Tender Document

Tender for Supply Installation and Commissioning of 3 Phase 4 wire 50kW$_p$ ON Grid LT Rooftop PV Solar power plant with Civil works

For proposed Incubation centre in FEAT, Annamalai University under RUSA Scheme.

Tender No.

AU/DRD/RUSA 2.0/AIIRF/Solar power plant/Tender/04/2020-21

Registrar, Annamalai University Annamalainagar 608 002

Tel: 04144-238259, Fax: 04144-238080

Visit us at
http://www.annamalaiuniversity.ac.in

CONTENT OF THE BID DOCUMENT

SECTION-A TENDER ELIGIBILITY & INSTRUCTIONS		
Sl. No	**Description**	**Page No.**
1.	Introduction	12
2.	Tender Data Sheet	13
3.	Tender Cost and EMD	14-15
	3.1 Cost of Bidding	14
	3.2 Tender Document fee	14
	3.3 Earnest Money Deposit (EMD)	14-15
4.	Tender Eligibility Criteria	16
5.	Instructions to the Bidder	17-19
	5.1 General Instructions	17
	5.2 Language of the Bids	17
	5.3 Bid Currency	17
	5.4 Clarifications and Amendments	18
	5.5 Contacting Tender Inviting Authority	18
	5.6 Bar of Jurisdiction	19

SECTION –B
BID SUBMISSION AND EVALUATION

SECTION –D TECHNICAL SPECIFICATIONS		
14.	Technical Specifications for SPV Rooftop Systems	30-40
	14.1 Introduction	30
	14.2 Quality and WorkmanShip	30
	14.3 Sysyem Configuration	31
	14.4 Specification of Solar PV Modules	31-32
	14.5 Solar PV Modules Mounting Structure	32-33
	14.6 Solar Array Fuse	33
	14.7 Solar Grid Inverter	33-35
	14.8 DC Distribution Box	35-36
	14.9 AC Distribution Box	36
	14.10 Grid Connection Features	36
	14.11 Cables	36-37
	14.12 Earthing	37
	14.13 Surge Protection	38
	14.14 junction Box	38
	14.15 Caution Signs	38-39
	14.16 Metering	39
	14.17 Documentation	40
	14.18 Test Certificates and Reports to be Furnished	40
	14.19 Insurance under the scope of University	40
	14.20 Project Duration	40

ACRONYMS		
#	**Parameter**	**Details**
1.	AC	Alternating Current
2.	BIS	Bureau of Indian Standard
3.	BoS	Balance of System
4.	CMC	Comprehensive Maintenance Charges
5.	DC	Direct Current
6.	DIN	Deutsche Industries Norm
7.	IEC	International Electro Technical Commission
8.	MPPT	Maximum Power Point Tracking
9.	NABL	National Accreditation Board for testing and calibration Laboratories
10.	PCU	Power Conditioning Unit
11.	PWM	Pulse Width Modulation
12.	RFID	Radio Frequency Identification
13.	STC	Standard Testing Conditions
14.	THD	Total Harmonic Distortion
15.	BOM	Bill of Materials

SHORT TITLES USED IN THE TENDER DOCUMENT		
1.	Bidder	Bidder means the party who makes a formal offer in pursuance of the Tender floated.
2.	Successful Bidder	Successful bidder means the bidder who becomes successful through the Tender Process
3.	Day	A day means a calendar day.
4.	Service Centre	Service Centre means the centre or place, wherein the Bidder, inter-alia undertakes and performs the service activities relating to the solar Rooftop systems indicated in the Tender and shall include a Direct service centre or Authorized service centre.
5.	Authorized Service Centre	Authorized Service Centre means a Service Centre run by the Bidder through another party by entering into a valid commercial agreement.
6.	Testing Agency	Testing Agency notified by ANNAMALAI UNIVERSITY for the purpose of sample testing.
7.	Annual Cost	Cost means the total cost to be incurred towards the Supply, installation, commissioning and maintenance of SPV Rooftop Systems after warranty period.
8.	Purchaser	Purchaser means the domestic applicant for whom the price discovery made through this Tender.
9.	ANNAMALAI UNIVERSITY	Institute Governed by Government of Tamil Nadu which is proposing this scheme.
10.	Commissioning	Commissioning means the Rooftop would have energized through SPV system and the functioning has to be tested by testing agency.

CHECKLIST FOR ENCLOSURES

(Bidder shall fill up YES or NO without fail)

#	Bid Enclosures	YES/ NO	Page No.
1.	Whether the Tender is submitted in Two covers (Techno Commercial Bid and Price Bid)?		
2.	Whether Two covers are put into an outer cover?		
3.	**Whether Technical Bid (Envelope- A) contains the following**		
3.1	Earnest Money Deposit (EMD) amount as specified in the Tender.		
3.2	Letter certifying number of pages in bid document as per format F5 (Page no 65).		
3.3	Bidder's undertaking covering letter as per Format F3 in the Letter Head signed by the authority & stamped (Page no 59).		
3.4	Filled up Technical Bid signed by the authority & stamped		
3.5	**Supporting documents to meet the Eligibility Criteria** All documents shall be in English only. Documents in any other language shall be accompanied by an accurate translation in English, duly notarized and signed by the authority and stamped in all pages a) Bidder's Certificate of Incorporation / Registration Certificate of Incorporation. b) Balance Sheet and Profit & Loss accounts for all three of the audited years from 2017 -18, 2018- 19, 2019 - 20. c) Copy of Work Orders along with proof for satisfactory completion of that work. d) Bidders undertaking letter for not currently black listed		
3.6	Following Test Certificates / Reports as per clause 15 i) SPV Modules IEC 61215 / IS 14286 IEC 61730 Part 1 & 2 IEC 61701 STC Performance Report from accredited laboratories		

ii) Solar Grid –Tie Inverter IEC61683 & IEC60068-2(1,2,14,30) Anti-Islanding protection As per VDE 0126-1-1 / IEC60255.5 / IEC 60255.27 Safety Compliance, IEC 62109-1 & 2 , Galvanic Isolation

iii) BALANCE OF SYSTEMS (Certificates or Letter of Undertaking)

a) Cables- IEC 60227/IS 694, IEC 60502/IS 1554 (Pt.I& II)

b) Switches / Circuit Breakers/ Connectors – IS/ IEC 60947 part I,II,III & EN 50521

c) SPD – As per IEC 60364-5-53

d) Junction Boxes/Distribution boxes- IP 65 for Outdoor and IP 54 for indoor

e) L.T panel

Synchronizing Panel/LT Isolator Switch

4. **F.1 Techno Commercial Bid Format (Envelope-A)**
5. W**hether Price Bid (Envelope-B) contains the following**

   a) Filled Price Bid with signature and stamp in all pages.

   b) Whether corrections or overwriting if any is attested?
6. Whether Bid documents are page numbered & bound

Note: Envelope B will be opened only if the Techo Commercial bid contained in **Envelope A** satisfies Annamalai University requirement

IMPORTANT NOTE:

Bidders must ensure that they submit all the required documents indicated in the Tender document without fail. Bids received without supporting documents for the various requirements mentioned in the tender document or test certificate are liable to be rejected. The data sheet for the critical components shall be submitted by the Bidder for the scrutiny.

Bid documents shall be **page numbered & bound**. Any lose documents or documents which are not page numbered shall not be accepted.

SECTION –A

TENDER ELIGIBILITY AND INSTRUCTIONS

1. INTRODUCTION

Annamalai University has issued orders for implementation of Solar Rooftop Photovoltaic Power Plant Under RUSA Scheme. Under this scheme, Fund will be provided towards installation of ON Grid tied battery less Solar Rooftop Photovoltaic power plants of 50kWp capacity LT for catering to part 1oad of Incubation centre in FEAT Annamalai University. The generated solar power from the rooftop shall be consumed in the premises, of Incubation centre itself.

On behalf of Annamalai University under this scheme therein after called purchasers, **REGISTRAR, ANNAMALAI UNIVERSITY** therefore calls for National Level Price Discovery Bidding for Supply, Installation and Commissioning of Solar Rooftop Power plant in Annamalai University Under RUSA Scheme. Bidders can quote for 50 kWp, grid tied SPV systems.

The list of Successful bidder(s) selected based on their prices, installation experience and annual turnover shall be called for price negotiation by purchase committee constituted by the Vice-Chancellor, ANNAMALAI UNIVERSITY. The purchaser shall issue work order directly to the bidder.

The Successful Bidder(s) shall work based on norms framed by Annamalai University in implementing the above work and ensure successful installation. Installations will have to be done within 90 days of receipt of work order from the purchaser.

The project pertains to a clean (Solar Energy) intended to reduce carbon emissions. The project is not viable without consideration of the Clean Development Mechanism (CDM) revenue. The CDM benefit will be availed by ANNAMALAI UNIVERSITY.

2. TENDER DATA SHEET

1.	Tender inviting Authority, Designation and Address	**The Registrar** Annamalai University Annamalai Nagar, Chidambaram-608002 (INDIA) Phone: +91- 4144238259 Fax: +91-4144238080 Email: au_regr@ymail.com
2.	Name of the Work	Tender for Supply, Installation and commissioning of 50 kW peak Grid tied Solar Rooftop Power plants in LT mode of operation with bi directional meter in Incubation centre FEAT in Annamalai University.
	Tender Reference	AU/DRD/RUSA 2.0/AIIRF/Solar power plant/Tender/04/2020-21
3	Cost of Tender Document Fee	Rs.2,100/-
4	Earnest Money Deposit (EMD)	Rs.40,000/-
5	Date & time of submission of Tender	22.02.2021 - 10.45 a.m.
6	Due Date & Time of submission of Tender	09.03.2021 - 05.00 p.m.
7	Date, Time and Place of Tender opening	10.03.2021 – 10.30 a.m. Senate Hall
8	Date, Time and Place of opening of Price Bids	Will be intimated only to the bidders qualified in Techno Commercial bid.

3. Tender cost and EMD

3.1 Cost of Bidding

The Bidders shall bear all costs associated with the preparation and submission of Bids. Annamalai University will in no way be responsible or liable for these charges/costs incurred regardless of the conduct or outcome of the bidding process.

3.2 Tender Document Fee

a) Cost of the Tender Document Fee: Rs.2100/-

b) The Tender document cost may be paid by way of Demand Draft in favour of the Registrar, Annamalai University, payable at Annamalai Nagar.

c) The Tender document may be downloaded from www.annamalaiuniversity.ac.in and www.tenders.tn.gov.in. The Tender document is not transferable to any other Bidder.

3.3 Earnest Money Deposit (EMD)

a) An EMD amount of Rs.40,000/- (Rupees forty thousand only) shall be paid in Indian Rupees by way of Demand Draft only, from any of the Nationalized/ Scheduled /Foreign banks, drawn in favor of The Registrar payable at Annamalai Nagar. EMD submitted in any other forms will be SUMMARILY REJECTED.

b) The EMD shall be kept in the Techno Commercial Bid Cover.

c) The EMD amount of the bidders not qualified in the Techno commercial bid will be refunded immediately after rejection of their techno-commercial bid. The EMD amount of the bidders qualified in the techno commercial bid will be refunded after finalization and signing of agreement with the successful bidder(s). The EMD amount held by Annamalai University till it is refunded to the Bidders will not earn any interest thereof.

d) The EMD amount paid by the Successful Bidder(s) will be adjusted towards Security Deposit payable by them. If the successful Bidder submits Security Deposit for the stipulated value in full in the form of DD, the EMD will be refunded.

e) The EMD amount will be forfeited by the Registrar, if the Bidder withdraws the bid during the period of its validity specified in the tender or if the successful Bidder fails to sign the contract and to remit

5% of TPC as security Deposit within the 10 days after receiving of PO.

f) The bids received without the specified EMD amount will be SUMMARILY REJECTED.

g) Industries exempted from payment of EMD shall enclose duly attested Photostat copy of their Registration Certificate showing the **materials** viz. SPV panels, Inverters and PV System Electronics they are permitted to manufacture/to do services and the period of validity of the certificate as proof of eligibility for exemption from payment of EMD.

h) Those Bidders who are exempted from payment of E.M.D shall furnish in lieu of EMD an under taking in a non-judicial stamp paper of value not less than Rs 200/- (only) to the effect to pay penalty an amount equivalent to EMD in the event of non-fulfillment or non-observance of any of the conditions stipulated in the contract consequent to such breach of contract.

i) Duly attested Photostat copy of Registration certificate and Undertaking and proof of exemption of EMD as specified in clause A-2 shall be kept in the EMD cover. TENDERS RECEIVED WITHOUT PROOF FOR EXEMPTION OF EMD AND UNDERTAKING WILL NOT BE READ OUT AND WILL BE **REJECTED SUMMARILY**.

4. TENDER ELIGIBILITY CRITERIA

The Bidder(s) shall meet the following Eligibility Criteria to participate in the Tender and shall enclose documentary proof for fulfilling the Eligibility in the Techno commercial Bid.

S.No	Minimum Eligibility Criteria	Proof to be submitted for fulfilling the Eligibility Criteria
1.	(a)The Bidder shall be a Registered Manufacturing Company/ Firm in India of SPV Cells/Modules OR PV System Electronics .	Certificate of Incorporation or Registration or Relevant proof for manufacturing company or firms or PV systems Integrator shall be submitted
2.	It is mandatory that the bidder should be TEDA enlisted/ TEDA or MNRE approved channel partners	Relevant proof for TEDA or MNRE approved channel partners.
3.	Bidder shall have a minimum turnover of 100 lakhs in any one of the audited year from 2017 – 2020	a) Balance sheet. b) Profit and loss accounts for any one of the audited year from 2017 – 2020 shall be submitted toward meeting annual turnover criteria.
4.	Bidder shall have installation experience of 20 Solar Rooftop systems of min 50kW at least in India, these systems shall be working satisfactorily. Installation experience will also be considered totally by Bidder. Various components of the SPV system shall conform to the standards as per Section-"D"	Copy of Work Orders and performance certificate for satisfactory function of those SPV systems obtained from the end user if the system cost was paid by the end user . Copy of test certificates along with reports for SPV module, Solar Grid Tie inverter shall be submitted.
5.	Bidder(s) shall not be currently blacklisted by any of the State or Central Government or organizations of the State or Central Government or Union Territories of India as on date of submission of tender	Necessary Undertaking letter shall be furnished.

5. Instructions to the Bidder

5.1 General Instructions

a) It must be clearly understood that the Terms and Conditions and specifications are intended to be strictly enforced. No escalation of cost in the Tender by the Bidder will be permitted throughout the period of work completion.

b) The Bidder shall make all arrangements as part of the contract for Supply, Installation, Commissioning and 5 years AMC Annual Maintenance of SPV Rooftop systems after the warranty period and train the beneficiaries at various locations at their own cost during the warranty period specified in the tender documents. AMC is at the discretion of the purchaser.

c) The Bidder shall be fully and completely responsible to Purchaser, for all the deliveries and deliverables. The bidder shall be responsible for the proper functioning of the finally erected systems.

d) The Bidder shall quote for

(1) 50kWp PV panel capable of synchronizing with 0.43 LT grid alone.

(2) 50kWp PV panel capable of synchronizing with LT grid and LT diesel Genset available in FEAT.

Note: In the event of power failure from TANGEDCO for the first case auto isolation scheme should be provided for entire 50kWp PV system so as to isolate from the LT diesel genset.

5.2 Language of the Bids

The bid prepared by the Bidder as well as all correspondence and documents relating to the bid shall be in **English only** and shall be legible. The supporting documents and printed literature furnished by the Bidder in any other language shall necessarily be accompanied by an accurate translation in English duly notarized, in which case, for all purposes of the Bid, the translation shall govern. **Bids received without such translation copy will be rejected.**

5.3 Bid Currency

Price shall be quoted in Indian Rupees (INR) only. Price quoted in any currency other than INR will be rejected.

5.4 Clarifications and Amendments

a) A prospective Bidder requiring any clarification in the Tender may address to the Registrar by Registered post or by personal delivery under acknowledgement. No clarifications will be offered by the university within 48 hrs prior to the time of opening of the Tender.

b) A pre-bid meeting will be held, for addressing the clarifications, on the date and time mentioned in the Tender Data sheet or any other date decided by Annamalai University. The Bidders are requested to participate in the Pre-bid meeting for clarifications.

c) Before the closing date of the Tender, clarifications and amendments if any will be notified in the university website http://www.annamalaiuniversity.ac.in. The Bidders shall periodically check for the amendments or corrigendum or information in the website till the closing date of this Tender. University will not make any individual communication and will in no way be responsible for any ignorance pleaded by Bidders.

d) Purchaser is not responsible for any misinterpretation of the provisions of this tender document on account of the Bidders failure to update the Bid documents based on changes announced through.

5.5 Contacting Tender Inviting Authority

a) Bidders shall not make attempts to establish unsolicited and un authorized contact with the Tender Inviting Authority or Tender Evaluation Committee or Tender Accepting Authority after the opening of the Tender and prior to the notification of the Award and any attempt by any Bidder to bring, to bear extraneous pressures on the Tender Inviting/Evaluation/Accepting Authority which may lead to disqualification of the Bidder.

b) Tender Form Notwithstanding anything mentioned above, the Tender Inviting/Evaluation/Accepting Authority may seek bona-fide clarifications from Bidders relating to the tenders submitted by them during the evaluation of tenders.

5.6. Bar of Jurisdiction:

Same as otherwise provided in Tamil Nadu Transparency in Tender Act 1998, no order passed or proceeding taken by any officer or authority under this act shall be called in question in any Court and no injunction shall be granted by any court in respect of any action taken or to be taken by such officer or authority in pursuance of any power conferred by or under the above Act.

Since the purchaser shall directly select and issue the work order to the successful bidder, Court shall in no way be responsible for any dispute arising between Bidder and the Purchaser.

Section-B
Bid Submission and Evaluation

6. BID PREPARATION

Bidders shall examine all Instructions, Terms and Conditions and Technical specifications as given in the Tender documents. Failure to furnish information required by the Bid or submission of Bids not substantially responsive or viable in every respect will be at the Bidder's risk and may result in rejection of Bids. Bidders shall strictly submit the Bid as specified in the Tender, failing which the bids will be held as non-responsive and will be rejected.

6.1.1 Test Certificates/Reports and Samples

6.1.2 The bidder shall submit the test certificates / reports of PV modules and Solar Grid tie Inverters, Bidirectional meters, synchronizing panel etc. for the 50kW$_p$ grid tie system (whichever is applicable as per the quote of bidder) from the notified testing agencies, as per "Section D"(Page no 33) .

6.1.3 Any bids received without the test certificates/reports will be summarily rejected for non-responsive to the tender condition.

7. BID SUBMISSION

The Bids shall be submitted as per the instructions given below in the sub sections. The Bids shall be addressed to "The Registrar, Annamalai University, Annamalai Nagar, Chidambaram 608001, Tamil Nadu, India. **Only bound bids** with all pages **serially numbered** alone will be accepted.

7.1 Techno commercial Bid (Envelope-A)

a) The Techno commercial Bid enables the technical committee to evaluate whether the Bidder is techno commercially competent and capable of executing the order. Only those Bids which qualify in the Techno commercial stage will be eligible for the Price bid opening. The Price Bids of Bidders who failed in the Techno commercial stage will not be opened.

b) The Techno commercial Bid format as given in the Tender shall be filled, signed and stamped in all pages.

c) The Techno commercial Bid shall strictly not contain any **Price indications or otherwise the Bid will be summarily rejected**.

7.1.1 Details to be furnished in the Techno Commercial Bid

a) The tender fee amount shall be submitted in the prescribed format.

b) The EMD amount shall be submitted in the prescribed form.

c) The Techno Commercial Bid shall be duly filled, signed by the authorized person and stamped in all the pages and shall be submitted.

d) The supporting documents to prove Bidder's eligibility shall be duly attested by the authorized person and shall be submitted.

e) Test certificates / reports shall be submitted for components of quoted grid tie systems from notified testing agencies, as per "Section – D".

f) All the required documents insisted in the Tender shall be enclosed in the Techno Commercial Bid.

7.1.2 Signing the Techno Commercial Bid

a) The Bids shall be typed and shall be signed by the Authorized Official(s) of Bidder. All pages of the bid shall be signed and stamped by the authorized person.

b) Any alterations, deletions or overwriting will be treated as valid only if they are attested by the full signature of the authorized person.

7.1.3 Sealing the Techno Commercial Bid

The Techno Commercial bid shall be placed in a separate cover (Envelope-A) and sealed appropriately. The Techno Commercial bid cover shall be super scribed with "Techno Commercial Bid (Envelope A) –

7.2 Price Bid (Envelope-B)

7.2.1 Details to be furnished

a) All the Price items as mentioned in the Tender shall be filled in the Price Bid format. The prices quoted shall be in INDIAN RUPESS (INR) only. The Tender is Liable for rejection if Price Bid contains conditional offers or partial offers and if quoted in any currency other than INR.

b) The cost quoted by the Bidder shall include the breakup cost of the quoted grid – tie system viz., PV panel, Inverter, Bidirectional meter and AC power panel with metering arrangements.

c) The cost quoted by the Bidder shall be kept firm for a period specified in the Tender from the date of opening of the Tender. **The Bidder shall keep the Price firm during the execution period including the period of extension of time if any.**

7.2.2 Signing the Price Bid

a) The Bids shall be typed and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the Contract.

b) Any alterations, deletions or overwriting shall be treated valid only if they are attested by full signature by the authorized person.

7.2.3 Sealing the Price Bid

The price Bid should be sealed in separate cover by super scribing with Price Bid (envelope B).

7.3 Outer Cover Should contain both technical bid envelope A and price bid envelope B and sealed addressed to

The Registrar, Annamalai University, Annamalai Nagar, Chidambaram 608001, Tamil Nadu, India

7.4 Mode of Submission of Bids

a) The Bids shall be dropped in the Tender box kept in front of Registrar office Annamalai University Annamalai Nagar , Tamil Nadu, India, on or before the due date and time. The Bids will not be received personally.

b) Alternatively, if the Bidder prefers to submit the Bid by post, the Bidders shall ensure that the Bid reaches on or before the due date and time. Purchaser will not be liable or responsible for any postal delay or any other delay whatsoever.

c) The Bids received after Due Date and Time or Unsealed or in incomplete shape or submitted by in person or any other mode will be summarily rejected

7.5 Modification and withdrawal of Bids

The Bids once submitted cannot be modified or amended or withdrawn.

8. BID OPENING

8.1 Techno Commercial Bid Opening

The Techno commercial Bid cover will be opened at Annamalai University on the date and time as specified in the Tender Data sheet or any other date published in the website specified.. The representative(s) of the Bidder who chooses to attend Tender opening shall bring an authorization letter from the Bidder. A maximum of two representatives for each Bidder would be allowed to attend the Tender opening. **On opening the Techno Commercial bid cover, if Tender fee and EMD in the prescribed form is not found, the bid will be summarily rejected.**

8.2 Tender Validity

a) Bids submitted shall remain valid for a period of 180 days from the date of Tender opening. If the bid validity is lesser than 180 days, the Bid will be rejected as non-responsive.

b) In exceptional circumstances, The Registrar may solicit the Bidders to extend the validity. The Bidder shall extend price validity and Bid security validity.

8.3 Initial Scrutiny

Initial Bid scrutiny will be held and on scrutiny following will be treated as non-responsive.

- Tender received **without** Tender fee and EMD amount
- Tender **not** submitted in two parts as specified in the Tender and signed and stamped in all pages of the Bid
- Tender where all documents are not page numbered and not bound

All responsive Bids will be considered for further evaluation. The decision of Registrar will be final in this regard.

8.4 Clarifications by ANNAMALAI UNIVERSITY

When deemed necessary, University may seek bona-fide clarifications and call for supporting historical documents if required on any aspect from the Bidder. However, that would not entitle the Bidder to change or cause any change in the substance of the Bid or price quoted. During the course of Techno commercial Bid evaluation, University may seek additional information or historical documents for verification to facilitate decision

making. In case, the Bidder failed to comply with the requirements of the purchaser as stated above, such Bids may at the discretion of the Registrar , shall be rejected as technically non-responsive.

8.5 Price Bid Opening

The Price Bids will be opened in the presence of the responsive Bidders or their authorized representatives (maximum two) will be allowed to take part in the Price Bid opening.

9. BID EVALUATION

9.1 Suppression of facts and misleading information

a) During the Bid evaluation, if any suppression or misrepresentation of information is brought to the notice of authorities, Annamalai University, **Registrar** shall have the right to reject the Bid and if after selection, would terminate further installation as the case may be, and will be without any compensation to the Bidder and the EMD/ Security Deposit as the case may be, shall be forfeited.

b) Bidders shall note that any figures in the proof documents submitted by the Bidders for proving their eligibility is found suppressed or erased, Registrar shall have the right to seek the correct facts and figures or reject such Bids.

c) The Tender calls for full copies of documents to prove the Bidder's experience, capacity and other requirements to undertake the project

9.2 Techno Commercial Bid Evaluation

a) The Bidders who have duly complied with the Eligibility Criteria will be eligible for further processing.

b) The Tenders, which do not conform to the Technical Specifications or Tender conditions or Bids without Test certificates/reports on the components offered or Tenders from Bidders without adequate capabilities for supply & installation, will be rejected. The Eligible Bidders alone will be considered for further evaluation.

9.3 Price Bid Evaluation

1. The Price evaluation will include all Duties and Taxes

(i) In cases of discrepancy between the cost quoted in Words and in Figures, the lower of the two will be considered.

(ii) In case of discrepancy between the actual total of price break up and the total mentioned in the bid, the lower of the two will be considered.

2. Under no circumstances shall a tenderer increase his price during the validity period after tenders are opened. Any tenderer who does so shall not only lose his EMD **but also run the risk of being Black listed by the purchaser,** Who also reserves the right under the law to recover damages resulting there from, in addition to forfeiture of EMD.

9.4 Award of Contract

1) No dispute can be raised by any Bidder whose Bid has been rejected and no claims will be entertained or paid on this account.

9.5 Banning of business deal:

The bidder will be banned from business with Annamalai University if any of the particulars produced by the bidder such as Auditor Certificate, Annual account, GST & other Taxes, Clearance Certificate, Test certificate, etc. are found to be incorrect, or if there is breach of any of the conditions in the contract.

Section- C

Award & Execution

10. AWARD OF WORK

10.1 Acceptance of the Tender

The final acceptance of the Tender for installation of solar is entirely vested with the Registrar who reserves the right to accept or reject any or all of the Tenders in full or in part. The Tender accepting authority may also reject any Tender for reasons such as changes in the new technologies, court orders, accidents or calamities and other unforeseen circumstances. After acceptance of the Tender by the Registrar, the Bidder shall have no right to withdraw their Tender or claim higher price.

10.2 Letter of acceptance of the Tender

After acceptance of the Tender by Registrar, a Purchase Order will be sent to the qualified bidder along with intimation to remit/furnish the Security Deposit and agreement within 10 days.

10.3 Payment of Security Deposit (SD)

a) The Successful Bidder will be required to remit the Security Deposit of 5% of TPC (INR only). The SD shall be paid by way of Demand Draft drawn in **favour of the Registrar** payable at **Annamalai Nagar**. **The Security Deposit shall be paid by the Bidder within 10 days** from the date of issue of **letter regarding the qualification of the bidder for installation of Solar by the Registrar, Annamalai University.**

b) The Security Deposit will be refunded to the Successful Bidder on expiry of warranty period for installation of Solar plant under this scheme. The Security Deposit held by the Registrar till it is refunded to the Successful Bidder will not earn any interest there of.

c) The Security Deposit or EMD will be forfeited if the Successful Bidder withdraws the Bid during the period of Bid validity specified in the Tender.

10.4 Execution of Agreement for installation of Roof Top Solar Power Plant

a) The Successful Bidder shall execute an agreement towards installation of Solar in the INR 200 non-judicial stamp paper bought in Tamil Nadu only in the name of the Bidder, within 10 days from the date of Letter of Intimation about qualification by the Registrar.

b) The Successful Bidder shall not assign or make over the benefit or burden thereof to any other person or persons or body corporate for the execution of the contract or any part thereof without the prior written consent of Registrar Annamalai University who reserves its right to cancel the either in part or full, if this condition is violated.

c) In case of the successful bidder fails to execute necessary agreement as prescribed, within the stipulated period, then his EMD will be forfeited and his tender held as non responsive.

10.5 Installation & Completion Schedule

The entire work involving Supply, Installation and Commissioning of Grid tied 50KWp Solar Rooftop power plants shall be completed within 90 days from the date of issue of work order by the purchaser.

11. EXECUTION OF WORK

11.1 Scope of Work

a) Scope of work covers ,Supply, Installation, Commissioning and Testing as per the technical specifications (RFID tag mandatory for the installed equipment).

b) Wiring upto Distribution panel Board from the SPV Rooftop system will be in the scope of the successful bidder. The maximum DC cable length for every Solar power plant installed shall be in the scope of the bidder and supply of excess cable length if required shall be in the scope of bidder themselves.

c) Mounting Structure within the scope of this tender is for flat RCC roofs.

d) Performance testing of the complete system.

e) The installer shall undertake to supply spares free of cost for the maintenance of the offered items during the warranty period.

f) A leaflet containing the details of the service centres shall be provided

to purchaser .

g) If the operation or use of the system proves to be unsatisfactory during the warranty period, the installer shall replace the faulty ones or carry out necessary repairs as per the warranty terms and conditions.

h) After installation of 50KWp systems, with a Safety Certificate should be obtained by the installer under Rule 47A of the Indian Electricity Rules 1956, from the Tamil Nadu Electrical Inspectorate. For the procedure please contact CEIG Office.

11.2 Warranty

1. (a) The SPV panel shall carry a life span of minimum 25 years. However 10 years is mandatory.

   (b) The PCU/Solar Grid tie Inverter shall carry a warranty of minimum 10 years.

2. The complete SPV rooftop systems installed and commissioned shall be under a warranty against any manufacturing or usage defect for a minimum period of 10 years from the date of Commissioning. The mechanical structures, electrical works including power conditioners/inverters/Bidirectional meter, Synchronization Panel etc./ distribution boards/digital meters/ switchgear etc. and overall workmanship of the SPV rooftop systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 10 Years

3. The warranty will be against breakages, malfunctions, non fulfillment of guaranteed performance and breakdowns due to manufacturing defects or defects that may arise due to improper operation of electrical / electronic components of the system but do not include physical damages by the end users.

4. The above warranty shall take effect from the date on which the system is taken over by the purchaser after commissioning.

5. The successful bidder shall be liable to make sure to compensate the loss by replacing the defective product during the warranty period for the entire system free of cost.

6. The warranty will cover all the materials and goods involved in the installation and commissioning of SPV rooftop systems by the successful Bidder.

12 Payment Terms

1. 25% of total project cost would be released on supply of all materials onsite pertaining to installation of 50KWp solar Plant and upto 30% completion of installation. Material supplied would be under the custody of both bidder and purchaser, separate locking system is to be adopted. Materials should not move from the site without the knowledge of purchaser.

2. On 75% completion of installation, 25% of TPC would be released to bidder.

3. After successful commission , testing and appropriate drawing approval, test certificate and safety certificate issued by CEIG, the bidder should produce the invoice copy of German PV cell purchase, inverter 40% of TPC payment would be released for the bidder.

4. After successful running of project for a duration of 60days balance 10 % TPC payment would be released.

13 Validity for Installation of Solar Power Plant

The validity for Installation of Solar and the price accepted will be for 180 days if necessary, it will be extended further.

13.1 Annual Maintenance Cost after Warranty Period

A broad under preventive /routine maintenance shall be included but not limited to the following

1.Cleaning and checking the PV Panels.

2.Regular painting if required for avoiding corrosion.

3.Routine maintenance of PV array including cleaning of modules, checking for physical damage of PV modules, tightening of electrical connection, changing of tilt angle of module mounting structure.

4. Routine maintenance of Inverter and all other electrical distribution boxes, junction boxes ,isolating switches, meters

Section –D

14. Technical Specifications

14.1 Introduction

In grid-tied Solar Photo-Voltaic (SPV) systems, solar energy is fed into the University loads that are connected to the Incubation Center grid available in FEAT through a service connection with shortfall being drawn from the grid. During the night, or when during the day energy demand in the Incubation Center exceeds solar energy production, energy is drawn from the grid. Grid-tied solar PV systems have no battery storage and will work during grid failure with captive LT Gen set in operation. For buildings with grid-tied solar PV systems, KWh are separately recorded.

A grid-tied Solar Photo Voltaic (SPV) power plant consists of SPV array, Module Mounting Structures, Solar Grid Inverter (SGI), control and protection devices, circuit breakers, interconnection cables and switches Bidirectional meter, Synchronization Panel etc..

Components and parts used in the SPV power plants shall conform to the BIS or IEC or other international specifications, wherever such specifications are available and applicable.

14.2 Quality and Workmanship

Solar PV modules are designed to last 25 years or more. It is therefore essential that all system components and parts, including the mounting structures, cables, junction boxes, distribution boxes, MV LT panel LT AC cables, Bidirectional meter, LT sync. Panel, proper earthing, metering panel, control mechanism and other parts should have a life cycle of at least 10 years. Therefore all works shall be undertaken with the highest levels of quality and workmanship. During inspection, ANNAMALAI UNIVERSITY and its representatives will pay special attention to neatness of work execution and conformity with quality and safety norms. Non compliant works will have to be redone at the cost of the Installer.

14.3 System Configurations

Bidders can quote for 50 kWp. System with LT system with synchronization panel and bidirectional meter.

14.4 Specification of Solar PV Modules

Solar PV modules shall be of the Polycrystalline silicon type, manufactured in Germany. Detailed specifications of the solar PV modules are given below:

Type	325Wp Polycrystalline solar module with UV protected TEDLER back sheet
Electrical Characterstics	Power tolerance % 0 +5W Temprature Co effectient of Pmax (% C)<-0.4%/C Vmp (Volt) 36V – 38V Imp (Amp) 8.3A – 8.6A Open Circuit Voltage Voc(Volt) 40V - 46V Short Circuit Current Isc (Amp) 8.5A – 9.5A Temprature Co effectient of Voc (% C)<-0.34%/C Temprature Co effectient of Isc (% C)<+0.04/ C
Origin	Manufactured in Germany only.
Efficiency	>= 16%
Fill factor	>= 70%
Warranty	>=90% of design nominal power after 12 years, >=80% of design nominal power after 25 years.
Module frame	Non-corrosive and electrolytically compatible with the mounting structure material
Termination box	Thermo-plastic, IP 65, UV resistant
Blocking diodes	Schottky type
Module minimum rated power	The nominal power of a single PV module shall not be less than 325w peak.
RF Identification tag for each solar module *RF Identification tag data*	Yes. Must be able to withstand environmental conditions and last the life of the solar module and shall be kept inside the module. 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 cells and module) e) I-V curve for the module f) W_m, I_m, V_m 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 Standard
Power output rating	To be given for standard test conditions (STC). I_V curve of the sample module should be submitted.
Compliance with standards and codes	IEC 61215 / IS 14286 IEC 61730 Part 1 and 2
Salt Mist Corrosion Testing	As per IEC 61701

14.5 Solar PV Module Mounting Structure

The PV modules shall be mounted on fixed metallic structures having adequate strength and appropriate design, which can withstand the load of the modules and high wind velocities up to 150 km per hour. The support structure shall be hot dip galvanized steel**.**

Detailed specifications for the mounting structure are given below:

Wind velocity withstanding capacity	*150km/hour*
Structure material	Hot dip galvanised MS/Steel with a minimum galvanisation thickness of 120 microns IS 2062:1992.
Bolts, nuts, panel mounting clamps, fasteners	
Mounting Arrangement for RCC-flat roofs	With removable concrete ballast made of pre-fabricated PCC (1:2:4), M15
Installation	The structures shall be designed for simple mechanical on-site installation.
Minimum Distance between roof edge and mounting structure (Horizontal Clearance)	>=0.6m
Minimum Clearance between lowest part of panel and mounting structure (Vertical Clearance)	Shall not be less than 50cm Minimum clearance between lowest Part of panel and Ground surface(Vertical Clearance) shall not be less than 150cm.
Access for panel cleaning and Maintenance	All solar panels must be accessible from the top for cleaning and from the bottom for access to the module-junction box.
Panel tilt angle	North – south orientation with a fixed tilt angle of 11 – 13 degrees (depending on location), south facing. The Lower and higher panel mounting structure should be located at regular intervals of 10

	feet.
Structural Details	Hot dip galvanized MS mounting structures may be used for mounting the modules/panels/arrays. Each structure should have angle of inclination as per the site condition to take maximum insolation. However to accommodate more capacity the angle of inclination may be reduced until plant meets the specified performance requirement. The Mounting structure shall be so designed to withstand the speed for the wind zone of the location where the PV system to be installed. The mounting structure steel shall be as per latest IS 2062:1992 and galvanization of the mounting structure is essential . Structure material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fatserners, nuts and bolts

The prospective Installer shall specify installation details of the solar PV modules and the support structures with lay-out drawings and array connection diagrams.

14.6 Solar Array Fuse

The cables from the array strings to the solar grid inverters shall be provided with DC fuse protection. Fuses shall have a voltage rating and current rating as required. The fuse shall have DIN rail mountable fuse holders and shall be housed in thermoplastic IP 65 enclosures with transparent covers.

14.7 Solar Grid Inverter

The solar grid inverter converts the DC power of the solar PV modules to grid-compatible AC power. (25 kw X 2 Nos) with overload capacity

of 10%.

The detailed specification of the solar grid inverter is given below.

Total output power (AC)	To match solar PV plant capacity while achieving optimum system efficiency
Input DC voltage range	As required for the solar grid inverter DC input.
Maximum power point (MPPT) tracking *Number of independent MPPT inputs*	As Applicable
Output AC voltage *Operating Frequency range* *Nominal frequency* *Power factor of the inverter* *Total harmonic distortion* *Built-in Protection* *Anti-islanding protection*	Three phase 415V (+ 12.5%, - 20%) 47.5 – 52.5 Hz 50 Hz >0.98 at nominal power Less than 3% AC high / low voltage; AC high /low frequency As per VDE 0126-1-1 or IEC 60255.5 / IEC 60255.27 or equivalent standards.
Operating Ambient temperature range	-10 °C - +60 °C
Humidity *Inverter efficiency* *Inverter weighted efficiency*	0 – 95% Rh >=95% >=94%
Protection degree	IP 65 for outdoor mounting, IP 54 for indoor mounting
Communication interface *Safety compliance*	RS 485 / RS 232 / RJ45 IEC 62109-1, IEC 62109-2 Galvanic isolation
Environmental Testing	IEC 60068-2 (1,2,14,30)
Efficiency Measurement Procedure	IS/IEC 61683
Cooling	Convection
Display type	LCD for data display. LCD / LED for status display
Display parameters to include	Output power (W), cumulative energy (Wh), DC voltage (V), DC current (A), AC voltage (V), AC frequency (Hz), AC current (A), cumulative hours of operation (h).

Features/ Specification of Inverters

The inverter type shall have the compliance sheet with the following features,

1. Reverse polarity at the input DC.
2. Over voltage protection for each MPPT controller.
3. Surge arrestor in a plug in modular pattern for both DC input ands AC output.
4. Isolation control for removing the faulty photovoltaic string.
5. Anti Islanding protection.
6. 10-15% of over load margin for the output.
7. AC over current protection.
8. Output over voltage protection.
9. Enhanced MPPT control with reduced DC input current ripple.
10. Individual panel level control.
11. Single PV module energy harvesting and monitoring.
12. Secure wireless interface for system monitoring and configuration means no wiring needed.
13. 10 years system warranty for all parts.
14. Auto power balancing with each phase at the output.
15. Ground fault protection.
16. Protection against lightening stroke.
17. Inverter with integrated AC and DC control switch.
18. Flat efficiency of 98.2% at all load.

Points Safety Standard

1. DC MCB Protection.
2. AC MCB Protection
3. Surge Protection
4. Reverse Polarity
5. Over Voltage Protection
6. Lightening Protection.
7. Ground Fault Protection.
8. Interruption Protection.
9. Auto Anti-Islanding.
10. Auto Power Balancing.

14.8 DC Distribution Box

A DC distribution box shall be mounted close to the solar grid inverter. The DC distribution box shall be of the thermo plastic IP65 DIN rail mounting type and shall comprise the following components and cable terminations:

- Incoming 2 core(Positive and negative DC) cables from the DC Combiner Box;
- DC circuit breaker, 2 pole (the cable from the DC Combiner Box will be connected to this circuit breaker on the incoming side);
- DC surge protection device (SPD), class 2 as per IEC 60364-5-53;
- Outgoing 2 core cable(Positive and negative DC) to the solar grid

inverter.

As an alternative to the DC circuit breaker a DC isolator may be used inside the DC Distribution Box or in a separate external thermoplastic IP 65 enclosure adjacent to the DC Distribution Box. If a DC isolator is used instead of a DC circuit breaker, a DC fuse shall be installed inside the DC Distribution Box to protect the DC cable that runs from the DC Distribution Box to the Solar Grid Inverter.

14.9 AC Distribution Box

An AC distribution box shall be mounted close to the solar grid inverter. The AC distribution box shall be of the thermo plastic IP65 DIN rail mounting type and shall comprise the following components and cable terminations:

- Incoming 3-core / 5-core cable from the solar grid inverter
- AC circuit breaker, 2-pole / 4-pole
- AC surge protection device (SPD), class 2 as per IEC 60364-5-53
- Outgoing cable to the building electrical distribution board.

14.10 GRID CONNECTION FEATURES

a) The Power from the solar should be injected to LT grid in IC as per DISCOM rules and associated switch gear with suitable protection arrangement are required to be provided by the bidders.

b) The control system embedded for grid control should able to perform the following operations.

1. Anti – Islanding protection
2. Power factor Control
3. Reactive Power Control
4. Active Power Control

c) The output power from SPV would be fed to the inverters which converts DC produced by SPV array to AC and feeds it into the main electricity grid after synchronization. In case of grid failure, solar PV system shall be out of synchronization and shall be disconnected from the grid. Once the DG set comes to service PV system shall again be synchronized with DG supply and load requirement would be met to the extent of availability of power. 4pole isolation of inverter output with respect to the LT grid/DG power connection need to be provided.

14.11 Cables

All cables shall be supplied conforming to IEC 60227/ IS 694 & IEC60502/ IS 1554 Voltage rating: 1,100V AC, 1,500V DC

For the DC cabling, XLPE insulated and PVC sheathed, UV stabilized single core flexible copper cables shall be used.

For the AC cabling, PVC or XLPE insulated and PVC sheathed single or multi-core flexible copper cables shall be used. Outdoor AC cables shall have a UV-stabilized outer sheath.

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

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

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.

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

All cables and conduit pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm.

The minimum DC cable size shall be 4.0 mm^2 copper.

The minimum AC cable size shall be 4.0 mm^2 copper. In three phase systems, the size of the neutral wire size shall be equal to the size of the phase wires. The following colour coding shall be used for cable wires:

- DC positive: red (the outer PVC sheath can be black with a red line marking)
- DC negative: black
- AC three phase: Phases: red, yellow, blue; neutral: black
- Earth wires: green

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

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, earth work excavation,cable marker etc.

14.12 Earthing

- The PV module structure components shall be electrically interconnected and shall be grounded.
- Earthing shall be done in accordance with IS 3043-1986, provided that earthing conductors shall have a minimum size of 6.0 mm^2 copper, 70 mm^2 hot dip galvanised steel. Unprotected

aluminium or copper-clad aluminium conductors shall not be used for final underground connections to earth electrodes.

- A minimum of two separate dedicated and interconnected earth electrodes must be used for the earthing of the solar PV system earthing support structure with a total earth resistance not exceeding 5 ohm.
- The earth electrodes shall have a precast concrete enclosure with a removable lid for inspection and maintenance. The entire earthing system shall comprise non-corrosive components.
- AC control panel earthing

14.13 Surge Protection

Lighting Protection

SPV power plant shall be provided with lighting and over voltage protection. The main aim in the protection shall be to reduce over voltage to a tolerable value before it reaches the PV or other sub system component. The entire space occupying the SPV array shall be suitably protected against lighting by deploying required number of lighting arrestors. Lighting protecting should be provided as per IEC:62305. The protection against induced high-voltage shall be provided by the use of surge protection device (SPDs) and suitable separate earthing such that induced transient find an alternate route to earth.

- Surge protection shall be provided on the DC side and the AC side of the solar system.
- The DC surge protection devices (SPDs) shall be installed in the DC distribution box adjacent to the solar grid inverter.
- The AC SPDs shall be installed in the AC distribution box adjacent to the solar grid inverter.
- The SPDs earthing terminal shall be connected to earth through the above mentioned dedicated earthing system. The SPDs shall be of type 2 as per IEC 60364-5-53

Junction Boxes

- Junction boxes and solar panel terminal boxes shall be of the thermo plastic type with IP 65 protection for outdoor use and IP 54 protection for indoor use.
- Cable terminations shall be taken through thermo-plastic cable glands. Cable ferrules shall be fitted at the cable termination points for identification.

14.15 Caution Signs

In addition to the standard caution and danger boards or labels as per Indian Electricity Rules, the AC distribution box near the solar grid

inverter and the building distribution board to which the AC output of the solar PV system is connected shall be provided with a non-corrosive caution label.

Fire Safety

One number of Fire bucket, bucket stand shall be provided. One of 9kg ABC type dry powder portable fire extinguisher shall be provided. The installation of fire extinguisher should confirm BIS standard. Fire extinguisher IS 134849.

Tools and Spares

After the completion of installation and commissioning of the power plant, necessary tools and tackles are to be provided free of cost are to be provided by the contractors for maintenance purpose. A list of requisite spares in case of PCS comprising of setoff control logic card, IGBT diver cards etc. Junction boxes, Fuses, MCCBs etc. along with the spare set of PV modules to be indicated, shall be supplied along with the equipment. A minimum set of spare shall be maintained in the plant itself for the entire period of warranty and which upon its use shall be replenished in addition to the standard caution and danger boards or labels as per Indian Electrical Rules, the AC distribution box near solar inverter and building distribution board to which the AC output of the Solar PV system is connected shall be provided with a non-corrosive caution label.

14.16 Metering

The proposed P-V cell connection needs to be metered (export power kWh) for the purpose of net-metering.

Installation of the Solar Power bidirectional Meter will be carried out by the Installer.

Monitoring System

Remote monitoring complete system including hardware and modem/router shall facilitate monitoring of the performance of the inverter/inverters ,energy yield. PC based inverter monitoring is also required for local monitoring of each system. Some of the salient features of the monitoring systems shall be :

a) Central recording of all system data
b) High data backup
c) Expansion possible with measuring modules
d) The system is also be also be able to be monitored in the internet at any time.

14.17 Documentation

The Installer shall supply the following documentation:

a) System description with working principles.
b) System single line diagram.
c) Solar PV array lay-out.
d) Routing diagram of cables and wires.
e) Data sheets and user manuals of the solar PV panels and the solar grid inverter.
f) A system operation and maintenance manual.
g) Name, address, mobile number and email address of the service centre to be contacted in case of failure or complaint.
h) Warranty cards.
i) Maintenance register.

14.18 Test Certificates and Reports to be Furnished

Test Certificates / Reports from IECQ / NABL accredited laboratory for relevant IEC / equivalent BIS standard for quoted components shall be furnished. Type Test Certificates shall be provided for the solar modules and the solar grid inverter to provide evidence of compliance with standards as specified Annexure of Tender Document (Refer page no:68). ANNAMALAI UNIVERSITY reserves the right to ask for additional test certificates or (random) tests to establish compliance with the specified standards with CEIG TANGEDCO drawing approval and safety certificate for the whole project.

14.19 INSURANCE

Scope of University

14.20 Project Duration

90 Days from Supply order

Section- E

Format and Annexure

F- 1 Techno Commercial Bid Format (Envelope-A)

All pages of the Techno commercial Bid shall be organised section-wise, annexed with proof documents, serially numbered and stitched/or spiral bound intact and submitted)Loose pages shall not be accepted.

F 1.1 Profile of the Bidder

S.No	Particulars	Bidder /Prime Bidder	Consortium / Partner-1	Consortium/ Partner-2
1.	Name of the Company			
2.	Year of incorporation			
3.	**Registered office**			
	Address			
	Office Telephone Number			
	Fax Number			
4.	**Contact Person**			
	Name			
	Personal Telephone Number			
	Mobile Number			
	Email Address			
5.	**Local office(s) in Tamil Nadu**			
	Address			
	Office Telephone Number			
	Fax Number			
6.	**Tender signing authority**			
	Name			
	Address			
	Personal Telephone Number			
	Email Address			
7.	Address for communications under the current Tender			

8. **Registration Details**
   Permanent
   Account Number
9. Banker's Name, Address and Account Number

F1.2 Tender Fee and EMD Details

#	Particulars	Please furnish details
1.	Name of the Bank	
2.	Demand Draft (DD) No	
3.	DD Date	
4.	DD Amount	

F1.3 Furnish details for meeting the Eligibility Criteria

1) Details about Incorporation / Registration

#	Description	Bidder / Prime Bidder	Consortium/ Partner-1	Consortium/ Partner-2
1.	Year of Incorporation /Registration			

* Enclose Certificate of Incorporation/Registration

2) Details about the components to be used in this Scheme

#	Description	Name of the Manufacturer	Manufacturing plant address
1.	PV Module		
2.	Solar Grid Tie Inverter/PCU		
3.	Synchronization panel, with LT Grid and Bidirectional meter etc.		

3) Details about Annual Turnover

#	Audited years (from 2017-20)	Bidder /Prime Bidder /	Consortium / Partner-1	Consortium/ Partner-2
1				
2				
3				

4 Enclose audited Balance sheet, P&L statement evidencing annual turnover criteria

4) Details about IT Returns

5) Details about GST Registration

6) Details about minimum quantity installed

#	W.O reference with Name Address & contact Details of the client	Quantity Installed (Nos)	Date of Commissioning	Bidder / Incase of consortium, Name of the consortium Who has executed the work
1.				
2.				
3.	Enclosed copies of related work orders along with proof for satisfactory completion of that work.			

7) Details about the Blacklisting, if any

#	Description	Bidder /Prime Bidder	Consortium/ Partner-1	Consortium/ Partner-2
1.	Has the Bidder or in case of Consortium/, any of the Consortium partners/ have been blacklisted by any of the State/Central Government or organisations of the State/ Central Government or Union Teritories			
2.	Bidder or in case of Consortium, all the Consortium partners shall submit the undertaking letter.			

F1.4 TECHNICAL BID

Sl.No	Description	To be furnished by the tenderer
A.	SPV MODULE	
1.	Type of Module	Mono/ Poly crystalline
2.	Make & Origin	
3.	Availability of RFID tag Whether inside the module	
4.	Max power at STC Pmax (W)	
5.	Max power voltage Vmp(V)	
6.	Max power current Imp(A)	
7.	Open circuit voltage Voc (V)	
8.	Short circuit current Isc (A)	
9.	Load voltage V ld (V)	
10.	Conversion Efficiency	
11.	No of cells per module	
12.	No of bypass diodes in module	
13.	Solar module frame material	
14.	Module Dimension	
15.	Module Weight	
16.	No of Modules	
17.	Series/ parallel combination	
18.	Other details, if any	
B.	MODULE MOUNTING STRUCTURE	
1.	Material of Structure	
2.	Material of supporting leg	
3.	Length, thickness & Dia of leg	
4.	Foundation size, if grouted	
5.	Other details, if any	
C.	SOLAR GRID TIE INVERTER/PCU	
1.	Type	
2.	Nominal Capacity	
3.	Input Voltage	
4.	Output voltage	
5.	Voltage Regulation	
6.	Output frequency	

7.	Over load capacity 10% must	
8.	Efficiency @ 60% load	
9.	Voltage THD	
10.	Current THD	
11.	Crest Factor	
12.	Operating Temp	
13.	Protections	
	Over load	
	Short circuit	
	Over & Under frequency	
	Over i/p & o/p voltage	
	Over i/p & o/p current	
	Others	
	PV Charging ON	
	Fault indicators	
14.	Anti – Islanding Protection	
15.	Safety Compliance	
16.	Coordination	
D.	DC CABLES	
1.	Make	
E.	Bidirectional meter synchronization, AC control panel etc.	
F.	EARTHING	
1.	Details of points to be earthed	
2.	Earth resistance	

Signature of the authorised person:
Name of the authorised person:
Designation:
Name and Address of Bidder
Stamp of bidder

F.2 Price Bid (Envelope-B)

The cost of SPV power plants shall include their respective components as per their respective technical specification, including cables, MCBs, switches, fuses etc., as per the site requirement

The Price bid should also have the BOM with cost of each item listed vide Page no: 51-54

Sl.	Particulars	Total Cost in figures (INR)	Total cost in Words
1	Total cost of Part-I (Split up details to be filled in)		
2	Total cost of Part-II (Split up details to be filled in)		
3	AMC for additional five years beyond the warranty period (Rs)		

Note:

1. In cases of discrepancy between the cost quoted in Words and in Figures, the lower of the two will be considered. **(Total cost offered shall be both in words and figures)**

PART- I 50KWp/PV/ON Grid Roof Top Solar Power Plant (10 Years of Warranty)				
S.No.	Description	Units	Quantity	Price
1.	SPV Module (325wP)German Cells/Canada Cells Make: Polycrystalline – Ultra High Efficiency – Hydrophobic – IP67 Junction Box	Nos	160	
2.	Module Mounting Structure for Roof Top – 120 microns Hot Dip Galvanized with Fiber glass reinforced polymer (FRP) coating – Custom designed to with stand wind velocity of 150 km/hr	Lot	1	
3.	SOLAR INVERTER:25KW Inverter from reputed make matching the features in page no 56 (27.6KW- TL preferable) -27600Wac -DC & AC Switch -String Fuse -IP65 – 10 Year Warranty -With 10 Point Safety Standard – Refer to Pg no :56	Nos	2	
4.	MCB Box – DC Side	Lot	1	
5.	MCB Box – AC Side	Lot	1	
6.	WIFI LOGGER CARD WITH PC - IEEE 802.11 b/g/n (2.4 GHz) Wi Fi Certified compatible with string inverter, see compatibility list / page no 55 - Modbus/TCP server for SCADA integration - 30 days of local data storage - Life time standard level access to Aurora Vision Monitoring Portal	Nos	2	
7	DC Cables Copper (Suitable Size)	Meters	LS	
8	3*1/2 Core 50 sqmm Aluminum armoued UG cable 1.1KV AC Cables	Meters	25	
9	Earthing cables/ Copper Strip (As Required)	Meter	LS	
10	Lighting Arrestor with suitable GI strip a. Lighting Arrestor	Nos	5	
11	Cable earth works Laying and end termination		LS	
12	Control system	No	1	
13	Annual Maintenance Contract (AMC) for whole system(4 visits per year)	After Warranty Period		
14	Combiner Box	LS	LS	
Total				

1. The price quoted above shall be inclusive of all taxes and charges except GST.
2. GST shall be mentioned seperately

	PART- II 50KWp/PV Roof Top Solar System with Synchronization to LT grid (EB & Genset supply) with all protection.	$50kw_p$	Price
1.	Supply and errection of wall mounting industrial type main panel board compressing of the following items: 1. 125Amps 4 pole MCCB (36KA) Incomer– 1no 2. 63Amps 4 pole MCCB (36KA)2 nos for inverter and 1 no for spare – 3nos 3. 32 Amps 4 pole MCCB (36KA) capacitor bank – 1 no All are mounted on angle iron frame work complete bus bar chamber of 16G sheet steel(Bus bar Chamber should be fabricated in such a way to extend in futher) with 25x6mm copper bus bar for phases, 25x3mm copper bus bar for neutral with necessary interconnections, adopter boxes with runs of 25x3mm copper bus for panel earthing, powder coating painting, over voltage,low voltage protection, over current protection, earth fault protection, over/under frequency protection and other protection, digital voltmeter (0-440V),ammeter (0-200A),KWH meter, one set of indicating lamp including CT arrangement if necessary (located near inverter room) in second floor.	1 no	
2	Supply and errection of Bidirectional meter (net metering) with CT arrangements with suitable ammeter, voltmeter, frequency meter, indicator lamp, fuse with enclosure mounted on a angle iron frame coupled with proposed incubation center main switch including interconnection, alteration work etc (to be located in ground floor Incubation center panel board)	1 no	

3	Supply and errection of wall mounting industrial type main panel board compressing of the following items: 1. 125Amps 4 pole MCCB (36KA) Incomer-1no 2. All are mounted on angle iron frame work complete bus bar chamber of 16G sheet steel(Bus bar should be fabricated in such a way to extend in futher) with 25x6mm copper bus bar for phases, 25x3mm copper bus bar for neutral with necessary interconnections, adopter boxes with runs of 25x3mm copper bus for panel earthing, powder coating painting, over voltage,low voltage protection, over current protection, earth fault protection, over/under frequency protection and other protection, digital voltmeter (0-440V),ammeter (0-200A),KWH meter, one set of indicating lamp including CT arrangement if necessary and coupled with Ground floor proposed incubation Center panel board .	1 no	
4	Supply of 1.1KV grade PVC insulated aluminum armoured UG cable (3*1/2 Core 50sqmm) from AC panel Second Floor to Incubation center main panel Ground floor	25 meters	
5	Supply of 1.1KV grade PVC insulated aluminum armoured UG cable (4 Core 25sqmm) from Inverter to AC panel Second Floor	10 meters	
6	Laying of 1.1KV grade PVC insulated 3*1/2 core 50sqmm cable, 4 core 25sqmm cable with clamp, screw accessories etc on wall	35 meter	
7	Supply and errection of 5KVAR capacitor bank (L&T) to be supported with suitable angle iron frame work mounted on wall, including supply and laying of suitable cable AC panel to capacitor bank Second floor	1 no	
8	Supply and fixing of cable termination with gland, aluminum legs, earthing etc 1. 3*1/2 core 50sqmm -2nos 2. 4 core 25sqmm – 2nos	4 nos	

9	Supply and errection of earth pit as per IE rule with 4inch dia standard cast iron pipe each 8 feet long buried with charcoal with flange arrangement for termination of earth strips including necessary civil works by providing RCC cover	6 nos	
10	Supply and laying of 25x3mm copper flat for PV structure, inverter of 2nos, lighting arrestors of 5nos.		
11	Supply of 1.1KV grade 6mm thick 1800mmX900mm rubber mat	1 no	
12	Supply and fixing of shock treatment chart duly framed (both English & tamil)	1 no	
13	Supply and fixing of First Aid Kit (with cotton bandages, cloth, tincture, iodine etc)	1 no	
14	Supply and fixing of 10Kg DC dry powder type fire extinguisher with suitable stand mounting on wall	1 no	
15	Supply and errection of fire bucket with stand and sand, red paint to be painted outside the bucket and white colour paint to be painted inside, the word FIRE to be painted outside on the bucket	1 no	
16	Supply and errection of 1500mmX150mm enameld danger board 440V AC	2 nos	
17	**Inverter Room**: Supply and errection of 1no of 48" ceiling fan , 2 no of 40W LED fitting with complete wiring	LS	
18	To obtain permission from TANGEDCO, CEIG drawing approval, to arrange inspection, to remit all fees and obtain safety certificate for whole project	LS	
19	**Civil Works:** All PV panel with structure mounted on the roof of innovation center building, laying of LT cable , Laying of copper earth strip (PV structure, inverter, Second floor AC main panel, Earth pit, Lighting arrestor etc)	LS	
Total			

1. The price quoted above shall be inclusive of all taxes and charges except GST.
2. GST shall be mentioned seperately

Note: In cases of discrepancy between the cost quoted in Words and in Figures, the lower of the two will be considered. **(Total cost offered shall be both in figures and words)**

F-3 Bidder's undertaking covering letter

(Letter shall be submitted on Bidder(s) Letter Head)

Date:

To
The Registrar
Annamalai University,
Annamalainagar – 608 002.
Tamil Nadu, India.

Dear Sir,

Sub: Supply, Installation and Commissioning of 50KW Grid tied Solar Rooftop Power plants in Annamalai University- reg.

Tender Reference: AU/DRD/RUSA 2.0/AIIRF/Solar power plant/Tender/04/2020-21

****

1. We have examined the Price Discovery Tender for Supply, Installation and Commissioning of Grid tied Solar Rooftop Power plants as specified in the Tender. We undertake to meet the requirements and services as required and as set out in the Tender document.
2. We attach our Techno commercial Bid and Price Bid in separate sealed covers as required by the Tender both of which together constitute our proposal, in full conformity with the said Tender.
3. We have read the provisions of Tender and confirm that these are acceptable to us. We further declare that additional conditions, variations, deviations, if any, found in our response shall not be given effect to.
4. We undertake, if our Bid is accepted, to adhere to the requirements as specified in the Tender or such modified plan as may subsequently be agreed.
5. We agree to unconditionally accept all the terms and conditions set out in the Tender document and also agree to abide by this Bid response for a period as mentioned in the Tender from the date fixed for bid opening and it shall remain binding upon us with full force and virtue, until within this period a formal contract is prepared and executed, this Bid response, together with your written acceptance thereof in your notification for installation of Solar, shall constitute a binding contract between us and ANNAMALAI UNIVERSITY.
6. We affirm that the information contained in the Techno commercial Bid or any part thereof, including its schedules, and other documents, etc., delivered or to be delivered to ANNAMALAI UNIVERSITY is true, accurate,

and complete. This proposal includes all information necessary to ensure that the statements therein do not in whole or in part mislead ANNAMALAI UNIVERSITY as to any material fact.

7. We also agree that you reserve the right in absolute sense to reject all or any of the products/ service specified in the bid response without assigning any reason whatsoever.
8. It is hereby confirmed that I/We are entitled to act on behalf of our company/ organization and empowered to sign this document as well as such other documents, which may be required in this connection.
9. We agree to use only indigenous PV modules in this project.
10. We also declare that our Company/Organization is not blacklisted by any of the State or Central Government and organizations of the State or Central Government
11. We undertake to use the BoS components other than PV Modules and Solar grid tie Inverters as per the standard stipulated in Section D.

Signature of the authorized person:

Name of the authorized person:

Designation:

Name and Address of Bidder

Stamp of bidder

CERTIFICATE AS TO AUTHORISED SIGNATORIES

I, certify that I am (Name) …… (Designation) ……,and

that (Name)…… who signed the above Bid has been duly authorized to sign the same on behalf of our Organisation.

Date:

Signature:

Seal:

F-4 Model Form of Agreement

To be executed on a Rs.200- Non-judicial Stamp paper bought in Tamil Nadu by the Successful Bidder for Supply, Installation and Commissioning of 50Kwp LT Solar Grid -Tie Rooftop Systems (NO FIGURES IN NUMERALS OR WORDS SHALL BE FILLED UP IN THIS SAMPLE FORM AT THE TIME OF SUBMISSION OF TENDER)

AGREEMENT

This Agreement is entered into at Chennai on the ..... day of _____ 2021 between Registrar, Annamalai University a wholly owned Government of Tamil Nadu Undertaking,

hereinafter referred to as "Implementing Agency" and ....., a Company registered under ..... and having its Registered office at ..... hereinafter referred to as the "Installer" (Which term shall mean and include its successors and permitted assigns)

Whereas ANNAMALAI UNIVERSITY on behalf of the Government of Tamil Nadu invited a tender vide Tender Ref. No. ANNAMALAI UNIVERSITY/ _____for Supply, Installation, Commissioning of 50KWp PV Roof Top with LT Grid Tie SPV Rooftop Systems at Annamalai University and the Installer was selected as per the following terms and conditions:-

This document on having been signed by both the parties shall constitute a binding contract between the parties and shall remain in force for a period of five years. But in the event of any breach of the Contract at any time on the part of the Installer, the contract shall be terminated by ANNAMALAI UNIVERSITY without compensation to the Installer. The contract may also be put to an end at any time by the Implementing Agency upon giving seven days notice to the Installer.

The Installer agrees for Supply, Installation, Commissioning of 50KW SPV Rooftop with 120 months warranty as per clause **" 11.4 "** and as per the Terms & Conditions given below.

1. **Installation & Completion Schedule**

   The entire work involving Supply, Installation and Commissioning of SPV Rooftop shall be completed within 90 days from the date of issue of work order by the purchaser.

2. **Installation and Commissioning locations**

The Grid tied Solar Rooftop power plants shall be installed and commissioned in the Incubation Center FEAT Building of purchasers who issue the work order for the Installer selected from the finalized list of ANNAMALAI UNIVERSITY in the State of Tamil Nadu.

3. PAYMENT TERMS:

a. Payment of the project cost, shall be paid by the Purchaser directly to the Installer after satisfactory Inspection solar Advisory / Technical Committee inspection & submission of invoice to the purchaser. However the payment terms Vested with the discretory powers of the University authorities.

4. The validity of the Project and the price accepted will be for 180 days if necessary, it will be extended further.

5. The following documents shall be deemed to form and be read and constructed as part of this Contract.

6. Technical Specifications
   a) Tender Terms and Conditions
   b) Amendments issued by ANNAMALAI UNIVERSITY for the Tender document
   c) Corrigendum/Clarifications issued by ANNAMALAI UNIVERSITY for the Tender document
   d) Detailed final offer of the Successful Bidder
   e) Correspondence made by ANNAMALAI UNIVERSITY to the successful Bidder from time to time during the period of the contract.

7. Waiver of any terms and conditions by ANNAMALAI UNIVERSITY / Purchaser in writing shall not have the effect of waiving or abandoning other terms and conditions of the contract.

8. (a) Unless otherwise provided in the Contract, any notice, request, consent or other communication given or required to be given hereunder shall be given by mailing the same by registered mail, postage prepaid to ANNAMALAI UNIVERSITY at its registered office.

(b) Any notice to the Installer shall be deemed to be sufficiently served, if given or left in writing at their usual or last known place of abode or business In case of failure by the Installer to commission the solar Rooftop systems within the period specified as per the schedule or in case

of installations made by them, not being of the stipulated quality and specifications, ANNAMALAI UNIVERSITY shall have the power to reject any such installations.

9. ANNAMALAI UNIVERSITY is no way responsible for any dispute arising between the Installer & Purchaser.
Subject to the above, the Courts at Chennai alone only shall have jurisdiction in the matter of installation of Solar.

In Witness whereof the parties hereto have signed on the day, month and year above written in the presence of

For and on behalf of Registrar, Annamalai University	For and on behalf of Successful Bidder
Witnesses: 1. 2.	Witnesses: 1. 2.

F-5 Letter certifying the number of pages in bid documents

(Letter should be submitted on Bidder(s) Letter Head)

Date:
To
The Registrar
Annamalai University,
Annamalainagar – 608 002.
Tamil Nadu, India.

Dear Sir,

Sub:

Sub: Tender for Supply, Installation and Commissioning of Grid tied Solar Rooftop Power plants in Annamalai University – Reg.

Ref: AU/DRD/RUSA 2.0/AIIRF/Solar power plant/Tender/04/2020-21

I hereby certify that our bid documents have been submitted in bound volumes as follows.

Techno Commercial bid Volume – I : Page 1 to Page _____

Volume – II (if any) : Page 1 to Page _____

Volume – III (if any) : Page 1 to Page _____

Price bid : Page 1 to Page _____

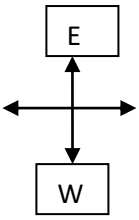
Signature of the authorised person:
Name of the authorised person:
Designation:

Name and Address of Bidder
Stamp of bidder

REGISTRAR
ANNAMALAI UNIVERSITY

ANNEXURE

Ground Floor Main Panel Board Incubation Center Building



Roof Top 2nd Floor Above Incubation Center Building

30 Meters

33.5 Meters

Roof Top Area (33.5x 30 Meters)

109 Ft x 98 Ft = 1682Sqft

Annexure

Technical Parameter of PV Module and various other components for use in Grid Connected Solar Power Plants

All components of the PV plant shall be in accordance with technical specifications given in relevant IS/IEC Standards. The design and commissioning also shall be as per latest IEC/IS standards. The following are some of the technical measures required to ensure quality of the major components used in grid connected solar power Projects.

1. PV Module Qualification

The PV modules used in the grid connected solar power Projects must qualify to the latest edition of any of the following IEC PV module qualification test or equivalent BIS standards.

Ultra High Efficiency - Poly Crystalline Bifacial Silicon Solar Cell Modules IEC 61215

In addition, PV modules must qualify to IEC 61730 for safety qualification testing @1000 V DC or higher. The PV modules to be used in a highly corrosive atmosphere throughout their lifetime, they must qualify to IEC 61701.The Solar Cell should be tested satisfying the following IECIEN norms as specified below,

1. IEC/EN/61215 : 2005
2. IEC61730 – 1 : 2004 / EN 61730-1:2007
3. IEC61730 – 2 : 2004 / EN 61730-2:2007
4. IEC61701 : 2011
5. IEC62716 : 2013

2. Power Conditioners/ Inverters

The Power Conditioners/Inverters of the SPV power plants conform to the latest edition of IEC/ equivalent BIS Standards as specified below:

Efficiency Measurements IEC 61683

Environmental Testing IEC 60068-

2/IEC 62093 Electromagnetic Compatibility (EMC)

IEC 61000-6-2,

IEC 61000-6-4 Electrical Safety IEC 62103/

IEC 62109- 1&2

Protection against Islanding of Grid IEEE1547/ IEC 62116/

UL1741 or equivalent
EN/BIS Standards

3. Supporting Structure with Galvanization

Since the University is closed to strom prone area nearer to sea shore, it is mandatory to have supporting structure capable of with standing wind speed of 150km/hr and should comply with following test standard,

1. IS 2629 - 1985
2. IS 2633 - 1986
3. IS 6745 - 1972
4. EN ISO - 1461
5. ASTM - A1/3

4. Other Sub-systems/Components

Other subsystems/components used in the SPV power plants (Cables, Connectors, Junction Boxes, Surge Protection Devices, etc.) must also conform to the relevant international/national Standards for Electrical Safety besides that for Quality required for ensuring Expected Service Life and Weather Resistance (IEC Standard for DC cables for PV systems is under development. It is recommended that in the interim, the Cables of 6001800 Volts DC for outdoor installations should comply with the draft EN50618 for service life expectancy of 25 years).

5. Authorized Test Centers

The PV modules/ Power Conditioners deployed in the power plants shall have valid test certificates for their qualification as per above specified IEC/ BIS Standards by one of the NABL Accredited Test Centres in India. In case of module types/ equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member Labs abroad will be acceptable.

6. Warranty

PV modules used in grid connected solar power plants must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years

7. Identification and Traceability

Each PV module used in any solar power Project must use a RF

identification tag. The following information must be mentioned in the RFID used on each module (This can be inside or outside the laminate, but must be able to withstand harsh environmental conditions).

1. Name of the manufacturer of PV Module
2. Name of the Manufacturer of Solar cells
3. Month and year of the manufacture (separately for solar cells and module)
4. Country of origin (separately for solar cells and module)
5. I-V curve for the module at Standard Test Condition (1000 W/mPP2PP, AM 1.5, 25PP0PPC)
6. Wattage, Im, Vm and FF for the module
7. Unique Serial No. and Model No. of the module
8. Date and year of obtaining IEC PV module qualification certificate
9. Name of the test lab issuing IEC certificate
10. Other relevant information on traceability of solar cells and module as per ISO 9000 Site owners would be required to maintain accessibility to the list of Module IDs along with the above parametric data for each module.

8. Performance Monitoring

All grid Solar PV Power Plants must install necessary equipment to continuously measure solar radiation, ambient temperature, wind speed and other weather parameters and simultaneously measure the generation of DC power as well as AC power generated from the plant. They will be required to submit this data to DISCOM or any other designated agency on line and/or through a report on regular basis every month for the entire duration of PPA. In this regard they shall mandatorily also grant access to DISCOM or any other designated agency to the remote monitoring portal of the power plants on a 24X7 basis.

9. Safe Disposal of Solar PV Modules

The SPD will ensure that all Solar PV modules from their plant after their 'end of life' (when they become defective / non-operational/ non-repairable) are disposed in accordance with the "e-waste (Management and Handling) Rules, 2011" notified by the Government and as revised and amended from time to time.

10. The Grid Tie inverter should be tested satisfying the following IEC/EN/CEI/DIN/NRS/VDE/ Norms & rules concerning.

a) Efficiency of Inverter

b) No load loss

c) Stand by loss

d) Various class of Integrated protection

e) Connectivity of Equipment with utilities / Feeder / Bus

f) Anti Islanding protection class –Automatic isolation between solar power generator and public low voltage grid during failure of power supply.

g) Total Harmoni &Distortion THD

h) % Harmonic content

i) Power quality issues such as voltage fluctuations , flickers etc

j) Loss % Mains / Mains failure

k) Fault level contribution

l) Reconnection time

m) Electromagnetic compatibility, etc

1. IEC 61727 : 2004
   EN 61727 : 1995

2. IEC 62116 : 2014/IEEE/547/UL 1741/Equivalent
3. CEI 0-16 : 2014
   CEI 0-16 V 1 : 2014

4. CEI 0- 21 : 2014- 09
   CEI 0- 21 : V1 : 2014-12

5. DIN U VDE V 0126 - 1- 1 :2006 & A1
6. IEC 60068 - 2 - 1 : 2007
   IEC 60068 - 2 - 2 : 2007

   IEC 60068 - 2 - 14 : 2007

   IEC 60068 - 2 - 30 : 2005

   EN 60068 - 2 - 78 : 2001

7. IEC 61683 : 1999
   EN 61683 : 2000

   CEI EN 61683 : 2010

8. EN 62109 - 1 : 2010
   IEC 62109- 1 : 2010

9. EN 62109 - 2 : 2011
   IEC 62109- 2 : 2011

10. NRS 097-2-1 :2010
11. IEC Guide 67:2004
    DIN V VDE V 0126 - 1- 1 : 2006 – 02

    DIN V VDE V 0126 - 1- 1/A1 : 2011 – 05

12. G 59 /3 /09.13
13. VDE – AR – N 4105 / 08.11
14. G 59/3 – THD
15. IEC 61000-6-2,IEC 61000-6-4