conduct, which would warrant the forfeiture of security.

4.2 Bidders who are registered as MSME / MSE / NSIC / Udhog Aadhar OR Central/State PSE are exempted from paying EMD and Tender Fee.

4.3 Online Payment modes: The tender document fees can be paid in through e-Payment facility provided by the e-Procurement system. Bidders can make payment only via Internet banking facility.

State Bank of India Multi Option Payment System (SBI MOPS Gateway): Bidders are required to avail Internet Banking Facility in any of below banks for making tender remittances in e-Procurement System.

A) Internet Banking Options (Retail)			
1	Allahabad Bank	32	Kotak Mahindra Bank
2	Axis Bank	33	Lakshmi Vilas Bank
3	Andhra Bank	34	Mehsana Urban Co-op Bank
4	Bandan Bank	35	NKGSB Co-operative Bank
5	Bank of Bahrain and Kuwait	36	Oriental Bank of Commerce
6	Bank of Baroda	37	Punjab and Maharashtra Cooperative Bank
7	Bank of India	38	Punjab National Bank
8	Bank of Maharashtra	39	Punjab and Sind Bank
9	Bassein Catholic Co-operative Bank	40	RBL Bank
10	BNP Paribas	41	Saraswat Cooperative Bank
11	Canara Bank	42	Shamrao Vithal Cooperative Bank
12	Catholic Syrian Bank	43	South Indian Bank
13	Central Bank of India	44	Standard Chartered Bank
14	City Union Bank	45	State Bank of India
15	Corporation Bank	46	Syndicate Bank
16	Cosmos Bank	47	Tamilnad Mercantile Bank
17	DCB Bank	48	Tamilnadu Cooperative Bank
18	Dena Bank	49	The Kalyan Janata Sahakari Bank
19	Deutsche Bank	50	TJSB Bank
20	Dhanalaxmi Bank	51	UCO Bank
21	Federal Bank	52	Union Bank of India
22	HDFC Bank	53	United Bank of India
23	ICICI Bank	54	Vijaya Bank
24	IDBI Bank	55	YES Bank
25	Indian Bank		
26	Indian Overseas Bank		
27	IndusInd Bank		
28	Jammu & Kashmir Bank		
29	JanataSahakari Bank		
30	Karnataka Bank		
31	KarurVysya Bank		
B) Internet Banking Options (Corporate)			
1	Bank of Baroda	21	Laxmi Vilas Bank
2	Bank of India	22	Oriental Bank of Commerce

3	Bank of Maharashtra	23	Punjab & Maharashtra Coop Bank
4	BNP Paribas	24	Punjab & Sind Bank
5	Canara Bank	25	Punjab National Bank
6	Catholic Syrian Bank	26	RBL Bank
7	City Union Bank	27	Shamrao Vitthal Co-operative Bank
8	Corporation Bank	28	South Indian Bank
9	Cosmos Bank	29	State Bank of India
10	Deutsche Bank	30	Syndicate Bank
11	Development Credit Bank	31	UCO Bank
12	Dhanalaxmi Bank	32	Union Bank of India
13	Federal Bank	33	UPPCL
14	HDFC Bank	34	Vijaya Bank
15	ICICI Bank	35	Axis Bank
16	Indian Overseas Bank		
17	Janta Sahakari Bank		
18	Jammu & Kashmir Bank		
19	Karur Vysya Bank		
20	Kotak Bank		

During the online bid submission process, bidder shall select ***SBI MOPS*** option and submit the page, to view the ***Terms and Conditions*** page. On further submitting the same, the e-Procurement system will re-direct the bidder to MOPS Gateway, where two options namely ***SBI*** and ***Other Banks**** will be shown. Here, Bidder may proceed as per below:

a) *SBI Account Holders* shall click ***SBI*** option to with its Net Banking Facility., where bidder can enter their internet banking credentials and transfer the Tender Fee and EMD amount.

b) *Other Bank Account Holders* may click ***Other Banks*** option to view the bank selection page. Here, bidders can select from any of the 54 Banks to proceed with its Net Banking Facility, for remitting tender payments.

**Transaction Charges for Other Banks vide SBI Letter No. LHO/TVM/AC/2016-17/47 – 1% of transaction value subject to a minimum of Rs. 50/- and maximum of Rs. 150/-*

** Bidders who are using Other Banks option under SBI MOPS Payment Gateway are advised by SBI to make online payment 72 hours in advance before tender closing time.*

5. SUBMISSION PROCESS:

5.1 For submission of bids, all interested bidders have to register online as explained above in this document. After registration, bidders shall submit their Technical bid and Financial bid online on www.etenders.kerala.gov.in along with online payment of tender document fees and EMD.

5.2 For page-by-page instructions on bid submission process, please visit www.etenders.kerala.gov.in and click "Bidders Manual Kit" link on the home page.

5.3 It is necessary to click on "Freeze bid" link/ icon to complete the process of bid submission otherwise the bid will not get submitted online and the same shall not be available for viewing/ opening during bid opening process.

6. VALIDITY

6.1 The tender offer shall be kept valid for acceptance for a period of 3 months from the date of opening of offers. The offers with lower validity period are liable for rejection. Further, the tenderer may extend the validity of the Bids without altering the substance and prices of their Bid for further periods, if so required

7. DEVIATIONS

7.1 The offers of the Tenderers with Deviations in Commercial terms and Technical Terms of the Tender Document are liable for rejection.

8. BLACK LIST

8.1 All the intending tenderers shall agree that in the event of the documents furnished with the offer being found to be bogus or the documents contain false particulars, they shall be blacklisted for future tenders/ association with ANERT and EMD shall be forfeited against any losses incurred by ANERT

9. BIDDER'S LOCATION

9.1 The tenderers are requested to furnish the exact location of their factories/godown with detailed postal address and pin code, telephone and fax nos. etc. in their tenders to arrange inspection by ANERT, if considered necessary.

9.2 All communication shall be made to the registered email of the bidder in the e-tendering systems and ANERT shall not be responsible for non-receipt or delay of any such communication.

10. CORRUPT AND FRAUDULENT PRACTICES

ANERT requires compliance with its policy in regard to corrupt and fraudulent/prohibited practices as set forth in this proposal. In further pursuance of this policy, the selected service Provider(s) shall permit ANERT or its representatives to inspect the accounts, records and other documents relating to the submission of the Proposal and execution of the contract, in case of award, and to have the records inspected by ANERT.

11. CONFLICT OF INTEREST

i. The service Provider(s) is required to provide professional, objective, and impartial services, at all times holding ANERT‟s interests paramount, strictly avoiding conflicts with other assignments or its own corporate interests, and acting without any consideration for future work. The supplier has an obligation to disclose to ANERT any situation of actual or potential conflict that impacts its capacity to serve the best interest of ANERT. Failure to disclose such situations may lead to the disqualification of the supplier or the termination of its Contract and/or sanctions by the Government.

ii. Relationship with the ANERT staff: a service Provider (including its subsidiaries /partners) that has a close business or family relationship with a professional staff of the ANERT who are directly or indirectly involved in any part of the preparation of this document, the selection process for the Contract, or the supervision of the Contract, may not be awarded a Contract, unless the conflict stemming from this relationship has been resolved in a manner acceptable to ANERT throughout the selection process and the execution of the Contract. Any other types of conflicting relationships as indicated in the Tender

12. CONFIDENTIALITY

i. From the time the Proposals are opened to the time the Contract is awarded, the agency (ies) should not contact any of the officials of ANERT on any matter related to its Technical and/or Financial Proposal. Information relating to the evaluation of Proposals and award recommendations shall not be disclosed to the agency (ies) who submitted the Proposals or to any other party not officially concerned with the process, until the publication of the Contract award information.

ii. Any attempt by the agency (ies) or anyone on behalf of the Suppliers to influence improperly ANERT in the evaluation of the Proposals or Contract award decisions may result in the rejection of its Proposal and may be subject to the application of prevailing Government sanctions procedures.

iii. Notwithstanding the above provisions, from the time of the Proposals‟ opening to the time of Contract award publication, if agency (ies) intends to contact ANERT on any matter related to the selection process, it should do so only in writing.

iv. The Bids should be submitted only through the e-tender portal www.etenders.kerala.gov.in. Agency (ies) shall upload all the necessary documents in the e tender portal before the last date & time for online submission. Proposal received after the submission deadline will be treated as non-responsive and will be excluded from further evaluation process.

v. Proposals must be direct, concise, and complete. ANERT will evaluate bidder's proposal based on its clarity and the directness of its response to the requirements of the project as outlined in this tender document. Bidders shall furnish the required information on their technical and financial proposals in the enclosed formats only. Any deviations in format or if the proper information is not provided properly, the tender will be liable for rejection. Tender Evaluation committee may seek clarification, if required, while evaluating the proposal.

vi. The technical bid opening date, time and the address are as stated in the tender document. The Financial Proposal shall remain securely stored online till the technical evaluation is completed and the results intimated to all successful bidders

13. APPLICABLE LAW

The work order shall be governed by the laws and procedures established by Government of Kerala, within the frame work of applicable legislation and enactment made from time to time concerning such commercial dealings. Any default in the terms and conditions of the document by the service provider will lead to rejection of work order.

14. AMENDMENT OF TENDER DOCUMENT

At any time prior to the deadline for submission of the tender, ANERT may for any reason, modify the tender document. The amendment document/ corrigendum shall be notified through the website www.etenders.kerala.gov.in and such amendments shall be binding on all the bidders.

15. COMMENCEMENT OF SERVICE

The successful bidder should sign the contract agreement within 7 days of issue of work order. The successful bidder should start the services as defined in the scope of work within 15 days of Issue of work order.

16. GOVERNMENT OF KERALA – CORRUPT AND FRAUDULENT PRACTICES

ANERT follows the policy of the Government of Kerala for anti-corruption and fraudulent practices to maintain sound procurement principles of open competition, economy and efficiency, transparency, and fairness. ANERT requires the agency (ies) to observe the following Government manuals (amended from time-to-time) during the selection process and in execution of such contracts The Kerala Financial Code (KFC), 2008 (7th Edition, 1st Edition was in 1963), The Stores Purchase Manual (SPM), 2013.

17. BID QUALIFICATION REQUIREMENTS

i. Every tenderer should submit along with his e-tender an Earnest Money Deposit (EMD). This may be done electronically from any of the Nationalized/Schedule Banks. The EMD of the disqualified tenderers will be returned automatically through e-procurement system. The EMD of the successful tenderers may be adjusted towards the security deposit. No interest shall be paid for the earnest money deposited.

ii. An agreement in Rs.200/- Kerala stamp paper as per the format given in Annexure B must be submitted along with e-tender document.

iii. Only the Registered vendors of ANERT for SPV Power plants issued by ANERT from time to time are eligible for participation in the tender. The maximum Power plant capacity and total volume of the works are limited to their grade allotted by M/s ICRA Analytics Ltd and as mentioned in the Registration order.

iv. The bidder must use PV modules listed in the ALMM list issued by MNRE from time to time. A detailed BoM in the letter head of the bidder is to be provided along with the bid.

v. Price Bid in excel format, for this tender to be downloaded from e-tender website, duly digitally signed by the tenderer/authorized signatory of the tender.

CONDITIONS OF CONTRACT

18. GENERAL CONDITIONS

18.1 The tenders should be submitted online at www.etenders.kerala.gov.in

18.2 The tenders should be as per the prescribed form which should be downloaded from the e-tender website.

18.3 Intending tenderers should submit their tenders on or before the due date and time mentioned in the tender abstract.

18.4 The rates quoted should be only in Indian currency. Tenders in any other currency are liable to rejection. The rates quoted should be for the unit specified in the schedule attached.

18.5 Tenders subject to conditions will not be considered. They are liable to be rejected on that sole ground.

18.6 The final acceptance/rejection of the tenders rests entirely with CEO, ANERT who do not bind themselves to accept the lowest or any tender.

18.7 The successful tenderer should be prepared to guarantee satisfactory performance for a period of guarantee under a definite penalty. Communication of acceptance of the e-tender normally constitutes a concluded contract. Nevertheless, the successful tenderer shall also execute an agreement for the due fulfilment of the contract within the period to be specified in the letter of acceptance. The contractor shall have to pay all stamp duty, Lawyer's charges and other expenses incidental to the execution of the agreement. Failure to execute the agreement within the period specified will entail the penalties set out below:

a) The successful tenderer shall sign an agreement with ANERT within the period specified in the letter of acceptance of this tender. The amount of stamp duty for the agreement must follow G.O. (P) No.113/2019/TD. dtd. 24.07.2019 with respect to public works. They are to deposit a sum equivalent to 5% of the value of the contract as security for the satisfactory fulfilment of the contract less the amount of money deposited by him along with his tender. The amount of security may be deposited in the manner prescribed to be specified in the work order issued by ANERT.

b) There will be no exemption for MSE's in depositing this security amount. If the successful tenderer fails to deposit the security and execute the agreement as stated above, the earnest money deposited by him will be forfeited to ANERT and contract arranged elsewhere at the defaulter's risk and any loss incurred by ANERT on account of the purchase will be recovered from the defaulter who will however not be entitled to any gain accruing thereby.

c) ANERT will deduct an amount of 2.5% of the total cost incl 18% GST towards license fee as decided by ANERT executive committee.

d) In cases where a successful tenderer, after having made partial works, fails to fulfil the contracts in full, all or any of the materials not supplied may at the discretion of the Purchasing Officer be purchased by means of another tender/quotation or by negotiation or from the next higher tenderer who had offered to supply already, and the loss if any caused to ANERT shall thereby together with such sums as may be fixed by ANERT towards damages be recovered from the defaulting tenderer.

e) If the contractor fails to deliver all or any of the stores or perform the service within the time/period(s) specified in the contract, the purchaser shall without prejudice to its other remedies under the contract, deduct from the contract prices, as liquidated damages, a sum equivalent to 0.5 % of the delivered price of the delayed stores or unperformed services for each week of delay until actual delivery or performance, up to a maximum deduction of 10% of the contract price of the delayed stores and services. Once the maximum is reached, the purchaser may consider termination of the contract at the risk and cost of the contractor.

18.8 The Security deposit shall, subject to the conditions specified herein be returned to the contractor within three months after the expiration of the contract but in the event of any dispute arising between ANERT and the contractor, ANERT shall be entitled to deduct out of the deposits or the balance thereof, until such dispute is determined the amount of such damages, costs, charges and expenses as may be claimed. The same may also be deducted from any other sum which may be due at any time from ANERT to the contractor. In all cases where there are guarantee for the goods supplied, the security deposit will be released only after the expiry of the guarantee period.

18.9 (a) All payments to the contractors will be made in due course by ANERT.

(b) All incidental expenses incurred by ANERT for making payments outside the State in which the claim arises shall be borne by the contractor.

18.10 Payments will be made only after the supply, Installation and Commissioning of the items and certification by the competent technical personnel of ANERT.

18.11 The contractor shall not assign or make over the contract on the benefits or burdens thereof to any other person or body corporate. The contractor shall not underlet or sublet to any person or persons or body corporate the execution of the contract or any part thereof without the consent in writing of the purchasing officer who shall have absolute power to refuse such consent or to rescind such consent (if given) at any time if he is not satisfied with the manner in which the contract is being executed and no allowance or compensation shall be made to the contractor or the subcontractor upon such rescission. Provided, that if such consent be given at any time, the contractor shall not be relieved from any obligation, duty or responsibility under this contract.

18.12 In case the contractor becomes insolvent or goes into liquidation, or makes or proposes to make any assignment for the benefit of his creditors or proposes any composition with his creditors for the settlement of his debts, carries on his business or the contract under inspection or behalf of or his creditors or in case any receiving order(s) for the administration of his estate are made against him or in case the contractor shall commit any act of insolvency or in case in which under any clause or clauses any act of insolvency or in case in which under any clause(s) of this contract the contractor shall have rendered himself liable to damages amounting to the whole of his security deposits, the contract shall, thereupon, after notice given by the Purchasing Officer to the contractor, be determined and ANERT may complete the contract in such time and manner and by such persons as ANERT shall think fit. But such determination of the contract shall be without any prejudice to any right or remedy of ANERT against the contractor or his sureties in respect of any breach of contract committed by the contractor. All expenses and damages caused to ANERT by any breach of contract by the contractor shall be paid by the contractor to ANERT and may be recovered from him under the provisions of the Revenue Recovery Act in force in the State.

18.13 In case the contractor fails to supply and deliver any of the said articles and things or the works within the time provided for delivery of the same, or in case the contractor commits any breach of any of the covenants, stipulations and agreements herein contained, and on his part to be observed and performed, then and in any such case, it shall be lawful for ANERT (if they shall think fit to do so) to arrange for the purchase of the said articles and things from elsewhere of on behalf of ANERT by an order in writing under *the* hand of the CEO put an end to this contract and in case ANERT shall have incurred sustained or been put to any costs, damages or expenses by reason of such purchase or by reason of this contract having been so put an end to or in case any difference in price, compensation, loss, costs, damages, expenses or other moneys shall then or any time during the continuance of this contract be payable by the contractor to ANERT under and by virtue of this contract, it shall be lawful for ANERT from and out of any moneys for the time being payable or owing to the contractor from ANERT under or by virtue of this contract or otherwise to pay and reimburse to ANERT all such costs, damages and expenses they may have sustained, incurred or been put to by reason of the purchase made elsewhere or by reason of this contract having been so put an end to as aforesaid and also all such difference in price, compensation, loss, costs, damages, expenses and other moneys as shall for the time being payable by the contractor aforesaid.

18.14 Any sum of money due and payable to the contractor (including security deposit returnable to him) under this contract may be appropriated by the CEO or any other person authorised by ANERT and set off against any claim of ANERT for the payment of a sum of money arising out of or under any other contract made by the contractor with ANERT or any other person authorised by ANERT. Any sum of money due and payable to the successful tenderer or contractor from ANERT shall be adjusted against any sum of money due to ANERT from him under any other contracts.

18.15 Every notice hereby required or authorised to be given may be either given to the contractor personally or left at his residence or last known place of abode or business, or may be handed over to his agent personally, or may be addressed to the contractor by post at his usual or last known place of abode or business and if so addressed and posted, shall be deemed to have been served on the contractor

on the date on which in the ordinary course of post, a letter so addressed and posted would reach his place of abode or business.

18.16 The tenderer shall undertake the installation and commissioning of the system according to the standards and specification.

18.17 No representation for enhancement of rate once accepted will be considered.

18.18 The prices quoted should be inclusive of GST and all other expenses which are or may become payable by the contractor under existing or future laws or rules of the country of origin/supply or delivery during the course of execution of the contract.

18.19 Special conditions, if any, of the tenderers attached with the tenders will not be applicable to the contract unless they are expressly accepted in writing by the purchaser.

18.20 The tenderer should send along with this tender an agreement executed and signed in Kerala Stamp Paper of value Rs.200/-. A specimen form of agreement is given as Annexure B to this tender. Tenders without the agreement in stamped paper will be rejected outright.

18.21 **Conditions in the technical document, technical specifications and special conditions of this tender document would override these general conditions, wherever applicable.**

18.22 ANERT, by notice sent to the Supplier, may terminate the contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for ANERT's convenience, the extent to which performance of the Supplier under the contract is terminated, and the date upon which such termination becomes effective.

18.23 The installation must be done at the highest standard as the project is undertaken by ANERT to showcase the best practices in the solar industry. Use of sub-standard materials and installation practices will not be tolerated and stringent actions will be imposed including debarring from future works etc.

18.24 It is mandatory to provide the drawings mentioned in the tender along with detailed BoM before the dispatch of materials to site. ANERT reserves the right to reject the materials if the same are not in compliance with the requirements of the tender. In case, the successful bidder delivers the materials without BoM

approval, they may have to take back the materials at their own cost and no time extension without penalty will be provided for completion of works.

18.25 E-tender shall be opened at the time and date announced in the tender notice, and the price bid will be evaluated on the same day.

18.26 In case any difference or dispute arises in connection with the contract, all legal proceedings relating to the matter shall be instituted in the Court within whose jurisdiction the CEO, ANERT voluntarily resides.

18.27 The Courts situated at the place where the headquarters of ANERT is situated viz, Thiruvananthapuram alone will have jurisdiction to entertain civil suits and all other legal pertaining to this contract.

19. SPECIAL CONDITIONS

19.1 Each bidder should submit only one (1) bid. Any bidder who submits/participates in more than one bid for the work shall be disqualified.

19.2 The tenders will be opened in the presence of bidders present at the date and time advised in the Bidding Document. If the due date for receiving and opening the tender happens to be declared holiday, then the tender will be received and opened on the very next day, for which no prior intimation will be given.

19.3 If the price bid is not submitted along with the tender, such tenders will be summarily rejected.

19.4 **During the tender evaluation, ANERT may seek more clarifications/details from any or all the tenderers, if felt necessary.**

19.5 The price bids of the tenderers, which submitted the required documents only will be opened and the L1 bidder will be awarded the work of supply and installation of items after fulfilling all the requirements.

19.6 **ANERT reserves the right, in the interest of completion of work within the time limit, to award portion/portions of the Work order to next higher bidders, called for negotiation in the increasing order of their price offers.**

19.7 **The rate quoted should be all inclusive including delivery of materials at the locations to be specified, and the cost of materials and labour for the civil works, installation and commissioning, warranties, fee for approval from the Electrical Inspectorate if any, Fee for KSEBL Feasibility application and registration fee along with GST and all other expenses.**

19.8 **The price quotes should be inclusive of initial cost of supply, installation and commissioning, support during the warranty period of 5-years.**

19.9 The tender offer shall be kept valid for acceptance for a period of 1 month from the date of opening of bid. The offers with lower validity period are liable for rejection.

19.10 The evaluation of the price bid will be based on the grand total of all-inclusive amount quoted excluding GST.

19.11 Based on available funds, ANERT may enhance or decrease the capacity of the power plant proposed. The pro rata cost per kWp will be calculated from the rate quoted by the bidder, and the work for the enhanced capacity will have to be done on this per kW basis itself.

19.12 The contractor shall immediately on occurrence of any accident at or about the site or in connection with the execution of the work report such accident to the ANERT. The contractor shall also report immediately to the competent authority whenever such report is required to be lodged by the law and take appropriate actions thereof.

AGENCY FOR NEW & RENEWABLE ENERGY RESEARCH AND TECHNOLOGY (ANERT)
Department of Power, Government of Kerala
Thiruvananthapuram, Kerala – 695 033;
www.anert.gov.in , projects@anert.in

E-TENDER DOCUMENT

Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.

Ref. No.: ANERT-MPM/6/2025-DE (MPM)

PART – 2: SCOPE OF WORKS

Date of Publishing of Bids : - 26/04/2025

Last Date of Submission of Bids : - 06/05/2025

SCOPE

20. INVITATION TO BID

20.1 **ANERT is the State Nodal Agency for Renewable Energy in Kerala** having its Headquarters at Thiruvananthapuram, Kerala and various district level offices. **This tender has been issued by ANERT for the selection of agency for the Design, Supply, Installation and Commissioning of Hybrid Solar Power Plant Solar Power Plants with 5-year warranty in Government buildings mentioned in this tender document.**

20.2 To meet the requirements, ANERT proposes to invite bids from ANERT registered vendors for Solar Power Plant to provide services as per details/**scope of work** mentioned in this tender document.

20.3 Bidder shall mean any entity (i.e. juristic person) who meets the **eligibility criteria** of this tender and willing to provide the Services as required in this bidding document. The interested Bidders who agree to all the terms and conditions contained in this document may submit their Bids with the information desired in this bidding document.

20.4 Address for submission of Bids, contact details including email address for sending communications are given in this tender document.

20.5 This document shall not be transferred, reproduced, or otherwise used for purpose other than for which it is specifically issued.

20.6 Interested Bidders are advised to go through the entire document before submission of Bids to avoid any chance of elimination. The eligible Bidders desirous of providing services to ANERT are invited to submit their technical proposal in response to this tender. The criteria and the actual process of evaluation of the responses to this tender and the selection of Bidder will be entirely at ANERT's discretion. This tender seeks proposal from Bidders who have the necessary experience, capability & expertise to provide ANERT the proposed Services adhering to its requirements outlined in this tender.

21. DEFINITION

A Hybrid Solar PV power plant system comprises of C-Si (Crystalline Silicon) Solar PV modules with intelligent Inverter having MPPT technology and Intentional Islanding feature and associated power electronics, which feeds surplus generated AC power to the Grid and islands when the Grid is not available. During grid supply outage the system operates in off-grid mode using battery. Other than PV Modules and Inverter/Inverters, the system consists of a Battery Bank, Module Mounting Structures, appropriate DC and AC Cables, Array Junction Boxes (AJB) / String Combiner Boxes (SCB), AC and DC Distribution Box, Lightning Arrester, Earthing Systems, Net meter, etc.

The system should be capable for exporting surplus generated solar power into the Grid, whenever the Grid is available and islands/disconnect whenever the grid is not available. The Hybrid power plants shall be capable of giving a battery backup considering full load operation.

22. SCOPE OF WORK

22.1 The scope includes the Supply, Installation, Testing and Commissioning of Hybrid SPV power plants. All the necessary approvals from KSEBL/Electrical Inspectorate, feasibility study, necessary civil work, Mounting of Module Structures, PV Module Installation, Inverter and Battery bank Installation, DC/AC Cabling and interconnections, Installation of Lightning Arresters and Earthing System as per the standards, arranging all the necessary inspections from KSEBL/Electrical Inspectorate/ANERT District Office as part of Pre-Commissioning, if any, Commissioning of the PV Power Plant, are coming under the scope of the bidder. The list of sites for installation are as below:

SN	Name of Site	Proposed Capacity (kWp)	Battery Backup (Hrs | kWh)
1.	Thanur Block Panchayat Office, Building 1.	5	1|5.2
2.	Thanur Block Panchayat Office, Building 2.	8	2|15.36
3.	Thanur Block Panchayat Office, Building 3. ***(Offgrid –Hybrid Conversion using existing panels)***	5	1|5.2
Total		**18**	

22.2 **Additional structure for installation of solar power plant, walkway for cleaning of panel etc. are under the scope of the bidder.**

22.3 The successful bidder is to bear the fee for KSEBL feasibility, Registration, and all other expenses. The additional costs for site specific cabling works, earthing, mounting structure modifications etc. are under the scope of the bidder.

22.4 **The scope of enhancing load, modification of Panel boards, segregation of loads for backup etc. wherever necessary is under the scope of the bidder. Also, the load segregation for connecting the standalone load to the inverter from the consumer DB is also under the scope of the bidder. The rates for the same are to be considered in the bid.**

22.5 It is mandatory that the bidders are to visit the sites and quote the rates considering all the requirements as mentioned in this tender document. No requests for revision of rates will be entertained. In case, the successful bidder is not undertaking the specific work, the work will be cancelled and disciplinary proceedings will be initiated against the bidder and all payments due will be withheld. Hence, Bidders are requested to visit the site before quoting and the rate for successful commissioning in all aspects is to be quoted.

22.6 **The rate quoted should be all inclusive including delivery of materials, the cost of materials and labour for the civil works, Installation and Commissioning, 5-yearWarranty, fee for approval from the KSEBL, Electrical Inspectorate if any,** Solar Meter**, Remote monitoring facility, Insurance, GST and all other expenses deemed necessary for the proper implementation of the conditions and specification in-corporated in the tender.**

22.7 In case of installations to be made in sites with HT connection, the replacement of CTs (Class 0.2s), PT (Class 0.2) of rating is under the scope of the vendor. The rates for Supply of tested transformers & Replacement at the site of these items to be quoted along with the bid.

22.8 The Component wise split up of the costs in percentage for each capacity is to be included as part of the technical bid (included as format A).

22.9 **Any site-specific cost for access ladders, pathway etc. if required is under the scope of the bidder. N- Type TopCon Bifacial Panels should be used,**

Roof area under the panel should be painted White. LiFePo4 Batteries should have BIS Certification (at least for Cells) with 6000 life Cycle .Customized Structure with Walk way and Ladder with handrail required. Cleaning provision should be provided. For conversion current panel structure should be reconditioned.

22.10 If required, the successful bidder shall replace the existing CTs, PT, RPRs and other electrical works required for the successful commissioning of the power plant.

22.11 Any other work required for the successful commissioning of the power plant which are not mentioned in this document and are required as per prevailing laws & regulations in the country

23. SCHEDULE OF SUPPLY

23.1 The items should be delivered and installed at the sites of institution for which work order shall be given and specified by ANERT, under prior intimation and supervision of ANERT. The list of sites is listed below:

23.2 The successful bidder should complete the Supply, Installation, Testing and Commissioning of individual Solar Power Plants as mentioned below:

SN	Name of Site	Proposed Capacity (kWp)	Battery Backup (Hrs | kWh)
1.	Thanur Block Panchayat Office, Building 1.	5	1|5.2
2.	Thanur Block Panchayat Office, Building 2.	8	2|15.36
3.	Thanur Block Panchayat Office, Building 3. ***(Offgrid –Hybrid Conversion using existing panels)***	5	1|5.2
Total		**18**	

23.3 If the successful bidder fails to deliver the materials within the days mentioned below, the order stands cancelled and ANERT will award the work to the next bidder and penalty as decided by ANERT will be levied.

#	Capacity of Solar Plant in kWp	Material Delivery (Days)	Completion Period (Days)
1	**18**	30	45

23.4 For any delay in Installation and Commissioning beyond the period mentioned above, the ANERT will charge penalty of 0.5% of the order value/week or part thereof, subject to the cost not exceeding 10% of the total cost.

23.5 Order will be cancelled if the delay of service is more than this time period and work will be issued to the second successful bidder

23.6 Bidders are to submit their quotes only after visiting the site and the details of additional works required for the successful commissioning of the power plant is to be mentioned in the technical bid. No additional amount for any works will be provided under any circumstance, even if the site requires additional work other than quoted by the bidder. Hence, special care must be taken while submitting the bids.

23.7 Supply of the SPV module must be from the ALMM list issued by MNRE from time to time. The test certificates and reports of the inverters being used for the project must be submitted along with the bid. ANERT reserves the right to reject the bid based on the non-conformity of the inverter being supplied.

23.8 The successful bidder shall submit the detailed BoM and the timeline for completion along with the agreement and security deposit. This timeline must be followed and no extension of time for completing the installation will be granted. Although, time extension may be granted for things beyond the control of the bidder.

23.9 In case of no valid reason, extension of time of completion that can be granted at a time shall be 25% of the original time. The maximum extension that can be granted for a work shall be limited to half the original time of completion.

23.10 When the contract period has to be extended wholly or partly due to default on the part of the bidder, the Agreement Authority may sanction extension of time after imposing fine as mentioned below;

Period	Rate of Fine
First Extension	1% of the PAC subject to a minimum of Rs. 1000/- and maximum of Rs. 50,000/-.
Second Extension	2% of the PAC subject to a minimum of Rs. 2000/- and maximum of Rs. 1,00,000/-

24. PAYMENT

24.1 2.5% of the total amount including 18% GST will be deducted as license fee and the balance amount will be considered as contract value for release of payments.

24.2 No advance payment will be given. All the documents submitted should be certified by the concerned District Office of ANERT.

24.3 The terms of payment shall be:

i. Upon delivery of major components (PV Modules, Inverter etc.) at the respective sites, 60 % of the contract value will be released as first part payment. The supplier shall submit the invoice for the materials (including serial numbers and delivery challan) duly certified by the concerned District Office along with a report regarding the supply of materials.

ii. On completion of the installation of power plant and filing application for testing with the electrical utility (incl. Energisation order for plant capacity above 30kW), 20% of the contract value shall be released as second part payment. The supplier shall submit the invoice for the materials supplied and all documents related including the Project Completion Report to the completion of the work certified by the district office shall be submitted for the release of the amount. The PCR submitted will be used for conducting the pre-commissioning tests.

iii. On commissioning of the grid connected system, 10% of the remaining contract value will be released. All documents related to the completion of the work including commissioning report shall be submitted for the release of the amount.

iv. The balance 10% shall be retained as performance security and will be released in equal parts of2% after each year of operation. This period will be considered only from the date of commissioning.

v. The security deposit of 5% furnished along with the contract agreement shall be released on successful completion of supply, installation and commissioning.

24.4 Income tax, contribution to workers' welfare fund and other statutory deductions shall be made from the payment as per prevailing norms.

25. SERVICE AND MAINTENANCE

25.1 The faulty system or components should be replaced/ repaired within 5 days of fault reporting. The servicing should be carried out at the site of installation.

25.2 The service personnel should visit the installations at least once in 3 months for preventive maintenance even if no faults are reported. **Reports of these preventive maintenance visits and generation data should be submitted to the concerned ANERT District Offices on a quarterly basis**.

25.3 Any Delay in servicing beyond 10 days of fault reporting would attract penalty at the rate of at the rate fixed by CEO, ANERT and further actions will be initiated against the agency.

25.4 A designated contact Telephone Number and address should be submitted for reporting faults during the warranty period.

26. SYSTEM COMPONENTS- TECHNICAL COMPLIANCE FOR SYSTEM COMPONENTS

S/N	System Component	Capacity/ rating	Minimum Technical Compliance
1.	Solar panel (N type Topcon Bifacial of capacity 550Wp or above)	As per the required capacity	IS 14286 -Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules
			IEC/IS 61730: Part I& II;
2.	Solar Hybrid Inverter	As per the required capacity	IS 16221: Part 1 &2- Safety of Power Converters for use in Photovoltaic Power Systems
			IS 16169 - Test Procedure of Islanding Prevention Measures for Utility-Interconnected Photovoltaic Inverters
3.	Battery	As per the required capacity	IS 15549; IEC 61427-1:2013
4.	Module Mounting Structure	As per the required capacity	IS 2062 - Hot Rolled Medium and High Tensile structural Steel
			IS 4759 - Hot-dip Zinc Coatings on structural steel and other products
5.	Cables	As required	IEC 60227 / IS 694
			IEC 60502 / IS 1554 (Pt. I & II)
6.	Switches/ Circuit Breakers	As required	IEC 60947 part I, II, III /IS 60947 Part I, II, III
7.	Connectors		EN 50521
8.	Surge Protection Device		IEC 60364-5-53 / IS 15086-5
9.	Junction Boxes/Enclosures for Inverters/ Charge Controllers	As required	IP 54 (for outdoor) or IP 65 / IP 21(for indoor) as per IEC 529
10.	Energy Meter for Recording Solar Electricity Generated & Two-way meter for Distribution Licensee grid connection		As per CEA Regulations; IEC 60687/ IEC 62052-11 / IEC62053-22 / IS 14697
11.	Lightning Protection	As required	As per IEC 62305 / IEC 62561
12.	Electrical Grounding (Earthing)	As required	As per IS 3043

The detailed Technical Specifications are attached as annexure – E.

27. STANDARDS AND REGULATIONS TO BE COMPLIED

The connectivity should be as per

a. Technical Standards for connectivity of the Distributed generation resources, Regulation, 2013.
b. KSERC (Renewable Energy and Net Metering) Regulations, 2020 and amendments thereto
c. KSERC (Grid interactive Distributed Solar Energy Systems) Regulations, 2014.
d. Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023has to be followed safety and Electricity supply.
e. Metering should be as per CEA regulation 2006.
f. Any amendments thereof will also be applicable.

28. SPV MODULES

Only the PV modules with N type Topcon Bifacial of capacity 550Wp or above listed in the ALMM list issued by MNRE from time to time are to be used. However, the specifications for the PV Module are detailed below:

28.1 The PV modules must be PID compliant, salt, mist & ammonia resistant and should withstand weather conditions for the project life cycle.

28.2 The back sheet of PV modules shall be with minimum of three layers with outer layer (exposure to ambience) and shall be made of PVDF or PVF. The Back sheets for PV Module with 2 layered or 3 layered Polyester types or the back sheets with Polyester (PET type) at Air side material are not permitted for the empanelment; The minimum thickness of the core layers (without adhesive and inner EVA coated) must be 300 microns. The maximum allowed water vapour transmission rate shall be less than 2 g / m2/day and shall have a Partial Discharge > / = 1500V DC

28.3 The front glass shall meet the following specifications:

a. The facing glass must be Tempered, PV grade with Low iron and high transmission.
b. The transmission shall be > 93 %
c. Thickness shall be min 3.2 mm
d. Textured to trap more light

e. The glass shall have an Anti-reflective coating for the better transmission and light absorption.

f. Tempered glass to meet the external load conditions

28.4 The encapsulant used for the PV modules should be UV resistant in nature. No yellowing of the encapsulant with prolonged exposure shall occur. The sealant used for edge sealing of PV modules shall have excellent moisture ingress Protection with good electrical insulation and with good adhesion strength. Edge tapes for sealing are not allowed.

28.5 Anodized Aluminium module frames of sufficient thickness shall be used which are electrically & chemically compatible with the structural material used for mounting the modules having provision for earthing.

28.6 UV resistant junction boxes with minimum three numbers of bypass diodes and two numbers of MC4 connectors or equivalent with appropriate length of 4 sq.mm Cu cable shall be provided. IP67 degree of protection shall be used to avoid degradation during Life.

28.7 Shading correction/ bypass diode for optimizing PV out to be incorporated in each solar module or panel level.

28.8 Each PV module used in any solar power project must use a RF identification tag (RFID), which must contain the following information. The RFID can be inside or outside the module laminate but must be able to withstand harsh environmental conditions.

a. Name of the manufacturer of PV Module
b. Name of the manufacturer of Solar cells
c. Month and year of the manufacture (separately for solar cells and module)
d. Country of origin (separately for solar cell and module)
e. I-V curve for the module
f. Peak Wattage, IM, VM and FF for the module
g. Unique Serial No. and Model No. of the module
h. Date and year of obtaining IEC PV module qualification certificate
i. Name of the test lab issuing IEC certificate
j. Other relevant information on traceability of solar cells and module as per ISO 9000 series

28.9 The following details should be provided on the module

a. Name of the manufacture
b. Month and year of manufacture
c. Rated Power at STC
d. VMP, IMP, VOC, Isc

28.10 The successful bidder shall arrange an RFID reader to show the RFID details of the modules transported to sites, to the site Engineer in charge up to their satisfaction, which is mandatory for the site acceptance test.

28.11 Each PV module used in any solar power project must use a RF identification tag (RFID), which must contain the following information. The RFID can be inside or outside the module laminate but must be able to withstand harsh environmental conditions.

28.12 The PV modules must qualify (enclose Test Reports/Certificates from IEC/NABL accredited laboratory) as per relevant IEC standard. The Performance of PV Modules at STC conditions must be tested and approved by one of the IEC/NABL Accredited Testing Laboratories.

28.13 PV modules used in solar power plant/ systems must be warranted for 10 years for their material, manufacturing defects, workmanship. The output peak watt capacity which should not be less than 90% at the end of 10 years and 80% at the end of 25 years

28.14 Original Equipment Manufacturers (OEM) Warrantee of the PV Modules shall be submitted by the successful bidder when the materials delivered at site.

28.15 The PV modules shall conform to the following standards:

a. IS 14286: Crystalline silicon terrestrial photovoltaic (PV) modules — design qualification and type approval.
b. IEC 61215 / IEC 61646: c-Si (IEC 61215): Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval Thin Film (IEC 61646): Design, Qualification & Type Approval
c. IEC 61730-1: Photovoltaic Module safety qualification- Part 1: Requirements for construction
d. IEC 61730-2: Photovoltaic Module safety qualification- Part 2: Requirements for testing
e. IEC 61701: Salt mist corrosion testing of photovoltaic modules
f. IEC 62716: Test Sequences useful to determine the resistance of PV Modules to Ammonia (NH3)

28.16 The PV module should have IS14286 qualification certification for solar PV modules (Crystalline silicon terrestrial photovoltaic (PV) modules — design qualification and type approval). The exemption of this certification and other

details are described, as per MNRE's Gazette Notification No. S.O. 3449 (E). Dated 13th July, 2018.

28.17 PV Module of same Make/ Model in the same series shall be considered as a single product while making the payment as per MNRE Order No. 283/54/2018-Grid Solar (ii) Dt. 06- Feb-2020.

29. SOLAR HYBRID INVERTER

The hybrid inverter should fulfil all technical requirements for grid connection, including the option to enable/disable export to the grid. Additionally, it should provide intentional islanding capabilities and have the facility to connect to a battery bank. The Hybrid inverter shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter's safe operating range due to internal or external causes.

General Specifications:

29.1 All the Inverters should contain the following clear and indelible Marking Label & Warning Label as per IS16221 Part II, clause 5. The equipment shall, as a minimum, be permanently marked with:

a. The name or trademark of the manufacturer or supplier.
b. A model number, name or other means to identify the equipment.
c. A serial number, code or other markings allowing identification of manufacturing location and the manufacturing batch or date within a three-month time period.
d. Input voltage, type of voltage (A.C. or D.C.), frequency, and maximum continuous current for each input.
e. Output voltage, type of voltage (A.C. or D.C.), frequency, maximum continuous current, and for A.C. outputs, either the power or power factor for each output.
f. The Ingress Protection (IP) rating

29.2 The inverter output shall be 415 VAC, 50 Hz, 3 phase.

29.3 IS 16169 certificates of Islanding Prevention Measures for Utility – Interconnected Photovoltaic Inverters.

29.4 The inverter shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of inverter component failure or from parameters beyond the inverter's safe operating range due to internal or external causes.

29.5 PCU shall have the dynamic and efficient MPPT algorithm behaviour which finds maximum power point even in low light conditions. The PCU Company should be able to display this feature.

29.6 The PCU shall be supplied with in-built advanced grid feed-in feature along with dynamic feed-in control considering self-consumption. The PCU shall also include control functions for optimum feed-in of reactive power and effective power. The amount of reactive power injection and absorption can be controlled depending upon under/over excited systems.

29.7 The PCU shall have a provision of external shutdown via remote signal separately with an in-built floating-point contact or similar option using any minimum interface which is to ensure the emergency stop function in the inverter

29.8 The PCU shall have a higher degree of ingress protection of IP 65 to handle robust environment conditions from dust and water ingress under complete outdoor installations.

29.9 The data logger should possess the feature of extracting the data externally with open protocols like Modbus TCP/RTU. The manufacturer should provide the Modbus register mapping file to utilise this feature

29.10 **The inverter shall have an efficient cooling concept with better power derating feature to handle higher temperatures and ensure the best efficiency. The inverter shall be able to provide full rated output power even at ambient temperatures of 50^0C. The manufacturer to provide the power derating curves to demonstrate the same.**

29.11 The inverter shall be flexible in terms of the installation and should be capable for installation in a horizontal position facilitating easy installation for site specific requirements.

29.12 The inverter shall have an integrated feature of emergency stop to halt the inverter from operation considering safety scenarios

29.13 The PCU manufacturer should have an authorised service centre in Kerala. The details of the service centre along with the spare list must be submitted along with the bid.

29.14 **PCU should be able to respond smoothly to the voltage fluctuations on the low-tension grid via active & reactive power control/ support. The PCU should be able to respond separately to fulfil below mentioned:**

29.14.1 Finding out optimisation of the system

29.14.2 Optimal power distribution on each phase

29.14.3 Prevent PCU from unnecessary disconnections

29.15 The PCU OEM must provide 8 years warranty for the Solar inverter being used

29.16 The Technical Specification of On-Grid Inverters are summarized below:

Specifications of Inverters	
Parameters	**Detailed specification**
Nominal voltage	230V/415V
Voltage Band	Between 80% and 110% of V nominal
Nominal Frequency	50 Hz
Operating Frequency Range	47.5 to 50.5 Hz
Waveform	Sine wave
Harmonics	AC side total harmonic current distortion < 3%
Ripple	DC Voltage ripple content shall be not more than 1%
Efficiency	Efficiency shall be >98%
Casing protection levels	Degree of protection: Min IP-65
Operating ambient Temp range	-10 to + 60 degree Celsius
Operation	Completely automatic including wakeup, synchronization (phase locking) and shut down
MPPT	MPPT range must be suitable to individual array voltages
Protection Class	1

Specifications of Inverters	
Parameters	**Detailed specification**
Protections	Over voltage: both input and output Over current: both input and output Over / Under grid frequency Over temperature Short circuit Lightning Surge voltage induced at output due to external source Islanding
Ingress Protection	IP 65
Recommended LED indications	ON Grid ON Under/ Over voltage Overload Over temperature
Recommended LCD Display on front Panel	DC input voltage DC current AC Voltage (all 3 phases) AC current (all 3 phases) Frequency Ambient Temperature Instantaneous power Cumulative output energy Cumulative hours of operation Daily DC energy produced
Communication Interface	RS485/ RS232/Wi-Fi (with or without USB)

29.17 The Technical Specification for Interconnection are summarized below:

Sl No	Parameters	Requirements	Reference
1	Overall conditions of service	Reference to regulations	Conditions for Supply of Electricity
2	Overall Grid Standards	Reference to regulations	Central Electricity Authority (Grid standards) Regulations 2010
3	Equipment	Applicable industry standards	IEC/EN standards
4	Safety and Supply	Reference to regulations, (General safety requirements	Central Electricity Authority (Measures of safety and electricity

Sl No	Parameters	Requirements	Reference
			supply) Regulations, 2010 and subsequent amendments
5	Meters	Reference to regulations and additional conditions issued by the commission.	Central Electricity Authority (Installation & operation of meters) regulations 2006 and subsequent amendments
6	Harmonic current	Harmonic current injections from a generating station shall not exceed the limits specified in IEEE 519	IEEE 519 relevant CEA (Technical Standards for connectivity of the distributed generation resource) Regulations 2013 and subsequent amendments
7	Synchronization	Photovoltaic system must be equipped with a grid frequency synchronization device, if the system is using synchronizer inherently built in to the inverter, then no separate synchronizer is required	Relevant CEA (Technical Standards for Connectivity of the distributed generation resources) regulations 2013 and subsequent amendments.
8	Voltage	The voltage-operating window should minimize nuisance tripping and should be under operating range of 80% to 110% of the nominal connected voltage. beyond the clearing time of 2 seconds, the Photovoltaic system must isolate itself from the grid	
9	Flicker	Operation of Photovoltaic system should not cause voltage flicker in excess of the limits stated in IEC 61000 or other equivalent Indian standards if any	Relevant CEA regulations 2013 and subsequent if any, (Technical standards for connectivity of the distributed generation resource)
10	Frequency	When the distribution system frequency deviates outside the specified limits	

Sl No	Parameters	Requirements	Reference
		(50.5 Hz on upper side and 47.5 Hz on lower side) up to 0.2 sec, the Photovoltaic systems shall automatically disconnect from grid and be in island mode.	
11	DC injection	Photovoltaic system shall not inject DC current greater than 0.5% of full rated output at the interconnection point or 1% rated inverter output current into distribution system under any operating conditions.	
12	Power Factor	While the output of the inverter is greater than 50%, a lagging power factor greater than 0.9 shall be maintained.	
13	Islanding and Disconnection	The photovoltaic system in the event of voltage or frequency variations must island/disconnect itself with the time stipulated as per IEC standards	
14	Overload and overheat	The inverter should have the facility to automatically switch off in case of overload or overheat and should restart when normal conditions are restored	

29.18 The Certifications of Hybrid Inverters are summarized below:

Standard	Description
IS/IEC 61683: 1999	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IS/IEC 61727 : 2004 IEC 61727 : 2004	Photovoltaic (PV) systems- Characteristics of the utility interface
IS 16221: Part 1: 2016	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements

Standard	Description
IS 16221: Part 2: 2015	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IS 16169: 2019	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
IS 16782: 2018 IEC 62910: 2015	Utility - Interconnected Photovoltaic Inverters Test Procedure for Low Voltage Ride - Through Measurements
IEC/EN 61000-3-3/ 3-11/ 3-5	Electromagnetic compatibility (EMC) - Part 3-11; Limits; Limitation of Voltage Change, Voltage Fluctuations and Flicker in Public Low- Voltage Supply Systems; Rated Current <16A / >16A and <75A / >75A per Phase respectively
IEC/EN 61000-3-2/ -3-12/ -3-4	Electromagnetic compatibility (EMC) - Part 3-12; Limits; Limits for Harmonic Currents produced by equipment connected to the public low voltage systems with Rated Current <16A / >16A and <75A / >75A per Phase respectively
*IEC/EN 61000-6-1 / 6-2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for residential and commercial / industrial environments
*IEC/EN 61000-6-3 / 6-4	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for residential and commercial / industrial environments
IEC 60068-2-1	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30	Environmental testing - Part 2-30: Tests - Test Db:, Damp heat, cyclic (12 h + 12 h cycle)

***Recommended but not mandatory**

The operation of this solar system is summarized below with presenting some common scenarios: Operation of the system according to different supply scenarios

Conditions	Operations Required
• Solar available • Grid available • Battery fully charged	• Normal On-grid operation • Loads supported by solar and grid as necessary
• Solar available • Grid available • Battery not fully charged	• Normal On-grid operation • Solar used first for charging battery • Excess solar used to support loads in combination with grid
• Solar available at low capacity • Grid available	• Normal On-grid operation • Solar used for charging battery

Conditions	Operations Required
• Battery not fully charged	• Grid charges battery in combination with solar • Loads supported by grid
• Solar available at high capacity • Grid available • Battery fully charged	• Solar used for all loads • Excess solar exported to grid • Battery stored energy cannot export to the grid
• Solar available • Grid not available • Battery fully charged	• Solar used for all loads • Battery stored energy used to support load still battery gets discharged
• Solar not available • Grid available • Battery fully charged	• Grid supports loads
• Solar not available • Grid available • Battery not charged	• Grid supports loads and charges the battery to pre-designed level
• Solar not available • Grid not available • Battery charged	• Battery supports loads
• Solar not available • Grid not available • Battery not charged	• DG set may operate to support loads (DG set not included in scope of work)

30. BATTERY BANK

The battery should having capacity as motioned below at standard conditions. The battery Voltage & AH can be changed keeping the overall KWH same. The voltage selection should be close to V_{max} of combinations of modules having 72/144 cells. The configuration of battery assembly should be as per requirement of capacity.

The battery needs to have a "Battery Management Systems" BMS to ensure the proper charging and discharging of each cell of battery with temperature compensation. This battery also needs constant current and constant voltage charging methodology related to upper voltage limit of battery. BMS primary focus is therefore on the safety and the protection of the battery pack, to minimize the risk of sudden failure and to maximize the life cycle of the battery. The secondary function of the BMS is to perform battery diagnosis, such as state of charge (SOC) estimation, state of health (SOH) estimation and state of power (SOP) estimation. Hence a very good battery management system to be incorporated and got it tested with battery from MNRE/NABAL accredited

lab as per IEC/BIS standard. The BMS of the LFP battery must also communicate with PCU in some standard protocol like RS485/ 232 or CAN so that PCU can adapt to requirements of battery and extend its life. Communication between PCU and BMS and the compatibility of the two should be ensured.

a. The test certificate and reports are to be provided along with the bid.

b. **Technical Requirements**

Sl No:	Parameters	Specifications
1.	Battery:	48 / 51.2V
2.	Working Temperature Range (both for charging & discharging)	0-60 Deg C
3,	Cycle Life (Full charge to full discharge @25 deg C before capacity of battery falls below 75%)	More than 6000 cycles
4.	Depth of Discharge	minimum 90%
5.	Maximum Discharging rate	up to 1C rate of battery Capacity
6.	Maximum Charging Rate	up to 0.5 C rate of battery capacity

26.1 General Specifications:

a. Test certificate submitted should qualify the minimum requirements as per above standards for capacity test, ampere-hour efficiency test, watt-hour efficiency test, self- discharge test.

b. Battery shall have a warrantee of minimum 10-years.

c. Original Equipment Manufacturers (OEM) Warrantee of Battery shall be submitted.

26.2 STANDARDS AND CERTIFICATIONS

Batteries shall comply with the specified edition of the following standards and codes.

Standard	Description
IEC 61427	IEC 61427 - This series gives general information relating to the requirements for the secondary batteries used in photovoltaic energy systems (PVES) and to the typical methods of test used for the verification of battery performances.
IS 16270: 2023	Secondary cells and batteries for solar photovoltaic application - General requirements and methods of test.

31. ARRAY SUPPORT STRUCTURE

a. Photovoltaic arrays must be mounted on a stable, durable structure that can support the array and withstand wind, rain, and other adverse conditions. The modules will be fixed on structures with fixed arrangement.

b. The module mounting structures shall have adequate strength and appropriate design suitable to the locations, which can withstand the load and high wind velocities. Stationary structures shall support PV modules at a given orientation, absorb and transfer the mechanical loads to the surface properly.

c. Wherever required, suitable number of PV panel structures shall be provided. Structures shall be of flat-plate design using minimum size of C (75 x 40 x 5mm) or L (55 x 55 x 5mm) or I (60x 40x 4mm) sections or higher dimensions for respective sections.

d. Each structure with fixed tilt should have a tilt angle as per the site conditions to take maximum insolation which will be approximately equal to the latitude of the location facing true South with a North - South orientation. The tilt angle can vary from 9 degree to 12 degree based on the location's latitude in Kerala

e. The PV module mounting structure shall have a capacity to withstand a wind velocity of 150 km/hr unless specified for dedicated requirements

f. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The PV array structure design shall be appropriate with a factor of safety of min 1.5.

g. The upper edge of the module must be covered with wind shield so as to avoid build air ingress below the module. Slight clearance must be provided on both edges (upper & lower) to allow air for cooling.

h. The materials used for structures shall be Hot dip Galvanized Mild Steel conformed to IS 2062:1992 or aluminium of suitable grade minimum alloy 6063 or better.

i. The minimum thickness of galvanization for hot dip Galvanized Mild Steel should be at least 80 microns as per IS 4759. The galvanisation thickness will be checked during inspection and the vendor is to arrange the equipment needed for the same at the site.

j. The Bolts, Nuts, fasteners, and clamps used for panel mounting shall be of Stainless-Steel SS 304.

k. Structures shall be supplied complete with all members to be compatible for allowing easy installation at the site. Additional Structures/Frames for required for the installation of modules if any need to be provided by the bidder.

l. The structures shall be designed to allow easy replacement of any module, repairing and cleaning of any module. No Welding is allowed on the mounting structure. Adequate spacing shall be provided between two panel frames and rows of panels to facilitate personnel protection, ease of installation, replacement, cleaning of panels and electrical maintenance

m. Aluminium structures used shall be protected against rusting either by coating or anodization. Aluminium frames should be avoided for installations in coastal areas.

n. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years. And shall be free from corrosion while installation.

o. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frames

p. The total load of the structure (when installed with PV modules) on the roof should be less than 60 kg/m^2.

q. Minimum distance between the lower level of PV Module and the ground shall be 0.6m from the ground level.

r. The PV Panel area shall be accessible for cleaning and for any repair work.

s. Sufficient gap needs to be provided between the rows to avoid falling of shadow of one row on the next row. Seismic factors for the site will be considered while making the design of the foundation.

t. Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance.

u. Installation of structure for solar PV mounting should not tamper with the water proofing of the roofs.

34.1 The Rooftop Structures maybe classified in three broad categories as follows. The bidders are required to quote the rates for each separately in the financial bid:

i. Ballast structure

a. The mounting structure must be Non-invasive ballast type and any sort of penetration of roof to be avoided.

b. The minimum clearance of the structure from the roof level should be in between 70-150 mm to allow ventilation for cooling, also ease of cleaning and maintenance of panels as well as cleaning of terrace.
c. The structures should be suitably loaded with reinforced concrete blocks of appropriate weight made out of M25 concrete mixture.

ii. Tin shed

a. The structure design should be as per the slope of the tin shed.
b. The inclination angle of structure can be done in two ways

b.1. Parallel to the tin shed (flat keeping zero-degree tiling angle), if the slope of shed in Proper south direction

b.2. With same tilt angle based on the slope of tin shed to get the maximum output.

c. The minimum clearance of the lowest point from the tin shade should be more then 100mm.
d. The base of structure should be connected on the Purlin of tin shed with the proper riveting. e. All structure member should be of minimum 2 mm thickness.

iii. RCC Elevated structure: It can be divided into further three categories:

A. Minimum Ground clearance (300MM – 1000 MM)

a. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirement. The gap between modules should be minimum 30MM.
b. Base Plate – Base plate thickness of the Structure should be 5MM for this segment.
c. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
d. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web site (y-axis) and 40MM in flange side (x-axis).
e. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.

f. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

g. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

h. For single portrait structure the minimum ground clearance should be 500MM.

B. Medium Ground clearance (1000MM – 2000 MM)

a. Base Plate – Base plate thickness of the Structure should be Minimum 6MM for this segment.

b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in C-Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.

f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

C. Maximum Ground clearance (2000MM – 3000 MM)

a. Base Plate – Base plate thickness of the Structure should be minimum 8 MM for this segment.

b. Column – Structure Column thickness should be minimum 2.6MM in square hollow section (minimum 50x50) or rectangular hollow section (minimum 60x40) or 3MM in C-Channel section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 80MM in Web side and 50MM in flange side in Lip section.
e. Front/back bracing – The section for bracing part should be minimum 3MM thickness.
f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

D. Super elevated structure (More than 3000 MM)

i. Base structure

b. Base Plate – Base plate thickness of the Structure should be 10MM for this segment.
c. Column – Structure Column minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40).
d. Rafter - Structure Rafter minimum thickness should be minimum 2.9MM in square hollow section (minimum 60x60) or rectangular hollow section (minimum 80x40)
e. Cross bracing – Bracing for the connection of rafter and column should be of minimum thickness of 4mm L-angle with the help of minimum bolt diameter of 10mm.

ii. Upper structure of super elevated structure

a. Base Plate – Base plate thickness of the Structure should be minimum 5MM for this segment.
b. Column – Structure Column should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.

c. Rafter - Structure rafter should be minimum 2MM in Lip section / 3MM in Channel section. The minimum section should be 70MM in Web side and 40MM in flange side in Lip section.
d. Purlin - Structure purlin should be minimum 2MM in Lip section. The minimum section should be 60MM in Web side and 40MM in flange side in Lip section.
e. Front/back bracing – The section for bracing part should be minimum 2MM thickness.
f. Connection – The structure connection should be bolted completely. Leg to rafter should be connected with minimum 12 diameter bolt. Rafter and purlin should be connected with minimum 10 diameter bolt. Module mounting fasteners should be SS-304 only and remaining fasteners either SS-304 or HDG 8.8 Grade.

iii. If distance between two legs in X-Direction is more than 3M than sag angle/Bar should be provide for purlin to avoid deflection failure. The sag angle should be minimum 2MM thick, and bar should be minimum 12Dia.
iv. Degree - The Module alignment and tilt angle shell be calculated to provide the maximum annual energy output. This shall be decided on the location of array installation.
v. Foundation – Foundation should be as per the roof condition; two types of the foundation can be done- either penetrating the roof or without penetrating the roof.
   a) If penetration on the roof is allowed (based on the client requirement) then minimum 12MM diameter anchor fasteners with minimum length 100MM can be used with proper chipping. The minimum RCC size should be 400x400x300 cubic mm. Material grade of foundation should be minimum M20.
   b) If penetration on roof is not allowed, then foundation can be done with the help of 'J Bolt' (refer IS 5624 for foundation hardware). Proper Neto bond solution should be used to adhere the Foundation block with the RCC roof. Foundation J - bolt length should be minimum 12MM diameter and length should be minimum 300MM.

i. Material standards:

a. Design of foundation for mounting the structure should be as per defined standards which clearly states the Load Bearing Capacity & other relevant parameters for foundation design (As per IS 6403 / 456 / 4091 / 875).
b. Grade of raw material to be used for mounting the structures so that it complies the defined wind loading conditions (As per IS 875 - III) should be referred as follows (IS 2062 – for angles and channels, IS 1079 – for sheet, IS 1161 & 1239 for round pipes, IS 4923 for rectangular and square hollow section)
c. Test reports for the raw material should be as per IS 1852 / 808 / 2062 / 1079 / 811.
d. In process inspection report as per approved drawing & tolerance should be as per IS 7215.
e. For ascertaining proper welding of structure part following should be referred:
f. D.P. Test (Pin Hole / Crack) (IS 822)
g. Weld wire grade should be of grade (ER 70 S - 6)
h. For ascertaining hot dip galvanizing of fabricated structure following should be referred:
i. Min coating required should be as per IS 4759 & EN 1461.
j. Testing of galvanized material
    - Pierce Test (IS 2633)
    - Mass of Zinc (IS 6745)
    - Adhesion Test (IS 2629)
    - CuSO4 Test (IS 2633)
    - Superior High-Grade Zinc Ingot should be of 99.999% purity (IS 209) (Preferably Hindustan Zinc Limited or Equivalent).

Foundation Hardware – If using foundation bolt in foundation then it should be as per IS 5624.

32. REMOTE MONITORING SYSTEM

A dedicated Remote Monitoring System (Hardware and software) for monitoring the plant shall be provided. It is recommended that the following important parameters shall be accessible through the Data Logging Facility.

a) AC Voltage
b) AC Output current
c) Output Power
d) Energy in kWh
e) DC Input Voltage
f) DC Input Current
g) Temperatures (C)
h) Inverter Status

Provision for Internet monitoring and download of historical data shall be incorporated. GSM based connectivity is to be ensured at all sites and only M2M sim cards to be used to ensure data security. This data is to be transmitted to ANERT server and the successful bidder must undertake all the works required for such deployment including software and arrange for APIs etc. The cost for data connectivity for the period of warranty must be borne by the bidder and shall be included in the bid.

33. ELECTRICAL SAFETY AND FIRE PROTECTION

a. All SPV system should comply with Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2023 and amendments thereto.
b. Internal Faults: In built protection for internal faults including excess temperature, commutation failure, overload, and cooling fan failure (if fitted) is obligatory.
c. Over Voltage Protection: Over Voltage Protection against atmospheric lightning discharge to the PV array is required. Protection is to be provided against voltage fluctuations in the grid itself and internal faults in the power conditioner, operational errors and switching transients.
d. Earth fault supervision: An integrated earth fault device shall have to be provided to detect eventual earth fault on DC side and shall send message to the supervisory system.
e. Every combiner box shall be provided with suitable surge protective device with arc extinguishing capability as per the relevant standards to avoid any risk of fire. The input circuits of combiner box shall be provided with over current protection as per the relevant standards.

f. The output circuits of combiner box shall be provided with isolation protection; Earth Fault protection and insulation monitoring for photovoltaic arrays and inverters shall be provided.

g. A fire detection system and automatic fire suppression system shall comply with the relevant standards.

h. Adequate fire-fighting equipment per site must be provided by the successful bidder at the sites of installation. The fire extinguishers shall be provided in the control room housing inverters as well as on the Roof or site where the PV arrays have been installed. One liquefied CO2/ABC fire extinguisher upright type of capacity min 8 kg having IS: 2171 -7, IS: 10658. A minimum of Two Fire extinguishers to be provided for installation capacity upto 30 kW, and additional fire extinguisher per 15 kW or part thereof to be provided by the successful bidder.

i. There shall be a manual disconnection switch to isolate the system from grid and shall be situated outside the alternating current combiner box; and protection shall be deployed (for both input and output) on site for overload, surge current, surge voltage, short circuit, high temperature, over voltage, under voltage and over frequency, under frequency, reverse polarity and lightning.

34. CABLING PRACTICE

Cable Cabling is required for wiring from AC output of inverter/PCU to the Grid Interconnection point. It includes the DC cabling from Solar Array to AJB and from AJB to inverter input.

34.1 All cables of appropriate size to be used in the system shall have the following characteristic:

a. Shall conform to IEC 60227 / IS 694 & IEC 60502 / IS 1554 standards.
b. Temperature Range: -10 degree Celsius to +80 degree Celsius
c. Voltage rating: 660/1000V
d. Excellent resistance to heat, cold, water, oil, abrasion, UV radiation
e. Flexible

34.2 Sizes of cables between any array interconnections, array to junction boxes, junction boxes to inverter etc. shall be so selected to keep the voltage drop (power loss) of the entire solar system to the minimum (2%).

34.3 For the DC cabling, XLPE or XLPO insulated and sheathed, UV stabilized single core flexible copper cables shall be used; multi-core cables shall not be used. The Connectors being used must comply - IS 16781: 2018 | IEC 62852: 2014 – Connectors for DC Application in Photovoltaic Systems Safety Requirements and Tests.

34.4 For the AC cabling, PVC or XLPE insulated and PVC sheathed single or, multi-core flexible copper cables shall be used. However, for above 10kWp systems, XLPE insulated Aluminium cable of suitable area of cross section can be used in the AC side subject to a minimum area of cross section of 10 sq.mm. Outdoor AC cables shall have a UV -stabilized outer sheath IS/IEC 69947.

34.5 All LT XLPE cables shall conform to IS: 7098 part I&II.

34.6 The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%

34.7 The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%

34.8 The electric cables for DC systems for rated voltage of 1500 V shall conform to BIS 17293:2020

34.9 The DC cables from the SPV module array shall run through a UV-stabilized RPVC conduit pipe / HDPE Double Wall Corrugated (DWC) conduits of adequate diameter with a minimum wall thickness of 1.5mmand suitably tagged and marked with proper manner by good quality ferule or by other means so that the cable is easily identified.

34.10 Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers.

34.11 All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50cm; the minimum DC cables size shall be 4.0mm2 copper; the minimum AC cable size shall be 4.0mm2 copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires. Conduits for taking outdoor cables shall be UV treated.

34.12 Cable Marking: All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified. The following colour code shall be used for cable wires

a. DC positive: red (the outer PVC sheath can be black with a red line marking
b. DC negative: black
c. AC single phase: Phase: red; Neutral: black
d. AC three phase: phases: red, yellow, blue; neutral: black
e. Earth wires: green

34.13 Cables and conduits that have to pass through walls or ceilings shall be taken through PVC pipe sleeve.

34.14 Cable conductors shall be terminated with tinned copper end ferrules to prevent fraying and breaking of individual wire strands. The termination of the DC and AC cables at the Solar Grid Inverter shall be done as per instructions of the manufacturer, which in most cases will include the use of special connectors.

34.15 All cables and connectors used for installation of solar field must be of solar grade which can withstand harsh environment conditions including high temperatures, UV radiation, rain, humidity, dirt, salt, burial and attack by moss and microbes for 25 years and voltages as per latest IEC standards. DC cables used from solar modules to array junction box shall solar grade copper (Cu) with XLPO insulation and rated for 1.1 kV as per relevant standards only.

34.16 Bending radii for cables shall be as per manufactures recommendations and IS: 1255.

34.17 For laying/termination of cables latest BIS/IEC Codes/ standards shall be followed.

34.18 The Size of neutral wire shall be equal to the size of phase wires, in a three-phase system.

34.19 The Cable should be so selected that it should be compatible up to the life of the solar PV panels i.e. 25 years.

35. FACTORY TESTING

a. PCU shall be tested prior to shipment and factory test certificate for relevant parameters should be provided with the PCU supplied. ANERT or authorised representative of ANERT may be allowed to witness the tests if required.

b. Factory testing shall not only be limited to measurement of phase currents, efficiencies, harmonic content and power factor, but shall also include all other necessary tests/simulation required and requested by the Purchasers

Engineers. Tests may be performed at 25, 50, 75 and 100 percent of the rated nominal power.

36. SURGE PROTECTION

The system should have installed with Surge Protection Device (SPD) for higher withstand of the continuous PV-DC voltage during earth fault condition. SPD shall have safe disconnection and short circuit interruption arrangements through integrated DC in-built bypass fuse (parallel) which should get tripped driving failure mode of MOV, extinguishing DC arc safely to protect the installation against fire hazards. The SPD should be provided in the AC Distribution Box as well. Type 2 SPD having maximum Discharge Current (8/20 μs) of value 40 kA with a minimum response time less than 25ns.

37. EARTHING

The Solar PV Plant should have a dedicated earthing system. The Earthing for array and LT power shall be made as per the provisions of **IS: 3043-2018** "Code of practice for earthing (Second Revision)," that governs the earthing practices of a PV system and **IS 732:2019** "Code of practice for electrical wiring installations (Fourth Revision)

37.1 Earthing System shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and PV module mounting structures in one long run. The earth strips should not be bolted. Earthing GI strips shall be interconnected by proper welding. Exothermic / Aluminothermic welding are only allowed for jointing earth electrode.

37.2 The earthing conductor should be rated for 1.56 times the maximum short circuit current of the PV array. The factor 1.56 considers 25 percent as a safety factor and 25 percent as albedo factor to protect from any unaccounted external reflection onto the PV modules increasing its current

37.3 In any case, the cross-section area or the earthing conductor for PV equipment should not be less than 6 mm^2 if copper, 10 mm^2 if aluminium or 70 mm^2 if hot-dipped galvanized iron. For the earthing of lightning arrestor, cross-section of the earthing conductor should not be less than 16 mm^2 of copper or 70 mm^2 if hot-dipped galvanized iron. Copper bonded Earth electrodes of minimum

thickness of 250 microns and diameter of 14.2mm and length of 3m must be used incompliance with the National Building Code of India 2016. The complete Earthing system shall be mechanically & electrically connected to provide independent return to earth.

37.4 Masonry enclosure with the earth pit of size not less than 400mm X 400 mm (depth) complete with cemented brick work (1:6) of minimum 150mm width duly plastered with cement mortar (inside) shall be provided. In case FRP based Earth chambers are used, the same must be certified by NABL accredited laboratory for Compression Test/Weight Holding Capacity. Hinged inspection covers of size not less than 300mm X 300mm with locking arrangement shall be provided. Suitable handle shall be provided on the cover by means of welding a rod on top of the cover for future maintenance.

37.5 Minimum required gap shall be provided in between earth pits as per relevant standard. Body earthing shall be provided in inverter, each panel frame, module mounting structure, kiosk and in any other item as required.

37.6 Earth pit shall be constructed as per IS: 3043-2018. Electrodes shall be embedded below permanent moisture level. Earth pits shall be treated with salt and charcoal if average resistance of soil is more than 20-ohm meter. The use of Earth enhancing compounds of adequate quantity is to be used in case the earth value is high in compliance with IEC 62561-7:2011

37.7 There shall be adequate number of interconnected earth pits provided in each location and minimum required gap shall be provided in between earth pits as per relevant standard. The interconnection is to be done using Copper conductors of minimum 25 mm x 3 mm or HDGI conductor of minimum 25mm x 6mm.

37.8 Earth resistance shall not be more than 5 ohms. Earthing system must be interconnected through GI strip to arrive equipotential bonding. The size of the HDGI earth strip must be minimum 25mm X 6mm and the coating thickness of minimum 80 microns is to be maintained.

37.9 In compliance to Rule 11& 61 Of Indian Electricity Rules,1956 (as amended up to date), all non-current carrying metal parts shall be Earthing with two separate and distinct earth continuity conductors to an efficient earth electrode.

37.10 The equipment grounding wire shall be connected to earth strip by proper fixing arrangement. Each strip shall be continued up to at least 500mm from the equipment.

37.11 Necessary provisions shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.

37.12 The frame of inverter cabinet shall be connected with the earthing bus bar through the earthing terminals using flexible braided copper wire; all metal casing and shielding of the plant, each array structure of the photovoltaic yard, equipment, inverters and control systems shall be earthed through proper earthing.

37.13 Earthing system shall connect all non-current carrying metal receptacles, electrical boxes, appliance frames, chassis and photovoltaic module mounting structures in one long run and the earth strips shall be interconnected by proper welding and shall not be bolted;

37.14 There shall be adequate number of interconnected earth pits provided in each location and minimum required gap shall be provided in between earth pits as per relevant standard.

37.15 For each earth pit, a necessary test point shall be provided.

37.16 Total no of Earth pits required for solar plants shall be as per the Electrical Inspectorate norms.

38. LIGHTNING PROTECTION FOR PV ARRAY

The SPV power plant should be provided with lightning and over voltage protection. The source of over voltage can be lightning or other atmospheric disturbance. The lightning conductors shall be made as per applicable Indian Standards in order to protect the entire array yard from lightning stroke.

The design and specification shall conform to IS/IEC 62305, "Protection against lightning" govern all lightning protection-related practices of a PV system.

- The entire space occupying SPV array shall be suitably protected against lightning by deploying required number of lightning arresters. Lightning protection should be provided as per IS/ IEC 62305.
- Lightning system shall comprise of air terminations, down conductors, test links, earth electrode etc. as per approved drawings.

- The protection against induced high voltages shall be provided by the use of surge protection devices (SPDs) and the earthing terminal of the SPD shall be connected to the earth through the earthing system.
- Separate pipe for running earth wires of Lightning Arrestor shall be used.
- Lightening conductor should be made of 25 mm dia 4000mm long GI spike as per Provision of IS 2309-1969. Necessary concrete foundation to be provided for holding Lightening conductor considering the wind speed. It should be earthed through 25 x 3 GI flat from pit with proper insulation. Height of Lightening conductor from array structure should be min 4 meter.
- The Vendor / Company shall submit the drawings and detailed specifications of the PV array lightning protection equipment to Employer for approval before installation of system.

39. AC DISTRIBUTION PANEL BOARD

a. AC Distribution Board (ACDB) shall control the AC power from inverter and should have necessary surge arrestors.
b. An ACDB panel shall be provided in between PCU and Utility grid. It shall have MCB/MCCB/ACB or circuit breaker of suitable rating for connection and disconnection of PCU from grid.
c. The connection between ACDB and Utility grid shall be of standard cable/ Conductor with suitable termination. It shall have provision to measure grid voltage, current and power.
d. The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.
e. The incomer shall be selected at required rating. The ACDB enclosure shall be of good protection and suitable for mounting on the trenches / on wall.
f. All the 415 V AC or 230 V AC devices/equipment like bus support insulators, circuit breakers, SFU isolators (if applicable), SPD, etc. mounted inside the switch gear shall be suitable for continuous operation.
g. Switches/ circuit breakers/ connectors meeting general requirements and safety measurements as per IS 60947 Part I, II, III and IEC 60947 part I, II and III.
h. Junction boxes, enclosures, panels for inverters/ Controllers shall meet IP 65 (for indoor) as per IEC 529. The use of PVC enclosures is not permitted.

i. All combiner boxes shall be provided with suitable surge protective device with arc extinguishing capability as per the relevant standards to avoid any risk of fire.

j. The inverter output shall have the necessary rated AC surge arrestors, if required and MCB/ MCCB. RCCB shall be used for successful operation of the PV system, if inverter does not have required earth fault/residual current protection.

k. Disconnection switches or circuit breakers provided in combiner boxes to disconnect the photovoltaic system from all other conductors of the system shall be located at a readily accessible location.

40. DC DISTRIBUTION BOARD

a. DC bus/ cable which can handle the current and the voltage of inverter output safely with necessary surge arrester as per the relevant IS standards. A separate DCDB with standard protection equipment must be provided for Battery bank also.

b. Polyamide glands and MC4 Connectors may also be provided. The rating of the junction box shall be suitable with adequate safety factor to interconnect the Solar PV array

c. DC panel should be equipped with an adequate capacity indoor DC circuit breaker along with control circuit, protection relays, fuses, annunciations and remote operating and controlling facility from the main control facility.

d. DCDB shall have sheet from enclosure of dust and vermin proof, the busbar/ cables are to be made of copper of desired size. DCDB shall be fabricated to comply with IP 65 protection. The PVC enclosures are not permitted.

e. All combiner box shall be provided with suitable surge protective device with arc extinguishing capability as per the relevant standards to avoid any risk of fire

41. CABLES, SWITCHES AND GENERAL REQUIREMENTS

a. PVC insulated copper cables with current rating suitable for AC and DC as per the National Electric Code, and meeting:

   i. General Test and Measuring Method as per IEC 60189/ IS 694

   ii. PVC insulated cables for working voltages up to 1100 V and UV resistant for outdoor installation as per IEC 60502/ IS 1554 (Pt. I & II)

b. Cable Marking: All cable/wires are to be marked in proper manner by good quality ferule or by other means so that the cable can be easily identified.
c. Switches/ circuit breakers/ connectors meeting general requirements and safety measurements as per IS 60947 Part I, II, III and EN 50521 for AC/DC.
d. Armoured cable should be used and overall PVC type 'A' pressure extruded insulation or XLPE insulation should be there for UV protection.
e. Cables should have Multi Strand, annealed high conductivity copper conductor on DC side and copper/FRLS type Aluminium conductor on AC side. For DC cabling, multi- core cables shall not be used. Size of neutral wire shall be equal to the size of phase wires, in a three-phase system.
f. Disconnection switches or circuit breakers provided in combiner boxes to disconnect the photovoltaic system from all other conductors of the system shall be located at a readily accessible location.
g. Clear pathways of minimum seventy five centimetre in width with hand rails for roof access and emergency exit shall be provided for roof top system. There shall be clear pathways, walkways between the rows or columns of solar panels which is necessary for cleaning and maintenance.
h. All indoor panels will have protection of IP 54 or better, as per site conditions. All outdoor panels will have protection of IP 65 or better, as per site conditions.

42. AC/DC WIRING

Before submitting the tender, actual measurement of cables required for wiring from AC output of inverter/PCU to load point should be calculated and this work is also included in the tender. The actual cable required from module to DC distribution board and DC distribution board to inverter input should be calculated and this work should be done as a part of Solar Power Plant installation. Separate drawings for exclusively for the AC/DC Wiring should be provided.

43. CIVIL WORKS

While installing solar power pants on rooftops, the physical condition of the rooftop, chances of shading, chances water level rise in the rooftop during raining due improper drainage in the roof-top should be taken in to consideration.

a. PV array shall be installed in the terrace space free from any obstruction and/or

shadow and to minimize effects of shadows due to adjacent PV panel rows.

b. PV array shall be oriented in the south direction in order to maximize annual energy yield of the plant.
c. The solar PV array must be installed on the rooftop in such a way that there is sufficient space on the rooftop for maintenance etc.
d. There should not be any damage what so ever to the rooftop due to setting up of the solar power plant so that on a later day there is leakage of rainwater, etc. from the rooftop.
e. Some civil works are inevitable for erecting the footings for the module mounting structure as discussed in Module Mounting Structure section. The roof top may be given a suitable grading plaster with suitable leak proof compound so as to render the roof entirely leak proof.
f. Ample clearance shall be provided in the layout of the inverter and DC/AC distribution boxes for adequate cooling and ease of maintenance.
g. While cabling the array, care must be taken such that no loose cables lie on the rooftops.
h. The roof top should look clean and tidy after installation of the array.
i. Neatness, tidiness and aesthetics must be observed while installing the systems.
j. RCC Works - All RCC works shall be as per IS 456 and the materials used viz. Cement reinforcement, steel etc. shall be as per relevant IS standards. Reinforcement shall be high strength TMT Fe 415 or Fe 500 conforming to IS: 1786-1985.
k. Brick Works (If any) - All brick works shall be using 1st class bricks of approved quality as per IS 3102.
l. Plastering - Plastering in cement mortar 1:5, 1:6 and 1:3 shall be applied to all.
m. Display of mandatory items- Single Line Diagram and layout diagram of modules and interconnection at installation site shall be provided near the inverter.
n. For painting on concrete, masonry and plastered surface IS: 2395 shall be followed. For distempering IS 427 shall be followed referred. For synthetic enamel painting IS 428 shall be followed. For cement painting IS 5410 shall be followed.
o. All Civil works required for the installation of the PV Plant and other civil and electrical work in evacuation infrastructure, wherever necessary, shall be within

the scope of the bidder

p. The layout of Inverter accommodation shall be designed to enable adequate heat dissipation and availability. Mount within the existing infrastructure available in consultation with the Site in charge. String Inverters may be installed with Canopy type structure over it to protect it from frequent monsoon and weather changes.

44. NET METERING AND UTILITY INTERCONNECTION

a. Net metering equipment (an Import-Export Energy Meter) approved and tested by the electrical utility based on the accuracy class required for the proposed capacity of the system must be provided with the necessary data cables if required.

b. Net Metering and Utility Interconnection should be accomplished according the Kerala State Electricity Regulatory Commission (Renewable Energy & Net Metering) Regulations, 2020 and amendments thereto.

45. INTER CONNECTION OF INVERTER OUTPUT WITH UTILITY GRID

a. The interconnection of load with inverter output should be done after obtaining permission from Electrical Inspectorate and Electrical Utility.

b. The plan scheme and drawing related to interconnection details should be submitted to Electrical Inspectorate through a licensed Electrical contractor with the guidance appropriate Engineering Authority.

c. Licensed contractor has to be engaged for preparation of plan scheme to be submitted to the Kerala State Electricity Licensing Board and necessary fee should be remitted for energisation of Solar Power Plant.

d. The panel board and distribution board required for AC interconnection should be done as per specification/ instruction given appropriate Engineering Authority.

e. All the electrical works required for the interconnection of load with inverter output should be done by the successful bidder as a part of the Solar Power Plant installation.

f. Bidder should visit the actual site and ensure the exact place for providing Solar Modules and Inverter etc. in presence of technical representative from the ANERT.

g. Net Metering Equipment shall be installed and maintained in accordance with the provisions of The Central Electricity Authority (Installation and Operation of Meters) Regulations, 2006 as amended from time to time. The Contractor shall maintain the Metering System as per metering code and CEA guidelines. The defective meter shall be immediately tested and calibrated.

h. The accuracy class of the Net Metering Equipment will be selected so that all levels of energy produced or taken by the Solar Power Plant will be measured accurately, and this equipment has applicable accuracy class.

i. Net Metering Equipment shall be microprocessor-based conforming to the relevant IEC standards with Advanced Metering Infrastructure (AMI) with RS232 cable facility.

j. Net Metering Equipment shall measure active energy (both import and export) and reactive energy (import) by 3 ph, 4 wire principle suitable for balanced / un-balanced 3 phase load (With KVAr, KWh, KVA measuring registers). Tri-vector based energy meter shall have an accuracy class of energy measurement of at least Class 0.2 for active energy and at least 0.5 Class for reactive energy according to IEC 60687.

k. Display parameters: LCD test, KWH import, KWH export, MD in KW export, MD in KW import, Date & Time, AC current and voltages and power factor (Cumulative KWH will be indicated continuously by default)

46. PERMISSION FROM KSEBL& ELECTRICAL INSPECTORATE BY BIDDER

a. The procedures for Grid Connectivity of the PV Plants for capacities from 1kWp to 1MWp are governed by the KSEBL Circular No. CE (REES)/Escot/AEE6/Solar-General/16-17/766(1) Dt. 09-09-2016 and its Amendments.

b. The beneficiary/ANERT will obtain a feasibility certificate by submitting an application form along with the documents and a fee of Rs 1000/- as per the Annexure-I form of KSEBL.

c. After submitting all the documents and clarification required by KSEBL, the vendors will pay a Registration fee of Rs 1000/- per kW to KSEBL (Eg: If the plant

size is 3.65kW then it will be considered as 4kW and the applicant has to pay a sum of Rs 4000/-) to acquire a SPIN (Solar Plant Identification Number). For example, 5501-00001 where 5501 is the section office code for the locality and 00001 is the solar plant number.

d. Request for the cancellation of Registration by the applicant will be verified by the Assistant Engineer, KSEBL and a decision will be taken on this by division Executive Engineer, KSEBL and 80% of the amount shall be reimbursed based upon the recommendation of Assistant Engineer.

e. The application for testing of the installed PV power plant has to be submitted at the Electrical Section office by the contractor. For plant capacities above 10kWp the application must be submitted along with Energization Certificate from Electrical Inspectorate and for the plant capacities below 10kWp the application must be submitted along with a Completion Report of a Certified Electrical Contractor. The minimum qualification for carrying out the installation work of a PV Plant shall be a B-Class contractor licensee and depending upon the capacity of installation, eligible contractors can carry out the work. (Circular no. B2-13958/2017/CEI Dtd 24.07.2018.)

f. The officials from Electrical Inspectorate and KSEBL will visit the site with prior notice to the beneficiary.

g. Tests shall be conducted as per system capacity norms issued by KSEBL/Electrical Inspectorate.

h. Test Certificate for Solar Plant Installation as per annexure 9 of KSEBL order will be issued by the Assistant Engineer, once the PV plants is successfully performing as per the standards.

i. Agreement for Connecting Solar Energy System as per Annexure 10 of KSEBL order shall be signed between KSEBL and the applicant as per the Annexure 11 (KSEBL Order) in which the capacity of the net meter should be mentioned. The contractor is required to undertake all the liaison work required for the same.

j. The import and export will be calculated based upon the Net meter installed at the site of the consumer for which the reading will be taken on every month from the Net meter and Solar meter.

k. The panel board and distribution board required for AC interconnection should be done as per specification/instruction given by PWD Electrical wing/Electrical Inspectorate Authorities /A. E, L.S.G.D. /appropriate Engineering Authorities.

47. WARRANTY

a. 5 years' warranty should be provided by the supplier for the system and components, or part of the system has to be provided as per the special conditions of the contract.

b. PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90 % at the end of 10 years and 80% at the end of 25 years

c. The Warranty Card to be supplied with the system must contain the details of the all the components supplied including serial numbers accompanied with the OEM warranty card

48. OPERATION AND MAINTENANCE

47.1 For the optimal operation of a PV plant, maintenance must be carried out on a regular basis. All the components should be kept clean. It should be ensured that all the components are fastened well at their due place.

47.2 The service personnel should visit the installations at least once in 3 months for preventive maintenance even if no faults are reported. **Reports of these preventive maintenance visits and generation data should be submitted to the concerned ANERT District Offices on a quarterly basis**.

47.3 Maintenance guidelines for various components viz. solar panels, inverter, wiring etc. are discussed below:

47.3.1 SOLAR PV PANELS

Although the cleaning frequency for the panels will vary from site to site depending on soiling, it is recommended that

a) The panels are cleaned at least once every thirty days.

b) Use water and a soft sponge or cloth for cleaning.

c) Do not use detergent or any abrasive material for panel cleaning.

d) Iso-propyl alcohol may be used to remove oil or grease stains.

e) Do not spray water on the panel if the panel glass is cracked or the back side is perforated.
f) Wipe water from module as soon as possible.
g) Use proper safety belts while cleaning modules at inclined roofs etc.
h) The modules should not be cleaned when they are excessively hot. Early morning is particularly good time for module cleaning.
i) Check if there are any shade problems due to vegetation or new building. If there are, make arrangements for removing the vegetation or moving the panels to a shade-free place.
j) Ensure that the module terminal connections are not exposed while cleaning; this poses a risk of electric shock.
k) Never use panels for any unintended use, e. g. drying clothes, chips etc.⎜Ensure that monkeys or other animals do not damage the panels.

47.3.2 CABLES AND CONNECTION BOXES

a) Check the connections for corrosion and tightness.
b) Check the connection box to make sure that the wires are tight, and the water seals are not damaged.
c) There should be no vermin inside the box.
d) Check the cable insulating sheath for cracks, breaks or burns. If the insulation is damaged, replace the wire.
e) If the wire is outside the building, use wire with weather-resistant insulation.
f) Make sure that the wire is clamped properly and that it should not rub against any sharp edges or corners.
g) If some wire needs to be changed, make sure it is of proper rating and type.

47.3.3 INVERTER

a) The inverter should be installed in a clean, dry, and ventilated area.
b) Remove any excess dust in heat sinks and ventilations. This should only be done with a dry cloth or brush.
c) Check that vermin have not infested the inverter. Typical signs of this include spider webs on ventilation grills or wasps' nests in heat sinks.

d) Check functionality, e.g., automatic disconnection upon loss of grid power supply, at least once a month.

e) Verify the state of DC/AC surge arrestors, cable connections, and circuit breakers.

47.4 Inspection and Maintenance Schedule

Component	Activity	Description
PV Module	Cleaning	• Clean PV modules with plain water or mild dishwashing detergent. • Do not use brushes, any types of solvents, abrasives, or harsh detergents.
PV Array	Inspection	• Check the PV modules and rack for any damage. • Note down location and serial number of damaged modules.
	Inspection	• Determine if any new objects, such as vegetation growth, are causing shading of the array and move them if possible.
	Vermin Removal	• Remove bird nests or vermin from array and rack area.
Junction Boxes	Inspection	• Inspect electrical boxes for corrosion or intrusion of water or insects. Seal boxes if required. • Check position of switches and breakers. • Check operation of all protection devices.
Wiring	Inspection	• Inspect cabling for signs of cracks, defects; lose connections, overheating, arcing, short or open circuits, and ground faults.
Inverter	Inspection Service	• Observe instantaneous operational indicators on the faceplate of the inverter to ensure that the amount of power being generated is typical of the conditions. • Inspect Inverter housing or shelter for physical maintenance, if required.
Plant	Monitoring	• Operation and Performance Monitoring
Spare Parts	Management	• Manage inventory of spare parts.

47.5 The faulty system or components should be replaced/ repaired within 7 days of fault reporting. The servicing should be carried out at the site of

installation. If any of the components are to be taken out from the site for repair, a standby must be provided to ensure un-interrupted power generation and the systems functions smoothly.

47.6 Any Delay in servicing beyond 7 days of fault reporting would attract penalty at the rate of at the rate fixed by CEO, ANERT and further actions will be initiated against the agency.

47.7 A designated contact Telephone Number and address should be submitted for reporting faults during the O&M period of 10 years.

49. PERFORMANCE RATIO TEST (PR TEST)

The Plant should run minimum two weeks without any major equipment failure to start the PR test. The EPC Contractor shall submit two copies of O&M manual with soft copy before the start of PR Test. Depending on the requirement, capacity and suitable Pyranometer shall be installed at locations suggested by ANERT or else METEONORM data shall be considered for calculating PR.

i. The PR test shall be conducted at site by the Contractor in presence of the ANERT officials as per IEC61724. The PR test procedure shall be submitted by the Contractor for review and approval. Any special equipment, instrumentation tools and tackles required for the successful completion of the performance test shall be arranged by the Contractor at his own cost.

ii. The procedure for PR demonstration test shall be as follows:

The Weather monitoring station installed in the plant shall be in working condition for minimum 2 weeks and all the parameters shall be available for analysis and verification. The test report for the calibration shall be submitted by the Contractor for approval. After the successful verification of the initial parameters by ANERT, PR test shall be conducted. The Following factors shall be excluded for calculation;

- Generation loss due to grid outage.
- Irradiance below 250 W/m2
- The measured global solar radiation of the period of the outage of the power evacuation system shall be excluded to calculate average global solar radiation for the period of PR test.

PR is to be calculated as per the below formula:

$$PR = \frac{\text{Measured output in kW}}{\text{Installed Plant capacity in kW} * (1000 / \text{Measured radiation intensity in W/m2})}$$

The EPC Contractor shall demonstrate minimum PR of 75% (measured at output of the inverter/solar meter level) in the initial PR test within 7 consecutive days. If the contractor fails to prove the desired performance ratio at the time of completion and during any of the consecutive years of defect liability period, he will be given a second chance to demonstrate the PR within another 7consecutive days. Still if it is not achieved, the same shall be demonstrated within another 7consecutive days and still if it is not achieved, EPC contractor shall improve the quality of the plant by replacement of module/other components with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio. After obtaining Energisation Approval from Electrical Inspectorate and demonstration of minimum specified PR, the solar plant shall be commissioned which shall be the date of completion of the project.

50. QUALITY ASSURANCE

The successful bidder shall establish a Quality Assurance system for the Work as per standards and specifications mentioned in the tender document and shall be subject to the approval of the ANERT or authorised personnel designated. Strict compliance with the approved, proven & established quality assurance systems and procedures during the different stages of the plant starting from sizing, selection of make, storage (at site), during erection, testing and commissioning have to be ensured by the successful bidder.

i. The material to be supplied for the plant should be tested as per the technical specification of the tender. The successful bidder in the presence of the authorized personnel designated shall carry out all factory acceptance tests of equipment as per the specification and relevant standards. The successful bidder shall arrange for the same through online mode and this will be applicable for major components such as PV modules and inverters. Random factory tests shall be arranged for other components of the plant
ii. ANERT at his own discretion may undertake the quality checks during the manufacturing stages also.
iii. All works shall be undertaken with the highest levels of quality and workmanship. Work shall be carried out in conformity with quality and safety norms.

iv. Any materials or work found to be defective or which does not meet the requirements of the specification will be rejected and shall be replaced at successful bidder's cost.

v. One of the staff / workers employed by the successful bidder may be trained under Solar PV installer course conducted by ANERT/MNRE under Skill Council for Green Jobs or under Surya Mithra programme of NISE for module erection and allied electrical works.

A. General Quality requirements of Solar PV Plant

The bidder shall use SPV modules of adequate capacity, Inverters etc. to ensure generation of power as per design estimates.

a. This is to be done by applying de-rating factors for the array mentioned and recognizing the efficiency parameters of inverters.
b. Use of equipment and systems with proven design and performance that have a high availability record of accomplishment under similar service conditions.
c. Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.
d. Strict compliance with the approved and proven quality assurance norms and procedures during the different phases of the plant.
e. Proper monitoring in the synchronizations, which ensures the availability of power to the grid.
f. The DC injection limit shall be as per IEEE 519, IEC 61727, CEA (Technical Standards for Connectivity of the Distributed Generation Resources) Regulations 2013 and CEA (Technical Standards for connectivity to grid) Regulations, 2007 and amendments thereof. It shall not inject DC current greater than the 0.5% full rated output of the inverter at interconnection point.
g. Ripple content should not exceed as specified in IEEE-519 2014.
h. Limits for harmonics as per CEA technical standard on Grid connectivity are: Total Voltage harmonic Distortion, Individual Voltage harmonics Distortion and total Current harmonic Distortions are as per IEEE-519 2014
i. The power plant has to operate in parallel with the grid system, which is an infinite electrical system. The Solar Power Plant design should be equipped with requisite protective measures/ relays / breakers to protect equipment in solar power plant against any of possible fault or other disturbances from the grid.

j. The Solar plant shall be equipped with necessary protection systems to ensure isolation of the solar power plant from the grid at the time of any fault.

k. The inverter shall have internal protection arrangement against any sustained fault in the feeder line and against lightning in the feeder line. MOV type surge arrestors shall be provided on AC and DC terminals for over voltage protection from lightning induced surges.

l. Successful bidder shall provide manual disconnect four pole isolation switch beside the automatic disconnection to grid to isolate the grid connection provided by the utility, so that the utility personnel can carry out maintenance of grid. The utility personnel shall lock this switch.

m. The alarm contact shall be provided for hardware failures, failures of internal and external auxiliary supplies etc. The alarm signals should be via system fault relay (voltage free contact)

n. The plant shall be capable of supplying dynamically varying reactive power support as per the grid requirement to maintain power factor within the range of 0.95 lagging and 0.95 leading.

o. The plant shall be in accordance with solar photovoltaic systems, devices and component Goods (Requirement for Compulsory Registration) order 2017 of MNRE or any amendment thereof.

The Bidder must submit an offer, based upon their own design with requirement mentioned in this bid document. The bidders should be familiar of the site condition before designing the plant and offer their bid. The bidders are also required to incorporate all the system required for realizing Grid tied solar Plants at different locations and efficient operation in parallel with KSEB Ltd supply. The successful bidder shall submit the location wise detailed design of the complete solar generating plant by using their software to optimize the string sizing considering the specific location, isolation, nature of load etc.

51. DATE OF COMMISSIONING

After the Inspection and approval of the Electrical Inspectorate, date of Energisation to the Grid will be considered as the official Date of Commissioning (CoD) of the project. To ensure PR, the bidder will be allowed EPC contractor shall improve the

quality of the plant by replacement of any components with all suitable modification requirements on balance of systems at his own cost to achieve the performance ratio.

52. OPERATION MANUAL

An Operation, Instruction and Maintenance Manual, should be provided with the system.

a. The Manual should include all the Dos & Don'ts of Power Plant along with Graphical Representation with indication of proper methodology for cleaning, Operation and Maintenance etc.

b. The following minimum details must be provided in the manual:

i. About solar power plant – its components and expected performance.

ii. DO's and DON'T's

iii. Cleaning of Solar PV Modules in regular intervals

iv. Clear instructions on regular maintenance and troubleshooting of solar power plant

v. AS built Drawings for the Installation

vi. OEM Warrantee Certificates of Inverters, PV Modules, Batteries etc.

vii. Specification of PV Plant

viii. Data Sheets of major equipment like PV Module, Inverter etc.

ix. Name and address of the E.P.C Contractor and the contract person in case of non-functionality of the solar power plant.

53. BILL OF MATERIAL

The bidder should provide the bill of material mentioning the quantity of each of the item consisting in the system, along with the offer in the format as show below for each capacity:

SN	Item	Make (If any)	Model & Individual Capacity(If any)	Qty (Nos)	Rating/Capacity
1.	PV Module				
2.	PCU/Inverter				
3.	Battery				
4.	DC Cables				
5.	AC Cables				

6.	AJB/SCB				
7.	Module Mounting Structure (MMS)				
8.	ACDB				
9.	Lightning Arrester				
10.	Earthing System Details and No. of Earth pits				
11.	Data Acquisition System				

54. SITE INSPECTON

It is recommended that the bidders visit all the sites listed here for the physical verification and for correctly estimating the quantity, especially related to structure and cabling, before submitting the bids. **Bidder must include all the AC/DC wiring cost, replacement of instrument transformers, panel boards etc. only after visiting the proposed site. The quoted amount will be for all the site-specific works and no additional amount will be allotted for any sort of works.**

The site-specific requirement of ladders for accessing PV modules, pathway facility (with minimum 75cm in width) along with handrails and guard rails in case of sheet roofs are under the scope of the bidder. The Fabrication of Permanent Ladder should be of GI (min14 SWG), coated with Epoxy steel primer with rung spacing not be more than 10 inches and rung width of min 50 cm. Side Handrails / Grab Bars welded on both sides for safety purpose with an extension of Min 50 inches above the landing or access level. The pathway can be either of GI or FRP material and shall include handrails of minimum seventy-five centimetre in width for safety without causing shade on the PV module and Guard rails to prevent accidental falls from the sheet roofs.

55. CLEANING

The bidder shall provide permanent arrangement for module washing in the SPV Plant. Water lines may be drawn to feed water from the available resources. Contractor has to provide additional facility including pipeline, motor for pumping to the additional overhead tank, if required.

56. DANGER BOARDS AND SIGNAGES

Danger boards should be provided as and where necessary as per IE Act. /IE rules as amended up to date. Signages shall be provided at Inverter area, solar array area and main entry from electrical panel board / control room. Text of the signage may be finalized in consultation with ANERT/ owner.

57. DISPLAY BOARD

The vendor has to display a board of size at the project site of size minimum 60 cm x 30 cm including the following details

- Plant Name, Capacity, Location, Type of Renewable Energy plant (solar), Date of commissioning etc. The logo of ANERT and details of the scheme as specified in the work order.

58. INSURANCE

a. The power plant must be insured at every stage of operation – from Material dispatch, storage, completion of installation and till 5 years after commissioning. The insurance coverage on handing over of the system. The Bidder shall also take insurance for Third Party Liability covering loss of human life, engineers and workmen and also covering the risks of damage to the third party/material/equipment/properties during execution of the Contract. Before commencement of the work, the Bidder will ensure that all its employees and representatives are covered by suitable insurance against any damage, loss, injury or death arising out of the execution of the work or in carrying out the Contract. Liquidation, Death, etc., shall be the responsibility of bidder.

b. Without limiting his obligations and responsibilities under the contract the contractor shall insure in the joint names of the ANERT/Concerned beneficiary institution and the contractor against all loss or damages from whatever cause arising other than the risks, for which he is responsible under the terms of contract and in such a manner that the ANERT/Concerned Beneficiary Institution and contractor are covered for the period stipulated in this document and are also covered during the period of maintenance for loss or damage arising from a cause, occurring prior to the commencement of the period of maintenance and for any loss or damage occasioned by the contractor in the course of any

operations carried out by him for the purpose of complying with his obligations under clause.

i. The works for the time being executed to the estimated current Contract value thereof, or such additional sum as may be specified together with the materials for incorporation in the works at their replacement value.

ii. The constructional plant and other things brought on to the site by the contractor to the replacement value of such constructional plant and other things.

iii. Such insurance shall be affected with an insurer and in terms approved by the ANERT which approval shall not be unreasonably withheld and the contractor shall whenever require to be produced to the ANERT, the policy of insurance and the receipts for payment of the current premiums.

c. The insurance premium for the 5 years of warranty is to be paid by the bidder. On handing over of the system, the original insurance policy is to be handed over to the authorised person at the site of installation and a copy to ANERT District Office. The annual premium payment receipt must be handed to the authorised person at the site of installation.

d. Third Party Insurance

i. Before commencing the execution of the work the contractor but without limiting his obligations and responsibilities shall insure against his liability for any material or physical damage, loss, or injury which may occur to any property including that of ANERT / beneficiary institution, or to any person, including any employee of the ANERT / beneficiary institution, by or arising out of the execution of the works or in the carrying out of the contract,

ii. Minimum Amount of Third-Party Insurance: Such insurance shall be affected with an insurer and in terms approved by the ANERT / beneficiary institution which approval shall not be reasonably withheld and for at least the amount stated below. The contractor shall, whenever required, produce to the ANERT the policy or policies of insurance cover and receipts for payment of the current premiums.

e. Minimum Insurance Cover The minimum insurance cover for physical property, injury, and death is Rs.5.0 lacs per occurrence with the number of occurrences

limited to four. After each occurrence contractor will pay additional premium necessary to make insurance valid for four occurrences always.

i. Accident or Injury to Workmen: - The ANERT/beneficiary institution shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workmen or other person in the employment of the contractor or any sub-contractor, save and except an accident or injury resulting from any act or default of the ANERT or their agents, or employees. The contractor shall indemnify and keep indemnified ANERT against all such damages and compensation, save and except as aforesaid and against all claims, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

ii. Insurance against accidents etc. to workmen: - The contractor shall insure against such liability with an insurer approved by the ANERT during the whole of the time any person employed by him on the works and shall, when required, produce to the ANERT / beneficiary institution such policy of insurance and receipt for payment of the current premium. Provided always that, in respect of any persons employed by any sub- contractor the contractor's obligation to insure as aforesaid under this sub-clause shall be satisfied if the sub-contractor shall have insured against the liability in respect of such persons in such manner that ANERT is indemnified under the policy but the contractor shall require such sub-contractor to produce to the ANERT when required such policy of insurance and the receipt for the payment of the current premium.

59. ENGINEERING DRAWINGS

The bidder should submit and get the necessary approval of the following detailed Engineering Drawings before execution of the project:

i. Schematic drawing showing the PV panels, Power conditioning Unit(s)/Inverter, Array Junction Boxes (AJBs)/String Combiner Boxes (SJB), AC and DC Distribution Box, Net meters, MSB etc.

ii. Layout of solar PV Array

iii. Single Line Diagram (SLD) with specification of all components.

iv. Design document for Module Mounting Structure (MMS) including certificate showing wind speed withstanding capacity of the structure (STAAD/Equivalent).

v. Module Mounting Structure (MMS) drawing along with foundation details for the structure.

vi. Sizes and specification of cables for PV Module interconnections, PV Array to Array Junction Boxes, Array Junction Boxes to Inverter, Inverter to ACDB/ Grid Connection point etc. shall be furnished.

The Vendor shall submit a PVsyst report for PV power plants from 25kWp and above. All PV plant design should contain the following details which should be approved by the concerned officer before installation.

i. Design of strings including the number of PV modules in series and number

ii. AC Protection (Circuit Breaker, Switches, Fuses, SPD)

iii. DC Protection (Switches, Fuses, SPD)

iv. AJB / SCB details

v. DC Cable size and length from point to point

vi. AC Cable size and length from point to point

vii. Earthing system details and number of pits

viii. Lightning protection details/specification

ix. PV Syst/ Any other software-based Simulation Report

FORMAT FOR COVERING LETTER

(This letter to be submitted on the official letter head of the tenderer, signed by the authorised signatory.)

Sir,

I/We hereby e-tender to undertake the works mentioned in the tender under the terms and conditions of contract, the whole of the works and described in the attached specification and quantity decided by the Agency for New & Renewable Energy Research and Technology (ANERT), at the rates quoted against each item.

I am/We are remitting herewith the required amount of Rs. ..... towards the cost of e-tender and Earnest Money Deposit by electronic payment vide transaction No ..... dtd.....

Yours faithfully,

Place:

Date:

Signature

Name

Designation

(Office Seal)

ANNEXURE A – SUMMARY OF BID QUALIFICATION REQUIREMENTS

(To be filled in by the bidder)

1.	Name of the bidder	
2.	Address in full	
3.	Contact Details Mobile: Land Phone: Fax: Email:	
4.	Name and Designation of the authorised signatory	
5.	Whether the bidder is a bonafide Manufacturer/ integrator of the item tendered (Yes/No)?	
6.	Details of EMD submitted along With the bid in favour of CEO ANERT	
7.	Whether Bidder was/is De-barred By ANERT (Yes/No)? If 'Yes' period of De-Barring:	
8.	Agreement submitted (Yes/No)?	

Documentary evidence for the bid qualification requirements are submitted along with this document and the details furnished above are true and correct.

Signature of authorised signatory

Name

Designation

Date: (office seal)

ANNEXURE B-AGREEMENT

ARTICLES OF AGREEMENT executed on this the . . . .day of . . . . Two thousand and . . . .between the **Agency for New & Renewable Energy Research and Technology** (hereinafter referred to as **ANERT**) of the one part and Sri . . . . (Name and Address of the tenderer) hereinafter referred to as "the Bounden") of the other part.

WHEREAS in response to the Notification No. . . . . dated . . . . the bounden has submitted to ANERT a e-tender for the ***Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.,*** specified therein subject to the terms and conditions contained in the said e-tender.

AND WHEREAS the bounden has furnished to ANERT a sum of Rs. . . . . .. as Earnest Money Deposit for execution of an agreement undertaking the due fulfilment of the contract in case his e-tender is accepted by ANERT. NOW THESE PRESENTS WITNESS and it is hereby mutually agreed as follows: -

In case the e-tender submitted by the bounden is accepted by ANERT and the contract for . . . . is awarded to the bounden, the bounden shall within seven days of acceptance of this e-tender, execute an agreement with ANERT incorporating all the terms and conditions under which ANERT accepts this e-tender. The bounden have visited all the sites as mentioned in the tender document and the rates quoted are in accordance with all the terms and conditions mentioned in the tender documents and corrigenda issued thereafter;

In case the bounden fails to execute the agreement as aforesaid incorporating the terms and conditions governing the contract, ANERT shall have power and authority to recover

from the bounden any loss or damage caused to ANERT by such breach as may be determined by ANERT by appropriating the moneys inclusive of Earnest Money deposited by the bounden and if the Earnest Money is found to be inadequate the deficit amount may be recovered from the bounden and his properties movable and immovable in the manner hereinafter contained.

All sums found due to ANERT under or by virtue of this agreement shall be recoverable from the bounden and his properties movable and immovable under the provisions of the Revenue Recovery Act for the time being in force as though such sums are arrears of land revenue and in such other manner as ANERT may deem fit.

In witness where of Sri . . . . . (Name and Designation) for and on behalf of the Agency for New & Renewable Energy Research & Technology and Sri . . . .the bounden have hereunto set their hands the day and year shown against their respective signature.

Signed by Sri	Signed by Sri . . . . .
(Date)	(Date) . . . .
in the presence of witnesses	in the presence of witnesses
1.	1.
2.	2.

ANNEXURE C –DECLARATION BY THE BIDDER

e-Tender Notification No: ....., dtd ..... for Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.

To

The CEO, ANERT

We, the undersigned, declare that:

1. We have examined and have no reservations to the Bidding Document, including Addenda No.: ..... (if any)
2. We offer to supply in conformity with the Bidding Document and in accordance with the delivery schedule and this is as per the visit to the sites. We also undertake that we will complete any additional works required for the successful commissioning of the power plants.
3. Our Bid shall be valid for a period of 3 months from the date fixed as deadline for the submission of tenders in accordance with the Bidding Document, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
4. If our Bid is accepted, we commit to submit a Security Deposit in the amount of 5 percent of the Contract Price for the due performance of the Contract;
5. We are not participating, as Bidders, in more than one Bid in this bidding process;
6. Our firm, its affiliates or subsidiaries, including any subcontractors or suppliers for any part of the Contract, has not been declared ineligible by the ANERT or Government of Kerala;
7. We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal Contract is prepared and executed.
8. We have visited all the sites for which we have quoted and all additional works required for the successful commissioning of the Solar Power Plant will be done by us. In case, we fail to do so, ANERT may initiate the required proceedings against us.

Signature

Date Name

ANNEXURE D – DECLARATION OF RELATIONSHIP WITH ANERT EMPLOYEE

(to be signed and submitted by the bidder along with the bid)

Tender Notification No.: ……..
Design, Supply, Installation and Commissioning Hybrid SPV Power Plants with a total of cumulative capacity of 18kWp at 3 Buildings within Thanur Block Panchayat Office (Lithium Ion Battery Backup & TopCon Panels) Malappuram.

To

The CEO
ANERT

Name of the ANERT employee with Designation:

Name of the bidder related to the employee:

This is to put on record that Shri/Smt ……

currently working as …… in ANERT is related to

……., who is the bidder in the bid. We are aware of the Anti-corruption policy of ANERT and will observe the highest standards during the procurement and the execution of contract and shall retain from corrupt, fraudulent, collusive or coercive practices on competing for the contract.

Signature

Name

Date

ANNEXURE E– QUALITY CERTIFICATION, STANDARDS AND TESTING FOR GRID-CONNECTED SOLAR PV POWER PLANTS

Solar PV Modules/Panels	
IEC 61215	*Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules*
IS 14286	*Design Qualification and Type Approval for Crystalline Silicon Terrestrial Photovoltaic (PV) Modules*
IEC 61646	*Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules*
IS 16077	*Design Qualification and Type Approval for Thin-Film Terrestrial Photovoltaic (PV) Modules*
IEC 62108	*Design Qualification and Type Approval for Concentrator Photovoltaic (CPV) Modules and Assemblies*
IEC 61701	*Salt Mist Corrosion Testing of Photovoltaic (PV) Modules*
IEC 61725	*Analytical expression for Daily Solar Profiles*
IEC 61853-1	*Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and power rating*
IS 16170: Part 1	*Photovoltaic (PV) Module performance testing and energy rating Part-1: Irradiance and temperature performance measurements, and energy rating*
IEC 62716	*Photovoltaic (PV) Modules - Ammonia (NH3) Corrosion Testing*
IEC 60721-2-1	*Classification of environmental conditions - Part 2-1: Environmental conditions appearing in nature - Temperature and humidity*
IEC 61730-1	*Photovoltaic (PV) Module Safety Qualification - Part 1: Requirements for Construction*
IEC 61730-2	*Photovoltaic (PV) Module Safety Qualification - Part 2: Requirements for Testing*
IEC 60904-2	*Photovoltaic devices - Part 2: Requirements for photovoltaic reference devices (STC Performance, 1-V)*
IEC 60891	*Photovoltaic devices - Procedures for temperature and irradiance corrections to measured I-V characteristics (STC Performance)*
IEC TS 62548	*Photovoltaic (PV) Arrays - Design requirements*
IEC 61829	*Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics*
Solar PV String Inverters/INVERTERs	

IEC 62109-1, IEC 62109-2	*Safety of power converters for use in photovoltaic power systems- Part 1: General requirements, and Safety of power converters for use in photovoltaic power systems - part 2: Particular requirements for inverters. Safety compliance (Protection degree IP 65 for outdoor mounting, IP 54 for indoor mounting)*
IEC/IS 61683	*Photovoltaic systems - Power conditioners: Procedure for measuring Efficiency (10%, 25%, 50%, 75% & 90-100% loading conditions)*
IEC 62093	*Balance-of-system components for photovoltaic systems – Design qualification natural environments for solar inverters (grid-connected)*
IEC 62116	*Utility-interconnected photovoltaic inverters- Test procedure of Islanding prevention measures Standard for Inverters, Converters, Controllers and*
UL1741	*interconnection system Equipment for use with Distributed Energy Resources*
IEEE 1547	*Standard for interconnecting Distributed Resources with Electric Power Systems*
IEEE 1547.1	*Standard for Conformance Test procedures for* *Equipment interconnecting Distributed Resources with Electric Power Systems*
IEC 60255-27	*Measuring relays and protection equipment - Part 27: Product safety requirements*
IEC 60068-2 (1,2,14,27,30 & 64)	*Environmental Testing of PV System – Power Conditioners and Inverters* *IEC 60068 -2-1: Environmental testing - part 2-1: Tests - Test A: Cold* *IEC 60068 -2-2: Environmental testing - part 2-2: Tests - Test B: Dryheat* *IEC 60068 -2-14: Environmental testing - part 2-14: Tests - Test N:Change of temperature* *IEC 60068 -2-27: Environmental testing - part 2-27: Tests - Test Ea and guidance: shock* *IEC 60068 -2-30: Environmental testing - part 2-30: Tests - Test Db:Damp heat, cyclic (12h+12h cycle)* *IEC 60068 -2-64: Environmental testing - part 2-64: Tests - Test Fh : Vibration, broadband random and guidance*
IEC 61727	*Photovoltaic (PV) systems - characteristics of the utility interface (Parallel operation)*
CEA Guidelines / Regulations	*Technical standards for connectivity of the distributed Generation Resources at Voltage - level of below 33kV*
IEC 62103	*Electronic equipment for use in power installations*
BS EN 50438	*Requirements for micro-generating plants to be connected in parallel with public low-voltage distribution networks*
IEC 61000 Series	*Electromagnetic Interference (EMI), and Electromagnetic Compatibility (EMC) testing of PV inverters*
IEC61850	*Inverters with Reactive Power Control*

IEC 62124	*Photovoltaic (PV) Stand -alone systems- Design verification*
Fuses	
IS/IEC 60947 (Part 1,2 &3) EN 50521	*General safety requirements for connectors, switches, circuit breakers (AC/DC)* *Low-voltage switchgear and Control-gear, Part-1: General rules* *Low-voltage switchgear and Control-gear, Part-2: Circuit Breakers* *Low-voltage switchgear and Control-gear, Part-3: Switches, disconnectors, switch-disconnectors and fuse- combination units* *EN. 50521: Connectors for photovoltaic systems - Safety requirement*
Surge Arrestors	
IEC 60364-5-53	*DC surge protection device (SPD), class 2*
IEC 60364-5-53	*AC surge protection device (SPD), class 2*
IEC 60364-5-53	*Electrical installations of buildings-Part 5-53: Selection and erection of electrical equipment - Isolation, switching and control*
IS 15086-5	*Surge Arresters, Part 5: Selection and Application Recommendations*
Cables	
IEC 60227/IS 694, IEC 60502/IS 1554 (Part 1 & 2)	*General test and measuring method for PVC (Polyvinyl chloride) insulated cables (for working voltage up to and including 1100V, and UV resistant for outdoor installation)*
Earthing	
IS 3043-1986	*Earthing shall be done in accordance with iS-3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm^2 copper, 10 mm^2 aluminum or 70mm^2 hot dip galvanized steel*
IEC 60364-5-53	*The SPDs earthing terminal shall be connected to earth through the above-mentioned dedicated earthing system; The SPDs shall be of type 2 as per IEC 60364-5-53*
IS 3043	*Code of practice for earthing (ETD 20: Electrical Installation)*
IEC 62561 Series	*IEC 62561-1 - Lightning protection system components (LPSC)- Part 1: Requirements for connection components* *IEC 62561-2 - Lightning protection system components (LPSC)- Part 2: Requirements for conductors and earth electrodes* *IEC 62561-7 - Lightning protection system components (LPSC)- Part 2: Requirements for earthing enhancing compounds*
Junction Boxes	
IEC 529	*Junction boxes and solar panel terminal boxes shall be of the thermo plastic type with IP 65 protection for outdoor use, and IP 54 protection for indoor use*

IE 62208, IP 54 as per IEC 529	*General requirements for junction boxes, charge controllers*
CEA Regulations	*Energy Meter Installation and operation of Energy Meters Regulations 2006, and as amended in 2010 & 2014*
IS 13779	*AC Static watt-hour Meters Class 1 and 2 - specification*
IS 14697	*AC Static Transformer Operated Watt-hour and Var- hour Meters, Class 0.2 S and 0.5 S - specification*
IS 15884	*Alternating Current Direct connected static Prepayment Meters for Active Energy (Class 1 and 2) - Specification*
IS 15959	*Data exchange for electricity meter reading, tariff and load control- companion specification*
IS 16444	*AC Static direct connected watt-hour Smart Meter Class 1 and 2 specifications (with Import & Export/Net energy measurements)*
System Performance Monitoring	
IS/IEC 61724	*Guidelines for PV System Performance Monitoring- measurement, Data Exchange, and Analysis*
Rooftop PV System/Power Plant inspection	
IEC 62446	*Grid connected Solar PV Systems-Minimum requirements for system Documentation, Commissioning Tests, and Inspection*
IEC 61557-1	*Electrical Safety in low voltage distribution systems up to 1000 V AC. and 1500 V DC - Equipment for testing, measuring or monitoring of protective measures – Part 1: General requirements*
IEC 60364-6	*Low-voltage electrical installations - part 6: Verification*
IEC 61829	*Crystalline silicon photovoltaic (PV) array- on-site measurement of I-V characteristics*
Battery/Electrical Storage	
IEC 61427-1	*Secondary cells and batteries for renewable energy storage-General requirements and methods of test- Part 1: Photovoltaic off-grid application*
IS 13369	*Stationary lead acid batteries (with tubular positive plates) in monobloc containers*

FORMAT A –COMPONENT WISE SPLIT UP OF COSTS

(On Letterhead of the respective entity for which the below details are provided.)

To be provided for all capacity quoted by the bidder

S/N	Component	Percentage (%)
1	SPV Modules	
2	Module Mounting Structure	
3	Grid Tied Inverter as per specification	
4	Balance of System	
5	Cost for 5 Year Warranty and Preventive Maintenance	
6	Installation and Commissioning Charges	
7	Insurance (From Material dispatch till 5 years warranty period)	
8	Any miscellaneous expenses required for the successful commissioning of the plant	
9	Remote Monitoring and associated costs	
Total		100%