



**Kerala  
Tenders**

## eTendering System Government of Kerala

### Tender Details

Date : 14-Aug-2023 06:14 PM



#### Basic Details

<b>Organisation Chain</b>	ANERT		
<b>Tender Reference Number</b>	ANERT-TECH/74/2023-CTM		
<b>Tender ID</b>	2023_ANERT_594765_1	<b>Withdrawal Allowed</b>	Yes
<b>Tender Type</b>	Open Tender	<b>Form of contract</b>	EPC Contract
<b>Tender Category</b>	Works	<b>No. of Covers</b>	2
<b>General Technical Evaluation Allowed</b>	No	<b>ItemWise Technical Evaluation Allowed</b>	No
<b>Payment Mode</b>	Online	<b>Is Multi Currency Allowed For BOQ</b>	No
<b>Is Multi Currency Allowed For Fee</b>	No	<b>Allow Two Stage Bidding</b>	No

#### Payment Instruments

Online Bankers	S.No	Bank Name
	1	SBI MOPS

#### Cover Details, No. Of Covers - 2

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

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

<b>Tender Fee in ₹</b>	2,950		
<b>Fee Payable To</b>	Nil	<b>Fee Payable At</b>	Nil
<b>Tender Fee Exemption Allowed</b>	Yes		

#### EMD Fee Details

<b>EMD Amount in ₹</b>	50,000	<b>EMD through BG/ST or EMD Exemption Allowed</b>	Yes
<b>EMD Fee Type</b>	fixed	<b>EMD Percentage</b>	NA
<b>EMD Payable To</b>	Nil	<b>EMD Payable At</b>	Nil

#### Work /Item(s)

<b>Title</b>	EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)				
<b>Work Description</b>	EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)				
<b>Pre Qualification Details</b>	Please refer Tender documents.				
<b>Independent External Monitor/Remarks</b>	NA				
<b>Tender Value in ₹</b>	NA	<b>Product Category</b>	Solar Power Plants	<b>Sub category</b>	NA
<b>Contract Type</b>	Tender	<b>Bid Validity(Days)</b>	90	<b>Period Of Work(Days)</b>	45
<b>Location</b>	Shankumugam Trivandrum	<b>Pincode</b>	695001	<b>Pre Bid Meeting Place</b>	NA
<b>Pre Bid Meeting Address</b>	NA	<b>Pre Bid Meeting Date</b>	NA	<b>Bid Opening Place</b>	Online
<b>Should Allow NDA Tender</b>	No	<b>Allow Preferential Bidder</b>	No		

#### Critical Dates

<b>Publish Date</b>	10-Aug-2023 05:00 PM	<b>Bid Opening Date</b>	26-Aug-2023 11:00 AM
<b>Document Download / Sale Start Date</b>	10-Aug-2023 05:00 PM	<b>Document Download / Sale End Date</b>	25-Aug-2023 05:00 PM
<b>Clarification Start Date</b>	NA	<b>Clarification End Date</b>	NA
<b>Bid Submission Start Date</b>	10-Aug-2023 05:00 PM	<b>Bid Submission End Date</b>	25-Aug-2023 05:00 PM

**Tender Documents**

NIT Document	S.No	Document Name	Description	Document Size (in KB)
	1	Tendernotice_1.pdf		NIT and Abstract

Work Item Documents	S.No	Document Type	Document Name	Description	Document Size (in KB)
	1	Tender Documents	SRWMTD.pdf		Tender Document
2	BOQ	BOQ_881737.xls		Financial Bid	379.00

**Tender Inviting Authority**

<b>Name</b>	CEO ANERT
<b>Address</b>	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](http://www.anert.gov.in) , [projects@anert.in](mailto:projects@anert.in)

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## **E-TENDER DOCUMENT**

***EoI for the Design, Supply, Installation, Testing and  
Commissioning of 2 Nos of 100 kg Solar Powered Rapid  
Waste to Manure converter on Pilot basis in  
Thiruvananthapuram under Solar City Project (funded by  
Smart City Thiruvananthapuram Ltd)***

**Ref. No.: ANERT-TECH/74/2023-CTM**

### **PART – 1: GENERAL CONDITIONS**

**Date of Publishing of Bids : - 10/08/2023**

**Last Date of Submission of Bids : - 25/08/2023**

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## E-TENDER NOTICE

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Competitive e-tenders in two cover system with Earnest Money Deposit (EMD) and Price Bid in accordance with the technical specifications are invited from reputed Manufacturers / System Integrators with relevant experience for the ***EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)***. The e-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

CEO

08/08/2023

## TENDER ABSTRACT

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Ref. No.	<b>ANERT-TECH/74/2023-CTM</b>
Name of Work	<b>EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)</b>
Download of Tender Form	<a href="http://www.etenders.kerala.gov.in">http://www.etenders.kerala.gov.in</a>
Last date of submission of Tender	25/08/2023 @ 5.00 PM
Date and Time of opening the Tender	26/08/2023 @ 11.00 AM
Estimated Cost	<b>Rs. 36,75,000/-</b>
Cost of Tender form	<b>Rs. 2,950/- (Including GST)</b>
EMD	<b>Rs. 50,000/-</b>
Warranty period	5 years from the date of Commissioning the system.
Availability of Tender Forms	Website <a href="http://www.etenders.kerala.gov.in">http://www.etenders.kerala.gov.in</a>
Place of opening of tender	Office of CEO, ANERT Law College Road, Vikas Bhavan. PO, Thiruvananthapuram - 695 033, Kerala

Thiruvananthapuram  
10/08/2023

Sd/-  
CEO

## GENERAL TERMS AND CONDITIONS FOR E-PROCUREMENT

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This e-Tender is being published for the EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd). The tender is invited in two cover system through e-procurement portal of Government of Kerala ([www.etenders.kerala.gov.in](http://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](http://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](http://www.cca.gov.in). Once, the DSC is obtained, bidders have to register on [www.etenders.kerala.gov.in](http://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](mailto:helpetender@gmail.com)/[etendershelp@kerala.gov.in](mailto: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](http://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](http://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](http://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. Copy of Registration Certificate of the bidder firm
- v. Copy of GST Certificate
- vi. Copy of PAN card
- vii. Documents to prove the annual Turnover of the bidder along with a certificate from Chartered Accountant regarding net worth. (Capital + Reserves)
- viii. Copy of the work orders and certification from the purchase regarding execution of the order, to prove the experience in executing similar orders, as specified
- ix. Bill of Material
- x. Details of the technical offer, including test certificates issued in the name of the bidder
- xi. Declaration by the bidder (format as in Annexure – C)
- xii. Declaration of relationship with ANERT employee (format as in Annexure - D)

3.1 (b) The Second Stage (Financial Cover as per two 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 or under 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 eProcurement System.

<b>A) Internet Banking Options (Retail)</b>			
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	ShamraoVithal 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	Janata Sahakari Bank		
30	Karnataka Bank		
31	Karur Vysya Bank		
<b>B) Internet Banking Options (Corporate)</b>			
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](http://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](http://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 the Terms of Reference for the assignment, 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 a 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](http://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](http://www.etenders.kerala.gov.in) and such amendments shall be binding on all the bidders.

### **15. COMMENCEMENT OF WORKS**

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.



## **BID QUALIFICATION REQUIREMENTS**

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### **17. BID QUALIFICATION REQUIREMENTS**

- 17.1 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.
- 17.2 An agreement in Rs.200/- Kerala stamp paper as per the format given in Annexure B must be submitted along with e-tender document.
- 17.3 Bidder should have cumulative experience of executing contracts of supply and Installation of at least 2 nos. of Solar Powered Rapid waste to Manure converter system OR 50 kW of Solar Power Plants OR 5 Nos of Rapid Waste to Manure converter to any Govt. Organization / PSU/co-operative or Society/any private organizations in the last three years ending up to date of publish of this tender.
- 17.4 The products offered by the bidder should confirm to the technical requirements given in the tender.
- 17.5 The bidder should have service centre/authorised service providers in Thiruvananthapuram district of Kerala. Detailed list with address, contact details and proof has to be submitted.
- 17.6 The bidder's company/firm must not have been debarred / blacklisted by any Govt. Dept., agency, PSUs / institution / agencies / autonomous organisations. The bidder shall submit a self-certification by an authorized person duly notarized to this effect.
- 17.7 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.

#### **17.2 Eligibility Requirement**

- The detail of eligibility requirements is provided in the table below. The bidders are required to furnish the required supporting documents along with the Technical Bid.

S. No.	Criteria	Documents Required
1.1	<p>The Bidder should have any of the following legal status:</p> <p>a) Body incorporated in India under the Companies Act, 2013 including any amendment thereto; OR</p> <p>b) Body incorporated in India under the Limited Liability Partnership (LLP) Act, 2008 including any amendment thereto; OR</p> <p>c) Firm registered under Partnership Act, 1932 in India; OR</p> <p>d) Sole Proprietor</p> <p>In case of JV, all the members must fulfil this requirement and submit the documents as per the Tender Document.</p>	<p>a) In case of Company – Copy of Registration/ Incorporation Certificate</p> <p>b) In case of LLP – Copy of Deed of Partnership</p> <p>c) In case of Partnership – Copy of Deed of Partnership</p> <p>d) In case of Sole Proprietor – Duly notarized Undertaking from Sole proprietor</p>
1.2	The Bidder must have the required GST Registration	Copy of GST registration certificate with legible GSTIN.
1.3	The Bidder must have valid PAN Number	Copy of Pan Card
1.4	Bidder should have cumulative experience of executing contracts of supply and Installation of at least 2 nos. of Solar Powered Rapid waste to Manure converter system OR 5 Nos of Solar Power Plants OR Rapid Waste to Manure converter to any Govt. Organization / PSU/co-operative or Society/any private organizations in the last three years ending up to date of publish of this tender	Statutory Documents substantiating this requirement along with Documents submitted in Clause 1.4 of this Section above.
1.5	The bidder should be having unblemished record and must not be blacklisted or declared ineligible for corrupt & fraudulent practices by “any state/ central government” department/ company / entity” as on date of bid opening.	The bidder shall provide an Undertaking as per the format provided as Format A.

### 10.3 Qualification Requirement

The details of qualification requirements are provided in the table below. The bidders are required to furnish the required supporting documents along with the Technical Bid.

S. No.	Criteria	Documents Required
1.1.	<b>Technical Criteria</b>	
	Bidder should have cumulative experience of executing contracts of supply and Installation of at least 2 nos. of Solar Powered Rapid waste to Manure converter system OR 50 kW capacity of Solar Power Plants OR 5 Nos of Rapid Waste to Manure converter to any Govt. Organization / PSU/co-operative or Society/any private organizations in the last three years ending up to date of publish of this tender	The details of projects executed during period mentioned above should be listed. Copy of work orders and a certificate issued by the SNA/ Govt. Organization/LSG/PSUs towards the satisfactory work completion to be furnished by the bidder. In absence of any one, it will not be considered for qualifying in technical bid.
1.2.	<b>Financial Criteria</b>	
1.2.1.	The Bidder should have positive net worth in at least 2 years out of the last five Financial Years (FY 17-18, FY 18-19, FY19-20, FY20-21 & FY 21-22).	1. Certificate fulfilling required financial criteria in the name of Bidder duly certified by Practicing Chartered Accountant as per the format provided Format B, duly mentioning UDIN
1.2.2.	Minimum Average Annual Turnover (MAAT) during any 2 best out of last five financial years (FY 17-18, FY 18-19, FY19-20, FY20-21 & FY 21-22) of the bidder shall not be less than 40 Lakhs.	2. Firm's Annual Audit Report, Balance sheet, Profit & Loss and Income Tax Returns / CA certificate for last Five years i.e., FY: FY 17-18, FY 18-19, FY19-20, FY20-21 & FY 21-22

## CONDITIONS OF CONTRACT

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### 18. GENERAL CONDITIONS

- 18.1 The tenders should be submitted online at [www.etenders.kerala.gov.in](http://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. The cost of tender forms should be paid online, and once paid will not be refunded. Tender forms are not transferable. Tenders that are not in the prescribed form are liable to be rejected.
- 18.3 Intending tenderers should submit their tenders on or before the due date and time mentioned in the tender abstract. Late tender will not be accepted.
- 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 Every tenderer should send along with his tender an Earnest Money Deposit. This may be paid online at the e-tenders website.
- 18.7 If any tenderer withdraws from his e-tender before the expiry of the period fixed for keeping the rates firm for acceptance, the earnest money if any, deposited by him, will be forfeited.
- 18.8 The final acceptance/rejection of the tenders rests entirely with CEO, ANERT who do not bind themselves to accept the lowest or any tender.
- 18.9 In the case of materials of technical nature, 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 before sign the agreement and within the period specified in the letter of acceptance of his tender, deposit a sum equivalent to 3% 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) In cases where a successful tenderer, after having made partial supplies 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.
- d) 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.

18.10 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.

- 18.11 (a) All payments to the contractors will be made by ANERT in due course  
(b) All incidental expenses incurred by ANERT for making payments outside the State in which the claim arises shall be borne by the contractor.
- 18.12 Payments will be made only after the supply, Installation and Commissioning of the items and certification by the competent Technical personnel of ANERT.
- 18.13 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 always that if such consent be given at any time, the contractor shall not be relieved from any obligation, duty or responsibility under this contract.
- 18.14 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.

18.15 In case the contractor fails to supply and deliver any of the said articles and things 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 or 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.

18.16 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.

- 18.17 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.
- 18.18 The tenderer shall undertake the installation and commissioning of the system according to the standards and specification.
- 18.19 No representation for enhancement of rate once accepted will be considered.
- 18.20 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.
- 18.21 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.
- 18.22 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.
- 18.23 **Conditions in the technical document, technical specifications and special conditions of this tender document would override these general conditions, wherever applicable.**
- 18.24 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.
- 18.25 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 bidder has NOT submitted the requisite EMD OR Agreement, OR 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 of 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, if they agree to supply at the L1 price.**
- 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 if any, 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 3 months 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.



**AGENCY FOR NEW & RENEWABLE ENERGY  
RESEARCH AND TECHNOLOGY (ANERT)**

Department of Power, Government of Kerala  
Thiruvananthapuram, Kerala – 695 033;  
[www.anert.gov.in](http://www.anert.gov.in) , [projects@anert.in](mailto:projects@anert.in)

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## **E-TENDER DOCUMENT**

***EoI for the Design, Supply, Installation, Testing and  
Commissioning of 2 Nos of 100 kg Solar Powered  
Rapid Waste to Manure converter on Pilot basis in  
Thiruvananthapuram under Solar City Project  
(funded by Smart City Thiruvananthapuram Ltd)***

**Ref. No.: ANERT-TECH/74/2023-CTM**

### **PART – 2: SCOPE OF WORKS**

**Date of Publishing of Bids : - 10/08/2023**

**Last Date of Submission of Bids : - 25/08/2023**

## SCOPE

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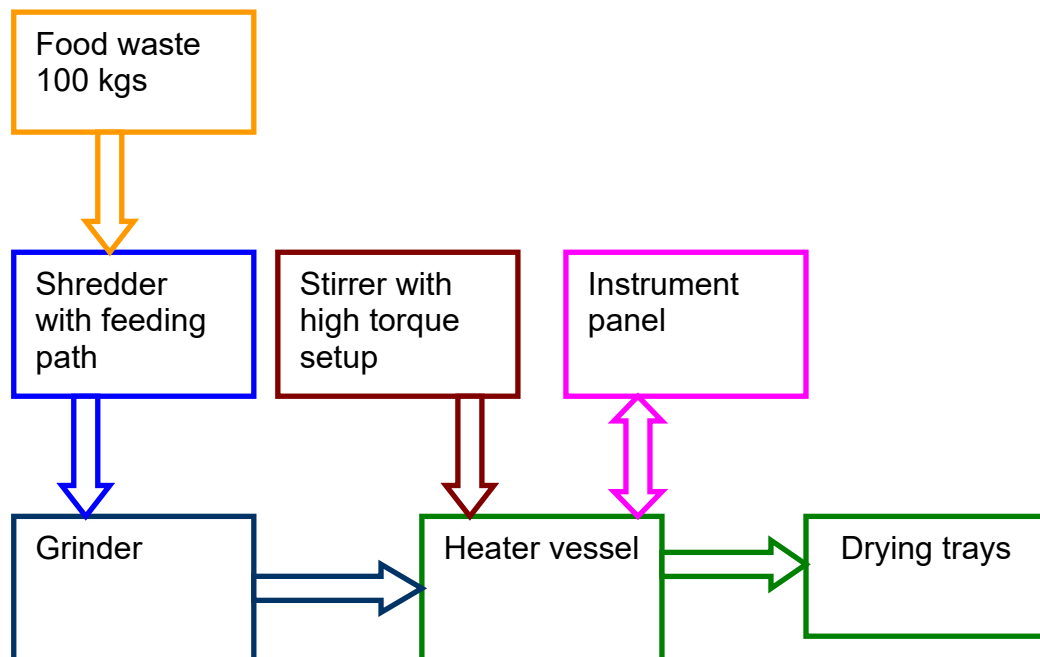
### 20. INVITATION TO BID

- 20.1 **ANERT is the State Agency for Renewable Energy in Kerala** having its Headquarters at Thiruvananthapuram, Kerala and various district level offices.
- 20.2 In order to meet the requirements, ANERT proposes to invite bids from Manufacturers / System Integrators of Solar Powered Cold Storage and 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 OF SYSTEM AND PARAMETERS

ANERT invites this Expression of Interest for the installation of a Solar Powered Rapid waste to Manure converter on Pilot basis which could handle a maximum capacity of 50 kg at a time. The proposed Rapid Waste to Manure converter shall have the following parts and shall be powered from the utility grid and the utilized energy shall be offset from Solar power plant of mentioned capacity. The rapid Waste to Manure converter shall

be capable of completing the process within 7 hours of time from the start of grinding waste.



- i. Grinding machine:** The major parts of grinder comprise of an AC motor, Shaft with ball bearings, huller, stainless steel sieve, V-belts etc. A grinding machine of capacity of Min 5 HP will act as its prime mover. The waste fed to the grinder needs to be hammered inside the huller unit and shall be grinded to finer particles which can be squeezed out through a sieve.
- ii. Heater vessel:** The waste from the grinder is automatically fed to a heater vessel of minimum 100 kg capacity. The Heater vessel shall consist of an insulated drum with ceramic contact type heater of Minimum capacity of 12 kW. This will provide uniform heating of the product and also avoids sticking of food waste in the vessel.
- iii. Stirrer Mechanism:** A three phase motor of 1.5 Hp with reduction gear is to be used for stirring the processed waste. It must be housed above the heater vessel for stirring the material inside the vessel. This will help to mix the reagents uniformly and also avoids sticking of the material in the vessel wall.
- iv. Temperature controller:** A thermocouple based electronic circuitry must be in place to control the heating element and keep the vessel temperature in between 95 and 105 Degree Celsius. There must be an LED/LCD based display to shows the temperature and HMI based system for controlling the same.

- v. **Drying Table:** A Drying perforated table of min size 8 x 4 ft is to be provided for removing the moisture content of the manure. Solar drying technique is to be preferably used on Sunny days, for which a perforated table is to be provided. During rains, the heater vessel can be used for drying.
- vi. **Housing for the system:** The whole system is to be housed in a room/ shed available at Shankumugam. The base foundation for the system is to be done by the successful bidder and also undertake the electrical wiring and incorporate various protective systems like ELCB, MCB etc for the proper working and safety.
- vii. **10 kW Solar power plant** – A Grid connected Solar Power plant of capacity 10 kW is to be installed to power / offset the consumption of the converter unit. All fees in terms of approval from Electrical Inspectorate, KSEBL etc are under the scope of the bidder.
- viii. **Kitchen Garden** – A Kitchen Garden comprising of various vegetable saplings shall be supplied in Grow bags of minimum 50 Nos and a mechanism / provision for Automatic irrigation of the grow bags must be done by the successful bidder. This must be powered from Solar and shall include timer for irrigating the crops at least twice a day. In case of crops which can yield better using Drip Irrigation technique, the same is to be followed.

## 22 SCHEDULE OF SUPPLY

22.1 The items should be delivered and installed at the sites given below for which work order shall be given and specified by ANERT, under prior intimation and supervision of ANERT. The work order for both sites can be awarded individually or by combining both of them.

#	Site	Capacity (kg)
1	Shankumugam, Thiruvananthapuram	100 kg x 2 Nos

22.2 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.

22.3 The materials being used for the civil works shall comply with all the standards and norms issued by PWD for public works

22.4 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.

22.5 In case of no valid reason, extension of time of completion that can be granted at a time shall will 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.

22.6 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/-

22.7 Penalty for delay in supply and installation and commissioning will be imposed at 0.5 % per week up to a maximum 10%. In case of delay in supply and installation, CEO, ANERT may cancel the contract and take recourse to other action as deemed appropriate.

## 23 SCOPE OF WORK

The broad scope of the work includes Design, Supply, Installation, Testing & Commissioning of Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram including five-year Comprehensive Maintenance Contract (CMC) of the following capacities;

#	Site	Capacity (kg)
1	Shankhumugam, Thiruvananthapuram	100 kg x 2 Nos

The detailed scope of this work is as under:

### **A. Design**

- i. The bidder will design the system as per the requirements given in the subsequent technical specification section. The proposed design is to be submitted for approval and the work is to be undertaken incorporating the changes if any suggested.
- ii. Adequate Protection must be provided as per the requirement of the site by taking lightening and other climatic conditions etc.
- iii. The foundation works and preparation of shed, is not included under the scope of the bidder, as the same is already available.

### **B. Installation and commissioning**

- i. The successful bidder will transport the system to the site, install and commission it on the field of beneficiaries given in clause #23
- ii. Before submission of the Bid, Bidders in their own interest are to visit the sites. No request for enhancement of rates considering the requirements at site will be entertained.
- iii. After completion of installation work, each unit have to be tested and commissioned in presence of the District Engineer, ANERT of the respective District.
- iv. A display board (size preferably 3ft X 3ft) to be provided at the prominent place. The design and content to be provided at time of issuing work order.

### **C. Maintenance services**

- i. The successful bidder is required to undertake Operation and maintenance as well as corrective maintenance for a period of 5 year starting from the date of commissioning of the project.
- ii. To ensure proper maintenance of the installed systems, the bidder is required to appoint a technically qualified person to look after maintenance and upkeep of the plant/System. Sufficient spare should also be kept with the service personnel so as to attend to any breakdown forthwith.
- iii. The date of commencement of warranty shall be reckoned from the date of commissioning of the system.
- iv. The bidder is also required to undertake on-call maintenance as and when



required upon receipt of service request from ANERT.

- v. The bidder must adhere to maintenance procedure by ANERT from time to time.
- vi. The bidder if required should agree to undertake extended maintenance services beyond 5 years on mutually agreed terms and conditions.
- vii. Following service request intimated by ANERT, the system must be made functional within 5 days. System downtime beyond 5 days will result in poor performance score of the vendor which might affect their chances of further bidding in the ANERT tenders or blacklisting of the firm.
- viii. The successful bidder should have a local office / Service Centre in Thiruvananthapuram district and any other place to be intimated later so as to deliver uninterrupted and sustainable maintenance services and share its contact details with all concerned.

#### ***D. Training***

- i. The successful bidder shall have to organize training programme for the beneficiaries for operation and maintenance of the unit. The training shall be a mix of audio and video modules.
- ii. A list of DOs and DON'Ts shall be prepared and displayed at a prominent place at the site along with warning signs wherever necessary
- iii. The beneficiary shall be equipped with copies of a pictorial (for easy understanding) operation manual in English and Malayalam (Regional Language)

## **24 SELECTION PROCEDURE**

ANERT will evaluate all the proposals to determine whether these are complete in all respects as specified in the tender document. Evaluation of the proposals shall be done in three stages as:

### **24.1 Level - I (Technical Evaluation):**

ANERT shall evaluate the technical bid(s) to determine whether these qualify the essential eligibility criteria, whether the bidder has submitted the EMD whether any computational errors have been made, whether all the documents have been properly signed & stamped, whether all the documents as mentioned / or required to submitted

with technical bid are submitted and whether bids are completed and generally in order. A detailed proposal to be submitted as part of the bid including proper site survey details.

After evaluation of technical bid(s), a list of the qualifying bidder(s) shall be made. Short-listed bidder(s) shall be informed of the date, time and place of opening of financial bid(s) (online).

#### **24.2 Level – II (Allocation of works)**

The financial bids of all the technically qualified bidders will be opened and shall be evaluated. The work will be awarded to the lowest bidder complying all the requirements.

### **25 PERFORMANCE SECURITY**

The successful bidder has to remit an amount @ 3% of the total amount quoted by them as performance security deposit in terms of Bank Guarantee/Deposit having validity for 6 months from the date of agreement. The bank guarantee/deposit will be released/refunded to the successful bidder after completion of the contract period after deducting the penalties if any.

### **26 PAYMENT**

26.1 No advance payment will be given. All the documents submitted should be certified by the concerned District Office of ANERT. This will be applicable for works issued through individual work order for installations done through Plan and Deposit work scheme of ANERT.

26.2 The terms of payment shall be:

#### **26.2.1 EPC Payment**

- i. Upon Delivery of Rapid Waste to Manure converter and the major components of the 5kW Solar Power plant materials at the site, 60 % of the contract value will be released as first part payment, if requested. The supplier shall submit the invoice for the materials (including serial numbers and delivery chalan) duly certified by the concerned District Office along with a report regarding the supply of materials.
- ii. On completion of installation and commissioning of the system, 30% of the contract value will be released. All documents related to the completion of the

work including commissioning report and commissioning certificate shall be submitted for the release of the amount. 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.

- iii. The remaining 10% shall be retained as performance security and will be released in equal parts of 2% each after completion of a year period. This period will be considered only from the date of commissioning.

#### **26.2.2 O&M Payment**

- i. The rates for the O&M is to be quoted separately and the charges shall be released on annual basis after completion of the O&M period of the previous year. The start of O&M period will be considered from the scheduled date of operation.
- ii. The preventive maintenance reports along with receipt of premium of insurance and generation reports are to be submitted for the release of O&M payments.
- iii. The payment shall be released after the inspection by the authorised personnel of ANERT on annual basis.

26.3 The security deposit of 3% furnished along with the contract agreement shall be released on successful completion of supply, installation and commissioning

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

## **27 SERVICE AND MAINTENANCE**

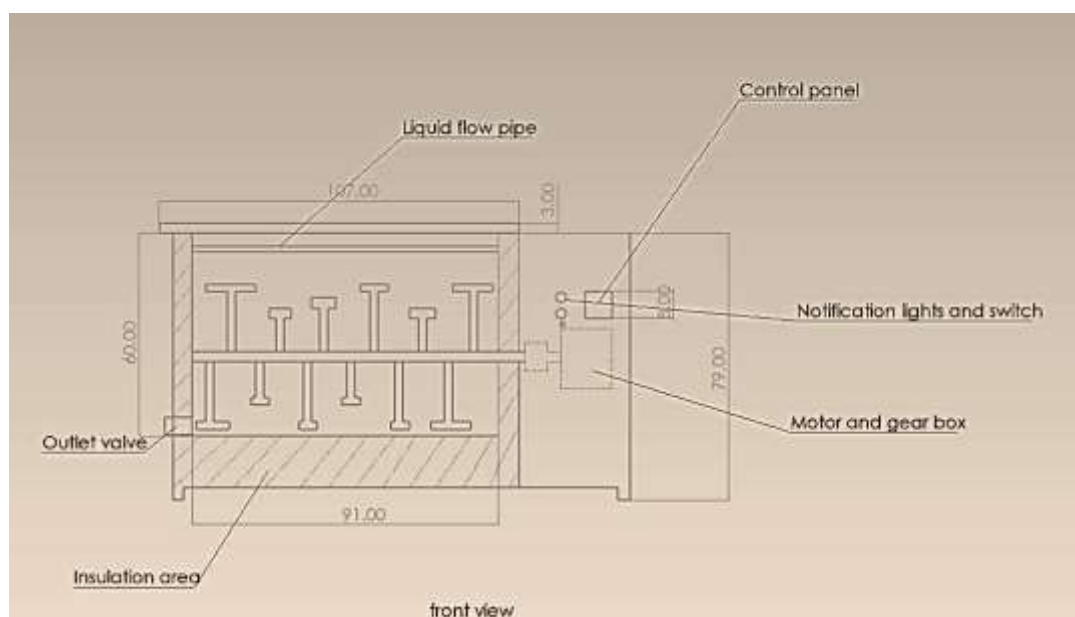
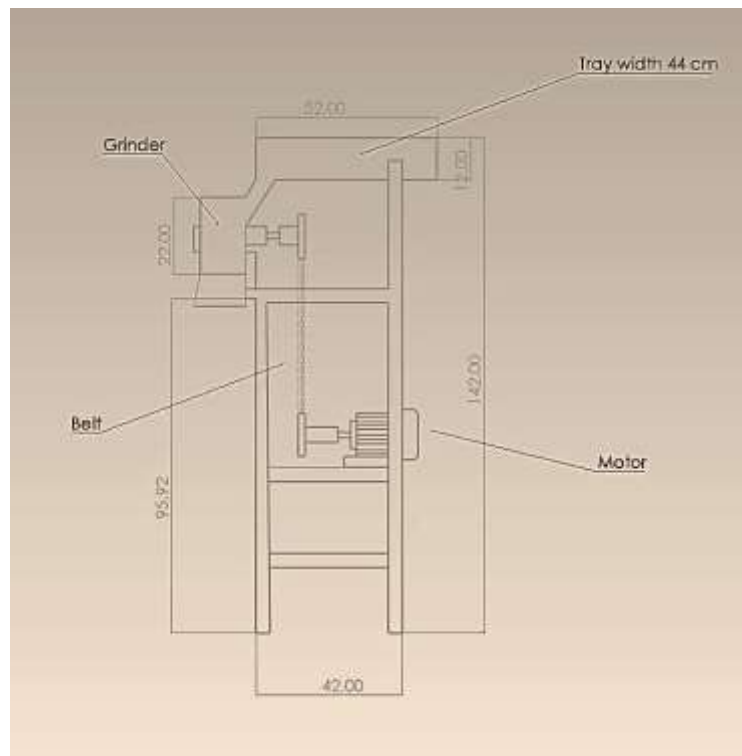
- 27.1 The faulty system or components should be replaced/ repaired within 5 days of fault reporting. The servicing should be carried out at the site of installation.
- 27.2 Any Delay in servicing beyond 10 days of fault reporting would attract penalty at the rate of at the rate fixed by CEO, ANERT and further actions will be initiated against the agency.
- 27.3 A designated contact Telephone Number and address should be submitted for reporting faults during the warranty period.

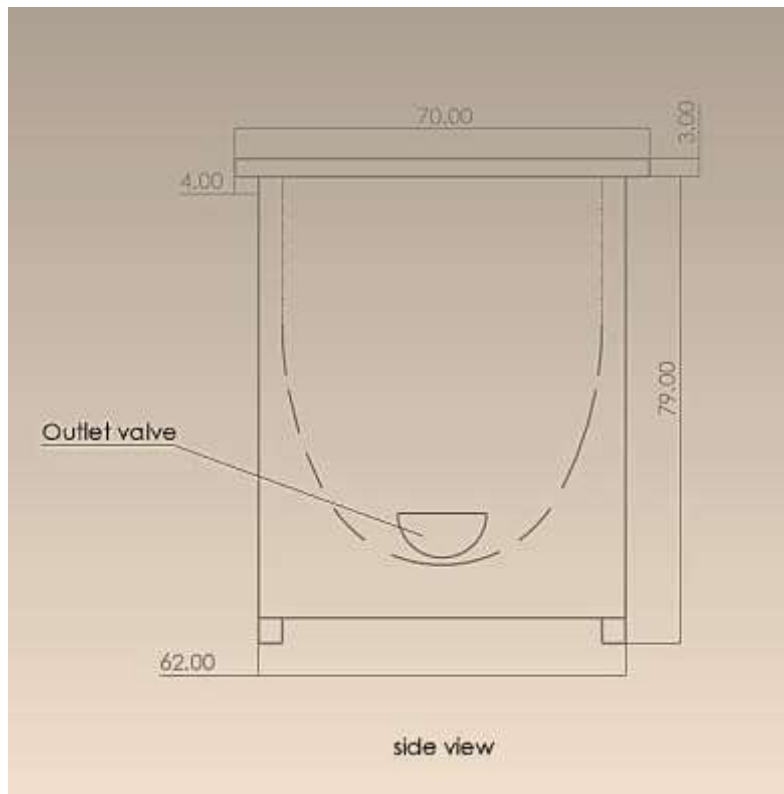
## 28. TECHNICAL SPECIFICATIONS

The technical specifications to be followed under the project are as follows:

### 28.1 RAPID WASTE TO MANURE CONVERTER

The general Arrangement Diagram of the proposed Rapid Waste to Manure Converter is given below. The bidders are free to customise the design to suit the requirements as per this tender document.





- The Motors being used in the Grinding and Stirrer units must be Star rated and a minimum of 3 stars is mandatory.
- The parts of the converter must be made from SS 304 grade.
- The Reactor vessel must be provided with thermal blanket with 400 Degree Celsius capacity to avoid heat leakage and to provide insulation.

## 28.2 SOLAR POWER PLANT

Solar PV power plant system comprises of C-Si (Crystalline Silicon)/ Thin Film Solar PV modules with intelligent Inverter having MPPT technology and Anti-Islanding feature and associated power electronics, which feeds generated AC power to the Grid. Other than PV Modules and Inverter/Inverters, the system consists of 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, etc. The system should be capable for exporting the generated AC power to the Grid, whenever the Grid is available with all System Protection facilities.

## 28.2.1 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.
- c. KSERC (Grid interactive Distributed Solar Energy Systems) Regulations, 2014.
- d. CEA Regulation 2010 has to be followed safety and Electricity supply.
- e. Metering should be as per CEA regulation 2006.
- f. Any amendments thereof will also be applicable.

## 28.2.2 SPV MODULES

Only the PV modules with MONO PERC Half cut cells of module capacity 500 Wp 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:

- i. The PV modules must be PID compliant, salt, mist & ammonia resistant and should withstand weather conditions for the project life cycle.
- ii. The back sheet of PV module shall be 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 vapor transmission rate shall be less than 2 g / m<sup>2</sup>/day and shall have a Partial Discharge > / = 1500V DC
- iii. 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
- iv. 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.
- v. 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.
- vi. 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.
- vii. Shading correction/ bypass diode for optimizing PV out to be incorporated in each solar module or panel level.
- viii. 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
- ix. 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

- x. 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.
- xi. 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.
- xii. 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.
- xiii. 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
- xiv. Original Equipment Manufacturers (OEM) Warrantee of the PV Modules shall be submitted by the successful bidder when the materials delivered at site.
- xv. 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 (NH<sub>3</sub>)
- xvi. 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.

- xvii. 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.

### **28.2.3 POWER CONDITIONING UNIT (PCU)**

The Power Conditioning Unit shall be String Inverter with power exporting facility to the Grid.

#### **General Specifications:**

- i. 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
- ii. The inverter output shall be 240 VAC, 50 Hz, 1 phase.
- iii. 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.
- iv. 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.

- v. 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.
- vi. 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
- vii. 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.
- viii. 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
- ix. 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<sup>0</sup>C. The manufacturer to provide the power derating curves to demonstrate the same.
- x. 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.
- xi. The inverter shall have an integrated feature of emergency stop to halt the inverter from operation considering safety scenarios
- xii. 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.
- xiii. 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:**
  - a. Finding out optimisation of the system**
  - b. Optimal power distribution on each phase**

**c. Prevent PCU from unnecessary disconnections**

- xiv. The PCU Company should have grid connected solar plants running in the country with inverters at least 7 years from the time of bidding to showcase the service reliability and long-term presence. Also, the PCU should have local presence in the county for at least last 5 years. The PCU manufacturer may need to provide authentic details to customer if asked to prove the same.
- xv. 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
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

Specifications of Inverters	
Parameters	Detailed specification
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)

xvi. 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 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 (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

xvii. The IEC Certifications of On-Grid Inverters are summarized below:

Standard	Description
IEC 61683	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IEC 61727	Photovoltaic (PV) systems- Characteristics of the utility interface
IEC/EN 62109-1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC/EN 62109-2	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
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

Standard	Description
	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 62116	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
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**

## 28.8.4 SYSTEM COMPONENTS - TECHNICAL COMPLIANCE FOR SYSTEM COMPONENTS

S/N	System Component	Capacity/ rating	Minimum Technical Compliance
1.	Solar panel (MONO PERC Half cut of capacity 500 Wp 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.	Grid Tied Inverter (DC to AC ratio of 1.2 to be maintained at all sites)	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.	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
4.	Cables	As required	IEC 60227 / IS 694 IEC 60502 / IS 1554 (Pt. I & II)
5.	Switches/ Circuit Breakers	As required	IEC 60947 part I, II, III / IS 60947 Part I, II, III
6.	Connectors		EN 50521
7.	Surge Protection Device		IEC 60364-5-53 / IS 15086-5
8.	Junction Boxes/Enclosures for Inverters/ Charge Controllers	As required	IP 54 (for outdoor) or IP 65 / IP 21(for indoor) as per IEC 529
9.	Energy Meter for Recording Solar Electricity Generated & Two-way meter for Distribution Licensee grid connection		As per CEA Regulations; IEC 60687/ IEC 62052-11 / IEC 62053-22 / IS 14697
10.	Lightning Protection	As required	As per IEC 62305 / IEC 62561
11.	Electrical Grounding (Earthing)	As required	As per IS 3043



## 28.2.5 REMOTE MONITORING SYSTEM

A dedicated Remote Monitoring System (Hardware and software) for monitoring the plant shall be provided even if the inverter has embedded data logging system. The following weather parameters are to be measured as part of the datalogging system.

### **a) Solar Irradiance:**

A Pyranometer/ Solar cell-based irradiation sensor (along with calibration certificate) shall be provided, with the sensor mounted in the plane of the array.

**b) Temperature:** Integrated temp, sensors for measuring the module surface temp., inverter inside enclosure temp, and ambient temp to be provided complete with readouts integrated with the data logging system.

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) Invertor Status

Provision for Internet monitoring and download of historical data shall be incorporated. GSM Modem/Wi Fi modem in case GSM connectivity is used or Wireless Router + modem in case Ethernet connection is being used for remote access must be provided. The data is to be transmitted to ANERT server as well as to the Integrated Command and Control Centre (ICCC) developed by Smart City Thiruvananthapuram Ltd. The successful bidder has to undertake all the works required for such deployment including software and arrange for APIs etc.

## **28.2.6 ELECTRICAL SAFETY, EARTHING AND PROTECTION**

- 28.2.6.1 Internal Faults: In built protection for internal faults including excess temperature, commutation failure, over load and cooling fan failure (if fitted) is obligatory.
- 28.2.6.2 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.
- 28.2.6.3 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.

## **28.2.7 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.

- i. 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
- ii. 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%).
- iii. 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.
- iv. 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.

- v. All LT XLPE cables shall conform to IS:7098 part I&II.
- vi. The total voltage drop on the cable segments from the solar PV modules to the solar grid inverter shall not exceed 2.0%
- vii. The total voltage drop on the cable segments from the solar grid inverter to the building distribution board shall not exceed 2.0%
- viii. The DC cables from the SPV module array shall run through a UV-stabilized PVC conduit pipe of adequate diameter with a minimum wall thickness of 1.5mm
- ix. Cables and wires used for the interconnection of solar PV modules shall be provided with solar PV connectors (MC4) and couplers
- x. 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 4.0mm<sup>2</sup> copper; the minimum AC cable size shall be 4.0mm<sup>2</sup> 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.
- xi. 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
- xii. Cables and conduits that have to pass through walls or ceilings shall be taken through PVC pipe sleeve.
- xiii. 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.
- xiv. 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.

- xv. Bending radii for cables shall be as per manufactures recommendations and IS: 1255.
- xvi. For laying/termination of cables latest BIS/IEC Codes/ standards shall be followed.

### **28.2.8 FACTORY TESTING**

- i. 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.
- ii. 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.

### **28.2.9 ARRAY SUPPORT STRUCTURE**

- i. 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.
- ii. 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.
- iii. 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.
- iv. 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

- v. The PV module mounting structure shall have a capacity to withstand a wind velocity of 150 km/hr unless specified for dedicated requirements
- vi. 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.
- vii. 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.
- viii. 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.
- ix. The Bolts, Nuts, fasteners, and clamps used for panel mounting shall be of Stainless-Steel SS 304.
- x. 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.
- xi. 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
- xii. Aluminium structures used shall be protected against rusting either by coating or anodization. Aluminium frames should be avoided for installations in coastal areas.
- xiii. 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.
- xiv. Screw fasteners shall use existing mounting holes provided by module manufacturer. No additional holes shall be drilled on module frames
- xv. The total load of the structure (when installed with PV modules) on the roof should be less than 60 kg/m<sup>2</sup>.
- xvi. Minimum distance between the lower level of PV Module and the ground shall be 0.6m from the ground level.

- xvii. The PV Panel area shall be accessible for cleaning and for any repair work.
- xviii. 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.
- xix. Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance.
- xx. Installation of structure for solar PV mounting should not tamper with the water proofing of the roofs.
- xxi. The Rooftop Structures maybe classified in three broad categories as follows (drawings at **Format-D**). 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 than 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 module 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 shall 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.

#### **28.2.10 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 in order to protect the installation against fire hazards. The SPD should be provided in the AC Distribution Box as well.

#### **28.2.11 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)

- i. 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.

- ii. 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
- iii. In any case, the cross-section area of the earthing conductor for PV equipment should not be less than 6 mm<sup>2</sup> if copper, 10 mm<sup>2</sup> if aluminium or 70 mm<sup>2</sup> if hot-dipped galvanized iron. For the earthing of lightning arrestor, cross-section of the earthing conductor should not be less than 16 mm<sup>2</sup> of copper or 70 mm<sup>2</sup> if hot-dipped galvanized iron. The minimum length of the earth electrode must be in compliance with the National Building Code of India 2016. The complete Earthing system shall be mechanically & electrically connected to provide independent return to earth.
- iv. 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. 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.
- v. 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.
- vi. 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.
- vii. 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 GI earth strip must be minimum 25mm X 6mm
- viii. 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.
- ix. 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.

- x. Necessary provisions shall be made for bolted isolating joints of each earthing pit for periodic checking of earth resistance.
- xi. For each earth pit, a necessary test point shall be provided.
- xii. Total no of Earth pits required for solar plants shall be as per the Electrical Inspectorate norms.

### **28.2.12 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.
- 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.

### **28.2.13 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 incomer shall be selected at required rating. The ACDB enclosure shall be of good protection and suitable for mounting on the trenches / on wall.
- e. 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
- f. 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.
- g. Junction boxes, enclosures, panels for inverters/ Controllers shall meet IP 65 (for indoor) as per IEC 529.

#### **28.2.14 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.
- b. DC panel should be equipped with an adequate capacity indoor DC circuit breaker along with control circuit, protection relays, fuses, annunciators and remote operating and controlling facility from the main control facility.
- c. 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.

#### **28.2.15 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. Junction boxes, enclosures for inverters/ charge controllers shall meet IP 54 (for outdoor)/ IP 21 (for indoor) as per IEC 529.

### **28.2.16 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.

### **28.2.17 CIVIL WORKS**

While installing solar power plants 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.

#### **28.2.18 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 to the Kerala State Electricity Regulatory Commission (Grid Interactive Distributed Solar Energy Systems) Regulations 2014 Clauses (8) & (9) (Notification No. 2096/KSERC/CT/2014 dt. 10<sup>th</sup> June 2014)

#### **28.2.19 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. Licenced 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 KVA<sub>r</sub>, 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)

#### **28.2.20 PERMISSION FROM KSEBL 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

## **29. TESTING AND INSPECTION**

All tests shall be carried out as per relevant standards at Vendor works. ANERT reserves the right to witness all tests and carryout inspection or authorize his representatives to witness all tests and carry out inspection. For this Vendor shall notify ANERT at least 5 days in advance giving exact details of tests that would be carried out.

## **30. WARRANTY**

- i. The complete system should be warranted against any manufacturing defect or bad workmanship at least for a period of 5 (five) years from the date of commissioning of the systems. This includes replacements of spare part and labour if any.
- ii. Warranty certificate to the above effect must be furnished along with the commissioning reports. Any defect noticed during warranty period should be rectified / replaced by the supplier free of cost upon due intimation by ANERT.

### 31. DISPLAY BOARD

- a. The logo of ANERT and details of the scheme as specified in the work order are to be provided.
- b. The board shall be made of GI/SS of min thickness 20 SWG having size 60cm x 30 cm. The matter is to be printed in RGB combination

### 32. INSURANCE

- i. The power plant must be insured at every stage of operation – from Material dispatch, storage, completion of installation and till 1 years (5 years after commissioning for Solar). The insurance coverage on handing over of the system must include all conditions of **Standard Fire and Special Perils Policy (Material Damage)**. Also, the damages from wildlife and natural calamity are to be covered in addition,
- ii. The insurance premium for the 5 years of warranty is to be paid by the bidder. Only the system components are to be insured. 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.

### 33. STANDARDS

The Design, Engineering, Manufacture, Supply, Installation, Testing and performance of the equipment shall be in accordance with latest appropriate IEC/ Indian Standards and as detailed in the Technical Specifications Section as per the MNRE / ANERT requirements of the bid document. The goods supplied under this contract shall confirm to the Standards mentioned, where appropriate Standards and Codes are not available, other suitable standards and codes as approved by the authoritative Indian Standards shall be used.

### 34. ENGINEERING DRAWINGS

The bidder should submit the Cold storage design drawings for approval. ANERT reserves the right to modify the landscaping design, Layout and specification of sub-

systems and components at any stage as per local site conditions/requirements. The bidder shall submit preliminary drawing for approval & based on any modification or recommendation, if any.

The Contractor shall furnish the following drawings Award/Intent and obtain approval:

- a. General arrangement and dimensioned layout including foundation
- b. Schematic drawing showing the requirement of SPV panel, Power conditioning Unit(s)/ inverter, Junction Boxes, AC and DC Distribution Boards, meters, condensing unit, thermal unit etc.
- c. Structural drawing for solar plant.

## FORMAT FOR COVERING LETTER

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*(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 supply, under annexed terms and conditions of contract, the whole of the articles referred to 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:

Signature

Date:

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.	Annual turnover of the firm during last five years (Rs.) (Proof to be enclosed)	2021-22 .....  2020-21 .....  2019-20 .....  2018-19 .....  2017-18 .....
8.	No. of service centres /Authorised service providers in Kerala (Proof to be enclosed)	

9.	Whether Bidder was/is De-barred by ANERT (Yes/No)? If ' Yes' period of De-Barring:	
10.	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

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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 ***EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)*** 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 Fifteen 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.

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 whereof 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

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e-Tender Notification No: ....., dtd ..... for  
EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar  
Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under  
Solar City Project (funded by Smart City Thiruvananthapuram Ltd)

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
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. Our firm has obtained the certifications from MNRE or NABL approved Test laboratories that the goods and services are satisfying the technical criteria specified in the bid.

Signature

Date

Name

## ANNEXURE D – DECLARATION OF RELATIONSHIP WITH ANERT EMPLOYEE

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

Tender Notification No.: .....

EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)

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

## **FORMAT A – UNDERTAKING FOR NO BLACKLISTING & NO BANNING**

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*(To be provided on Rs.200 Non-Judicial Stamp paper. In Case of JV the following format is to be provided by Each Member of the Joint Venture on their respective letterhead, signed by respective authorized Signatory along with Authorized Signatory for which POA is attached with Bid))*

### **Undertaking for No Blacklisting & No Banning**

To

The CEO  
ANERT

**Sub:** EoI for the Design, Supply, Installation, Testing and Commissioning of 2 Nos of 100 kg Solar Powered Rapid Waste to Manure converter on Pilot basis in Thiruvananthapuram under Solar City Project (funded by Smart City Thiruvananthapuram Ltd)

I / We hereby declare that presently our Company/Limited Liability Partnership/ Partnership Firm/ Sole Proprietorship is having unblemished record and is not declared ineligible for corrupt/fraudulent practices by any State/Central Government/PSU on the date of Bid Submission.

I / We further declare that presently our Company/Limited Liability Partnership/ Partnership Firm/ Sole Proprietorship is not blacklisted and not declared ineligible for reasons other than corrupt/fraudulent practices by any State/Central Government/PSU on the date of Bid Submission.

If this declaration is found to be incorrect then without prejudice to any other action that may be taken, our security may be forfeited in full and the tender if any to the extent accepted may be cancelled.

**(Signature & Seal of Authorized Signatory for which POA attached)**

**Name of Authorized Signatory:**

**Designation:**

**Date:**

**Place:**

## FORMAT B – CERTIFICATE OF BIDDER’S FINANCIAL QUALIFICATION

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

### Financial Qualification Certificate

(Rupees in Crores)

S/N	Financial parameters	FY 17-18	FY 18-19	FY 19-20	FY 20-21	FY 21-22
1.	<b>Net Worth</b>					
a)	Paid up Capital					
b)	Free Reserves and Surplus*					
c)	Misc expenses to the extent not written off					
	<b>Net Worth (a+b-c)</b>					
2.	<b>Annual Turnover **</b>					

\* Free Reserve and Surplus shall be Exclusive of Revaluation Reserve, written back of Depreciation Provision and Amalgamation.

\*\* Annual total Income/ turnover as incorporated in the Profit and Loss Account excluding non-recurring income, i.e., sale of fixed asset etc.

It is certified that all the figures are based on audited accounts read with auditors report and Notes to Accounts etc.

#### (Signature & Seal of Authorized Signatory

**Name of Authorized Signatory:**

**Designation:**

**Date:**

**Place:**

**Certifying Chartered Accountant:**

**Name of Firm:**

**UDIN No:**

**Date:**

**Place:**

#### **Note:**

1. In addition to above certificate from Chartered Accountant, Bidder is required to submit Firm's Annual Audit Report, Balance sheet, Profit & Loss and Income Tax Returns / CA certificate for last Five years i.e., F.Y: 2015-16, 2016-17, 2017-18, 2018-19 & 2019-20.

## FORMAT C – COMPONENT

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### BID SECURITY BANK GUARANTEE

BG No. :  
Amount :  
Date :  
Valid up to :

This guarantee is made on this ..... day of ..... 20.... by ..... (Complete postal address of the bank) hereinafter called 'the **Bank**', which expression shall unless repugnant to the context or meaning thereof shall include its successors and assigns.

WHEREAS the **ANERT**, having its registered office at PMG-Law College Rd, Vikas Bhavan PO, Thiruvananthapuram, Kerala, PIN – 695 033, hereinafter called as **ANERT**, which expression shall unless repugnant to the context or meaning thereof shall include its successors and assigns in having agreed to exempt .....(hereinafter called “**contractor(s)**” which expression unless repugnant to the context and meaning thereof shall include its successors and assigns) from depositing with **ANERT**, a sum of Rs. .... towards Security Deposit in lieu of the said **contractor(s)** having agreed to furnish a bank guarantee for the said sum of Rs. .... as required under the terms and conditions of Tender No. .... dated ..... (hereinafter referred as the 'bid') placed by the **ANERT**, on the said **contractor(s)** and on specific request on the part of the said **Contractor(s)**, we the **Bank** hereby unconditionally and irrevocably affirm and undertake-

On production of the Bank Guarantee for Rs..... (Rupees..... only) we, .....Bank having our Head Office at ..... (herein after referred to as “the Bank”) at the request of M/s. ....(name of contractor) do hereby undertake to pay to the **ANERT** an amount not exceeding Rs..... (Rupees ..... only), against any loss or damage

caused to or suffered or would be caused to or suffered by the ANERT by reason of any breach by the said contractor of any of the terms and conditions contained in the said agreement

We, .....Bank, do hereby undertake to pay the amount due and payable under this Guarantee without any demur, merely on a demand from the ANERT stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the ANERT by reasons of breach by the said contractor of any of the terms or conditions contained in the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. .... (Rupees ..... only).

This guarantee will not be discharged due to change in the constitution of the bank or the contractor/supplier.

**Notwithstanding anything contained hereinbefore:**

- 1) Our liability under this Bank Guarantee shall not exceed Rs.....(Rupees .... only)
- 2) This Bank Guarantee shall be valid upto .....
- 3) We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee amount only and only if you serve us a written claim or demand on or before.....

Dated at ..... this .... day of ..... 2023

SIGNATURE OF THE BANK \_\_\_\_\_

SEAL OF THE BANK \_\_\_\_\_

SIGNATURE OF THE WITNESS \_\_\_\_\_

Name and Address of the Witness \_\_\_\_\_

*The bank guarantee shall be issued by a bank (Nationalized/Scheduled) located in India*