

DIRECTORATE OF RESEARCH SERVICES
RAJMATA VIJAYRAJE SCINDIA KRISHI VISHWA VIDYALAYA

GWALIOR- 474002, M.P.

I PRO/DRS/AERO/cold storage/ 2025-26/1845

Dated:21-08-2025

e-TENDER NOTICE

Online tender(s) under two bid system (i) Technical bids (ii) Financial bids are invited by the Director Research Services, RVSKVV, Gwalior from reputed Manufacturers/ Authorized Dealers/Distributors in the line for supply and installation of scientific equipment(s)/ item(s)/ structures for the item **Potato Cold Storage (Cold Chamber)** in project "Tissue culture-based potato seed production through aeroponics" as described below:

| Sl. No. | Name of item | Divisions/Units/ Reg. Stations | Amount of EMD (Rs) | Tender publication fees (Rs) |
|----------------|---|--|---------------------------|-------------------------------------|
| 1. | Potato cold Storage (Cold Chamber) | 1. Biotechnology Centre, RVSKVV, Gwalior | 3.0 Lakhs | 12500/- |

CRITICAL DATES

| S. No. | Item | Date | Time |
|---------------|--|----------------|-------------|
| 1. | Publishing Date | 22 August 2025 | 16:00 |
| 2. | Document Purchase Start Date | 22 August 2025 | 16:00 |
| 3. | Last date for submission of technical e-Bid | 23 Sept 2025 | 17:00 |
| 4. | Physical bid documents submission end date in the office physically at office of Directorate of Research Services, RVSKVV, Gwalior | 26 Sept 2025 | 17:00 |
| 4. | Opening of the Technical Bid at office of Directorate Research Services, RVSKVV, Gwalior | 29 Sep. 2025 | 15:00 |
| 5. | Evaluation of Technical Bids at Office of Directorate, Research Services, RVSKVV, Gwalior | 29 Sep. 2025 | 15:00 |
| 6. | Opening of Financial/Price e Bid at Office of Directorate Research Services, RVSKVV, Gwalior | 14 Oct. 2025 | 15:00 |

Tender form can be downloaded from the website www.mptenders.gov.in and can also be seen on university website www.rvskvv.net. Tender documents with specifications can be purchased from this site by paying ₹12500.

Director Research Services
RVSKVV, Gwalior

**DIRECTORATE OF RESEARCH SERVICES
RAJMATA VIJAYRAJE SCINDIA KRISHI VISHWA VIDYALAYA**

GWALIOR, 474002, M.P.

IPRO/DRS/Aero/ cold storage/ 2025-26/1845

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e-TENDER INVITING NOTICE

Online tender(s) under two bid system (i) Technical bids (ii) Financial bids are invited by the Director Research Services, RVSKVV, Gwalior from reputed Manufacturers/ Authorized Dealers/Distributors in the line for supply and installation of scientific equipment(s)/item(s)/structures for the item **Potato Cold Storage (Cold Chamber)** in project “Tissue culture-based potato seed production through aeroponics” on or before **23-09-2025** up to 05:00 PM **via e tender and physically on or before 26.09.2025 upto 05:00 PM. For the list of item, tender forms, terms & conditions and detailed information please visit RVSKVV website www.rvskvv.net and for purchase of tenders www.mptenders.gov.in from 22 August 2025.**

Any related corrigendum, if required, will be published on RVSKVV website (www.rvskvv.net) and www.mptenders.gov.in only.

NAME OF ITEM: 01. Potato Cold Storage (Cold Chamber) (FIRST CALL)

Date:

**Director Research Services
RVSKVV, Gwalior**

DIRECTORATE OF RESEARCH SERVICES
RAJMATA VIJAYRAJE SCINDIA KRISHI VISHWA VIDYALAYA GWALIOR-
474002, M.P.

E-Tender Document

CRITICAL DATES

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DEPOSITING THE BIDS:

The bids will be submitted through on-line mode of www.mptenders.gov.in, as well as physically. The details are as follows:

(A) On-line Submission:

(i) Cover-I: Will contain the Technical Bids with the following documents:

- Detailed technical write-up highlighting the model Name/Number features offered and / or technical literature/manuals.
- Certificate for acceptance of terms and conditions of tender enquiry on firms' letterhead.
- Original Equipment Manufacturer (OEM) certificate or authorized dealership/distributorship certificate as applicable.
- Manufacturing Registration No.
- Company Printed Price List (If available)
- Last 3 (three) years Income Tax Return.
- Audited Balance Sheet for Last 3 (Three) years.
- TIN number/PAN Number/Certificate/GST number
- Business Registration Certificate.

- Scanned Copy of EMD as shown against each item.
- Compliance Certificate. Certificate of clause-by-clause compliance of specifications as mentioned in tender.

(B) Physical Submission:

Following documents to be submitted in hard copy physically in a sealed envelope by **speed post/ Registered post** to reach prior to bid submission closing date and time. The responsibility to ensure this lies with the bidder.

Please do not submit the hard copy of “Commercial/Price bid”

- All the documents submitted on-line in cover 1
- **EMD as shown against each item on line submitted and proof enclosed physically**
- Tender fee receipt copy (as applicable)
- Tender conditions acceptance certificate in form of downloaded tender documents duly stamped and signed
- Client list/ list of users on manufacture letter head duly stamped and signed
- User Certificate with phone number and e mail address
- Guarantee/ warrantee on manufactures letter head
- The supplier is bounded to supply spare parts of equipment’s for the **at least next 10 years**

GENERAL TERMS AND CONDITIONS:

- 1.*Only the manufactures and/or their authorized dealer/distributors/sole agents/ need to submit their tender.
2. No person or firm shall submit more than one Tender for the same item. No offer should have more than one model quoted; in case of more than one alternate offer only the first option will be considered.
3. It is mandatory to provide all the relevant information in ***Annexure -I***.
4. a. Last date for submission of e-Tender is 23.09.2025 up to 5:00 PM on www.mptenders.gov.in. and physically submitted date is 26.09.2025 up to 5: 00 PM
 - b. Belated tender due to postal or any other delay will be rejected.
 - c. If offers for more than one item are clubbed together, tender will be rejected.
 - d. The tender offers should have a validity of 180 days or more from the due date. The tenders will be valid for 6 months from the date of opening and may be asked for extension by taking written concern of the firms if needed.

e. Price bid will be opened online at www.mptenders.gov.in on 08-10-2025 from 3:00 P.M. to 5.00 PM. If date of opening of price bid will be changed due to any circumstances. That will be informed to bidders vis portal notification and e mail.

f. R.V.S. Krishi Vishwa Vidyalaya (RVSKVV) reserves the right to extend the opening due date and or the date of opening the tenders.

g. All the leaflets in the offer should be marked with signature and seal of authorized person.

5. a. The rates quoted should in Indian Rupees (₹) for a **single complete unit** with F.O.R. delivery at RVSKV, Gwalior. The rates quoted should be inclusive of packing and forwarding charges/loading/unloading/handling charges/freight/full risk coverage/insurance, *etc.* In case of imported goods all the expenses towards custom duty, clearing charges and transportation with insurance will be borne by the firm/tenderer and they must quote the rates inclusive of all FOR, RVSKV, Gwalior in INR.

b. Excise duty/Sales Tax/GST/Custom duty (with and without concession certificate) and other levies, if any should be shown separately and the **total price** of each item should be worked out incorporating the all.

c. Any other charges, such as technical service charges, cost of training, installation charges, TA/DA of tenderer's staff *etc.* if any, should be shown separately for each item and each sub-item and the total price of each item should be worked out incorporating the same in final quoted price.

6. All losses during transit will have to be made good by the tenderers at his cost within a period of 15 days.

7. The tenderers must provide guarantee/warranty on **manufacturers' letterhead** of satisfactory functioning of the equipment/system and free service including free replacement of parts for a period of at least **3 years** from the successful and satisfactory installation of the equipment/system. Original to be deposited by the successful bidder at the time of supply.

8. Performance Guarantee: The Successful bidder/supplier will be required to furnish a Performance Guarantee in the form of FDR from a public sector bank or a private sector bank authorized to conduct government business for a sum equal to **10%** of the Supply Order value within 30 days of signing of the Supply Order. Performance Bank Guarantee will be valid up to 3 years beyond the date of guarantee/warranty.

9. Offer must be accompanied by **Earnest Money** as stated against each item must be submitted on- line. Without the deposition of earnest money, the offers will be rejected.

10. The standard terms and conditions of payment is in full only after the installation is affected to the satisfaction of RVSKVV authorities in INR only.

11. Please quote maximum discounted price, as no further negotiations will be made.
12. Complimentary items/gifts offered will not be given any preference and will not be considered for calculating the cost of the item.
13. The offers must mention make, model all the specifications of the item clearly. The company must enclose printed literature/catalogue/manufacturer's web-site showing detailed technical specifications required. A folder showing many instruments without detailed technical specification, or tailor-made literature mentioning “yes” or “as per your specifications” for the specifications asked for, will not be considered. Specifications given in the offer must match to the website and/or printed technical literature otherwise the offers shall be rejected.
14. Technical specifications of the equipment / items have been very clearly formulated by the users/experts of the field as per the requirement of the work to be conducted. It will be sole discretion of the bidder whether to quote or not for equipment with particular specifications.
15. Firm must provide a compliance statement vis-à-vis specifications in a following “tabular form” clearly stating the compliance, supported by technical literature with clear reference. This statement must be signed, with the company seal, by the Tenderer for its authenticity and acceptance that any incorrect or ambiguous information found submitted will result in disqualification of the offer.

| | | |
|---------------------------|------------------|-------------------|
| Name of Equipment: | | |
| Technical Specification | Compliance (Y/N) | Deviation, If any |
| | | |

16. Offer must be accompanied with a comprehensive list of users on manufacturers' letterhead, wherever possible bidders may also provide certificates for satisfactory working of the equipment from users of universities and institutions of repute.
17. a. If so desired by RVSKVV, the bidders shall have to enter in to an agreement.
- b. Any wrong information about item, any forged document and any deviation, variation of non-compliance of the terms and conditions by the tenderers shall be considered as a breach of contract and RVSKVV reserves the right to forfeit the amount of earnest money and/or security deposit in full and take action as per legal arrangement.
18. Should there arise any dispute, the Hon'ble Vice Chancellor, RVSKVV, Gwalior shall be the sole Arbitrator whose decision in the matter shall be final and binding. Each and every judiciary transaction shall be subjected to Gwalior only.

- 19.** Tender will not be considered if the firm does not supply a copy of the TIN/ GST& PAN/ Registration of the firm allotted to it for relevant items. PAN of the owner or any other persons will not be accepted.
- 20.** This tender is being issued with no financial commitment and the Buyer reserves the right to change or vary any part thereof at any stage. Buyer also reserves the right to withdraw the tender, should it become necessary at any stage.
- 21.** RVSKVV reserves the right to accept or reject any or all offers in full or in part without assigning any reason (s) thereof. It also reserves the right to place an order wholly or in part with one or more than one firm as it may be convenient to RVSKVV, Gwalior.
- 22.** The tenderer shall have to give an undertaking that the terms and conditions as mentioned above of this tender are acceptable to the tenderers in form of downloaded Tender documents duly stamped and signed.
- 23.** If firm wishes, they can send their representatives, duly authorized in writing, to attend the Technical Evaluation and clarification regarding bids which is scheduled at 3:00 PM on 29 Sept. 2025.
- 24.** In case, if single manufacturer of the any item and having propriety rights. Items may be purchased with the permission of concerned higher authority and will be submitted as supportive document. Bidder should be submitted EMD (Provide EMD Details) in the form of DD/ MSME firms are exempted from EMD Submission
- 25.** The annual turnover of the agency should not be less than 5 crores for Potato Cold Storage (Cold Chamber) unit during last five financial years. For the annual turnover audited balance sheet along with annual report and IT return of the agency should be submitted as supporting documents.
- 26.** Bidder should have ISO certificate ISO 9001:2008, ISO 45001:2018, ISO 14001:2015.
- 27.** Firm should have 5 minimum years' experience of running minimum four similar project in any govt. dept./semi govt/ autonomous institution. (Attached documentary proof of work order and completion certificate)
- 28.** Firms applying for the proposed work should have last five years' experience of establishing of Potato Cold Storage (Cold Chamber).
- 29.** Bidder should have experience of establishing Potato Cold Storage (Cold Chamber) unit Setup at least 1 work order value not less than 25 Lakh. (Attached documentary proof of work order), issued from Govt. or Non-Govt. Organization should be attached with tender documents in support of experience which clearly indicates firms name and work executed along with price list and payment proof.

30. The party/firm/company should be provided comprehensive work plan proposed with sealed Designs/Drawings using CAD (Computer aided Design)
31. Valid Authorization certificate from the manufacturer/ company/ distributor /dealer applicable in the current year/valid for published tender for items.
32. Joint Venture is not allowed for participate in this tender as complexity of work requires single party accountability
33. Construction work should be completed within 8-9 months.
34. The financial bids of only qualified firm in technical bid will be opened. The financial bid will be evaluated on the basis of total cost of the project quoted by the firm.

Director Research Services
RVSKVV, Gwalior

Annexure-I

**DIRECTORATE OF RESEARCH SERVICES
RAJMATA VIJAYRAJE SCINDIA KRISHI VISHWA VIDYALAYA
GWALIOR 474002, M.P.**

SUPPLEMENT / CHECK-LIST TO BE PROVIDED WITH TECHNICAL BID

ITEM No. _____ NAME _____

| S. No. | Information required | Proposed |
|---------------|---|-----------------|
| 1. | Make of main item | |
| 2. | Model of main item | |
| 3. | Name of manufacturer of Main Item | |
| 4. | Country of origin of main item | |
| 5. | Name, Make and model of sub item I (if any) | |
| 6. | Name, Make and model of sub-item II (if any) | |
| 7. | Name, Make and model of sub-item III (if any) | |
| 8. | Delivery within (days) | |
| 9. | Rate of Excise duty (%) with surcharge, if applicable (item-wise if different ED is applicable) | |
| 10. | Rate of GST (%) livable. If no, state basis and terms of the exemption. | |
| 11. | Is Service Tax extra? If yes, rate of Service Tax livable (%) | |
| 12. | Any other Taxes / Duties / Octroi / Entry taxes <i>etc.</i> in % | |
| 13. | Order to be placed on | |
| 14. | Guarantee/Warrantee (3 years) | |
| 15. | Validity (at least 180 days) | |
| 16. | FOR: RVSKVV, Gwalior? | |
| 17. | List of current users (Attach, if any) | |
| 18. | Certification of satisfactory working of the equipment (Attach, if any) | |
| 19. | Compliance of equipment with current directives of ISI / CE / EEC / US / EU or equivalent standards | |
| 20. | Whether manufacturer / authorized distributor/sole agent? (Attach original certificate) | |
| 21. | Technical literature (Attach, if any) | |
| 22. | Earnest money (EMD) deposited on line and proof has been enclosed | |
| 23. | Situations of Authorized service centers/ service personals <i>etc.</i> (Provide complete address) | |
| 24. | Relevant documents such as ITCC, ST registration shop Act. establishment certificate, factory registration <i>etc.</i> (enlist and attach) | |

| | | |
|-----|--------------------------------------|--|
| 25. | TIN and PAN allotted (Attach a copy) | |
| 26. | GST number | |
| 27. | Any other relevant information | |

DECLARATION

The terms and conditions as mentioned in the tender are acceptable to us.

Authorized Signatory

(Seal of the Firm)

Item1. Technical Specifications of Potato cold storage

A. Technical Specification for cold storage infrastructure

1. Basic Foundation and Upper Level:

General Notes:

1. All conc. Mix m20 unless otherwise specified.
2. Opc cement m – 43 or higher grade shall be used
3. Potable water shall be used for concrete as per is code
4. “#” indicate tor steel, yield strength 500 kn/mm²
5. All dimensions shall be checked and verified at site. Any ambiguity if found, shall be brought to the notice of consulting engineers.
6. Top of soil shall be well rammed and consolidated before execution.
7. Supervision shall not be our responsibility However team will visit time to time the site and will inform the company about the deficiency if any.
8. Builder /contractor must use all the materials confirming to i.s. specifications
9. All brick work shall be in c.m. (1:6) or as per is code
10. Construction joints in column shall be at the bottom of beams unless other wise mentioned.
11. All concrete work shall be machine mixed and vibrated.
12. Gradation of aggregates 20 mm to 10 mm – 67% below 10mm – 33%
13. Foundation are designed for industrial drawing/section
14. This DRG shall be read along with respective architectural DRG and if any discrepancy is found, the same shall be brought to the notice before commencement of excution.
15. Max, quantity of water per 50 k.g. of cement shall be 30 liters for m:20 and 28 liters for m:30 grade concrete.
16. In case of beam (unless otherwise mentioned in detail drawings) minimum distance between the two parallel bars be 25mm & for these necessary spacers shall be provided.
17. All center line dimensions must be verified with architectural dugs. Before excavation, consulting engineer shall not be responsible for c/l dimensions.
18. Cube test must be carried out from every batch of concrete for columns, beams & slabs & test results of 7 & 28 days must be submitted to the consultant if contractor fails to do so, consultants shall not be responsible for any inferior strength
19. To take out cube & material testing shall be contractor’s responsibility
20. If required load testing of structure shall be carried out by contractor before giving possession

Important notes:

- * Lapping of column shall be done away from beam – column junction preferably at middle floors at any point not more than 50% of column bar shall be lapped and c/c distance between the laps shall be at least 1.3 ld, where ld 50 x d and d is lesser diameter of the bars being lapped
- * Bottom bars in beams shall be lapped closer to columns & lapping shall be avoided at middle of span for top bars lapping shall be done preferably at center of the span

* Ductile detailing for beam & columns must be followed.

* Properties of concrete & water cement ratio are to be taken as per conc. Mix. Design.

Clear cover notes:

- A. Foundations: bottom, sides & top = 50 mm.
- B. Columns/pedestals = 40 mm.
- C. Ground beams = 25 mm.
- D. Beams = 25 mm.
- E. Slabs (roof and floor) and waist slab = 20 mm.
- F. Walls = 15 mm.

Specification/notes:

Concrete mix:

| Conc. Mix | Cement | Sand | Aggregate |
|--|-----------------------|------|-----------|
| M- 15 | 1 | 2 | 4 |
| M- 20 | 1 | 1.5 | 3 |
| M-2 5 | 1 | 1 | 2 |
| M- 30 | As per lab design mix | | |
| <ul style="list-style-type: none">• Indicate higher diameter bar• Indicate lower diameter bar | | | |

2. Plinth and Roof level Structure:

General Notes:

1. All dimensions are in MM.
2. All dimensions are to be read and not to be measured
3. All Dimensions shall be checked and verified at site any ambiguity if found shall be brought to the notice of consulting engineers
4. Supervision shall not be our responsibility
5. Builder / contractor must use all the materials confirming to I.S. specifications

Steel work notes:

1. Structural steel to be grade FE410 confirming to IS 2062:1999
2. All steel plates, angles, channels ETC shall conform to IS 226
3. All Steel bolts and nuts shall conform to IS 1387
4. Steel work shall be in accordance with the following specifications
 - A. Design – IS 800
 - B. Hot rolled sections – IS 808
 - D. Steel tubes IS 1161:1998
 - C. Fabrication & Erection – IS 800
5. All Joints, tubes shall be welded all around

6. All fillet and butt weld shall be min, 6mm thick, for all joints.
7. All welding shall be as per I.S – 5227/ I.s – 816
8. All electrodes shall be as per I.S – 814
9. All open ends of tubes shall be sealed by 3 mm plate welded surround care shall be taken that before sealing the open end the tube shall be dry from inside
10. All welded joints to be of full strength
11. All structural members to be painted with one shop coat red oxide Zink chromate or as per specification
12. The contractor must prepare a sample template in timber or steel plate with exact bolt hole punched into it in relation to the concrete structure
13. Contractor must take precautions to ensure that the bolts are not dislocated at the time of concreting
14. Where sections/plates are to be welded to already galvanized sections, the damaged galvanized sections and exposed steel sections are to be corrosion protected as follows:
 - Sections to be painted with double coated red oxide Zink chromate or as per specification.
 - Preparation = surfaces to be painted shall be very thoroughly degreased by the use of “plasconaquasolv” or equal approved water miscible solvent based degreaser, applied in accordance with the manufacturer’s instructions. followed by washing with clean potable water. if the surface is not “water break free” the cleaning process shall be repeated
 - Priming = apply a two-component epoxy primer designed for application to galvanized steel, or equal approved primer, to a dry film thickness of 80 + 20 microns
15. Unless indicated otherwise all site splices, moment connections
16. And butt welds to be full strength
17. Unless specified all welds to be 6mm continuous fillet
18. Minimum plate thickness to be 8mm
19. Steel work to be painted in accordance with client specifications.
20. Supporting structure plate form of stored potato should be termite proof.

Roofing work notes:

1. Roof sheeting to be 0.5mm thick pre-coated galvanized iron cladding sheet
2. Down pipes to be 100mm min.

Bolt Hole

| Sr. No. | Indication | DIA of Bolt MM | Clearance (mm) | DIA of Bolt Hole (mm) |
|---------|------------|----------------|----------------|-----------------------|
| 1. | M12 | 12 | +1 | 13 |
| 2. | M16 | 16 | +2 | 18 |
| 3. | M20 | 20 | +2 | 22 |
| 4. | M24 | 21 | +2 | 26 |

B. Technical Specification for cold chamber

Design Data:

| | |
|------------------------|------------------------|
| Application | : Potato Cold Chamber |
| Site location | :RVSKVV, Gwalior |
| Ambient temp. | :2-4°Cz |
| Power supply | :415V, 3Phase,50Hz |
| Storage system | :50kbags |
| No. of Cold rooms | :01no. |
| Cold-room size | :33600x 20100x3600mm |
| Storage capacity | : 550-600MT |
| Floor levels | :Single (Ground-floor) |
| Daily loading rate | : Approx. 2500 Kgs |
| Entering product temp. | : 25 deg. C |
| Pull-down rate | : 1deg. C per24hours |
| Room condition | : 2deg.C& 90-95% RH |
| Desired CO2levels | :2700-2900 ppm |
| Humidity | : 90-95% |
| Voltage Stabilizer | : 100 KVA |

Technical Specifications:

PUF Panels:

PUF insulated wall Panel with 0.5mm PPGL sheet both sides in 40±2 Kg/m³ density. The PU panel shall be CFC free and Zero Ozone depleting panel made out of continuous line running on uninterrupted power supply. The pre-coated sheet shall be of 240 MPA grade confirming to IS 14246:1995 and shall have Galvalume coating mass of 120 GSM as per IS: 277:1992, 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 micron. The PPGL sheet shall have plastic protective guard film of minimum 25 microns to avoid scratches during transportation. The panels shall be vertically joined together by tongue and groove joints and sealed with silicon sealant. All the corner joints to be covered with PPGI flashing required size & quantity.

Floor insulation will be of 80mm thick PUF slabs having minimum density of 40±2 Kg/m³ & covered with sand-cement plaster with GI chicken mesh

| | | |
|----------------------------|---|--|
| Wall panel thickness/Qty | : | 100mmthk. / 700 m ² |
| Roof panel thickness/Qty | : | 100mm thk. / 750 m ² |
| Floor insulation thk/Qty : | | 80mm thk. PUF slabs / 900 m ² |

Note: Floor-insulation will include Bitumen, Tar-felt, poly-film, etc.

Cold Room Doors:

Leaf manual swing hinged double doors system cassette type 0.6mm thick PCGI sheet on both sides with PUF in fill 45kg/m³(+/-3KG) density with door thickness 80mm for temperature upto 0°C (Zero Degree Centigrade) with air curtain on each door

Door size/ Quantity : 1000x 2100mm (H)/03nos.

Air-cooled Condensing Unit:

Complete with single-stage semi-hermetic compressor, crankcase heater, air-cooled condenser with EC fans, liquid receiver with shut-off valve, connection for pressure-relief valve, HP-LP switches, oil separator, suction accumulator, discharge gas line, base-frame for mounting, vibration eliminator & all required accessories.

Total Refrigeration load: 84kW

No. of units/room: 04 nos.

Capacity of each unit:21kW

Refrigerant: R134A

Evaporation SST:(-) 3deg.C

Room temperature:(+)2deg.C

Condensing coil:To be designed for 10⁰C C TD between ambient Temp

Temperature& condensing temperature

CDU model:LH124E/4TES-12Y

Other technical details:As per attached data-sheet

Evaporator Coil (Air Cooling Unit):

Ceiling/ Floor mounted evaporator unit with DX coil made from seamless copper tubes & aluminum fins and pressure tested pneumatically at 20 kg/cm², sandwiched insulated drain tray and powder-coated galvanized steel sheet casing.

Total Refrigeration load : 84 kW

No. of units/room : 04 nos.

Capacity of each unit : 21kW

Refrigerant feed : HFC-DX (R-134A)

Evaporation SST : (-) 3 deg. C with 5 deg. C TD

| | | |
|--------------------|---|------------------------------|
| Room temperature | : | (+) 2 ⁰ C |
| Air - flow | : | 28000CMH |
| No. of fans | : | 04 nos. |
| Motor type | : | 415V-3Ph-50Hz-4Pole |
| Air-throw | : | 21m |
| Fin-spacing | : | 4 FPI |
| Heat-transfer area | : | 130 m ² (approx.) |
| Coil defrosting | : | Air defrost |

Refrigerant Piping, Fittings, Valves & Controls:

The piping shall be of refrigeration quality with seamless copper tubes (18swg)

The piping shall be included accessories such as filter, drier, sight-glass, suction line accumulator etc. as per P & I diagram approved by consultant. Adequate number of supports shall be included. The piping shall be supported at distances of maximum 1.5m from each other with suitably placed GS threaded rods of minimum 6 mm thickness when outside the chamber and piping shall be run on cable trays of size suitable to fit the pipes including insulation. Common cable trays can be considered depending on suitability at site, however the same shall be acceptable to the consultant/owner.

The piping shall be designed with proper slope in the direction of refrigerant flow and to ensure proper oil return other compressor and should be installed with adequate supports to avoid undue vibration. The piping should be thoroughly cleaned as per standard practice prior to installation.

Refrigeration valves & controls (Danfoss make) to be included as below:

- 1) Liquid-line solenoid valve : 01 no. each per evaporator coil
- 2) Thermostatic expansion valve : 01 no. Each per evaporator coil

Drain Piping:

Drain piping with rigid U-PVC pipe from evaporator units to suitable drain point complete with 'U' Traps for each cold room with supports. Individual drain outlet line from ACU pipe-size shall be same as the drain outlet of ACU and further the header shall be at least one size higher (or as required) than the drain outlet connection size.

Pipe Insulation:

EPDM/ XLPE/ Equivalent insulation with minimum 28G Aluminium foil cladding in the covered areas and weatherproof cladding in areas exposed to sunlight and is uncovered e.g., woven glass cloth with epoxy coating or Arma check GC/ equivalent cladding with suitable fittings and adhesives.

Suction-line thickness :25mm

Liquid-line thickness : 06/09mm

System Consumables:

This will include first charge of Refrigerant (R-134A) & oil,etc. alongwith other miscellaneous items such as vibration isolators for condensing units, support frame structures for condensing units/air cooling units, painting of equipment/piping etc. as per standard color codes with initial coat of red oxide & two coats of synthetic enamel pain required up to commissioning and handing over of the plant.

Humidification System:

Complete with industrial type ultrasonic humidifier, U-PVC water piping from the tanks to humidifier unit, flexible tubing and etc. as may be required to maintain the relative humidity in the design range. Also consider heavy duty PVC piping for air delivery into the cooling area for a release of humidified air into the main air stream.

Humidifier capacity/Qty : Five liters per hour/02 nos.

Ventilation System:

Mechanical CO2 extractor with energy recovery system comprising of floor-mounted double-skin unit with having fresh-air chamber with FA damper & cut-out, filter section with 50mm thick flange type filters, heat recovery wheel section with rotating HRW having at least 75% efficiency, supply-air & exhaust-air section with DIDW centrifugal backward curved fan, v-belt drive set, foot-mounted motor & SA damper. Unit shall have 25mm thick PUF insulated panels fixed on extruded aluminum framework & GI/M Schannel base frame.

Capacity/Quantity : 1500 cfm/ 01 no.

CO2 Exhaust/Fresh Air Supply Piping:

This will include supply & installation of PVC Piping/ Fittings of required size/ length to suite site conditions & as per final approved drawing for removal of CO2 gas & supply offer through mechanical CO2 extractor with energy recovery system