



INDIAN INSTITUTE OF TECHNOLOGY MADRAS
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V.Sathyannarayanan
Senior Manager (ProjectPurchase)

Ref:MEE/AMAN/031/2017
Date:23rd October2017

Open Tender for supply of "**Studies on Development of
Solar based Cold Storage at CARD**"

Tender No:MEE/AMAN/031/2017

Due Date: 20.11.2017,2:30pm

Technical Bid opening on 20.11.2017 at 3.30P .m.

DearSir/Madam,

On behalf of the Indian Institute of Technology Madras, tenders are invited for the supply of "**Studies on Development of Solar based Cold Storage at CARD (MEE/AMAN/031/2017)**" conforming to the specifications given in Annexure.

Instructions to the Bidder

iPreparation of Bids: - The tenders should be submitted under two-bid system(i.e.)Technical bid and Financial bid.

ii.Delivery of the tender: - The tender shall be sent to the below-mentioned address either by post or by courier so as to reach the following address before the due date and time specified in the Schedule: **Senior Manager, Project Purchase,2nd floor, IC & SR Building,I.I.T.Madras-600036.**

iii.Opening of the tender: - The offer/Bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and it will be examined by a technical committee which will decide the suitability of the bid as per our specifications and requirements. The bidders will be invited for opening of Technical bids. In respect of opening of financial bid, those bidders who are technically qualified only will be called for.

iv. **Prices:** - The price should be quoted in nett per unit (after breakup) and must include all packing and delivery charges to various Departments/Centres/Institutions. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. The price should be quoted without custom duty.I.I.T. Madras is eligible for concessional custom duty and for exemption of IGST on Imports.In case of import supply, the price should be quoted on **EX-WORXS** and **CIP** basis indicating the mode of shipment.

v. **Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in Rupees on receipt of the equipment and after satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be shown in Tender even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate about the percentage of payment and it should be included in the originally quoted basic price, if any.

vi. **Terms of Delivery** - The item should be supplied to our various Departments/Institutions as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.

vii. **Technical Bid Opening:** The technical bid will be opened on **20/11/2017** between 3.30 pm to 4.00 pm In Department of Mechanical Engineering (conference Room , RAC LAB),IIT Madras and the financial bids of those tenders who are technically qualified will be opened at a later date under intimation to them.

viii. **IIT Madras reserves the full right to accept/reject any tender at any stage without assigning any reason.**

Your sincerely,



Senior Manager (Project Purchase)

IC&SR, I.I.T.Madras

वि. सत्यनारायणन

V. SATHYANARAYANAN

वरिष्ठ प्रबन्धक (परियोजना क्रय)

SENIOR MANAGER (PROJECT PURCHASE)

इंजीनियरिंग एवं एसआर केन्द्र / Centre for IC & SR

आईआईटी मद्रास/I.I.T.MADRAS-600036

SCHEDULE

Important Conditions of the tender

The due date for the submission of the tender is **20.11.2017, 2:30pm.**

The offers / bids should be submitted in two bids system (i.e.) Technical bid and Financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and Financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Tender for supply of "**Studies on Development of Solar based Cold Storage at CARD**" should be written on the left side of the Outer bigger cover and sealed.

2.EMD: The EMD in the form of account payee DD for 2% value of the item in favor of Registrar IIT Madras Which should be enclosed in the cover containing financial Bid. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive. The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD.

EMD is exempted for Micro and Small Enterprises (MSEs) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME) or registered with the Central Purchase Organization or with IIT Madras as on the date of submission of bids..

3. Performance Security:-The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply within 21 days from the issue of work/purchase order. The Performance Security should be furnished in the form of an Account Payee DD / FD Receipt from the commercial bank (or) Bank Guarantee from any nationalized bank in India.

Performance Security in the form of Bank Guarantee:- In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.

The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

4. Indian agent:-If an Indian agent is involved, the following documents must be enclosed:

Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.

Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.

The enlistment of the Indian agent with Director General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.

5.The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.

6.**Original catalogue** (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid. No prices should ever be included in the Technical bid.

7.Documentary proof for the claimed position and repetition accuracies must be obtained from the principals and submitted along with the relevant pages of the standards.

8.Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.

9.**Validity:** Validity of Quotation not less than 90 days from the due date of tender.

10.**Delivery Schedule:-** The tenderer should indicate clearly the time required for delivery of the item. In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.

11.**Risk Purchase Clause:-** In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

12.**Payment:-** No Advance payment will be made for Indigenous purchase. However 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).

13.**Advance Payment:-** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.

14.**On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at site of IIT Madras. After experimentation, the unit to be installed at CARD, NLCIL, Neyveli

15.**Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately. (for more details please refer our Technical Specifications).

16.**Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.

17. Acceptance and Rejection: - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.

18. Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.

19. Disputes and Jurisdiction: -

Settlement of Disputes: Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate one arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceedings shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai..

- a. **The Applicable Law:** This Purchase Order shall be construed, interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.

20. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement:- It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE**

Annexure

1. AIM OF THE PROJECT

- 1.1. Design and development of solar cold storage.
- 1.2. To conduct experimentation on such a system under actual utilization front in the laboratory scale.
- 1.3. To carry out performance and commercial research and development analysis through project.

2. SCOPE OF WORK

The scope of work consists of detailed process and mechanical design of the vapor absorption refrigeration system components – evaporator, condenser, generator, absorber, solution heat exchanger, cooling tower for condenser and absorber cooling, photovoltaic panels with mounting, inverter system and controls, evacuated tube type solar collectors for generator, cold room, drawings of each subcomponent, preparation of training and maintenance documents.

Also includes procurement of raw materials, fabrication of all components and subsystems, piping, electrical and instrumentation, delivery of all the equipment at site, including bought out items, installation, and commissioning of solar photovoltaic power generation system with adequate storage, solar thermal collectors and final performance testing.

3. SCOPE OF SUPPLY

Scope of supply consists of manufacturing items including evaporator, condenser, generator, absorber, solution heat exchanger, cooling tower, piping, etc. as required.

All bought items such as solar photovoltaic panels, evacuated tube solar collectors, pumps, variable frequency drives, etc. subsystems, as required.

4. PROCESS DESCRIPTION

The proposed concept of solar cold storage involves use of R134a-DMF vapor absorption system. In a vapor absorption system, refrigerant evaporates in the evaporator at low pressure, and is then absorbed by absorbent in the absorber. The absorption heat is extracted by coolant to facilitate the absorption. This relatively cold strong solution is pumped to the generator through a solution heat exchanger. The solution heat exchanger transfers heat from the hot generator stream to the cold absorber stream. At generator, heat is supplied which causes the R134a to be liberated from the solution. This R134a gas is condensed at the condenser, and then throttled and fed to the evaporator for meeting the cooling load. The P&ID is shown in Fig. 1.

The heat is supplied to the generator by using evacuated tube solar collectors. Solar photovoltaic system is used to drive the cooling tower fan, cold storage fan, instruments, and the pumps – solution pump, pump for hot liquid circulation from generator to solar collector, water circulation pump to circulate water from cooling tower to absorber and condenser. For the system to function during cloudy patches, half hour backup for the electrical system is provided.

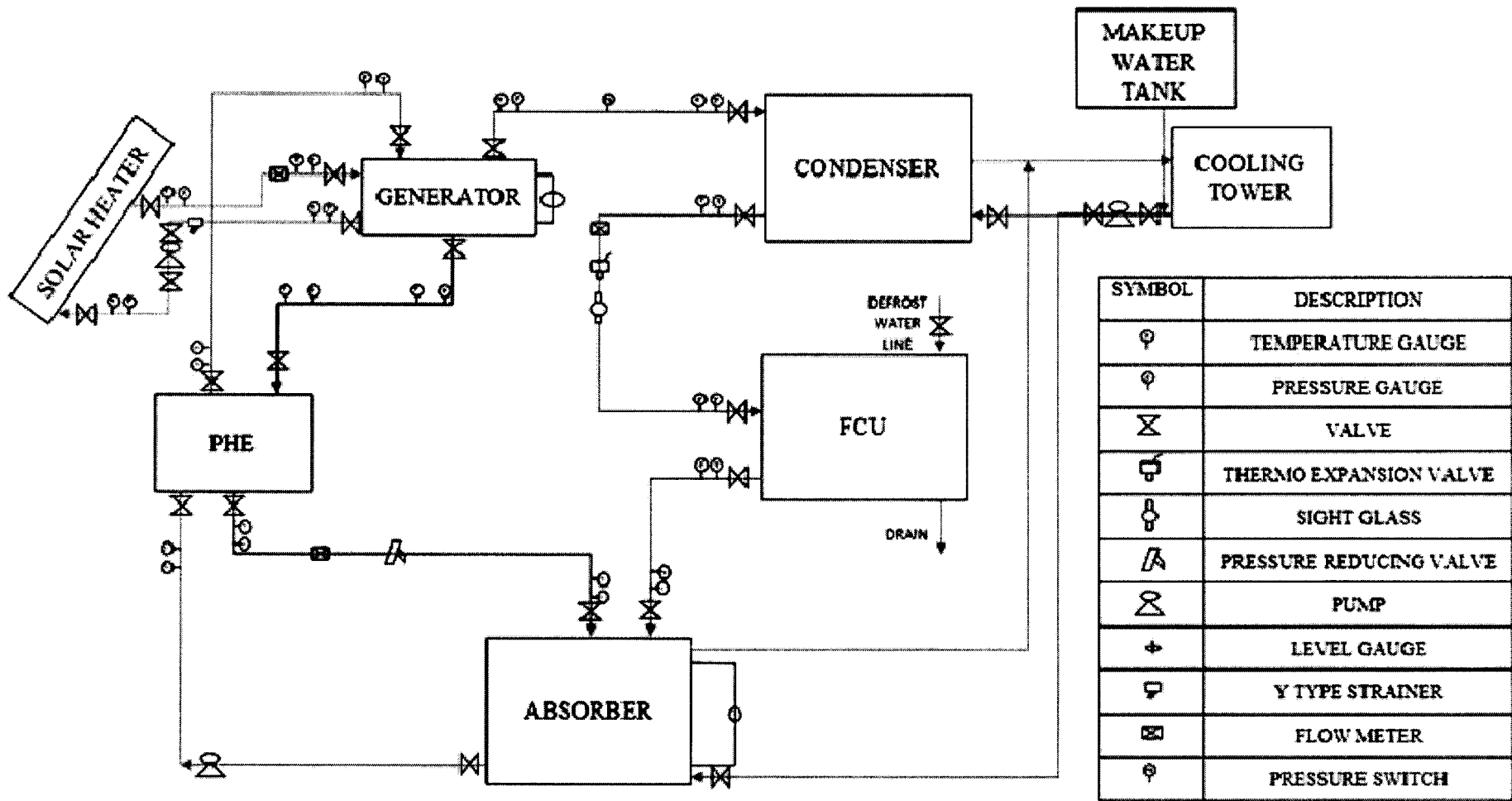


Fig. 1 P&ID of solar vapor Absorption Refrigeration System.

5. MAIN COMPONENTS

The major plant components/equipment comprise of the following:

Si. No.	Main Component/Equipment	Unit	Quantity
1	Generator	No.	1
2	Absorber	No.	1
3	Solution Heat Exchanger	No.	1
4	Evaporator-Fan Coil Unit	No.	1
5	Condenser	No.	1
6	Solar Thermal Evacuated Tubular Collector Panels	Lot	1
7	Solar Photovoltaic Power Plant System	Lot	1
8	Solution Pump – Hermetically Sealed	No.	1
9	Heat Transfer Fluid Pump	No.	1
10	Cooling Tower Unit with Fan and Pump	No.	1
11	Variable Frequency Drive (VFD) for 3 ϕ Motors	No.	1
12	Variable Frequency Drive (VFD) for 1 ϕ Motors	No.	1
13	Piping Components	Lot	1
14	Electrical Components and Instrumentation	Lot	1
15	Cold Storage Room	No.	1

5.1. GENERATOR

The generator shall be of PHE type to heat the R134a + DMF liquid to liberate R134a gas at condensing pressure. A suitable storage tank may be provided to collect the weak R134a DMF solution after liberation of R134a gas. The capacity of generator shall be 12 kW.

5.2. ABSORBER

The absorber, of PHE type, shall facilitate absorption of cold R134a vapor with the weak R134a DMF coming out from the generator. The capacity of absorber shall be 10 kW.

5.3. SOLUTION HEAT EXCHANGER

The solution heat exchanger shall transfer heat from enthalpy of weak R134a-DMF stream coming from generator to R134a-DMF solution coming from absorber. The heat transfer capacity should be 214 kW. The solution heat exchanger will be of PHE type.

5.4. EVAPORATOR-FAN COIL UNIT

The evaporator fan coil unit shall be fin and tube type with fan to circulate the cold refrigerant from the expansion valve to maintain 0 ± 2 °C. The capacity of FCU shall be 3.5167 kW at 0 °C. The FCU shall be provided with all accessories like, defrosting, drain, arrangement.

5.5. CONDENSER

The condenser shall be PHE type, water cooled, of 6 kW capacity.

5.6. SOLAR THERMAL PANELS

The solar thermal panels shall have evacuated tube type solar collectors delivering 12kW of heat at 120 °C to the generator.

5.7. SOLAR PHOTOVOLTAIC SYSTEM

The solar photovoltaic system shall deliver 9.5 kW of electrical energy and have a battery backup of half hour.

5.8. SOLUTION PUMP – HERMETICALLY SEALED

The solution pump shall be hermetically sealed type, with a head of 72 m and flow rate of 1.2m³/hr.

5.9. HOT LIQUID PUMP

Hot liquid pump shall be of appropriate capacity as per the heat transfer fluid chosen, to transfer heat from the solar thermal panels to the generator, such that the generator can be supplied 12 kW.

5.10. COOLING TOWER UNIT WITH FAN AND PUMP

The cooling tower unit with fan and pump shall reject 16 kW (10 kW from absorber and 6 kW from condenser) of heat at 40 °C.

5.11. VARIABLE FREQUENCY DRIVE (VFD)

The fans and pumps should be driven by (VFD).

5.12. PIPING COMPONENTS

Supply of necessary pipes and valves and laying them are under the scope of the supplier. Suitable sensors insertion points are to be kept on the piping for sensing the required parameters like flow, pressure and temperature. Suitable valves are to be provided wherever needed. Suitable non-return valves are to be provided wherever necessary. Adequate flanged connections shall be provided for hot water inlet and outlet piping from solar water heating system

5.13. ELECTRICAL COMPONENTS AND INSTRUMENTATION

The electrical connections from solar photovoltaic system to all electrical loads and the instrumentation are under the scope of work.

5.14. COLD STORAGE ROOM

The cold room shall be constructed with 60 mm thick PUF Panels with PPGI outside and inside with corrugated Aluminum sheets for floor. The cold room door of size 0.85 m x 1.95 m shall be provided with latches, hinges, sight glass. The cold room will have FCU of 0.5kW capacity with expansion valve, defrost arrangement, drain tray, etc., The temperature to be maintained inside 0 ± 2 °C. All accessories like lighting, emergency alarm, etc., as required for the cold room to be provided.

6. INSPECTION / TESTING / ACCEPTANCE TESTS

- i. IIT reserves the right to inspect, or to have their authorized representative inspect the solar cold storage at any time during their fabrication to ensure their compliance with the specification.

- ii. The supplier shall conduct the following tests at the factory.
 - Visual Inspection
 - Overall dimensional inspection
 - Leak test
 - Pressure test
 - Weight of each piece of the equipment
- iii. The necessary tapping to be provided on the tube side as well as on the shell side for fixing gauges (Pressure, Temperature and Flow).

7. DRAWINGS & DOCUMENTS

The following Set of documents shall be supplied along with equipment:

- Bought out items data sheet
- Raw material test certificate for metallic components (shell, tubes, tube sheets, baffle plates etc.)
- Factory acceptance test certificate
- Operation / maintenance manual/ parts catalog
- As-Built drawings for the entire assembly and non-assembly procedure
- Handling procedure.

8. STANDARDS

The goods supplied and works executed shall confirm to the standards mentioned in the technical specification and where no applicable standard is mentioned, the latest version of Indian Standard Institution or Bureau of Indian Specification shall be applicable.

9. PERFORMANCE GUARANTEE

The solar cold storage shall be guaranteed for material, workmanship and satisfactory performance at site, online for a minimum period of twelve (12) months from the date of commissioning.

10. TECHNICAL SPECIFICATIONS

A. COMPONENTS OF VAPOR ABSORPTION SYSTEM

Si. No.	DESCRIPTION	REMARKS
A	EVAPORATOR – FAN COIL UNIT	
	Capacity	1 TR(3.5167 kW)
	Material of Construction	Copper
	Operational/Design Pressure	2.91 bar (a)/4.37 bar (a)

	Operational Temperature	0 °C
	Type	Finned tube
	Tube Size (mm) – OD x Thk x Length	** x ** x **
	FCU Size (mm) – L x B x H	** x ** x **
	Heat transfer area in m ²	**
	Fan and Fan Motor Specifications	0.5kW
B	CONDENSER	
	Capacity	6 kW
	Type	PHE
	Material of Construction	Copper
	Operational/Design Pressure	10.11 bar (a)/15.165bar (a)
	Design Temperature	40 °C
	Size (mm) – L x B x H	** x ** x **
	Heat transfer area in m ²	**
C	GENERATOR	
	Capacity	12 kW
	Type	PHE
	Material of Construction	Copper
	Design Temperature	120 °C
	Operational/Design Pressure	10.11 bar (a)/15.165bar (a)
	Size (mm) – L x B x H	** x ** x **
	Heat transfer area in m ²	**
D	ABSORBER	
	Capacity	10 kW
	Type	PHE
	Material of Construction	Copper
	Design Temperature	40 °C
	Operational/Design Pressure	2.91 bar (a)/4.37 bar (a)
	Size (mm) – L x B x H	** x ** x **
	Heat transfer area in m ²	**
E	SOLUTION HEAT EXCHANGER	
	Capacity	214kW
	Type	PHE
	Material of Construction	Copper
	Hot/Cold Side Fluid	DMF/R134a+DMF Solution
	Size (mm) – L x B x H	** x ** x **
	Heat transfer area in m ²	**
F	SOLUTION PUMP	
	Head	72 m of water column
	Flow Rate	1.2 m ³ /hr
	Operating Temperature	0 °C
	Fluid	R134a+DMF solution

	Pump Specifications	**
	Pump Capacity	6 kW
G	OTHERS	
	Cooling Tower Capacity	16 kW
	Cooling Tower Fan & Fan Motor Specifications	1 kW each
	Cooling Tower Pump Specifications	**
H	INSTRUMENTATION	
	As required	**

** - Bidder to specify in their offer

Note: All the technical parameters are indicative value, Bidder will be designing and specifying in their offer.

B. SOLAR THERMAL EVACUATED TUBE COLLECTOR PANELS

Si. No.	DESCRIPTION	SPECIFICATIONS
1	Type of solar thermal collectors	Evacuated tube collector
2	System capacity @ 800 W/m ²	12 kW at 120 °C delivery at generator
3	Total Floor Space m ²	**
4	Collector Dimensions per ETC (Length × Height × Width) mm of each Module	**x** x**
5	Absorber Area per Module	**
6	Gross Area per Module	**
7	Number of Modules of Solar Evacuated Tube Collector (ETC)	**
8	Maximum Operating Pressure	**
9	Flow Rate of Each Module	**
10	Peak Output of Each Module	** kW at ** W/m ² irradiation
11	Evacuated Tube Specifications	Material: Borosilicate 3.3 Tube Style: Twin wall all glass Dimensions: ** Absorber Material: Selective coating Absorptance: ** Emittance: ** Vacuum: ** Heat Loss: **
12	Heat Pipes Specifications	Material: **

		Working Fluid: ** Maximum Heat Transfer Capacity: **
13	Header Pipe Specifications	**
14	Mounting Frame Material	**
15	Manifold Casing Material	**
16	Manifold Insulation	Material: ** Thickness: **
17	Tube Clips, Fasteners	Material: **
18	Common Storage Tank/Thermal Energy Storage for Heat Transfer Fluid	Material of Construction: ** Insulation Material and Thickness:
19	Flanges	SS304 , Class **
20	Piping	Piping as per IBR standards
21	Insulation for piping	Insulation of rock wool/ glass wool/ mineral wool of suitable thickness shall be provided with Aluminium cladding for hot water lines.
22	Heat Transfer Fluid Pump Specifications	**
23	Mounting structures	Suitable mounting structures made of GI metallic frames or mild steel shall be provided for solar thermal plant
24	Piping and Instruments	All the interconnecting pipes and valves shall be provided as per IBR standards. Suitable sensor insertion points shall be provided for sensing the parameters (Flow, temperature, pressure). Adequate flanged connections shall be provided for facilitating the process piping
25	Hot Water Pump	1 kW

Note: All the technical parameters are indicative value, Bidder has to design and specify in their offer.

All the components must confirm BIS Standards and IBR standards as specified below:

- The evacuated tube collector and its components must confirm standards **IS16542:2016**, **IS 16543:2016** and **IS 16544:2016**
- Piping as per relevant IBR standards

C. SOLAR PHOTOVOLTAIC POWER PLANT SYSTEM

The major components of the solar PV power generation system comprise the following

Si. No.	DESCRIPTION	SPECIFICATIONS
A.	Solar PV array capacity	9.5 kW
1.	Type of PV module	Poly Crystalline
2.	No. of modules	30
3.	Module rating	200 Watts
4.	Module efficiency	≥14%
5.	Open circuit voltage	**
6.	Short circuit current	**
7.	Vmax	**
8.	I _{max}	**
9.	No. of cells	**
10.	Module dimensions L x B x T	**
B.	Battery bank	Battery backup for half hour
1.	Battery rating	24 V, 150 Ah
2.	Type of battery	Lead acid tubular battery
3.	No. of batteries	**
C.	Power conditioning unit	Minimum 9.5 kW output
1.	Inverter output voltage	3 phase 415 Volts
2.	Inverter output frequency	50 Hz
3.	Inverter efficiency	>80%
4.	Waveform	Pure sine wave
D	Cables	Cables running between solar panels and array junction box should be 4 Sq.mm copper flexible. Power cables of adequate voltage and current insulation rating shall be used.

		Cable trays shall be provided as per requirement.
E	Junction Box/Combiners	Dust and water proof junction boxes of adequate rating and adequate terminal facility made of fire resistant plastic (FRP) shall be provided.
F	Module Mounting structure	Modules shall be mounted on a non-corrosive support structures towards due south and at a suitable inclination to maximize annual energy output. Suitable grouting shall be provided for installing over the ground.
G	DC distribution board (DCDB)	It shall be provided in between PCU and Solar array.
H	AC distribution board(ACDB)	It shall control the AC power from PCU and should have necessary surge arrestors.

** - Bidder to specify in their offer

Note: All the technical parameters are indicative value, Bidder has to design and specify in their offer.

All the components must conform to the latest edition of IEC/ Equivalent BIS Standards/ MNRE specifications as specified below:

- The PV modules must confirm IEC / BIS equivalent IS Standards IEC 61215-1:2016 / IS14286
- PCUs must comply with IEC 61683/IS61683 or equivalent BIS standards
- Batteries as per relevant BIS standards
- Cables IEC 60227 / IS 694
- Junction boxes, charge controllers IP 54(for outdoor)

D. OTHERS

Si. No.	DESCRIPTION	SPECIFICATIONS
1	Variable Frequency Drive (VFD) for 3 ϕ Motors	**
2	Variable Frequency Drive (VFD) for 1 ϕ Motors	**
3	Cold Room	60 mm thick PUF Panels with

		PPGI outside and inside with corrugated Aluminum sheets for floor. The cold room door of size 0.85 m x 1.95 m shall be provided with latches, hinges, sight glass. All accessories like lighting, emergency alarm, as required for the cold room to be provided.
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** - Bidder to specify in their offer

11. EXPERIENCE OF THE BIDDER

- 11.1. The tenderer should have minimum experience of 30 years in design, and execution of vapor absorption refrigeration systems.
- 11.2. The tenderer should enclose the design details, for the entire equipment including VAM, Solar water heater, PV panels, PUF panels, with data sheet to prove the competence to execute such specialized, unique projects.
- 11.3. The tenderer should have design office or representative or agent in Chennai for frequent inter action and finalization of engineering immediately.
- 11.4. The tenderer should have associated in design for any one of the project involving research and new technology.